J. R. FROBERG.

AERIAL MACHINE.

APPLICATION FILED NOV. 15, 1910.

1,012,836.

Patented Dec. 26, 1911.

2 SHEETS—SHEET 1.

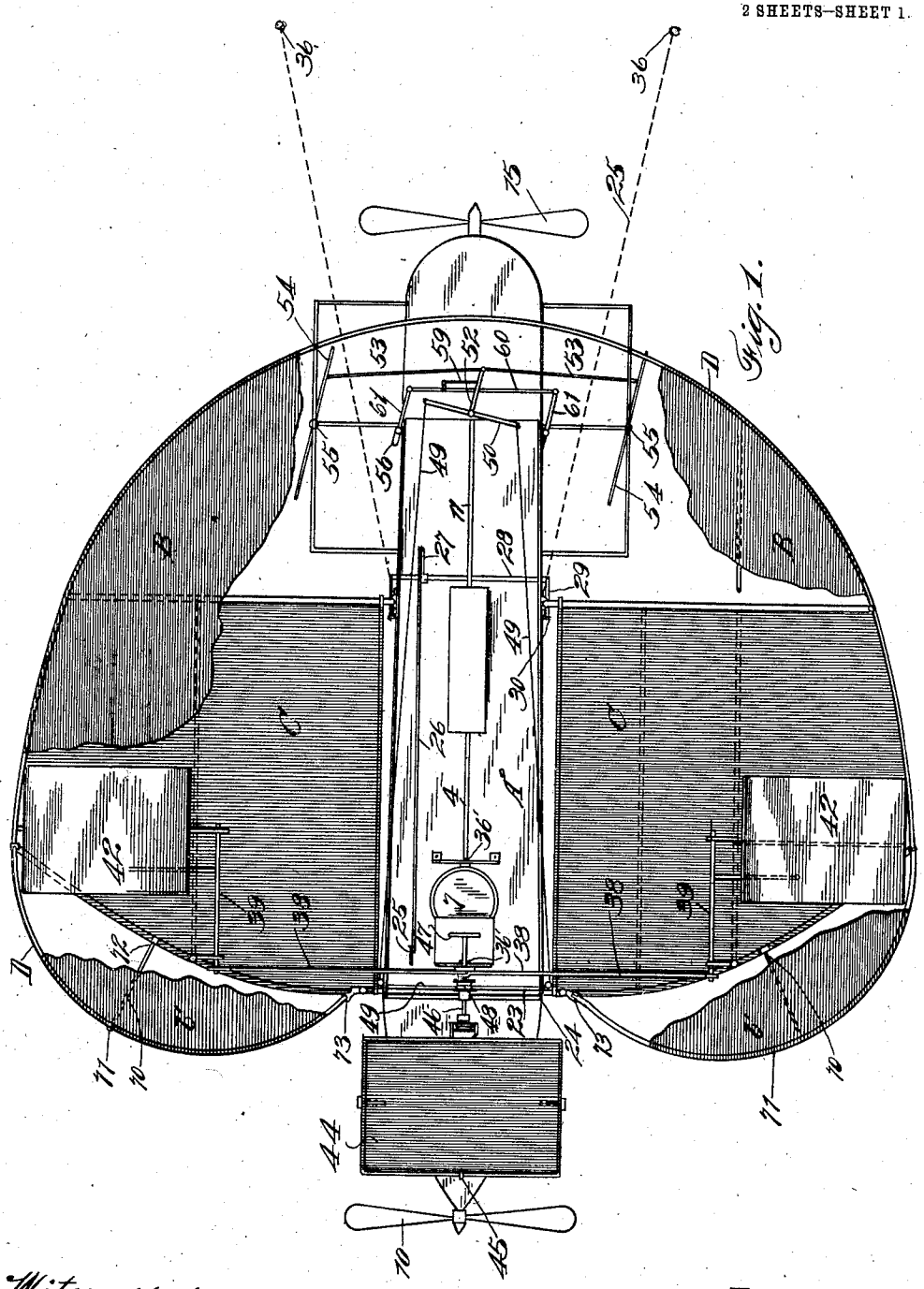

Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 2.

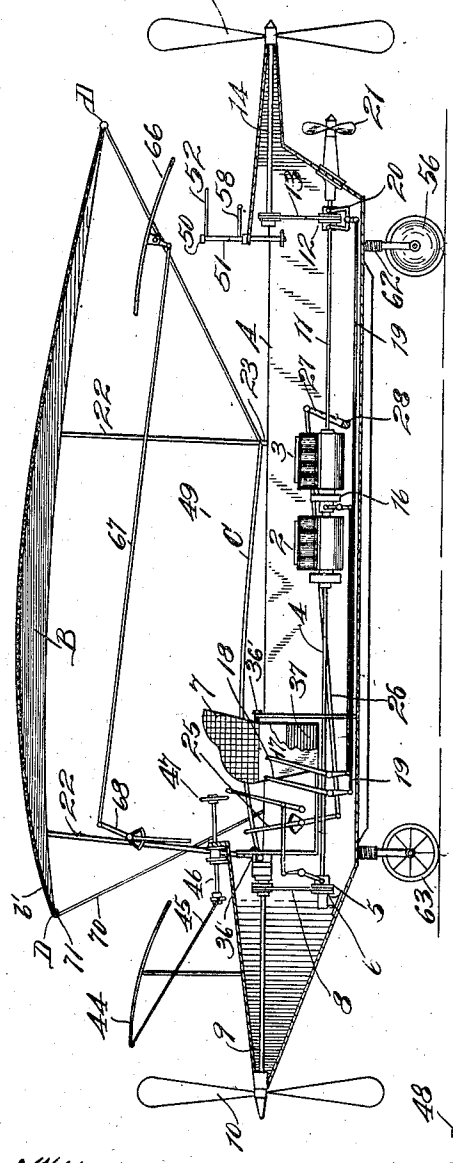


Fig. 3.

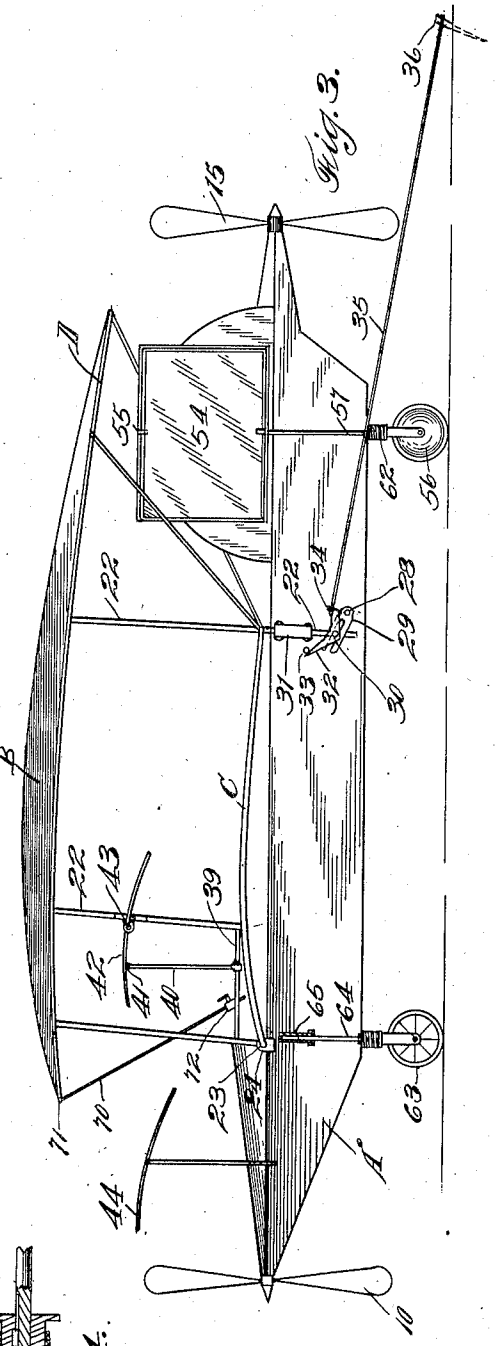
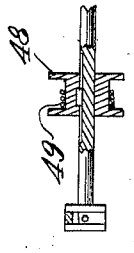


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHAN RICHARD FROBERG, OF RICHMOND, CALIFORNIA, ASSIGNOR TO THE FROBERG AEROPLANE CO., OF RICHMOND, CALIFORNIA, A CORPORATION OF CALIFORNIA.

AERIAL MACHINE.

1,012,836. Specification of Letters Patent. Patented Dec. 26, 1911.

Application filed November 15, 1910. Serial No. 592,443.

To all whom it may concern:

Be it known that I, JOHAN RICHARD FROBERG, citizen of the United States, residing at Richmond, in the county of Contra Costa and State of California, have invented new and useful Improvements in Aerial Machines, of which the following is a specification.

This invention relates to aerial machines and particularly to aeroplanes of the biplane type.

The object of this invention is to provide an aeroplane involving an upper, shield-shaped main supporting plane of substantially continuous area, and a pair of side planes, all of which planes are mounted for uniform adjustment relative to the body of the machine; means whereby the stabilizing planes are automatically actuated to accomplish the equipoise of the machine; to provide in combination with the aeroplanes a suitable body so designed as to be capable of floating in water; to provide means for propelling the boat-shaped body through the water and through the air; and to provide means whereby the airship may be restrained and manually released when the propelling blades have attained an effective velocity.

Other objects and purposes of the invention will be made manifest in the following description.

The invention consists of the parts and the construction and combination of parts, as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a plan view of the aeroplane, in which view the uppermost plane is largely broken away to show the body of the machine and the lateral projecting side planes. Fig. 2 is a central, longitudinal, vertical section through the aeroplane, omitting the vertical steering rudder. Fig. 3 is a side elevation of the apparatus omitting a few of the parts for the purpose of more clearly showing the vertical steering rudders and the stabilizing planes. Fig 4 is a detail sectional view of the device for actuating the forward elevating rudder.

In the present embodiment of my invention A represents a boat-shaped body or car of the apparatus, within which is mounted a pair of engines 2—3; the forward engine 2 being provided with a shaft 4 which runs to the fore end of the boat or body and is provided with a suitable friction clutch 5, whereby a driving pulley 6 may be engaged or disengaged by the aviator, who occupies a position in the car in the chair 7. Power is transmitted from the shaft 4 through the driving wheel 6 by means of a suitable device, as the belt or chain 8, to the upper shaft 9, upon the outer end of which is secured an appropriate propeller 10.

The rear engine 3 is provided with a shaft 11 mounted in suitable journals, and upon which shaft is mounted a driving pulley 12 from which power may be transmitted through a belt or chain 13 to the shafts 14 at the rear of the body of the apparatus and upon which is mounted a propeller 15.

The shafts 4—11 are normally uncoupled and each is driven by its respective engine, but upon necessity the shaft may be coupled through means of a suitable friction clutch, as indicated at 16, so that in the event of one of the engines becoming disabled, the other engine may be used to drive either the fore propeller 10 or the aft propeller 15.

A suitable hand lever 17 is positioned near the aviator's chair 7 so that he can actuate the clutch 16, and there is also provided in the same location another hand lever 18 connected to the rod 19, which runs to the rear end of the ship and is connected to the rocking lever 20, so as to engage and disengage one or the other side of the transmission pulley 12.

At the lower rear end of the body or boat A is mounted a water propeller 21, which may be coupled by the rocking lever 20 to the shaft 11 in the event the aeroplane sinks to the water level, and by means of the propeller 21 the boat may still be driven.

During the flight of the apparatus it is supported upon superposed aeroplanes, as B and C. The plane B is clearly shown in Fig. 1 as being substantially shield-shaped in outline and extends from a point near the forward end of the boat or body to the rear and is securely fastened upon a suitable frame or skeleton structure D, which is connected to the lower transversely projecting side planes C by means of a plurality of suitable vertical stanchions 22. In order to control the angle of incidence of the main supporting planes D and C, one of the bars 23 is continued transversely across the boat A and is pivotally mounted in suitable bearings 24, and the skeleton structure D—C

with its connected fabrics forms the aeroplane. The adjustment of the planes about the pivot bar 24 is accomplished by means of a suitable hand lever 25, which is fulcrumed adjacent to the aviator's chair 7 and connected by the link 26 to a crank arm 27 which is fastened upon a rocker shaft 28 transversely extending across the boat, and having fastened upon its outer ends slotted levers 29. The levers 29 embrace projections or pins 30, which are securely fastened to a pair of stanchions 22 which are guided through suitable bearings 31 secured upon the vertical sides of the boat. Loosely pivoted upon the pins 30 on each side of the boat is a curved lever 32, one end of which is adapted to swing up into abutment with fixed stops 33 secured upon the outer sides of the boat. The other arm of the lever 30 is provided with a hook 34 over which may be passed the ends of restraining cables 35 which, as shown in Figs. 1 and 3, are run back from the apparatus and secured to stakes 36 driven in the ground.

In operation, the aviator, without any assistance, may start the aeroplane in full flight from a standing position. This is accomplished by throwing the lever 25 forward rocking the shaft 28; thus, by means of the levers 29 lifting the skeleton aeroplane by means of the long downwardly projecting stanchions 22. In this position of the parts the angle of incidence of the aeroplane to the body of the ship is at its minimum of resistance and the operator, starting either of the engines 2 or 3 and coupling either of the propellers 10 or 15, holds the lever 25 until the velocity of the propeller which is being driven is sufficient to almost instantly lift the apparatus from the ground when released. Usually for machines of this character to rise from the ground, they are restrained during the starting operations of the engines or engine by a number of helpers, who grasp convenient portions of the machine and forcibly hold the car against movement until the velocity of the propellers is sufficient to rapidly move the machine. In my invention the aviator takes his position in the seat, starts the engine, and by pulling on the lever 25 rocks the shaft 28 so as to lower the stanchions 22, thus increasing the angle of incidence of the aeroplanes and simultaneously releasing arm 32 from engagement with the stop 33 and allowing the hook 34 to swing below the center of the pin 30, releases the car from the restraint of the guy ropes 35, when the car will immediately begin its flight.

An important feature of my invention is in providing for the automatic stabilizing of the apparatus and this is accomplished by mounting the chair 7 upon pivots 36′ and suitably weighting the lower part of the chair, as at 37, so that the chair may have an independent oscillating motion transversely and relatively to the boat A. As shown in Figs. 1 and 3, the chair 7 is connected by transversely extending links 38 to rocking shafts 39 suitably supported in the skeleton D—C, and to each of the rocker shafts is connected a link 40, the upper end of which is pivoted at 41 to suitably proportioned and curved horizontal stabilizing planes 42, which are fulcrumed at 43 upon convenient stanchions 22. By means of this connection between the oscillating chair 7 and the pivotal planes 42, when the machine tilts to one side or the other, motion is transmitted through the several connecting links 38—40 to oppositely and simultaneously vary the angle which each of the planes 42 bears relatively to the apparatus; thus when one side of the apparatus tilts downwardly its relative aeroplane 42 will be tilted to increase its angle of resistance and tend to naturally and automatically stabilize or balance the apparatus.

For the purpose of controlling the angle of flight and the ascent or descent of the apparatus, a horizontal rudder 44 is mounted on the fore end of the ship and connected by a link 45 to a reciprocal shaft 46 mounted in front of the chair 7 of the body and provided with a suitable hand wheel 47. By longitudinally moving the shaft 46, the angle of inclination of the horizontal rudder 44 may be controlled by the operator, and by turning the shaft 46 upon its axis the operator tightens or loosens by means of the drum 48 a cable 49 which is connected at its ends to the transverse tiller 50 mounted upon the upper end of the rocker shaft 51 and to which is secured a rocker arm 52 connected by links 53 to vertically fulcrumed guiding planes 54, which swing in parallelism about other fulcrums 55 when the operator turns the hand wheel 47, thus actuating the tiller 50. Simultaneously with the operation of the tiller shaft 51, rear wheels 56, which are mounted in the lower forked ends of spindles 57, are likewise turned in parallelism and uniformly with the planes 54. By reason of the movement of a crank arm 58, which is secured to the tiller shaft 51 and from which crank 58 a connection, as 59, is made to the link 60, which is connected to the arm 61 formed upon the upper end of the wheel bearing spindles 57, the wheels may be turned. These rear wheels 56 may be substantially solid so as to present surfaces which may be utilized as steering rudders when the boat is afloat in water. Each of the rear wheels 56 is supported upon a resilient cushion member, as springs 62. Also are provided forward ground wheels 63 mounted on the lower ends of spindles 64, the upper ends of which operate in air cushions or dash pots 65. The purpose of resiliently mounting these

ground wheels 56—63 is to insure the safe and easy alighting of the apparatus upon the ground.

An auxiliary lifting plane 66 is pivoted adjacent to the rear of the boat and connected by a link 67 to a lever 68 fulcrumed upon the forward stanchions 22, and the angle of the auxiliary lifting plane 66 may be adjusted properly to compensate for variations in the weight of the apparatus.

An important feature of this invention is the provision of means whereby the forwardly extending curvilinear lobes or lips b' of the shield-shaped upper aeroplane B may be independently adjusted in their angular relation to the main plane B, as may be desired. This adjustment of these forwardly projecting lips or lobes b' is accomplished by means of suitable rods 70 which are connected at the upper tips 71 and which are longitudinally movable in a suitable bearing 72 secured to the boat A. The frame-work of the lobes may be sufficiently flexible to permit of this relative angular bending, or they may be hinged, as at 73, to the main frame of the aeroplane. It is not necessary to frequently adjust these planes. They are adjusted as condition requires, due to the changing of the balance of load in the boat A or any other cause which would necessitate the adjustment of the angles of the plane.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. In an aerial apparatus, upper and lower supporting planes, connections between said planes, a transverse member forming a pivot upon which the planes may be adjusted, bearings for said pivot, a car or body in which the bearings are mounted, and means whereby the angle of the connected superposed aeroplanes may be uniformly adjusted relative to the body, said means including a lever, a rocker shaft having a crank arm, a link connected to said arm, and slotted levers on the outer ends of said rocker shaft, and vertically guided stanchions engaged by said slotted levers and connected to the planes.

2. In an aerial apparatus, upper and lower supporting planes, connections between said planes, a transverse member forming a pivot upon which the planes may be adjusted, bearings for said pivot, a car or body in which the bearings are mounted, means whereby the angle of the connected superposed aeroplanes may be uniformly adjusted relative to the body, means adapted to anchor the apparatus until the angle of incidence of the supporting planes has been adjusted, and means for releasing the anchoring means, said last named means being simultaneously operated by the means for adjusting the angle of the planes.

3. In an aerial apparatus, upper and lower supporting planes, connections between said planes, a transverse member forming a pivot upon which the planes may be adjusted, bearings for said pivot, a car or body in which the bearings are mounted, means whereby the angle of the connected superposed aeroplanes may be uniformly adjusted relative to the body, other means adapted to prevent propulsion of the apparatus until the angle of incidence of the supporting planes has been adjusted, said last named means including latches mounted on the frame of the aeroplanes, a stop to limit the movement of the latches until the frame has moved, and temporary restraining devices attached to the latch at one end and secured to a permanent body at the other end.

4. The combination in an aerial apparatus, of a plurality of superposed supporting planes, the uppermost of which are of considerably greater area than the lower planes, connections whereby the upper and lower planes are rigidly united, a suitable body or boat, a transverse bar journaled in the boat and about which the aeroplanes may be moved, a pair of stabilizing planes of suitable area mounted between the superposed planes and at their transverse extremities, a pivoted transversely oscillating chair in said body or boat, and connections between said chair and the stabilizing planes whereby the latter are automatically actuated by the oscillations of the chair relative to the boat, said last named means including transversely extending links, rocking shafts connected therewith, and other links connected to the shafts and to the stabilizing planes.

5. In an aerial apparatus, a main, cordate, supporting plane, horizontal, lateral sub-planes extending as wide as the main plane, adjustable, forward, arcuate lobes on the main plane, and ailerons mounted between the main and the sub-planes.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JOHAN RICHARD FROBERG.

Witnesses:

C. J. GERAGHTY,

ELLEN PENALIS.