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PROPELLER FOR AEROPLANES.

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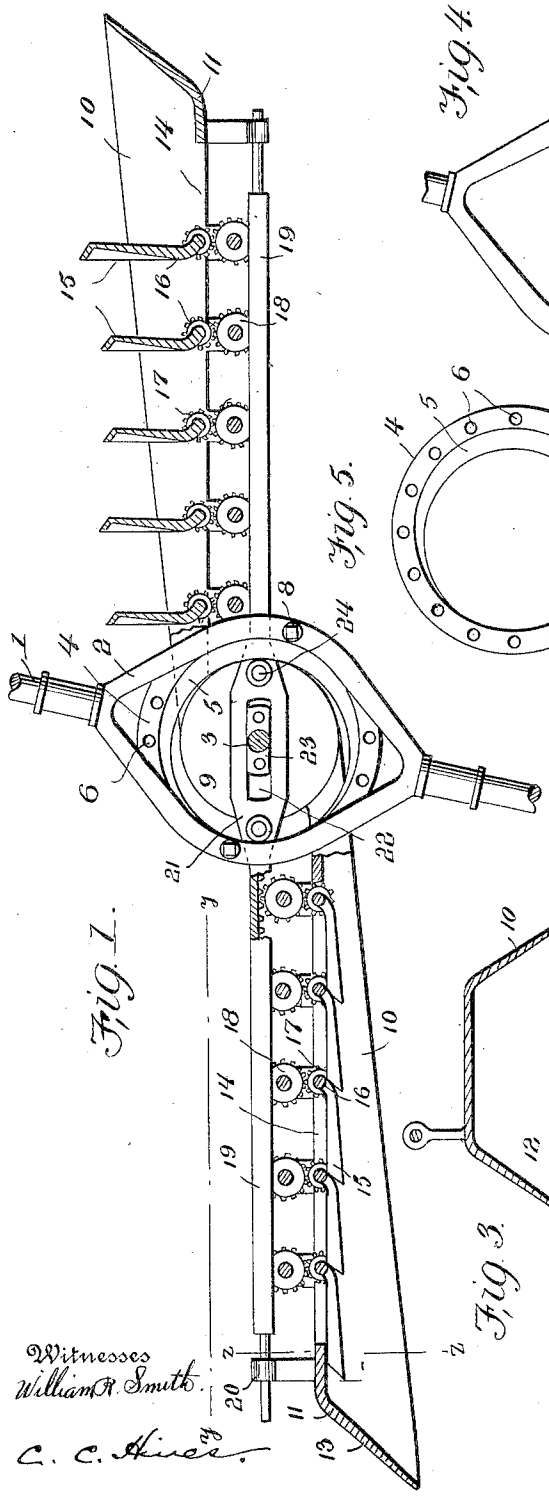


Fig. 1.

Fig. 3.

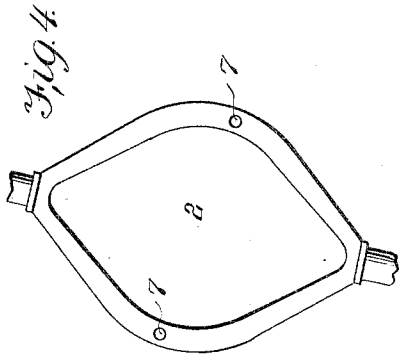


Fig. 4.

Fig. 5.

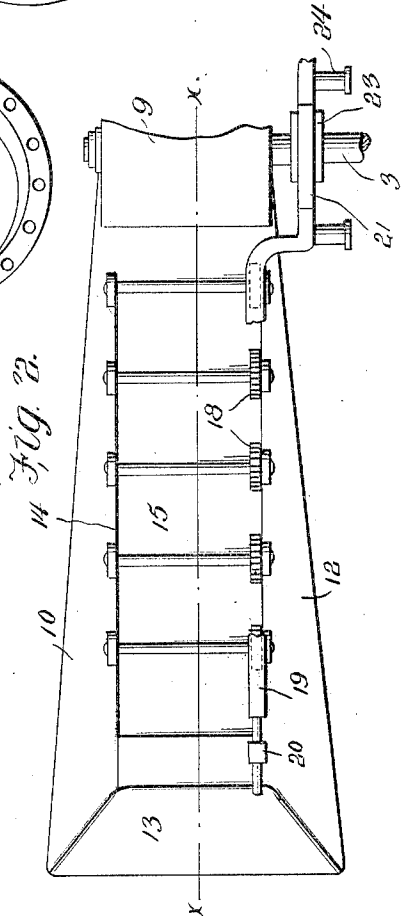


Fig. 2.

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PROPELLER FOR AEROPLANES.

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To all whom it may concern:

Be it known that I, HERBERT PRINCE, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented new and useful Improvements in Propellers for Aeroplanes, of which the following is a specification.

This invention relates to propellers or paddle wheels for flying machines, dirigible balloons and other air and marine craft, the object of the invention being to provide a propeller having an efficient working thrust and the blades of which are provided with air passages and vanes or shutters automatically operated to open and close the same in the revolution of the blades by suitable mechanism, whereby the vanes or shutters of each blade on its working portion of rotation will be closed to compress and exert a working thrust pressure on the air and opened on the remaining portion of the rotation of the blade to diminish the air resistance to the movement thereof.

A further object of the invention is to provide propeller blades which will give both a lifting or sustaining and a propulsive action, and which embodies gearing for shifting the vanes or shutters of the blades including an operating member and a cam controlling the same, said cam being adjustable to vary the action of the vanes or shutters at different points in the revolution of the blades as occasion may require under different phases of service.

The invention consists of the features of construction, combination and arrangement of parts, hereinafter fully described and claimed, reference being had to the accompanying drawings, in which—

Figure 1 is a sectional elevation of a portion of the frame of an air craft and a propeller constructed in accordance with my invention, the section being taken longitudinally through the propeller on the plane indicated by the line *x*—*x* of Fig. 2. Fig. 2 is a plan view looking toward the rear face of one of the propeller blades, and showing parts of the controlling section in section on the plane indicated by the line Y—Y of Fig. 1. Fig. 3 is a detail transverse section through one of the propeller blades on the line Z—Z of Fig. 2. Figs. 4 and 5 are detail views of the yoke and cam ring.

Referring to the drawings, 1 designates a portion of the frame of a flying machine or other air craft, to which is suitably secured a supporting member or yoke 2 through which extends the propeller shaft 3, and to which is adjustably secured a ring 4 having a cam surface 5, said ring being provided with an annular series of openings 6 adapted to register with openings 7 in the said yoke or supporting member 2 for the passage of bolts 8 fixing the yoke in adjusted position, the arrangement of the bolt openings adapting the cam to be circularly adjusted upon the yoke to vary the arrangement of the cam surface 5.

To the shaft 3 is suitably secured a hub 9 carrying two or more propeller blades 10, which as shown, are concaved to gather and confine the air for compression in an effective manner, each blade comprising a body portion 11 carrying forwardly projecting side walls or flanges 12 connected by an outer end wall 13, said side walls increasing in depth and diverging toward the end wall to gradually increase the depth of the concavity toward the outer end of the blade.

The body portion 11 of each blade is provided with a longitudinal slot or air passage 14 controlled by a series of preferably concaved vanes or shutters 15, conforming in shape to the blades themselves. These vanes or shutters are suitably connected at their inner ends to shafts 16 extending transversely of the slot or opening and are adapted to swing inwardly to close the same or outwardly at right angles to the blade for the free passage of air through the slot. The outer end walls of the concaved vanes or shutters are adapted by their angle of inclination to lap the inner ends of adjacent vanes when the vanes or shutters are closed, as clearly shown in Fig. 1.

The shafts 16 carry gear pinions 17 meshing with openings 18 suitably supported by the blade, which openings 18 mesh in turn with rack bars 19, movable longitudinally of the blade in suitable guides 20. The rack bars are disposed longitudinally upon the rear surfaces of the bodies of the blades, and said rack bars are connected at their inner ends with a shifting bar or head 21 formed with a slot 22 receiving a block 23 on the propeller shaft, whereby said shifting bar or head is mounted to rotate with the shaft and propeller as a whole, and is yet slidably connected with the shaft to reciprocate in a plane parallel with the blades to simultaneously move one of the rack bars inwardly

and the other outwardly, as will be readily understood.

The bar or head 21 carries friction rollers 24 to traverse the face of the cam ring 4 in the revolution of the propeller, by which the bar is shifted at different points in the rotation of the propeller to control the vanes or doors of the propeller blades. As will be seen, the arrangement of the cam surface is such, that upon the downward movement or working stroke of each propeller blade the vanes or shutters thereof will be closed against escape of the air through the slot or passage 14 therein, while upon the upward or return stroke of said blade the vanes or shutters thereof will be opened for the free flow of the air through the slot or passage, whereby on the working stroke the air will be confined and compressed and upon the return stroke will be allowed to flow through the blade in order to diminish the resistance of the air to the travel of the blade. In practice, the blades and vanes may be arranged to have a proper pitch to secure both a lifting or sustaining and a propulsive action, whereby the efficiency of the propeller is increased. By adjusting the cam ring in the yoke, the points of opening and closing movements of the vanes or shutters in the revolution of the propeller may be varied and regulated as circumstances in the operation of the propeller may require.

The propeller is designed for use upon heavier-than-air flying machines of any type, dirigible balloons, and aero-hydroplanes or marine craft of any type employing an aerial propeller for propulsion.

Having thus described the invention, what I claim as new is:—

1. In a propeller, a plurality of propeller blades rotating about a common axis and having air passages, pivoted vanes for controlling said passages, rack gearing for opening and closing the vanes, cam mechanism for operating said gearing to simultaneously open the vanes of one blade and close the vanes of another blade, and means for varying the action of said cam gearing.

2. In a propeller, a plurality of propeller blades rotating about the common axis and having air passages, pivoted vanes for controlling said passages, rack gearing for opening and closing the vanes, and cam mechanism for operating said rack gearing to simultaneously open the vanes of one blade and close the vanes of another blade.

3. In a propeller, a shaft, propeller blades provided with air passages, pivoted vanes controlling said passages, gearing including rack bars for feathering the vanes, a reciprocating member for oppositely shifting the rack bars, and a cam for operating said reciprocating member.

4. In a propeller, a plurality of propeller blades provided with air passages, vanes controlling the air passages, gearing for feathering the vanes, and a cam for actuating said gearing, said cam being adjustable to vary the feathering action.

5. In a paddle wheel, a revoluble concave paddle-supporting frame having flaring sides and end and an open top, in combination with a series of paddle blades pivotally secured to the frame in the opening thereof, and cam-operated mechanism constructed to raise the paddles perpendicular to the frame whereby the air may pass between the paddles and to turn the paddles into position to close the said opening in the frame as the frame revolves.

6. In a paddle wheel, a revoluble concave paddle-supporting frame having flaring sides and end and an open top, in combination with a series of concave paddle blades pivotally secured to said frame in the opening thereof, the said paddles having an open and a closed position and the concave side of said paddles when they are closed being arranged in the same direction as the concave side of said frame, and cam-operated mechanism constructed to raise the said paddles perpendicular to the frame whereby the air may pass between the paddles and to turn the paddles into position to close the said opening in the frame as the frame revolves.

7. In a paddle wheel, the combination with a paddle-supporting frame having flaring sides and end and an open top, of paddle blades pivotally secured to said frame in the opening thereof, the said blades having open and closed positions, and said blades being constructed to overlap at the ends when in their closed positions, and mechanism constructed to raise the paddles perpendicular to the said frame whereby the air may pass between them and to turn the paddles into position to close the opening in said frame when the frame revolves.

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

HERBERT PRINCE.

Witnesses:
CHARLES HONKER,
MAXIMILIAN JUTTNER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."