E. BERLINER.

AEROMOBILE.

APPLICATION FILED AUG. 11, 1908

1,115,162.

Patented Oct. 27, 1914.

2 SHEETS—SHEET 1.

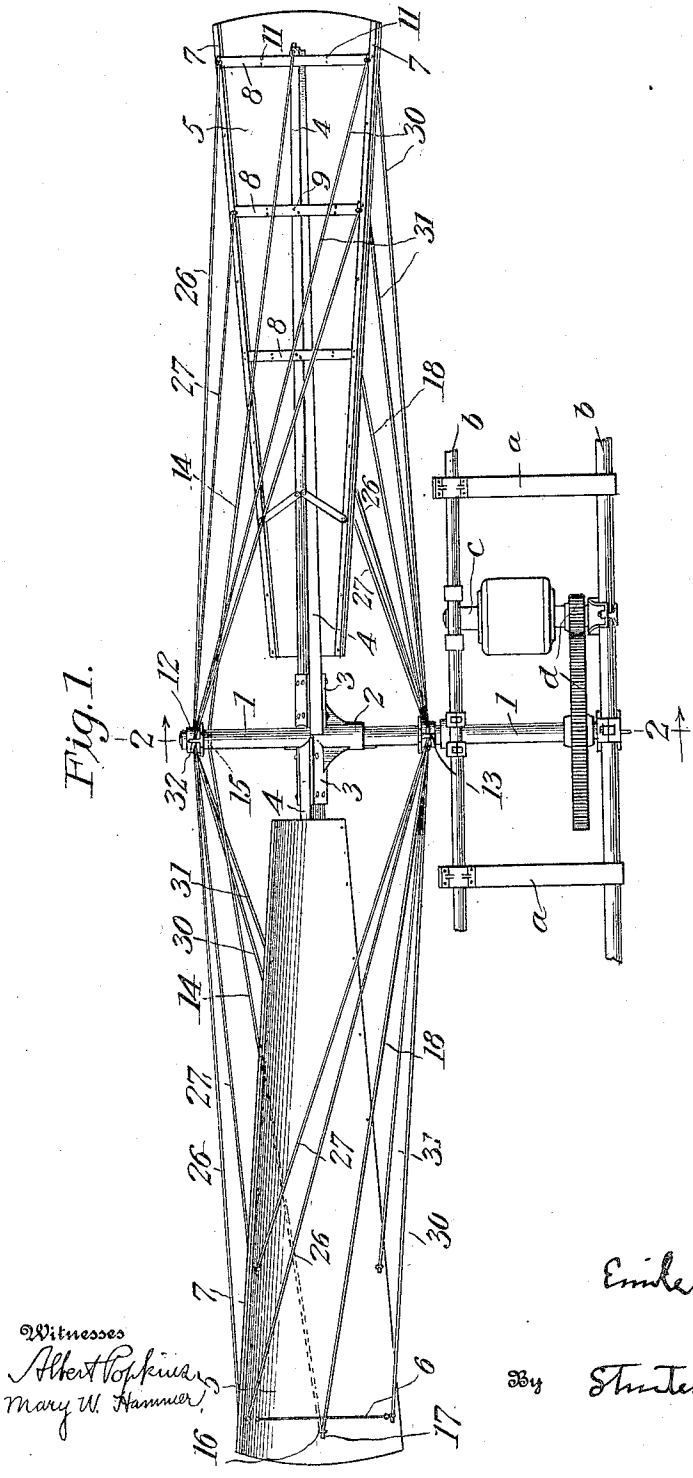


Fig. 1.

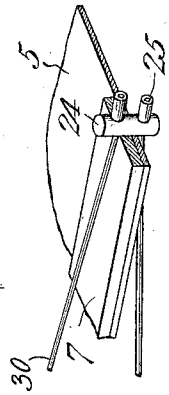


Fig. 5.

Witnesses

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2 SHEETS—SHEET 2.

Fig. 2.

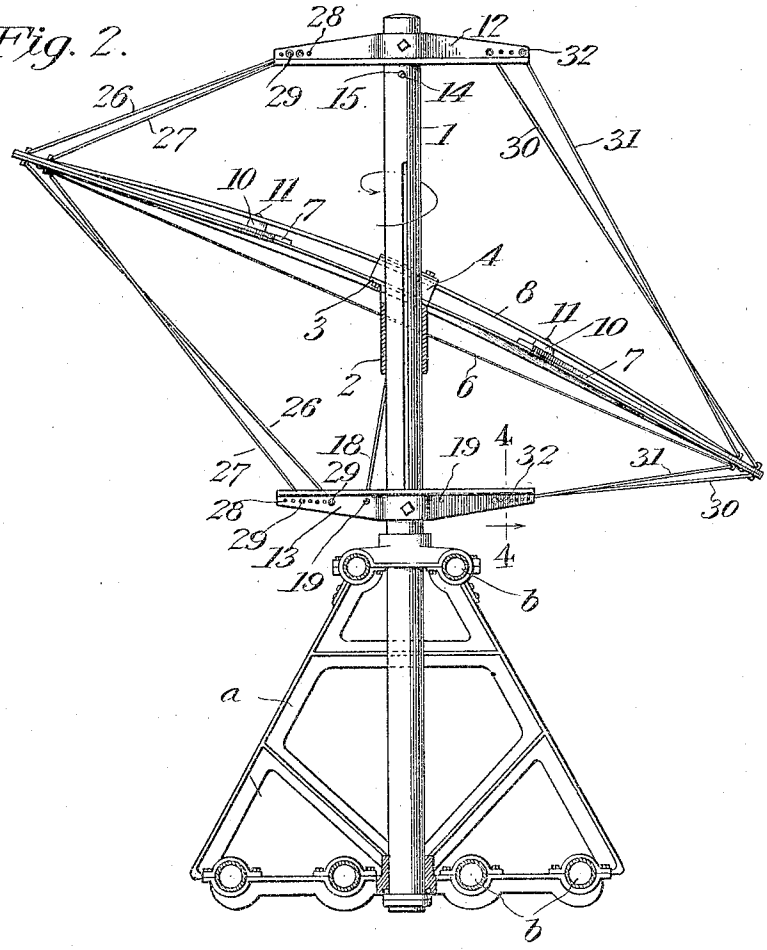


Fig. 3.

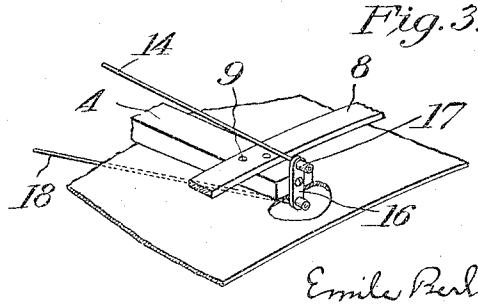
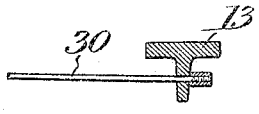


Fig. 4.



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UNITED STATES PATENT OFFICE.

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AEROMOBILE.

1,115,162. Specification of Letters Patent. Patented Oct. 27, 1914.

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To all whom it may concern:

Be it known that I, EMILE BERLINER, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Aeromobiles, of which the following is a description, reference being had to the accompanying drawing and to the letters and figures of reference marked thereon.

My invention relates to flying machines or aerial vessels, and especially to the type known as aero-mobiles or helicopters, in which rotary horizontal blades are employed, arranged at such an angle that they exert a lifting action upon the machine.

The principal object of the invention is to provide an improved blade or propeller structure, which is so shaped and braced as not only to prevent breakage or distortion when subjected to abnormal strain, but to hold each blade at all times in proper relative position to the other, and in proper relation to every other part of its own surface.

With the foregoing and other objects in view, the invention consists in the novel construction and arrangements hereinafter described and referred to in the appended claims.

The invention is illustrated in the accompanying drawings, in which,—

Figure 1 is a side elevation of an aeromobile propeller, constructed in accordance with my invention. Fig. 2 is a transverse sectional view of the same on line 2—2 of Fig. 1, the vertical shaft and cross arms being shown in elevation; Fig. 3 is a detail perspective view of a portion of the blade structure, showing the arrangement of one of the braces; Fig. 4 is a detail section through one of the brace-connecting arms; and Fig. 5 is a detail perspective view, showing one of the brace connections with the blade.

The base or main frame of the apparatus, as shown in the drawing, is merely typical. It comprises a pair of triangular end frames *a*, connected by tubes *b*. The tubes which constitute the flooring and upper structure, are provided with bearings for the reception of a pair of vertically disposed parallel shafts *c* and *l*, which are connected by gearing *d*. On the shaft *c* is a motor, which may be driven by any suitable power, but is preferably a hydrocarbon motor. This motor as shown conventionally in Fig. 1 mounted on the shaft *c*, is rotatable about a vertical axis and carries a small pinion meshing with the gear *d*.

The vertical shaft 1 carries a sleeve or collar 2, secured in place by a key or the like. From this sleeve extend diametrically opposite socket members 2, in which are seated blade-carrying arms 4, which are preferably of rectangular form in cross section and gradually taper from their inner to their outer ends.

On the arms are secured fan blades 5, which preferably are formed of sheet metal, said blades being inclined in opposite directions respectively, and their active faces being slightly concaved by tension wires 6, which extend across the blade surfaces near the outer ends thereof.

The thin metallic blades have reinforcing strips 7 extending along each edge of their rear surfaces, and extending from side to side of the face of each blade are cross strips 8, these being bowed across the arms 4, and being permanently secured to the arms and blades 5 by suitable rivets, as shown at 9. Arranged between the cross strips 8 and the blade, are spacing blocks 10 which are located about midway between the arm 4 and the edges of the blade and secured by bolts or rivets 11.

Secured to the vertical shaft are upper and lower arms 12 and 13, disposed parallel with each other and at right angles to the arms 4. These arms 12 and 13 are in the form of T bars in cross section, and are arranged to hold the ends of a number of brace rods or wires that extend from the fan blades.

The primary brace rod 14 of the blades is in the form of a tension wire that passes through an opening 15 formed in the shaft 1. The ends of this wire pass to the ends of the arm 4 and extend through openings formed in small cross bars 16 that are secured to the extreme outer ends of the arms 4 and pass through openings in the blades (see Fig. 3). The ends of the rod are threaded and receive clamping nuts 17, by which it is properly tensioned and held in place. To the lower ends of the cross bars

16 are secured the outer ends of brace rods 18, that pass to the lower arm 13 and extend through openings 19 formed in said bar. These rods 18 incline forward in the direction of rotative movement of the blade to which they are attached and greatly strengthen the blade.

In addition to the central braces, a series of auxiliary bracing rods is also employed. These extend from the arms 12, 13 to the blades, and at the latter point are connected in the manner best shown in Fig. 5. Through the edge battens 7, the blades 5, and cross strips 8, are drilled holes for the reception of pins 24. These pins project beyond the opposite faces of the blades, and have openings for the passage of the braces, the latter being threaded and held in place by nuts 25.

Probably the greatest strain on each blade is at its upper edge, and from this point extend four tension braces or wires 26 and 27, connected as before described by the pins 25. These braces pass through openings 28 formed in both the upper and lower arms 12 13, at the same side as the forward edge of the blade, and are held in place by nuts 29. The braces run in pairs from the upper and lower faces of the blade, and their tension may be readily adjusted by turning the nuts 17 and 29. In addition to these, four auxiliary braces arranged in pairs (see 30—31), run from the rear and lower edges of the blades to the arms 12 and 13, and are confined by nuts 32. These serve to transmit the strain from blade to blade, and make the whole fabric taut and properly braced and tensioned for moving at high speed. It will be seen that by arranging the moving parts of the motor to rotate horizontally, that said motor will act as a gyroscope to steady the vessel while the same is in motion.

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

1. In a flying machine, a propeller having blades each formed of sheet material and concaved transversely, a supporting arm extending longitudinally of the blade, and secured to the central portion of its rear face, and a plurality of arched cross strips secured to the edge portions of the blade and extending over and secured to said arm.

2. In a flying machine, a propeller having blades formed of sheet material, a carrying arm extending along the longitudinal center of the blade and secured to the rear face thereof, reinforcing battens secured to the edge portions of the rear face of the blade, and cross strips extending transversely of the blade and arched over the carrying arm, said strips being secured to the battens and the arm.

3. In a flying machine, a propeller having blades, each blade being formed of sheet material transversely concaved, a carrying arm for each blade, the carrying arm being secured to the rear face of the blade, reinforcing battens at the opposite edges of the blade, cross strips arched across the arm, and secured to the battens and the arm, and spacing blocks arranged between the cross strips and the blade, at points between the battens and arm, said blocks being secured to the blade and strips.

4. In a flying machine, a propeller having blades, each blade being formed of sheet material, a tension member extending transversely across the active face of the blade, at a point near the outer end thereof, and serving to arch the blade transversely, a carrying arm secured to the rear face of the blade, and rigid bracing members extending across and secured to the arm and to the marginal portions of the blade.

5. In a machine of the class described, a revoluble shaft, blade carrying arms extending therefrom, transversely concaved blades secured to said arms, cross arms carried by the shaft at points above and below the blade arms, said cross arms being disposed at an angle with respect to the length of the blade arms, tension members extending from the cross arms to the forward edges of the blades, and auxiliary members extending from said bars to the rear edges of the mating blade to permit distribution of the strain from blade to blade.

6. In a machine of the class described, a revoluble shaft with arms projecting therefrom, blades carried by said arms, and a tension member extending continuously longitudinally of said blades and connected at its opposite ends at or near the outer ends of said blades.

7. In a machine of the class described, a shaft, arms extending therefrom, blades secured to said arms and each provided with an opening at the outer end of the arm, cross bars extending through the openings and having their central portions secured to the ends of the arms, cross arms secured to the shaft, tension members connecting the upper ends of the blades to the cross arms, and tension members extending from the lower arms of the blade cross bars to the shaft cross arms, the attaching point with the latter arms being in advance of the face of the blade, whereby said members may act as draft devices for the blades.

8. In a machine of the class described, a shaft, a cross arm thereon, blade carrying arms extending from said shaft, a blade secured to each arm and provided with an opening at the outer end of the arm, a cross bar extending through the opening and having a central portion secured to the end of the arm, a cross arm secured to the shaft, a tension member connecting the upper arms

of the blade cross bars and extending through an opening in the shaft, and tension members extending from the lower arms of the blade cross bars to the shaft cross arm, the direction of said tension members connecting the lower arms of the blade cross bars with said shaft cross arm being forwardly with respect to the direction of rotation, whereby said members may act as draft devices for the blades.

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

EMILE BERLINER.

Witnesses:
A. M. PARKINS,
C. S. STURTEVANT.

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