V. F. CARPENTER.

POWER DRIVEN MACHINE FOR AERIAL NAVIGATION.

APPLICATION FILED OCT. 24, 1910.

1,022,302.

Patented Apr. 2, 1912.

4 SHEETS—SHEET 1.

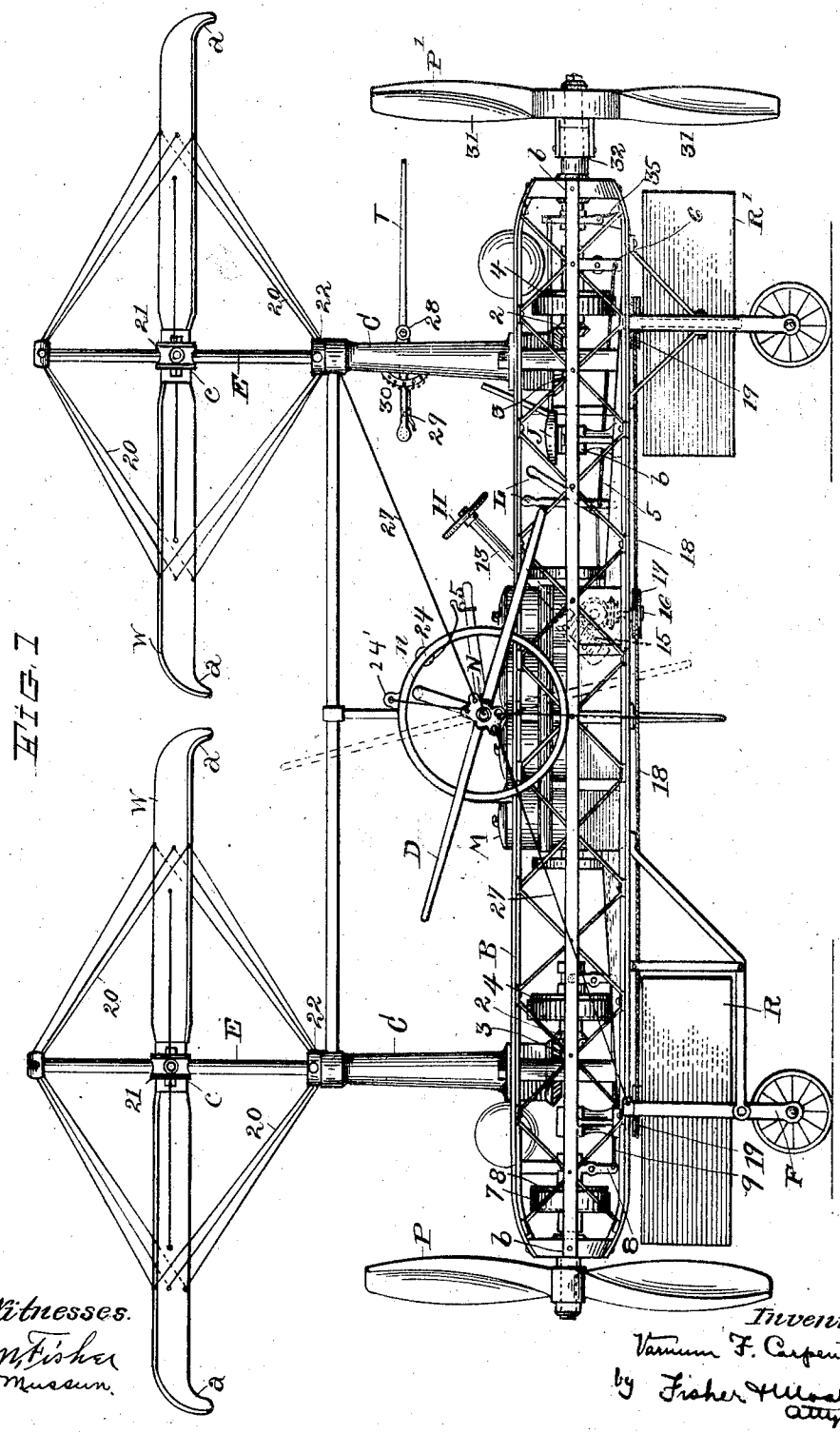

Fig. 1

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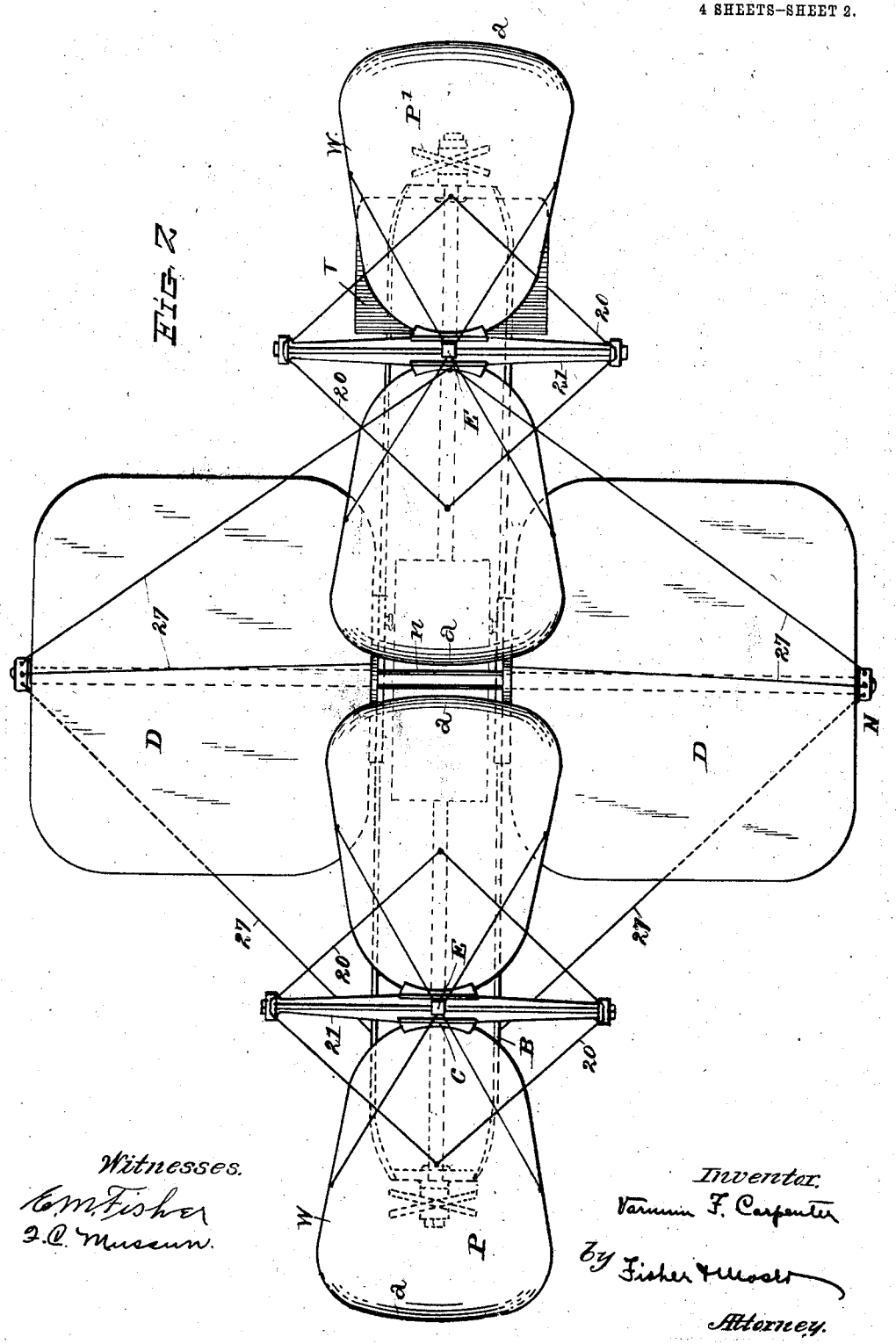
4 SHEETS—SHEET 2.

Fig. 2



Witnesses.

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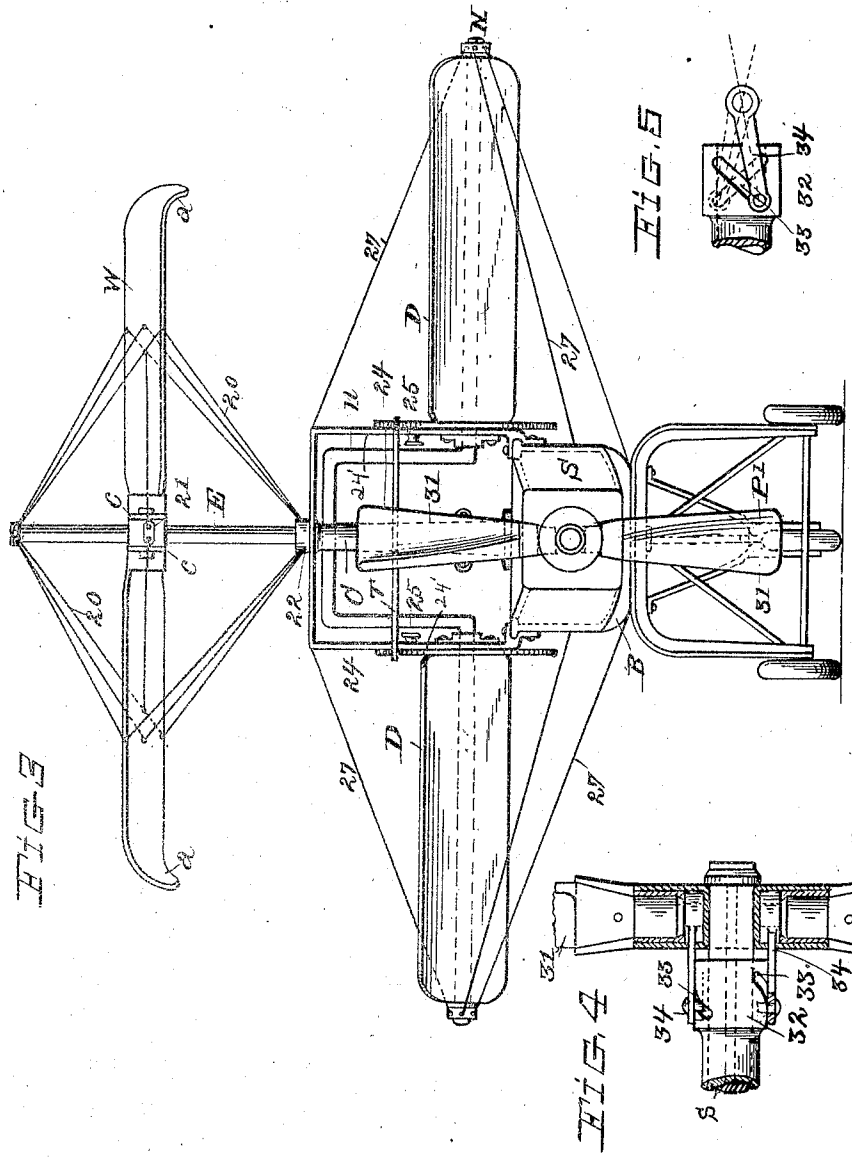

FIG. 3

FIG. 5

FIG. 4

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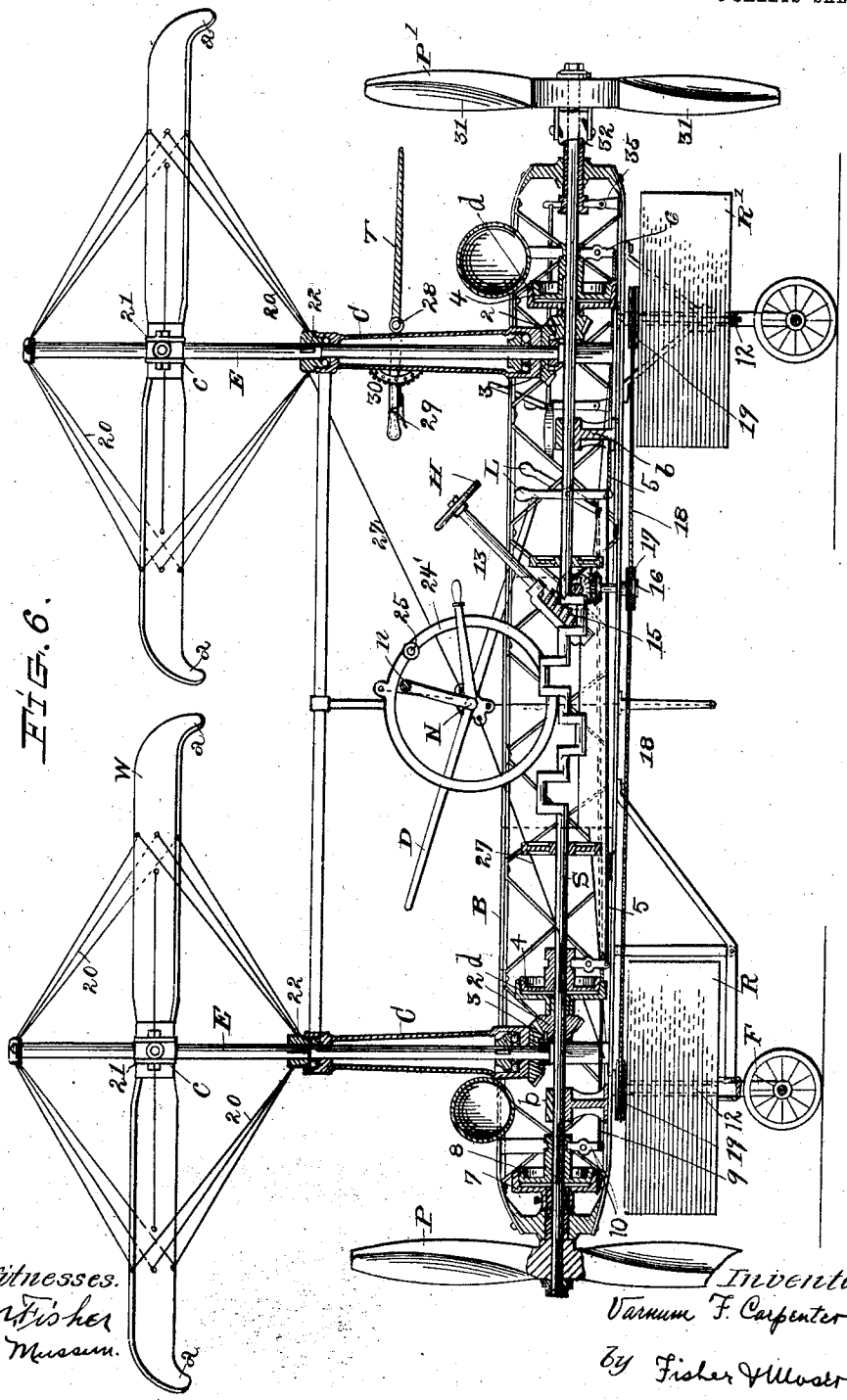

FIG. 6.

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UNITED STATES PATENT OFFICE.

VARNUM F. CARPENTER, OF CLEVELAND, OHIO.

POWER-DRIVEN MACHINE FOR AERIAL NAVIGATION.

1,022,302. Specification of Letters Patent. Patented Apr. 2, 1912.

Application filed October 24, 1910. Serial No. 588,597.

To all whom it may concern:

Be it known that I, VARNUM F. CARPENTER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Power-Driven Machines for Aerial Navigation, of which the following is a specification.

My invention relates to an improvement in power driven machines for aerial navigation, all substantially as shown and described and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of the machine, and Fig. 2 is a plan view thereof. Fig. 3 is an end elevation. Fig. 4 is a sectional elevation of the rear propeller and operating parts, and Fig. 5 is a detail of the adjusting head for the said rear propeller. Fig. 6 is a section and side elevation.

As thus shown, the invention comprises a suitable skeleton frame constructed to provide maximum rigidity and strength with a minimum of weight, and specifically comprises the substantially rectangular body B which is narrowed to approximately cigar shape at its ends and has the power driven crank shaft S mounted centrally therein lengthwise, said shaft being supported in suitable bearings *b* at and between its ends, and the propellers P and P′ are mounted on said shaft outside the ends of said body.

The engine or motor M is supported in said body midway between its ends in a balancing relation and is arranged to drive shaft S and the other power driven parts operatively engaged with said shaft. These parts comprise especially the said propellers P and P′ and the lift planes W, also referred to as lift blades, which are mounted over each end of the machine and adapted to be rotated horizontally when the machine is at work. To this end the said main frame is provided with a braced vertical tubular post or standard C at each end and a shaft E for each set of planes or blades W through said post projects above the same and has said planes or blades W mounted thereon, while beveled gears 2 and 3 respectively operatively unite said shafts E with the main shaft S. However, the gear 2 is sleeved on shaft S and has a flanged saucer shaped friction disk *d* rigid therewith adapted to be engaged by a friction clutch 4 which is slidably splined on shaft S and adapted to frictionally engage said disk *d* and thereby impart rotary power to gear 2 and thus propel the said blades W.

The operator occupies seat J, and one of the several levers L, shown in Fig. 1 at the front of said seat is connected by a rod 5 with each clutch 4 through a short lever 6. A similar arrangement extends to front propeller P, which is sleeved on shaft S and has a tubular extension shaft S with a flanged friction disk 7 at its end adapted to be engaged by friction clutch 8 splined on shaft S and operated from one of said group of levers L by link or rod 9 to a pivoted lever 10 engaging said clutch 8.

Two rudders R and R′ are arranged at the ends and bottom of the machine and consist of comparatively wide flat blades set vertically edgewise and mounted on their own shafts 12 and adapted to be horizontally rotated to govern the direction of travel and turn the machine as in the case of rudders generally. Steering gear mechanism governing said rudders proceeds from steering shaft 13 carrying hand wheel H, and said shaft has a worm 15 from which operating connection is made with said rudders, the mechanism for this purpose in this instance comprising a short shaft 16 operated from said worm 15 and a sheave 17 on said shaft engaged by cord or cable 18 with other sheaves 19 on the shafts respectively of said rudders. The same line of mechanism is operatively engaged with the front truck F to guide the machine on the ground.

The propellers P and P′ are alike at both ends, as also are the lift blades W, and said blades have the shape substantially of a palm leaf fan in plan and are of a size to practically compass or cover more or less space laterally and extend somewhat beyond or over the ends thereof at a suitable elevation in respect to the propellers and relatively as shown. In edge view the said blades show a downward curvature or deflection at their outer and wider edges as indicated at *a*, which has the effect of gathering the air inward and adds very greatly to buoyancy and steadiness. Said planes are adapted to be adjusted to such an inclination laterally as to give the desired lift or rise to the machine as will lift and carry the same when said blades are rotated with the requisite power and speed. The lateral inclination of said blades may of course be varied and they are provided with swivel

joints *c* on shaft E for this purpose, but they are set to stay when adjustment has been made and are not controllable from the operator's seat. These blades are in fact also the carrying blades of the machine and upon which it must depend mainly for its buoyancy or support in the air, and both their shape and arrangement are therefore of prime importance. As to the shape and size or proportions reference is made to the drawings, and their arrangement also is best about as shown with enough dip in their outer edges *a* and enough lateral inclination or pitch to perform the function of lifts and carriers as described. In this connection it should be understood that it is planned to have the machine rise bodily from the ground in a direct upward ascent and not to rise with a glide as with some varieties of aerial machines, so that when the requisite power is applied to the said lift blades they will bodily lift the machine from its moorings and support it in the air. It is also to be observed that said blades have stays or guys and braces 20 engaged therewith both from below and above, and that the shaft E extends above the plane of said blades a suitable distance to make engagement with the top thereof by some of said stays, a cross-bar 21, Fig. 3, being mounted on each shaft E for this purpose while a free collar 22 below serves to engage other of said stays therewith. As to these details any suitable arrangement of parts may be adopted, the essential thing being to sustain said blades here and there where they may require strengthening to do their work.

Incident to the foregoing I employ two side or balancing planes D, D, which are supported on a tubular cross shaft N and are variously adjustable in respect to the plane in which they work according to the effect desired in handling the machine in the air. Thus, assuming that a direct upward movement be desired either in starting or subsequently the said planes or wings D are rotated to stand vertically, at which position they will offer no resistance to the rising of the machine. Otherwise and when the machine is in the air these planes or wings can be turned to any desired angle or inclination to a horizontal plane according to the effect desired and their value as balancing members is obvious. The said shaft N is supported on rigid brackets from the body of the main frame across its middle, and said shaft N has a crank lever *n* at its middle adapted to be engaged by hand and adjust both planes at the same time, means being provided to fix the adjustment in any case and consisting in a ring or segment of a ring 24 rigid with planes D and adapted to be engaged by any suitable temporary lock or fastening device 25 which is mounted on a fixed ring part 24′ of the main frame, see Fig. 3. Suitable stay or guy wires are provided for said planes and the nearly vertical position thereof from the full lines is shown in the dotted lines. The full lines of the planes represent one working angle when the machine is being propelled forwardly. In point of position said planes or wings come wholly outside the body of the main frame of the machine and said controlling rings 24 come next adjoining where the catches 25 engage them and thus fix the said wings at any desired position relative to either a vertical or a horizontal plane. Obviously, also, these planes are relatively beneath the plane of the lift blades W and in balancing relation midway lengthwise of body B. Of course the adjustment of both wings is alike and simultaneous through shaft N, to which they are affixed, and said shaft is strengthened with the necessary guy wires 27 extending to its ends. The said wires 27 are attached to a ferrule ring or the like on each outer end of the shaft N in different planes and in such manner as to permit the balancing planes to swing to substantially horizontal positions between said wires and which will bring said planes above one wire and below the other. It should also be noted that to this end the same wires run at inclination or diagonally across the axis of shaft N and in respect to a horizontal plane, as shown in Fig. 6 and are attached to the main frame of the machine at their outer ends.

In Fig. 1, particularly, and also in Fig. 3, there is shown a tail plane T, which in a sense performs the office of a tail in a flying bird besides serving as a balancing member for the rear of the machine and is supported on a cross bar 28 rotatably mounted on rear standard C and adjustably controlled by a lever 29 and notched segment 30, or the equivalent of these parts.

As to the rear propeller P′, it remains to be said that the blades 31 thereof are axially adjustable to different angles of inclination to the direction of flight by means of a head 32 slidably mounted on shaft S and having a sleeve extension engaged by a lever 35 pivoted between its ends and adapted to be controlled from the operator's seat, and said head has oppositely inclined slots 33 as seen in Fig. 5. Arms 34 rigid with said blades 31 are provided with rollers running in said slots and serve to fix the positions of said blades as said head is moved axially on shaft S.

The plan of operation contemplates a direct upward rise under the action of the lift planes W, and with the central planes D in vertical position and the propellers P and P′ out of action. A forward movement then would necessitate shifting of said

planes D to the desired angle and starting one or both of the propellers, which can be independently operated through the respective friction clutches.

What I claim is:

1. A machine substantially as described comprising a substantially cigar shaped body having tubular uprights near its ends, power driven shafts supported in said uprights and projecting above the same, lift blades mounted on said shafts between their ends and the top of said uprights and inclined stays running to said blades top and bottom and confining the blades to horizontal rotation, in combination with balancing planes relatively midway between said lift planes, a shaft on which said balancing planes are mounted outside said body and said shaft adapted to rotate said balancing planes to a substantially vertical position, said latter shaft being supported across the top and middle of said body, thereby elevating the said balancing planes above the body of the machine, propellers at the ends of said body and gear connections operatively uniting the same with said power driven shafts.

2. In aerial machines, a skeleton body of substantially cigar shape, a drive shaft lengthwise through the same and propellers on the ends thereof outside said body, tubular uprights fixed on said frame near the ends thereof and vertical shafts extending through said uprights above the same and operatively geared with said drive shaft, lift blades fixed on the said vertical shafts and above said tubular uprights and limited to horizontal rotation, stays for said blades above and below on said shafts, a single hand controlled cross shaft at the middle and top of said body having bearings at its ends, and a single balancing blade fixed on each end thereof outside said body and arranged relatively beneath the said horizontal blades, and overlapped thereby, and inclined stays stretched between the said bearings and the main frame.

3. In an aerial machine, a main frame having a propeller at each end and lift blades over its ends limited to a horizontal rotation, in combination with a single balancing plane at each side of said frame centrally between and beneath said lift blades and overlapped thereby and a cross shaft supporting said planes, having suitable bearings at its ends; wire stays 27 extending from said frame on an inclined plane longitudinally of the frame and connected at their other ends with said bearings, and means for rotating said shaft, whereby said planes can be adjusted to a substantially vertical position between and in respect to said lift blades.

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

VARNUM F. CARPENTER.

Witnesses:
E. M. FISHER,
F. C. MUSSUN.