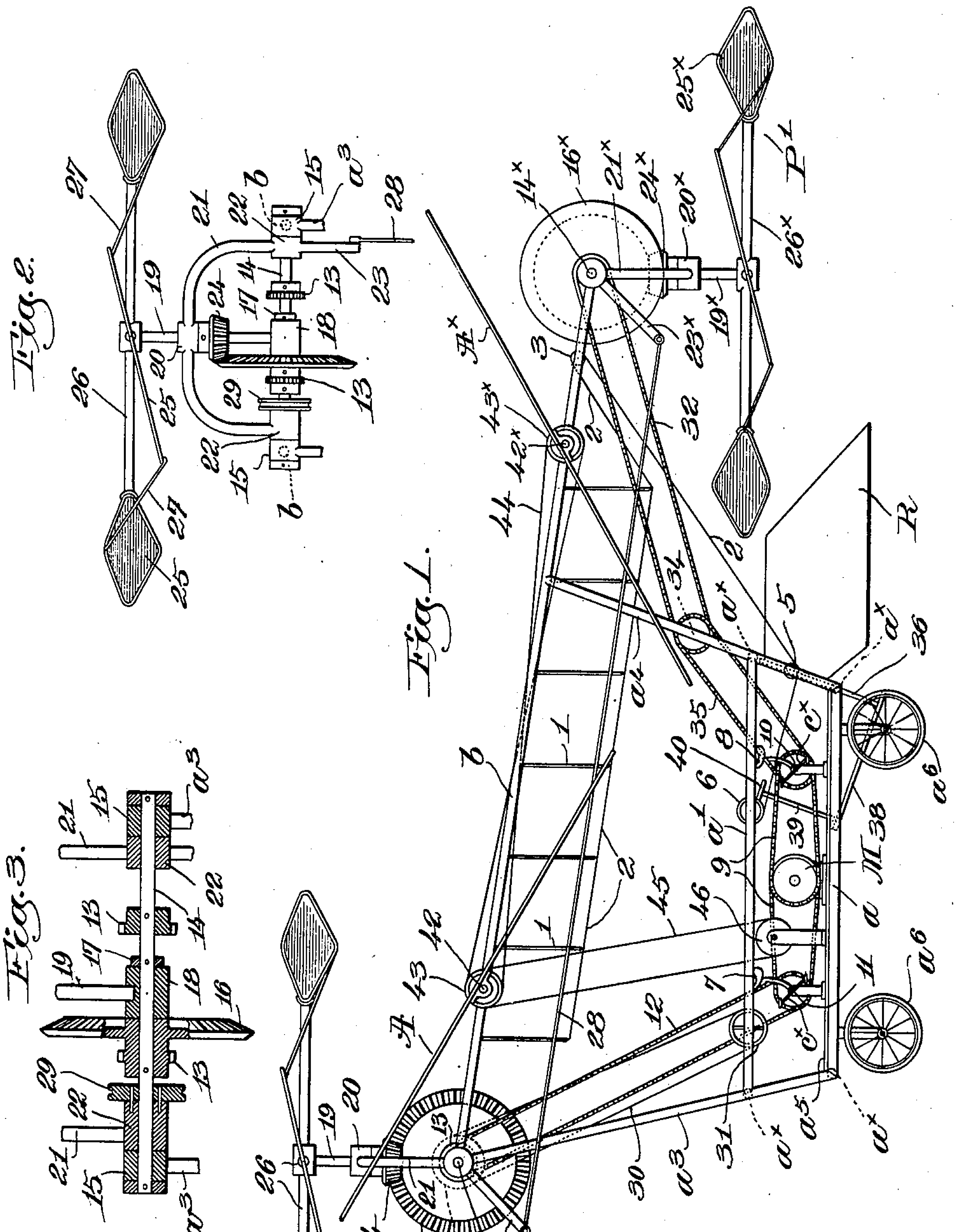
J. M. ALLÈAS.

APPARATUS FOR AERIAL NAVIGATION.

APPLICATION FILED OCT. 21, 1909.

991,686. Patented May 9, 1911.

2 SHEETS—SHEET 1.



Witnesses.
Thomas J. Drummond.
Joseph M. Ward.

Inventor.
Jean M. Allèas,
by Crosby & Gregory attys.

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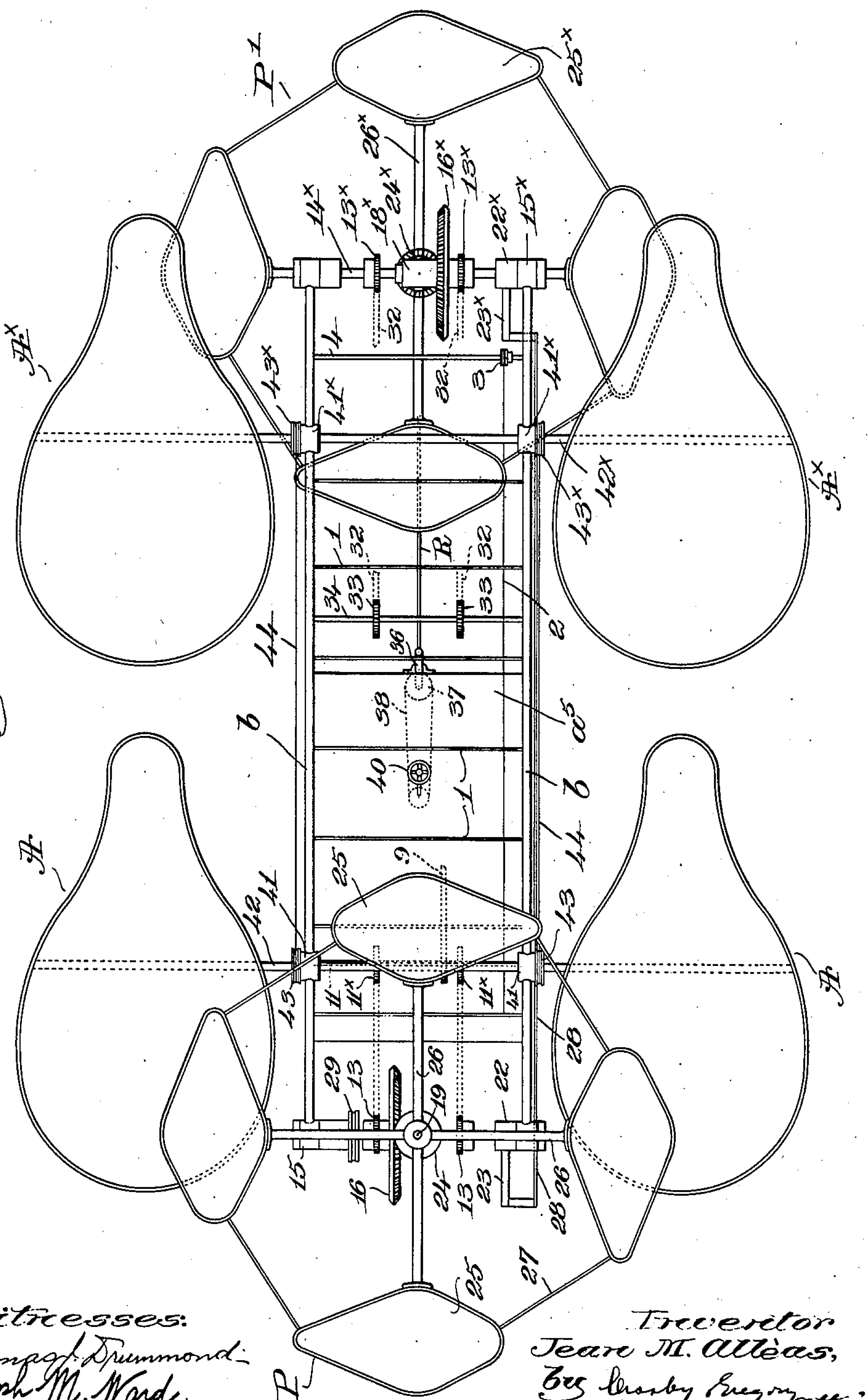

Fig. 4.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR AERIAL NAVIGATION.

991,686. Specification of Letters Patent. **Patented May 9, 1911.**

Application filed October 21, 1909. Serial No. 523,757.

To all whom it may concern:

Be it known that I, JEAN M. ALLÈAS, a citizen of France, and resident of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Apparatus for Aerial Navigation, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention relates to apparatus for aerial navigation, and more particularly to the heavier-than-air type of dirigible apparatus provided with extended surfaces or planes capable of sustaining the apparatus when driven by suitable propelling means.

The novel features of my invention will be fully described in the subjoined specification and particularly pointed out in the following claim.

In my present invention I have so arranged the propelling mechanism that it can be adjusted to elevate the machine to any desired height and then to drive it ahead, or such mechanism can be adjusted to effect the ascent in an inclined path, doing away altogether with the use of a starting track and extraneous power to initiate the flight.

Figure 1 is a side elevation of an apparatus for aerial navigation embodying one form of my invention, the motive mechanism being adjusted or set for lifting the apparatus; Fig. 2 is a left hand end view of the propeller at the front of the machine, showing the means for supporting the propeller-shaft so that it may be swung or moved angularly in a vertical plane; Fig. 3 is a section detail of the transverse shaft shown in Fig. 2 and which forms a fulcrum for the swinging yoke or supporting frame carrying the propeller-shaft; Fig. 4 is a top plan view of the apparatus shown in Fig. 1, but omitting some of the devices mounted on the lower part of the main frame, to avoid confusion in illustration.

In the present embodiment of my invention the main frame comprises a sub-structure and a connected superstructure, the former consisting of longitudinal side members, a, a', rigidly connected at their ends by upwardly divergent members a^3, a^4, which members may be conveniently made of light and strong metal tubing, and the two open and laterally separated frame-sides will be rigidly connected by cross-bars a^x, Fig. 1, which sustain a flooring a^5. Light wheels a^6 may be provided, as shown, to sustain the apparatus when not in flight. The members or standards a^3, a^4 support the superstructure, which is essentially made up of two elongated rods b, b arranged in parallelism and fixedly secured to the standards at their upper ends, the said rods being located in an inclined plane, as shown in Fig. 1, the left-hand end of the apparatus, hereinafter designated at the front, being higher than the opposite or rear end.

Between the members b, b of the superstructure I pivotally mount the upper transverse edges of a series of leaves or planes 1, of such depth and so spaced apart that when swung up into operative position they form a substantially closed top for the superstructure, each leaf slightly overlapping the next one. A wire or other connection 2 is attached to the free edge of each leaf and leads rearwardly and upwardly to a sheave 3 on a cross-rod 4 connecting the members b, said connection leading therefrom down around a guide sheave 5 on the substructure and forward to a suitable drum 6, adapted to be manually rotated to control the position of the leaves. When the machine is ascending the leaves depend, as shown in Figs. 1 and 2 and hence offer practically no resistance, but when the desired height is attained and forward movement is instituted, the operator will swing the leaves up to close the top of the frame, and the resistance of the air upon the under faces of said leaves assists in supporting or buoying up the machine. Said leaves also serve to check the rapidity of descent when the machine is coming down to a lower level, or to the ground after a flight.

I have devised the machine for control by two persons, who sit on suitable seats 7, 8, Fig. 1, the drum 6 and also the steering rudder being controlled by the person on the after seat 8.

A motor M of any suitable type, preferably a light but relatively powerful gasolene or petrol engine, is mounted on the flooring a^5 of the substructure, and transmits its power by sprocket chains 9 to cross-shafts 10, 11 adjacent the seats 7, 8, and by suitable pedal devices c^x, Fig. 1, said shafts can be rotated by manual power should anything happen to the motor.

In practice the cross-shaft 11 will be provided with two like sprockets, shown at 11^x, Fig. 4, for engagement with suitable driving chains 12 coöperating at their upper ends with sprockets 13 fixedly secured to a transverse shaft 14 rotatably mounted in bearings 15 on the front of the superstructure. As shown in Figs. 2 and 3 one of the sprockets 13 has secured to or forming part of it a large bevel gear 16, which is thus rotated with the shaft 14 by the motor M through the intervening connections, and loose on the shaft between the gear and a fast collar 17 I mount a sleeve 18 which forms an end-thrust bearing for the forward propeller-shaft 19. This shaft is rotatably mounted in a bearing 20 at the center of an arched frame or yoke 21 having hubs 22 loosely embracing the shaft 14 just inside its main bearings 15, so that the yoke can swing up and down on the shaft as a fulcrum, and the propeller-shaft 19 always maintains a fixed relation to said shaft. An arm 23 depends from one of the yoke-hubs, to be referred to, and a pinion 24 fast on the shaft 19 at the inner end and adjacent the bearing 20 meshes with the gear 16 the pinion and the thrust-bearing sleeve 18 preventing any longitudinal movement of the shaft. Upon the latter at its outer end is fixedly attached a propeller, of any suitable construction, and herein shown as comprising four blades 25 carried on the ends of cross-arms 26 and connected by suitable bracing 27.

So many different constructions may be employed for the propeller itself that it is immaterial, so far as my present invention is concerned, what particular arrangement be adopted, so long as it will perform the functions of lifting and driving. As shown herein I employ two propellers, P and P′, and they are substantially alike in structure, the former being carried at the front of the superstructure and the latter at the rear thereof, but the one P at the front is so mounted that it can be swung from lifting position, shown in Fig. 1, forward and downward to propelling position ahead of the frame. The propeller P′ is shown in Fig. 1 in lifting position, below the rear end of the superstructure, but it can be swung rearward and upward to propelling position at the rear of the frame, and I have provided means to effect simultaneous shifting of the propellers while maintaining them parallel, as will be described. The support and control, of the after propeller shaft $19^{\times}$ is practically the same as that described for the forward shaft 19, and herein I have applied similar reference numerals, with a $^{\times}$, to like parts, but the large gears 16 and $16^{\times}$ are shown as oppositely turned and symmetrically located with respect to the longitudinal center of the frame, to maintain a proper balance.

Referring to Fig. 1 the arms 23, $23^{\times}$ depend in parallelism from the yokes 21, $21^{\times}$ respectively, and are pivotally connected by a longitudinally rigid link 28 outside the main frame, so that if one of the yokes is swung about its fulcrum shaft the connected yoke must swing oppositely and in unison, and if one is swung up or down the other swings down or up, as will be manifest. Such swinging movement is effected manually in any suitable manner, and herein I have shown a sheave 29 fixedly attached to one of the yoke-hubs 22 and carrying an endless band 30 extended around a hand-wheel 31, Fig. 1, on the substructure of the frame, convenient to the operator upon the seat 7. By turning the hand-wheel the yokes will be swung to regulate the angularity, in a vertical plane, of the longitudinally extended propeller-shafts 19, $19^{\times}$ and consequently the position of the propellers P and P′ will be varied as desired. As the after yoke $21^{\times}$ is carried at the extreme end of the superstructure the power transmission from the motor is somewhat changed from that shown for rotating the shaft 14. That is, sprocket chains 32 engaging the sprockets $13^{\times}$ on the shaft $14^{\times}$ lead forward and downward to sprockets 33, Figs. 1 and 3, on a counter-shaft 34 rotatably mounted on the standards a^4, the counter-shaft being rotated by a sprocket 35 from the shaft 10. I prefer this arrangement to the direct connection of the shafts 10 and $14^{\times}$, as that would require objectionably long sprocket chains, and furthermore, the lower runs of such chains would tend to interfere with the blades of the after propeller P′ when positioned for lifting, as herein shown.

A steering blade or rudder R is pivotally hung at the after end of the substructure to swing laterally and control the movement of the machine from one to the other side, the rudder post 36 having an attached sprocket 37 connected by a suitable chain 38 with the steering post 39, the latter having a hand-wheel 40 convenient to the operator on seat 8.

The side rods b of the superstructure are provided with oppositely located bearings 41, $41^{\times}$, Figs. 1 and 3, in which are mounted rotatably long transverse rods or shafts 42, $42^{\times}$ parallel to each other, and having attached sheaves 43, $43^{\times}$ connected by crossed belts or bands 44, to effect simultaneous and opposite rotative movement of said shafts. By means of a shifting band 45, leading from one of the sheaves 43 to a hand operated drum 46 on the substructure, the shafts 42, $42^{\times}$ can be turned more or less.

Aeroplanes A are secured to shaft 42 at opposite sides of the superstructure, as shown in Fig. 3, and like aeroplanes $A^{\times}$ are attached to the projecting ends of the shaft $42^{\times}$, and I have shown such planes as broad at their front ends and tapered or reduced in width at their rear ends. The aeroplanes are used to balance and sustain the machine in soaring, and also to vary the inclination of its path of movement when driven ahead by the propellers, the aeroplanes being set in Figs. 1 and 3 for an ascent of the machine. That is, the large front ends of the forward planes A are elevated and their rear ends or tails depressed, so that the propulsive action of the propellers tends to cause the said planes A to slide upward upon the air beneath, lifting the front of the machine. At the same time the front ends of the after planes A^x are depressed and their tails elevated, tending to lower or depress the after end of the machine, so that the resultant action of the aeroplanes is to cause a movement of the machine upward and forward along an inclined path, with the frame slightly tilted longitudinally. A reversal of the aeroplanes will have the opposite effect on the direction of movement of the machine, depressing its front end and lifting its rear end, to cause the machine to travel forward and downward in an inclined path. In either case the inclination of the path will be governed by the angularity of the aeroplanes, the steeper the angles at which they are set the steeper the inclination of the path traveled, up or down, by the machine.

When the machine is to rise the propellers are adjusted as in Figs. 1 and 3, and set in motion, the propeller P then acting to pull up the front of the frame while propeller P′ acts with equal effect to push the after end of the frame upward, and by changing the position of said propellers the actual path traveled by the machine will be the component of the forces tending to lift and to drive the machine forward.

The spatulate shape of the aeroplanes is adopted in order that each one may exert its greatest effect forward or ahead of its axis of rotation, as will be apparent.

Inasmuch as many changes may be made in details of construction without departing from the broad features of my invention I have shown in a general way such details as in themselves form no part of the invention, the spirit and scope of my invention being set forth in the claim hereto annexed.

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

In apparatus of the character described, a main frame having elongated and parallel side rods, an arched frame, a transverse shaft on which it is fulcrumed, said shaft being rotatably mounted at its ends on the side rods of the main frame at the end of the latter, a gear rotatable with said shaft, a propeller, an attached shaft having a pinion thereon in mesh with said gear, the propeller-shaft at right angles to the fulcrum shaft, lateral and thrust-bearings for the propeller-shaft centrally mounted on the arched frame and the fulcrum-shaft, respectively, means to swing the arched frame about said transverse shaft as its fulcrum and thereby vary the angularity of the propeller-shaft, means to prevent axial movement of the thrust-bearing on the transverse shaft while permitting rotation thereon, and mechanism to effect rotation of the fulcrum-shaft and the gear thereon at any angular position of the arched frame, the thrust of the propeller being taken up by the thrust-bearing independently of the transmitting gear and pinion, to relieve the same from strain.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

JEAN M. ALLÈAS.

Witnesses:
JOHN C. EDWARDS,
THOMAS J. DRUMMOND.