A. A. HEIL.

AEROPLANE.

APPLICATION FILED OCT. 5, 1909.

969,865.

Patented Sept. 13, 1910.

4 SHEETS—SHEET 1.

Fig. 1.

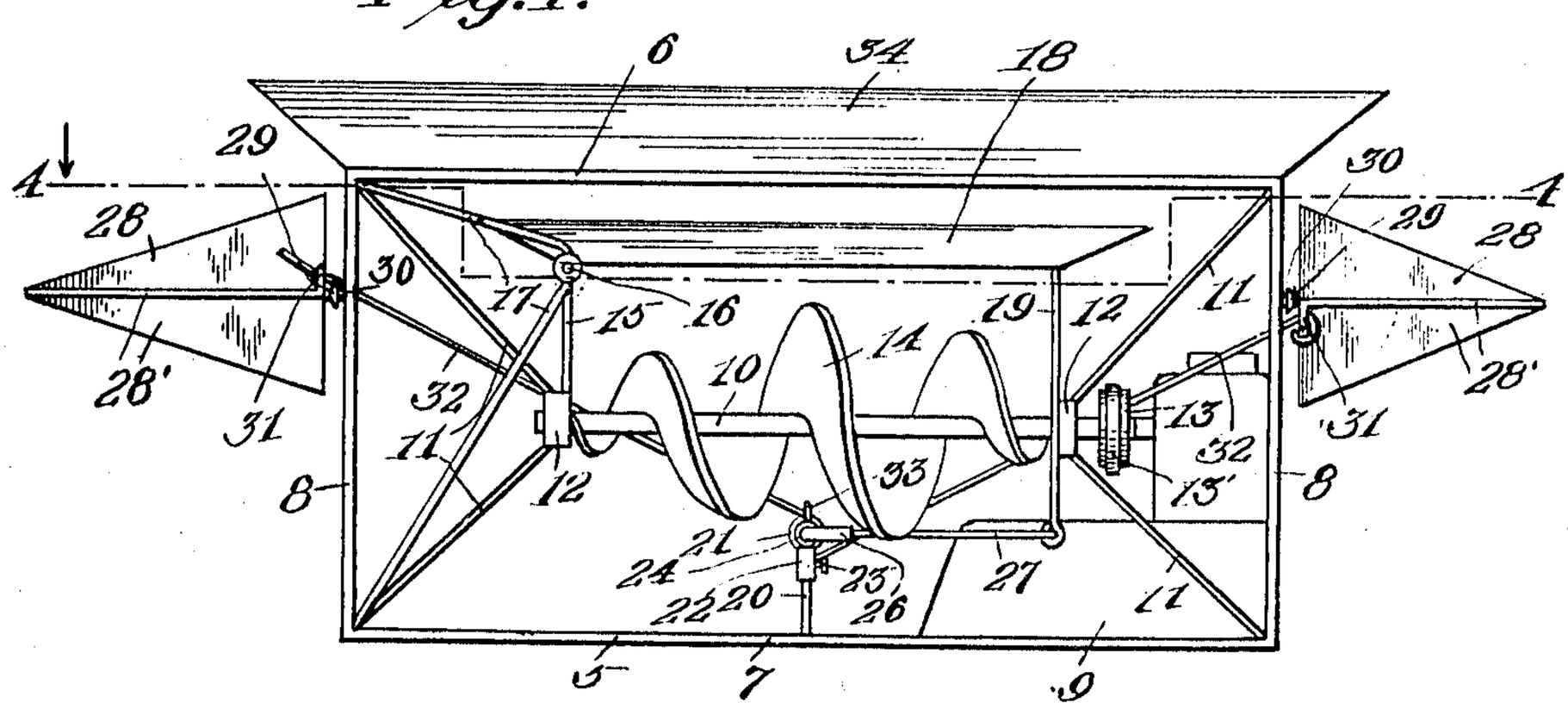
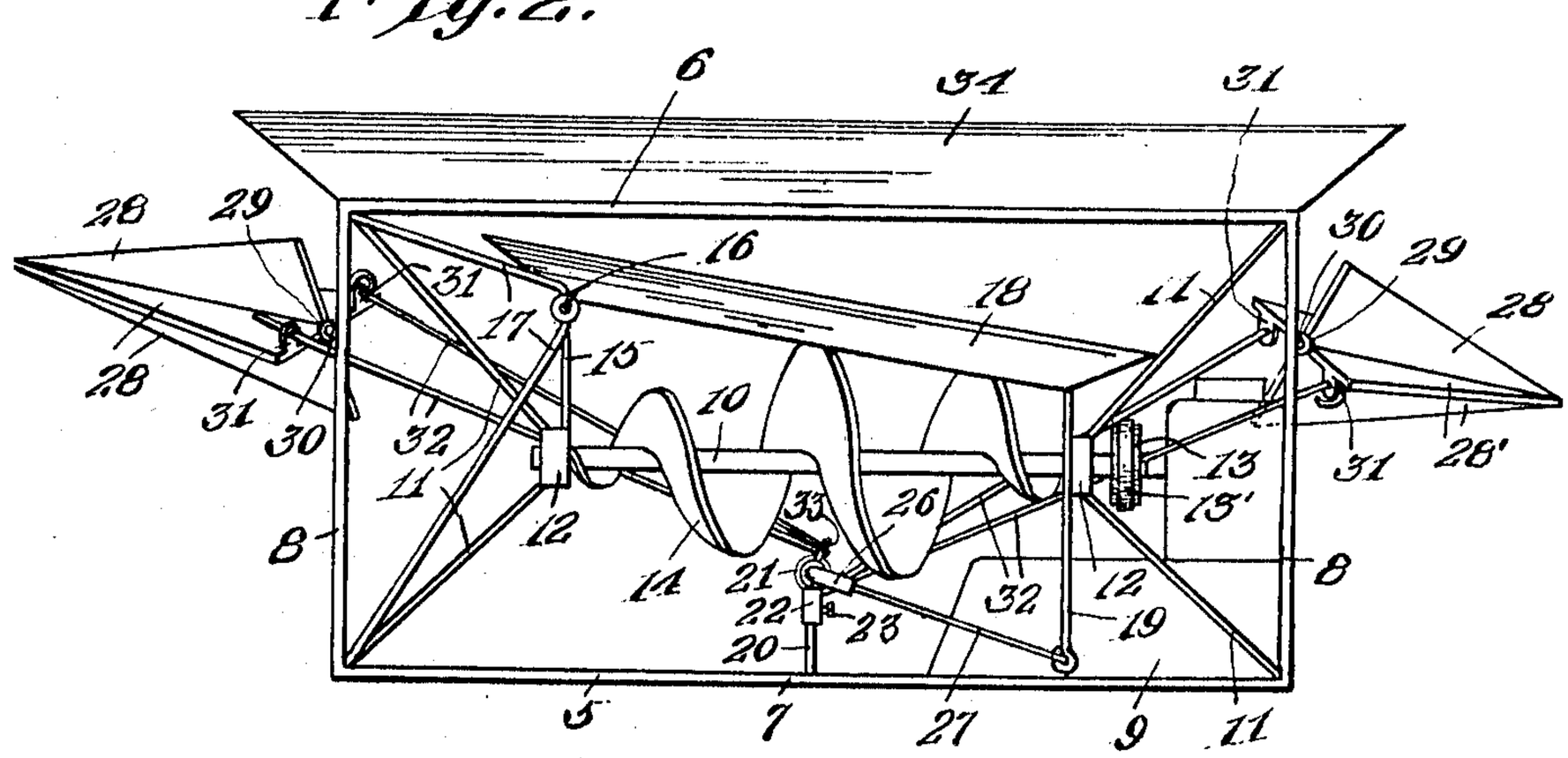


Fig. 2.



Witnesses

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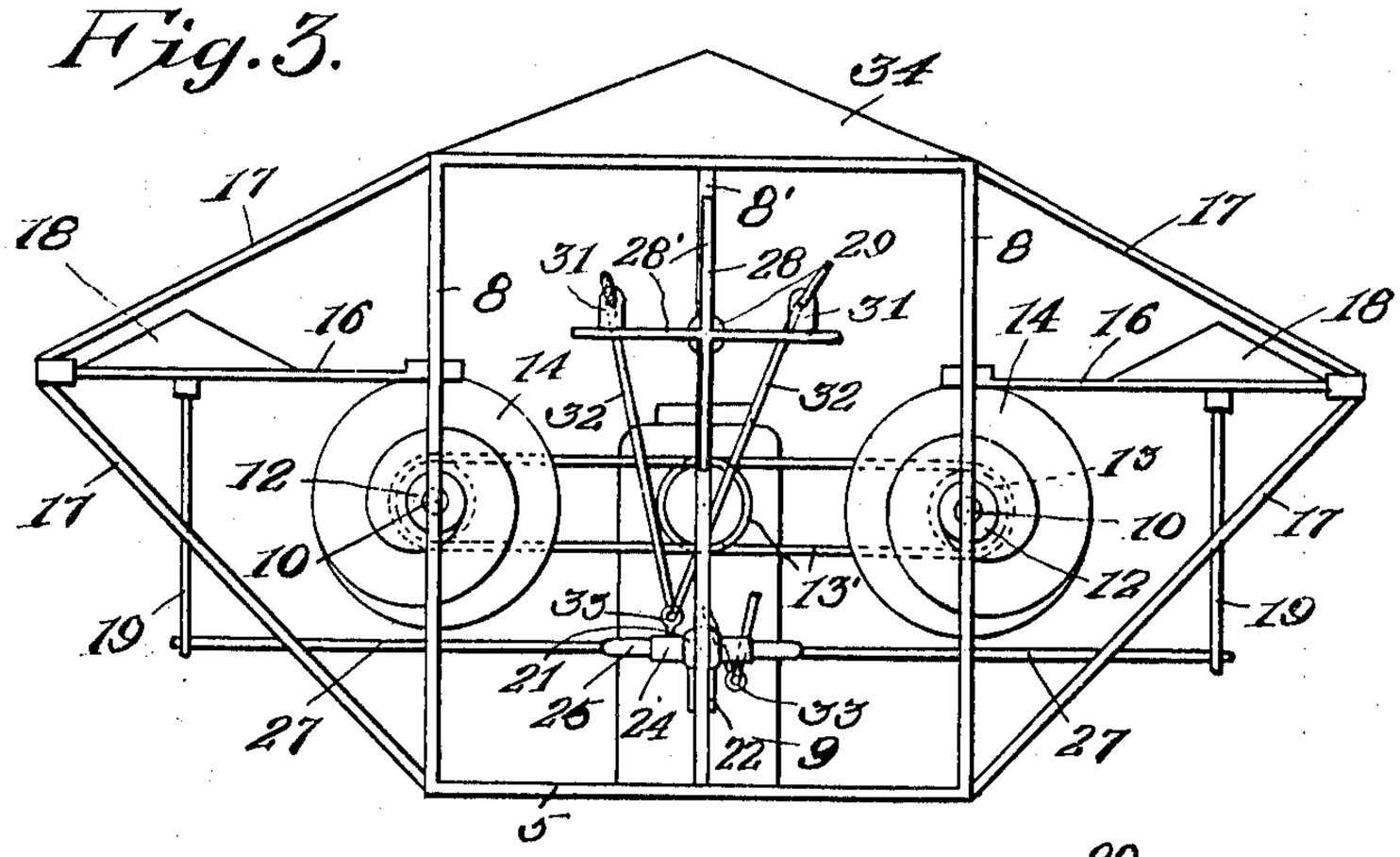
4 SHEETS—SHEET 2.

Fig. 3.



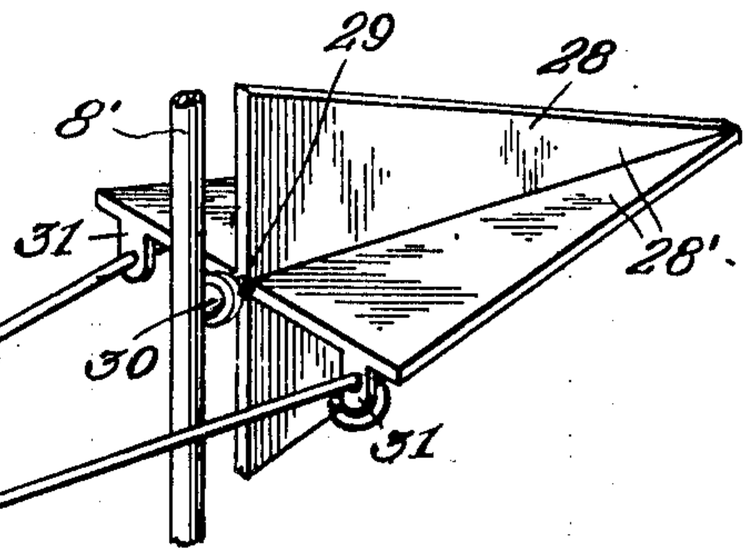


Fig. 5.

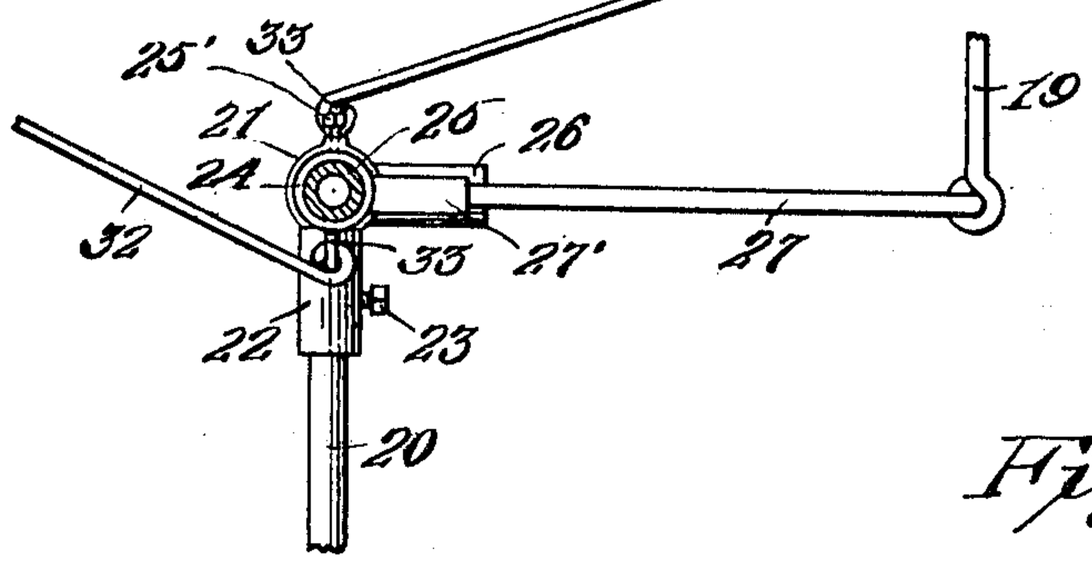
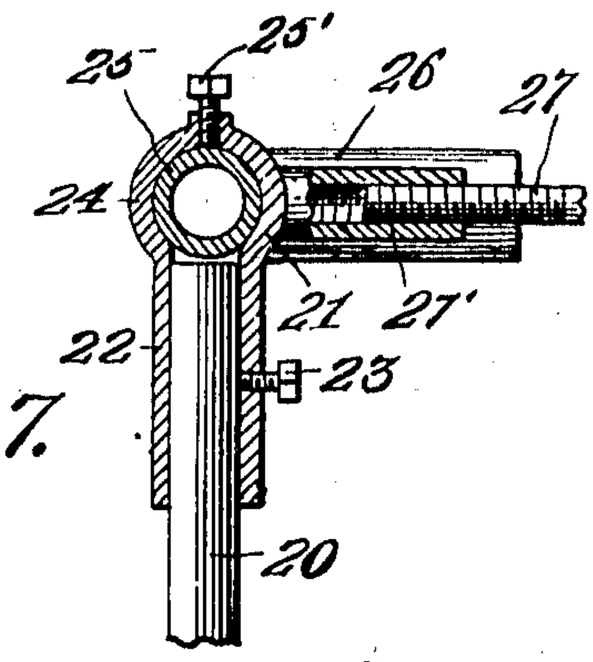


Fig. 7.



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4 SHEETS—SHEET 3.

Fig. 4.

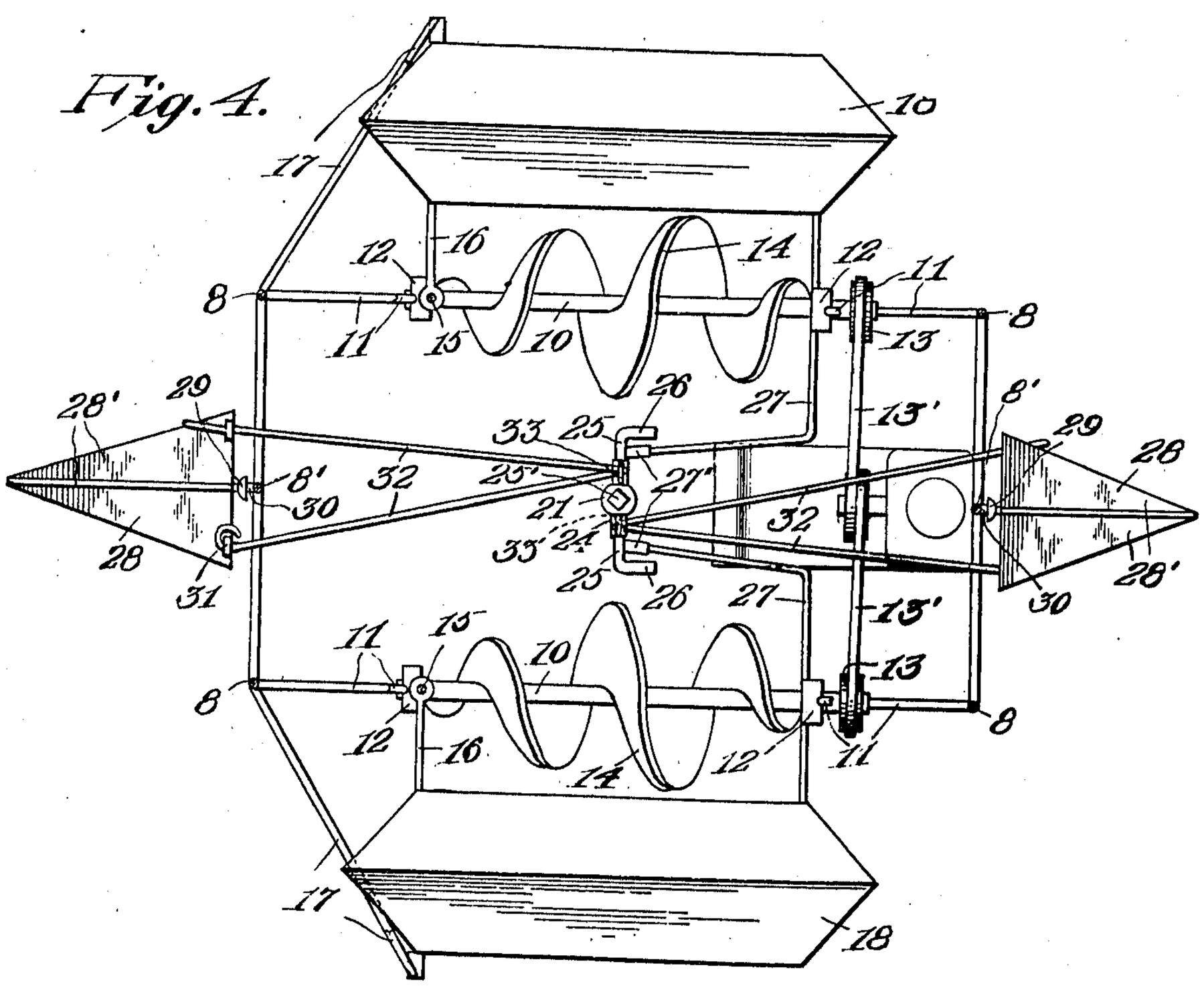
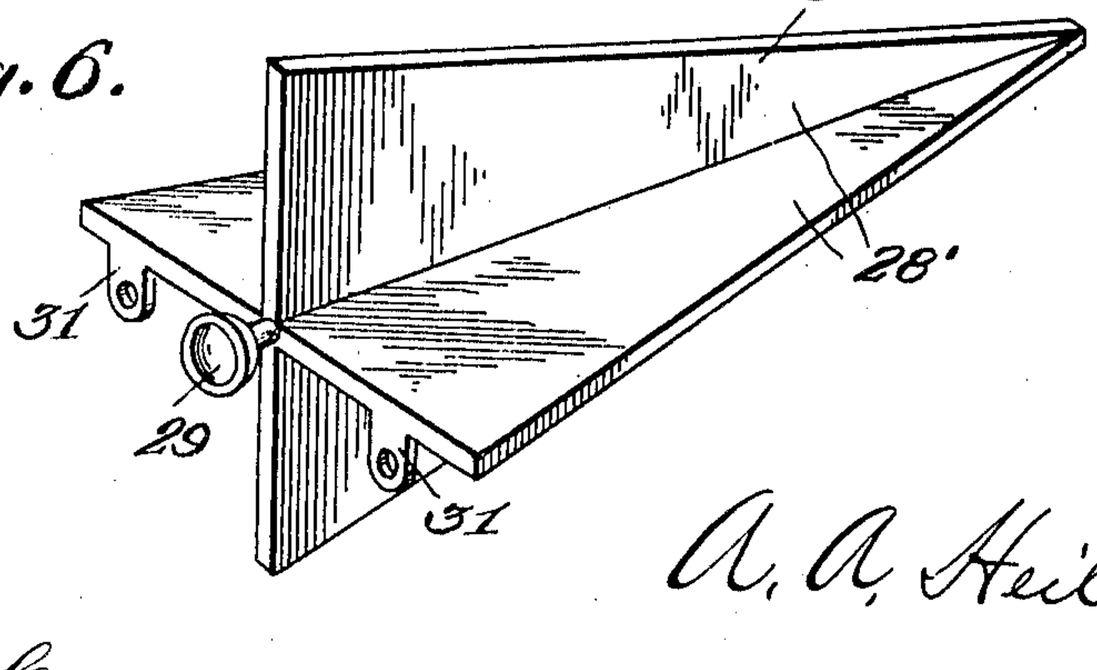


Fig. 6.



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4 SHEETS—SHEET 4.

Fig. 8.

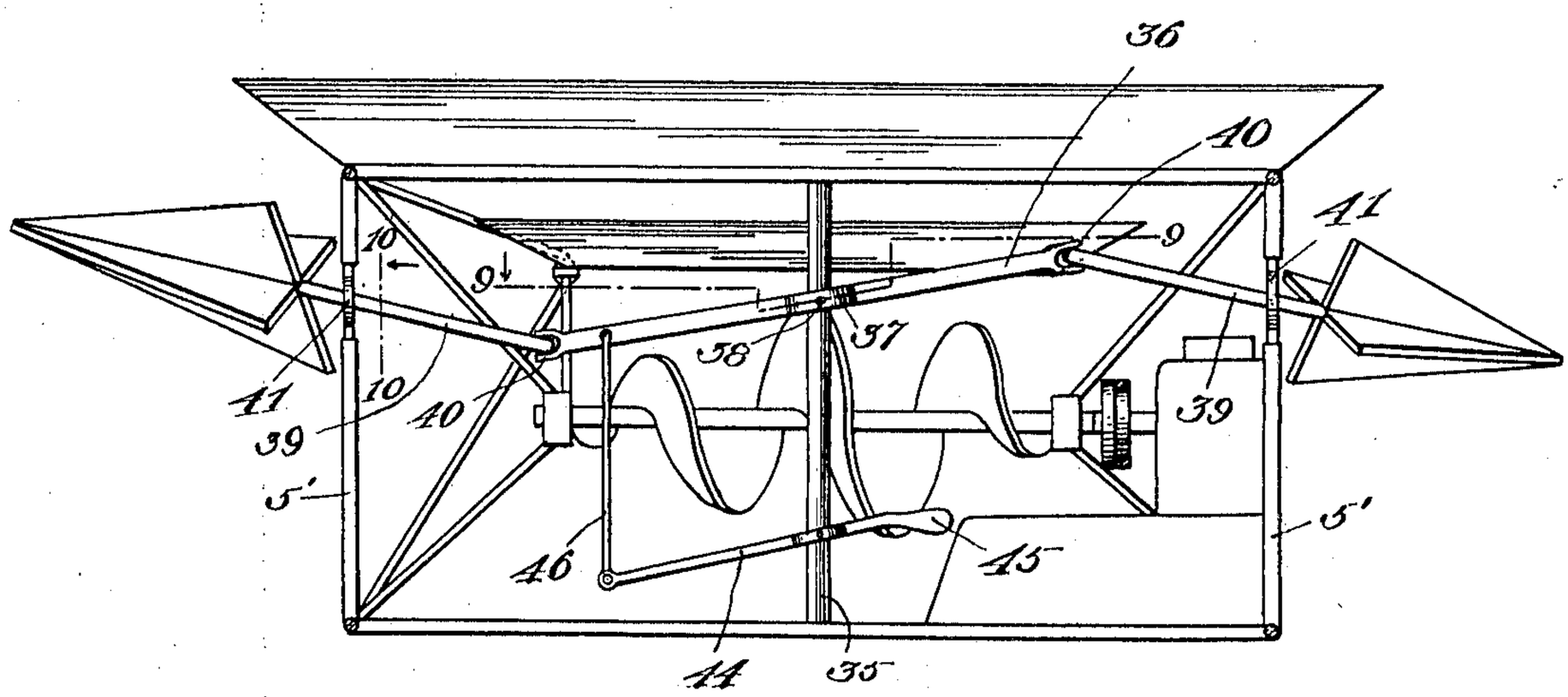


Fig. 9.

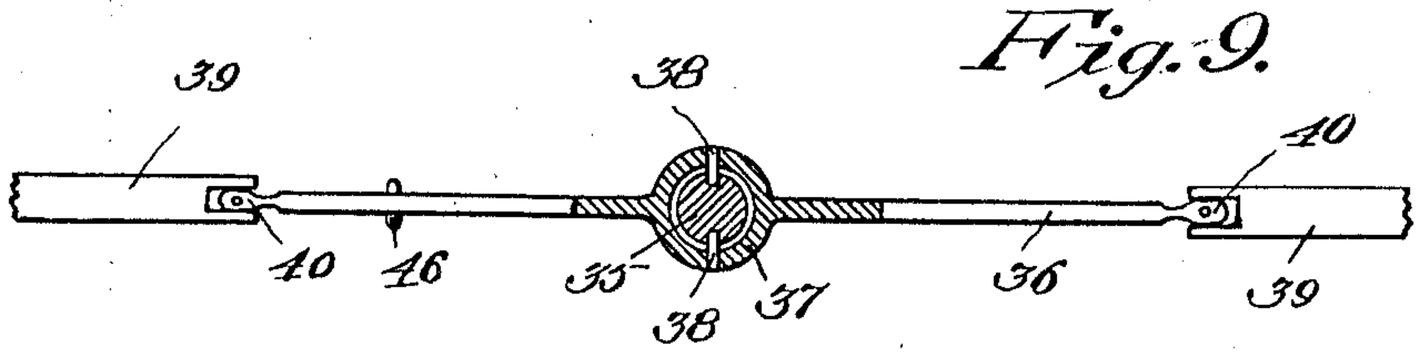
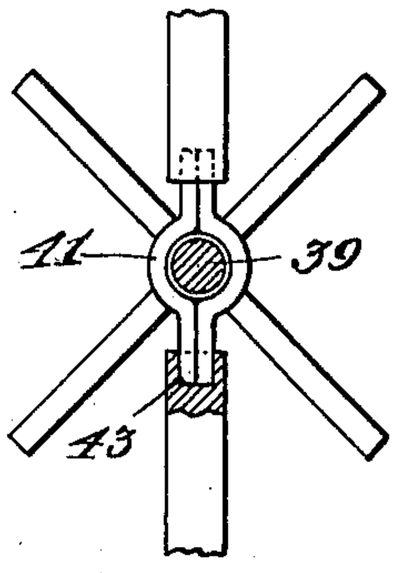


Fig. 10.



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UNITED STATES PATENT OFFICE.

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AEROPLANE.

969,865. Specification of Letters Patent. Patented Sept. 13, 1910.

Application filed October 5, 1909. Serial No. 521,052.

To all whom it may concern:

Be it known that I, ANDREW A. HEIL, a citizen of the United States, residing at St. Louis, State of Missouri, have invented certain new and useful Improvements in Aeroplanes, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to certain new and useful improvements in aero-planes and has for its object to provide a machine of this character which is so constructed that the body or passenger carrying portion thereof will always retain a horizontal position in the air, irrespective of the direction of its flight.

Another object is to provide a machine of this character designed with a view to navigating the air, the propelling mechanism of which is so constructed and disposed with relation to the flight directing wings, as to direct the air currents against said wings to assist in retaining the machine in the air.

An additional object of the present invention is to provide an aero-plane which is constructed of very few parts, the rudders or directing members which are positioned and supported on the front and rear of the machine frame, being simultaneously or independently directed together with the longitudinal side wings, by the manipulation of a suitable steering handle centrally mounted in the frame.

With these and other objects in view the invention consists of the novel construction, combination and arrangement of parts hereinafter fully described and claimed and illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of an aeroplane illustrating one embodiment of my invention; Fig. 2 is a similar view, showing the side wings and the end directing members disposed at an inclination to the body of the machine; Fig. 3 is a front end elevation; Fig. 4 is a horizontal section taken on the line 4—4 of Fig. 1; Fig. 5 is a detail longitudinal section through the steering handle and its support, showing the rudder and its connections. Fig. 6 is a detail perspective view of one of the rudders or directing members; Fig. 7 is an enlarged detail section through the steering device. Fig. 8 is a side elevation illustrating a slightly modified form of the machine; Fig. 9 is a detail section taken on the line 9—9 of Fig. 8; and Fig. 10 is a detail section taken on the line 10—10 of Fig. 8.

Referring to the drawings 5 indicates the frame or body portion of the machine which comprises the parallel longitudinal upper and lower bars or rods 6 and 7 respectively, to the ends of which the rods 8 are secured. If desired a flooring of any suitable material may be secured between the lower frame bars, and between these bars the operator's seat 9 is arranged centrally of the machine.

Between the end rods 8 of the frame, the longitudinal shafts 10 are disposed and are supported by the diagonal rods 11 which extend inwardly from the upper and lower corners of the frame, and have a bearing 12 formed at their meeting ends in which the shaft 10 is rotatably mounted. Upon each of the shafts 10 a band wheel 13 is secured, around which passes a driving belt 13′ which is connected to an engine or motor of any desired construction suitably mounted in the frame. Upon each of the shafts 10 a screw propeller 14 is spirally disposed, and gradually increases in diameter from its ends to the center of the shaft. Any desired number of convolutions of the propeller blade may be employed in proportion to the dimensions of the machine frame.

The vertical rods or standards 15 are secured to the bearings 12 at one end of the shafts 10, and a transversely and upwardly extending bar or rod 16 is secured to the upper end of each of said rods. The outer end of the rod 16 is supported and braced by the diagonal rods 17 which are secured to the upper and lower ends of the frame 5. A wing or vane 18 is pivotally mounted on one of its ends upon the transverse rod 16, and a depending rod 19 is pivotally connected to the opposite end thereof.

Centrally arranged in the machine frame and secured to the base or floor thereof, there is a post or standard 20 upon the upper end of which a T-shaped sleeve 21 is mounted. The vertical cylindrical portion of this sleeve is rotatably mounted upon the upper end of the post as shown at 22 in Fig. 5 and may be rigidly secured thereto by means of a set screw 23. Through a horizontal tubular portion 24 of the sleeve, a steering handle 25 extends and has its extremities disposed at right angles to provide suitable hand grasps as shown at 26. This steering handle is securely held within the sleeve 21 by means of the set screw 25′. Connected to the handle

25 and extending rearwardly therefrom there is a rod 27, which is pivotally connected at its other end to the lower end of the depending rod 19 which in turn is pivotally connected to the wing 18. Thus it will be seen that as the operating handle is turned within the sleeve, the rod 19 will be moved upwardly and downwardly through the medium of the connecting rod 27, whereby the wings 18 will be positioned at an inclination to the horizontal plane of the machine. The connecting rod 27 is rigidly secured to a short arm 27′ carried by the steering handle to insure the proper adjustment of the wings. After the wings have been adjusted as desired, the handle 25 is rigidly secured in position by means of the set screw 25′.

Upon the opposite ends of the frame of the machine, and positioned centrally thereof are the rudders or directing members 28. These members comprise the substantially triangular vanes 28′ which are shown in Fig. 6 are four in number and extend at right angles to each other. These vanes may be connected in any preferred manner and secured centrally thereof at one end is the female member 29 of a ball-and socket joint, which permits of the universal pivotal movement of the directing members. The male member 30 of the joint is carried upon the central vertical end rods 8′ of the supporting frame. Secured to the inner edges of one pair of the vanes 28′ of each of the directing members, are the ears 31. The ears upon the vanes at one end of the machine are positioned in a reverse direction from those at the opposite end of the machine as shown in Fig. 1. To each of these ears one end of the steering rods 32 is loosely connected, the opposite ends of said rods being secured to an eye 33 carried by the steering handle.

It will be noted that the eyes for one pair of the supporting rods are disposed upon one side of the center of the handle 25, and the eyes for the other of the rods extend in a radially opposite direction to the first named eye. Thus when the handle is turned within the sleeve 21 to adjust the wings 18, at the same time the directing members 28 will also be angularly disposed from the opposite ends of the frame in a parallel plane to the wings, such inclination determining the direction of flight of the machine. By providing the universal pivotal connection to the frame for the directing members, they may be also directed transversely as well as vertically, by turning the handle 25 upon the upper end of the supporting rod 20. One of the rods 32 is slidable in one of the ears 31 and acts as a guide for the members 28, while the other of the rods actuates the members to change their position with relation to the ends of the frame structure. This adjustment of the members will have no effect whatever upon the previous horizontal disposition of said members and the wings 18, the supporting handle being rigidly held within the sleeve by the set screw 25′ to prevent its rotation.

The wings 18 are preferably inclined upwardly from their longitudinal edges to form a shallow inverted triangularly shaped vane as shown in Fig. 3. A cover 34 of like form is secured to the upper longitudinal frame rods 6, and provides a retaining means for the air currents which are thrown outwardly from the propellers 14, upon the underside of the wings 18 and cover 34, whereby the machine is rendered more buoyant and its suspension in the air is thus assured. The wings 18, vanes 28 and cover 34 may be conveniently formed of canvas or other material of a similar nature.

From the foregoing it will be seen that I have provided an aero-plane in the construction of which a minimum number of elements are employed which will not readily be broken, the propelling parts and adjustable wings being so arranged that the greatest possible buoyancy is secured without additional parts and consequent expense in the construction of the machine.

It will be understood that if desired but one of the spiral propelling members may be used, without materially altering the construction of the remainder of the machine in any of its essential features, and I reserve the right to make such changes as may appear to be best adapted to the requirements of a machine of this character, which are within the scope of the claims.

In Figs. 8, 9 and 10 a slightly modified form of the steering mechanism is illustrated. This construction is somewhat simpler than that previously described and comprises a central vertically disposed shaft 35 which is mounted in the frame 5′. This shaft is rotatable in the frame and a longitudinal bar 36 is centrally pivoted thereon adjacent to its upper end. This bar is formed with the collar 37 which surrounds the shaft 35. Pivot pins 38 extend through the collar and into the shaft. On these pins the bar 36 has vertical pivotal movement. The outer ends of the bar 36 are connected to the inner ends of the rudder shafts 39 by means of a universal joint 40. The rudder shafts extend exteriorly of the frame 5′ through a collar 41 which is swiveled in the frame as clearly shown in Fig. 10. This collar is formed in two sections which have their ends disposed in the sockets 43 in the frame bars. These collar sections loosely embrace the rudder shafts which are freely movable therein. Adjacent to the lower end of the rotatable shaft 35 an operating lever 44 is pivotally mounted in a similar manner to the bar 36. One end of this lever is extended adjacent to the operator's seat and pro-

vided with a handle 45 by means of which it may be easily manipulated. The opposite end of the lever 44 is connected by means of a rod 46 to the bar 36, and it will be obvious that when the operating lever is moved upwardly or downwardly from its point of pivotal connection to the shaft 35, the bar 36 will likewise be swung into parallel relation thereto. This movement of the bar 36 will position the rudder shafts in the collars 41 as shown in Fig. 8, in a common direction thus directing the flight of the machine. The rudders will likewise be laterally positioned by turning the shaft 35 which will swing the rudder shafts and collars 41 laterally in the frame and the rudders to opposite sides of its longitudinal center.

Having thus described the invention, what is claimed is:

1. In an aero-plane, the combination of a frame, propelling mechanism mounted in said frame, longitudinal side wings pivotally supported at one of their ends on said frame, directing members universally pivoted on the opposite ends of said frame, and means for simultaneously adjusting the inclination of said wings and directing members.

2. In an aero-plane, the combination of a frame, longitudinal side wings adjustably supported on said frame, adjusting means carried by the frame, and a screw propeller rotatably mounted in said frame adjacent to the wings, said propeller increasing in diameter from its ends to its center to direct the air currents against said wings.

3. In an aero-plane the combination of a frame, longitudinally disposed propeller shafts mounted in said frame, a propeller blade spirally disposed on each of said shafts and increasing in diameter from its ends to its center, longitudinal side wings pivotally supported at one of their ends on said frame, means for raising and lowering the other end of said wings, and directing members universally pivoted upon the ends of said frame, and means for vertically and transversely adjusting said members thereon.

4. In an aero-plane, the combination of a frame, propeller shafts longitudinally disposed in said frame, supporting rods for said shafts, said rods having journal bearings formed at their inner ends to receive said shafts, a propeller blade spirally disposed about said shaft, vertical standards secured on said bearings, transverse rods extending outwardly from the upper ends of said standards, brace rods connecting the outer ends of said transverse rod to the frame, a wing pivoted at one end of said transverse rod, a depending rod pivoted to the opposite end of said wings, a steering handle arranged centrally in the frame, a connecting rod connecting said handle to said depending rod and adapted to raise and lower the rear end of said wings, directing members universally pivoted upon the ends of said frame, and means connecting said members to said steering handle, whereby said members may be vertically or transversely directed.

5. In an aero-plane, the combination with a frame, propeller shafts rotatably mounted in said frame, a spiral propeller blade disposed about said shafts, a wing pivotally supported on opposite sides of the frame adjacent to the propellers, a supporting handle centrally disposed in said frame, connecting rods between said handle and the rear ends of said wings, substantially triangular directing members universally pivoted on the opposite ends of said frame, each of said members having ears secured thereto disposed in opposite directions, a connecting rod between said ears and the operating handle, said handle being positioned through a T-shaped sleeve, said sleeve being rotatably mounted upon the upper end of a supporting standard, said handle being rotatable within the horizontal tubular portion of said sleeve, means for securing said sleeve and handle against rotation, and a cover for said frame extending inwardly and upwardly from the sides thereof to provide a shallow air receiving chamber.

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

ANDREW A. HEIL.

Witnesses:

WILLIAM RICHTER,

SAM ALEXANDER.