Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, NEW YORK.

O. D. MUNN. A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year, for the U. S. or Canada.....$3 00
One copy, six months, for the U. S. or Canada..... 1 50
One copy, one year, to any foreign country belonging to Postal Union, 4 00
Remit by postal or express money order.

Australia and New Zealand.—Those who desire to receive the SCIENTIFIC AMERICAN, for a little over one year, may remit £1 in current Colonial bank notes. Address

MUNN & CO., 361 Broadway, corner of Franklin Street, 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, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, $5.00 a year, for U. S. and Canada. $6.00 a year to foreign countries belonging to the Postal Union. Single copies, 10 cents. Sold by all newsdealers throughout the country.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, to any address in U. S. or Canada, on receipt of *seven dollars*.

The safest way to remit is by draft, postal order, express money order, or registered letter.

Australia and New Zealand.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for a little over one year on receipt of £2 current Colonial bank notes.

Address MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

NEW YORK, SATURDAY, NOVEMBER 3, 1888.

Contents.

(Illustrated articles are marked with an asterisk.)

TABLE OF CONTENTS OF

SCIENTIFIC AMERICAN SUPPLEMENT

No. 670.

For the Week Ending November 3, 1888.

Price 10 cents. For sale by all newsdealers.

THE PATENT OFFICE THE FRIEND OF THE INVENTOR.

In the recent case of Donovan, on appeal, the Hon. Benson J. Hall, Commissioner of Patents, laid down the following excellent doctrine:

"The rules of the office, particularly rules 68 and 139, point out that at all times in the investigation of an application, and in the progress of appeals, it is the duty of each tribunal having jurisdiction of the case to see to it that the inventor shall secure a patent for whatever patentable matter may be shown in his application. As has been frequently stated by me in decisions, the office must put itself in the attitude of a friend, and not of a litigant with the applicant, and see that he secures every right that belongs to him. Not only is this true of the rules cited, but Congress has seen proper to take especial pains to provide that whenever an applicant, in consequence of any inadvertence or mistake in the framing of his specification or claim, has failed to secure that to which he is entitled, or his patent is inoperative or invalid either by reason of having claimed too much or too little, he may have the proper correction made by a reissue, which will secure him the precise invention to which he is entitled.

"Now, unquestionably, if under rules 68 and 139 it is the duty of the Examiners-in-Chief and the Commissioner to suggest and recommend, in order that an applicant may receive letters patent for subject matter not involved in the appeal, it must be the duty of the Primary Examiner in the examination of the case made by him to point out and recommend the same thing. I do not mean by this that it is the duty of the Examiner to become an agent or an attorney for the applicant; but I think in all cases when he is satisfied or believes that the application contains patentable matter which is not claimed, but which he has reason to believe the applicant is seeking to cover, it is his duty to advise the applicant briefly and specifically, precisely as the Examiners-in-Chief and the Commissioner are authorized to do, as above stated. By acting upon this principle, all of the tribunals of the office become friendly to the applicant, and enable him to clearly see and understand the views of the office as to the nature and patentability of the invention described. Such practice would undoubtedly tend to lessen the correspondence and conflicts which arise between applicants or their counsel and the office."

LAUNCH OF A NEW TYPE OF FERRY BOAT.

On Thursday, October 25, a double-ended propeller, designed for service on the Hoboken and New York ferries, was launched at the ship yards of Thos. C. Marvel & Co., Newburg, N. Y. While not in all respects a novelty, the boat marks a distinctly new departure in naval engineering. Hitherto all the ferry boats in these waters have been driven by side wheels. These lend themselves very perfectly to double-ender propulsion, it being practically immaterial as regards the perfection of their action whether they drive the boat in one direction or the other.

In the new boat the motive power of the screw has been adopted, and has been applied to the same type of vessel. A shaft is carried the entire length of the hull, emerging at each end. To each of the ends a screw, both of identical pitch and diameter, is secured. In advance of each screw a rudder is placed, provided with the usual pin for holding it fixed when made to constitute the bow end of the boat. As seen from the outside, each end of the vessel appears precisely like the stern of an ordinary propeller.

A single engine is provided to drive the screws. Both, therefore, have to rotate together and at exactly the same speed. They propel the boat by the pulling action of the leading wheel and the pushing action of the rear one.

By their use several important results are achieved. The most obvious ones relate to the increased deck room. Her engines will be entirely under deck, a space of two feet intervening between their highest parts and the deck planks. The smoke stack is to be elliptical in section, to save width. On account of these features of construction, the central deck house will be two feet narrower than the usual ones and about two-thirds of their length. The cabins will be unobstructed by the paddle boxes. The narrow gangway leading fore and aft will be disposed of, and the area will be clear of encumbrance from front to rear. These changes, it is calculated, will give an increase of capacity of twenty per cent for trucks and carriages and thirty-five per cent for passengers.

It has been found by experience that a tug boat can cope quite effectually with the ice that packs in the ferry slips, and one has often been used for the purpose of clearing them of ice. The new boat will, it is anticipated, prove most effectual in this regard. Paddle wheels can only drive ice about twenty feet, but screws are far more effectual. As the new vessel enters a slip, her forward screw will start currents of water that will carry the ice past her sides, to be driven out into the river by her after screw.

This is not the first boat of her class, if the term is broadly interpreted. A single-ended boat, with bow and stern screw, has been recently put in use at Detroit. It works, however, on a different principle from that of the new ferry boat. The Detroit vessel's after wheel is larger than the forward wheel, and each is driven by independent engines. Normally both are turned in the same direction. When ice is encountered the forward wheel is reversed, and the vessel is propelled by the differential action of the larger and small wheels. The smaller forward wheel forces currents of water out from the bow that clear the ice so effectually that the boat can go steadily through a field of considerable thickness. Double-screwed boats, with independent engines for forward and after screws, have also been used on the Mississippi. These were not double-enders. They were found to injure the levees, and were finally discarded from regular service, and were used to clear the channels in the carrying out of Col. Eads' successful project.

Thus the new vessel is of distinct type. As seen on the ways, her model was characterized by fine lines, her ends being very sharp, giving good entrance and run. She is two hundred feet long, sixty-two feet over the guards, thirty-two feet width of hull, seventeen feet deep, and will draw from nine and a half to ten feet of water. She is of steel throughout. She is to have two tubular boilers, eight feet diameter by twenty-three feet long, to work at 160 lb. pressure. Her engine is of twenty-four inch stroke, triple expansion, with eighteen and one-half, twenty-seven, and forty-two inch cylinders. The shaft varies from 8¼ to 8¾ inches. The screws are of eight feet diameter and nine and one quarter feet pitch. They are alike on both faces, so as to cut both ways with equal efficiency. She was christened the Bergen.

Col. E. A. Stevens and Capt. C. W. Woolsey, of the Hoboken Land and Improvement Company, were the originators of the idea, and anticipate a better winter service from the Bergen than any vessel now afloat can render. Our thanks are due to them for their courtesy in giving us all the information attainable about their new and yet unfinished vessel.

A Saratoga Spring over 3,000 Feet Deep.

A dispatch from Saratoga says: A company has purchased the Seltzer Spring and will utilize its waters for the purpose of liberating and storing, in liquid form, the carbonic acid gas with which it abounds. To do this, extensive arrangements are being made upon a large amount of invested capital. The establishing of the plant is under the supervision of Mr. Oscar Brunler, a German expert.

This Seltzer Spring, located on Spring Avenue, was developed by Dr. Haskins less than three years ago. The drill was put down to the depth of 500 feet. At this depth an abundant supply of water was found flowing from a crevice in the rock bottom. A few days ago, to assure himself of the depth of the spring, Mr. Brunler sounded it with a line and plummet; but instead of resting at 500, the weight sank the whole length of the line, 900 feet. Other soundings have since been made, the weight used being a piece of inch gas pipe filled with lead and weighing thirty-four pounds, until a depth of 3,300 feet has been reached, and yet without touching bottom or any obstacle. No further soundings will be made until instruments expressely designed for the purpose can be procured.

Prof. Brunler admits it as possible that the line and weight could have been carried away by some powerful current, but he holds to his original belief in the existence of a subterranean sea of greater or less extent, and that there is undoubtedly some connection between it and the water of the ocean. In other words, that Saratoga is over a vast water-filled cavern, the roof of which is about 500 feet thick. He also thinks it probable that at a given depth and temperature carbonic acid gas may be found in a liquid form. The specific gravity of the liquid gas is about nine degrees lighter than water, which would readily cause the water to climb 300 feet above the ocean level. Should the existence of a subterranean sea be established, it would put to flight many theories and scientific speculations as to the source and course of the many mineral springs here.

Causes of Fire.

In regard to spontaneous combustion, the fires of the year in Boston have furnished some new observations of considerable importance. In one case, says the *American Architect*, a quantity of feather dust in a bedding manufactory took fire without apparent reason. It was found, however, that a piece of thick glass had been lying on the feathers, and the sun's rays, concentrated in some way by the glass, had set fire to them, although the day was a cold one in the month of March. In another case, a number of tarpaulin hats were lying, packed together, in a window. The high temperature, with, perhaps, the close packing of the hats, caused them to burst into a blaze. Two other fires were caused by putting paraffine paper, such as candy is wrapped in, into a refuse barrel which contained a little sawdust; and a third, which destroyed twenty thousand dollars' worth of property, was occasioned by putting greasy paper, which had been used to wrap lunches in, into a wooden refuse barrel, which contained some sawdust and sweepings.