Oct. 2, 1928. 1,686,069

H. E. BUCKLEN

PROPELLER

Filed Feb. 8, 1926

Fig. 1.

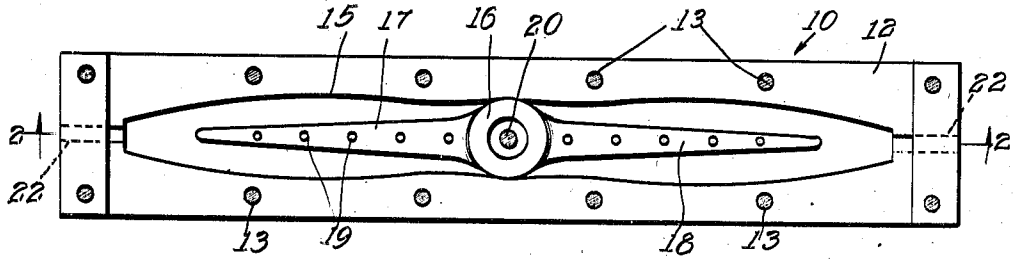


Fig. 2.

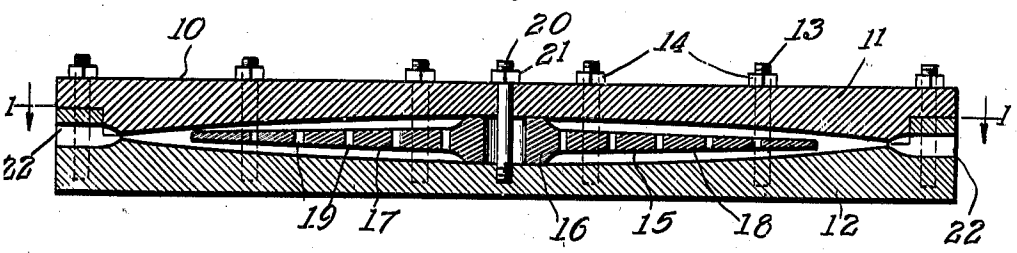


Fig. 3.

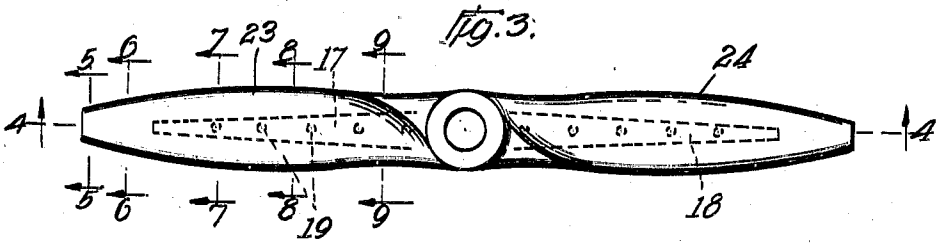


Fig. 4.

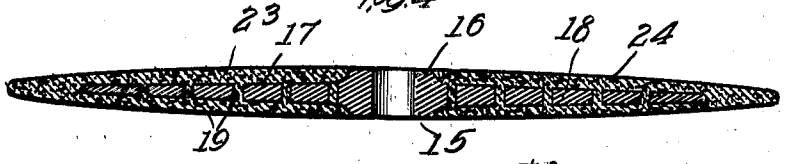


Fig. 5



Fig. 6.



Fig. 7.



Fig. 8.



Fig. 9.



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UNITED STATES PATENT OFFICE.

HERBERT E. BUCKLEN, OF ELKHART, INDIANA.

PROPELLER.

Application filed February 8, 1926. Serial No. 86,684.

The present invention relates to a propeller for wind driven machines.

My propeller is particularly adapted for use in connection with wind driven water pumps, electric generators, and the like, where the prime essential is to be able to start the unit to which the propeller is connected under various weather conditions and, especially, when there are winds of low velocity—say eight to ten miles an hour. There is very little energy in such low winds, and hence it becomes important to have a propeller the inertia of which may be quickly and easily overcome so that full advantage may be taken of any succeeding puffs of wind.

I have found that for a given diameter and pitch a lighter propeller will respond more quickly to winds of low velocity and accelerate faster than a relatively heavy propeller and, therefore, it is highly desirable that the weight be kept at a minimum consistent with strength.

To make a propeller which is relatively light and strong, I employ a light substance, such as cork. This is ground up and then mixed with a suitable cementitious material. I next form the propeller by forcing the mixture of cork and cement into a mould in which suitable means for reenforcing the propeller has been placed. Here it remains until the cement sets. However, I wish it understood that any substance other than cork may be employed if desired. What is necessary is that it be relatively light and have sufficient strength when mixed with a suitable binder or cement to be used for the purposes above set forth.

Another feature of the invention lies in the fact that once a satisfactory propeller design has been determined as respects diameter, pitch, and area, it is possible to produce any number of propellers by my method without any physical change of the factors involved.

Also, I find that a propeller of my invention when used on a wind electric plant, rotates at a speed not to exceed four or five hundred R. P. M. However, my construction, due to its lightness, will permit of much higher speeds because the centrifugal forces will be less than when relatively heavier materials are used. Therefore, a propeller of my construction might also be highly satisfactory for aeroplane use as well.

To acquaint those skilled in the art with the manner of construction and operating my invention, I shall now describe a specific embodiment of the same in connection with the accompanying drawings.

In the drawings:—

Figure 1 is a sectional view of the mould taken on line 1—1 of Fig. 2 showing the reenforcing member in plan;

Fig. 2 is another sectional view of the mould taken on line 2—2 of Fig. 1;

Fig. 3 is a top plan view of my propeller;

Fig. 4 is a sectional view of a propeller of my invention taken on line 4—4 of Fig. 3; and

Figs. 5, 6, 7, 8 and 9 are cross sectional views of my propeller taken on lines 5—5, 6—6, 7—7, 8—8, and 9—9 respectively, of Fig. 3.

To make my propeller, I provide a mould 10 which comprises two separate sections 11 and 12. The mould may be constructed of cast iron, and two or more sections may be used, if desired. The under side of the upper section 11 is shaped to conform to the contour of the propeller blades. The upper side of the bottom section 12 is likewise formed to conform to the contour of the bottom side of the blades. These separate sections 11 and 12, respectively, are held together by means of suitable bolts 13 and their co-operating nuts 14.

To make a propeller of my invention, I first place between the opposite faces of the sections 11 and 12 of the mould, a reenforcing member or insert 15. This may be cast of aluminum or some other light metal or it may be made of wood. The insert 15 comprises a hub portion 16 and a pair of diametrically opposite arms or fins 17 and 18 which are preferably made integral with the hub 16. They are also generally triangular in form and are spaced from the inner surfaces of the sections 11 and 12 at all points. Each arm is provided with a large number of openings or holes 19 which extend substantially vertically therethrough and along the longitudinal axes thereof. These openings serve as anchor holes for the material out of which the blades are to be moulded. The insert 15 should preferably be made of a strong and light material, such as wood, or the like. It is clamped rigidly in a central position with respect to the mould by means of the bolt 20 and its co-operating nut 21.

After the insert is rigidly secured in posi-

tion and the top section 11 securely fastened in place with respect to the bottom section 12, a mixture of some light substance and a suitable cement or binder therefor is introduced under pressure through the openings or ports 22 at the opposite ends of the mould 10. This mixture is forced towards the hub 16 of the insert and into the anchor holes 19 formed in the fins or arms thereof. After the mixture has been shaped into the form of the blade members 23 and 24, it is permitted to set and harden.

The substance which I employ is preferably a plastic mixture of a light material, such as finely divided cork and shellac. This mixture forms a desirable substance since cork is not soluble in water nor does it absorb it, neither does shellac. In view of this, the mixture might be termed non-hygroscopic. Since cork is a vegetable product and of a granular structure, the term "granular vegetable" might be used in describing the cementitious material formed by mixing the cork and shellac together. However, I wish it expressly understood that the invention need not be limited to the use of cork or shellac, as it is obvious that any light material and a suitable binder therefor may be employed.

The mould may also be heated if a material, which sets or hardens with heat more readily, is used. This may be done, for example, by providing suitable steam chambers therein. It may also be heated in an oven, or in any other desirable manner.

After the mixture has set, the mould is opened by loosening the nuts which hold down the upper section 11 so as to remove the "casting," which in this case is the completed propeller. The propeller is next finished in any desirable manner to make it weather resistent.

Hence, it is seen that little or no hand work is required to make a propeller of my invention. Also, once a suitable mould is made, no further attention need be given in getting the blades of the propeller of the proper diameter and pitch.

Also, I do not wish to limit the invention to a propeller having two blades, as it is obvious that by my method a propeller having any number of blades may be made by simply changing the size and shape of the mould and also the respective parts of the reenforcing member. Furthermore, although the anchor holes have been shown as extending vertically through the arms, it is not necessary that this construction be used. The anchor holes may extend through the arms in any desirable direction. Instead of the anchor holes suitable anchor members may be fastened to or made integral with the arms. These and other changes may be made without deviating from the basic principle of my idea which consists in the use of a more or less finely divided material of any suitable nature possessing light weight and strength when mixed with a suitable binder or cement, and compressing this mixture into the form of a propeller.

I do not wish to be limited to the details shown or described. Also it is to be understood that the present invention is applicable equally well to both aircraft propellers and wind mill impellers. By the term propeller in the accompanying claim, is meant any helicoid construction such as a wind driven impeller, air craft propeller or the like.

I claim:—

A propeller comprising a core and a propeller shaped body surrounding the core and formed of molded cork.

In witness whereof, I hereunto subscribe my name this 4th day of February, 1926.

HERBERT E. BUCKLEN.