

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

NO. 37 PARK ROW, NEW YORK.

O. D. MUNN.

A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year, postage included... \$3 20
One copy, six months, postage included... 1 60

Clubs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at \$3.20 each; additional copies at same proportionate rate. Postage prepaid.

Single copies of any desired number of the SUPPLEMENT sent to one address on receipt of 10 cents.

Remit by postal order. Address MUNN & CO., 37 Park Row New York.

The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, with handsome cover uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, \$5.00 a year, postage paid, to subscribers. Single copies 10 cents. Sold by all news dealers throughout the country.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, postage free, on receipt of seven dollars. Both papers to one address or different addresses, as desired. The safest way to remit is by draft, postal order, or registered letter. Address MUNN & CO., 37 Park Row, N. Y.

Scientific American Export Edition.

The SCIENTIFIC AMERICAN Export Edition is a large and splendid periodical, issued once a month. Each number contains about one hundred large quarto pages, profusely illustrated, embracing: (1.) Most of the plates and pages of the four preceding weekly issues of the SCIENTIFIC AMERICAN, with its splendid engravings and valuable information; (2.) Commercial, trade, and manufacturing announcements of leading houses. Terms for Export Edition, \$5.00 a year, sent prepaid to any part of the world. Single copies 50 cents. Manufacturers and others who desire to secure foreign trade may have large and handsome elegantly displayed announcements published in this edition at a very moderate cost.

The SCIENTIFIC AMERICAN Export Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN & CO., 37 Park Row, New York.

VOL. XLI, No. 9. [NEW SERIES.] Thirty-fifth Year.

NEW YORK, SATURDAY, AUGUST 30, 1879.

Contents.

(Illustrated articles are marked with an asterisk.)

Table listing various articles such as 'America, discovery of', 'Living cost of', 'Magnets, steel for', etc., with corresponding page numbers.

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 191.

For the Week ending August 30, 1879.

Price 10 cents. For sale by all newsdealers.

Table of contents for the supplement, categorized by I. ENGINEERING AND MECHANICS, II. ELECTRICITY AND MAGNETISM, III. TECHNOLOGY AND CHEMISTRY, IV. PHYSICS, V. AGRICULTURE, HORTICULTURE, ETC., VI. ARCHITECTURE, VII. BIOLOGY, VIII. MEDICINE.

BALANCE OF TRADE IN MEN.

It is a grand thing for any country to be able to show a balance of trade in material products on the home side of the sheet. To be able to sell, year by year, two or three hundred million dollars' worth of stuff in excess of what we have to buy abroad, as the United States can do, is substantial evidence of our progress in solid wealth.

The nation is justified in rejoicing over so favorable a showing. But there is another phase of our relations with the rest of the world, which tells still more remarkably in our favor, and which promises to aid in the near future, even more than it has done in the past, in building up for us a grand and abiding prosperity. There is nothing that contributes so much to the wealth of a nation as hopeful, energetic, thrifty men and women; and the Old World is daily sending us these by the ship load. At this port alone, during the year ending with May last, there were landed nearly a hundred thousand immigrants, mostly from the countries of Northern Europe, and this year the influx is still greater.

And what is more encouraging to us than the numbers of these incoming citizens, is their high average character. The social, military, and industrial conditions in Europe are such that a better class are emigrating now than formerly, and the indications are that still larger numbers of intelligent farmers and skilled workmen will seek our shores in the immediate future. It is but a little while since a single party of German-Russians, 350 in number, passed through this city to make their homes in the West, carrying with them money and property to the value of \$400,000. The influx of well-to-do English and Scandinavian farmers, during recent years, has been unparalleled, and it promises to increase.

Meanwhile skilled mechanics are coming to us, not only singly, but in large companies. More than 150 French and English families recently took up their residence in New Albany, Ind., to engage in the plate glass industry established there. The day before this writing (August 6), 22 families and 20 single men, in all over 100 skilled workmen, arrived here on their way to Bridgeport, Conn., to which place they had emigrated from Sheffield, England, at the instigation of the Frary Cutlery Company, of Bridgeport. The men were, for the most part, between 20 and 35 years of age, picked workmen, intelligent, and well dressed. They were preceded by a smaller party a few weeks ago; and it is said that in the fall about 50) more skilled cutlers will be brought over by the same company from England and Germany.

These men come to America not because they cannot live at home, but because they and their children can live to better advantage here. And they come provided with certain employment, for the capital of the establishment which they had worked for in Sheffield comes with them. Thus, with the migrating workmen, a new center of industry, if not a new industry, is brought to our shores; and to a corresponding extent the necessity is removed for sending abroad for fine cutlery.

These are but scattering drops of the grand industrial rain, which has done so much, and which promises to do so much more, toward making this country the garden spot of the world for the industrial arts to thrive in. It is impossible to overestimate the national advantage of such additions to the productive wealth of a new country. With the best of wishes for the prosperity of the nations of the Old World, we cannot but be glad to receive from them contributions of such intrinsic and lasting value. May the balance of trade in men be the last to turn against us.

A LITTLE PARADOX.

M. Piateau, Member of the Academy of Sciences of Brussels, communicates the following note to La Nature: If, says he, perpetual motion were simply defined as the motion of a body, which, after receiving an impulse, continues to move indefinitely by virtue of its inertia alone, I should say, that under these conditions, it was realizable. As well known, all movements that we produce ultimately come to an end, because they inevitably meet with resistances which destroy them; so that to keep up a motion for a long time the intervention of a foreign force is necessary in order to continually restore to the moving body that portion of the motion which resistances have taken from it. It is thus that the oscillations of a clock's pendulum are kept up by the small impulses of the escapement. But if the foreign force, instead of communicating to the moving body the motion that resistances have caused it to lose, is employed to annul these resistances, the body will continue to move as long as the foreign force shall neutralize the resistances. Now we may make use of a force that is ever present, such as a current derived from a river; and in this case the moving body freed from resistances will continue to move indefinitely by virtue of its inertia alone.

Let us take an example; let us conceive of a horizontal disk movable around a vertical axis which is fixed to the center of its lower surface; and let there be hollowed out a hemispherical cavity of a few millimeters diameter in the center of its upper surface. Now let us suppose the apparatus located by the side of a river, where it is put in communication with the latter by means of a tube leading from a reservoir placed at a level lower than that of the lowest tide, the reservoir being constructed so as to furnish, by means of an orifice at the bottom, a uniform and strong flow, which shall be able, when we wish it, to cause the disk to revolve very swiftly.

This being done, before we allow our water course to act, let us spin a top very rapidly, place its point in the small hemispherical cavity, immediately cover the top with a bell glass whose axis coincides with that of the apparatus, and keep this glass firmly in position by some means or other. Finally, by the aid of one current of water, let us set the disk, along with the bell glass, in motion in the same direction as the top. As may be conceived, after a certain length of time, the movements of the disk, the top, and the air confined beneath the bell glass, will become equalized. Then the top will meet no further resistance at its point, since the support on which it rests is revolving with exactly the same speed and in the same direction; it will no longer experience any resistance from the surrounding air, since the latter will also possess the same angular velocity, and we will thus have the curious spectacle of a top remaining indefinitely in equilibrium on its point; and it will continue to revolve, not because any lost motion is restored to it, but because it does not lose any. This will be a perpetual motion according to the definition given at the beginning of this note.

FUNGI IN MAN.

The human ear is sometimes attacked by a disease which shows itself in the form of a running sore; in many cases the tympanum is destroyed and hearing lost before the nature of the malady is discovered. The disease is due to the growth of a microscopic plant or fungus of the Aspergi us family. It especially thrives when, from any cause, the secretion of wax in the ear is stopped or hindered. The microscope is a valuable assistant in the discovery of this fungus.

Consumption, the most disastrous malady that afflicts humanity, is now said to be caused by a yeast plant that flourishes in the blood. The presence of this fungus in the blood is readily shown by the microscope, and now forms the subject of careful study among physicians.

Dr Ephraim Cutter, M.D., of Boston, Mass., has devoted much labor to this subject, and, we understand, has recently produced micro-photographs of the fungus with Tolles' remarkable 1/2 objective.

We believe that Dr James H. Salisbury, of Cleveland, Ohio, was among the earliest to detect and describe this curious yeast plant of the blood.

New Documents Relating to the Discovery of America.

A very important publication, says La Nature, has recently been made in Spain under the supervision of the Minister of Public Instruction. It is a collection of letters of Christopher Columbus and his contemporaries, and reports made during the 16th century by the governors of the American provinces. The originals of these letters and reports are now in the state archives at Seville. The work, entitled Cartas de Indias (Letters from the Indies), forms a large folio volume of 1,754 pages, and contains the following documents of great interest:

1 Two autographs of Columbus addressed in 1502 to Ferdinand and Isabella, the first urging the necessity of suitable measures for increasing the population of the isle of Española (St. Domingo), the second containing a dissertation on the art of navigation. 2. A letter from Amerigo Vespucci to Cardinal Ximenes di Cuenos, Archbishop of Toledo, dated at Seville, 1508, regarding some merchandise to be sent to the Antilles. 3. Two letters from Fra Bartholomeo de Las Casas, Archbishop of Nicaragua, to the Infante Don Filippo, dated at Gracias á Dios, in Guatemala. 4. Two letters from Bernaldo Diaz del Castillo, one of the warriors of the small army of Cortez and the author of a history of Mexico. These two letters are addressed to Charles V., 1552, and to Philip II., 1558. 5. Letters from the bachelors, Don Pedro de Gasca and Don Christopher Vaca, of Casca, dated at Quito, 1541, and Cusco, 1542, announcing to Charles V. the death of the Marquis Don Pizaro, and the insurrection of Don Diego de Almagro. All these letters are very interesting, being written by eyewitnesses of the occurrences which they narrate. 6. A very curious letter from Dona Isabella Quivara, relating to the remarkable courage exhibited by the women during the expedition of Cortez, while all the men were prostrated by sickness.

The work contains 652 pages of text, and an appendix of 225 pages, in which we find 29 autograph letters and reports of different historic persons; 28 autograph pages from Columbus, Vespucci, Las Casas, Diaz del Castillo, Ximenes, etc.; a map of the fortress in which the precious stones of the Incas were found; and, finally, maps of the Amazons, the Archipelago of the Antilles, and the Straits of Magellan, executed in the 16th century.

The Worcester Free Institute.

In an article on the advantages of a mechanical education, in a recent issue of this paper, mention was made of several of our leading institutions of technology, wherein the education commended could be had. It was not intended to give a full list of such institutions, much less to intimate that any not named were inferior to those named. Had such been the intention, it would have been a serious mistake, as well as an injustice, to omit the Worcester Free Institute, a school which ranks with the best technological institutions in the land. Our high opinion of the value of the work done there has been too frequently and too plainly expressed, we should think, to allow even a suspicion of an intentional slight of that nature on our part.