

April 7, 1925.

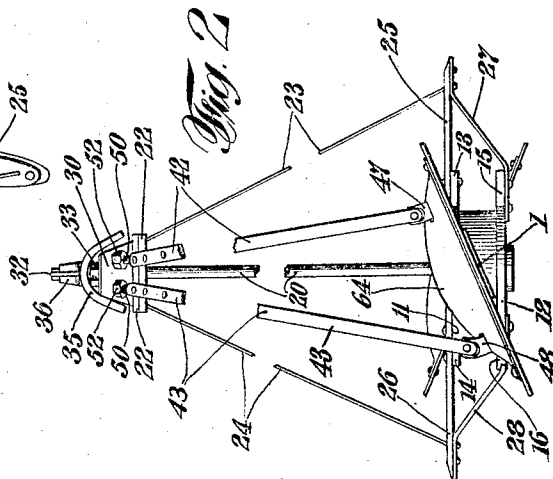
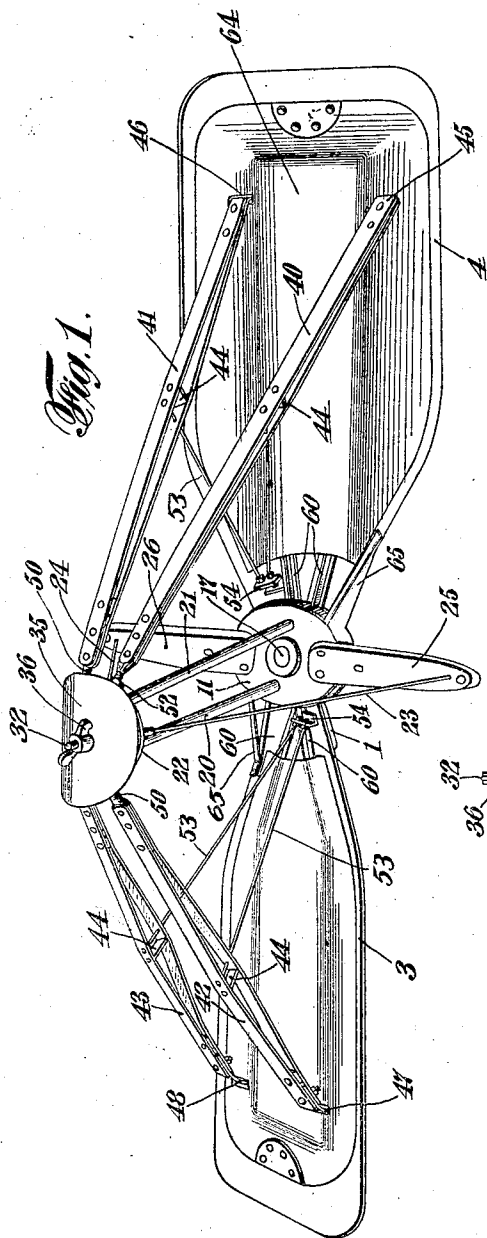
1,532,601

F. W. REGENER

AIR PROPELLER

Filed March 26..1923

6 Sheets-Sheet 1



INVENTOR
Frank W. Regener
BY *Prindle, Wright and Small*
his ATTORNEYS

April 7, 1925.

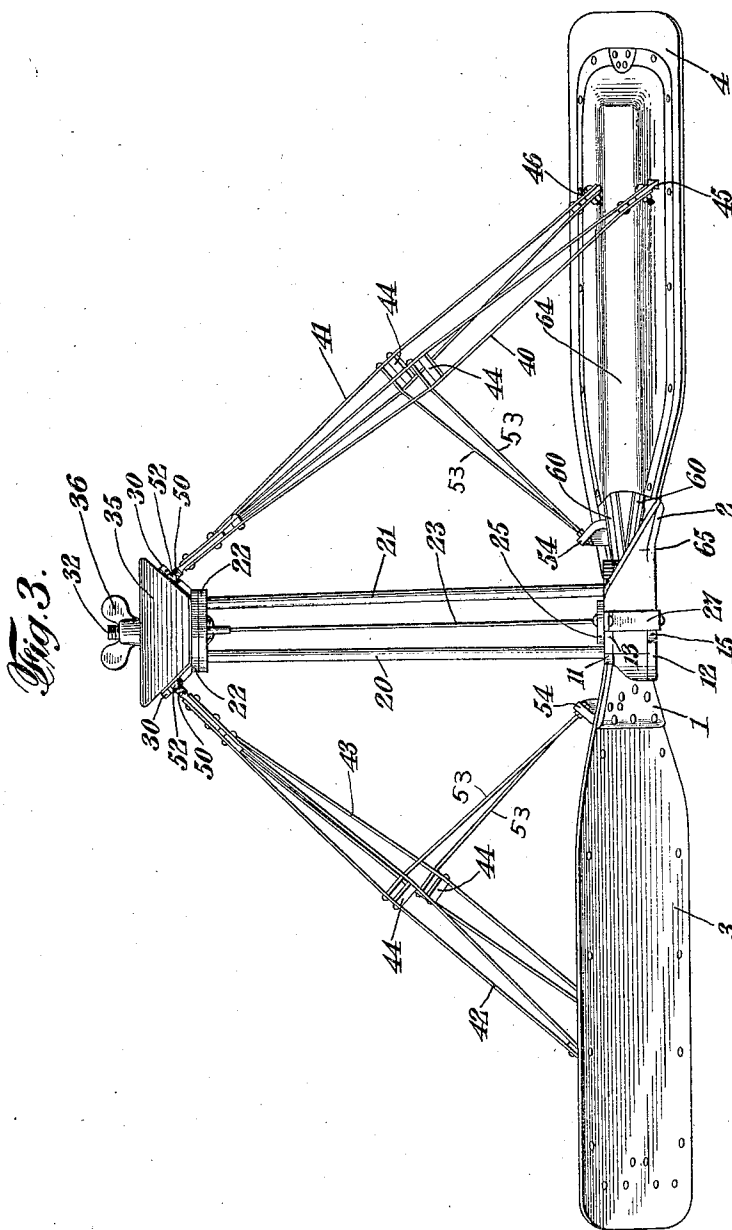
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6 Sheets-Sheet 2



INVENTOR

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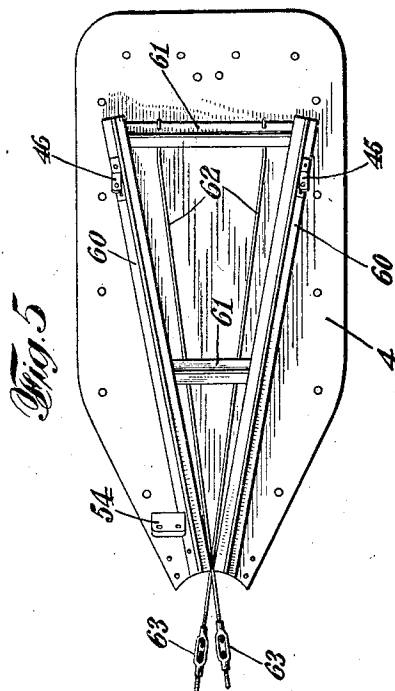
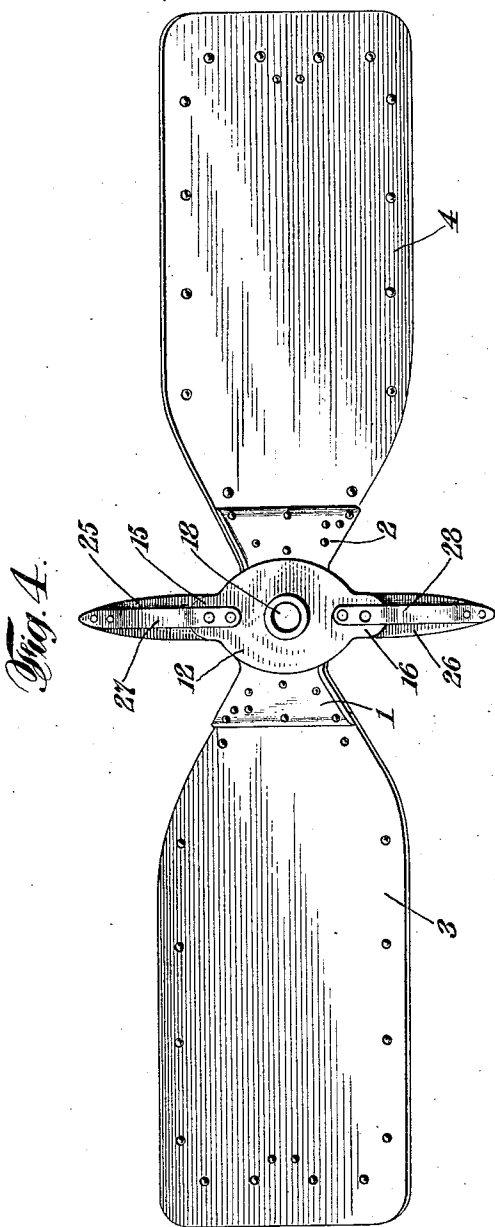
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6 Sheets-Sheet 3



INVENTOR
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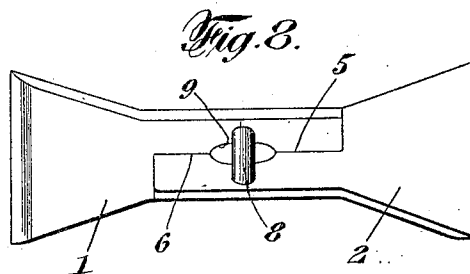
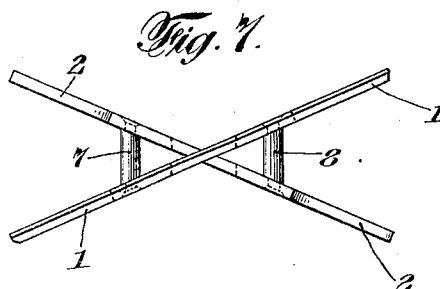
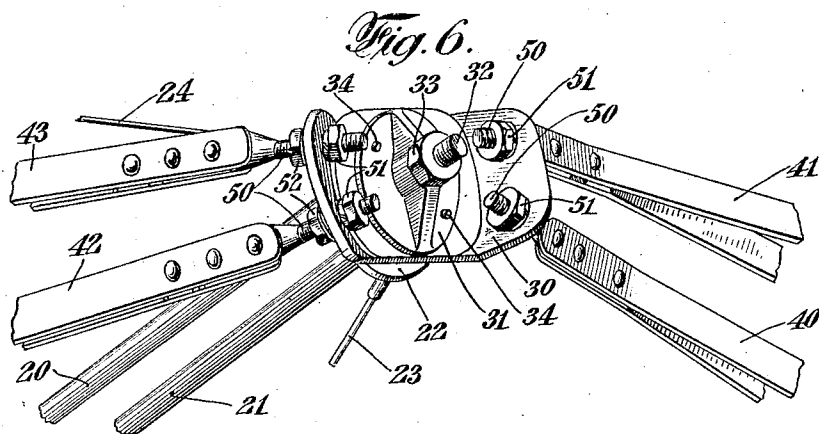
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6 Sheets-Sheet 4



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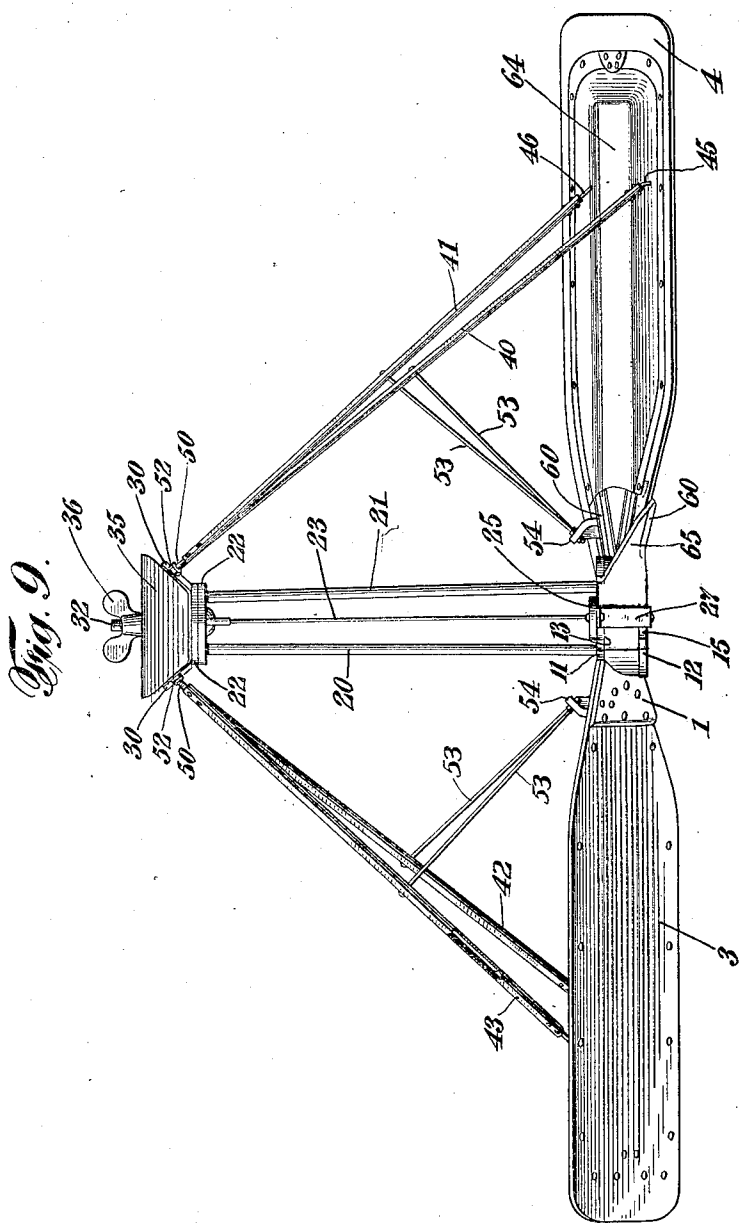
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F. W. REGENER

AIR PROPELLER

Filed March 26, 1923

6 Sheets-Sheet 5



INVENTOR

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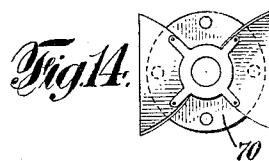
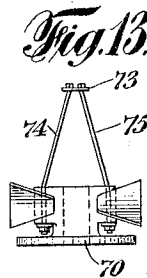
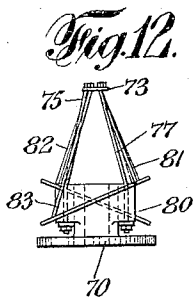
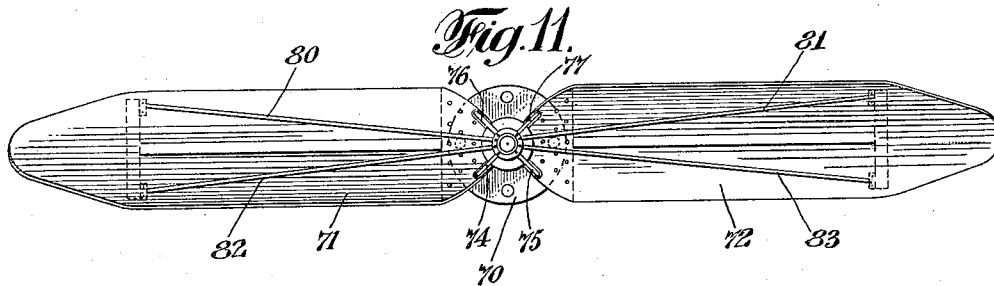
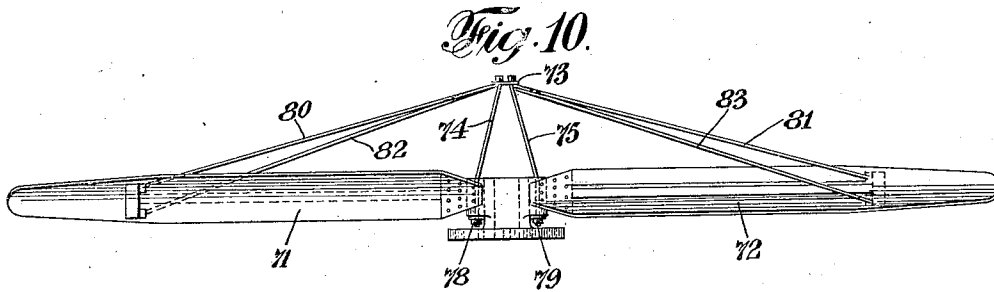
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F. W. REGENER

AIR PROPELLER

Filed March 26, 1923

6 Sheets-Sheet 6



Inventor
Frank W. Regener
By his Attorneys
Brindle, Wright, Neal and Bean

Patented Apr. 7, 1925.

1,532,601

UNITED STATES PATENT OFFICE.

FRANK WM. REGENER, OF NEW YORK, N. Y.

AIR PROPELLER.

Application filed March 26, 1923. Serial No. 627,841.

To all whom it may concern:

Be it known that I, FRANK W. REGENER, a citizen of the United States, a resident of New York city, in the county of New York and State of New York, have invented certain new and useful Air Propellers, of which the following is a specification.

My invention relates to air propellers and has for its object to provide an air propeller of metal which is strong enough to withstand without distortion the stresses and strains to which it is subjected in use and yet simple and economical to construct.

A further object of my invention is to provide a propeller so strongly constructed that its blades may be given a pitch greater than is common with wood propellers.

A further object of my invention is to provide a propeller so strongly constructed that its blades may be given a pitch greater than is common with wood propellers and with a length of blade shorter than is common with wood propellers.

Other and further objects of my invention will be apparent from the following description of one embodiment thereof and from the accompanying drawings of said embodiment in which—

Figure 1 is a perspective of said embodiment;

Figure 2 an end elevation of said embodiment;

Figure 3 a side elevation of said embodiment;

Figure 4 a bottom plan of said embodiment;

Figure 5 a top plan of one blade with its covering removed showing the strengthening ribs;

Figure 6 a perspective of the saddle with its cap removed and of portions of the stress and tension rods connected therewith;

Figure 7 an end elevation of the intersecting base arms to which the blades are attached;

Figure 8 a side elevation of the intersecting base arms to which the blades are attached;

Figure 9 a side elevation of another embodiment of my invention;

Figure 10 is a perspective view of another modification of my invention;

Figure 11 is a plan view thereof;

Figures 12, 13 and 14 are views showing details of the manner of constructing the hub and attaching various parts thereto.

Similar reference characters refer to similar parts throughout the drawings.

In an embodiment of my invention chosen for purposes of illustration, an air propeller adapted for use with a tractor type of airplane has been illustrated. In said embodiment, reference characters 1 and 2 (Figure 4) illustrate base arms to which are secured respectively in any desired manner as, for example, by riveting or brazing, blades 3 and 4 of any desired metal preferably aluminum. Each base arm 1 and 2 preferably is provided respectively with a central longitudinal slot or slit 5 and 6 (Figures 7 and 8) extending from the inner end, to permit the arms to be dovetailed a distance sufficient to ensure a strong interlocking structure which may, if desired, be strengthened further by studs 7 and 8, one on each side. A central opening 9 is provided in this embodiment for the motor shaft.

On the dovetailed base arms 1 and 2 are secured in any desired manner, as, for example, by brazing, circular plates 11 and 12, each of which is provided respectively with ears 13, 14 and 15, 16. Each of said plates in this embodiment also is provided respectively with central openings 17 and 18 registering with central opening 9 in the base arms. The unoccupied space between the plates may be filled with any desired material, thus forming a smooth cylindrical hub.

Mounted in any desired manner in the hub formed by circular plates 11, 12, are saddle supports 20 and 21, having mounted on the top thereof a plate or plates 22. These saddle supports 20, 21 preferably have their centers in line with the centers of the blades and are held from sidewise movement in any desired manner as by tension wires 23 and 24 secured respectively at one end to extensions 25 and 26 mounted respectively on ears 13 and 14 and at the other end to plate or plates 22, preferably adjustable so that said saddle supports may be kept firmly in true. If desired, extensions 25 and 26 may be braced suitably, as, for example, by connections 27 and 28 extending respectively from near the outer end of extensions 25 and 26 to ears 15 and 16.

On plate or plates 22 is placed a saddle 30 and a reinforced washer 31—the plate or plates, saddle, and reinforced washer being secured firmly together in any desired manner, as, for example, by a threaded bolt 32

with nut 33 and also if desired by rivets 34. A cap 35 held in place by a wing nut 36 on threaded bolt 32 is placed over the saddle to act as a protective covering and reduce
 5 air pressure in a propeller of the type in the embodiment illustrated.

The blades are braced in this embodiment by compression members 40, 41, 42, and 43 extending therefrom to saddle 30. These
 10 compression members may be of any desired construction. In the embodiment illustrated in Figures 1, 2, 3, and 6, the members are shown as bowed strips with struts 44 there-
 15 between wherever desired. In the embodiment of Figure 9, hollow compression members are shown. The compression members are secured to the blades in any desired
 20 manner as by securing brackets 45, 46, 47 and 48 to said blades to which respectively are secured the lower ends of said compression members. The upper ends of said compression members are secured adjustably to
 25 saddle 30 (Figure 6). In the embodiment illustrated, each compression member is supplied with a threaded bolt 50 secured to the saddle by upper and lower nuts 51 and 52. By adjusting the nuts the blades may
 30 be maintained rigidly at the desired pitch. If desired, the compression members may be strengthened by members such as tension members 53 from each of said compression
 35 members to brackets 54 secured to each blade preferably at a point to afford maximum support.

Each blade is strengthened longitudinally and laterally respectively by ribs 60 and 61 (Figure 5) which are shown in this embodiment as T bars. If desired, the blades may
 40 be strengthened further by longitudinal wires 62 (Figure 5) running from blade to blade or to a portion of the hub and adapted to be adjusted in any desired manner as by
 45 turn buckles 63. In the embodiment illustrated, the wires are shown preferably as secured to the outside lateral rib 61 but they may be secured to the blades in any other
 50 desired manner. It will be noted by reference to Figure 5 that the brackets 45, 46, 47, and 48 on the blades for the compression members 40, 41, 42, and 43 are mounted on
 55 longitudinal ribs 60 to which they are secured by rivets extending through the blades. This is a preferable but not exclusive construction.

That side of the blade on which the ribs 60 and 61 are mounted preferably is covered by a protective covering 64, which is of
 60 advantage in reducing wind resistance.

In order to obviate twisting of the blade at the point of strain near the hub, brackets 65 may be provided, secured to plates 11 and 12 of the hub and extending along the edge
 65 of the blade.

Although my invention has been illustrated by an embodiment adapted for use

with an air plane of the tractor type, it is obvious that it may be adapted to other uses such, for example, as a pusher type of air plane in which case the suitable changes and reversal of parts would be within the pur-
 70 view of one skilled in the art.

Many embodiments of my invention will be apparent to those skilled in the art without departing therefrom or from the scope of the claims, my invention not being limited
 75 to the embodiment chosen for purposes of illustration but consisting of an air propeller having metal blades suitably braced and secured rigidly, even when constructed with a pitch of blade greater than is possible with
 80 a propeller having wood blades.

In another embodiment of my invention I have shown a particularly advantageous manner in which the saddle may be attached to the hub. In said embodiment there is
 85 shown a hub 70 having blades 71 and 72 attached thereto as shown. A saddle 73 is mounted upon the hub and firmly connected thereto by four struts, 74, 75, 76, and 77, which are passed through the hub and bolted
 90 thereto by bolts such as 78 and 79. These struts, as shown in Figure 11, are preferably equidistantly placed. In addition to these struts there are longitudinal members 80 and 81 which connect the saddle with the upper
 95 parts of the blades, and there are members 82 and 83 which connect the saddle with the lower edges of the blades. These longitudinal members may be designated compression and tension members, respectively.
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This application is a substitute for my allowed application, Serial No. 273,895, filed January 29th, 1919.

What I claim and desire to secure by Letters Patent is:

1. In an air propeller, the combination of a hub having lateral extensions therefrom, blades secured to said hub, a saddle, means to support said saddle from said hub, supporting members from said saddle to said
 105 extensions, and compression members from said saddle to said blades.

2. In an air propeller, the combination of a hub having lateral extensions therefrom, supports for said extensions, blades secured to said hub, a saddle, means to support said
 110 saddle from said hub, supporting members from said saddle to said extensions, and compression members from said saddle to said blades.

3. In an air propeller, the combination of dovetailed base arms, blades secured to said arms, a saddle, means to support said saddle from said arms, and supporting
 115 members for said blades extending from said saddle to said blades.

4. In an air propeller, the combination of dovetailed base arms, strengthening studs for said base arms, blades secured to said arms, a saddle, means to support said saddle
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from said arms, and supporting members from said saddle to said blades.

5 5. In an air propeller, the combination of a hub, blades secured to said hub, a saddle, means to support said saddle from said hub, supporting members from said saddle to said blades, and a bracket from said hub to each of said blades at a point of strain on said blades.

10 6. In an air propeller, the combination of a hub, blades secured to said hub, a saddle, means to support said saddle from said hub, supporting members from said saddle to said blades, and compression and tension members connecting together the outer part of said blades.

20 7. In an air propeller, the combination of a hub, blades secured to said hub, strengthening ribs on said blades, a saddle, means to support said saddle from said hub, supporting members from said saddle to said blades, and compression and tension members connecting together the outer part of said blades and secured to said strengthening ribs.

25 8. In an air propeller, the combination of a hub, blades secured to said hub, a saddle,

means to support said saddle from said hub, compression members from said saddle to said blades, and supporting members from said compression members to said blades at a point adjacent the hub.

9. In an air propeller, the combination of a hub, blades secured to said hub, a saddle, means to support said saddle from said hub comprising four equidistantly placed struts, and longitudinal members from said saddle to said blades.

10. In an air propeller, the combination of a hub, blades secured to said hub, a saddle, means to support said saddle from said hub comprising four equidistantly placed struts, and longitudinal members from said saddle to said blades at their upper edges.

11. In an air propeller, the combination of a hub, blades secured to said hub, a saddle, means to support said saddle from said hub comprising four equidistantly placed struts, and longitudinal members from said saddle to said blades at their lower edges.

In testimony that I claim the foregoing, I have hereunto set my hand this 22 day of March, 1923.

FRANK WM. REGENER.