IRON PIERCED BY HAILSTONES.

One is justified in many cases in giving only a tentative belief to many of the big hailstone tales over which some travelers delight to spread themselves, says the St. James's Budget. A correspondent in Dholi, Behar, however, sends the indubitable proof of photographs to quite convince us and our readers of the terrible nature of the hailstorm which occurred in his district recently. The storm passed over the greater part of the districts of Mozufferpore and Durbungah, but it appears to have concentrated itself with special fury over the indigo factory called Dholi. Here the storm was terrific, even for tropical regions, the hailstones weighing as much as five ounces. On an average they were as large, if not larger than cricket balls. It can be easily understood that the damage done was great. Not a whole tile was to be found in the roofs, trees were uprooted, birds were killed, and general destruction wrought all round. What is more astounding, the corrugated iron roofing over many of the factory buildings was riddled as if it had been shelled by a battery. We can quite imagine, as our correspondent informs us, that no storm like it has ever occurred in the district. Hailstones have, however, had the same terrific force in Africa, a sample of corrugated iron pierced in a like manner having been recently shown in London.

THE PROPULSION OF BARGES.

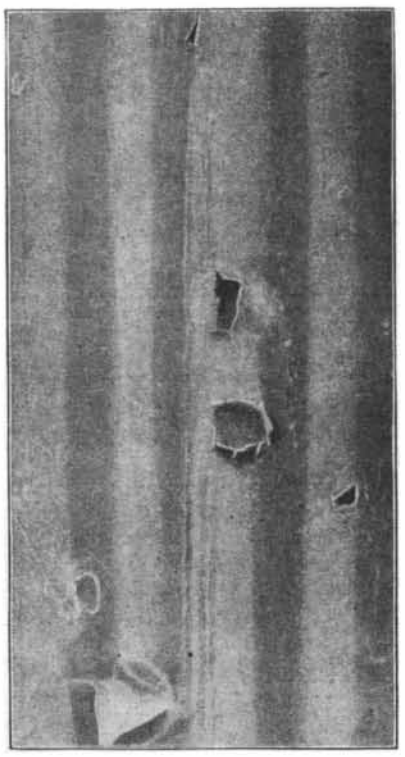
The propulsion of barges, especially upon canals, is not as yet effected in a really satisfactory manner. This is because multiple and special difficulties are met with. In the first place, it is necessary that the boats shall be able to run isolatedly, since the formation of trains is almost impracticable, generally speaking, by reason of the loss of time that it involves. Recourse to complicated methods of propulsion cannot be thought of, since the bargeman, who has no special education, must perform the necessary maneuvers without any trouble. It is indispensable, too, that the mechanical means adopted shall not introduce any modifications into the hull of the barge. Moreover, the propeller, if it be adapted to the hull, must not interfere with passages into locks or under bridges, and its weight or its installation must not cause any loss of the space reserved for the cargo. Finally, account must be taken of the fact that aquatic plants, so abundant in many canals, may interfere with the play of the propeller, and that the latter is capable of forming waves that are prejudicial to the proper preservation of the banks of the waterway.

For these various reasons and for several others, different methods of propulsion have been tried, such as the Levy or Oriolle cable system, the Galliot system of electric towing, etc. Mr. H. Barcroft, an English engineer, has just devised a method of propulsion by screws, but under very peculiar and very original conditions. While some have endeavored to place the screw upon the rudder, in elongating the latter, Mr. Barcroft arranges his propeller on each side of the rudder at the stern of the boat. In its installation, he has taken as a basis the principle enunciated by Rankine, viz., that the most efficacious propeller is the one that forces back the greatest volume of water at the feeblest velocity. On another hand, he has endeavored to make a removable apparatus that can be easily put on shore or be embarked and put in place without any change in the arrangement of the boat.

What adds to the interest of the invention is that it has withstood the test of practice. It is now more than a year ago that a boat provided with the arrangement in question was put in service upon the canals of the north of Ireland. This boat, which is called the Ulster, is now running upon the canal of the same name between Lough Erne, Lough Neagh, and the sea. This navigation is so much the more difficult in that the section of the waterway is often only double the transverse section of the boat, that there are many aquatic plants, and that billows are often encountered upon the lakes that must be traversed.

We present engravings representing the arrangement of the boat. Let us examine the barge Newry, which is 62 feet in length and 11½ in breadth and draws 5½ feet of water. With the motor installed it has an effective load of 65 tons. The motor weighs 6,600 pounds. It comprises a locomotive boiler with a heating surface of 87 square feet, and a horizontal engine with two cylinders 46 inches in diameter and having a stroke of 80 inches, the whole placed upon the deck without causing any real encumberment. As the axes of the cylinders are lengthwise, the shaft is breadthwise.

At each of its extremities it carries a helicoidal toothed wheel that gears with another wheel of the same



CORRUGATED IRON PIERCED BY HAILSTONES.

form placed upon a vertical shaft and carried by a frame fixed to the posterior part of the hull. The two frames are shown in Fig. 2. It will be remarked that they are provided with a supplementary frame, P', designed to protect the blades of the screw against the shocks to which its situation might expose it. At the base of these frames the vertical shafts actuate the screws through bevel wheels. These screws have three blades, this number giving the best rendering with a suppression of vibration. The diameter of each screw is 4¾ feet, with a total surface of 24 square feet. The blades are of steel and their pitch is a little over 5 feet. At a normal speed the screws make 100 revolutions a minute. The hub of the screw, which is cast in a piece with the bevel wheel, revolves around a horizontal axle that carries the step bearing in which rests the lower end of the vertical axle. It presents an enlargement forming a collar that receives the thrust of the screw upon a surface of 8 square feet. The internal arrangement of the hub of the screw upon this axle and this collar is entirely analogous to that adopted for what is called the "patent" carriage axle. A constant bath of oil diminishes the friction to a considerable degree.

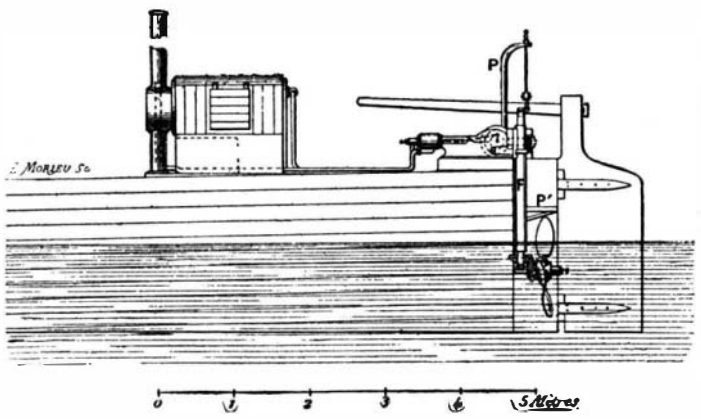


Fig. 2.—DIAGRAM EXPLANATORY OF THE BARCROFT PROPELLER.

As has certainly been remarked upon the first glance at the figures, the screws are far from being entirely submerged. This arrangement has been much criticised, since, in matters of maritime navigation, it is considered necessary that the propeller shall be constantly submerged, as otherwise it would, in its revolution, carry along a certain quantity of air that would by so much diminish the density of the liquid in which it revolves. But here it is a question of navigation upon canals, where there is practically no carrying along of the air, since the velocity of revolution is feeble, and where it is necessary to prevent the blades of the screw from becoming entangled with aquatic plants. Let us note, moreover, that the submersion of the screw is variable according to the pleasure of the bargeman. To this effect the vertical shaft is capable of rising or descending along the frame, F, in carrying along the propeller according to an arrangement frequent in many machine tools. This movement is obtained very simply by means of a standard, P, and a screw that is revolved by hand. Bargemen very quickly recognize the submersion that produces the best results for a given boat and maneuver correspondingly. For a draught of five feet, the lower part of the blades should be about forty inches beneath the float water line.

Upon a boat provided with this arrangement one man and a boy suffice as a crew. The steam engine may doubtless be easily replaced by a gasoline motor. In the trips made by the Ulster with a boat in tow and a total load of 107 tons, the usual speed reached is three miles an hour with a recoil of 11 per cent solely and a consumption of 275 pounds of coal for 13 miles. —La Nature.

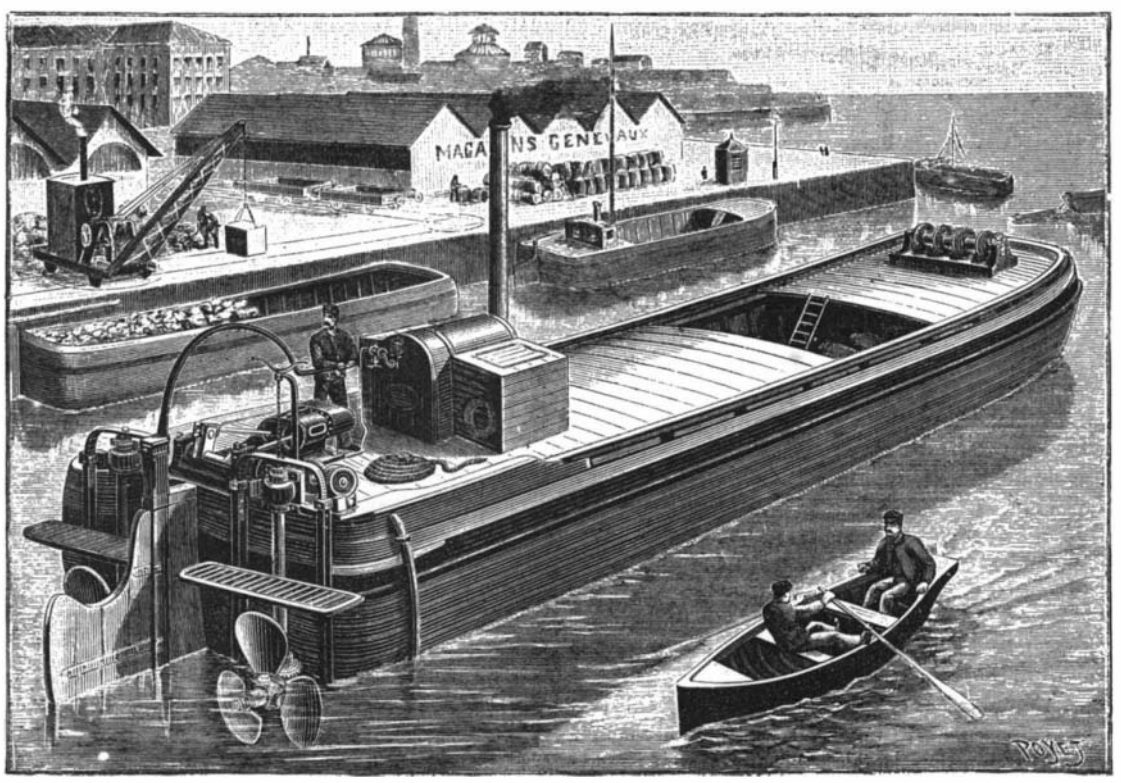


Fig. 1.—GENERAL VIEW OF A BARGE PROVIDED WITH THE BARCROFT PROPELLING APPARATUS.

Proposed Polar Exploration.

The expedition to Jones Sound, planned for 1897, is intended to initiate a system of continuous Arctic exploration. Its object is to be the scientific research above indicated, and to this all else will be subordinated. Special attention will be paid to geology. Disasters having been plainly due to lack of a secure and always accessible base, the first object will be the establishment of a base at the mouth of Jones Sound, which Julius von Payer calls "the one spot most suitable for such a base." Being in assured annual communication through the Scotch and Newfoundland whalers, a well housed and well provisioned party, with some Eskimo families, will be as safe there as anywhere on earth, and will have before it a field unequaled in richness and extent. To the north, the west coasts of Ellesmere Land and Grinnell Land are to be explored; to the northwest, the triangle between those coasts and the Parry Islands is to be rescued from the unknown; to the west, the interior of North Devon is an interesting problem; to the southwest, Prince Regent Inlet may present an avenue to the magnetic pole; to the south, Baffin Land—with its Eskimo settlements, its herds of reindeer, its wealth in fishes and birds, its fossils and minerals—offers a tempting field, larger than the British Isles. Even Greenland may not be beyond the sphere of that strategic point.

Such a system, once initiated, will cost very little. Lecturing tours and the sale of collections will defray a large part of the cost. Considering the enormous sums spent on Arctic exploration in the past by governments and by individuals, it seems probable that when the system is once in running order it will not lack patrons. The cost of the initial expedition is estimated at five thousand dollars. Much smaller sums will probably suffice in subsequent years.—Robert Stein, in Appletons' Popular Science Monthly.

A LABORATORY for the examination of patients by the Roentgen rays has been established in Berlin under Prof. Buka, of the Polytechnicum.