Science and Art.

Notes on the Progress of the Paddle and Screw.—No. 5.

The use of the screw propeller in China may be of an indefinite antiquity. A model of one was brought from that country about the year 1780. It had two sets of blades, turning in opposite directions; but the first distinct description of the screw propeller to be turned by machinery inside a vessel, seems to have been by D. Bernouilli, of Groningen, in 1752; and it is remarkable that this, though the earliest recorded proposal, was well enough matured to comprise the use of oblique vanes at the bow, sides, and stern, turned by a steam engine, and capable of being hoisted out of the water. The accompanying illustration, representing the inventions of Bernouilli, is copied from one published A. D. 1803, in *Annales des Arts et Manufactures*, Vol. XX, Pl. II., p. 100.

In 1768, Paucton proposed the pterophore, a screw thread on a cylinder, to be wholly or partly immersed. In 1770, James Watt suggested to Dr. Small the trial of a steam screw propeller; Bramah, in 1785, first patented a rotary engine for this purpose; Ramsey (1792) put the screw between two hulls, and Lyttleton (1794) used a three-threaded screw, while Fulton (1798) tried one with four blades. Shorter's screw (1800), with a jointed shaft (patented again by Phipps, 1850, with a movable outside bearing, and by many others), and worked by men, was applied in 1602, to the British ships *Dragon* and *Superb*. The first screw steamer I can find, was tried by Stevens in America, in 1804. In 1825, Brown used one on the Thames.

The only patent for combining the screw propeller and paddle wheel is that of Turck, in 1852. The *Bee*, a steam-tender for Portsmouth (Eng.) dockyard, has carried both paddles and screw since 1842, but they are not worked together.

Screw propellers are so various in form that we can scarcely arrange them for consideration according to their shapes or modes of action. A general division may be made into two classes. In one (as in the plans of Bernouilli and Bouguer), no thread continues through an entire revolution. In the other, a helical thread has at least one revolution (as in the plans of Duquet and Paucton). It will be better to group the inventions according to the several parts of the apparatus they relate to. And first, with respect to the general arrangement of the whole apparatus, there is scarcely any position under or above water all around the vessel which has not been proposed for the screw propeller; indeed, most of these varieties of position were exhausted by the earliest plans.

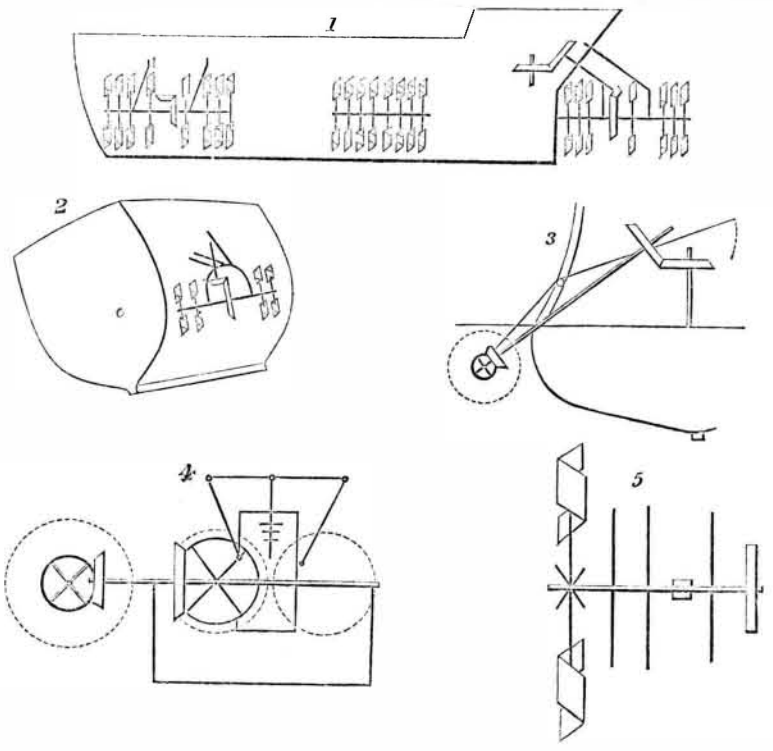
The first English patent relating to the subject is Miller's in 1775. Here the blades are at the end of the arms of a windmill on a vessel's deck, with its axis parallel to the keel. Duncan (1851) put the blades on an endless strap, running outside over the deck and round the hull. He suggested, also, (1856) that a spiral rib, wound round a floating cylinder, should act for propulsion as the cylinder is caused to turn.

Bernouilli and Shorter, having suggested propellers at the bow, sides, and stern of a vessel, Cummerow, in 1828, placed one in an opening in the stern deadwood, which is now the usual position.

Taylor, again (1838 and 1846), using two propellers on separate shafts, brought them so near that the blades overlapped and passed between each other. Napier (1841) placed one of the approximated propellers astern of the other. Carpenter (1851) put two propellers in separate stern-pieces. Bucholz (1851) had three of them, and placed the middle one astern of the others. In all these cases the shafts were on the same level; but Tombs (1856) placed the shaft of one (the aftermost overlapping propeller) a short distance above the other shaft, to which it was geared, so as to turn in an opposite direction. Morrison (1854) placed one propeller above the other.

Next, we must notice different propellers on the same axis. Perkins patented this plan in 1824, placing one shaft within the other, and turning the screws in opposite directions. Church patented it in 1829, and Ericsson in 1836, when a hoop with short vanes was used instead of blades. The Chinese propeller seen by Col. Beaufoy, in 1780, had two screws turned in opposite directions, but they may have had separate axes. The plan of Perkins was patented afterwards by Smith (1838). Dugdale (1849) put several propellers on the same shaft.

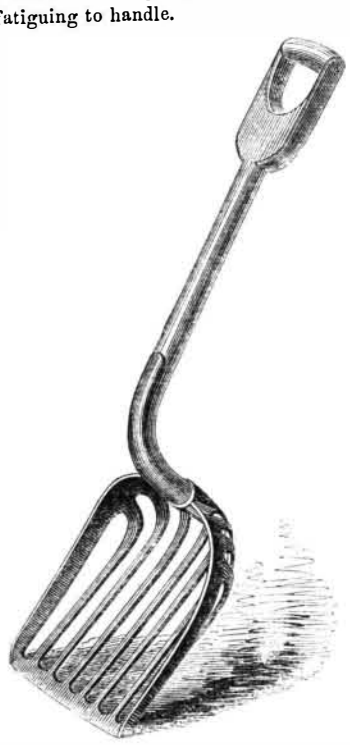
Such were the positions of the propeller when in use; but it was soon found needful to have a power of altering the position, so as to hoist it out of the way. For this purpose, Bernouilli (1752) put hinges on the rods supporting his side propellers, and detached the propeller from the shaft at the stern. Others left the propeller free to revolve as the vessel sailed. Slaughter (1849) helped it to do so without resistance by a "donkey engine."



This week we give a side view of Bernouilli's screw propellers at the bow, side, and stern of a vessel, 1. 2. Three-quarters view of the side propeller. 3. Stern view of the side propeller, with a cross section of the vessel. 4. The steam engine. 5. Enlarged view of a section of the propeller.

Sabbaton's Coal Shovel.

The sifting or screening shovels now in use, are either made wholly of sheet or bar iron, or in part of both, and as these materials are flexible in their nature, they are liable to bend, and thus lose their form; and consequently the shovel, when constructed of these materials, no matter how well they may be put together, is liable to soon get out of order, and become unserviceable, in addition to the other defects of being expensive to construct, and fatiguing to handle.



The object of this invention is to make the shovel cheap, strong, and durable, by forming it of a material that shall combine these characteristics when the bars and its other parts are cast iron, and thereby enable the same to withstand the wear and tear that it is subjected to in shoveling and sifting coal, and the other broken material, and in assorting the different sizes of coal, coke, &c., and other purposes to which it may be applied, and at the same time render it light and convenient to handle.

To effect these objects, the form of the shovel is not altered, but is made in the usual or most approved form, as represented in the illustration, and of cast iron properly annealed, and made malleable in the usual method, by which means it is made a light, durable, strong, and cheap shovel, and capable of varying the spaces between the bars; of separating and sifting all ordinary substances, such as coal, coke, potatoes, or other articles and materials of a like character. The handle of the shovel may be formed, adjusted, and affixed to the sifting portion in the most convenient methods, or to suit the views of the constructor; but it is believed that the plan of handle represented in the illustration is best suited to the design.

It is the invention of Paul A. Sabbaton, of Albany, N. Y., from whom any further particulars can be obtained. Many of these shovels are now in use, and give great satisfaction. A patent is applied for.

Preserving Iron Ships.

Mr. Daniel McCrae, of Scotland, has just patented a greasy substance as a preventive coating for ships' bottoms, and other exposed surfaces. "Bone grease" is preferred, that is to say, fibrine grease obtained from the cells of bones by boiling. Other greasy matters may be employed, such as that obtainable from "kitchen stuff;" but oils, tallow, and lard are not available. The grease may have blue stone or sulphate of copper mixed with it, or it may have various poisonous matters incorporated, to prevent *molluscs* adhering to the ship.

Woolen Manufactures in Belgium.

While we are every day advancing in our manufacturing industry and the production of textile fabrics, it is well that we should not forget that we are not alone in our progress. Recently Belgium has made some advances in the woolen manufactures, which deserve to be noticed. During the last fifteen years the consumption of wool in that country has nearly doubled. In 1857 the quantity of cloth and other woolen goods exported from Belgium amounted to nearly $5,000,000. Flannel is now an important branch of manufacture, and fairly competes with the American and English.

Brickmaking by Elephants.

The Ceylon *Observer* contains an account of some brickmaking works recently visited by Sir Henry Ward. The works, which turn out about 20,000 bricks a day, are only six miles from Colombo. The clay for brickmaking is prepared by elephants. The wild and tame work together, and both attempt to shirk their work by endeavoring to put their feet in old footprints, instead of in the soft, tenacious, untrodden mud.

The Great Eastern.

There is now some hope of this vessel being completed at an early date. It has passed into the hands of a new company, with capital sufficient to complete it. Its cost to the new company is £160,000; and £140,000 is the estimate for finishing and equipping her for sea, leaving a margin of £30,000 for working capital.

Electric Clocks.—In Marseilles, France, one hundred electric clocks have been placed in various parts of the city, and in the street lamps, so that the hours may be known from them by night as well as by day. Such clocks have been on the street lamps in the city of Ghent, Belgium, for some years.