E. L. LAUR & G. FLORENCE.

AERIAL PROPELLER.

APPLICATION FILED SEPT. 5, 1911.

1,046,814.

Patented Dec. 10, 1912.

2 SHEETS—SHEET 1.

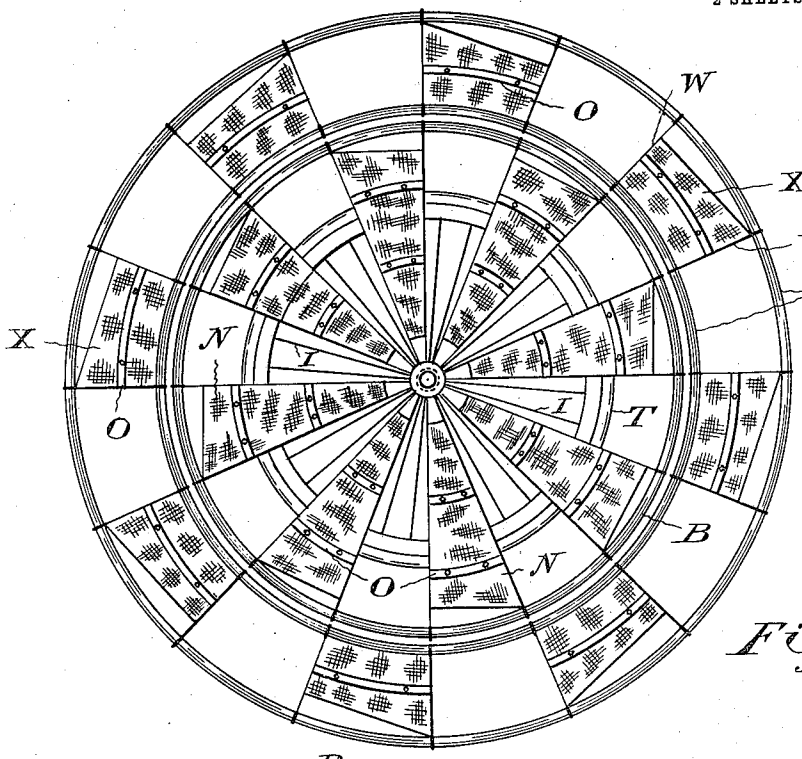

Fig. 1

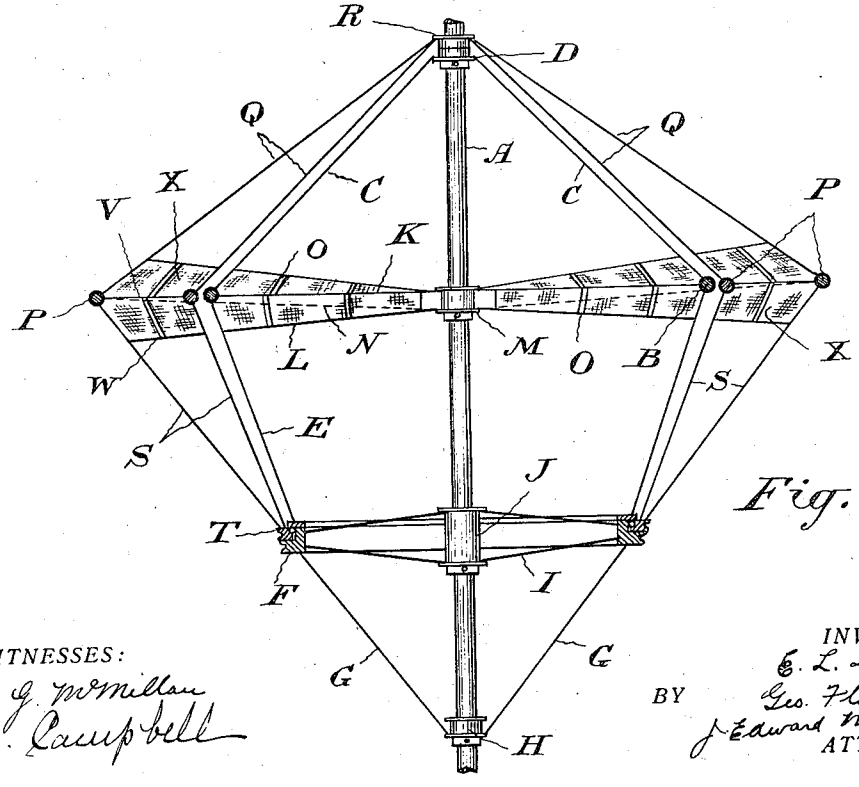

Fig. 2

WITNESSES:

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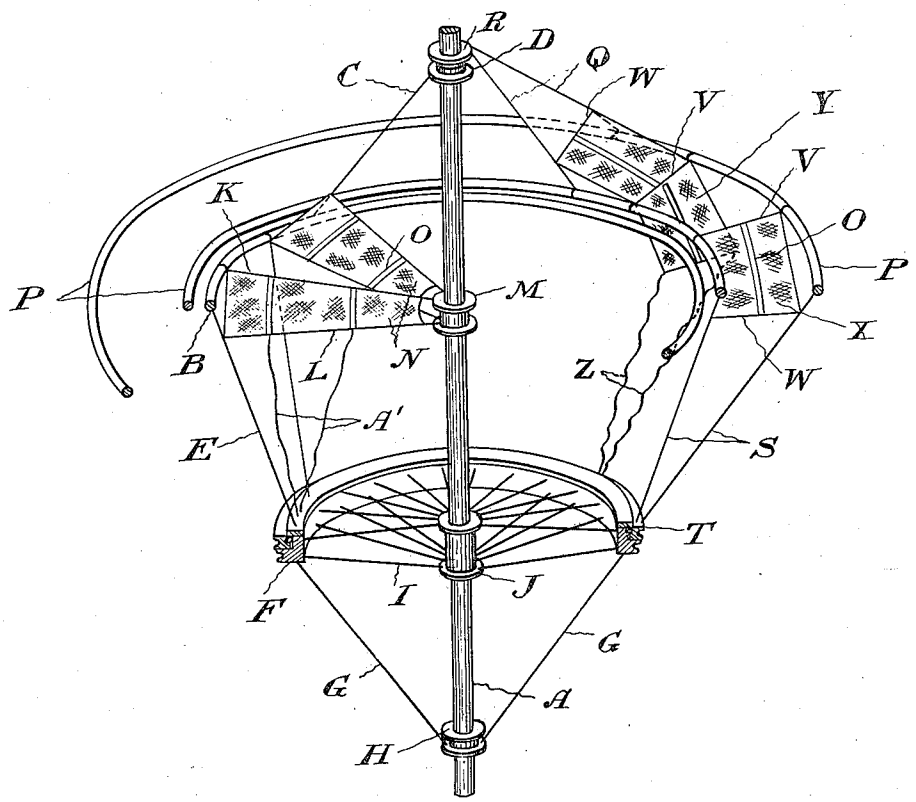

Fig 3

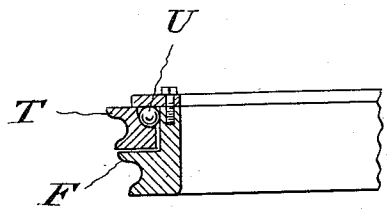

Fig. 4

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EDGAR L. LAUR AND GEORGE FLORENCE, OF TORONTO, ONTARIO, CANADA.

AERIAL PROPELLER.

1,046,814. Specification of Letters Patent. Patented Dec. 10, 1912.

Application filed September 5, 1911. Serial No. 647,643.

To all whom it may concern:

Be it known that we, EDGAR L. LAUR and GEORGE FLORENCE, both of the city of Toronto, in the Province of Ontario, Canada, have invented certain new and useful Improvements in Aerial Propellers, of which the following is a specification.

This invention relates to propellers for use in air ships, aeroplanes and the like either for sustaining or propelling the same and our object is to devise a light strong propeller with large blade area which will require tension connections only with the shaft.

We attain our object by the constructions illustrated in the accompanying drawings in which—

Figure 1 is a plan view of our improved propeller. Fig. 2 is a vertical section of the same. Fig. 3 is a perspective view partly broken away. Fig. 4 is a cross-section of the rims of the driving pulleys.

In the drawings like letters of reference indicate corresponding parts in the different figures.

A is a rigid shaft.

B is a ring of suitable stiff material, preferably wood, arranged concentric with the shaft A. This ring is connected with the shaft by means of diagonal tension stays extending each way from the plane of the ring. One set of diagonal tension stays C run direct to the collar D on the shaft. If the shaft A when the propeller is in operation is held stationary the collar D will be arranged to revolve on the shaft. If the shaft, however, be mounted to revolve the collar D may be secured thereto. The other set of diagonal tension stays E is not shown as directly connected with the shaft but is secured to the grooved pulley F, a second set of stays G connecting the grooved pulley with the collar H carried by the shaft A and preferably arranged similarly to the collar D. The effect of the tension stays E and G is thus the same as if the stays E ran direct from the ring B to the collar H.

The rim of the pulley F is connected with the shaft by means of the radial tension stays I preferably arranged in two sets, as shown, and connected with a collar J carried by the shaft in the same manner as the collars D and H.

The propeller blades are preferably arranged and carried in the following manner: Sets of radial tension stays K and L are employed. The stays K are substantially radial and connect the ring B with a collar M carried by the shaft in the same manner as the collars D, H and J. The stays L connect the collar M with the diagonal stays connected with the ring B. These stays L preferably are connected alternately with the diagonal stays C and the stays G, as shown particularly in Fig. 3 the connections being made at such a point as to give the propeller blades the right pitch. The propeller blades N are preferably of light flexible waterproof fabric their edges being supported by the stays K and L, as shown. Stiffeners O of any suitable material are preferably secured to the fabric and the stays supporting the same.

The pulley F will be driven by a belt from any suitably located motor. It will be seen that the torque of the pulley is applied to the blades through the medium of the diagonal stays E which connect directly with the ring B. This means that the strain on the parts of the propeller and the stays supporting the blades is reduced to minimum, enabling all the parts to be made much lighter than is the case with the ordinary propellers which are shaft driven. By this arrangement all the members except the ring, shaft, pulley rim and collars thereon may be made of material capable of sustaining tension only in which condition the parts are able to withstand much greater loads than when under compression or when bending stresses are applied.

It is desirable for various reasons to have two propellers on the same shaft pitched to rotate in opposite directions. While this may easily be accomplished by putting two propellers similar to that above described on one shaft, yet the arrangement we will now describe possesses some advantages.

Two stiff rings P preferably of wood are arranged exterior to and concentric with the ring B. Diagonal tension stays Q connect these rings with a collar R preferably carried by the same shaft in the same manner as the other collars thereon. Diagonal stays S also connect these rings P with a grooved pulley T arranged to rotate on the pulley F preferably by means of the ball bearings U, illustrated particularly in Fig. 4.

Radial tension stays V connect the two rings P and radial tension stays W con-

nect pairs of stays Q and S, as shown particularly in Fig. 3, on which radial stays are carried the propeller blades X preferably similarly constructed to the blades N and provided with similar stiffeners O. From this construction it will be seen that the outer rings may be readily rotated by means of the pulley T in the opposite direction to the ring B.

A propeller such as described may be made of very large area so as to make it effective for lifting purposes in flying machines of the helicopter type, and will also prove effective for driving purposes in machines in which propellers are used only for horizontal driving.

As in machines of the helicopter type it may be desirable to arrange the propellers so as to obtain a parachute effect in case of stoppage of the engine we may arrange loose flaps capable of closing the gaps between the blades of the propeller. Such a flap Y is shown at the right hand of Fig. 3 being hinged to one of the radial stays connecting the outer rings so that it may hinge upward into contact with the underside of the adjacent stay at the other side of the gap.

Flexible stays Z may be provided connecting each flap Y with the pulley T to take some of the strain off the propeller blades to which the flap is connected or with which it may engage. This arrangement of flaps is, of course, unnecessary when the propeller is used for driving only. We also prefer to stay each blade by means of stays A′ connected to the stiffeners O and to the pulleys F and T. These stays are normally a little slack so that they take no strain until the other parts carrying or driving the blades have taken up the greater part of their load. An even distribution of the strains is thus assured.

What we claim as our invention is:—

1. In a propeller the combination of a rigid shaft; a stiff ring concentric therewith; diagonal tension stays connected with the ring and with the shaft at each side of the plane of the ring; radial tension stays connecting the ring and shaft; radial tension stays connecting the shaft and certain of the diagonal stays at points adjacent the ring; and propeller blades each connected to one of each set of said diagonal stays.

2. In a propeller the combination of a rigid shaft; a stiff ring concentric therewith; diagonal tension stays connected with the ring and with the shaft at each side of the plane of the ring; radial tension stays connecting the ring and shaft; propeller blades connected with said stays; and a driving pulley connected to the diagonal stays at one side of said ring.

3. In a propeller the combination of a rigid shaft; a series of propeller blades having tension connections with the shaft; and driving means connected with the blades and having tension connections with said shaft, whereby a torque is applied directly to the outer parts of the blades.

Toronto this 1st day of September, 1911.

EDGAR L. LAUR.
GEORGE FLORENCE.

Signed in the presence of—
J. Edw. Maybee,
W. G. McMillan.