N. H. FREEMAN.

PROPELLER.

APPLICATION FILED OCT. 26, 1911.

1,049,571. Patented Jan. 7, 1913.

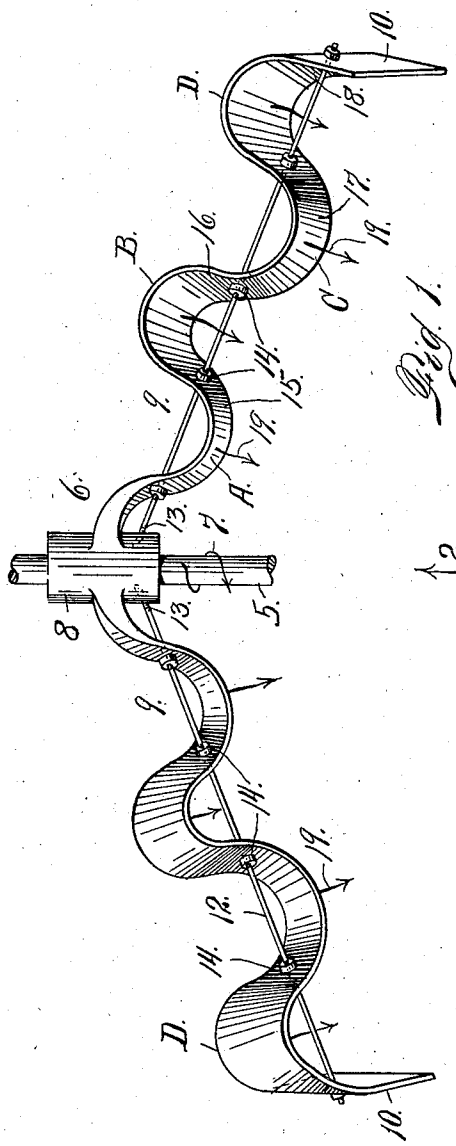

Fig. 1.

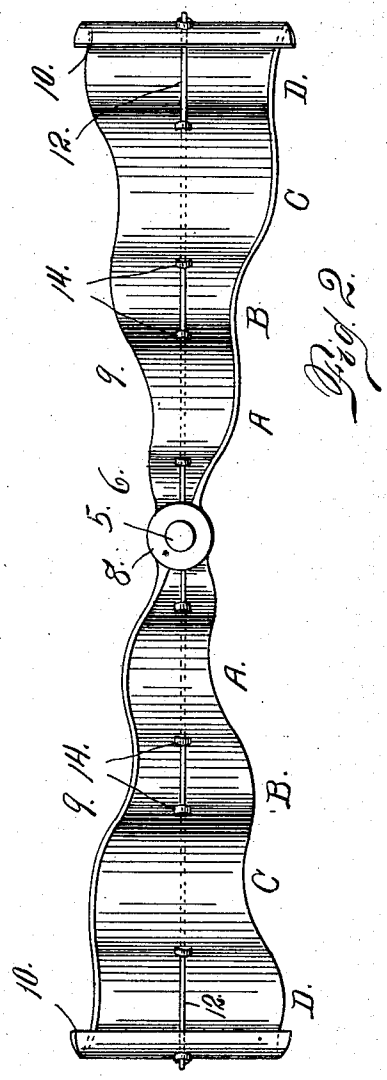

Fig. 2.

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PROPELLER.

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To all whom it may concern:

Be it known that I, NAT H. FREEMAN, a citizen of the United States, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Propellers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in propellers, more especially intended for use in connection with flying machines, my object being to provide a device of this character which shall prevent what may be termed the "atmospheric slip" or escape of the air laterally from the blades in a direction away from the zone of rotation. The tendency, in propellers of this character, as ordinarily constructed, is to drive all of the air out of the zone of rotation, thus producing a partial vacuum in the atmosphere and, to a large extent, removing the resistance upon which the propeller blades must rely for effective operation.

The difficulty of flying with heavier than air machines is, of course, due to the fact of the lack of density of the atmospheric medium; otherwise, it would be as easy to navigate the air as the water, the difference between traveling in or upon the two mediums being entirely due to the difference in density. The ordinary propeller with flat blades, inclined in the well known manner, as soon as it begins to rotate, forces the air strongly radially in all directions from the axis of rotation, thus having a tendency to drive the air or resisting medium out of such zone, the result being either the production of a vacuum or the rarefaction of the air to such an extent that it is of little or no avail as a resisting medium. The more rapidly the propeller rotates the greater is the tendency to produce the aforesaid result. Various efforts have been made to overcome this difficulty, the mechanisms employed being generally quite complicated and consequently difficult to handle, and, therefore, objectionable.

My improved propeller, as hereinafter explained, is exceedingly simple in construction, and it is believed thoroughly efficient in operation.

Generally speaking, my improvement consists in forming the propeller blades of relatively thin sheet metal and forming bends therein, increasing in depth from the axis of rotation outwardly, the said bends preventing the "atmospheric slip" or lateral escape of the air as it is acted upon by the blades. To further increase the efficiency of my improved construction, the blades are deflected inwardly from a direction at right angles to the axis of rotation, the inward deflection being in a rearward direction, assuming that the machine with which the propeller is connected is traveling in a horizontal plane, thus having a tendency, not only to prevent the air from passing out of the zone of rotation, but also driving it inwardly toward the axis, thus further increasing its efficiency as a resisting medium.

Having briefly outlined my improved construction, I will proceed to describe the same in detail, reference being made to the accompanying drawing, in which is illustrated an embodiment thereof.

In this drawing: Figure 1 is a top plan view of my improved propeller, assuming that the axis of rotation is in a horizontal position. Fig. 2 is a rear view of the same, or a view looking in the direction of arrow 2, Fig. 1.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate a shaft upon which my improved propeller 6 is mounted to rotate in the direction indicated by arrow 7. As illustrated in the drawing, the propeller consists of a hub 8, to which are secured in any suitable manner two blades 9, which are of the same construction, whereby the propeller is properly balanced. As illustrated in the drawing, the blades are formed integral with the hub 8. It is evident, however, that they may be connected therewith in any suitable manner. These propeller blades are each provided with bends A, B, C, and D, the bend A being somewhat less in depth than the bend B, while the bend C is of greater depth than the bend B, and the bend D of greatest depth. This construction of blade is formed by bending the blade alternately in opposite directions, the outer or free extremity 10 of the blade extending

beyond the bend C. It may be assumed that, before the bends A, B, C and D are formed in each blade, the blade is inclined in such a manner as to perform the proper function in the manner of the usual or ordinary propeller blade. The blade, without changing its inclination, is formed into the bends, as aforesaid, and, in order to maintain each blade in the bent position, a rod 12 is passed through the blade in a lengthwise direction, the said rod crossing the bends some distance beyond the arch of each. The inner extremity of each rod, as illustrated in the drawing, is anchored in the hub of the propeller, as shown at 13. At each place, where the rod 12 passes through the propeller blade, nuts 14 are applied to the rod, which is threaded for the purpose. These nuts form stops to prevent any tendency on the part of the blade to straighten out or neutralize the bends formed therein for the purpose stated.

During the operation of the propeller, the bends prevent the "atmospheric slip" in a direction outwardly from the axis of rotation, and this result is increased by virtue of the increase in the depth of the bends from the inner extremities of the blades outwardly. For instance, the air which slips from the surface 15 of the bend A may travel in a direction outwardly from the axis of rotation, but this air will strike the surface of the bend B, which forms a stop against its further travel in an outward direction; while the air which slips from the surface 17 of the bend C will strike the inner surface 18 of the member 10 of the bend D. The result will be that the air will be directed rearwardly and inwardly toward the axis of rotation, as indicated by the arrows 19.

Having thus described my invention, what I claim is:—

1. A propeller equipped with blades, which are inclined to the plane of the axis of rotation and increase in width from the said axis outwardly, the blades being bent transversely to form a number of corrugations, and rods passed through the blades in a longitudinal direction, the rods being threaded and equipped with nuts engaging the blades to lock the latter against any tendency to straighten or neutralize the bends when in operation, substantially as described.

2. A propeller equipped with blades bent transversely to form a number of corrugations, rods passed through the blades in a longitudinal direction, the rods being threaded and equipped with nuts engaging the blades to lock the latter against any tendency to straighten or neutralize the bends when in operation, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

NAT H. FREEMAN.

Witnesses:
A. J. O'Brien,
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