Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN. S. H. WALES. A. E. BEACH.

☞ "The American News Company," Agents, 121 Nassau street, New York

☞ "The New York News Company," 8 Spruce street.

☞ Messrs. Sampson Low, Son & Co., Booksellers, 47 Ludgate Hill, London, England, are the Agents to receive European subscriptions or advertisements for the SCIENTIFIC AMERICAN. Orders sent to them will be promptly attended to.

☞ Messrs. Trubner & Co., 60 Paternoster Row London, are also Agents for the SCIENTIFIC AMERICAN.

VOL. XVIII., No. 1....[NEW SERIES.]....*Twenty-third Year.*

NEW YORK, SATURDAY, JANUARY 4, 1868.

Contents:

(Illustrated articles are marked with an asterisk.)

ENCOURAGING PROSPECTS.

In our last issue we stated that it was our desire to increase the circulation of the SCIENTIFIC AMERICAN from thirty-five thousand to fifty thousand on the new volume. We are encouraged from the prompt manner in which our old patrons are renewing their subscriptions, and the large clubs of new names our good friends are sending in, that our ambition to increase the weekly circulation to fifty thousand will be early accomplished.

STEREOTYPING WITH PAPER.

This is now in common use in all the principal daily newspaper establishments in New York. It is conducted substantially as follows: The stereotyper first dries the form of types upon an iron steam table. The form is then partially unlocked and a hand brush is rubbed over the surface of the types, cleansing them preparatory to placing over the entire form a sheet or sheets of thin bank note paper, of the finest quality, previously wetted to insure the required pliability. This paper being evenly laid over the types, the workman takes a long-handled brush made of short, stiff bristles, with which he beats the wet paper evenly, forcing it into all the depressions of the types, taking care not to break the paper. This work finished, a dampened sheet of thicker but more ordinary paper is placed over the first. This is also brush-hammered down upon the types, and followed by another sheet of paper, thinly coated with a preparation of whiting and starch. Again the brush is used to beat this home, after which a brown paper backing is put on, and then the form of types, covered by the before-mentioned sheets of paper, is trundled to another steam table, where it is slid under a powerful screw press, several blankets folded over it, and all firmly held down until the paper matrix is dry-hardened, or "cooked," as the workmen express it. The papering process occupies three or four minutes, the cooking about twice as many. The matrix is now peeled off from the form and prepared for casting, by sifting it with finely powdered borax, which with a soft brush is thoroughly rubbed into the sunken surface left by the types. The surplus borax having been removed, the matrix (which now resembles hard but pliable pasteboard) is ready for the casting box, which is made of iron, either straight or curved, to suit the press bed. Handle irons hold the matrix in its proper place, at the exact distance (about half an inch) necessary for the thickness of the stereotype plate, which is made by pouring a quantity of hot type metal into an open end of the casting box. This metal, dropping between one surface of the casting box and the sunken surface of the matrix, fills up the latter without burning it. A few moments are allowed for cooling, and then the matrix is stripped from the warm plate, which is subsequently prepared for the press, by trimming down all thick lines, or chiseling away any superfluous metal, paring off the edges, filing, and otherwise treating the stereotype after the usual manner. Circular saws driven by steam power, and hand cutting machinery of various kinds are used in finishing, the whole operation of stereotyping occupying from fifteen to twenty minutes. A second plate may be obtained from the original matrix, in about two minutes, and almost any number of castings can be taken by careful workmen. In some offices only one mold is taken, this being used for casting the number of plates required for several presses. The stereotype, being an exact reproduction, in solid plate form, of the million or more types originally put together by the compositors, is fastened upon the Hoe, Bullock, or any other printing press, and used in place of the types. The advantage of duplicating the plates is apparent. Two or ten presses, working similar plates, will print off in a couple of hours an edition of twenty or a hundred thousand copies, which formerly occupied so much more time that when ten or twelve-cylinder "fast" presses became "slow," second and third editions were resorted to by editors desirous of giving the public the latest news. Previous to the use of stereotypes for newspaper purposes, duplicate forms were sometimes "set up" in type, an extra expense to the office adopting this course which was incurred only whenever a pressure of important news was likely to prevent the forms going to a single press in season for working off the edition. Compositors can now work until three and four o'clock in the morning, and half an hour later half a dozen "duplicates" of their work may be seen on as many different presses, striking off the printed sheets, units of an immense edition of perhaps seventy-five or eighty thousand copies of some newspaper, all of which are frequently counted and delivered to the carriers and newsmen before the editors, compositors, or stereotypers can reach their homes and retire to rest.

MINING EDUCATION---GOVERNMENTAL MINING SCHOOLS.

No department of industry in this country has received such an impetus, or been so largely developed within the past twenty years, as the mining of metals. Especially is this statement applicable to the production of the precious metals. Their mining and separation has become one of the most important departments of our national industry. From this source more than from any other, perhaps, is derived the bullion upon which the government relies to redeem its promises. Yet, with all the developments of new mines, the increase of the number of men engaged in the business, and the improvements made in reducing machinery and appliances, it is believed that the amount of the precious metals derived are wholly inadequate to the means, whether of labor, capital, or material, employed. Not only so, but the actual production is gradually declining. Surface workings, however rich, and however easily made profitable, are soon exhausted, and then the labor of human hands must be superseded by the power of machinery and the agency of chemical science.

And it is in these respects that the failure to increase the total yield of our gold and silver fields is most perceptible It is confidently asserted that our imperfect systems of reduction entail a loss of at least twenty-five per cent, probably more. On the Comstock lode, a return of sixty-five per cent of the silver contained in the ore is considered very fair. The yield of this lode for the past year is estimated at $17,000,000. A loss of thirty-five per cent amounts to more than $9,000,000.

We have received several communications on this subject, from practical men acquainted with the facts, all of whom attribute this waste entirely to a lack of scientific knowledge of the quality of the ores, the best methods and materials for their reduction, and to the want of proper machinery. To remedy this undesirable state of affairs, practical education is necessary, and the establishment of governmental schools for instruction in the treatment of ores is advocated. At present our skilled managers are mostly foreigners; those Americans who are engaged in mining, and possess a scientific knowledge of the business, having gained it in foreign schools. Mr. J. Ross Browne, in a pamphlet just received, proposes the establishment of a national school, for practical and scientific instruction in the reduction of ores, at some convenient locality in our gold and silver producing regions. That such a school, properly managed, is to be desired by every consideration of national advantage cannot be denied; but we cannot see the necessity of its being established or supported by the national government, any further than an appropriation of money or lands could be considered as an aid. Instruction in the science of the mining art is already adopted as a branch of study by several of our educational institutions. Yale, Harvard, Columbia, and other colleges have departments devoted to this branch, and others will undoubtedly follow their example. Neither do we see the necessity of locating such an institution as that proposed in a mining region. Assays of ores and their chemical treatment can as well be made and accomplished in New York city, or anywhere else, as in Colorado, California, Montana, or Arizona, and certainly the locations should be chosen with a view to the benefit of the greatest number. Governmental patronage and interference in our industrial pursuits seldom have produced satisfactory results. An endowment by government may be very well, but the institution should be managed by the associated effort of those directly interested.

A correspondent from Denver, Colorado, advocates similar schools, to be established and conducted by the legislatures of the states or territories. A bill for a school, he informs us, has been passed by the legislature of Colorado. This writer believes the institution will be self-sustaining from the income of donated property, tuition fees, the labor of students, assaying, ores presented for analysis, the proceeds of its own mines kept continually at work, and the preparation of plans, etc., for the construction of works. We confess we do not share in the sanguineness of our correspondent's belief. He expects the school to be in some respects an incorporated company, owning, controlling, and working its own mines. Such an institution, under the patronage and direction of a state legislature, would become, in all probability, a source of corruption, and its objects removed from the domain of science to the arena of politics. We see no more reason for establishing governmental schools for teaching mining than for teaching farming.

Doubtless, however, the facilities for procuring a thorough scientific and practical knowledge of the metals and their reduction from their ores should be increased, and that, we think, can be done without placing such institutions under the control of the government or locating them exclusively in mining regions. The remedy for the want of truly scientific knowledge on this subject is to be found in the exertions of individuals and companies directly interested in mining, rather than in appeals to the government either of a state or the nation.

Our Iron Deposits.

Iron ores of nearly every species and variety are distributed profusely over the whole country, and among them are species which belong to North America alone. Native iron—to commence with the simplest ore in which iron occurs—has only been met with in Canaan, Conn., in a vein or plate of two inches thickness, and is rather a mere curiosity. The ore, however, most generally distributed over the country is that of the mineralogical term limonite; it comprises a great number of varieties of all shades of color and the most varying forms, as the brown and yellow hematite, the pipe and bog ores. They are nearly all very well qualified for the manufacture of pig metal, and contain in their pure condition 59.15 lbs. of iron in 100 lbs. of ore. Vast beds of this ore are near Salisbury and Kent in Connecticut. Similar deposits are in the State of New York; it occurs in Massachusetts, Vermont, Maryland, and Ohio. The whole iron business of Hanging Rock depends upon it. Kentucky, Tennessee, and Alabama abound in inexhaustible beds of the best quality, but Pennsylvania is favored with the richest varieties of this mineral. It is there found in the anthracite region and in the valleys of the western coal formation. The kind of ore particularly adapted for the production of heavy wrought iron, yielding a most tenacious metal, is the red iron ore. If pure, it may contain about 70 per cent of iron, but when associated with clay, or silicious matter, it often does not yield more than 10 to 12 per cent of it. Specular iron and iron glance are varieties of this ore, the former being the kind from which the damask of Persia and the wootz of India are manufactured. In the United States it is, however, not yet found in any amount worth noticing, but other varieties are found throughout the Union. Heavy beds of the red variety occur in Wisconsin and Michigan; other but inferior varieties are largely met with in Missouri, New York, New Jersey, Pennsylvania and Arkansas.

MAGNETIC IRON ORE, LOADSTONE.—The richest kinds of this ore, as that occurring on the west side of Lake Champlain, contain 70 per cent of metallic iron; other varieties—conglomerates—do not yield more than 20 to 25 per cent. of the metal. Large and valuable beds of magnetic iron are found in Essex county, New Jersey, Pennsylvania, New York, and Ohio. The iron mountains of Missouri also appear to belong to this species. It forms the main body of iron ore in Sweden.

THE CARBONATE OF IRON.—This species comprises two varieties: the spathic, or sparry iron, and the compact carbonate, which has no relation externally with the sparry variety. The compact carbonate is largely distributed over the United States; its finest quality is found near Baltimore. We also find it in the Foostburg coal region, in Maryland, and in almost all the western coal deposits along the Alleghany and Ohio rivers. It generally does not contain more than 20 to 33 per cent of metallic ore, but is little used, on account of its being of rather difficult treatment in preparing it for smelting. The same is the case with the sparry or spathic variety, which almost in all instances, where it occurs, is adulterated with sulphur, and in some cases with copper. Large quantities of this ore are found in Vermont, Connecticut, and New York; smaller veins occur in all the New England States, in New Jersey, Pennsylvania, Virginia, North Carolina, and the States around the Lakes. In North Carolina it forms the bulk of a vein of gold ore, and it besides this associates with nearly all kinds of metallic ores, changing the character of a vein from one kind of an ore to another.

The Franklinite or dodecahedral iron ore is composed of 66.00 parts of peroxide of iron, 16.00 parts of oxide of manganese, and 17.00 parts of zinc, being a species which belongs to North America alone. It is, in association with the red zinc ore, found in large veins and masses near Franklin furnace, in Hamburg, N. J., and at Sterling, in the same vicinity, and is a most important ore, particularly for the manufacture of crushers and mills. The mixed ore of Franklinite and red zinc has been successfully worked for metallic zinc.

Illuminated Time Calendar for 1868.

Subscribers to the SCIENTIFIC AMERICAN who would like a copy of our handsomely Illuminated Calendar for 1868, can have copies mailed to them free on sending their address to this office.

PROPOSED OVERLAND ROUTE THROUGH BRITISH AMERICA.—Mr. Waddington, a person of note in British Columbia, has sailed for England to advocate a pet scheme of his which is the construction of a railroad through British America connecting the Atlantic and Pacific oceans, The journey across this part of the continent has been undertaken by only few adventurers, and to this day a package of merchandise or mail bag has never passed direct from Canada to British Columbia. From a pamphlet Mr. Waddington has published it appears that by making use of the lakes and rivers on the line 2,400 miles of steam navigation can be introduced. The railroads now in running order at the East are 1,285 miles more making necessary only the building of 648 miles of road more. When the line is completed the time to be occupied in traversing the entire 4,333 miles from ocean to ocean will not exceed twenty to twenty-three days.

ADVERTISERS are referred to the new rates for advertising as announced in the first column of advertising page.