C. M. WANZER.

AEROPLANE PROPELLER.

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988,681.

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Fig. 1

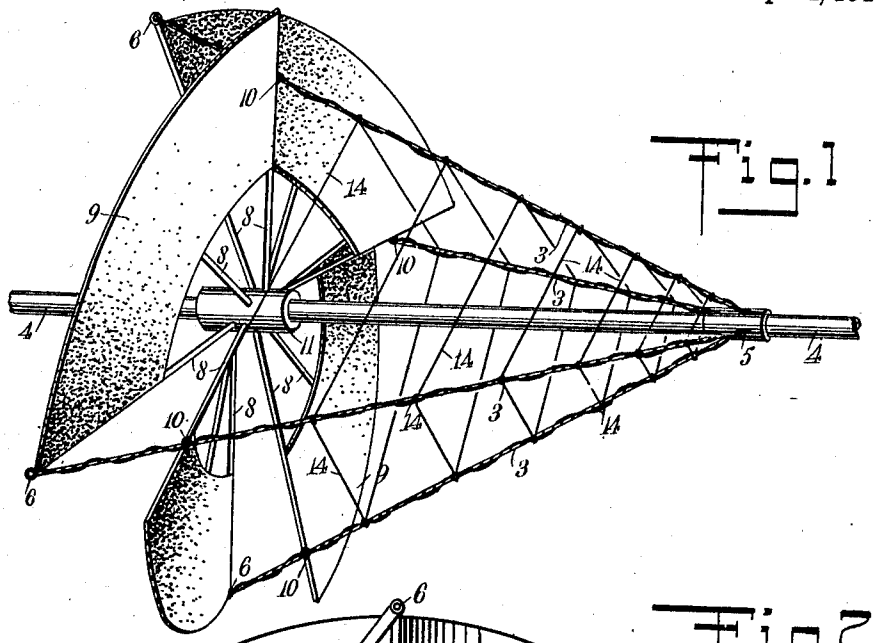
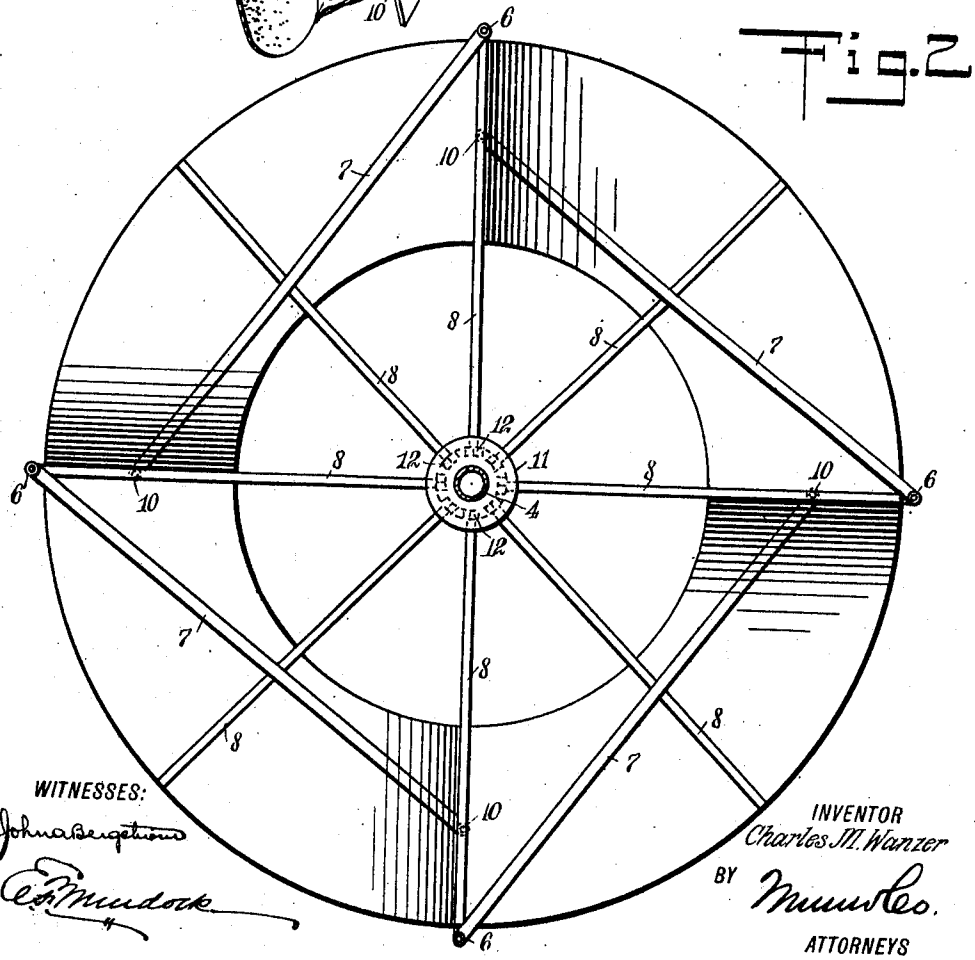


Fig. 2



WITNESSES:

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AEROPLANE-PROPELLER.

988,681. Specification of Letters Patent. Patented Apr. 4, 1911.

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To all whom it may concern:

Be it known that I, CHARLES M. WANZER, a citizen of the United States, and a resident of Urbana, in the county of Champaign and State of Ohio, have invented a new and Improved Aeroplane-Propeller, of which the following is a full, clear, and exact description.

Among the principal objects which the present invention has in view are: to provide a construction whereby the blades of the propeller are reinforced and mutually supported; to provide a reinforcing structure disposed in straight line arrangement whereby is utilized the tensile strength of the reinforcing members; to provide means for preventing vibration in the cordage of the reinforcing elements; and to provide means for securing the structure parts of rotary members against centrifugal displacement.

One embodiment of the present invention is disclosed in the structure illustrated in the accompanying drawings, in which like characters of reference denote corresponding parts in both views, and in which—

Figure 1 is a perspective view of a propeller constructed and arranged in accordance with the present invention, and of the driving shaft of the aeroplane; and Fig. 2 is a front elevation of the same, partly in section.

In constructing a propeller for an aeroplane in accordance with the present invention, I am not limited to the number of blades used. The invention recognizes that in the near future, propellers for aeroplanes will be constructed on much larger diameters than at present. Realizing this and foreseeing the need for reinforcing which shall remove the necessity for disproportionate increase in the carrying structure, I have provided a system of reinforcing cables 3, 3, which are fixedly attached to a driving shaft 4 by any suitable means, that shown in the drawings being to reeve the said cables through the shaft 4, as shown at 5. The cables 3, 3, are each secured to two adjacent propeller blades. The cables are secured to eyelets 6 provided in the upper end of a diagonal brace 7, which brace is joined to one of the spokes 8, 8 at the extreme outer end thereof. The braces 7, 7 are disposed, as shown in Fig. 2 of the drawings which show the back of the propeller, or the advanced side of a pulling propeller to which type the present propeller belongs, as distinguished from a pushing propeller. The said braces extend diagonally behind the propelling surface of the blade 9, and to connect with that spoke 8 which forms the rearward edge of the blade 9 at a point in direct line between the eyelet 6 on the advanced edge of the adjacent blade and with the reeving point 5 on the shaft. The cables 3, 3 are fixedly secured to eyelets 10, 10 at the rear edge of each of the blades. By reason of this disposition of the cables 3, 3 and the fixed attachment thereof to the front and rear edges of adjacent blades, the cables 3 are subjected to the tensile strain only. As the tensile strain is that of greatest strength, it is obvious that the lightest cable may be employed in this capacity.

The supporting structure for the blades 9, 9, is formed by the spokes 8, 8 and the braces 7, 7, which are fixedly attached to each of the said spokes. The spokes are fixedly connected to and extended from a hollow tubular hub 11, the means of attachment being to provide a series of staggered threaded perforations through which the ends of the spokes 8, 8 are passed, and in which they are screw threaded when desired. The ends of the spokes are extended to the inner side of the hub 11 where they are capped by screw nuts 12, 12, or headed as a rivet. By means of this construction, there is prevented the dislodgment of the various spokes and parts connected therewith caused by the centrifugal action.

The hub 11, as stated, and as illustrated in the drawings, is elongated. The spokes 8, 8 are inserted and held therein in a staggered relation, the inclined arrangement being substantially parallel to the incline of the blades 9. This arrangement forms a supporting structure, braced longitudinally to receive the longitudinal thrust of the blade to which the said spokes are attached.

It is to prevent vibration and whipping in the cables 3, 3, that I wind about the same the retaining cables 14. In the drawings I have shown but one such cable, 14, but more may be used, as is obvious. In each instance I secure the forward end of the retaining cable to the eyelet 10 on one of the blades 9. The cable 14 is then wrapped about the cables 3, 3 in spiral disposition, as shown at Fig. 1 of drawings. The pitch of the spiral formation is parallel to the pitch of the blades 9 throughout the winding of the

said cable 14. Where more than one cable 14 is used, it is anchored to one or other of the blades 9. There may be used as many cables 14 as there are blades 9.

The shaft 4 is constructed of tubing, and is mounted in bearings suitably arranged in the aeroplane.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. An aeroplane propeller, comprising a plurality of inclined blades the front and rear edges whereof aline; and a plurality of flexible reinforcing members fixedly secured to the propeller shaft at a point removed from and at the rear of said propeller, and fixedly secured to the adjacent edges of each pair of successive blades, the points of attachment of said blades being alined with the points of securement of said reinforcing members with said shaft.

2. An aeroplane propeller, comprising a plurality of inclined propeller blades the adjacent ends whereof are separated in a plane radial to the driving shaft of said propeller; a plurality of flexible reinforcing members fixedly secured to and converged upon the driving shaft of said propeller, the points of securement for said reinforcing members being disposed in straight line arrangement; and a cross brace for each of said blades extended between the points of securement of said reinforcing members.

3. An aeroplane propeller, comprising a plurality of inclined blades the adjacent edges whereof are longitudinally separated and alined; a plurality of supporting radially extended spokes; an elongated hub to fixedly hold said spokes in longitudinally staggered relation; a plurality of flexible reinforcing members fixedly secured to the adjacent edges of said blades; and a plurality of cables for reinforcing the said blades against the longitudinal pull thereof.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CHARLES MICHAEL WANZER.

Witnesses:
FRANCES HEATHERMAN,
JOHN W. CROWL.

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