(No Model.) 2 Sheets—Sheet 1.

M. F. & B. F. SPARR.

SCREW PROPELLER.

No. 463,322. Patented Nov. 17, 1891.

Fig: 1.

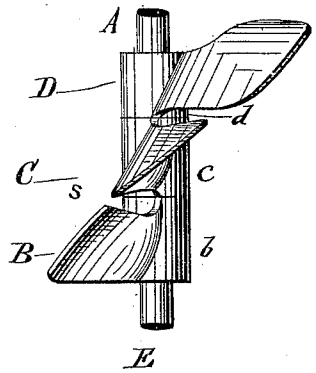


Fig: 2.

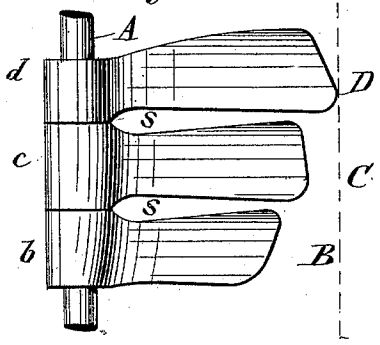


Fig: 3.

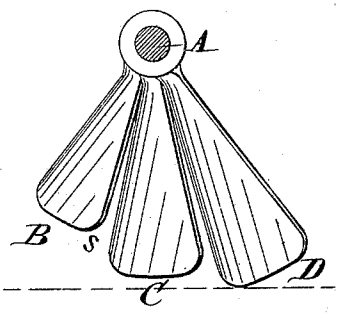
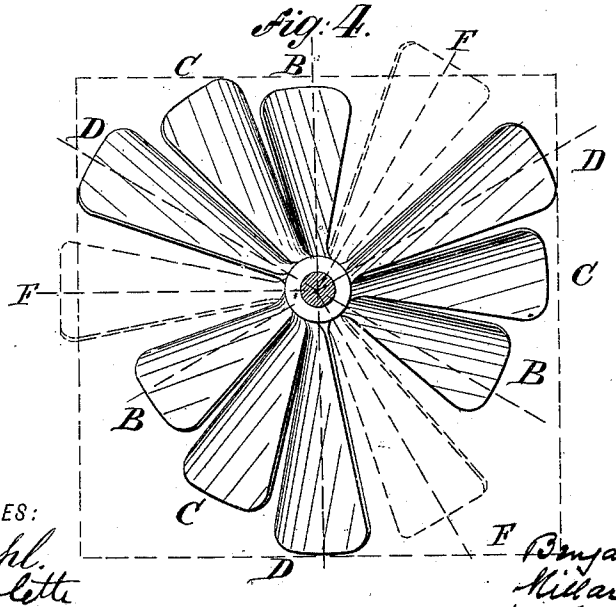


Fig: 4.



WITNESSES:

A. Schehl.

J. M. Rowlett

INVENTORS.

Benjamin F. Sparr

Millard F. Sparr

by F. H. Benjamin

ATTORNEY.

(No Model.) 2 Sheets—Sheet 2.

M. F. & B. F. SPARR.

SCREW PROPELLER.

No. 463,322. Patented Nov. 17, 1891.

Fig: 5.

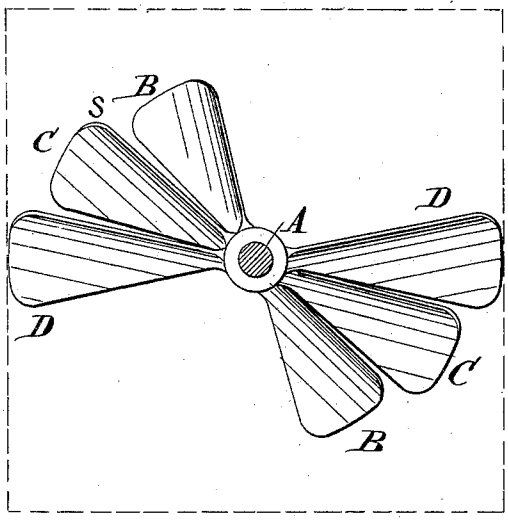


Fig: 6.

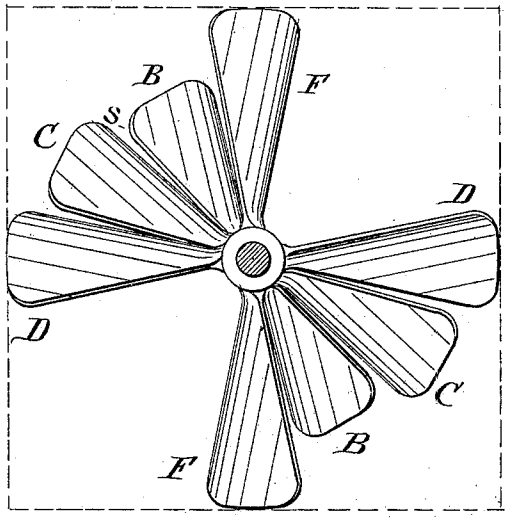
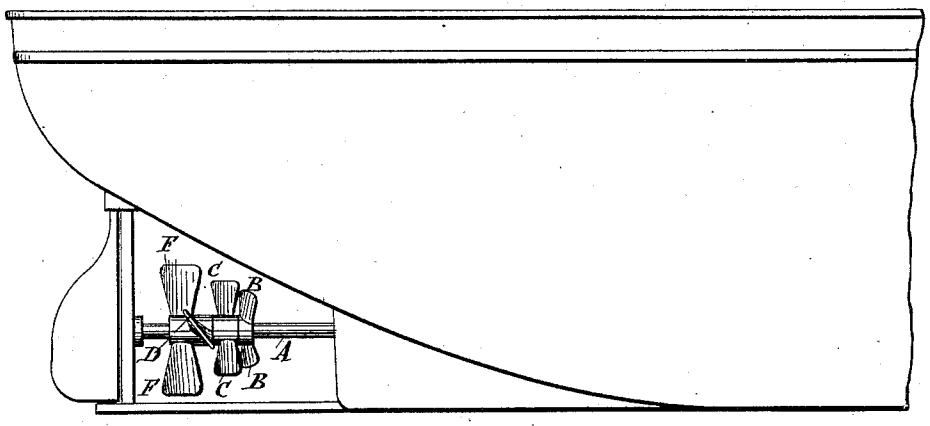


Fig: 7.



WITNESSES:

A. Lohehl

J. M. Rowlett

INVENTORS.

Benjamin F. Sparr

Millard F. Sparr

BY

Geo. H. Benjamin

ATTORNEY.

UNITED STATES PATENT OFFICE.

MILLARD F. SPARR AND BENJAMIN F. SPARR, OF BROOKLYN, NEW YORK.

SCREW-PROPELLER.

SPECIFICATION forming part of Letters Patent No. 463,322, dated November 17, 1891.

Application filed July 3, 1891. Serial No. 398,375. (No model.)

To all whom it may concern:

Be it known that we, MILLARD F. SPARR and BENJAMIN F. SPARR, of the city of Brooklyn, county of Kings, and State of New York, have invented a new and Improved Screw-Propeller, of which the following is a true, clear, and exact description.

Our invention consists of a propeller formed by locating spirally upon a cylindrical shaft two or more series of spiral tapering propeller-blades, the succeeding blades of each spiral series increasing in length and width and having such an angular inclination relative to each other that each series of blades forms a true screw around the shaft; or, in other words, a propeller consisting of two or more tapering blades, each formed as an inclined plane wound around a shaft and each blade provided with two or more separate blades.

Our invention further relates to a propeller formed as above set forth and having in addition to the blades of the spiral series two or more tapering and spiral blades so located as not to be included in any of the spiral series formed by the other blades.

The object of our invention is a propeller by which increased speed may be attained without requiring a corresponding expenditure of energy.

In the accompanying drawings, which illustrate our invention, similar letters of reference indicate like parts.

Figure 1 is a top view of a propeller consisting of three hubs and each hub provided with one blade, the blades shown as projecting upward. Fig. 2 is a top view of a propeller consisting of three hubs and each hub having one blade, the blades shown as laid on flat. Fig. 3 is an end view of a propeller with three hubs and each hub having one blade, the shaft shown in section. This view illustrates the relation of the blades and their lengths as regards each other. Fig. 4 is an end view illustrating a propeller composed of three hubs and three blades on each hub, the corresponding blades of each hub arranged to track each other and form around the propeller-shaft three true screws. Fig. 5 is an end view showing a propeller composed of three hubs and each hub having two blades, the corresponding blades of each hub arranged to track each other and to form around the propeller-shaft two true screws. Fig. 6 is an end view showing a propeller having three hubs, two blades on each of the innermost hubs and four blades on the outermost hub, two of which are arranged to track with the blades of the innermost hubs and two auxiliary blades having their longitudinal axes at right angles to the axis of the blades which track with the smaller blades of the other hubs to form two true screws around the propeller-shaft. Fig. 7 is a side view of the hull of a vessel provided with a screw of the construction shown in Fig. 6.

In the drawings, A represents a propeller-shaft; B, C, and D, propeller-blades secured to the propeller-shaft by means of the hubs *b*, *c*, and *d*. The blades B are the shortest and are located nearest to the power or engine end of the shaft A. Each hub may be provided with two or more blades. In practice two or three blades give the best results. Any desired pitch may be given to the blades; but the blades of a spiral series should correspond in angular inclination, so that the blades will track each other from the engine end of the shaft spirally as a true screw around the shaft.

The blades B, C, and D, while they track each other around the shaft, do not touch each other, but are separated by a space S, the object of which arrangement is for the purpose of allowing a certain portion of water acted upon by the blades to move between the blades, so as to relieve the propeller from the weight of the body of water acted upon. In other words, in a propeller formed as shown in Fig. 5 there are two true screws around the propeller-shaft, each screw formed of three separate screws made by the separate blades. Thus while the two sets of blades act as true screws and turn through a considerable body of water each independent screw also turns through a smaller body of water and an effect is obtained, evidenced as motion, which is greater than would be obtained by the independent action of the separate screws.

We have described our invention thus far as a propeller made up of a series of hubs and each hub containing a definite number of blades. It is obvious that a propeller may be made with a single hub and all the blades

cast or otherwise fastened in a proper position thereon, so as to form the true screws.

Where a propeller is constructed as shown in Fig. 5, we have found it advantageous to use auxiliary blades F, located as shown in Fig. 6—that is to say, the blades F are so arranged relatively to the blades D that the axes of the respective blades shall be at right angles to each other. The object of this arrangement is to break up the body of water delivered from the two true screws formed by the pairs of blades B, C, and D. Instead of using two auxiliary blades we may use three, as shown in Fig. 4, (dotted lines,) in which case the axis of the blades F F will be at an angle of sixty degrees from the axes of the blades D.

We do not limit ourselves to any particular angular relation between the auxiliary blades F and the blades D, whether two or three blades be used, as the position of the auxiliary blades will depend somewhat upon the pitch given to the true screws composed of the blades D, C, and B.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. A screw-propeller consisting of a hub and two or more series of blades, each series formed of a plurality of blades arranged spirally around a hub, the opposing edges of contiguous blades coinciding in radial and axial pitch, whereby two or more true screws are formed around said hub.

2. A screw-propeller consisting of a hub and two or more series of tapering blades, each series formed of a plurality of blades of increasing length and width arranged spirally around the hub, the opposing edges of contiguous blades coinciding in radial and axial pitch, whereby two or more true screws of increasing diameter are formed around said hub.

3. A screw-propeller consisting of a cylindrical shaft and two or more series of blades located spirally around said shaft, the blades of each series arranged to track each other and to correspond in surface trend, and two or more blades which are not included in any of the spiral series and which do not track or correspond in trend with any of the blades of any spiral series, substantially as and for the purpose set forth.

In witness whereof we have hereunto set our hands this 2d day of July, 1891.

MILLARD F. SPARR.
BENJAMIN F. SPARR.

Witnesses:
GEO. H. BENJAMIN,
THOMAS M. ROWLETTE.