

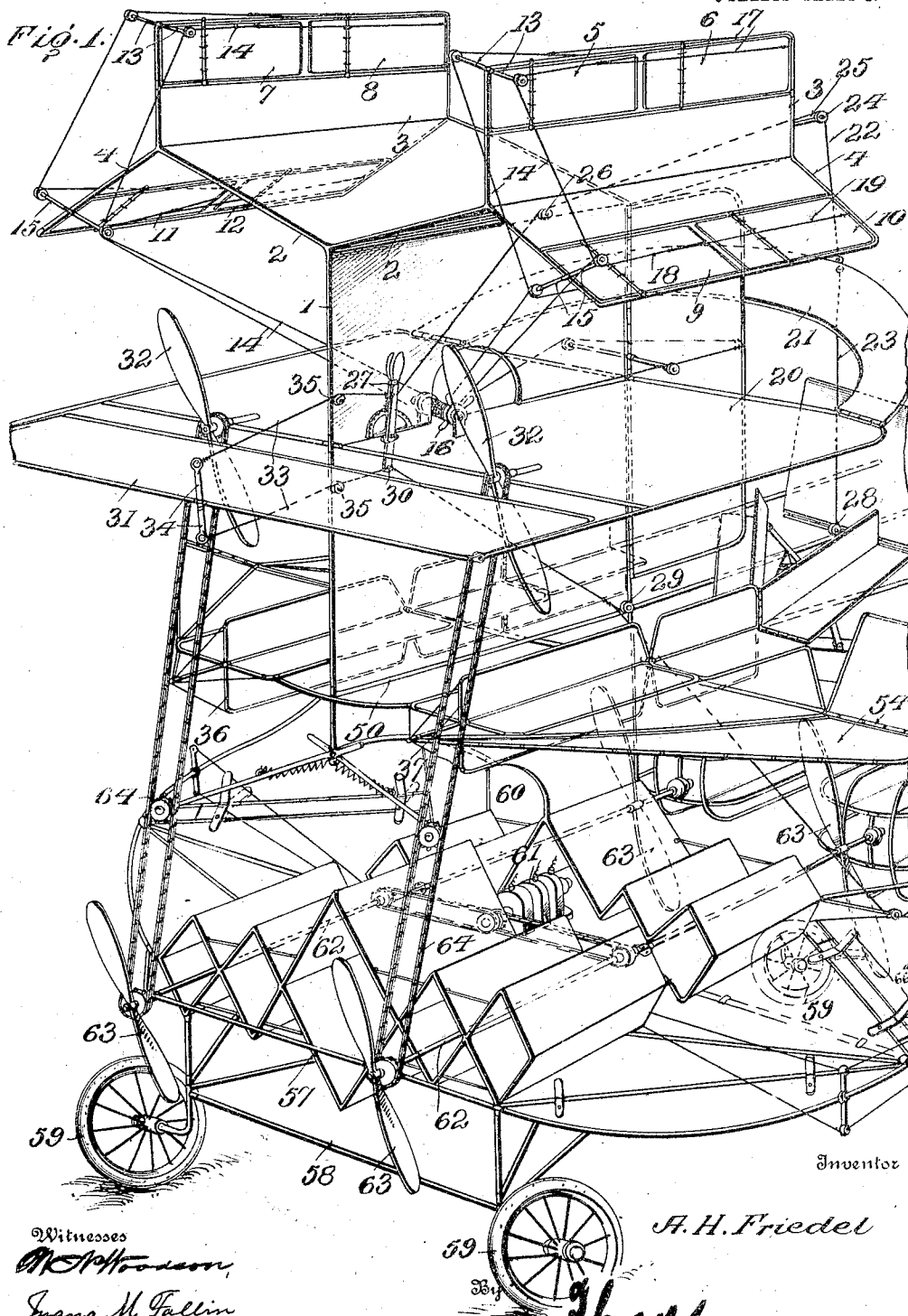
A. H. FRIEDEL.

FLYING MACHINE.

APPLICATION FILED AUG. 28, 1909.

Patented Aug. 16, 1910.

3 SHEETS—SHEET 1.



Inventor

A. H. Friedel

Witnesses
M. J. Johnson
Juana M. Fallin

By
H. H. Kacy

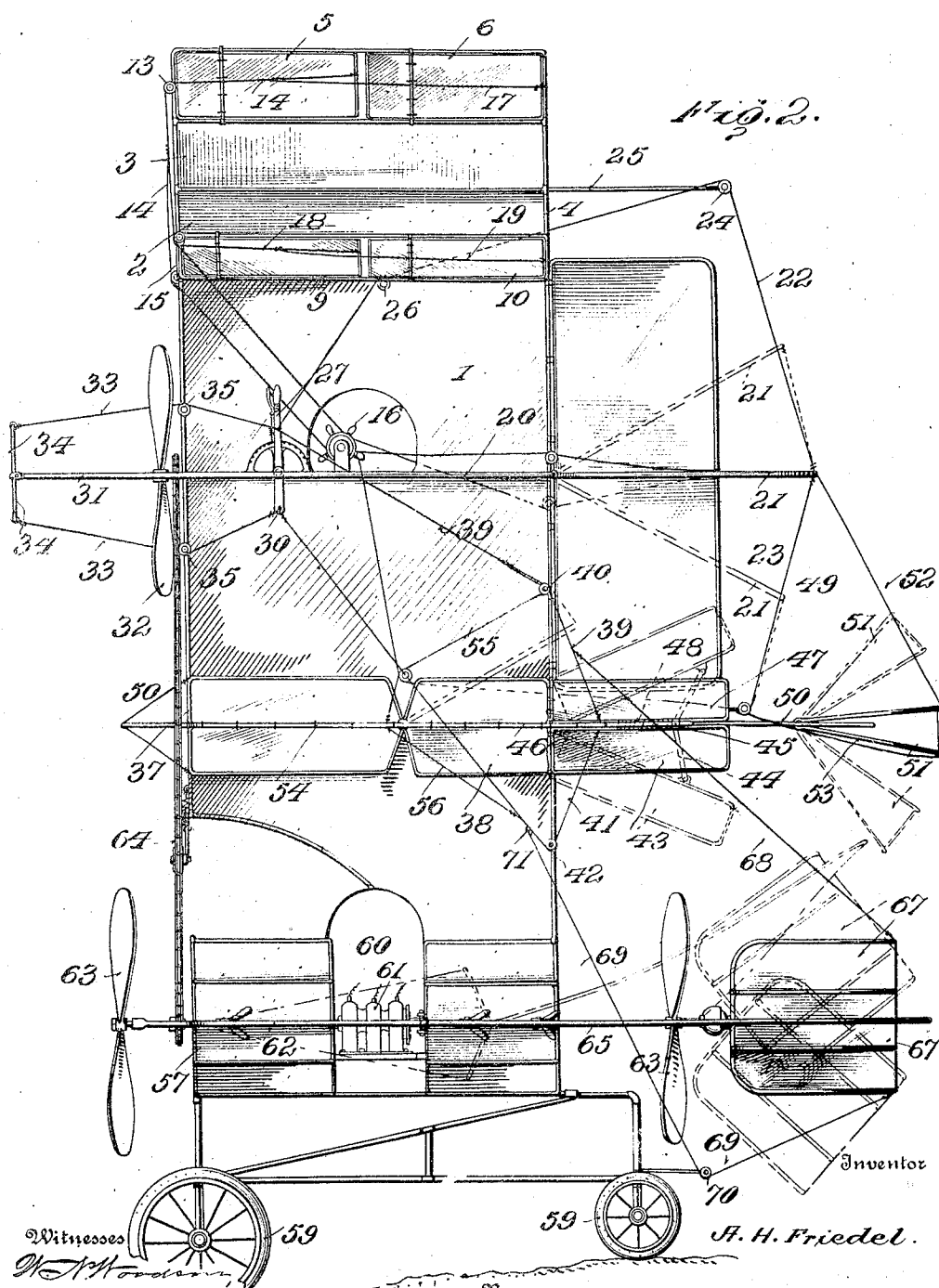
Attorneys

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3 SHEETS—SHEET 2



Witnesses
W. H. Woodson,
Juana M. Tallin,

Inventor
A. H. Friedel.
W. H. Woodson, Attorneys

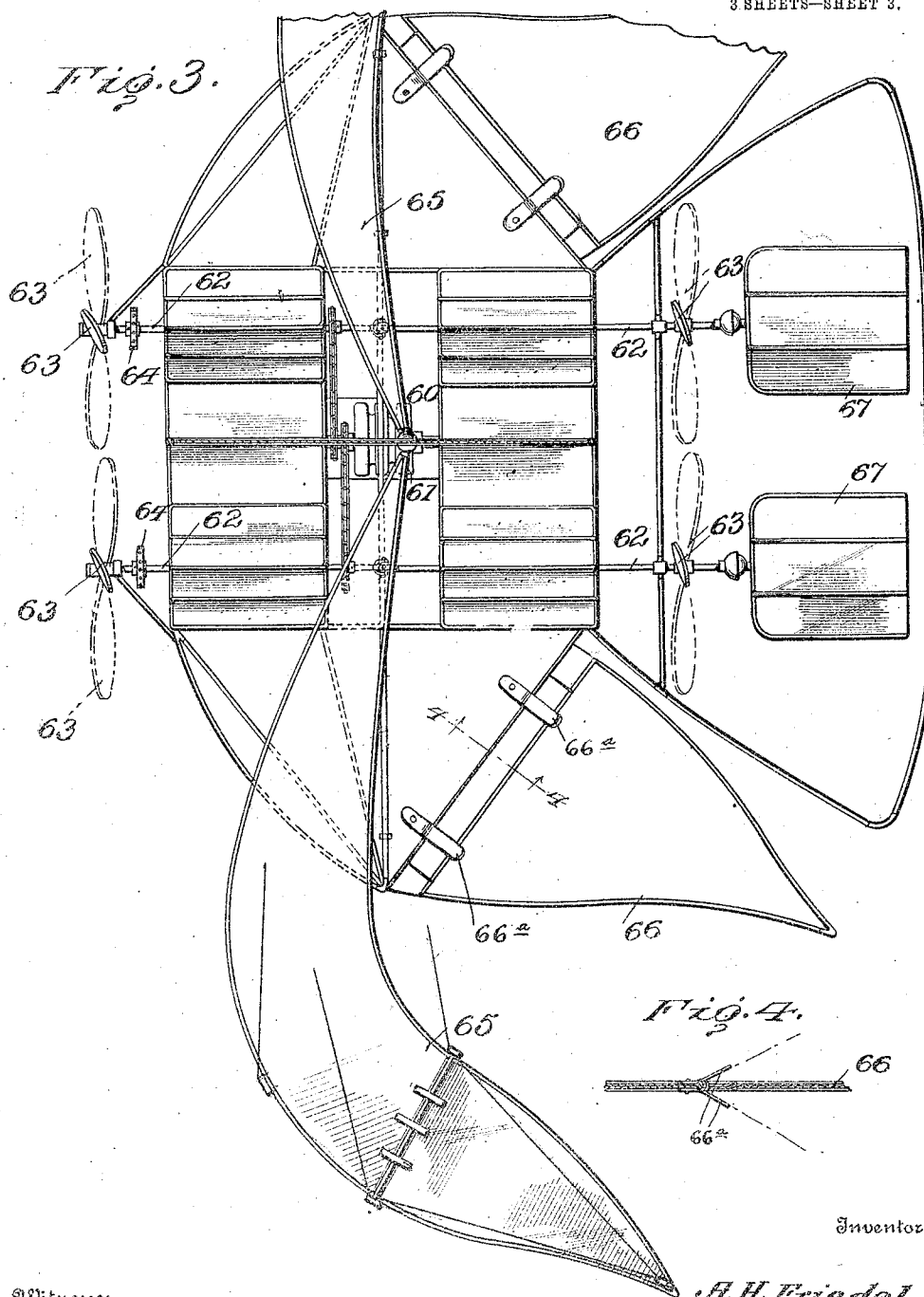
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3 SHEETS—SHEET 3.

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Witnesses

Wm. W. Woodson,
Juana M. Tallin,

Inventor

A. H. Friedel.

ಪೊಕ್ಕ

W. A. Bailey, Attorney.

UNITED STATES PATENT OFFICE.

ALBERT HUGO FRIEDEL, OF BALTIMORE, MARYLAND.

FLYING-MACHINE.

967,359.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ALBERT H. FRIEDEL, citizen of the United States, residing at Baltimore, State of Maryland, have invented certain new and useful Improvements in Flying-Machines, of which the following is a specification.

This invention comprehends certain new and useful improvements in flying machines of the heavier than air type and the invention has for its primary object a machine of this character which will be light, strong and durable, exposing a maximum amount of superficial area without occupying any considerable amount of ground space when at rest. And the invention has for a further object a machine of this character in which the various steering and equilibrium restoring devices may be easily controlled by a single operator mounted upon one of the horizontal planes of the machine.

With these and other objects in view as will more fully appear as the description proceeds, the invention consists in certain constructions, arrangements and combinations of the parts that I shall hereinafter fully describe and claim.

For a full understanding of the invention, reference is to be had to the following description and accompanying drawings in which:

Figure 1 is a perspective view of a flying machine constructed in accordance with my present invention; Fig. 2 is a side elevation thereof; Fig. 3 is a horizontal sectional view, the section being taken on the line 3—3 of Fig. 2; and, Fig. 4 is a detail transverse sectional view.

Corresponding and like parts are referred to in the following description and indicated in all the views of the accompanying drawings by the same reference characters.

In describing the construction of my improved flying machine let it first be understood as will be seen from the accompanying drawings, particularly Fig. 1, that my present invention embodies a plurality of planes arranged one above the other, and I shall commence by describing the uppermost planes and so on in downwardly extending series.

The upper portion of my improved flying machine embodies a middle vertically dis-

posed plane 1 which extends downwardly throughout practically the entire machine, 55 two inclined planes 2 which extend laterally and upwardly from the upper edge of the plane 1, two vertical planes 3 which extend upwardly from the outer edge of the planes 2, and laterally and downwardly extending 60 planes 4 which also project from the outer edges of the respective planes 2.

Each of the planes 3 and 4 includes pivoted steering sections that are designated 5, 6, 7, 8, 9, 10, 11 and 12 respectively. The 65 pivoted plane sections 7 and 8 are mounted to move about vertical axes to one side or the other of the planes 3, while the sections 9, 10, 11 and 12 are mounted to move at right angles to the planes 4. The following 70 controlling devices have been devised for the movement of these sections: It will be noted that arms 13 project laterally in opposite directions from the frames which form part of the planes 3, at the forward upper corners 75 thereof, and that cords or cables 14 are secured at their front ends to the sections 5 and 7 and pass over pulleys carried by the arms 13, thence downwardly and over pulleys carried by the arms 15 and finally pass 80 around the drum 16. Other cords or cables 17 are connected to the free ends of the sections 6 and 8 and said cords 17 are also connected to the cords 14 as shown, whereby when the drum 16 is turned in one direction, 85 or the reverse, the wings 5, 6, 7 and 8 will all be swung in the same direction. A similar arrangement controls the sections 9, 10, 11 and 12. For instance, it will be seen that the cords or cables 18 are connected to the 90 sections 9 and 10, and that other cords 19 are connected to the sections 10 and 12 and that the cords 18 pass over the pulleys which are carried by the arms 15 and also wind upon the drum 16. Hence it will be seen 95 that by turning said drum in one direction or the reverse, these movable sections above enumerated may be swung in the desired direction. This portion of the machine also embodies a horizontal plane 20 which inter- 100 sects the plane 1. To the rear edge of this plane 20 is a movable section substantially of horse-shoe shape as indicated at 21. To move this section 21 up and down, I secure to it an upwardly extending cord or cable 105 and a downwardly extending cord or cable

23. The cable 22 extends forwardly and over a pulley 24 which is carried by an arm 25 extending rearwardly from the framework at the point of juncture of the rear edges of the planes 1 and 2. The cord 22 thence extends forwardly and downwardly over a pulley 26 and is secured at one end to a hand lever 27 fulcrumed intermediate of its ends on the main horizontal plane 20 near the front edge thereof. The cord or cable 23 extends downwardly and forwardly over a pulley carried by an arm 28 similar to the arm 25 and thence extends forwardly and upwardly over a pulley 29 to the lower arm of the hand lever 27 as indicated at 30. Movably connected to the front edge of the plane 20 is a horizontally disposed section 31 which is substantially of the same transverse extent as the plane 20 and which is spaced therefrom to provide clearance for the propellers 32. Upper and lower cords 33 are connected to the arm 34 that projects upwardly and downwardly from the section 31, the said cords 33 passing rearwardly over pulleys 35 and being secured to the upper and lower arms of the hand lever 27. By this means it will be understood that by moving the hand lever 27 in one direction or the reverse, the horse shoe shaped section 21 and the front section 31 may be moved in opposite directions so as to assist in the rising or descending movement of the machine while in flight.

As best seen in Fig. 1, the main vertical plane 1 extends downwardly below the main horizontal plane 20. Underneath the plane 20 and spaced therefrom are two pairs of vertical and horizontal longitudinally extending planes bisecting each other, said pairs being located on opposite sides of the main vertical plane 1 and being designated respectively 36 and 37. These planes 36 and 37 are tiltably connected by braces to the main vertical plane 1 and are spaced therefrom as clearly illustrated in Fig. 1. The planes 36 and 37 terminate short of the rear edge of the main vertical plane 1 and to the rear ends of said planes 36 and 37, movable rudder sections 38 are connected, said sections also embodying horizontal and vertical planes bisecting each other. In order to move these sections 38, each one has secured to its rear end a cable 39 which extends upwardly over a pulley 40 to the hand lever 27. Another cord or cable 41 is secured to the rear end of the section 38 and extends downwardly and forwardly over a pulley 42 thence upwardly to the lower arm of the hand lever 27. Secured to and movable with the rear end of each movable section 38 is a spreading device 43 which embodies retarding sections that are V-shaped in cross section and that are adapted to be spread out after the manner of an umbrella. They are so connected at their front ends to the

rear ends of the sections 38 that their rear ends may be spread apart from each other and near such ends they have connected to them spreader arms 44. The inner ends of these arms are connected to a collar 45 which slides on a rod 46 which forms the central brace of the section 38 which projects rearwardly therefrom. A cord or cable 47 is connected to one or more of the arms 44 and the collar 45 to which they are connected so that by pulling upon said cable 47 the arms will be straightened out and thereby spread the rear ends of the sections 43 apart. By moving the rudder section 38 the machine may be assisted in being steered, while at the same time, the spreading apart of the rear ends of the V-shaped sections which form part of the spreading retarding device 43 will not only further assist in the steering operation, but will when desired, serve to retard the forward movement of the machine and thereby tend to bring the same to a standstill, if for instance, one of the retarding devices be spread, and the other remain contracted. A spring 48 tends to draw such rear ends inwardly. As the cords 47 come to a common point they are connected by a cord or cable 49 to the rear edge of the horse shoe shaped section 21 so that as said section is moved up or down, the section 43 will be opened or permitted to close. The central longitudinally extending brace rod 50 of the plane 1 projects rearwardly between and beyond the two sets of spreading devices 43 and has secured to it preferably by universal joint, a rudder section 51. This section is connected by a cord 52, to the rear edge of the section 21 and is also connected by another cord 53 to the cord 49, so that the up and down movement of the section 21 will impart movement to the section 51. This portion of the machine just described, also embodies side wings 54. These are connected to the side edges of the planes 36 and 37 and may be moved upwardly by means of cords 55 connected to the cords 39 and may be moved downwardly by cords 56 connected to the cords 41 at opposite sides of the machine respectively.

The plane 1 extends downwardly below the planes 36 and 37 and is connected to the middle of a framework 57 embodying any desired number of box like frames extending longitudinally and covered with silk or any kind of cloth, the same being mounted upon a ground supporting framework 58, carried by the front and rear wheels 59. This lowermost framework has a space 60 for the motors 61, the drive shafts of which are connected to the countershafts 62 which run the lower front and rear propellers 63. The upper front propellers 32 are connected to the shafts 62 by sprocket chains 64 or the like. In connection with this lowermost portion of the machine, there are laterally ex-

tending wings 65 which may be moved front and rear or up and down in any desired direction by any desired means. This portion of the machine, as best seen in Fig. 3, embodies upwardly and downwardly moving wings 66 which are connected to the framework at their front edges, the movements of said wings being free and limited by upper and lower stops 66^a.

67 designates rudders which have a universal joint connection with the shaft 62 at the rear ends of the latter. As best seen in Fig. 2 each of the rudders 67 may be moved upwardly by means of a cord or cable 68 which is connected thereto and which is also connected to the cord or cable 39, and each of these rudders 67 may be moved downwardly by means of a cord or cable 69 which is secured thereto and which extends downwardly and forwardly over a pulley 70, said cord 69 being connected to the cable 56 as indicated at 71.

It will be understood that the box-like frames which compose the framework 57 are arranged in front and rear sections, the front section being capable of being shifted or moved upwardly or downwardly as desired. It is also to be understood that the laterally extending wings 65 have cables connected thereto as illustrated in the drawings, and that their tips also have cables connected thereto, these several cables being connected to the hand lever which moves the other parts as hereinbefore described, or to any other hand lever whereby the tips may be raised or lowered, or the wing as a whole raised or lowered.

Having thus described the invention, what is claimed as new is:

1. In a flying machine, horizontal and vertical planes bisecting each other, means for propelling the machine, outwardly and upwardly projecting planes secured to the upper edge of the vertical plane, outwardly and downwardly projecting planes secured to the outer ends of the upwardly and outwardly projecting planes, vertically extending planes secured to the upwardly and outwardly projecting planes at the outer ends thereof, laterally movable sections carried by said last named planes and movable sections carried by the outwardly and downwardly projecting planes, and means for moving said sections.

2. In a flying machine, horizontal and vertical planes bisecting each other, means for propelling the machine, outwardly and upwardly projecting planes secured to the upper edge of the vertical plane, outwardly and downwardly projecting planes secured to the outer ends of the upwardly and outwardly projecting planes, vertically extending planes secured to the upwardly and outwardly projecting planes at the outer ends thereof, laterally movable sections carried

by said last named planes and movable sections carried by the outwardly and downwardly projecting planes, and means for moving said sections simultaneously.

3. In a flying machine, horizontal and vertical planes bisecting each other, means for propelling the machine, outwardly and upwardly projecting planes secured to the upper edge of the vertical plane, outwardly and downwardly projecting planes secured to the outer ends of the upwardly and outwardly projecting planes, vertically extending planes secured to the upwardly and outwardly projecting planes at the outer ends thereof, laterally movable sections carried by said last named planes and movable sections carried by the outwardly and downwardly projecting planes, means for moving said sections, cables connected to said sections for moving the same, and an operating drum around which said cables wind.

4. In a flying machine, the combination with a main supporting framework including a horizontal and a vertical plane, a horse-shoe shaped section connected to the rear end of the horizontal plane, a vertically disposed movable section connected to the rear end of the vertical plane within the arc of said rear section, and means for moving said sections.

5. In a flying machine, the combination with the main supporting framework embodying a vertical plane, of two pairs of longitudinally extending planes arranged on opposite sides of said vertical plane each including a vertical plane and a horizontal plane bisecting each other, movable sections connected at their front ends to the rear ends of said last named planes, and means for moving said sections.

6. In a flying machine, the combination of vertical and horizontal planes connected together, a series of box like structures connected to the lower end of the vertical plane, shafts mounted in said structures, front and rear propellers carried by said shafts, propellers journaled on the said horizontal plane above said structures, and an operative connection between said shafts and said last named propellers.

7. The combination with a main supporting framework, of rudder sections 38 pivotally connected to the framework, means for moving said rudder sections as a whole, and spreading devices carried by the rudder sections 38, each of said supporting devices embodying V-shaped sections that are pivotally connected at their front ends to the rudder section 38, so that the ends of said V-shaped sections may be spread apart from each other, spreader arms connected to said V-shaped sections, a supporting rod, a collar mounted to slide on said rod and connected to the supporting arms, and means for moving said collar.

8. In a flying machine, the combination with a main supporting framework embodying a vertical plane, of two pairs of longitudinally extending planes arranged on opposite sides of said vertical plane, movable sections V-shape in cross section, connected at their front ends to the rear ends of said last named planes, means for moving said sections as a whole, and means for spread-

ing the rear ends of said V-shape sections 10 apart.

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

ALBERT HUGO FRIEDEL. [L. S.]

Witnesses:

W. N. WOODSON,
FREDERICK S. STITT.