

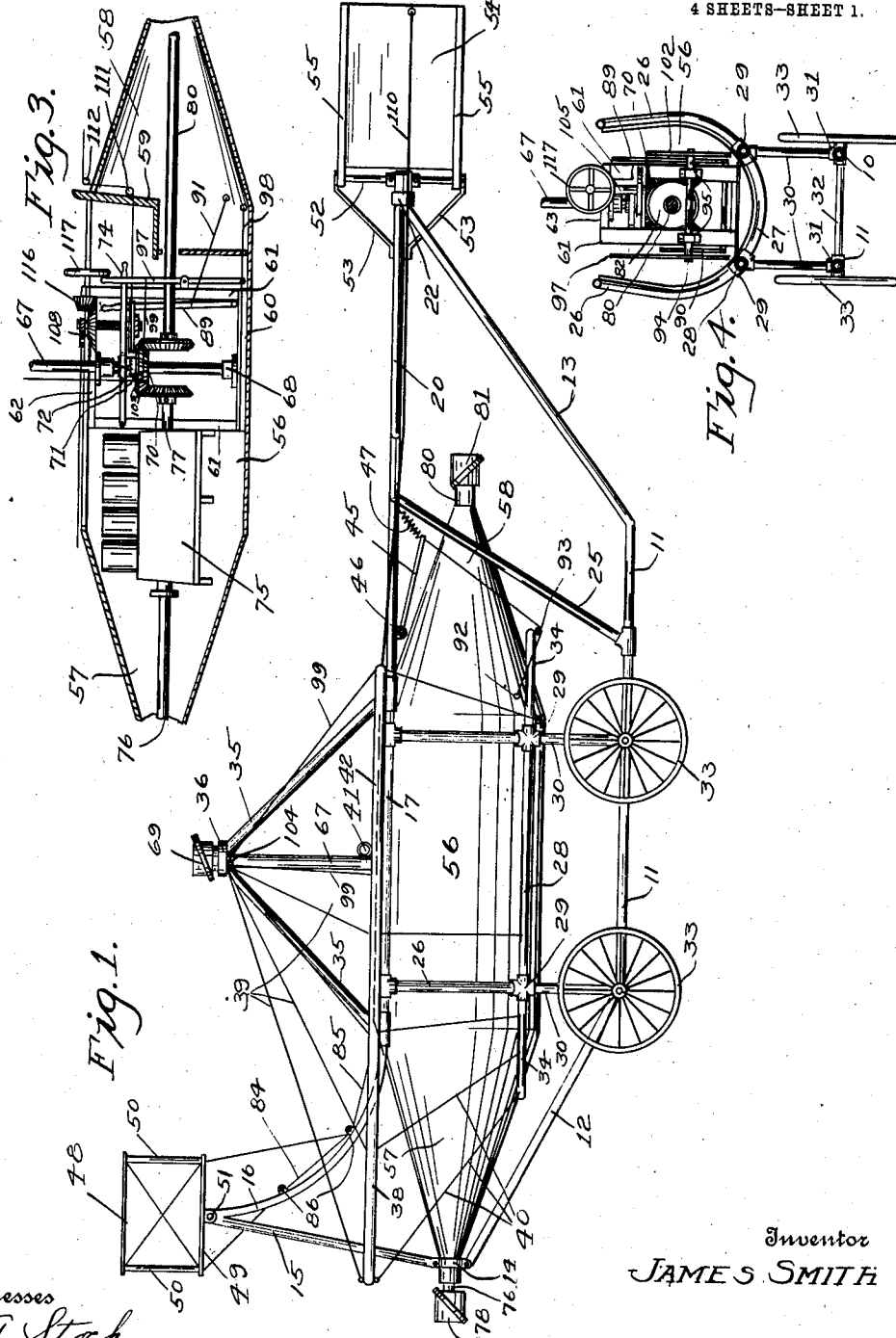
AEROPLANE.

APPLIOATION FILED DEC. 4, 1911. RENEWED OCT. 26, 1912.

1,047,581.

Patented Dec. 17, 1912.

4 SHEETS--SHEET 1.



Witnesses
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4 SHEETS—SHEET 2.

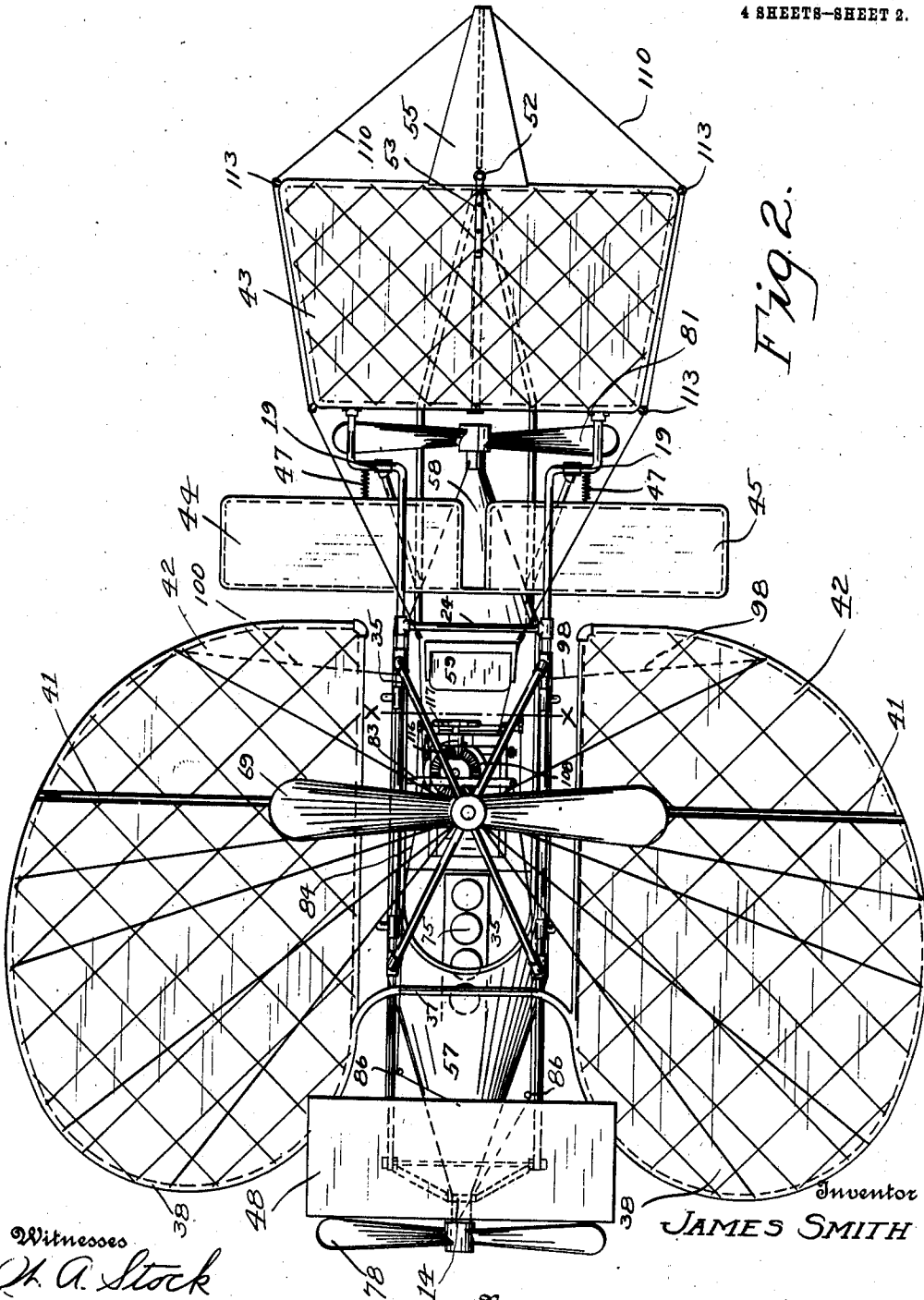


Fig. 2.

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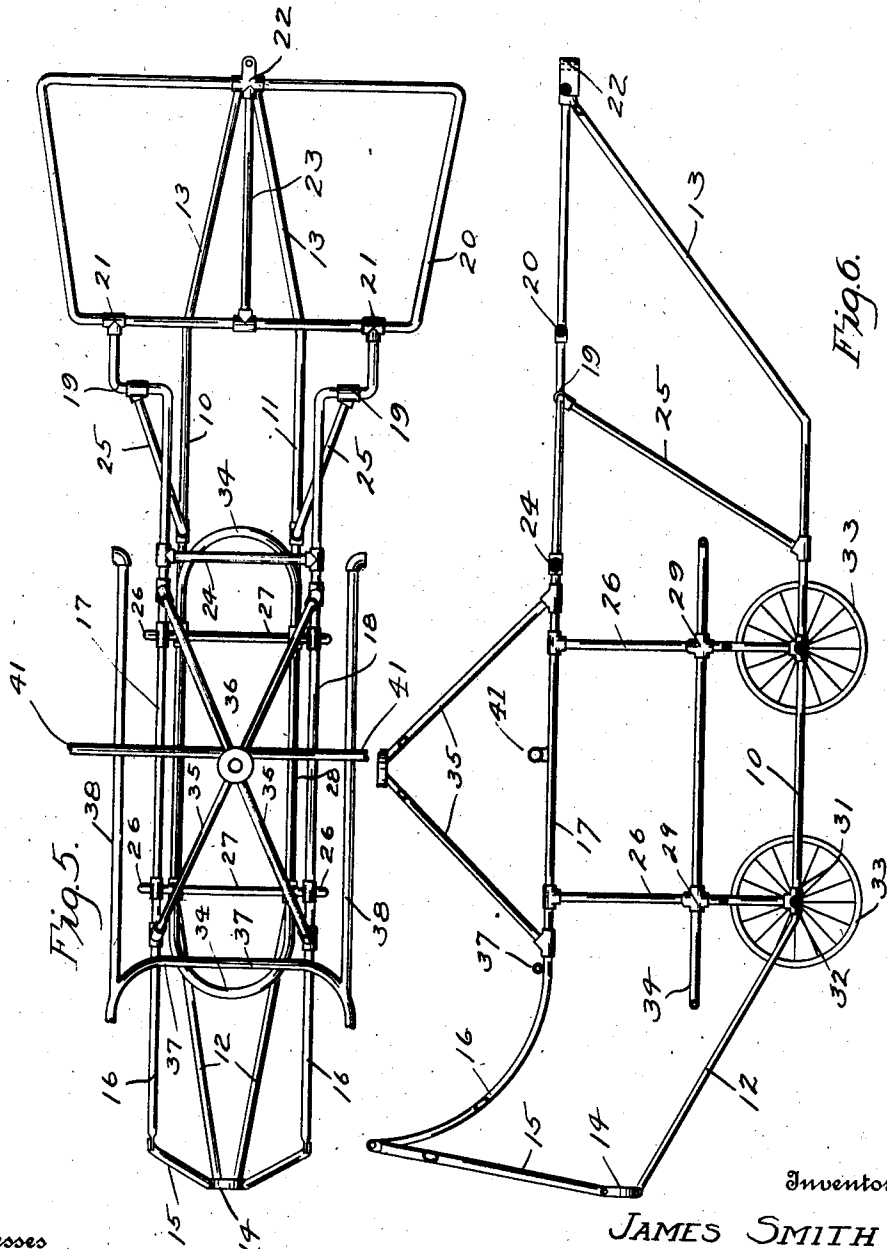
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4 SHEETS—SHEET 3.



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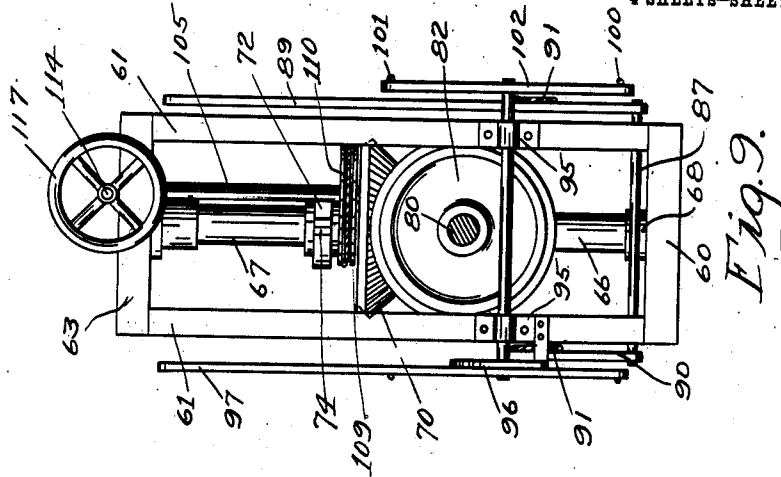


Fig. 9.

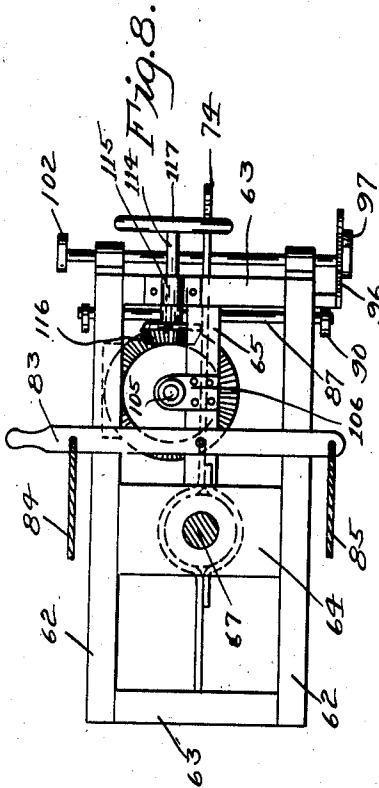


Fig. 8.

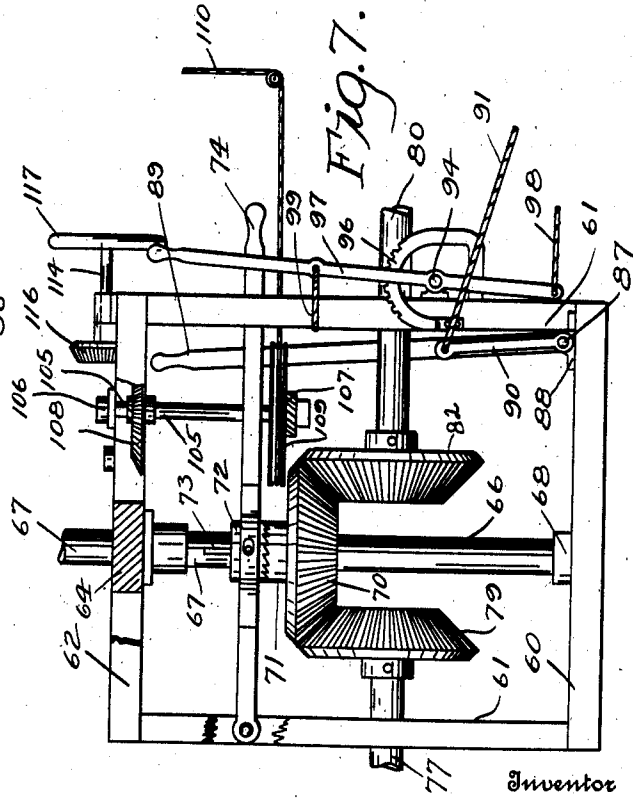


Fig. 7.

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UNITED STATES PATENT OFFICE.

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Specification of Letters Patent.

Patented Dec. 17, 1912.

Application filed December 4, 1911, Serial No. 663,888. Renewed October 26, 1912. Serial No. 727,969.

To all whom it may concern:

Be it known that I, JAMES SMITH, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented certain new and useful Improvements in Aeroplanes, of which the following is a specification.

This invention relates to flying machines and the object of the same is to provide the machine with an improved type of steering and propelling means, and also to provide a novel type of frame for the machine.

This invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a side elevation of the machine. Fig. 2 is a top plan view. Fig. 3 is a longitudinal section through the body of the machine. Fig. 4 is a view in section on the line X—X in Fig. 2. Fig. 5 is a top plan view of the frame for the machine. Fig. 6 is a longitudinal section through the frame with the body portion removed. Fig. 7 is an enlarged view of the operating mechanism shown in Fig. 3. Fig. 8 is a top plan view of the mechanism shown in Fig. 7. Fig. 9 is an end elevation of the operating mechanism in end elevation.

Referring to the accompanying drawings, it will be seen that this invention comprises a frame which is formed from lengths of piping formed from some light material, such as aluminum. The frame comprises the lower bars 10 and 11, which have upwardly inclined forward portions 12 and rear portions 13. The forward portions 12 are connected to the collar 14 to which there is connected the upwardly extending bars 15. The upper ends of the bars 15 are connected with the upwardly curved forward portions 16 of the upper bars 17 and 18. The upper bars 17 and 18 are shorter than the bars 10 and 11, and have their rear ends bent to form the angular ends 19. A substantially rectangular frame 20 is connected with the upper bars by means of the couplings 21 with the upwardly inclined ends 13 of the lower bars by means of the coupling 22. A bracing bar 23 extends across the frame 20 so that the frame will be prevented from buckling. A transversely extending bracing bar 24 connects the bars 17 and 18 intermediate their length, and the bracing bars 25 connect the bars 10 and 11 with the angularly extending ends 19 to the bars 17

and 18 so that the frame will be supported practically. It should be noted that the bracing bars 25 are rearwardly inclined so that the frame will be better braced. Bars 26 are connected with the bars 17 and have their lower ends connected by the curved transversely extending bars 27 and the longitudinally extending bars 28 the bars being connected by the coupling 29. Shorter bars 30 are connected with the couplings 29 and with the bars 10 and 11 by means of the couplings 31, the couplings 31 carrying the axles 32 upon which the supporting wheels 33 are mounted. U-shaped bars 34 are connected with the couplings 29 and together with the bars 27 and 28 form a cradle in which the body portion is mounted. Standards 35 are mounted upon the bars 17 and 18 and have their upper ends converging and connected with the bearing 36.

A length of piping 37 extends across the bars 17 and 18 and has its outer end portion 38 curved to form a support for the main suspending wings of the flying machine. The wings are braced by means of the upper and lower guy wires 39 and 40 which brace the forward ends of the wings so that it will be prevented from having any vertical movement. The wings are braced intermediate their length by the braces 41 and the rear portions 42 of the wings are unsupported by any guy wires thus leaving the rear portions of the wings flexible so that they may be tilted in order to assist in guiding the machine. A frame 20 is covered by a fabric 43 so that a supporting plane for the rear portion of the machine will be provided, thus assisting in supporting the machine while in flight.

A rear guiding plane which comprises two sections 44 and 45 is connected with the bars 17 and 18 by means of the pivot ears 46 and is normally held in a horizontal position by the springs 47 which are connected to the angular ends 19 of the bars 17 and 18. A forward guiding plane, which comprises the upper and lower plates 48 and 49 connected by the supports 50 is pivotally mounted upon the bar 51 which connects the forward ends of the bars 17 and 18. This forward guiding plane is operated by a mechanism which will be hereinafter described, so that it may be tilted either forwardly or rearwardly in order to vertically guide the machine. A pivot bar 52 is carried by the coupling 22

which connects the bars 17 and 18 with the upwardly inclined ends 13 of the bars 10 and 11, and is braced by means of the upper and lower braces 53. The rudder 54 is mounted between two plates 55 which are mounted upon the bar 52, the plates and rudder being turned by a mechanism which will be described hereinafter so that the machine may be guided horizontally.

The body portion of the machine is mounted in the cradle and comprises the cylindrical central portion 56 and the tapered ends 57 and 58, the tapered end 57 passing through the collar 14. The body portion of the machine carries the driving and controlling mechanism and also carries the operator's seat 59 which is mounted in the rear end portion of the body portion. A frame is mounted in the body portion and comprises the base 60, standards 61, and upper bars 62 and 63, the bars 62 being connected intermediate their length by the block 64. The block 64 is connected with the rear cross bar 63 by means of the bar 65, the purpose of which will be brought out hereinafter.

A vertical shaft, comprising upper and lower sections 66 and 67, is mounted in the frame in the body portion with the lower section positioned in the bearing 68, and the upper section passing through the block 64. The upper section 67 passes through the body portion and has its upper end journaled in the bearing 36, and carries the propeller blade 69 upon its upper end. A beveled gear 70 is rigidly mounted upon the lower portion 66 and is provided with a clutch 71 upon its upper portion. A clutch collar 72 is slidably mounted upon the lower end of the upper section 67 and is connected with the upper section by means of a key fitting into the slot 73 so that when the collar 72 is brought into engagement with the clutch 71, by means of the operating lever 74, the upper section and propeller blade 69 will be caused to rotate. A motor 75, which may be of any type desired, but which is preferably of the internal combustion type, is mounted in the forward end of the body portion and is provided with the two engine shafts 76 and 77, the shaft 76 passing through the forward end of the body portion carrying the propeller blade 78. The engine shaft 77 is shorter than the shaft 76 and extends into the frame and carries a beveled gear 79 which meshes with the beveled gear 70. A propeller shaft 80 passes through the body portion beneath the operator's seat and out through the rear end of the body portion, and carries the propeller blade 81. The inner end of the propeller shaft 80 carries a beveled gear 82, which meshes with the beveled gear 70 so that when the engine is in motion the propeller 81 will be rotated. It should be noted that the beveled gear 70 causes the shaft 80 to rotate in the opposite direction from the shaft 76, so that the propeller blades 78 and 81 rotate in opposite directions, this being necessary to cause the machine to work properly.

From an inspection of Figs. 3 and 7, it will readily be seen that the clutch collar 72 may be brought into and out of engagement with the clutch 71 so that the upper propeller 69 may be rotated or not at will. This is so that the propeller 69 may be rotated when it is desired to elevate the machine, and may be cut out when the desired height has been reached.

A lever 83 is pivotally mounted upon the bar 65 and has cables 84 and 85 connected with its outer ends. The cables are carried forward along the frame and along the pulleys 86 mounted upon the forward portions 16 of the frame up to the forward guiding plane where they are connected to the forward and rear portions of the lower plate 49. By turning the lever 83 upon its pivot the cables 84 and 85 will be moved to either tilt or depress the forward edge of the forward guiding plane so that the machine will be guided.

A short shaft 87 is mounted in the journal 88 and has an operating lever 89 rigidly mounted upon one end and a short arm 90 secured to its opposite end. A cable 91 is secured to the arm 90 and is carried rearwardly through an opening 92 in the body portion, around a pulley 93 secured to the cradle and up to the guiding plane which is mounted to the rear of the supporting planes 38. By moving the lever 89 forwardly the cable draws its guiding plane downwardly against the tension of the springs 47 so that the rear portion of the flying machine will be elevated so that a quick descent may be made. When this plane is in a normal position it forms an additional supporting surface for the machine.

A shaft 94 is mounted in the bearings 95 and has one end passing through a rack 96 which is secured to one of the bars 61. A lever 97 is secured to the end of the shaft 94 and cables 98 and 99 are secured to the lever 97 above and below the shaft 94 so that when the lever is moved the cables will be drawn in opposite directions. Similar cables 100 and 101 are secured to the bar 102 which is mounted upon the opposite end of the shaft 94. The cables 98 and 101 pass through openings in the rear portion of the body portion and are connected with the lower faces of the rear portions of the supporting wings 38, and the cables 99 and 100 are carried forwardly over the pulleys 103 up over the pulleys 104 and down to the rear portions of the supporting wings where they are secured above the cables 98 and 101. It will therefore be seen that when

the lever 97 is rocked the rear portions of the supporting wings will be oppositely warped, thus permitting the flying machine to be more readily turned.

5 The shaft 105 is rotatably mounted between the bearing plate 106 and the block 107 and carries the upper gear plate 108, and the lower pulley wheel 109. A cable 110 passes around the pulley wheel 109
10 around the pulley wheels 111 and 112 out of the body portion, and is led along the sides of the rear supporting plane 43 over the pulley wheels 113 and has its ends secured to the rudder 54. A shaft 114 is
15 mounted in the bearing 115 and carries a beveled gear 116 which meshes with the gear plate 108 and also carries a wheel 117. By turning the wheel 117, the gear 116 turns the gear plate 108 and shaft 105 so that the
20 cable 110 is moved to turn the rudder upon its pivot to permit a horizontal guiding of the flying machine.

From the foregoing description, it will be seen that when using this machine the engine is started and this rotates the propellers 78 and 81. The propellers create a rearwardly extending current of air which has a tendency to support the machine in the air. After the engine has started the clutch collar 72 is brought into connection with the clutch 71, and this causes the propeller 69 to rotate so that the machine is raised in the air. The guiding planes are so set as to assist the machine in rising from the
35 ground. After the machine has reached the desired height the lever 74 is moved to bring the collar 72 out of engagement with the clutch 71 so that the propeller 69 does not rotate, although the propellers 78 and 81
40 continue to turn thus causing the machine to move forwardly. If it is desired to descend or to rise higher, the guiding planes 48 and 44 are moved to the proper positions and the machine will be vertically adjusted
45 or guided in accordance with the manner in which the guiding planes are moved. By turning the rudder 54, the machine may be guided horizontally, the rear portions of the supporting wings 38 being warped to assist the machine in making turns.

What is claimed is:—

1. A frame comprising upper bars, lower bars, a cradle carried by said upper and lower bars, a body portion mounted in said
55 cradle, supporting planes carried by said frame, guiding planes carried by said frame, propelling means carried by said body portion, and controlling means for said guiding planes carried by said frame.

60 2. In a flying machine, a frame comprising upper bars, lower bars, said bars having upwardly inclined forward end portions, vertical bars connecting the forward ends of said upper and lower bars, a sup-
65 porting frame connected with the rear ends

of said upper bars, said lower bars having upwardly inclined rear end portions connected with said supporting frame, a cradle carried by said first-mentioned frame, a body portion mounted in said cradle, propelling means carried by said body portion, supporting planes carried by said first-mentioned frame, guiding planes carried by said first-mentioned frame, and controlling means for said planes mounted in said
70 body portion.

3. In a flying machine, a frame comprising upper bars, lower bars, vertical bars connecting the forward ends of said upper and lower bars, a substantially rectangular
80 frame carried by the rear ends of said upper bars, rear end portions of said lower bars being upwardly inclined and connected with said rectangular frame, inclined bars carried by said upper bars, a bearing connecting the upper ends of said inclined bars, a
85 body portion mounted in said frame, propellers carried by said body portion, the shaft of one of said propellers passing through said bearing, supporting planes carried by said frame, and guiding planes carried by said frame, and controlling means for said guiding planes carried by said body
90 portion.

4. In a flying machine, a frame comprising upper bars, lower bars connected with said upper bars, a cradle comprising vertical bars extending from said lower bars, longitudinally extending bars connecting said
95 vertical bars, transversely extending curved bars connecting said vertical bars, U-shaped bars connected with said vertical bars and extending longitudinally of said frame, depending bars carried by said upper bars and having their lower ends connected with
100 said vertical bars, a body portion mounted in said cradle, supporting planes carried by said frame, guiding planes carried by said frame, propelling means carried by said body portion, and controlling means for said
105 guiding planes carried by said body portion.

5. In a flying machine, a frame comprising upper bars, having angular rear end portions, lower bars, a bearing connecting the forward ends of said lower bars, vertical bars connecting the forward ends of said upper bars with said bearing, bracing bars connecting the angular ends of said upper bars with said lower bars, a substantially rectangular frame carried by the
120 angular ends of said upper bars, the rear end portions of said lower bars being upwardly inclined and connected with said rectangular frame, a body portion carried by said frame and having its forward end
125 passing through said bearing, inclined bars carried by said upper bars, a bearing connecting the upper ends of said inclined bars, propellers carried by said body portion, the shaft of one of said propellers pass-
130

ing through said upper bearing, supporting planes carried by said frame, guiding planes carried by said frame, and operating means for said planes carried by said body portion.

6. In a flying machine, a frame, a body portion carried by said frame, supporting wings extending to each side of said frame, said wings having flexible rear end portions, a pivotally mounted supporting and guiding plane carried by said frame to the rear of said wings, a supporting plane carried by said frame to the rear of said pivotally mounted plane, means carried by said body portion for tilting said pivotally mounted plane and the rear portions of said wings, a horizontal rudder mounted upon the forward end of said frame, a vertical rudder mounted upon the rear end of said frame, means carried by said body portion for operating said rudders and propelling means carried by said body portion.

7. In a flying machine, a frame, a body portion carried by said frame, bars extending above said frame, means connecting the upper ends of said bars, supporting wings extending to each side of said frame, guy ropes secured to said upper bars and having their lower ends connected to the forward portions of said wings, lower guy ropes secured to the forward portions of said wings and connected with the lower portions of said frame, the rear portions of said wings being flexible, a pivotally mounted supporting and guiding plane connected with said frame to the rear of said wings, a stationary supporting plane carried by the rear portion of said frame, vertical and horizontal rudders carried by said frame, means carried by said body portion for operating said rudders and planes, and propelling means carried by said body portion.

8. In a flying machine, a frame, a body portion carried by said frame, supporting wings carried by said frame, said wings being provided with flexible rear portions, a standard extending above said frame, cables connected with the upper and lower faces of the rear portions of said wings, said upper cables extending to the upper portion of said standard and passing over the pulleys carried by said standards, said upper cables extending from said standard into said body portion, a rocker shaft mounted in said body portion, an arm rigidly mounted upon one end of said rocker shaft, an operating lever rigidly mounted upon the opposite end portion of said rocker shaft, one of said upper cables being connected with the upper portion of said lever and the other of said upper cables being connected with the lower portion of said arm, said lower cables entering said body portion through openings formed therein, one of said lower cables being connected with the lower portion of said lever and the other of

said lower cables being connected with the upper portion of said arm, and propelling means carried by said body portion.

9. In a flying machine, a frame, a body portion mounted in said frame, supporting wings carried by said frame, means in said body portion for tilting the rear portions of said wings in opposite directions, a supporting and guiding plane pivotally mounted upon said frame to the rear of said wings, springs connected with said frame and said pivotally mounted plane, a rocker shaft mounted in said body portion, an arm carried by said rocker shaft, a line connected with said arm and passing out of said body portion and having its outer end connected with said pivotally mounted plane, a lever mounted upon said rocker shaft for turning the same to draw said line and move said pivotally mounted plane against the tension of said springs, and propelling means carried by said body portion.

10. In a flying machine, a frame, supporting planes carried by said frame, a body portion mounted in said frame, a horizontal rudder at the forward end of said frame, said rudder comprising an upper plane, a lower plane, bars holding said planes in spaced relation, a frame mounted in said body portion, a lever pivotally mounted upon the frame in said body portion, cables connected to the upper and lower sides of said rudder and extending along said first-mentioned frame into said body portion and having their inner ends connected to opposite ends of said lever whereby a movement of said lever will tilt said rudder, a vertical rudder at the rear of said first-mentioned frame, means mounted upon said inner frame for operating said rear rudder, and propelling means carried by said body portion.

11. In a flying machine, a frame, a body portion mounted in said frame, supporting planes carried by said frame, a rudder at the forward end of said frame, a frame mounted in said body portion, means carried by said last mentioned frame for moving said forward rudder, a rudder at the rear of said first-mentioned frame, a vertical shaft rotatably connected with said inner frame, a gear plate at the upper end of said shaft, a pulley wheel at the lower end of said shaft, a second shaft rotatably connected with said inner frame, a gear wheel carried by said second shaft and meshing with said gear plate, an operating wheel carried by said second shaft for rotating the same, and a cable passing around said pulley wheel and carried out of said body portion along said first-mentioned frame and having its ends secured to opposite sides of said rear rudder whereby the turning of said operating wheel will rotate said vertical shaft and pulley wheel to turn said

rear rudder, and propelling means carried by said body portion.

12. In a flying machine, an outer frame, a body portion carried by said outer frame, supporting wings carried by said outer frame, bracing bars extending across said wings and dividing said wings into forward and rear portions, said forward portions being rigid and said rear portions being flexible, a supporting and guiding plane pivotally mounted to the rear of said supporting wings, a supporting plane to the rear of said pivotally mounted plane, a horizontal rudder at the forward end of said outer frame, a vertical rudder at the rear end of said outer frame, an inner frame mounted in said body portion, a lever pivotally mounted upon said inner frame, cables secured to opposite ends of said lever, and passing out of said body portion along said outer frame and having their outer ends connected with the forward and rear sides of said forward rudder whereby the turning of said lever will tilt said forward rudder, a shaft passing through said inner frame, an arm secured to said shaft, a cable secured to said arm and passing out of said body portion and having its outer end connected with said pivotally mounted plane, a lever mounted upon said shaft and adapted to draw said line and move said pivotally mounted plane, means for returning said pivotally mounted plane to its normal position, a rack mounted upon said inner frame, a second shaft mounted upon said inner frame and passing through said rack, a lever secured upon one end of said second shaft, an arm secured upon the opposite end of said second shaft, cables secured to the upper and lower faces of the rear portions of said supporting wings, said upper cables entering said body portion and secured to the upper portion of said last-mentioned lever and the lower portion of said last-mentioned arm, said lower cables entering said body portion and secured to the lower portion of said last-mentioned lever and the upper portion of said last mentioned arm, a vertical shaft rotatably mounted in said frame, a gear plate at the upper end of said vertical shaft, a horizontal shaft rotatably mounted upon said inner frame, a gear carried by said horizontal shaft and meshing with said gear plate whereby the turning of said horizontal shaft will rotate said gear plate, an operating wheel mounted upon said horizontal shaft, a pulley wheel mounted upon the lower end of said vertical shaft, a cable passing around said pulley wheel out of said body portion along said frame and having its ends secured upon opposite sides of said rear rudder, and propelling means carried by said body portion.

13. In a flying machine, a frame comprising upper bars, lower bars, bars connecting

the forward ends of said upper and lower bars, said lower bars having their rear end portions connected with said upper bars, a cradle carried by said frame, a body portion mounted in said cradle, propelling means carried by said body portion, supporting planes carried by said frame, guiding planes carried by said frame, and propelling means for said planes.

14. In a flying machine a frame comprising upper bars, lower bars, bars connecting the forward ends of said upper and lower bars, the rear ends of said lower bars being connected with said upper bars, a bearing, bars holding said bearing above said upper bars, a body portion mounted in said frame, propellers carried by said body portion, the shaft of one of said propellers passing through said bearing, supporting planes carried by said frame, guiding planes carried by said planes, and controlling means for said guiding planes.

15. In a flying machine a frame comprising upper bars, lower bars, a bearing connecting the forward ends of said lower bars, bars connecting the forward ends of said upper bars with said bearing, bracing bars connecting said upper bars with said lower bars, a substantially rectangular frame carried by the rear ends of said upper bars, the rear end portion of said lower bars being connected with said rectangular frame, a body portion carried by said first-mentioned frame and having its forward end passing through said bearing, propellers carried by said body portion, supporting planes carried by said first-mentioned frame, guiding planes carried by said frame, and operating means for said planes.

16. In a flying machine, a frame, a body portion carried by said frame, supporting wings extending to each side of said frame, said wings having flexible rear end portions, a supporting and guiding plane carried by said frame to the rear of said wings, a stationary supporting plane carried by said frame to the rear of said supporting and guiding plane, means carried by said body portion for operating said supporting and guiding plane, means for tilting the rear portions of said wings, rudders carried by said frame, means carried by said body portion for operating said rudders, and propelling means carried by said body portion.

17. In a flying machine, a frame, a body portion carried by said frame, bars extending above said frame, means connecting the upper ends of said bars, supporting wings extending to each side of said frame, guy ropes secured to said upper bars and having their lower ends connected to the forward portions of said wings, lower guy ropes secured to the forward portions of said wings and connected with the lower portions of said frame, the rear portions of said wings

being flexible, supporting and guiding planes to the rear of said wings, rudders carried by said frame, means for operating said rudders and planes, and propelling means carried by said body portion.

18. In a flying machine a frame, a body portion carried by said frame, supporting wings carried by said frame, a supporting and guiding plane pivotally mounted upon said frame to the rear of said wings, springs connected with said frame and said pivotally mounted plane, a rocker shaft mounted in said body portion, an arm carried by said rocker shaft, means connecting said arm with said pivotally mounted plane whereby the rotation of said rocker shaft will draw said pivotally mounted plane against the tension of said springs, and propelling means carried by said body portion.

19. In a flying machine, a frame, a body portion carried by said frame, supporting planes carried by said frame, a rudder at the forward end of said frame, means for moving said forward rudder, a rudder at

the rear of said frame, a vertical shaft rotatably mounted in said body portion, a gear plate at one end of said shaft, a pulley wheel at the other end of said shaft, a second shaft rotatably mounted in said body portion, a gear wheel carried by said second shaft and meshing with said gear plate, an operating wheel carried by said second mentioned shaft for rotating the same, a cable passing around said pulley wheel, flexible means passing around said pulley wheel and carried out of said body portion and having its ends secured to opposite sides of said rear rudder whereby the turning of said operating wheel will rotate said vertical shaft and pulley wheel to turn said rear rudder, and propelling means carried by said body portion.

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

JAMES SMITH.

Witnesses:

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