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A DECISION which is of much importance has been rendered by Judge VAN VORST of the Supreme Court. We print elsewhere details which will be read with interest.

THE differences between the trunk lines are still unsettled, and, contrary to all expectations, the war which seemed to approach an end some time ago is again waging as fiercely as ever.

It has been noticed as a fact which is probably not without significance, that a number of our best known deposits carrying native silver in large quantities, as, for instance, Batopilas and Silver Islet, are closely allied with dioritic rocks.

THE Times is authority for the statement that the steel rail ring has fallen out with its own "agents" at Washington. It is asserted that the latter, incensed at the refusal of the steel rail people to pay \$15,000 expended to "promote" their interests in connection with the Eaton Tariff Commission Bill in the last Congress, are now vigorously at work to defeat the passage of any similar measure now. The rail men do not, apparently, deny that they did make an agreement with these "agents" last year, the point they base their refusal upon being, it seems, that they were to pay the money only in case the Eaton bill actually passed.

CAPTAIN EADS'S Tehuantepec ship railway project has received the indorsement of one of the most eminent English naval architects, Sir EDWARD J. REED. In a letter addressed to Rear-Admiral AMMEN, he demolishes the arguments against that scheme advanced by Captain PHELPS, who sought to ridicule it in a pamphlet printed some time since. Sir EDWARD REED answers affirmatively the two crucial questions whether ships with their cargoes on board can be lifted out of the water by hydraulic lifts or otherwise, and upon adjustable cradles, without injury; and whether they can be transported overland upon such cradles with safety. He shows that ships on a railroad would be exposed to far less strain than they are subjected to on the ocean, and he finally comes to the conclusion that in his belief the railway would prove more economical than the canal.

THE great point of interest in the coal trade at present is the approaching election for President of the Reading Railroad Company. The pre-eminent position of the road as a factor in the anthracite coal market; the vast and varied interests involved, affecting so wide a range of ownership of stock and bond, call for the gravest consideration of those pecuniarily interested and attract a large share of public attention. The question to be considered is, which of the two candidates has the ability, earnestness, and general comprehension of its affairs, to re-establish the company on the basis of prosperity to which its immense ownership of mineral lands, its great earning capacity, geographical position, and natural advantage of gradients entitle it.

During Mr. BOND'S incumbency of nearly a year, he has given no evidence of power to grapple with the exigencies of the road. His abilities as a railroad operator do not necessarily fit him to reorganize and adjust its disturbed finances. He has never been identified largely with the anthracite coal trade, learning its requirements and details of management, and has not for the road that feeling of attachment which comes of a long connection with so distinctive an enterprise as the Reading road.

We think that, for the good of all concerned, Mr. GOWEN should receive the support of the shareholders. Happily for him, he needs neither apologist nor champion. He stands out clear and well defined as a man of unassailable character for personal integrity and directness of purpose, while none are more ready than those who have measured swords with him to bear witness to his ability to defend himself against slanderous speech and innuendo. Mr. GOWEN'S administration of the affairs of the company has been the subject of almost unlimited discussion and criticism. We do not propose a sweeping indorsement of all his methods. That he has committed many and serious errors of judgment, none is more ready to admit than himself. But the general tone of criticism to which he has been subjected has been so manifestly unfair—his critics taking only a retrospective view—that we desire to address a few words on the subject to the shareholders for their consideration.

Instead of judging with the history of nine years before us, let us go back to the point from which Mr. GOWEN started. Being thoroughly familiar with the general affairs of the road, and foreseeing the danger that was impending from ultimate designs of rival and powerful corporations more favored in their chartered privileges, he at once, on assuming the presidency of the road, took steps to secure to it, in the acquisition of mineral lands, a perpetual tonnage, and to put an effectual stop to the encroachments of rival enterprises. This was the central idea of Mr. GOWEN'S management, and the rock upon which, for reasons beyond his control, the company subsequently came to grief. It must be borne in mind that when he took control the company was in a splendid financial condition, with unlimited credit, and the general prosperity of the country unbounded. Under these circumstances, with every one anxious to become a creditor of the company, and with his intelligent understanding of the existing and prospective value of the coal lands, it was the proper thing for him to secure them for the company. Long since, the wisdom of the acquisition has been demonstrated in more ways than one. It is not to the purpose whether he paid too much or too little for any particular tract; the grand fact remains that the same acreage of coal lands could not be purchased to-day for perhaps double the price he paid for it; while the Reading road, as long as it retains its present mining properties, is the dictator of the anthracite coal market. The investments made incidental to the general scheme have been so widely discussed that we shall not touch on them at all. Had Mr. GOWEN foreseen 1873, with its direful train of disaster, he would undoubtedly have shortened sail as quickly as any prudent financier; but who could foretell the long burden of financial and industrial depression, of which the failure of JAY COOKE & Co. was the initiative? That Mr. GOWEN labored honestly and determinedly for the best interests of the coal trade during 1873-79, is known to all interested in the trade. Had he had his way, the coal companies would have earned more—Wall Street less. The failure of the company, after one of the most heroic struggles on record, brought its lesson of grief and humiliation to Mr. GOWEN in a manner which he is not likely to forget. His eyes were thoroughly opened to many defects and errors. But he is the man to profit by his errors, and make them serve a good purpose. Is it not

far better for the interests of the company to have him, with his enlarged experience, his intimate knowledge of its intricate affairs, his *esprit de corps*, than a man who so signally failed to find a way out of the dilemma? Mr. GOWEN'S financial plans will succeed if the presidency falls to him, as the road is becoming richer every year, by reason of its enormous earning capacity and the constantly enhancing value of its real estate. All its securities will increase in value. The outlook for the coal trade is most flattering, and the dark days we have just passed will probably never come again. Mr. GOWEN in his last London address outlined the comprehensive scheme he has for still further increasing the usefulness and importance of the road. The literature of the controversy has been so exhaustive that it is unnecessary to enter into details here, and we content ourselves with saying that, with our knowledge of its affairs, we think it of the highest importance that the shareholders of the Reading Railroad return Mr. GOWEN again to its presidency.

THE SIEMENS DIRECT PROCESS.

After having made a series of preliminary experiments at Birmingham, Dr. C. W. SIEMENS, the well-known English metallurgist and engineer, built works on a larger scale at Towcester, England, starting them in July, 1875. The details of the work done there have been described by Dr. SIEMENS himself before the Iron and Steel Institute, by PETER VON TUNNER, in a report on the Centennial Exhibition, and by Mr. A. L. HOLLEY, in a paper read before the American Institute of Mining Engineers. Though the results obtained at Towcester were encouraging, a series of circumstances led to the abandonment of the works; and as similar trials made at Právali, Austria, were declared a failure, the impression became general among European metallurgists that, like many previous attempts to supersede or rival established methods of iron manufacture, the SIEMENS direct process could not be made a success practically. It is just to say that a number of our most eminent engineers persisted in predicting for it a large future. At Towcester, the ore was not one suitable for the purpose, and there were other adverse circumstances. The most serious error made there in the beginning was the attempt, however, to roll the blooms produced into merchant iron.

It is true that an excellent grade of metal was made, remarkable for purity and softness; but the losses incident to its manufacture were so great as to counterbalance other advantages. When iron ore is reduced by carbon at comparatively low temperatures, so that the iron is obtained in a solid state in the shape of a sponge permeated by liquid cinder, the first step in its utilization must be the removal of that cinder. There have been no means to attain that end but heating to such a temperature that the cinder will melt and can be squeezed out. At such a heat, the finely-divided metallic iron, however, oxidizes very rapidly, and the waste during this shingling process is excessive, so that the quantity of wrought-iron finally obtained is so small as to be too costly compared with the ordinary method of smelting the ore in blast-furnaces and puddling the pig thus obtained. Since the introduction of the open-hearth process of steel-making, in which metal low in carbon or wrought-iron is added to a bath of pig, there has been a growing demand for the manufacture of milder grades of steel for pure wrought-iron, because in this it is impossible to obtain high grades of steel low in carbon with indifferent raw materials. As scrap-iron and steel are very variable and uncertain in quality, steel-makers have been forced to buy for high figures blooms made in the primitive Catalan forges. The great advantage of the latter has been, that they furnish a pure article; but as they can only be made with charcoal as fuel, in remote regions, and by skilled labor in small quantities, their cost, delivered at the steel-works, is naturally high, ranging at the present time about \$65 per ton. It will be readily understood what great advantages a process would offer by which blooms of the same purity could be made on a large scale from impure ores and ordinary fuel by common labor, by bringing down the cost of production and furnishing open-hearth steel-makers with a cheap and good raw material. With it at their command, they can not only push the steel into the territory now occupied by wrought-iron made by the puddling process, but also could invade the special field of crucible steel manufacturers, and prove a powerful rival of the Bessemer process. Aside from the mechanical questions now agitating the iron trade concerning the comparative merits of iron and steel for various purposes, the matter would be decided by cost of production, and it is in this respect that the Siemens direct process now looms up as a very formidable competitor.

The steps taken in the various processes may be best understood by the following:

Ore (smelted in blast-furnace); Pig (treated in puddling-furnace); Wrought-iron.

Ore (smelted in blast-furnace); Pig (blown in Bessemer converter); Steel.

Ore (reduced in direct process); Wrought-iron blooms (melted in open-hearth furnace); Steel.

It is not probable that either of these methods of manufacture will be entirely superseded, as each has advantages of its own, dependent either

upon local circumstances or upon the nature of the product, which will assure to it a field of its own. But it appears certain, from the present aspect of affairs, that their relative importance will be subject to very material changes in the near future. The rapid growth of the demand for steel rails has confined the Bessemer process almost entirely to the manufacture of metal for that purpose, and the high cost of open-hearth metal has limited its sphere of utility. The announcement that the puddling-furnace was doomed has been made so often and so emphatically that prophets have lost credit, and their predictions are looked upon by many iron-masters as speculations to which little importance need be attached. The course of events in this country has seemed to favor that view; but no one can follow the mighty struggle which is now going on abroad, and which our iron-masters are fortunate enough to be able to follow at a distance, without being convinced that momentous changes are at hand. In one direction, the basic process is showing its capability of conquering an important place in the making of merchant steel, and in another the combined SIEMENS direct and open-hearth steel processes are coming forward as claimants. It is impossible, in view of the many circumstances which affect the final result, to attempt to draw the lines, which probably will not be clearly defined, both as to time and locality, in any case. But we believe that future events will bear us out when we assert that open-hearth steel manufacture, and through it the SIEMENS direct process, will command a much greater share than has hitherto been accorded to it. In justification of that belief, we call attention to an account printed elsewhere of the results already accomplished. While many interesting practical as well as metallurgical details still remain to be elaborated, the principal facts are already established, and it is highly creditable to American metallurgists that they have borne so prominent a part in the work of making the SIEMENS direct process what it now is.

THE CHEMISTRY OF COAL.*

Even our best metallurgical text-books and our most elaborate works on chemistry or geology contain little besides an enumeration of analyses and a limited discussion of the chemical constitution of coal. As in almost every branch of technology, current progress in this field has far outstripped our text-books, in which the achievements of the last decade are not presented. What those who are interested are most eager to know is scattered in the transactions of societies and in technical journals, all of which are accessible to only a few.

Dr. MUCK, the author of the work before us, was some years since called to fill the post of chemist for a confederation of Westphalian collieries, and professor of a mining school at Bochum, Germany, and in that capacity soon discovered how little accurate information on the special subject of the chemistry of coal was to be found in technical literature. As a guide in his lectures, he elaborated a series of chapters, which finally took the form of the volume he has now printed.

The popular idea concerning the chemical constitution of coal is, that that substance is a simple chemical compound, or that it is a mixture of pure carbon with certain bituminous substances. The latter notion may have arisen from the fact that when such coals are subjected to dry distillation a residuum remains, which is almost pure carbon. This fact does not, however, furnish any proof of the pre-existence of that carbon as such. Coal is probably a mixture of hydrocarbons, and it is not even likely that the latter belongs to one series of homologous compounds. Two coals may have the same percentage of carbon, hydrogen, oxygen, and nitrogen, and yet they may be mixtures of different hydrocarbons, and accordingly may possess striking differences in their physical properties, and when subjected to dry distillation may yield products different in nature and quantity. Chemical analysis of a sample of coal does not, therefore, furnish a perfectly safe criterion as to its nature and its behavior when heated. It is true that, as a general thing, chemical composition and the properties of coal bear a certain relation to one another, but the former can only act as a guide. For technical purposes, the action of coal, when heated, furnishes a much better means for judging its fitness for certain purposes. Dr. MUCK then goes into a discussion of the various efforts made to establish a classification of coals, and he shows that GRUNER'S attempt is by no means exact, later work in Germany having shown important differences. He seems to accept SCHONDORFF'S classification as an improvement. His third chapter on the relation between chemical composition and fusibility, yield of coke, etc., is much more satisfactory. It was believed, and PERCY seems to support that view, that the fusibility of coal was largely dependent upon the chemical composition; but careful examination has proved that, while it may be true in some instances, that property does not bear any relation to the quantity of "disposable" hydrogen or oxygen. It is probable that it depends rather upon the presence in the coal, in greater or smaller quantities, of certain hydrocarbons, the identification of which will prove a very difficult problem. The yield of coke

* THE CHEMISTRY OF COAL (STEINKOHLEN-CHEMIE). By Dr. F. MUCK. Bonn: Emil Strauss. 1881. 8vo. (Full Index.)

is not in proportion to the quantity of carbon, hydrogen, or oxygen in the coal, nor does it appear to be dependent upon the sum of two of either of them. Numerous experiments have proved, however, that the yield of coke is far less influenced by the percentage of carbon than by the quantity of "disposable" hydrogen in the coal, "disposable" hydrogen being the excess of that element over the quantity necessary to form water with the oxygen in the coal. Whether the coke produced be light or dense depends largely, with some kinds, upon the temperature in coking, a low heat making a lighter coke, while with others heat appears to make little difference. As for the influence of ash upon coking, experiments have shown that to a certain extent it increases the yield absolutely, owing probably to the fact that the presence of inert mineral substances lowers the temperature.

DR. MUCK has a valuable chapter on the ash of coal, in which he makes the statement, which it would be of interest to verify, that pyrites is rarely found interstratified with coal, but that it generally occurs in the cleats or vertical partings. This he considers evidence of the formation of the pyrites by infiltration. His seventh chapter is devoted especially to the weathering of coal, in which he comes to the conclusion that it is due to the absorption of oxygen, by which a portion of the carbon and hydrogen of the coal is converted into carbonic acid and water, and also enters into chemical combination with the coal. If this process is accompanied by heating, the weathering proceeds rapidly, and seriously depreciates its calorific value and coking qualities. Moisture does not aid the weathering process unless it accelerates the decomposition of pyrites in the coal, and thus leads to an increase in temperature. REDER has found that in some instances coal on exposure to atmospheric influences actually gains in weight. DR. MUCK attributes the spontaneous ignition of coal to absorption of oxygen alone, and rejects the explanation so frequently given that it is due to the decomposition of pyrites. He then gives quite an elaborate series of graphical formulæ to illustrate the possible chemical constitution of various coals, and then enters into a discussion of the origin of coal, a brief abstract of which we presented in our issue of December 3d. In an appendix, Dr. MUCK takes up the question of the calculation of the calorific value of mineral fuel from its chemical composition, and finally briefly describes the various products of dry distillation, such as coke, tar and its utilization, ammonia, water, and gas.

Throughout the whole work, Dr. MUCK displays that close and exhaustive study of literature which is a characteristic of German writers, and our brief notes of its contents may serve to show that he does not lack originality. Still, the book is as yet only a skeleton frame, which we believe Dr. MUCK could very profitably expand. It would then take rank as a text-book on the subject. We trust that he may undertake the work at an early date.

NEW PUBLICATIONS.

ARIZONA BUSINESS DIRECTORY AND GAZETTEER. By W. C. DISTURNELL, Compiler and Publisher. San Francisco, Cal. 1881. 327 pages.

Besides a general description of Arizona and its mining districts, the first 122 pages of this work contain a list of mine superintendents and owners, a list of the quartz mills, historical sketches of the organization of the various counties and their officers, and data relating to Arizona railroads. The rest is occupied by a directory, which appears to be very full and complete. A classified business directory of San Francisco is added.

AMERICAN MINING CODE. By HENRY N. COPP. To Replace Copp's Handbook of Mining Law, now out of print. Washington. 1881. 8vo, 226 pp. (Index.)

This volume contains the United States mining laws and regulations, the State and territorial laws now in force, a digest of judicial and departmental decisions, a list of several thousand patents (comprising all issued by the Land Office down to July 1st, 1881), the glossary of mining terms already published elsewhere by Mr. COPP, and a collection of forms for practical use. There are two editions: one, in paper covers, printed on very poor paper; another, in cloth, printed on good paper.

STEAM HEATING FOR BUILDINGS. By WILLIAM J. BALDWIN. New York: John Wiley & Sons.

It is rarely that practical men can be induced to lay down in a volume the facts, precautions, and expedients which the experience of many years has taught them. A majority of those who might feel an inclination to give to beginners in their profession the benefit of what their labors have taught them appear to abandon such a project when imaginary difficulties connected with literary work loom up before them. It is true that many who have rich stores of valuable information seem incapable of clearly imparting it to others, and this is the defect under which most of the works by practical men labor. Though there are some traces of this in Mr. BALDWIN'S work, it is, on the whole, though plainly written, free from awkwardness. It does not profess to be a scientific treatise, but is intended to furnish hints to those who are to do fitting for steam heating, and for that purpose it is admirably adapted, and will prove exceedingly useful. The various

systems of steam heating of buildings are fully treated and carefully compared, the apparatus and devices employed described and criticised in the light of practical experience, and the laws governing the action of steam, water, and air in pipes are stated, due attention being paid to ventilation. In industrial establishments where steam is available, the steam-heating system has much to commend it, and we notice with satisfaction that Mr. BALDWIN has gone into its application for that purpose also.

DIVIDENDS PAID FROM AMERICAN MINES DURING THE YEAR 1881.

NAME OF COMPANY.	Location of mines.	Metal produced.	Amount paid.
Aetna.....	Colorado.	Silver, Lead.	\$66,667
Alice.....	Montana.	Silver.	400,000
Black Bear Quartz.....	California.	Gold.	24,000
Bonanza Developing Co.....	Colorado.	Silver.	135,000
Boston & Montana.....	Montana.	Gold.	200,000
Brown & Urton.....	Nevada.	Silver.	8,333
Bulwer Consolidated.....	California.	Gold.	10,000
Calumet & Hecla.....	Michigan.	Copper.	2,000,000
Catalpa.....	Colorado.	Silver, Lead.	120,000
Central Copper.....	Michigan.	Copper.	120,000
Consolidated Gold Mining Company of Georgia.....	Georgia.	Gold.	32,000
Copper Queen.....	Arizona.	Copper.	150,000
Christy.....	Utah.	Silver.	24,000
Chrysolite.....	Colorado.	Silver, Lead.	500,000
Deadwood-Terra.....	Dakota.	Gold.	480,000
Dunkin.....	Colorado.	Silver, Lead.	110,000
Eureka Consolidated.....	Nevada.	Silver, Lead.	225,000
Evening Star.....	Colorado.	Silver, Lead.	500,000
Exchange.....	Nevada.	Silver.	15,000
Father de Smet.....	Dakota.	Gold.	200,000
Gagnon.....	Montana.	Silver.	5,000
Gem.....	Colorado.	Nickel.	3,750
Glass-Pendery.....	Colorado.	Silver, Lead.	25,000
Gold Stripe.....	California.	Gold.	67,500
Grand Central.....	Arizona.	Silver.	200,000
Great Western.....	California.	Quicksilver.	25,000
Green Mountain.....	California.	Gold.	109,375
Hecla Consolidated.....	Montana.	Silver.	90,000
Hibernia.....	Colorado.	Silver, Lead.	120,000
Homestake.....	Dakota.	Gold.	360,000
Horn-Silver.....	Utah.	Silver, Lead.	300,000
Idaho Grass Valley.....	Idaho.	Gold.	263,500
Indiana Queen.....	Nevada.	Silver.	51,500
Inyo Consolidated.....	California.	Gold.	40,000
Iron Silver.....	Colorado.	Silver, Lead.	500,000
La Plata.....	Colorado.	Silver, Lead.	180,000
Leadville Consolidated.....	Colorado.	Silver, Lead.	20,000
Moore Mining and Smelting Company.....	Colorado.	Silver, Lead.	36,000
Morning Star.....	Colorado.	Silver, Lead.	75,000
Napa Consolidated.....	California.	Quicksilver.	90,000
Navajo.....	Nevada.	Silver.	25,000
New York Hill.....	California.	Gold.	100,000
North Belle Isle.....	Nevada.	Silver.	15,000
Northern Belle.....	Nevada.	Silver.	387,500
Ontario.....	Utah.	Silver.	800,000
Osceola.....	Michigan.	Copper.	225,000
Plumas Eureka.....	California.	Gold.	135,468
Plumas Mining and Water Company.....	California.	Gold.	7,500
Polonia.....	Colorado.	Silver.	12,000
Quicksilver, Preferred.....	California.	Quicksilver.	304,945
" Common.....	California.	Quicksilver.	128,448
Quincy.....	Michigan.	Copper.	320,100
Richmond Consolidated.....	Nevada.	Silver, Lead.	788,292
Rising Sun.....	California.	Gold.	25,875
Robert E. Lee.....	Colorado.	Silver, Lead.	50,000
Robinson Consolidated.....	Colorado.	Silver, Lead.	400,000
St. Joseph.....	Missouri.	Lead.	60,000
Sierra Buttes.....	California.	Gold.	78,125
Silver King.....	Arizona.	Silver.	300,000
South Yuba Water and Mining Company.....	California.	Silver.	50,000
Spring Valley.....	California.	Gold.	120,000
Standard Consolidated.....	California.	Gold.	50,000
Starr-Grove.....	Nevada.	Gold.	975,000
Stormont.....	Nevada.	Silver.	120,000
Tip Top.....	Utah.	Silver.	20,000
Tombstone.....	Nevada.	Silver.	100,000
Tombstone.....	Arizona.	Silver.	600,000
Vizina.....	Arizona.	Silver.	80,000
Western (Contention).....	Arizona.	Silver.	775,000
Yuba.....	California.	Gold.	8,000
Total.....			15,034,776
Total amount paid by gold mines.....			3,286,343
" " " silver mines.....			4,213,333
" " " silver and lead mines.....			4,015,850
" " " copper mines.....			2,815,000
" " " quicksilver mines.....			640,391
" " " lead mines.....			60,000
" " " nickel mines.....			3,750
Total.....			15,034,776
Amounts paid by mines located in the States and Territories are as follows:			
Arizona.....			2,105,000
California.....			2,654,734
Colorado.....			2,903,417
Dakota.....			1,040,000
Georgia.....			32,000
Michigan.....			2,665,000
Missouri.....			60,000
Montana.....			695,000
Nevada.....			2,035,625
Utah.....			844,000
Total.....			15,034,776

THE SIEMENS DIRECT PROCESS AT PITTSBURG.

A little more than a year ago, Mr. R. J. Anderson (to whom belongs the credit of having been the first, in 1868, to introduce the Siemens regenerative furnace for crucible steel, and one of the early pioneers of open-hearth steel manufacture in this country) was induced to take up the Siemens direct process. In view of the fact that it had been tried unsuccessfully by another well-known American firm, and that the aspect of affairs in Europe was by no means encouraging, this undertaking was a bold one. An experimental plant was put up at Tyrone, Pa., and there gradually many minor practical details were worked out;

and when the practicability of the manufacture of iron on a large scale at low cost had been fully established, the Siemens-Anderson Steel Company put up works at Pittsburg, which were started about four weeks ago, and have since been running steadily. During a recent visit to the establishment, we gathered the following details:

The principle of the process is a simple one. Iron ore is reduced by carbon at a temperature at which the metallic iron formed is in a solid state, while the impurities, the gangue of the ores, the ash of the coal, and any fluxes added are converted into a fluid cinder, the bulk of which can be tapped off, while the rest, filling the interstices between the spongy iron, must be squeezed out.

The Plant.—The plant at Pittsburg consists of a crusher building and four Siemens rotators. It is located about 2½ miles from Pittsburg, near the Monongahela River, the Baltimore & Ohio Railroad passing the works. On the level of the dumping platform from the latter, stand two Blake crushers, 10 by 15, below each of which is a Blake pulverizer, by which ore, coal, or limestone, as the case may be, is reduced to less than one quarter inch size. Belt elevators convey the crushed material into a series of bins, the lower dumping opening of which is 11 feet above the crusher floor. From the bins the material is dropped into cars on a track entering the furnace building at such height that it passes over the line of furnaces, into which the charge can be dumped through chutes, so adjusted that when they are disconnected they are not in the way. The furnace building, which is large and commodious, contains four rotators, consisting each of two regenerators and two gas-producers and a drum, the rotator proper, which is driven by a separate engine. There is, besides, a three-ton hammer, built by Morgan Williams, of Alliance, Ohio, used for shingling blooms. It has a 29-ton anvil-block. The producers, which are of the ordinary Siemens type, and whose charging hoppers are on the general level, are directly coupled with the regenerators. The producer gas goes through a flue between the two regenerators to the rotators. The regenerators, of which, as already mentioned, there are two for every rotator, are each 21 feet high, 10 feet long and 7.5 feet wide. The checkerwork they contain was at first built up of ordinary fire-brick, which, however, as it proved too weak, had to be replaced by Woodland brick. One of the rotators still has the old checkerwork, and does not therefore heat as well and work to as full advantage as the others. The opening through which the gas enters the drum, which is placed with one end directly before the regenerators, is oval in shape, being 3 feet wide and 1 foot 1 inch in height. Above this gas-flue are two other openings of crescent shape, each of which communicates with a regenerator. Through one the air heated by contact with the hot checkerwork of its regenerator enters the drum, producing combustion of the gas, while through the other the hot waste gases escape into the other regenerator, heating it on their way to the main chimney-flue and the 90-foot stack. The valves of the regenerators, for air and gas, and the chimney valve, are controlled from the front of the rotators. The rotators have horizontal cylindrical one-inch shells, double riveted, with cast-iron head. They are 11 feet in diameter inside the shell and 12 feet long. They are lined all over with a 4½-inch course of fire-brick, and the cylindrical portion is felled with iron ore. It will be understood that one head of this large barrel is placed against the regenerators, and that through it gas and air enter and the products of combustion escape, thus leaving the other end free for all the working operations. In one quadrant of this circular face is the large working door, which is hoisted and lowered by a winch 35 feet from the door. In the other quadrants, near the circumference, are three tap-holes for cinder. In the center of the working door is the charging door, through which the ore is run into the drum. A peculiar arrangement has been made to divide the blooms when formed. It consists of four water pipes running through the drum near its circumference. Each of these pipes has bent on it three 12-inch loops pointing toward the center of the rotator. The inlet orifice of this pipe, which is thus passed through the rotator four times, is 2 inches, while the outlet is 1½ inch. The drum is rotated by means of twin cylinder engines, with 14-inch stroke and 8-inch diameter of cylinder. Coupled to the engine shaft is a worm shaft, and on it is a small pinion, which engages with a larger wheel. On the same shaft with the latter is another small gear-wheel, which engages with a gear-wheel on the drum, the diameter from pitch to pitch being 12 feet 9¼ inches. It will be seen, therefore, that while the engine is running at a tolerably high speed, ranging from 120 revolutions, the figure generally reached, up to 300 revolutions, the maximum attainable, the drum is rotating only at the rate of about one revolution in five minutes. The engines ordinarily use very little steam, almost a touch of the valve sufficing to cut it off entirely. The drum is carried by two pairs of steel wheels, of which the back pair is mounted on rollers to provide for expansion or contraction. The plant is in every respect admirably built, and, as we are informed, cost, as it stands, about \$40,000. Duplicates of it could, of course, be put up at a less cost, because patterns, etc., are now available.

The Process.—The ore and limestone, as delivered to the works, are reduced to one quarter-inch size in the crusher building. Hitherto the reducing coal, too, has been crushed, but it is intended in the future to use slack exclusively for this purpose. When ready for a charge for one of the rotators, the drum is turned so that the working door is uppermost, the neck of the chute is introduced into the charging orifice, and the ore run in. The charge for a rotator consists of 5000 pounds of ore, from 1200 to 1600 pounds of coal, and, if necessary, as much as 400 pounds of lime as a flux. The quantity of limestone, and, in fact, many other very important points, depend upon the nature of the ore. After rotating the drum for about eight hours, the reduction of the ore is completed, and the bulk of the cinder is then tapped into iron bogies. During the heats witnessed at Pittsburg, the slag was hot and fluid. A few minutes' tapping suffices to complete the balling of the iron, the working door is opened, and one by one the balls, which are often very irregular in size, are drawn out and taken to the hammer, where they are shaped into blooms, this being really the only labor performed. During this shingling a moderate amount of cinder is pressed out; but as the slag sets very rapidly, the work must be done very quickly. Occasionally, especially the first blooms are not at a welding heat, and then some trouble is experienced in properly shaping the blooms, the balls falling to pieces under the hammer. Their weight varies from 175 to 225 pounds, and the yield is about 47 to 53 per cent of

the ore. This is somewhat less than has been done abroad, where, according to Tunner, the loss was 27.6 per cent, as an average of 100 charges, and Holley gives 12 per cent for 43 charges. The following analysis of ores and cinder from Towcester will serve to show the relations between both:

	Towcester ores.			Black-band.	Cinder, first tap.	Second tap.
	I.	II.	III.			
Peroxide of iron	52.04	54.1	50.4	74 to 80	46.95	49.24
Protoxide of iron	tr.	tr.	tr.	8 to 16	.....	7.05
Oxide of manganese	0.223	tr.	0.112	trace	0.40	trace
Alumina	8.76	12.7	14.1	.....	16.50	20.40
Silica	16.3	12.3	15.3	2 to 3	28.10	18.10
Lime	.....	.....	.....	3	2.09	trace
Phosphoric acid	2.4	2.15	2.1	1 to 1.3	5.22	3.465
Sulphur	6.033	tr.	tr.	0.3 to 0.6	1.03	0.408
Carbonic acid and water	19.5	14.8	16.3	.....	.....	.....
Magnesia	.....	.....	.....	2 to 3	.....	.....
Total	97.296	96.05	98.312	.....	100.38	99.363

According to Mr. Herbert Le Neve Foster, the iron in the blooms contained:

Iron	99.710
Combined carbon	0.120
Silicon	0.065
Manganese	trace
Sulphur	0.027
Phosphorus	0.074
Total	100.005

The reason for the waste of iron is the high percentage of the ores in silica and the composition of the cinder. The following analyses of ores used at Pittsburg will best show that, as a rule, they are high in silica and have very little lime:

	Virginia Ore.	Dalliva (L. S.).	Canada.	Tyrone.
Silica	12.79	1.600	12.07	21.03
Lime	0.95	2.750	9.24	4.62
Metallic iron	48.21	60.255	52.21	44.82
Alumina	3.02	3.000	3.75	2.11
Phosphorus	0.926	0.471	0.03	0.94
Sulphur	trace	.....	.....	.....
Water	11.24	.....	.....	.....
Manganese	.....	.....	.....	1.86

The blooms made from a charge of Canadian ore held:

Iron	82.570
Phosphorus	0.006
Sulphur	0.021
Slag	16.950

The yield of iron has ranged within pretty wide limits during the early part of the work, and it is a matter of surprise that with unknown raw materials it has been as good as it is. Recently, however, the plant has worked to better advantage. During the week ended December 17th, 164,600 pounds of ore were charged, 76,080 of blooms were obtained, thus showing an average yield of 46.2 per cent, while 21 subsequent heats gave 48,482 pounds of blooms from 102,700 pounds of ore, a return of 47 per cent.

Taking day and night shift together, there are now employed at the works 35 men; but it should be noted that, with one or two exceptions, they are all raw hands who have gained the experience they now have during four weeks' work only. Even as it is, there is no doubt that the same force could work a larger number, say six furnaces. The discharging operation now takes one hour, so that the entire heat requires nine hours, less than three heats being got out in twenty-four hours. That time will undoubtedly, with regular working, be reduced to eight hours, and the output will then be 90 tons per week, for the entire plant. By shortening the heats by calcining the ore and running it into the rotator hot, as suggested by Mr. Alexander L. Holley, the production could be considerably increased and the cost of labor and the consumption of fuel be materially reduced. At Towcester, the coal required to fire the producers amounted to 3 tons per ton of blooms. At Pittsburg, the total amount of fuel required has proved to be 3.25 tons, that amount including producer, reducing, and boiler coal. With ordinary Pittsburg gas-coal, costing six cents a bushel, the fuel account per ton of blooms would foot up to about \$5.16 per ton of blooms. It is estimated by Mr. R. J. Anderson that the actual cost of production of the blooms on the basis of the present working with the new plant is \$26 per ton.

For the week ended December 12th, the following is an account of the expenses:

59 tons Lake Superior ore at \$6	\$354.00
15 tons Tyrone	60.00
600 bushels reducing coal at 6c	24.00
4 tons limestone at \$1	4.00
2650 bushels producer coal at 6c	159.00
Pay-roll	351.00
	\$952.00

The product was 38 tons of blooms, so that the cost per ton, exclusive of general expenses, repairs, incidentals, etc., was \$25.05. Mr. G. W. Maynard, in a preliminary report, makes the following estimate on the basis of a production weekly of 90 tons:

144 tons Lake Superior ore at \$6	\$864.00
36 tons Tyrone ore at \$4	144.00
1440 bushels reducing slack at 4c	57.60
6300 bushels producer coal at 6c	378.00
9¼ tons limestone at \$1	9.25
Pay-roll	351.00
	\$1,803.85

The cost of the items enumerated, covering raw materials and labor, would, therefore, be \$20 a ton, from which it will be seen that Mr. Anderson's estimate is a conservative one.

The Product.—Concerning the quality of the product, the analyses already given substantiate fully what experience has long proved in all direct processes. The blooms are practically pure iron mixed with a varying quantity of cinder. All efforts before the introduction of the open-hearth furnace, and since then occasionally repeated, were to remove this cinder by a laborious process of shingling, reheating, and rolling. Now all that is done is to hammer out as much as can be got out of the blooms with the heat

which they have when taken out of the rotator. This is of course done as thoroughly as circumstances will permit, and improvements are contemplated in this direction; but even if fifteen per cent actually remain in the blooms, that fact is not in any way fatal to their further use. As soon as the bloom is dropped into the bath of an open-hearth furnace, the iron is dissolved in it, being protected from oxidation during that time while the cinder melts and floats on the surface. At present, the distance of the open-hearth plant from the rotators precludes any attempt to use the blooms while still in a hot state, which would obviously be a very considerable advantage. Even if there were such facilities, a portion of the blooms would have to be allowed to cool down in the open air. At the works of the Siemens-Anderson Steel Company, the rotator blooms have been currently used in open-hearth steel-making, the maximum quantity available being, however, only one third, the rest being pig and scrap. The works possess one fifteen-ton and one ten-ton furnace, and it may be noted in this connection that at the time of our visit the latter was rapidly approaching its one hundredth heat without other than current repairs. A wide range of grades of steel, from low to high carbon, for all the various purposes of a large merchant steel mill, were being made, but as no steel has been cast, produced from pig and ore blooms alone, it is not possible to speak with confidence of the exact nature of the metal made from such a mixture. It would be of considerable interest to have such a test made, particularly with the object of settling conclusively the question whether the purest grades of mild steel on the one hand, and the finest varieties of tool steel on the other hand, could be produced from ores running high in phosphorus and sulphur. Present indications, as furnished by the results already reached, point to the attainment of that end. As it is, the Siemens direct process is valuable as furnishing a cheap and pure raw material for the open-hearth steel process from certain classes of impure ores, and its prospects are undoubtedly bright.

THE GENESIS AND DISTRIBUTION OF GOLD.*

By Prof. J. S. Newberry.

(Concluded from page 417.)

SEGREGATED VEINS.

Most of the quartz veins which carry gold belong to the class of what are called segregated veins. These occur only in metamorphic rocks, are lenticular sheets, limited in depth and lateral extension, and generally showing little of the banded structure so characteristic of fissure-veins. They consist mainly of quartz, in which the gold is sometimes free, but more commonly contained in iron pyrites, with which yellow copper is often associated. Sometimes the gold is not strictly confined to the quartz veins, but extends more or less into the inclosing rocks, which are oftener than otherwise magnesian slates.

The gold in segregated veins would seem to be indigenous to the formation in which it occurs, and not, as in fissure-veins, to have been derived from some foreign source. It is usually supposed that, before they were metamorphosed, the rocks which inclose the segregated veins contained gold generally, though sparsely, disseminated through them, and that, in the process of the segregation of the siliceous matter to form sheets of quartz, the gold was somehow gathered and concentrated by it.

Sir Roderick Murchison, guided by his study of the gold deposits of the Ural Mountains, supposed that auriferous quartz veins were confined to Paleozoic rocks, but that the gold impregnation had taken place at a comparatively recent date. It was demonstrated, however, by Professor Whitney, in the prosecution of the geological survey of California, that the metamorphic slates which carry gold in the Sierra Nevada are of Triassic and Jurassic age; and in the light of later observations, we may say that metamorphic rocks of all ages contain auriferous veins. Nearly all the great mountain chains of the world contain more or less of such veins, and as these mountain chains have been the great condensers of moisture, and erosion has been constantly wearing down their slopes, placer deposits have been formed which have supplied most of the gold yielded by the earth to man. As it can be procured from them by the simplest methods, the work of its extraction was begun by prehistoric races, and the Altai, the Himalayas, the Ural Mountains, the Australian Alps, the Sierra Nevada, and the Rocky Mountains, have in turn contributed their millions to the treasuries of the world. These mountain chains are of very different ages, and we have abundant evidence that gold has existed in some of them from the earliest geological times. The oldest mountains of which we have any knowledge—the Laurentian, of Canada, now nearly removed by erosion—contained auriferous quartz veins that have supplied gold to all the successive formations which have been derived from their ruins. The gold impregnation of the Laurentian rocks dates back certainly to the period of their metamorphism; and this was pre-Silurian, for the undisturbed lower Silurian strata overlap and partially cover these gold-bearing rocks.

In the same way, the gold at the Black Hills is proved to be pre-Silurian, since the Potsdam sandstone which abuts against the Archean nucleus of the hills in places contains rolled fragments of the Archean rocks, and gold washed from them in such abundance as to form rich mining ground—the so-called cement deposits of that region. The distribution of gold from the Archean rocks has probably been constantly going on from the Silurian age to the present day. This is shown in the almost universal dissemination of gold through the drift of New England, New York, Ohio, etc., where the superficial materials have been largely derived from the Canadian highlands. In Ohio, gold is found in the drift clays, sands, and gravels, and locally in as great quantity as in the poorer placers of California. There is little doubt that the mechanical sediments derived from the wear of the Archean rocks all contain gold, and since it has been proved that gold exists in sea-water, it has probably impregnated all the organic marine sedimentary rocks as well. In the subsequent metamorphism of some of these strata it has been concentrated in such a way as to produce auriferous quartz veins rich enough to be worked.

From these facts it will be seen that there is no geological age which can be called the age of gold. It existed in the oldest rocks known, and

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from them and their derivatives, more modern rocks, it has been, and is now, being constantly distributed by both mechanical and chemical processes. Even some of the igneous rocks of the Western country are said to contain minute quantities of gold,* and this is not surprising, if, as is supposed, much of our volcanic material is a fused condition of sedimentary rocks.

GOLD IN FISSURE-VEINS.

As is well known, gold is a frequent constituent of the fissure-veins of the Far West. The ore of the Comstock vein has yielded about 47 per cent of gold and 53 per cent of silver; and it is probable that one half of the so-called *silver veins* contain gold in sufficient quantity to be of practical value. In some true fissure-veins, gold is the only valuable ingredient, but more generally it is associated with several other metals. The Revenue mine, at Tuscarora, Nev., contains silver in the form of arsenical and antimonial sulphide, and gold in iron pyrites frequently crystallized lining cavities. At Eureka, the ore occurs in chambers, which were originally filled from a solution issuing through fissures from below and deposited as argentiferous galena and auriferous pyrites, the silver and gold being in nearly equal proportions. In the great veins of Bingham Cañon, and at the Cave mine, near Frisco, in Utah, the combination is the same, and, as at Eureka, the sulphides have been decomposed to a spongy, rusty go-san. At the Bassick mine, in Colorado, gold exists free, or in combination with tellurium and associated with zinc, copper, and iron. In all these, and many other cases which might be cited, the gold has been brought up in a hot solution impregnated with mineral matter far below, and deposited as the temperature and pressure were reduced. The formation of this class of auriferous deposit is well illustrated by the Steamboat Spring, in Western Nevada, where hot water, flowing out through fissures produced by subterranean forces, is depositing a siliceous vein-stone, containing sulphides of iron, copper, oxide of manganese, and metallic gold. There is little doubt that, in the great mineral belt lying between the Sierra Nevada and the Rocky Mountains, where, in Tertiary times, volcanic activity was exhibited on a grand scale—sedimentary rocks upheaved and fissured in every direction, with great outflows of fused material—hot springs, like the Steamboat, were everywhere busy, doing similar work. Bursting out at different places and times, and flowing from different sources, the solutions they carried and the ores they deposited varied greatly; but the methods of accumulation, transportation, and deposition were essentially the same, namely, the leaching of various rocks by steam and hot water under great pressure, by which silica and sparsely-disseminated metals were gathered and driven toward the surface, to be deposited as the pressure and temperature were reduced. Gold collected in this manner was unquestionably taken into chemical solution, and in the resulting vein deposits we find it in strings, scales, and irregular masses, often beautifully crystallized and associated with other crystallized minerals which are certainly chemical precipitates.

We may sum up the teachings of geology in regard to the genesis and distribution of gold by saying:

First. Gold exists in the oldest known rocks, and has been thence distributed through all strata derived from them.

Second. In the metamorphism of these derived rocks it has been concentrated into segregated quartz veins by some process not yet understood.

Third. It is a constituent of fissure-veins of all geological ages where it has been deposited from hot chemical solutions which have leached deeply-buried rocks of various kinds, gathering from them gold with other metallic minerals.

Fourth. By the erosion of strata containing auriferous veins, segregated or fissure, gold has been accumulated by mechanical agents in placer deposits, economically the most important of all the sources of gold.

THE DUNDERBERG MINING COMPANY

An option to purchase mining property in Clear Creek County, Colo., known as the Dunderberg, Sub-Treasury, East Terrible, Silver Chain, Muldoon, and Elephant lodes, within a specified time, was procured by Walter T. Hatch, Edward P. Burgess, William C. Stuart, Jasper Cairns, and Charles T. Jung, early in 1879. They then took steps toward the organization of a corporation to be known as the Dunderberg Mining Company, whose capital stock was fixed at \$1,500,000, divided into 150,000 shares of \$10 each, par. Subscriptions to the capital stock were invited, the subscribers to pay \$4 per share. The money, it was agreed, should go to Walter T. Hatch, as trustee, and be paid by him to J. Warren Brown upon the purchase of the mining property by him as trustee for the corporation. Sixty-three thousand shares of the capital stock of the projected corporation were subscribed and paid for, and the mining property was purchased and the company was organized. J. Warren Brown became its president, and the other persons above named its trustees. The price paid for the property was \$242,000.

After the organization of the Dunderberg Mining Company, there remained in the hands of its officers 86,000 shares of its capital stock. These shares were retained by those officers for their own use and profit. James D. Brewster and four other stockholders, who were interested in the company to the extent of 3200 shares, objected to this disposition of the unsold shares, and urged that they should be used to form a fund for the benefit of all persons interested in the company. They asserted that they subscribed with the understanding that J. Warren Brown should act as their agent in the acquisition of the mining land, and that all the capital stock of the company should go through him for its purchase. They declared that the fact that the property could be bought for \$242,000 was wrongfully concealed from them, and they alleged that it was a fraud upon them for Brown, abetted by the other persons above named, to purchase the land for \$242,000, and then convey it to the company for stock worth \$1,500,000 at par and \$600,000 at \$4 per share. On these grounds they asserted that the trustees had no title to the 86,000 shares they had obtained, and by which they kept the control of the company. No attention was paid to these objections, and the

* For example, the basalt of the Snake River lava-plain, and, according to Prof. J. J. Stevenson, the trachyte of Colorado.

stockholders, therefore, began a suit in the Supreme Court to compel Walter T. Hatch, J. Warren Brown, and the other trustees to account to the corporation for the shares they retained, to the end that a fund for the benefit of all stockholders should be created with them. They demurred to the complaint on the ground that it did not state facts sufficient to constitute a cause of action. The argument upon the demurrer took place in Supreme Court, Special Term, before Judge Van Vorst, who yesterday handed down a decision in favor of the plaintiffs. In this opinion Judge Van Vorst says:

"This appropriation to themselves of the 86,000 shares by the defendants, without consideration, is a wrong, primarily, to the corporation and its creditors, if it has any, and secondarily, both directly and indirectly, to the body of stockholders of the 63,000 shares, who contributed the only funds used for the purchase of the mining property." After deciding that the agreement between the defendants and the subscribers to the shares of the Dunderberg Mining Company, before the mining property was bought, expressly provided that all the shares of the company should be the consideration for the property, Judge Van Vorst says: "It is enough for the present to announce that from the allegations of the complaint some relief shall be awarded, so that the defendants shall be held accountable for the 86,000 shares of stock, or its proceeds, which they have received to their own use. * * * The complaint discloses a state of facts showing special damage and injury to the plaintiffs growing out of the representations alleged to have been made by the defendants to induce the subscription to the capital stock, which have proved to be untrue, and out of a concealment of material facts which, from the relations in which Brown and Hatch stood to them as trustees, the defendants were bound to disclose, which entitles the plaintiffs to maintain this action. The result reached is, that there should be judgment for the plaintiffs on the demurrer, with liberty to the defendants to answer on payment of costs."

Messrs. Chamberlain, Carter & Hornblower represent the plaintiffs, and Messrs. Shipman, Barlow & Larocque the defendants.

MAGAZINES FOR EXPLOSIVES.

Captain Philip Hess, of the Austrian Imperial Engineers, has been for some time experimenting on the best materials for constructing magazines and factories of explosive material, and for protecting them from fire. He altogether dismisses the old idea that such buildings should be made very strong, with thick walls. No walls will resist the force of the explosives: an explosion can not be shut in; and if it is to occur, provision must be made that it shall do as little mischief as possible. Falling fragments are the great source of danger; and the heavier these are, the more harm will be done. Such buildings ought, therefore, to be made of the lightest possible material, which is wood; and this he recommends. Where they can be situated in the midst of high and thick trees, a valuable protection is obtained; but this, of course, can seldom be commanded. Wood has, however, the drawback of being easily inflammable; and as explosives are frequently stored for convenience of use near the works where they are employed, which nearly always implies the neighborhood of fires of some sort, it is necessary to protect it against flying sparks. Precautions are also needed against fire originating within the building. With the former object, a roof of sheet metal is sometimes used; but this, though efficacious, is as dangerous in case of explosion as stone; is in many localities expensive; and in hot weather becomes itself a source of danger for dynamite factories. A very safe roofing can be constructed with the old tar compound (often called asphalt), which was tested at experiments conducted by the Prussian authorities at Neustadt-Eberswalde in 1854, and by the Austrians at Graupen bei Teplitz in 1875, and has been retained wherever adopted. Its maintenance is, however, difficult and expensive, because the tar and other kindred substances which it contains are easily volatilized under the action of the sun's light and heat. In order to prevent this as far as possible, sand, gravel, and cement are usually employed; but it is evident that the material is only suitable to horizontal or gently inclined surfaces, and that other means must be sought for the protection of the walls. The Asbestos pasteboard of the Roman Asbestos Company is an excellent material, being unflammable, weather-proof, a bad conductor, and a good absorbent of heat; but it is very expensive, and at present is not made any thinner than one millimeter. If it were prepared of half the thickness, it might be used economically and with equal effect. Since no covering material exists which is in every respect satisfactory, Captain Hess instituted a series of experiments upon preparations for impregnating wood, so as to render it impervious to weather and unsusceptible of kindling. Slabs of soft wood were coated with the material to be tested; each was kept for fifteen minutes under a stream of water, and rubbed with the hand; afterward, a copper cylinder was heated to a clear red glow, laid on the prepared side of the slabs and left there until cool; and lastly, a jet of flame from a blow-pipe was applied alternately several times to both surfaces. These tests were applied to various preparations, and the general result was, that water-glass formed the basis of all that were satisfactory, combined with such substances as would form indissoluble silicates on the surface of the wood. Such are powdered slate, brick-dust, powdered chalk, flint, hydraulic lime, and cement, and many others. Saturated solution of water-glass, diluted with an equal volume of water, was applied, and before it had cooled, finely-powdered black slate was sprinkled on it. When dry, all loose powder was brushed away, and the process twice repeated. This composition stood the test of water and hot metal, but scaled off under the blow-pipe flame. Substituting brick-dust for the slate, the result was very unsatisfactory, as, after fourteen days, it would resist neither the action of the water nor the blow-pipe. A similar composition made with lime, on the contrary, proved excellent, withstanding all the tests after three days' hardening. The blow-pipe flame was applied until the prepared surface glowed and sank into the charred wood underneath; but there was still no approach to kindling. Portland cement, applied over a coating of water-glass, proved even better than the preceding; but when used in dynamite factories, it requires to be whitewashed when it grows dark from exposure, for the sake of coolness in summer. A preparation of oxychloride of zinc proved about equally effectual with the lime composition. Captain Hess does not con-

sider he has by any means exhausted the subject, and thinks that experiments with magnesia cement, mixtures of water-glass with powdered slag, feldspar, various hydraulic limes and cements, Scott's selenitic mortar, and other similar preparations, might be made with advantage. The power of resistance to frost can be well tested when frost is not at command by wetting the surface profusely, and then suddenly evaporating the water by the application of the blow-pipe flame. He has found that the disintegrating fairly corresponds to frost; but the Portland cement preparation appears to be the only one which he has submitted to this test. It withstood it satisfactorily, as well as that of the actual frost itself. None of these compositions should be used in the interior of the magazine itself, or in the work-rooms of factories, on account of the danger of friction from crumbling morsels.—*Engineering.*

TAIL-ROPE UNDER HOISTING-CAGES.

Mr. William Dean writes the following suggestive letter to the *Colliery Guardian*: The line of argument adopted by advocates of tail-ropes is, or need only be, one of figures. I will at once presume we have a pit 600 yards deep, with flat drums, and round ropes $3\frac{1}{2}$ inches circumference, and 13 pounds per fathom (equal to 3900 pounds), and raising at one winding two tons of fuel. Without the tail-rope, we have to overcome a dead-weight at commencement of 3900 pounds of rope; and 4480 pounds of fuel, or 8380 pounds total, plus the friction and strain power, must be supplied to meet this. Now, suppose we attach a tail-rope to these cages, what is the result? The resistance to be overcome in the former case was 8380 pounds, plus the friction; but now we have under the cages a tail-rope, equal in size and weight to the winding rope in shaft, or 3900 pounds less dead-weight to lift, so that we have to lift not 8380 pounds, plus friction, but 8380 less 3900 pounds, giving 4480 pounds, plus the friction, or simply fuel and friction, and this decrease in dead-weight will give a very considerable reduction in piston pressure necessary for ordinary winding. I have often wondered why colliery proprietors do not, when practicable, apply the tail-rope, and can find no other excuse worthy the name than simplicity. Probably it may be owing to its simplicity that the tail-rope does not so rapidly as could be wished gain in the good opinion of the colliery proprietors. Still I fear some people hesitate to use the tail-rope, thinking it is part of the "Koepe" patent, and can not consequently without danger be applied. This is not so. The tail-rope is applied to some collieries, and I believe with every satisfaction. I am told at one colliery—a shallow one—where it is working they "effect a saving of 5 pounds per square inch boiler power," and at another colliery they "save one sixth in fuel." Other instances could be quoted if it were necessary. The tail-rope may be an old rope from off the pit in which it is to work, and will last as long as it can safely carry its own weight, it having no other work to do. The adoption of tail-rope effects the very desirable result of reducing to a minimum the oscillation of the cages, seeing it acts the part of an additional conductor, and in addition enables the engines to get up to full speed in a very short time, and at a much less expenditure of fuel. The only things necessary to apply the tail-rope are an old rope and a dip-hole, and, where flat drums are in use, a moderately shallow dip-hole will suffice; but with vertical or conical drums, provision has to be made, by having a deeper dip-hole, for the increase in velocity of the descending cage, until the "meeting" is reached, when the rope which has accumulated will with equal speed be taken up again. The deeper the pit, the greater the advantage in the tail-rope, and with flat ropes a great saving is effected. The application need not cost more than a mere trifle; no difficulty is experienced at point of return in sump with the rope, and a pulley in sump is unnecessary.

PROGRESS IN SCIENCE AND THE ARTS.

The Manufacture of Potash Salts at Stassfurt.—The four mines of the great potash salt district of Stassfurt, Germany, now produce daily about 3000 tons of crude potash salts, from which thirty-two works make daily 500 tons of chloride of potassium. The price of the latter, which was about \$7 per 100 pounds in the beginning of the year 1874, steadily fell, until it reached 84 cents. This naturally crippled the manufacturers, two of whom failed, while fifteen others suspended operations, and still the stocks continued to accumulate, until they reached the enormous amount of 15,000 tons. In the beginning of 1879, according to the *Chemiker Zeitung*, the four mines made an agreement for five years, the principal points of which were the following: A committee of representatives settles the total quantity of crude salt to be mined, of which the Prussian mines furnish 25 per cent, the Anhalt 50 per cent, and Douglashall and New Stassfurt each 12.5 per cent, the price of the crude 15 per cent salt to be fixed at 10 cents per 100 pounds. In consequence of this action, the stocks have been lowered, production has increased to 3000 tons per day, and the price of 80 per cent chloride of potash has risen to \$1.56 per 100 pounds.

Electricity in the Manufacture of Porcelain.—Dynamo-electric machines are used in France in porcelain manufacture. The paste used for porcelain often contains ferruginous particles, which give the baked articles a color or a minutely spotted appearance, where a pure white may have been desired. In this way, ceramic products may lose as much as fifty per cent of their value. The attempts hitherto made to remove these traces of iron with magnets have met with poor success. Recently, however, at two important French works, the Faïencerie, of Creil, and the establishment of MM. Pilivuyt & Co., of Mehun-sur-Yèvre, it was decided to set up powerful apparatus in which the electricity, instead of being supplied from batteries, was obtained by means of a small Gramme machine driven by a steam-engine. The arrangement, which is said to work well, comprises a strong horizontal electro-magnet, with the poles very near each other, and between them a thin box. The paste, very liquid, enters the upper part of this box, and is deflected toward the polar sides by a bent piece of zinc. As it flows down these sides, the iron corpuscles are caught on them by the magnetic force. The apparatus is cleaned twice a day by means of a jet of water, the magnet being de-

magnetized for the time. About one gram of iron particles is stopped in the passage of twelve kilos of paste, and from 500 to 600 kilos of paste may be passed through one apparatus in a day.

A "Bushel of Charcoal."—In the *Journal* of the United States Association of Charcoal Iron-Workers we find the following table, which shows how numerous are the "various bushels of charcoal" in various parts of the country. The standard adopted by the Association ought to be generally accepted:

DESIGNATION OF BUSHEL.	Cubic inches.	Cubic feet.	Standard bush, (2748 cubic in., equal to 100.
New Hampshire standard.....	1989	1 151	72.4
New York.....	2150.42	1 244	78.3
Minnesota.....	2419.5	1 4	88.0
Rhode Island.....	2481	1 436	90.3
Connecticut.....	3159	1 828	114.9
Massachusetts.....	2564	1 483	93.3
Pennsylvania.....	2566	1 484	93.4
Montana Territory.....	2571	1 488	93.6
Missouri.....	2650	1 534	96.4
Winchester.....	2680	1 55	97.5
Baltimore.....	2688	1 556	97.8
Standard as adopted by resolution of the Association.....	2747.7	1 59	99.9
Oswego Iron Co. (Oregon) standard.....	2748	1 59	100.0
	2844	1 046	103.5
	2000	1 157	72.8
	2200	1 273	80.0
	2250	1 302	81.9
	2300	1 331	83.7
	2350	1 360	85.5
	2400	1 389	87.3
	2450	1 418	89.1
	2500	1 447	90.9
	2550	1 476	92.8
	2600	1 505	94.6
	2700	1 563	98.3
Swedish standards for charcoal:			
Tunna.....		5 822	366
Last or Stig.....		69 876	4394

GENERAL MINING NEWS.

ARIZONA.

TOMBSTONE DISTRICT.

A recent issue of the *Tombstone Epitaph* has the following: **CONTENTION.**—Still timbering on the 400 level. It will take from two to three weeks to finish this necessary work; winze on this level down 35 feet on the ledge, which is looking fine. Flora Morrison shaft down 55 feet below the 400 level. They are all looking well, and yielding their usual amount of ore of the grade heretofore worked during the present year. Of late, there has been a perceptible increase in the percentage of gold in the ore. Heretofore it has been from 16 to 20 per cent of the value, but now it will reach from 22 to 24 per cent. This mine has been noted for some very rare specimens of efflorescent gold, sometimes perfectly bespangling the surface of the ore, and occasionally being deposited on a surface of horn-silver.

GIRARD.—About the 10th of January, the mill will begin its work. This is the first mill that has been built in Tombstone, all the others, with the exception of the Hopkins mill (five stamps) at Watervale, being located on the San Pedro. The mill is of twenty-stamp capacity, with 10 pans, five settlers, and one agitator.

GRAND CENTRAL.—Main shaft 460 deep, being 60 feet below the 400-foot level. For the last 60 feet, they have encountered several small veins of ore, which indicate the near approach to an ore-body. The uprise from 200 level is up 85 feet, and will connect with the 100 within a day or two. Drift on the 100 has 50 feet to run and to connect with the uprise. Have connected the winze from the 100 with the stopes in the old works. At the old works they expect to intersect the winze from the 400 with the 500 west cross-cut this week. The 600 cross-cut is in 100 feet. Stopes somewhat improved since last report. The west lateral is yielding very high-grade ore. The track is nearly completed from the main shaft to the new ore-house. Hoisting ore will begin at this point shortly.

SAN PEDRO.—The strike reported in this mine was at a depth of 232 feet. At last reports it was looking well, and the ore gave good assays.

TOMBSTONE MILL AND MINING CO.—The Combination workings send to the mill fifty tons per day. The stopes in this part of the mine look particularly well. The Northwest workings are improving from day to day. A good deal of development-work is doing at this point. West Side main shaft is down 240 feet. At 78 feet have a drift running both north and south along the ledge, which, though not large, is uniform. The ledge is vertical so far as developed. The last wagon sample gave 252 ounces to the ton. Ship two loads per week to the mills from this mine. At the Good Enough main works, are drifting on the 300-foot level, both east and west, to cut the ore-bodies that exist above. The stopes here look well, and furnish two loads per day.

TOTAL WRECK.—The Tucson *Citizen* announces that the litigation pending against the Total Wreck mine has been settled, and all the suits which have tended to retard the development of the property have been dismissed.

CALIFORNIA.

THE BODIE DISTRICT.

Superintendents' reports for the week ending December 17th read as follows:

BODIE CONSOLIDATED.—During the past week, 98 435 tons of ore were sent to the mill from the fifth and sixth levels and the workings below it. The quality of ore from the stopes during the week has much improved. Winze No. 9 is 97 feet in length. The north drift from this winze is now 6 feet in length. Winze No. 13 was sunk 20 feet during the past week; total length, 80 feet. There is but little change in the vein. It continues to carry good ore. The mill crushed during the week 107 792 tons of ore. The yield of bullion was \$6018.70. The average value of the ore worked was \$66.32 per ton. The mine looks as well as usual.

BULWER CONSOLIDATED.—The west cross-cut from the north drift, on the 500-foot level of the Standard mine, is in 247 feet; progress for the week, 7 feet. The ground is very hard.

LENT SHAFT.—Cutting out the station at the 800-foot level is now going on. Work on the 700-foot level is progressing favorably, with no particular change to note.

STANDARD CONSOLIDATED.—The shaft has now reached a depth of 1139 feet; progress during the week, 6 feet. The east cross-cut on the 600-foot level is now 490 feet in length. The south drift from the east cross-cut, 700-foot level, is in 390 feet. The west cross-cut, 700-foot level, is in 375 feet. West cross-cut No. 1, 500-foot level, is in 247 feet; progress, 7 feet. The rock is hard. West cross-cut, same level, has been run 21 feet during the week; total

length, 27 feet. The south drift, 500-foot level, is in 541 feet; progress, 25 feet, showing the vein in the face to be 4 1/2 feet wide. Uprise on the bullion ledge, 500-foot level, is up 102 feet; progress, 6 feet. The vein is 4 feet wide of fine ore. Uprise on the Cook vein, 385-foot level, is up 108 feet; progress, 7 feet. The vein is 5 feet wide in the face. The stopes continue to look well. On the 385-foot level, the vein is from 15 to 25 feet wide, and on the 550-foot level it is from 10 to 20 feet wide of good milling ore. There were extracted and hauled to the mills 1296 tons of ore. The average assay of pulp for the week was \$33.21. The amount of bullion shipped to San Francisco amounted to \$42,338.58.

COLORADO.

CLEAR CREEK COUNTY.

CONSOLIDATED PAY ROCK.—The *Coloradan* says: We see that the superintendent is having about ten tons a day of the dump hauled away. This is shipped to Lawson, and even after this expense, the superintendent states that he receives 50 cents per ton. The Silver Bend level is turning out ore in large quantities, and of very good grade. Some forty men are working on this level. The Pay Rock tunnel is also turning out well, and the Eagan tunnel level has been cleaned out, new track laid, and every thing put in order for profitable work. A rise from the 90-foot level has been put through to the Silver Bank level, securing good ventilation, and the company is doing some extensive work on this level. We found in the different levels no rocks or piles of debris to impede work—all is kept clean. While we were present at the mine, we saw some three hundred sacks of ore shipped—the product of last month—the largest since the company has had the property, amounting to \$7000.

LAKE COUNTY.

BIG PITTSBURG.—A recent issue of the *Leadville Democrat* says: A strike has recently been made in the Heytrossar shaft of the Big Pittsburg mine. This shaft is in Big Stray Horse Gulch, and has lately been leased for a term of seven months. A few days ago, while working a level at a depth of 132 feet, a vein of hard carbonate was struck, which is about two feet wide. It has been opened up about 30 feet, and the extent of it is not yet known. A *Democrat* reporter visited the mine, and was shown a number of specimens of hard carbonates which were taken from the newly-discovered breast of ore. The vein of hard carbonates is underlain by sand carbonates, which are improving all the time. The hard carbonates contain chlorides in small quantities, and run from twenty to thirty ounces in silver to the ton, and from fifteen to twenty per cent in lead. The same has improved from two and a half to ten ounces in silver to the ton and from eight to ten per cent in lead, and continues to get better. There are from four to five feet of this ore already in sight, and the drifting has only extended from eight to ten feet. The lessee has closed a contract with J. B. Grant for 150 tons of the ore.

DENVER CITY.—The same paper states that this mine is shipping at present about 15 tons of ore per day. The ore varies in character so much that it would be difficult to tell just what the average value of it is. Some of it runs as high as 266 ounces of silver to the ton, while another lot may run very low. Yesterday, 2 1/2 tons were shipped to the Harrison Reduction-Works that ran 218 ounces of silver to the ton. Within the last eight days, the mine has delivered to the smelters \$2800 worth of ore without doing any stoping whatever. There are about eighty men employed on the mine, and two shafts are worked.

IRON.—The *Leadville Chronicle* says: Under the old workings, which were excavated two or three years ago, which were filled up with waste, and were left as worked-out ground, lower ore-bodies have been discovered. These lower bodies were separated from the excavated upper ones by a sheet of poor iron and flint, which originally had been regarded as foot-wall of the vein, but which proved to be a poor counter-portion of the vein. The extent of these lower ore-bodies is not yet known, and has to be determined by exploring drifts, which now are in course of excavation. The vein of the Iron mine, which lies between porphyry and limestone, is very regular in formation and character. The outcrop along the side of Iron and Rock hills and across California Gulch is marked by the openings and dumps of the tunnels and drifts, which on the dip of the vein are driven from the surface into the hill. This dip is almost due east, and amounts to about 13 degrees below the horizontal. The Iron vein is worked by means of inclines and levels. The northern or chain workings of the mine are situated on Iron Hill, and consist of two chain inclines, which are excavated on the dip of the vein to about 900 and 1200 feet into the hill. With these inclines 10 working levels are in connection. By this system of openings, which are provided with cart works, the mine is laid out in blocks of about 100 feet in width and 400 feet in length. These blocks are divided into smaller bodies by run-outs. The ore is excavated from the blocks by the described openings, loaded on cars and brought to the surface. In a similar way, by one incline and one shaft, the southern workings on Rock Hill are explored. The total length of all the openings of the Iron mine is over six miles. About six acres on the vein are stoped to the greatest part; about eighteen acres of the vein are developed by exploring drifts; in about six acres of this ground pay-ore is exposed and waits for further opening and stoping. The total length of the ore-breasts exposed in the stopes and drifts is about 4500 feet, the thickness of the breasts varies from one half foot to over twenty feet. The daily output of ore from the Iron mine is about 225 tons, and will be kept up at this amount during the winter. Five hundred men are employed at the mine, and four steam-engines are used to hoist the ore to the surface.

LITTLE CHIEF.—This mine is now working fifty-five men, and is taking out about 80 tons of ore per month, that runs 50 ounces in silver to the ton, and twenty per cent in lead. The company is working only the Daly shaft at present, which is 204 feet deep. The ore that is taken out is hard and sand carbonates and galena, which is shipped to Grant's smelter. The ore that is taken out is principally found in stringers, and the work is almost entirely confined to prospecting. The company has nine acres of ground, with but little more than half of it prospected.

EVENING STAR.—Two stopes have been started; one to the south along the Catalpa line, and the other to the north joining the Morning Star territory. The mine is now shipping over 100 tons a day.

PARK COUNTY.

The *Leadville Democrat* says: There are two smelters at Alma—the Stevens and the Fanny Barret smelter. Both of them are preparing to blow in shortly. The latter has accumulated a good deal of lead ore, and is moving along slowly. The Stevens smelter, which proposes to work on the new patented Stevens system, has not been tried yet, and of course has not had a chance to prove what it can do. Many practical people doubt the efficacy of the process, and predict ultimate failure. In our opinion, the proper process for treating refractory ores has yet to be invented. Both of these smelters seem to be rather unpopular with the mine owners and ore producers of the district, on account of their high charges. Their average charge for smelting is \$15 per ton.

LONDON.—It is promised that the London will continue to ship a car-load of ore per week to Leadville throughout the winter. This is the amount now shipped, though the output is considerably larger.

SAN JUAN COUNTRY.

A Rico correspondent of the *Denver Tribune* says that the Grand View smelter is hard at work, running 24 men and turning out about \$2000 worth of bullion each day. This week the ore worked was from the Grand View and Puzle Extension mines. At the Grand View, a force of men is hard at work getting out ore for the smelter, and experiments as to its actual value have been thorough, showing a yield of 100 ounces to the ton.

SUMMIT COUNTY.

ROBINSON CONSOLIDATED.—Later news from the Robinson indicates that the

worst reports concerning the condition of the mine are true. Professor Ashburner has made a second examination of the mine, and, according to the *Democrat*, he acknowledged that his previous report had been erroneous and exaggerated, and that he would have to take it all back. There is hardly any ore shipped at present, and to keep up a shipment of mineral lately promised, the last remnants even of ore have to be taken out. To-day most of the men still at work will be discharged. What little mineral there is still in sight is not worth taking out. In the eighth level, the ore runs from three to ten ounces per ton, and does not pay the cost of mining, as about all there is still in sight consists of "black jack" and white iron.

DAKOTA.

A press dispatch from Deadwood, dated the 28th, says: Of the 580 stamps operated by the Homestake Company, 280 have been hung up, owing to lack of water, and unless there is rain or wet snow soon, the others must cease work. Nearly all of the Central mills are idle. Three hundred men are temporarily out of work.

FATHER DE SMET.—The superintendent's report from 15th December to 22d December shows ore extracted from first level, 1200 tons; second level, 800 tons; third level, 65 tons; total, 2065 tons; ore milled, 2065 tons. North end tunnel advanced 14 feet; tunnel in 354 feet. South header, Golden Gate, advanced 10 feet; header in 61½ feet.

MICHIGAN.

AZTEC.—The *Ontonagon Miner* says: But a few men are employed at the Aztec mine now; but they are working in a slope that is producing a fair amount of copper, and should the ground continue to yield as well for the winter, they will have more copper to ship in the spring than they have had for some time. With copper at the present price, it is a pity that they have not a large amount of ground open, ready for stopping.

HURON.—The *Hancock Journal* says: Since our last visit to the Huron, there has been marked progress in the direction of putting the mine among the profitable mining industries of the copper region. No. 8 shaft has reached the ninth level. The lode at this point is large, and for the first 30 or 40 feet sunk below the eighth level is rich in all grades of mineral. The remainder to the ninth level is showing copper in paying quantities. In a winze south of the shaft now down about 60 feet below the eighth level, the lode seems to be very much the same as what the shaft passed through. The ninth level is now opening north and south of the shaft in a very promising lode. The south drift will soon be connected with the winze from the eighth level, which will doubtless furnish mass, barrel, and stamp copper, that pay well to remove. This shaft will be pushed down to the tenth level as fast as possible. At the sixth and seventh levels, north of No. 8 shaft, some very good ground for stamp work has been opened. No. 6 shaft is now sinking below the seventh level, but at this writing is not showing very much copper. The north drift at this level has been connected with a winze from the sixth level which had opened considerable ground that will pay to stop. The south drift at this level is also showing stamp copper. The sixth level south of this shaft will soon be connected with the drift from No. 8 shaft. For some considerable distance, this level has been very poor, but to-day it is showing in the breast of the drift a good paying lode.

NATIONAL.—The *Ontonagon Miner* reports that the new shaft on the stamp lode north of the old mine is down about 75 feet from the surface. It is a large shaft, and going down on the junction of what is known as the north and middle veins. The hoisting is now done by steam power, which will greatly facilitate the work, as heretofore the hoisting has been done by a hand windlass, so that we may now expect to see the work progress more rapidly. All of the rock taken out from the commencement at the surface has been a very good grade of stamp rock, much of it of more than average richness. In the future of this mine, this vein or rather both of these veins are destined to play a very important part in its production, both of them being essentially stamp lodes and of sufficient promise to warrant the opening of a large mine on, and capable of making a large monthly product, independent of what may be expected from the mass production of the old mine when unwatered. This north vein is a wide metalliferous belt, rich in copper, and in the early history of the mine had more or less attention paid it, but no extensive mining has ever been done on it. Sometime before the mine was stopped, under the old management, a cross-cut was driven to it from the fifth level in the old mine, and the management was very enthusiastic over its value as a stamp lode; a shaft was then sunk on it with the intention of working the vein through the old mine. There can be no doubt, therefore, that the vein will be a large producer of copper as soon as a mine is opened on it and the proper facilities are furnished for stamping and dressing. In the old mine, the work of unwatering is progressing favorably. They are now down about sixty-three feet below the fifth level, and from the evidences before them at present, they have good prospects for at least many feet.

MONTANA.

SUMMIT VALLEY DISTRICT.

MOULTON.—We learn from the *Butte Inter-Mountain* that after a short preliminary run on the 18th, twenty of the stamps in the new Moulton mill were dropped on ore December 19th. The mammoth engine is running smoothly and noiselessly, and all parts of the mill seem to be in perfect order. Some little adjustment of the stamps is necessary in order to get the proper "splash," and to do this successfully may require several days yet. The mill, however, may be considered fairly in operation, though an occasional stoppage of a few hours may be required before every thing can be got in perfect running order.

We are indebted to the *Butte Miner* of the 18th for the following notes:
ANSELMO.—For some eighteen weeks past, no sinking has been done, but all energies have been directed toward the extraction of the ore. Preparations have been made, however, to begin sinking at once. On the 350-foot level, a great deal of steady and productive work has been done recently. Ore is taken out regularly from the east drift and stopes on the level, the average daily output being from eight to ten tons. The average assay is about 100 ounces in silver. No second-class ore has been milled yet, there being some 300 tons on the dump. Of the first-class ore, there are now on the dump 160 tons.

MORNING STAR.—The shaft is now down about 290 feet, and work is steadily prosecuted on the 220-foot level. The west drift is in about 115 feet, the vein showing a breadth of from twelve inches to two feet of pay-ore, averaging from 40 to 70 ounces per ton in silver. Eighty feet west from the shaft, on the 200-foot level, a stope has been started from the rise, and good ore is taken out.

WABASH.—Work is progressing steadily on the east and west drifts of the 55 and 100-foot levels, and preparations are making for stopping. The intention is to sink some 200 feet on the little ledge, which he is now working, and then to cross-cut north to the main ledge, the surface croppings of which are some 150 feet distant from the present shaft. Both the veins dip north at a slight angle, and the croppings of the main vein are about 150 feet in width. During the month of December, the output of the Wabash will be about 100 tons of high-grade ore, averaging from 100 to 125 ounces in silver. Samples made carefully from twenty-five tons showed an average assay of 125 ounces.

NEVADA.

COLUMBUS DISTRICT.

Official reports for the week ending the 17th inst. are as follows:
MOUNT DIABLO.—The winze from the bottom of winze No. 1 on the third level is down 12 feet, and shows a 2½-foot ledge of ore which assays \$45 per ton. The east drift from the bottom of winze No. 1 has been stopped. The intermediate

below the third level shows some very fine ore, and the east drift on this level is giving some excellent ore from small bunches, the chances being favorable for its opening very well. There is no change in the west drift. The east drift on this level has attained a length of 52 feet. The winze from the west drift on the second level shows a two-foot ledge of \$75 ore. The east drift on this level is driven ahead to prospect the ground above the ore found in this part of the mine, on the level below, and is now cutting into some low-grade ore.

NORTHERN BELLE.—For want of air-connection, work has been stopped in the west drift on the fourth shaft level. Slow progress is making in the uprise from the drift and in the winze from the third level, on account of the intense heat. There is no material change in other shaft levels. The adit and levels above are looking very much the same as last week, and producing about the same quantity of ore. There are extracted and sent to the mills about 66 tons of ore daily. Bullion shipments for the week ending December 14th amount to \$16,816.86. Shipments on December account to December 14th, \$28,419.67.

THE COMSTOCK LODE.

The *Gold Hill News* regards the week ending the 21st inst. as an unimportant one for the mines along the lode. The usual routine work has been done, but nothing developed of consequence. It is taking longer to put in order the drift connecting the Union shaft with the joint Union-Sierra Nevada winze than was expected, owing to the presence of considerable hot water. A week's further time will complete the work; then the drift to connect the above winze with the joint Mexican winze will be started. The proposed drift will pass through interesting ground, and operators who are watching the work at that end believe it will find good indications of ore at least. The mines adding to the bullion yield are the Ophir, Savage, Belcher, Crown Point, Silver Hill, and Regent.

CONSOLIDATED VIRGINIA.—The winze joint with California from the 2500 level is sunk 10 feet each week. The work of repairing old winzes and drifts has reached the 1600 and 1700 levels.

SIERRA NEVADA.—The chamber for the winze in cross-cut No. 2 is nearing completion. Cross-cuts Nos. 3 and 5 have been advanced as usual. There is no change reported in the material passed through. For work joint with Union Consolidated, see that mine.

UNION CONSOLIDATED.—The 2800 tank station of the joint Sierra Nevada winze has been completed, and the winze sunk five feet below that level. The work of cutting out a drain and timbering the drift leading from the joint winze to the Union shaft is pushed as rapidly as possible, but a week's time is required to finish it.

YELLOW JACKET.—The east cross-drift on the 2828 level is in porphyry and quartz; east cross-drift, 3000 level, is in ground giving considerable water. The south lateral drift, same level, is in hard, dry ground. The north lateral drift was run 248 feet and a cross-drift started from that point, which cut seams of quartz giving low assays.

MINING AND MILL SUPPLIES AND WAGES.

BUTTE, MONT.—We are indebted to Mr. G. W. Maynard for the following details of the cost of wages and supplies for mine and mill:

WAGES:		SUPPLIES:	
Mine.	Per day.		
Miners	\$3.50	Shovels, per doz.	\$11.50
Timber-men	4.00	Battery shoes and dies, p'r p'nd.	8
Pump-men	4.50	Pan shoes and dies,	8
Tool-pickers (boys)	2.00	Mullers, each	132.00
Chief-engineer	5.00	Iron turnings, per pound	5
Assistant-engineer	4.00	Brass screens, per sq. ft.	42
Firemen	3.50	Rubber Belting:	
Wood-man	2.50	6-inch, 4-ply	38
Top-men (car-men)	3.50	8-inch, 4-ply	42
Carpenters	5.00	10-inch, 4-ply	54
" helper	3.50	14-inch, 4-ply	1.00
Blacksmith	5.00	20-inch, 4-ply	1.25
" helper	3.50	36-inch, 7-ply	3.80
Foremen	5.00	Leather Belting:	
Stable-men	3.25	8-inch, raw hide	1.40
Ore-haulers	3.00	10-inch, raw hide	1.85
Assayers	4.00	Cyanide of Potassium, per p'd.	50
" helper	1.66	Bluestone, per pound	13
Mill:		Coal oil, per gallon	50
General foreman	5.00	Lard " " extra	1.30
Foremen	5.00	" " " No. 1	1.05
Crushers	3.50	" " " No. 2	90
Battery-men	4.00	Tallow	9
Roasters	4.00	Lubricating oils	1.75
Cooling-floor	3.50	Heavy lubricators	65
Wood workers	3.00	Cott'n waste, per pound	15
Amalgamators	4.00	Packing	60
Car-men	3.50	Assay Materials:	
Melter	5.00	No. 8 cruc's, French, per doz.	1.40
Assistant melter	4.00	" " " covers,	
Engineers	4.00	per doz	75
Firemen	3.50	Black-lead, crucible, No. 50	3.75
Millwright	5.00	Litharge, per pound	13
Chief machinist	6.00	Bone-ash	9
Machinists	5.00	Muffles, each	1.00
" helper	4.00	Bicarbonate of soda, per p'nd	9
Watchman	3.50	Assay, lead, per pound	12
Tailings-man	2.50	Argols	19
Roustabout	3.00	Nitric acid, C. P.	50
Salt-man	3.00	Borax, pu'verized, per pound	25
		" crystallized	17
SUPPLIES:		Quicksilver, per pound	43
Wood per cord	6.00	Battery stems	42.20
Mine timber, per thousand	25.00	Hydraulic cement	6
Charcoal, per bushel	18	Steel dies, per pound	9
Candles, box	6.50	Iron	8
Lagging, each	12½	Drill steel (English) per pound	22
Hercules powder, No. 1	55	Boiler tubes (¾)	9.30
" No. 2	40	Gas-pipes, per foot	80
Fuse, per thousand feet	9.00	Wire rope, Roebing, 1"	37
Black powder, per keg	7.50	" ½"	18
Hammers, per pound	24	Hemp rope, per pound	14
Pickeys, per doz.	8.00	Babbitt metal, per pound	18
" handles, per doz.	3.50	Copper rivets	42
Sledge handles, per doz.	2.35	Salt, per ton	39.00

ASSAY DEPARTMENT OF THE ENGINEERING AND MINING JOURNAL.

This department is opened for the benefit of miners, prospectors, and others interested in minerals.

Replies will be made in these columns, and *without charge*, to questions asked regarding the nature and commercial value of minerals, and of samples sent.

Assays, determining the actual composition and value of ores, will be made at the following rates. All assays are made with the utmost care by the most experienced and competent assayers:

Assay for gold	\$3.50	Assay for copper	\$3.00	Assay for iron	\$4.00
" silver	3.00	" lead (wet)	3.00	" nickel and	
" gold and silver	5.00	" zinc	5.00	" cobalt	10.00

The amount should invariably accompany the order, and expressage or postage must always be prepaid.

Communications, samples, etc., to be addressed to
ENGINEERING AND MINING JOURNAL, 27 Park Place, New York
(P.O. Box 1833.)

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Dec. 30.

The business of the past week has been curtailed to five days, and being holiday time, the transactions have been small, amounting to 620,123 shares. The wreck of Robinson Consolidated has produced a demoralization which it will take some time to overcome. The year closes with poor prospects for the mining interests.

In the Tuscarora stocks the only notable feature has been a business of 3600 shares in Navajo at 10@22c.

The Comstock shares have been quiet and weak. California sold at 40@27c. to the extent of 8903 shares. Consolidated Virginia declined from \$1 1/4@95c.; the sales of this stock amounted to 9420 shares. Sierra Nevada declined from \$9 3/4@9 1/2. Mexican ranged between \$9 3/4 and 8 1/4, and Union between \$14 1/2@14.

In the Bodies, Standard has been a feature, declining to \$17 1/2, but recovering again to \$19 1/2. Bodie ranged between \$2 1/2@2.90, with sales of 1100 shares. Boston Consolidated was active at 50@41c., the sales aggregating 24,900 shares. The stocks of the other mines in this district have been very quiet.

Alice declined from \$3.20@2.80, with sales of 4450 shares. Chrysolite ranged between \$3 1/2@4.60 on sales of 2875 shares. Eureka touched \$11 1/2 yesterday. Green Mountain has been active and weak, the sales amounting to 8300 shares at \$2.55@2. Hibernia has been active and irregular, the sales aggregating 35,100 shares at 18@35@24c. Horn-Silver has been quiet and steady at \$15 1/2@16 1/2. Iron Silver has had a liberal business at strong prices, the sales amounting to 12,150 shares at \$1.95@2.15. Leadville has been active and a little weak. Moose has been quite active and strong; the sales aggregating 37,070 shares at 66c.@1.10. Robinson Consolidated continues to be the feature of the market. The sales amount to 165,780 shares at \$1.95@3.35@3.25. It is said that Mr. Ashburner's report will not give 1000 tons of ore. Several experts, who lately examined the mine, placed the reserves at 300 to 1000 tons. The reserves, at least, are said to be practically exhausted. Something else may be developed, but the prospects are very discouraging.

Central Arizona declined from \$1.75@1.50 on sales of 4150 shares. Cherokee sold down to 35c. today. The sales aggregate 5300 shares. North State has ranged between 25@15c., with sales of 21,600 shares. The business in Oriental & Miller amounts to 14,000 shares at 41@30c. State Lines, Nos. 1 and 4, have been quiet and fairly steady at 23@27c., with sales of 11,700 shares. Nos. 2 and 3 record sales of 34,700 shares, at \$1.70@1.45. Suro Tunnel declined to 88c.; sales for the week, 16,600 shares.

DIVIDENDS.

The Bulwer Consolidated Mining Company has declared its second monthly dividend of ten cents per share, payable January 12th. Transfer-books close January 3d, 1882.

Interest on first mortgage bonds of the Fairmount Coal and Iron Company, due January 1st, will be paid at the Continental National Bank, New York, after December 24th, 1881.

The Evening Star Mining Company has declared a dividend (No. 25) of five per cent on the capital stock, payable December 29th. The transfer-books closed on the 27th inst.

The Morning Star Consolidated Mining Company has declared a dividend (No. 3) of 2 1/2 per cent on the capital stock, payable on the 30th inst. The transfer-books closed on the 27th.

The Osceola Copper Mining Company has declared a dividend of \$1 per share.

The Saltburg Coal Company has declared a semi-annual dividend of 3 1/2 per cent on the capital stock of the company, payable after December 27th, at the banking-house of B. K. Jamison & Co., Third and Chestnut streets, Philadelphia.

UNLISTED QUOTATIONS.

Mr. L. V. Deforest, No. 70 Broadway, under date of December 30th, 3 P.M., reports the current quotations of unlisted stocks as follows:

Table with 4 columns: Bid, Off'd, Menlo, Bid, Off'd. Rows include Highland Chief, Hite, Lowland Chief, Menlo, Satemo.

DIVIDEND-PAYING MINES.

Large table with columns: NAME AND LOCATION OF COMPANY, SHARES, ASSESSMENTS, DIVIDENDS, HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE. Rows list various mining companies like Alice, Amie, Argenta, etc.

SALES.—Alice, 4450; Amie Consolidated, 3300; Barbee & Walker, 500; Bodie Consolidated, 1100; Bulwer, 910; California, 8903; Caribou, 100; Chrysolite, 2875; Climax, 500; Consolidated Virginia, 9420; Copper Queen, 100; Deadwood, 50; Eureka, 275; Excelsior, 1750; Father de Smet, 510; Findley, 500; Gold Stripe, 2600; Great Eastern, 2400; Gr. Mountain, 8300; Hibernia, 35,100; Homestake, 50; Horn-Silver, 860; Hukill, 600; Independence, 500; Iron-Silver, 12,150; La Plata, 100; Leadville, 6350; Little Chief, 2100; Little Pittsburg, 3000; Moose, 37,070; Navajo, 3600; Northern Belle, 520; North Belle Isle, 100; Ontario, 100; Ophir, 860; Plumas, 1500; Quicksilver, pref., 300; common, 200; Rising Sun, 100; Robinson Consolidated, 165,780; Sierra Nevada, 1200; Silver King, 400; Spring Valley, 300; Standard, 885; Stormont, 200; Tip Top, 20; Vizina, 5200. Dividend shares sold, 325,488.

REVIEW OF THE SAN FRANCISCO MARKET.

Prices of Comstock shares are fairly maintained, and it is given out that recent developments in the north end mines, particularly in Union Consolidated, show quite an improvement. The occurrence of the holidays, however, has a retarding influence on speculation. News from the Comstock is meager.

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

Boston, Dec. 29.

There is a very firm market for copper stocks, although prices do not show any material advance, with perhaps a few exceptions. There is a prevailing impression, however, that with the continued advance in ingot copper the price of stocks can not be much longer delayed, and we confidently look for an active and advancing market during the coming month.

Calumet & Hecla continues firm at \$237@237 1/2, although the transactions have been very light. Pewabic advanced from \$15@16 on light sales. The reports from the mine continue favorable. A mass of over eight tons was taken from the mine last week, and the outlook is very encouraging.

Franklin advanced from \$14@14 1/2. Quincy has ruled strong, and advanced to \$50—the highest point for the year.

Osceola steady at \$31. There is more inquiry for the low-priced stocks, and we note sales of Ridge at \$4@4 1/2; Phoenix at \$2 1/2; National at \$3; Huron at \$4; Allouez at \$3. In silver stocks, there is no activity, and with the excep-

tion of Harshaw, which had one of its periodical jumps, the market is unusually tame.

Bonanza Development steady at \$4 1/2.

Sullivan declined to \$2 1/2.

Silver Islet advanced to \$19 1/2 on sale of 15 shares only. Harshaw, which has ruled dull at about \$3, on Friday last advanced to \$4, and the next day to \$5. The cause of the advance would be hard to say, but that there was no good reason for it is patent from the fact that it declined as rapidly, and sold to-day at \$4.

At the Boston Mining and Stock Exchange, the business has been very light, but prices as a rule are slightly higher. Deer Isle declined to \$30 and advanced to \$33; Empire steady at \$26@27; Massachusetts & New Mexico advanced to 25c., but was a little off again to-day, selling at 22c.

3 P. M.—At the afternoon Boards, prices were very firm. Atlantic, \$17 bid; Calumet, \$23 1/2. Sales: Franklin, \$14 1/2 @ \$14 1/2; Pewabic, \$16 bid; Quincy, \$48 1/2 @ \$50; Silver Islet, \$10 1/2 bid; Osceola, \$30 1/2 bid; Deer Isle sold at 33c.; Sullivan, \$2 1/2 bid; Harshaw, \$4 1/2 @ \$5.

Coal Stocks.

NEW YORK, Friday Evening, Dec. 30.

The transactions in these stocks have been marked by an increased degree of activity and a tendency to higher prices. The aggregate sales in this market and in Philadelphia, notwithstanding the loss of one day, are 453,051 shares. Delaware, Lackawanna & Western, on a business of 189,550 shares, has fluctuated between \$126 1/2 @ \$128 1/2. Delaware & Hudson sold at \$108 1/2 to-day, as against \$106 1/2 on Tuesday, these being the extreme prices; the sales

SAN FRANCISCO MINING STOCK QUOTATIONS. Daily Range of Prices for the Week.

Table with columns: NAME OF COMPANY, CLOSING QUOTATIONS (Dec 23-28), Opening Dec 29, Opening Dec 30. Lists various mining companies like Alpha, Alta, Bechtel, etc.

NON-DIVIDEND PAYING MINES.

Large table with columns: NAME AND LOCATION OF COMPANY, NUMBER OF SHARES, Par, ASSESSMENTS (Total levied to date, Date and amount of last), HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE (Dec 24-30). Lists mines like Albion, Allouez, Alta, etc.

amount to 10,590 shares. New Jersey Central records sales of 79,600 shares at \$89 1/4 @ \$93. Reading has been active, the sales in this market amounting to 55,200 shares at \$64 1/4 @ \$69 1/4.

In the Common Pleas Court, on the 28th inst., a hearing was had upon the bill in equity, filed by the McCalmonts against the Philadelphia & Reading Railroad Company, praying for the appointment of a master to take supervision and control of the election next January.

Gas Stocks.

The following list of companies in New York and vicinity is corrected weekly by GEORGE H. FRENSS, Broker and Dealer in Gas Stocks, No. 17 Wall street, New York. Quotations are based on the equivalent of \$100.

Table with columns: COMPANIES IN NEW YORK AND VICINITY, Capital Stock, Par, DIVIDENDS (Rate per ann., Am. of last, Date of last), QUOTATIONS (Bid, As'd). Lists companies like Mutual, N. Y., N. York, Metrop., etc.

BULLION MARKET.

NEW YORK, Friday Evening, Dec. 30.

An advance in the rate for silver in London, and a better sterling exchange market, have slightly improved the rates for silver in our market; but there are no indications of any decided change, either way, in the near future for silver.

Table with columns: DATE, London (Pence, Cents), N. Y. (Pence, Cents). Shows bullion prices for Dec 24, 26, 27.

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended December 23d, as compiled from various sources, amounted to \$348,702.44, as against \$257,517.79 reported for the previous week. The receipts from January 1st to date are \$16,980,612.19.

Exports of Gold and Silver from New York.

Table with columns: Week ending, Corresponding week last year, Since January 1st, Corresponding period last year. Shows export figures for Dec 24, 26, 27.

of England at their regular weekly meeting made no change in the Bank's minimum rate for discounts, and it remains at 5 per cent. During the week, the bank lost \$434,000 bullion, and the proportion of its reserve to its liabilities was reduced from 35% to 34% per cent, against 38 5/16 at same date last year. To-day the bank gained \$50,000 bullion on balance. The weekly statement of the Bank of France shows specie changes as follows: Gold increase, 2,550,000 francs, and silver decrease 2,700,000 francs.

BULLION PRODUCTION FOR 1881.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official state-

Foreign Bank Statements.—The Governors of the Bank

£71½, which figure brought out sellers, and buyers then refused to pay over £71, said terms, which to £71½ was the closing quotation. In cash stuff, a good trade took place from £69½@£70¼, the final values being £70@£70¼.

Dec. 16th. Again we have to note a strong market for Chili Bars, with a good business doing both for cash and forward delivery. Sales of g. o. bs. were reported from £70@£70½ cash, £71@£71½ sundry extended prompts, also a moderate quantity of best marks at £70½@£71 cash. There was a firm appearance at the close of second 'Change, though the highest figure was not maintained for three months' stuff.

Tin.—During the week, about 100 tons of tin have changed hands, and at the close 24½c. is asked and 24¼c. bid for cash lots. For small lots the quotations are 24¾@24½c. At one time, advices from London were very strong, owing probably to the report that the Billiton sale of 13,000 piculs brought high figures. The latest cables are £109 for spot, and £111 for futures.

We have the following mail advices from London :
Dec. 12th. Tin is strong, and shows an advance of about 1s. 6d. per cwt. since 9th inst. Sharp cash metal has found prompt takers up to 109½s., fourteen days prompt to 110s., three months to 111s.; the market closing with rather buyers than sellers at these rates.

Dec. 13th. Tin is firm, and a fair business done at slightly higher prices. Sharp cash sold up to 110¼s., fourteen days prompt to 110¾s., one month to 111s., three months to 111½s., and these were the final values.

Dec. 14th. Tin has sold on rather easier terms. Sharp cash was disposed of from 110¼s. down to 109¾s., fourteen days from 110½@110s., two months prompt went at 110½s., three months at 111½@111s.; the market closing with rather sellers than buyers at the lowest figures.

Dec. 15th. A large trade was done, but at lower prices, sharp cash selling from 109½s. down to 108¾s., fourteen days 109¼s., one month 110@109¾s., three months 111¼@110s.

Dec. 16th. Quiet, but prices are fairly steady. Sharp cash changed hands from 109¼s. down to 108¾s., fourteen days 109¼s., one month 109½@109¾s., three months 110¼s., with further sellers.

Tin Plates—Have been very quiet and dull. Quotations are unchanged, coke tins alone having weakened somewhat, being \$5.55@5.60 per box.

Lead.—The market is virtually unchanged, and little business has been done. We learn that yesterday an offer of 5'15c. for 800 tons of Richmond lead for future delivery was made, but was refused. For Common, lead is now quoted at 5½@5¼c. and Refined at 5½c. For the latter figure, considerable quantities for January and February delivery might be obtained. London cables £15.

Spelter and Zinc.—There is considerable inquiry, and consumers show a disposition to make engagements far into the next year. The supply of domestic Spelter is limited, and lots of 3 to 4 cars have brought 6c. cash, which is the figure we quote also for Silesian, for which also there is much demand. Sheet-Zinc is somewhat easier, owing to lead arrivals. We quote 7¼@8c.

Antimony.—With a steady inquiry and light supplies, this metal is getting into better shape. Cookson's is worth 14¼@14½c., and American 13c.

Quicksilver.—The San Francisco Commercial Herald of December 22d, 1881 says:

The spot market lacks vitality. The nominal price is 37½c., and in London £6 5s. per bottle. The schr. Golden Fleece will carry for Mexico 750 flasks, valued at \$22,500, shipped by J. B. Randol; 300 do., valued at \$9000, shipped by Falkner, Bell & Co.; and 100 do., valued at \$2854, shipped by Cabrera, Roma & Co.

The exports for the week, by sea, were as follows :

To Melbourne per Zealandia, hence 20th inst.:		
Muecke, Vitor & Co.	30	\$875
To Auckland per same:		
Hellman Brothers & Co.	25	720
Wilkins & Co.	25	725
To Hong Kong per Oceanic, 21st inst.:		
Wing Chong Wo & Co.	300	8,745
Totals	380	\$11,065
Previously since Jan. 1st, 1881.	33,163	965,482
Totals	33,543	\$976,549
Totals same period 1880	33,878	1,017,263

Receipts since January 1st, 1881, 50,515 flasks. The shipments by rail for the first ten months aggregate 10,310 flasks, of which 5530 flasks were shipped from this city.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Dec. 30.

Some departments of the iron trade have been quiet, as is usual during the holiday week; but in all there has been a very large business done. There is a very strong effort on the part of makers and others to prevent a "boom." Despite this, prices have been steadily advancing, and the situation at the present time would warrant a great "boom" if speculators could get any thing upon which to base the movement. As it is, prices are likely to advance on the legitimate requirements of the country, which, if they continue as great as they are now, it will be impossible to meet either by our own product or importations. Our importations of manufactured iron and steel from Great Britain alone have amounted to about 100,000 tons per month during this year, while at the same time we have consumed about 800,000 tons of foreign iron that was in store at the beginning of the year—the residue of the last "boom." It will therefore be seen that our wants have been more than 60 per cent greater than our importations, and even what we have imported has greatly advanced freights and absorbed all spare vessel room. Those familiar with the situation say that the prospects of vessels are not so good as they were, and that reliance will principally be had on steamers; that the sailing vessels are generally fully employed on long voyages in other trades. A good authority makes the following estimate, which does not cover every thing, of the importations that will have to be made for railroad needs and the manufacture of railroad material :

Ore	850,000
Bessemer pig	350,000
Steel rails	240,000
Iron	50,000
Spiegel	50,000
Blooms	120,000
	1,660,000

This does not include old rails, scrap iron, Scotch and English pig, bar iron, tin plates, etc. In addition to the demands we shall make principally on Great Britain, all late advices indicate great activity on the continent, and higher prices there.

American Pig.—We learn of sales of 15,000 tons of Thomas iron at \$26 for No. 1 Foundry, \$24 for No. 2 Foundry, and \$23 for Forge. In addition to this, there has been a considerable business in other irons, the particulars of which are kept private. There is a great disposition to underquote the market; but when buyers attempt to secure iron, they do not get it in quantity at the figures named. In fact, bids \$1@2 per ton over quoted prices from responsible parties able to pay cash have been rejected. The object of the makers is apparently to keep out foreign iron, and prevent a "boom." As there is but little American iron in stock, and a very large proportion of next year's production has already been sold, it seems impossible for this condition of affairs to be maintained. We quote nominally as follows: No. 1 Foundry, \$26@27; No. 2 Foundry, \$24@25½; and Forge, \$23@23½. There is a suspicion that a large amount of iron is going West at better prices than are quoted here. An advance in wages of about 15 per cent will take place at the New Jersey iron mines and at the furnaces on the Lehigh on January 1st.

Scotch Pig.—The arrivals are moderate and sales light. The stock here is estimated at about 2000 tons. We note a sale of 500 tons of Glengarnock at \$25, and other sales, the particulars of which are withheld, but stated to be at full quotations. We quote Eglinton at \$24; Coltness, \$26½@27; Glengarnock, \$25; Gartsherrie, \$26; and Summerlee, \$26. The stock of Bessemer iron here is said to be about 6000 tons, the greater portion of which, if not all, is held at \$30.

Messrs. John E. Swan & Brothers, of Glasgow, under date of December 16th, report 105 furnaces in blast, as against 122 at the same time last year. The quantity of iron in Connal & Co.'s stores was 636,156 tons, an increase of 2493 tons for the week. The shipments show a decrease since last Christmas of 90,895 tons, as compared with the shipments to the same date in 1880. The imports of Middlesbrough pig-iron for the same period show an increase of 29,769 tons. The following were the quotations of the leading brands of No. 1 pig-iron: Gartsherrie, 60s. 6d.; Coltness, 62s.; Langloan, 62s.; Summerlee, 60s.; Carn-

broe, 56s.; Glengarnock, 55s.; Eglinton, 53s. Middlesbrough pig-iron was quoted as follows, f. o. b.: No. 1 Foundry, 47s. 3d.; No. 2, 45s. 3d.; No. 3, 43s. 3d.; No. 4, 42s. 9d.; No. 4 Forge, 42s. 3d.

Rails.—In these there has been no business worthy of note. Quotations are nominally unchanged.

Old Rails.—Without business, we quote Ts. at \$29 and D. Hs. at \$31¼.

Wrought Scrap.—We note a sale ex store at \$31.

We publish the following letters from our regular correspondents :

Baltimore. Dec. 27.
[Specially reported by R. C. HOFFMAN & Co.]

The iron market shows increased inquiry for best grades of car wheel and foundry iron. With light stocks on hand, prices are tending upward. We quote present rates about as follows :

Balt. Char.	\$36.00@38.00	Anth. No. 3.	\$21.00@23.00
Va.	36.00@38.00	Mot. and Wh.	20.00@21.00
Anth. No. 1.	26.00@27.00	Cl. C. B. Bl'm	70.00@75.00
" 2.	24.00@25.00	Refined Bl'm	60.00@65.00

Cincinnati. Dec. 28.
[Specially reported by JACOB TRABER & Co.]

Since our last, the situation of our pig-iron market has not changed. As is usual in the intermediate of the holidays, business is very quiet; prices remain unchanged but very firm, namely :

No. 1 Hanging Rock Charcoal	Four mon'ths.	\$29.50@30.00
" 2		28.50@29.00
" 1 Tenn. Charcoal		28.00@28.50
" 2		27.00@27.50
" 1 Hanging Rock and Virginia Coke		28.00@28.50
" 2		27.00@27.50
Jackson G. and C. Range		24.00@27.50
Hanging Rock C. B. C. Wheel, all Nos.		39.00@40.00
Virginia		38.00@39.00
Southern		37.00@38.00

Milwaukee. Dec. 27.
[Specially reported by R. P. ELMORE & Co.]

We have to report a steady business in sales and consumption of pig-iron, with more disposition to buy at present prices, owing to reported advances in the Eastern markets. We still quote last month's prices, namely :

No. 1 Lake Superior	\$30.00
" 2	29.50
" 3	33.00
" 4, 5, 6,	34.00
" 1 Eastern Foundry	30.00
" 2	28.00
" 1 Silvery (Ohio)	26.50
Summerlee Imperial Scotch	31.50
Glengarnock	31.00
F. O. B. cars here; four months.	

Pittsburg. Dec. 27.
[Specially reported by A. H. CHILDS.]

There has been a very active market during the past week, and indications favor a further advance in prices. Quotations are :

No. 1 F'dry	\$26.50@28.00	M. & White	\$23.00@23.50
No. 2	25.00@26.00	Hot Blast Ch.	30.00@35.00
Gray Forge	24.50@26.00	Cold Blast W.	35.00@41.00

Richmond. Dec. 27.
[Specially reported by ASA SNYDER.]

The season is closing with the usual business distractions incidental to the holidays, but with no indication of a weakening market. It may be difficult to obtain the articles scheduled below, at present quotations, one week hence.

Scotch Pig-Iron	\$24.50@27.50
Anthracite Pig-Iron No. 1	26.00@28.00
" " No. 2	24.00@25.50
" " No. 3	24.00@25.50
Virginia Coke Pig-Iron, No. 1	24.00@24.50
" " No. 2	22.50@23.50
" " No. 3	20.00@23.00
Va. Charcoal C. B. Wheel Iron	34.00@36.00
Old Rails	29.00@31.00
Wrought Scrap No. 1	26.00@28.00
Cast Machinery Scrap	20.00@21.00
Richmond Refined Bar-Iron	2 8-10@ 03
Horse-Shoes (Tredegar)	4.00
Mule	4.50

St. Louis. Dec. 24.
[Specially reported by HOFFER, PLUMB & Co.]

The condition of the market has not changed. Makers continue firm in their views, some anticipating higher prices for all of next year, while others hope only for a continuance of the strong market at about present prices. Consumers continue their policy of buying only for their present needs, though some feelers as to a supply forward of wants are put out. Our quotations of last week fairly represent prices here.

Missouri	\$28.00@
Southern	28.00@
Ohio	30.00@31.00

Missouri	None offering.
Southern	\$27.50@29.00
Ohio	27.00@

Red short	\$25.00@26.00
Neutral	23.00@24.00

Missouri	\$28.00@34.00
Southern	35.00@38.00
Ohio	32.00@43.00

Philadelphia. Dec. 30.

Quotations to-day are. No. 1 Foundry, \$26@27; No. 2, \$24@25; Gray Forge, \$23@24.50; English, \$20@20.50, some little \$21; Scotch, \$24@26; Bes-

semer, \$27.50. The largest sale of the week heard of was 500 tons Forge; the aggregate reported being 1800 tons. Inquiries were quieter than last week. Prices are very firm; companies are declining orders beyond urgent necessities of regular consumers. Some cinder iron from New Jersey ores, and white iron from furnaces west of here, are going westward at \$19@21 at furnace. Several New England contracts have been renewed; some at terms stated, others at prices to be named. The tone of the market indicates an advance. Producers report themselves able to meet all actual requirements. Large orders are floating about awaiting acceptance, some of them speculative. No transactions could be heard of in Bessemer. A decline is looked for, notwithstanding that a recent cablegram shows an advance in the foreign market. Muck Bars were advanced to \$46, and 1500 tons were sold at a little under.

Charcoal blooms are scarcer, and two or three lots were sold above current quotations. The forges are crowded with orders. Galvanized iron on prompt deliveries has been advanced; common and refined sheets are quieter, but accumulated orders will occupy capacity actively until the spring requirements are presented. It is probable that demand will be greater in March than during the fall months. Nails are quieter, but the sales exceed the average for the season. Concessions have been asked on large orders for spring delivery and declined, as local manufacturers want to enter on the spring trade free-footed; \$3.30 is firmly held, and an advance is confidently predicted because of extraordinary building activity coming. Merchant bars continue to be actively inquired for at the advance, 2'8c. Stores have calls for all they can deliver at 2'9@3c. quoted. Nothing has occurred in the opinion of manufacturers to check the upward tendency heretofore mentioned. While 2'8c. is quoted, few deliveries are guaranteed at that price. Structural iron is strong, but not particularly active. Plates exhibit evidences of weakness. The largest order this week was 1000 tons ship plates. Other large orders are being made out. Common is quoted at 3 1/4@3 1/2c.; Refined, 3 3/4c.; Shell, 4@4 1/4c. Wrought pipe works are full of orders. Steel rails are quoted \$60@58. Rumors of lower prices can not be substantiated unless trading of old iron rails for new steel rails is involved in transactions. Scrap dealers look for increased supply of old material. Quotations are irregular, and transactions light. Heavy scrap is firm and active. Large lots on cars sold between \$30@33.50; old car-wheels, \$27.50@28 on cars. Imports for week, light. Private cables show no material change in foreign situation.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Dec. 30.

Anthracite.

It is not usual to look for much business during the holiday week; still, even with the very mild weather, which has greatly curtailed the consumption of domestic sizes, there has been a very fair trade for this season of the year. Our statistics show that for 51 weeks of this year the shipments of anthracite coal aggregated in round figures 28,000,000 tons. During this the last week of the year, we estimate that the production will amount to 500,000, making a total for the year of 28,500,000. Our statistics at the same time show that the production last week was at the rate of 31,000,000 tons. Such a production is excessive at this season of the year, and it is not surprising that a cutting of prices should exist, probably in anticipation of a glutted market, rather than from a great excess of coal at the present time. The general opinion prevails that a curtailment should be made in January, but the presidents have not broached the matter yet.

Plans for the management of the trade for 1882 are submitted, but they contain nothing striking or novel. Fortunately the prospects for 1882 warrant the belief that the trade will nearly take care of itself; and although curtailment may be necessary for next month, it is feared that the long quietness of the miners will be disturbed during the coming year by strikes, with the result of all further curtailment that may be necessary.

Vessels are not in great supply, yet freights, especially to Boston, are lower. The production of anthracite coal last week was 594,845 tons, as compared with 634,797 tons the previous week, and 332,110 tons the corresponding week of 1880. The total

product from January 1st to December 24th was 27,991,164 tons, as against 23,096,111 tons for the like period of last year, showing an increase this year of 4,895,053 tons.

Bituminous.

A scarcity of cars still makes a scarcity of coal and high prices. The demand is almost entirely on contracts made months since, the incidental demand being small at present. In fact, the situation shows no change as compared with weeks past.

San Francisco.

Dec. 22.

Imports continue upon a free and liberal scale, and include the following cargoes: Willamette, 2800 tons Seattle, and the Mississippi, 1200 tons do.; Orpheus, 1223 tons Scotch from Glasgow; Idaho from Seattle, 260 tons; Vigilant from Liverpool, 2136 tons; Bonanza from same, 1194 tons; Arcata from Coos Bay, 500 tons; Ardvär from Ardrossan with 1120 tons Scotch; Proteus from New York, 900 tons Anthracite for the Navy Yard; Standard from Philadelphia with 700 tons Cumberland; G. C. Tobey from New York with 400 tons Hard; George F. Manson from Liverpool with 1797 tons; Empire from British Columbia with 825 tons Wellington. A private circular before us says asking prices for cargoes of foreign coals, early loading, are the same as last week; but buyers are not as anxious to purchase, as the seasonable rain-fall of the week leads them to believe that freights from Europe will decline and lower prices may be looked for in the near future. The coal room of the wholesale dealers is fully taxed, hence cargoes arriving unsold do not find anxious buyers. Lump Lehigh is still scarce and high; there are not 100 tons in first hands. We submit the following schedule of rates:

	Prices to arrive.	Spot rate.
Australian	\$6.62 1/2 @ 6.75	\$6.75
Liverpool steam	5.87 1/2 @ 6.00	6.00
West Hartley	6.62 1/2 @ 6.75	6.75
Scotch splint	6.37 1/2 @ 6.50	6.50
Cardiff	6.50 @ 6.75	6.25
Lehigh lump	13.25 @ 13.50	18.00
Cumberland bulk	11.00 @ 11.25	13.00
Egg hard	11.50 @ 11.75	14.00

Retail prices of Wellington and other household coals are out of all proportion high. The Hyton Castle has 1530 tons Wellington.—Commercial Herald

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended Dec. 24th, and years from January 1st:

Tons of 2240 lbs.	1881.		1880.	
	Week.	Year.	Week.	Year.
<i>Wyoming Region.</i>				
D. & H. Canal Co.	81,443	3,581,781	44,630	3,002,807
D. L. & W. RR. Co.	97,818	4,271,953	53,770	3,479,628
Penn. Coal Co.	27,621	1,406,059	17,390	1,110,443
L. V. RR. Co.	27,371	1,155,492	15,322	1,033,472
P. & N. Y. RR. Co.	3,501	105,454	650	39,047
C. RR. of N. J.	47,088	2,282,160	27,017	1,709,840
Penn. Canal Co.		457,260		457,629
	284,842	13,260,159	158,779	10,832,876
<i>Lehigh Region.</i>				
L. V. RR. Co.	105,066	4,519,907	58,066	3,399,226
C. RR. of N. J.	46,751	2,175,906	26,158	2,039,981
S. H. & W. B. RR.		10,926		9,515
	151,817	6,706,739	84,224	5,448,722
<i>Schuylkill Region.</i>				
P. & R. RR. Co.	156,878	6,945,243	79,529	5,897,366
Shamokin & Lykens Val.	*	1,014,823	7,842	868,411
	156,878	7,960,066	87,371	6,765,777
<i>Sullivan Region.</i>				
S. L. & S. RR. Co.	1,308	64,200	1,136	48,736
Total	594,845	27,991,164	332,110	23,096,111
Increase	262,735	4,895,053		
Decrease				

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

* These reports were not received this week.

Total same time in	1876	1877	1878	1879
1876	18,105,339 tons.	20,134,739	17,127,681	25,769,385

Belvidere-Delaware Railroad Report for the week ending Dec. 24th:

	Week.	Year. 1881.	Year. 1880.
Coal for shipment at Coal Port (Trenton)	304	84,525	53,273
Coal for shipment at South Amboy	22,954	675,178	498,884
Coal for distribution	16,104	718,495	503,130
Coal for company's use	2,194	113,780	104,907

The decrease in shipments of Cumberland Coal, over the Cumberland Branch and Cumberland & Pennsylvania railroads, amounts to 86,857 tons, as compared with the corresponding period in 1880.

The Transportation of Coke over the Pennsylvania Railroad for the week ending Dec. 10th, and year from Jan. 1st:

Tons of 2000 lbs.	Week.	Year.
Penn. RR. (Alleghany Region)	2,293	93,176
West Penn. RR.	3,195	116,940
Southwest Penn. RR.	36,668	1,328,401
Penn. & Westmoreland Region, Pa. RR.	5,500	190,401
Pittsburg, Penn. RR.	10,339	519,903
Show Shoe (Clearfield Region)	387	12,161
Total	58,382	2,260,982

The Production of Bituminous Coal for the week ended Dec. 10th was as follows:

Tons of 2000 lbs., unless otherwise designated.	Week.	Year.
<i>Cumberland Region, Md.</i>		
*Tons of 2240 lbs.	43,518	2,197,716
<i>Barclay Region, Pa.</i>		
*Barclay RR., tons of 2240 lbs.	8,203	411,235
<i>Broad Top Region, Pa.</i>		
*Huntingdon & Broad Top RR.	3,515	201,711
East Broad Top	2,015	80,161
<i>Clearfield Region, Pa.</i>		
Snow Shoe	3,160	115,804
Tyrone and Clearfield	46,455	5,256,390
<i>Alleghany Region, Pa.</i>		
Pennsylvania RR.	8,481	274,044
<i>Pittsburg Region, Pa.</i>		
West Penn. RR.	7,630	275,193
Southwest Penn. RR.	912	27,246
<i>Lehigh & Westmoreland gas-coal, Pa.</i>		
RR.	25,222	914,141
Pennsylvania RR.	15,722	649,048

* For the week ending Dec. 24th.
The shipments of Cumberland Coal, over the George's Creek & Cumberland RR., by the Maryland and the American Coal companies, for the week ended Dec. 24th, amounted to 6117 tons, making a total of 207,824 tons since the beginning of transportation.

FREIGHTS.

Coastwise Freights.

Per ton of 2240 lbs.

Representing the latest actual charters to Dec. 30th, 1881.

PORTS.	From Philadelphia.	From Baltimore.	From Elizabethport, Port Johnston, South Amboy, Hoboken, and Weehawken.
Alexandria			
Annapolis			
Albany			
Baltimore	.60		1.00
Bangor			1.75
Bath, Me.			1.60
Beverly			1.60
Boston, Mass.	2.25@2.30		1.50@1.60
Bristol			
Bridgeport, Conn.			.65
Brooklyn			
Cambridge, Mass.			
Cambridgeport			
Charleston	1.37 1/2@1.40		1.80
Charlestown			1.50
Chelsea			
City Point			
Com. Pt., Mass.			
E. Boston			1.50
East Cambridge			
E. Greenwich, R. I.			1.00
Fall River			
Galveston			
Georgetown, D. C.			
Gloucester			
Hartford			
Hackensack			1.00
Hudson			
Lynn			
Marblehead			
Medford			
Millville			
Milton			
Newark, N. J.			1.10
New Bedford			1.75
Newburyport			.65
New Haven			1.00
New London			.75
Newbern			1.00
Newport			
New York	.95		
Norfolk, Va.	1.00		
Norwich			
Norwalk, Conn.			.80
Pawtucket			1.10
Philadelphia			
Portland			1.50
Portsmouth, Va.			1.10
Portsmouth, N.H.	2.50		1.75
Providence	1.80@2.00		1.75
Quincy Point			1.60
Richmond, Va.	1.50		
Rockland			
Rockport			
Roxbury			
Saco			
Sag Harbor			
Salem, Mass.			1.50
Saugus			
Savannah			1.00
Savermet			
Staten Island			
Trenton			
Troy			
Wareham			
Washington			
Weymouth			
Williamsbz, N.Y.			
Wilmington, Del.			
Wilmington, N.C.			

* And discharging. † And discharging and towing. ‡ 3c. per bridge extra. § Alongside. ‖ And towing up and down. ¶ And towing. ** Below bridge.

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A Brain Restorer.

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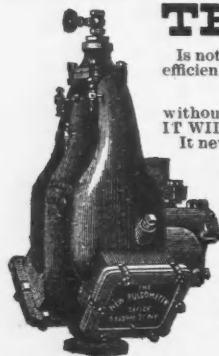
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THE CINCINNATI, VIRGINIA & CAROLINA Railroad, with its connections, will make an air line from Cincinnati to Charleston, South Carolina, starting at WADESBORO, NORTH CAROLINA, running northwest through SALISBURY, WILKESBORO, AND JEFFERSON, NORTH CAROLINA, through MARION, VIRGINIA, and north through WEST VIRGINIA, to CHARLESTON, Kanawha County, making a line of 300 miles. The whole distance through a section of the country rich in agricultural and mineral products, such as coal, iron, copper, cotton, tobacco, corn, and wheat. The gross earnings of the road when finished will average over TEN THOUSAND (\$10,000) dollars per mile. This will give gross earnings of three million (\$3,000,000) dollars per year, which will yield large and remunerative dividends to the stockholders.

Subscriptions to the stock will be received at the office of the Company, 39 BROADWAY, NEW YORK, or by the MUTUAL TRUST COMPANY, 115 BROADWAY, NEW YORK CITY.

Full information will be sent on application to the Company.

SPECIAL NOTICES.

SEALED PROPOSALS FOR BUILDING 100 coke-ovens on Laurel Fork of Bluestone River, in Tazewell Co., Va., will be received until noon, January 15th, 1882. For blank forms, specifications, and drawings, apply at the office of the South West Virginia Improvement Co., 37 South 3d Street, Philadelphia, or of the Supt. of Works, Abbs Valley, Tazewell Co., Va. Parties wishing to go to Abbs Valley can go to Lowell station, on Ches. & Ohio RR., or to Dublin or Wytheville, on Norfolk & Western RR., and thence by conveyance. The company reserves the right to reject any and all bids.

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DIVIDENDS.

THE ROBINSON CONSOLIDATED MINING COMPANY, No. 18 Wall Street, New York, Nov. 1, 1881.

DIVIDEND NO. 8.

The Board of Trustees have this day declared the regular DIVIDEND OF FIFTY THOUSAND DOLLARS, also an EXTRA DIVIDEND (No. 3) of FIFTY THOUSAND DOLLARS, making one hundred thousand dollars, payable on and after November 15th, 1881, at the office of the company.

The transfer-books will close at 3 o'clock P.M. of the 5th, and remain closed until 10 o'clock A.M. of the 16th inst. JAMES K. SELLECK, Secretary.

OFFICE OF THE STORMONT SILVER MINING COMPANY, No 2 Nassau Street, New York, Oct. 19, 1881.

DIVIDEND NO. 5.

The Board of Trustees have this day declared a monthly dividend of FIVE CENTS per share, payable on the first day of November, at this office.

The transfer-books will close on the 26th inst., and reopen November 2d. WILLIAM S. CLARK, President. JOHN R. BOTHWELL, Secretary.

OFFICE OF THE GREEN MOUNTAIN GOLD MINING COMPANY, of California, No. 18 Wall Street, New York, October 13th, 1881.

DIVIDEND NO. 28.

The Trustees have this day declared a dividend of SEVEN AND ONE-HALF CENTS per share on the capital stock of this company for the month of September (being the 28th consecutive monthly dividend; and making a total to date of \$203,000), payable on the 26th inst.

Transfer-books close on the 19th, and reopen on the 26th of September. J. JAY PARDEE, Secretary.

NEW YORK, Nov. 2, 1881.

THE STANDARD CONSOLIDATED MINING COMPANY to-day declared its regular monthly dividend of

SEVENTY-FIVE CENTS PER SHARE, payable Nov. 12th, 1881, at the Farmers' Loan and Trust Co., 26 Exchange Place, New York. Transfer-books close Nov. 5th, and open on 14th inst. M. R. COOK, Vice-President.

VIZINA CONSOLIDATED MINING Co., (New York, Dec. 15, 1881.

THE TRUSTEES HAVE DECLARED FROM the earnings a regular monthly dividend of TEN CENTS per share, or \$20,000; also an

EXTRA DIVIDEND

of TEN CENTS per share, or \$20,000, both payable at the office of the Company, No. 39 Pine Street, on January 3d, 1882. Transfer-books close December 27th, 3 P.M., and reopen January 4th, 1882.

J. E. HASKELL, Vice-resident.

DIVIDEND NO. 28.

OFFICE OF THE LA PLATA MINING AND Smelting Company, of Leadville, Colo., 58 Broadway, Rooms 12 and 13, New York, Dec. 15, 1881.

DIVIDEND NO. 28.

The Board of Trustees have this day declared a dividend of SEVEN AND ONE HALF CENTS per share (par value \$10) on the capital stock, payable on TUESDAY, January 3d, 1881, at the office of the company. Transfer-books will close on Saturday, December 31st, and reopen Wednesday, January 4th, 1882.

Statement of the financial condition of the company: Working capital..... \$100,000.00 Nov. 1, 1881—Balance surplus account..... 63,240.98 Dec. 1, 1881—Net earnings for month of Nov. 16,263.00

\$179,503.98

Dividend of 7 1/2 cents per share, 200,000 shares. 15,000.00

Balance Dec. 1, 1881..... \$164,503.98

D. OLYPHANT TALBOT, Ass't-Secretary.

OFFICE OF COPPER QUEEN MINING COMPANY, 34 AND 36 THOMAS ST., NEW YORK, Dec. 15, 1881.

THE Board of Directors of this company have this day declared a monthly dividend (No. 7) of TWENTY-FIVE THOUSAND DOLLARS; also an extra dividend of TWENTY-FIVE THOUSAND DOLLARS, payable to stockholders of record on and after January 3d, 1882.

Transfer-books close December 29th, and reopen January 5th.

L. ZECKENDORF, Sec. and Treas. A. A. HAYES, Jr., President.

SAN FRANCISCO, Dec. 14, 1881.

THE FATHER DE SMET CONSOLIDATED

GOLD MINING COMPANY has declared DIVIDEND NO. 16, of 25 cents per share, payable at the office of LAIDLAW & CO., No. 14 Wall Street, January 3d, 1882. Transfer-books will close December 23d.

H. DEAS, Secretary.


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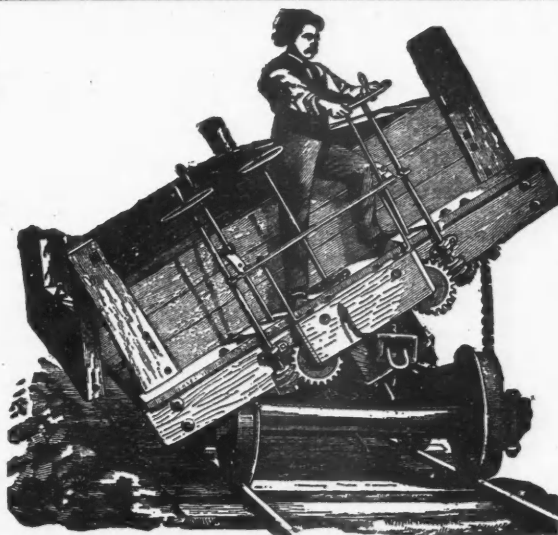
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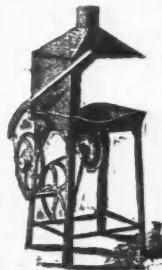
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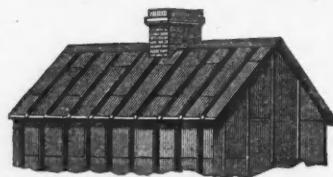
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