AN INGENIOUSLY WHITTLED FAN.

On a street corner near City Hall Park in New York city, an industrious old blind man has for years plied a brisk trade in selling the fans which he dexterously whittles from a single piece of wood to the undisguised admiration of the many small boys who gather about him.

The blind man's tools are a jack-knife and a tub of water; his material a piece of soft white pine 12 or 14

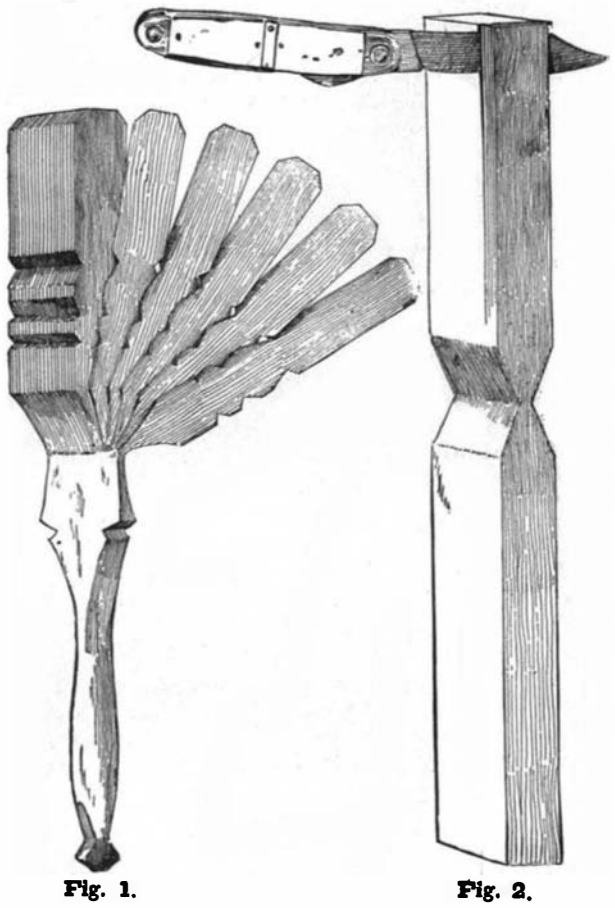


Fig. 1. Fig. 2.

HOW THE FANS ARE MADE.

inches in length, 2 inches in width, and about an inch thick. Notches are made in each side of the piece of wood somewhat above its middle point, a thickness of one-quarter of an inch being left between the notches. The shorter end of the wood is split downward, as indicated in Fig. 2, as far as the notches, into sections about $\frac{1}{16}$ of an inch thick. From twenty-five to thirty-five parts or blades are needed to make a good fan. To form the handle of the fan, the lower, longer portion of the wood is partially sectioned to form small auxiliary fans, or merely thinned down to form a handle. The blades, after having been thus produced, are notched, as shown in Fig. 1. The wood is then thoroughly soaked in a tub of water, and the blades bent to form a fan of the form illustrated in Fig. 3.

ELECTRICAL DREDGE FOR THE VOLGA RIVER, RUSSIA.

In the whole field of civil engineering it would be difficult to find a device which has done more to expedite the construction of works that involve the handling and removal of great masses of material than the powerful suction dredges which are associated with the name of Lindon W. Bates, an American engineer. In a recent issue of the SCIENTIFIC AMERICAN we illustrated the big dredges which are in use by the United States government on the Mississippi River, and of these the "Beta" is credited with a record of between seven hundred and eight thousand cubic yards of material handled in one hour. One of the most recent machines of this class to be constructed is the powerful double dredge that forms the subject of our illustration, which was built for the Russian government dredging operations on the Volga River.

In designing the Volga dredges Mr. Bates introduced several novel features, which were intended to economize time in the maneuvering of the dredges themselves and of the pontoon pipes by which the dredged material is conveyed and discharged. A distinctly novel feature is the use of electric power for these purposes, the movements of the dredges and of the pipes being controlled by twelve separate electric motors, disposed on the dredges themselves and upon the pontoons. In order to allow the dredge to be taken through the canals by which she had to pass from the Baltic to reach the Volga River, the dredge was constructed practically in two halves. Each of the two hulls is constructed of steel and is covered with a 3-inch pine deck, above which is built a deck-house and a pilot-house of light frame composition. At the bow, recesses are formed to accommodate the "suction ladders." A few feet back from the bow, one on each side of the hull, are two triangular recesses, which are cut away to accommodate a pair of screw propellers. Each screw shaft is direct-connected to a 125 horsepower electric motor. The shafts are arranged at an angle of about thirty degrees with the center line of the vessel, and they not only co-operate with the twin propellers at the stern in driving the vessel ahead or astern, but they assist in swinging the dredge to right or left when the operation of dredging is in process. The twin propellers at the stern are also each direct-connected to a 125-horsepower motor. Two 30-horsepower motors are carried on each pontoon line, one of which extends from the stern of each half of the dredge. The four motors on each dredge and the motors on the pontoons are all connected with, and can be controlled from, the pilot-house. The electric current is furnished by a 600-kilowatt generator, directly connected to a fore-and-aft triple-expansion engine, which is clearly shown in our illustration. The engine has cylinders as follows: high pressure, 14¼ inches; intermediate, 22¾ inches; and low pressure, 37⅜ inches diameter, the stroke being 24 inches. At a speed of 200 revolutions per minute the indicated horse power is 800.

Of course, the most important feature in a dredge of this type is the main centrifugal pump, which is located amidship. The runner makes from 150 to 180 revolutions per minute. It is driven by a divided, vertical, triple-expansion engine, one set of cylinders being carried on the starboard and the other set on the port side of the pump, the whole being connected upon one shaft. The high pressure cylinder is 21 inches in diameter; the intermediate, 34 inches; and the low pressure, 39 inches in diameter; the common stroke being 24 inches. The indicated horse power is from 1,425 to 1,600. Steam for the whole steam plant is supplied by eight Babcock & Wilcox boilers, four on each hull. These are fired exclusively with naphtha, which is fed to each boiler by four burners, the spraying of the naphtha being accomplished by a steam jet.

The dredged material is brought up by means of

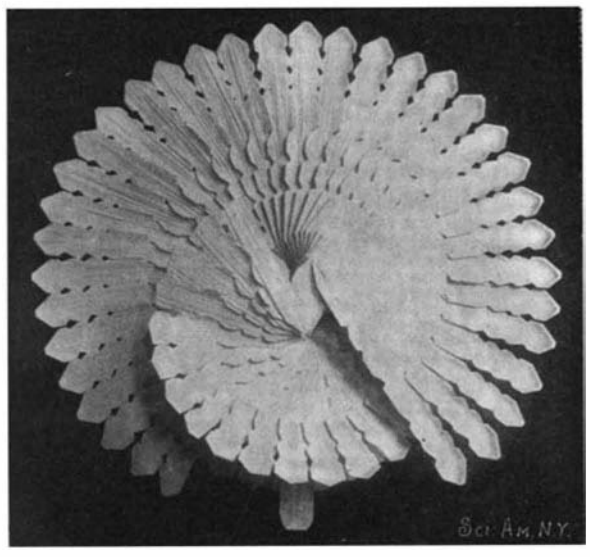
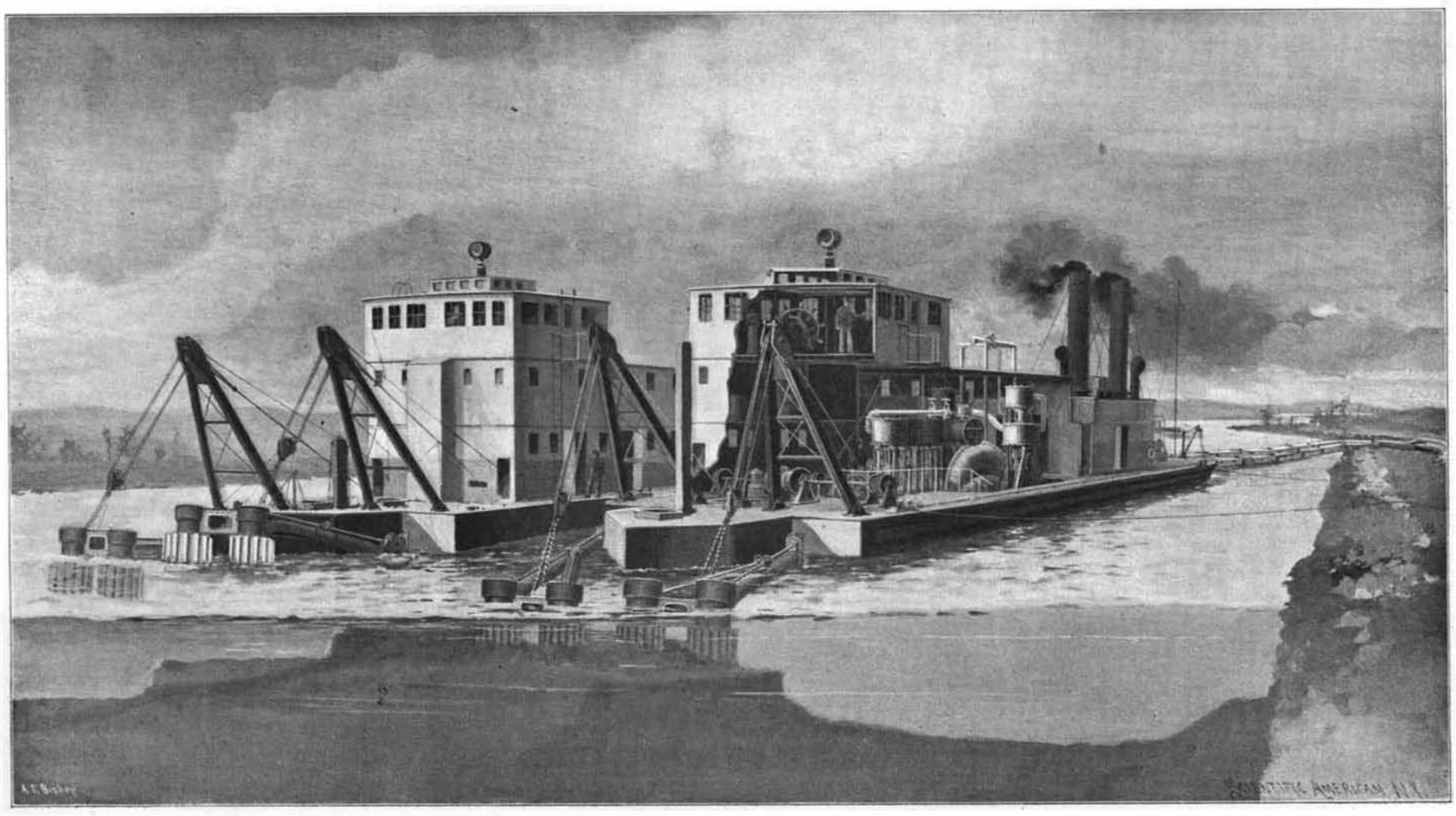


Fig. 3.—A COMPLETED FAN.

four suction pipes, which are attached near the bow of the dredge and hinged upon a common horizontal axis on the dredge. They are raised and lowered by means of derricks, two of which are attached at each bow, and they are capable of dredging to a maximum depth of 16 feet. The lower ends of the four suction pipes on each dredge are inclosed by rotary cutters, which are rotated by means of miter gears and shafting which are attached to the suction pipes and move with them. Each set of shafting is driven by a cutter engine, which is located in the forward part of the hull. It will be seen from our illustration that the suction pipes and cutters form two ladders, supported one on either side of each hull, and approaching each other just in front of the stem of the bow, the four cutters being spaced at equal distances from each other, the width from outside to outside being slightly more than the extreme breadth of the dredge.

Some novel features are embodied in the pontoons, which, with the exception of one at the extreme ends



POWERFUL ELECTRICAL SUCTION DREDGE FOR THE RUSSIAN GOVERNMENT—CAPACITY, 7,000 CUBIC YARDS PER HOUR.