F. F. SIMONS.

FLYING MACHINE.

APPLICATION FILED DEC. 24, 1918.

1,355,111.

Patented Oct. 5, 1920.

5 SHEETS—SHEET 1.

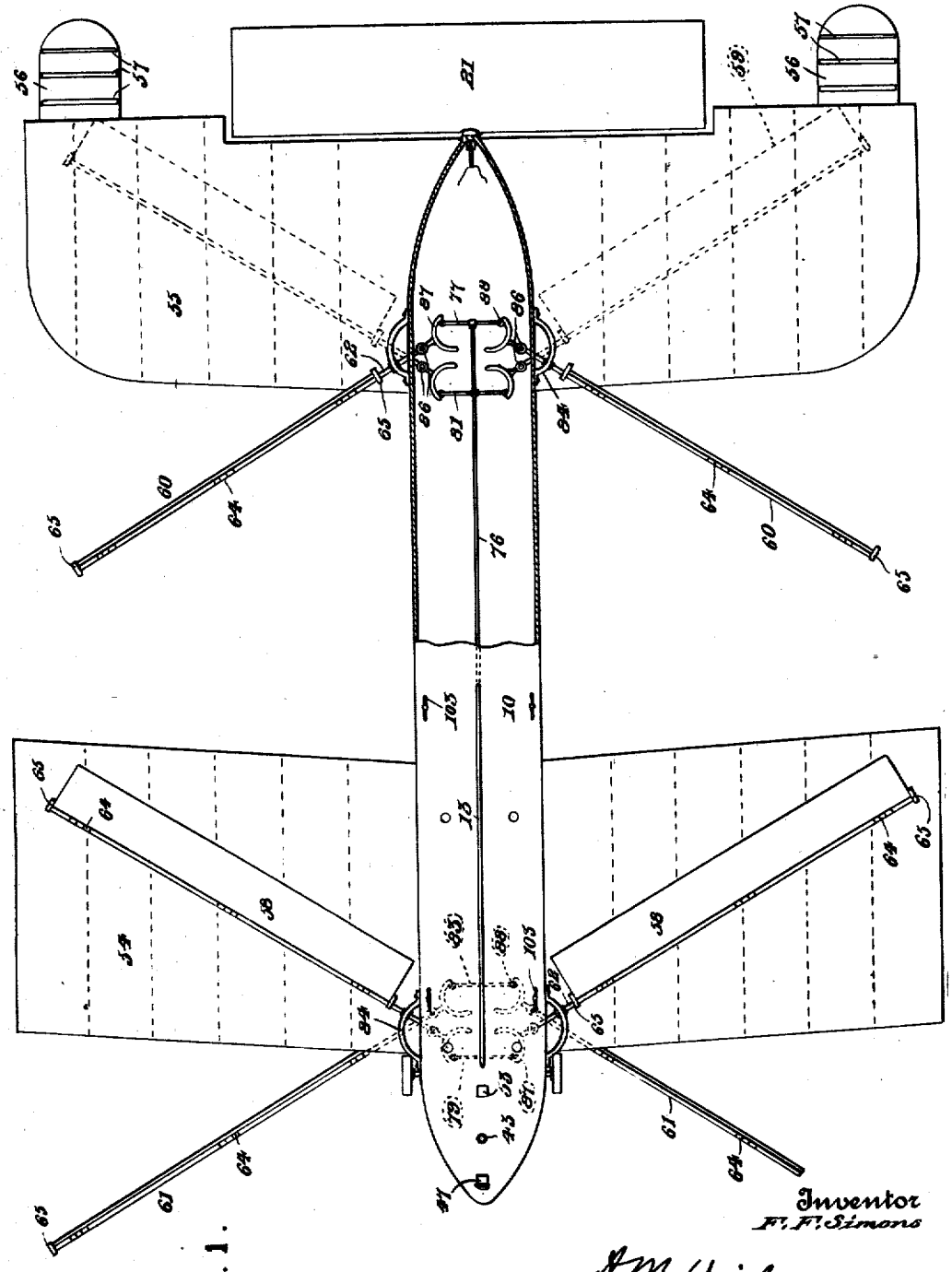


FIG. 1.

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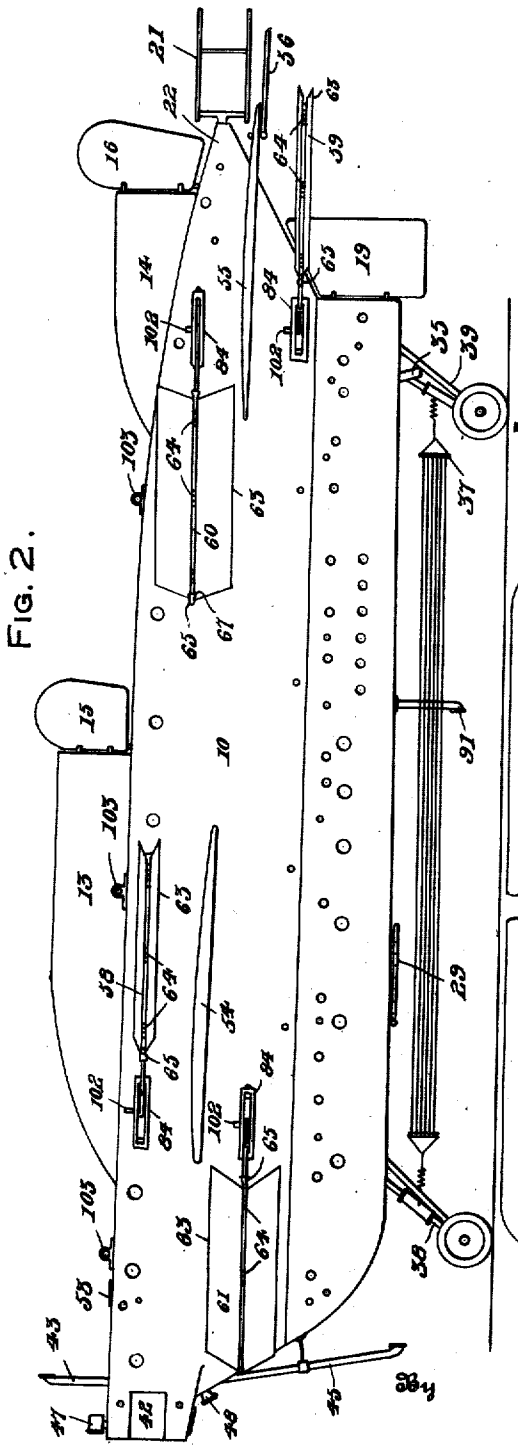


FIG. 2.

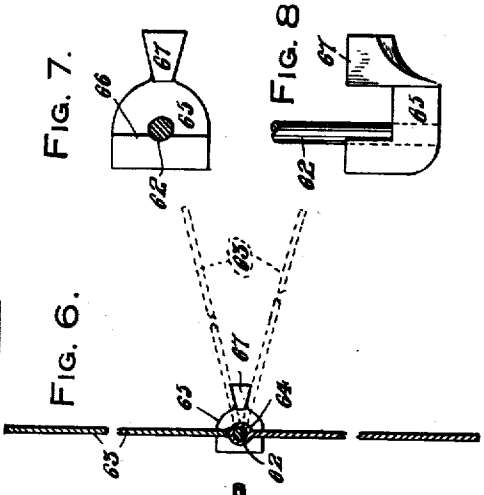


FIG. 7.

FIG. 8.

FIG. 6.

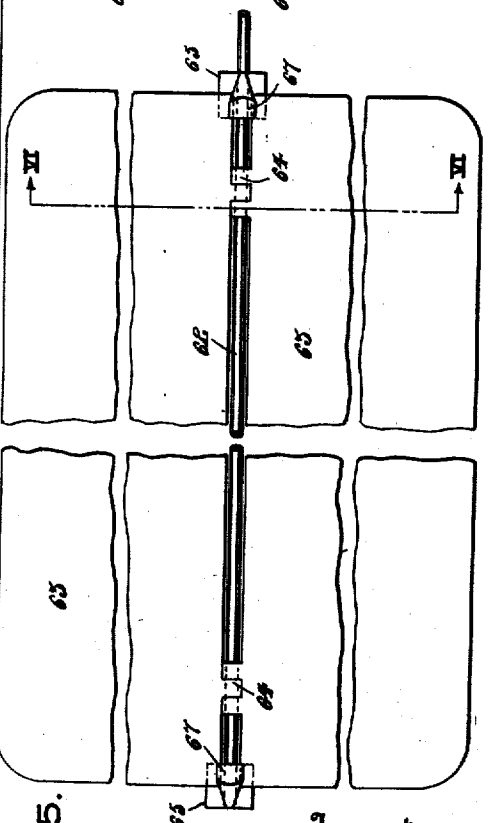


FIG. 5.

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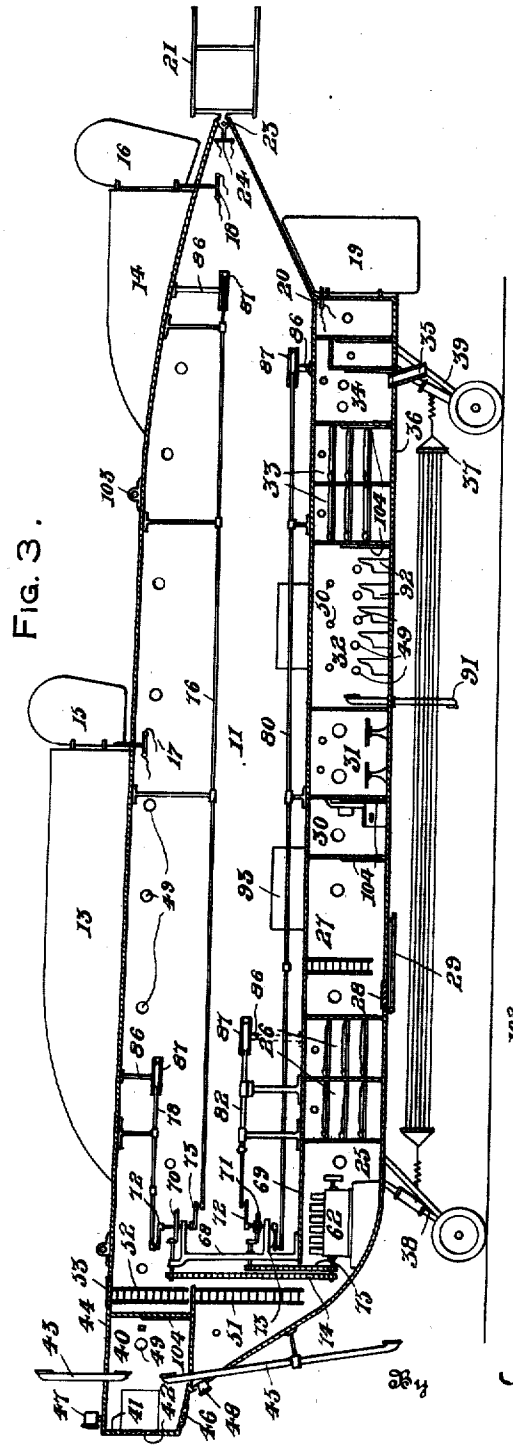


FIG. 3.

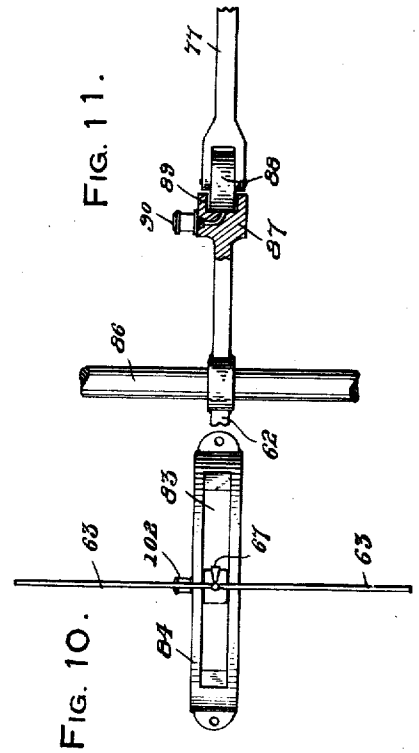


FIG. 11.

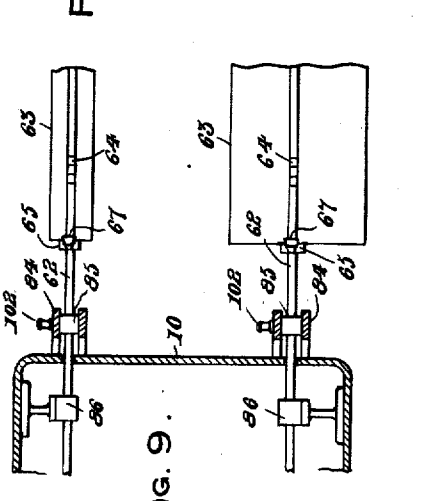


FIG. 10.

FIG. 9.

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5 SHEETS—SHEET 4.

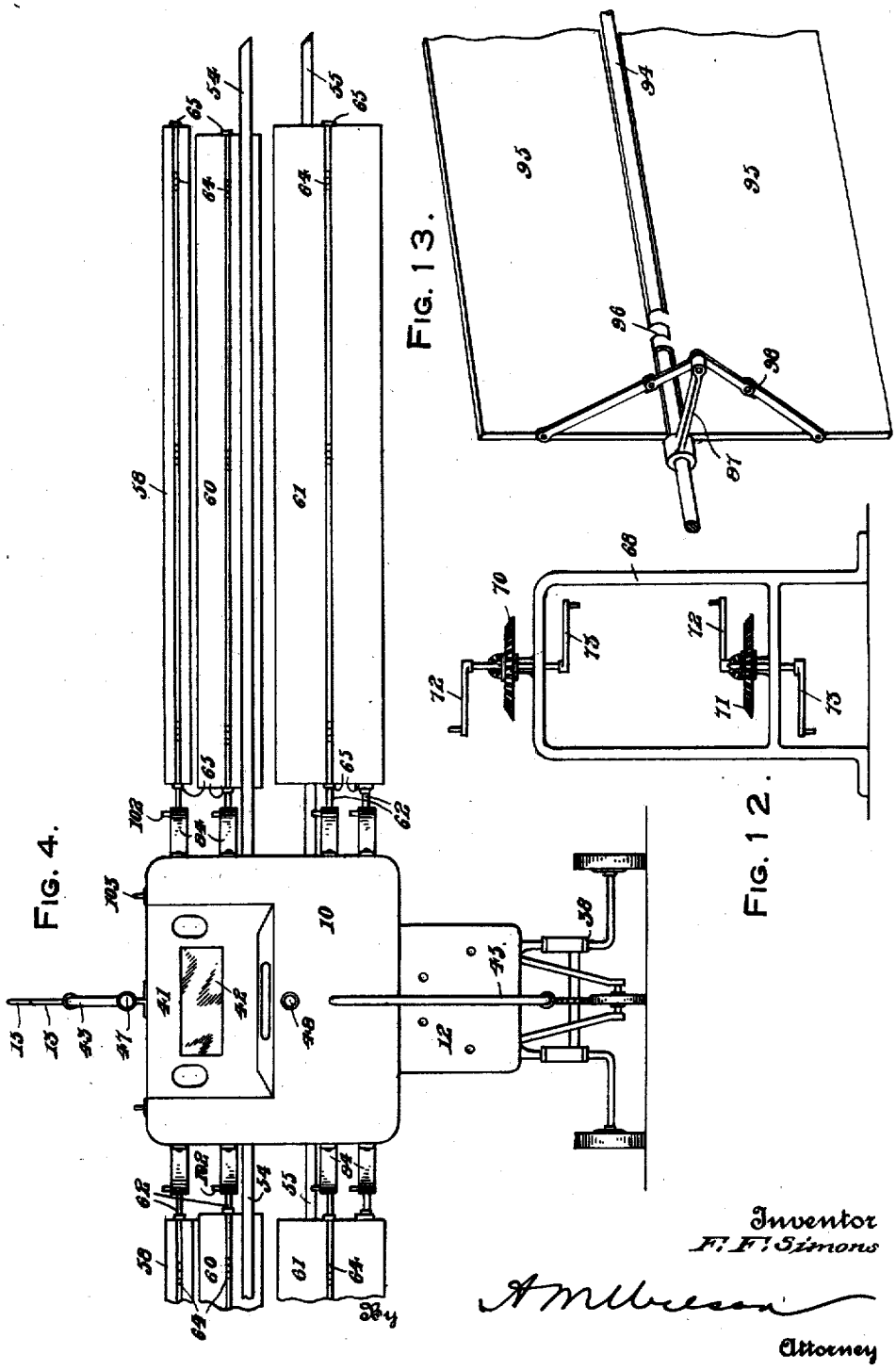


FIG. 4.

FIG. 13.

FIG. 12.

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5 SHEETS—SHEET 5.

FIG. 17.

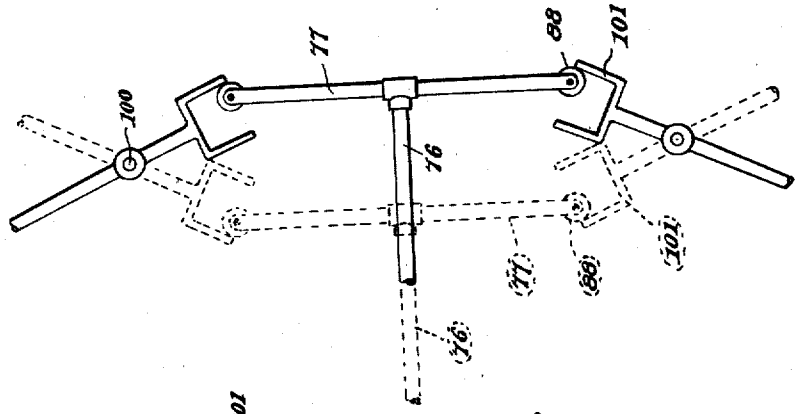


FIG. 16.

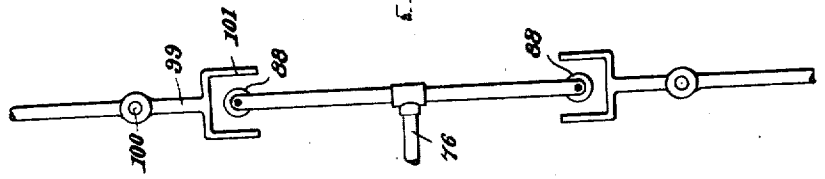


FIG. 15.

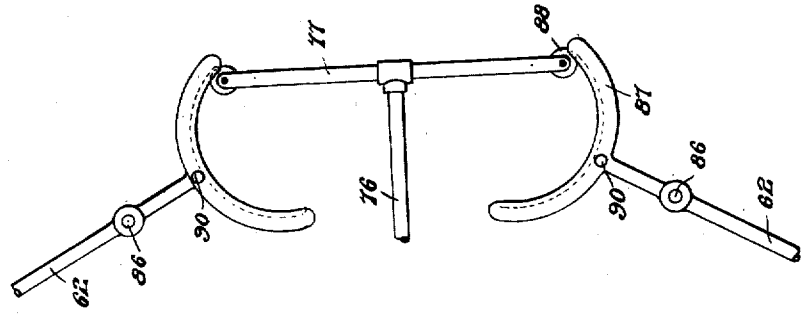
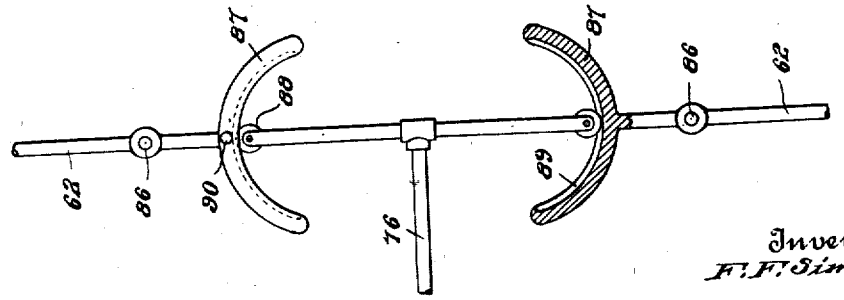


FIG. 14.



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UNITED STATES PATENT OFFICE.

FRANK F. SIMONS, OF HARMONY, PENNSYLVANIA.

FLYING-MACHINE.

1,355,111. Specification of Letters Patent. Patented Oct. 5, 1920.

Application filed December 24, 1918. Serial No. 268,147.

To all whom it may concern:

Be it known that I, FRANK F. SIMONS, a citizen of the United States of America, residing at Harmony, in the county of Butler and State of Pennsylvania, have invented certain new and useful Improvements in Flying-Machines, of which the following is a specification.

The primary object of the invention is the provision of a machine designed to travel through the air to transport passengers, mail and freight or any other purpose, the maintenance of the craft in the air being mainly effected by the powerful propelling means employed.

A further object of the invention is to provide an air-craft of the heavier-than-air type having a great degree of stability and calculated to automatically maintain its lateral balance while flying, the craft being easily guided and possessing great strength as well as simplicity of construction.

A still further object of the invention is to provide an air-craft in which the propulsion through the air assists in maintaining the machine in flight in perfect equilibrium and that the craft may be converted into a bombing or scout plane and suitably armed if desired for use in time of war.

When the craft is employed with a heavy cargo a gas bag may be temporarily attached to the machine providing additional lifting power, the bag to be detached upon discharging the excess cargo.

With these general objects in view it will be understood that the invention broadly belongs to the class of air-craft in which the forward speed alone and a lifting rudder are utilized for maintaining the craft in flight.

In the drawings, forming a part of this application, and in which like reference characters designate corresponding parts throughout the several views,

Figure 1 is a top plan view of my flying machine, partly broken away,

Fig. 2 is a side elevation thereof,

Fig. 3 is a central vertical longitudinal sectional view of the same,

Fig. 4 is a front elevation of the invention, with a side portion thereof broken away,

Fig. 5 is an elevational view of one of the propellers broken away,

Fig. 6 is a vertical sectional view taken upon line VI—VI of Fig. 5,

Fig. 7 is an enlarged view of one of the hub blocks employed with the propeller with the shaft shown in section,

Fig. 8 is a side elevation of the same,

Fig. 9 is a vertical transverse sectional view through a side portion of the hull or fuselage of the machine showing the propeller mounting means,

Fig. 10 is an exterior view of one of the propeller guides illustrating the propeller open,

Fig. 11 is a view partially in section showing one of the operative connections for the propellers,

Fig. 12 is a view of the frame and operating gears,

Fig. 13 is a perspective view of a portion of a modified form of propellers,

Fig. 14 is a view partially in section illustrating the operating connections employed for each pair of propellers,

Fig. 15 is a similar view illustrated with the propellers at one extremity of their movement,

Fig. 16 is a view similar to Fig. 14 of a modified form of operative connection, and

Fig. 17 illustrates the modified form of connection as positioned when the propellers are at their opposite extremities of movement.

Referring more in detail to the drawings, my air-craft comprises a fuselage 10 having a main chamber 11 therein, a reduced lower portion 12 serving as the cabin for the craft. Two fins or keels 13 and 14 are centrally provided upon the top of the fuselage 10 having vertical rudders 15 and 16 respectively pivoted to the rear ends thereof and adapted for operation by suitable shifting means 17 and 18 respectively interiorly of the fuselage 10. Another vertical rudder 19 is centrally pivoted to the rear end of the cabin 12 having operating means 20 within the cabin it being designed to simultaneously shift the rudders 15, 16 and 19 when desired by means of the members 17, 18 and 20. A relatively large horizontal rudder 21 of biplane formation is pivoted to the tapered stern 22 of the fuselage 10 as at 23, shifting means 24 being provided within the chamber 11 for manipulating the rudder 21.

The cabin 12 is provided with an engine-room 25 forwardly positioned therein, state-rooms 26 being provided for the crew adjacent thereto while a freight compartment 27 is provided with a trap-door 28 and a

landing ladder 29. A kitchen 30 is also provided on the cabin as well as a dining room 31 and a passenger parlor 32. State-rooms 33 being next to the parlor while a mail-room 34 next to the state-rooms 33 has a discharge tube 35 for the mail extending through the bottom 36 of the cabin.

A wireless apparatus 37 is suspended between the forward and rear chasses 38 and 39 adapted for supporting the machine when positioned upon the ground, such as during alighting and launching. A forwardly positioned room 40 at the bow 41 of the fuselage 10 is for the accommodation of the captain and pilot, a glass observation front or panel 42 being provided for said bow. A periscope 43 projects through the roof 44 of the fuselage by which the occupants of the pilot-room 40 may take observations rearwardly above the craft while the periscope 45 extends downwardly through the bottom of the fuselage 10 for obtaining observations rearwardly beneath the craft from the pilot-room 40. A glass door-plate 46 is provided in the pilot-room 40 for looking downwardly beneath the craft while suitable searchlights 47 and 48 are carried respectively above and beneath the pilot-room for use in the night-time.

Light-ports 49 are provided in the sides of the fuselage 10 while ventilators 50 are arranged through the sides of the cabin 12. A ladder 51 extends from the engine-room 25 to a point adjacent the pilot-room 40 while an upper ladder 52 reaches to a point adjacent a door 53 in the roof 44.

Oppositely positioned fore and aft aerofoils 54 and 55 respectively, are carried by the fuselage 10 with the forward aerofoils 54 positioned slightly above the level of the rear aerofoils 55. A trailing aileron 56 is shiftably provided adjacent the opposite rear corners of the rear aerofoils 55 being adapted for manipulation either upwardly or downwardly by any suitable means operable within the craft. Transverse openings or slots 57 are provided through the ailerons 56 adapted to engage the air when the ailerons are tilted, thereby offering greater resistance during the travel of the craft through the air and effecting a corresponding change or tilting in the carrying aerofoil 55 for maintaining the normal lateral balance of the air-craft.

Upper and lower sets of four propellers each are carried by the fuselage 10, there being a forward pair of upper propellers 58 adapted for swinging movement simultaneously and in the same direction as the rear pair of propellers 59 forming a part of the lower set of propellers. The rear upper pair of propellers 60 operate simultaneously in the same direction as the lower forward pair of propellers 61 and from this description it will be apparent that as a single motor 62 simultaneously operates all of the propellers, the upper forward pair and lower rearward pair of propellers will be taking their rearward recovery stroke while the forward lower and rearward upper pair of propellers are on their rearward swinging power stroke. The propellers 58, 59, 60 and 61 operate somewhat after the manner of oars whereby the craft is forced with great power through the air controlled mainly by the horizontal rudder 21, the movement of the propellers and the regulation of the speed thereof keeping the craft progressing at the desired elevation. The said propellers are of identical construction, each having a central shaft 62 with blades 63 swingingly hinged thereon as at 64 while hub blocks 65 are mounted upon the shaft 62 at the ends of the blades 63. Shoulders 66 are provided upon each block 65 engaged by the blades 63 when open and acting in the form of stops maintaining the blades 18 vertical during the power stroke of the propeller. During the return stroke of the propeller, the blades 63 fold downwardly toward each other as indicated by dotted lines in Fig. 6 of the drawings and at such times they engage wedge-shaped lugs 67 upon said blocks which prevent the blades 63 from contacting each other. When the propellers have moved rearwardly upon their power strokes, the forward swinging movement thereof forces the blades 63 to their closed position for feathering upon the recovery strokes and when again forced rearwardly, the blades 63 are opened by the engagement of the air therebetween. An A-shaped frame 68 is mounted upon the deck 69 of the cabin 12 provided with upper and lower gears 70 and 71 respectively each having upper and lower cranks 72 and 73. The gears 70 and 72 are operatively connected by sprocket chains 74 and 75 respectively with the aforesaid motor 62, shown in Fig. 3 whereby as will be evident, the operation of the motor 62 causes the simultaneous revolution of the gears 70 and 71 as well as the power cranks thereof. The lower crank 73 of the upper gear 70 is provided with a longitudinally reciprocating shaft 76 having a cross arm 77 at its rear end for operating the upper rear propellers 60. The crank 72 of the upper gear 70 has a reciprocating shaft 78 provided with a cross arm 79 for operating the upper front propellers 58.

In a similar manner the crank 73 of the lower gear 71 operates a reciprocating rod 80 provided with a cross arm 81 at its rear end for forcibly swinging the lower rear propellers 59 backwardly and forwardly. The arm 72 of the lower gear 71 is operatively connected for longitudinally shifting a shaft 82 having a cross arm 83 thereon adapted for moving the lower forward propellers 61 simultaneously and in the oppo-

site direction with respect to the lower rear propellers 59.

The operative connections between the shafts 62 of the propellers and the said cross arms 77, 79, 81 and 83 is best illustrated in Figs. 1, 14 and 15 of the drawings. The propeller shafts 62 extend through slots 83 in arcuate guides 84 secured to the sides of the fuselage 10, squared blocks 85 being secured upon the shafts 62 for sliding in the slot 83 in contact with the opposite sides thereof for preventing the shafts 62 and the propeller blades 63 carried thereby from revolving during the operative shifting movements of the propellers. Each propeller shaft 62 is pivoted as at 86 within the fuselage and is provided with an arcuate head 87 upon its inner end within which the opposite ends of the connecting arms of the reciprocating shafts are adapted to move. A roller 88 is preferably journaled at each end of the arms 71, 79, 81 and 83 bearing in grooves 89 upon the inner faces of the heads 87 while suitable grease-cups 90 are positioned upon the heads communicating with said grooves. During the reciprocation of the rods 76, 78, 80 and 82, the cross heads 77, 79, 81 and 83 respectively will be alternately moved within the oppositely positioned heads 87 and the propeller shafts 62 rocked or swung thereby upon their pivots 86. The swinging forward movement of the upper forward pair of propellers 58 and the lower rear pair of propellers 59 causes them to close or feather. Such movement being the idle return movement thereof while simultaneous with such movement, the forward lower propellers 61 and the rearward upper propellers 60 move rearwardly simultaneous in their open positions forcing the craft forwardly upon its travel. In this manner the air-craft is continuously moved forwardly with powerful strokes controlled in its vertical direction by the horizontal rudder 21 while the aerofoils 54 and 55 serve mainly as horizontal keels although assisting to support the craft in the air and the vertical keels 13 and 14 assist in maintaining equilibrium while lateral steering is made possible by the rudders 15, 16 and 19.

The sweep of the propellers as herein illustrated is in four different planes substantially parallel with the bottom 36 of the fuselage 10 but it will be noted that the planes of movement of any or all of the propellers may be inclined whereby a forward upward impulse will be imparted to the craft during the operation of the propellers. With such an arrangement, the propellers 58, 59, 60 and 61 will serve all the more serviceably in supporting and sustaining the craft in the air during flight assisted by the double rudder 21 as well as the aerofoils 54 and 55.

A periscope 91 extends through the bottom 36 of the fuselage into the parlor 32, whereby the passengers upon the seats 92 may view the landscape over which the craft is traveling, the periscope being arranged for presenting the same after the nature of a panorama or moving picture.

All accomodations that may be desired are provided upon the craft including additional storage tanks 93 for fuel and provisions while stores of any nature may be carried in the chamber 11.

A modified form of wing construction is illustrated in Fig. 13 of the drawings consisting of a central shaft 94 with wings 95 hinged thereto as at 96 while a post 97 secured to the shaft 94 is connected to the adjacent edges of the wings 95 by means of pivoted links 98. By this arrangement, the wings 95 will be positioned as illustrated in Fig. 13 during the rearward power stroke of the shaft 94, the links 98 and post 97 retaining the wings in their outstretched positions. During the return forward movement of the propeller, the wings 95 will be permitted to automatically close by the pressure of the air exerted thereon. A modified form of connections between the propellers and the cross arms 77, 79, 81 and 83 is illustrated in Figs. 16 and 17 of the drawings. The propeller shafts 99 are pivoted as at 100 and are provided with U-shaped heads 101 for engagement by the rollers 88 of the said heads, the heads 77 upon the shaft 76 being illustrated by way of example. It will be seen that the reciprocations of the shaft 76 and head 77 will swing the propeller shafts 99 upon the pivot 100.

Grease-cups 102 may be provided upon the guards 84 if desired for lubricating the blocks 85.

Rings 103 upon the roof 44 of the fuselage 10 may be employed for attaching a gas bag or balloon to the fuselage 10 for supporting any excess cargo placed within the craft, it being understood that a supporting balloon is ordinarily unnecessary but in the event of an excess cargo, the balloon may be temporarily employed and removed at any station where the excess cargo is discharged. Suitable link connections may be substituted if desired for the arm and head connections illustrated in Figs. 14, 15, 16 and 17 for the propeller. The pilot in the pilot-room 40 can take observations in all directions by means of the periscopes 43 and 45, the window 42, bottom plate 46 and side ports 49 so as to accurately steer the craft when propelled by the propellers 55, 58, 60 and 61, the vertical rudders 15, 16, and 19 adapted for simultaneous operation serving to control the lateral movements of the craft while the horizontal rudder 21 shifted by the operating means 24

controls the vertical movements thereof. Suitable doors 104 may be provided between the different rooms or sections in the cabin 12. The occupants of the craft may enter and leave the same by means of the ladder 29 and the door 38 in the bottom of the fuselage and may also ascend to the roof 44 if desired by passing through the engine-room 25 and up the ladders 51 and 52.

My craft may carry passengers great distances well accommodated in the cabin 12 while the transportation of mail and other commodities may be accomplished, the same being discharged through the tube 35 without stopping the airship if found desirable.

What I claim as new is:—

1. An air-craft comprising a fuselage, spaced vertical fins centrally carried by the roof thereof, a swinging rudder at the rear of each fin and also at a point adjacent the bottom of the fuselage adapted to be operated from a point within the fuselage and a biplane form of horizontal rudder operatively mounted at the stern of the fuselage.

2. An air-craft comprising a fuselage, spaced vertical fins centrally carried by the roof thereof, a swinging rudder at the rear of each fin and also at a point adjacent the bottom of the fuselage adapted to be operated from a point within the fuselage, a biplane form of horizontal rudder operatively mounted at the stern of the fuselage, fore and aft aerofoils projecting from the fuselage in different horizontal planes and four pairs of oar-propellers swingingly carried at the sides of the fuselage having paths of movement forwardly and rearwardly in different horizontal planes, two alternate pairs of said propellers being adapted for operation simultaneously.

3. An air-craft comprising a fuselage having a contracted lower cabin portion and a pilot-room at the bow of the craft, a forwardly positioned glass window and a glass bottom plate for the pilot-room, spaced vertical fins centrally positioned upon the roof of the fuselage, a vertical rudder hinged at the rear of the cabin portion beneath the stern of the craft, a vertical rudder pivoted to the rear end of each of said fins adapted to be operated from within the fuselage and oar-like propellers at opposite sides of the fuselage.

4. An air-craft comprising a fuselage having a contracted lower cabin portion and a pilot-room at the bow of the craft, a forwardly positioned glass window and a glass bottom plate for the pilot-room, spaced vertical fins centrally positioned upon the roof of the fuselage, a vertical rudder hinged at the rear of the cabin portion beneath the stern of the craft, a vertical rudder pivoted to the rear end of each of said keels adapted to be operated from within the fuselage, a double horizontal rudder pivoted to the stern of the fuselage adapted for manipulation from a point therein, fore and aft aerofoils projecting in different horizontal planes from the opposite sides of the fuselage and propellers above and below each of said aerofoils adapted for simultaneous operation in opposite directions.

5. An air-craft comprising a fuselage having a contracted lower cabin portion and a pilot-room at the bow of the craft, a forwardly positioned glass window and a glass bottom plate for the pilot-room, spaced vertical fins centrally positioned upon the roof of the fuselage, a vertical rudder hinged at the rear of the cabin portion beneath the stern of the craft, a vertical rudder pivoted to the rear end of each of said fins adapted to be operated from within the fuselage, a double horizontal rudder pivoted to the stern of the fuselage adapted for manipulation from a point therein, fore and aft aerofoils projecting in different horizontal planes from the opposite sides of the fuselage, propellers oppositely positioned above each of said aerofoils with the propellers at one side of the fuselage adapted for simultaneous operation in opposite directions, similar propellers oppositely positioned beneath each of said aerofoils adapted for opposite simultaneous operation at each side of the craft and motor means within the fuselage operatively connected to all of said propellers.

6. An air-craft comprising a fuselage, propeller shafts pivoted within the fuselage projecting outwardly through the sides thereof adapted for swinging movement forwardly and rearwardly of the craft, blades hinged to said shafts, blocks upon said shafts adapted for limiting the swinging movements of the blades whereby the blades will be vertically positioned during the rearward power strokes of the propellers, spacing lugs upon said blocks adapted for contact by said blades during the forward recovery stroke of the propellers whereby the blades are prevented from closing contact with each other for engaging the air and automatically opening upon the reverse rearward movement of the propeller shafts, guides carried upon the inner end of said shafts, and reciprocating means within the fuselage engaging said guides alternately to swing the shafts in opposite directions.

7. An air-craft comprising a fuselage, propeller shafts pivoted within the fuselage projecting outwardly through the sides thereof adapted for swinging movement forwardly and rearwardly of the craft, blades hinged to said shafts, blocks upon said shafts adapted for limiting the swinging movements of the blades whereby the blades will be vertically positioned during the rearward power strokes of the propellers, spacing lugs upon said blocks adapted for contact by said

blades during the forward recovery stroke of the propellers whereby the blades are prevented from closing contact with each other for engaging the air and automatically opening upon the reverse rearward movement of the propeller shafts, arcuate heads upon the inner ends of said shafts, reciprocating rods longitudinally positioned within the fuselage, cross arms upon said rods with the opposite ends of said arms anti-frictionally engaging within said heads whereby the heads and shafts are adapted for to and fro swinging movements.

8. An air-craft comprising a fuselage, propeller shafts pivoted within the fuselage projecting outwardly through the sides thereof adapted for swinging movement forwardly and rearwardly of the craft, blades hinged to said shafts, blocks upon said shafts adapted for limiting the swinging movements of the blades whereby the blades will be vertically positioned during the rearward power strokes of the propellers, spacing lugs upon said blocks adapted for contact by said blades during the forward recovery stroke of the propellers whereby the blades are prevented from closing contact with each other for engaging the air and automatically opening upon the reverse rearward movement of the propeller shafts, arcuate heads upon the inner ends of said shafts, reciprocating rods longitudinally positioned within the fuselage, cross arms upon said rods with the opposite ends of said arms anti-frictionally engaging within said heads whereby the arms and shafts are adapted for to and fro swinging movements, a propelling motor within the fuselage operatively connected to the said rods, arcuate guides outwardly of the fuselage having slots through which said propeller shafts extend and guide blocks secured to said shafts slidably positioned within said slots.

In testimony whereof I affix my signature.

FRANK F. SIMONS.