

G. H. CURTISS.
CONTROLLING MECHANISM FOR FLYING MACHINES AND THE LIKE.

APPLICATION FILED SEPT. 6, 1912.

1,085,575.

Patented Jan. 27, 1914.

3 SHEETS—SHEET 1.

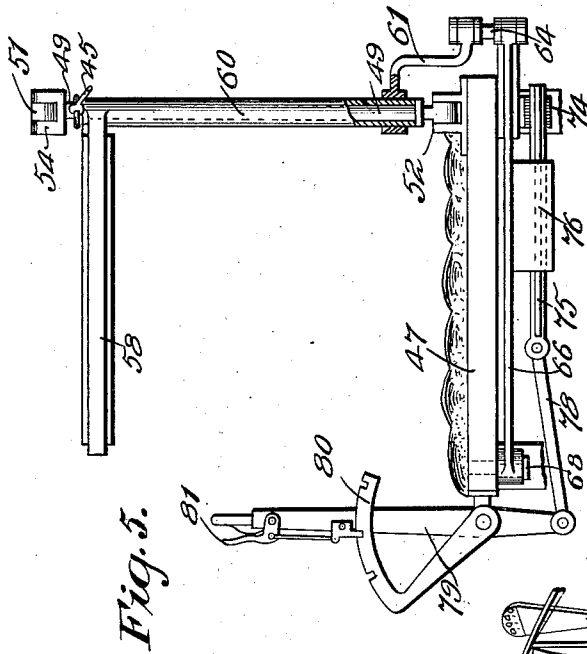


Fig. 5.

Fig. 1.

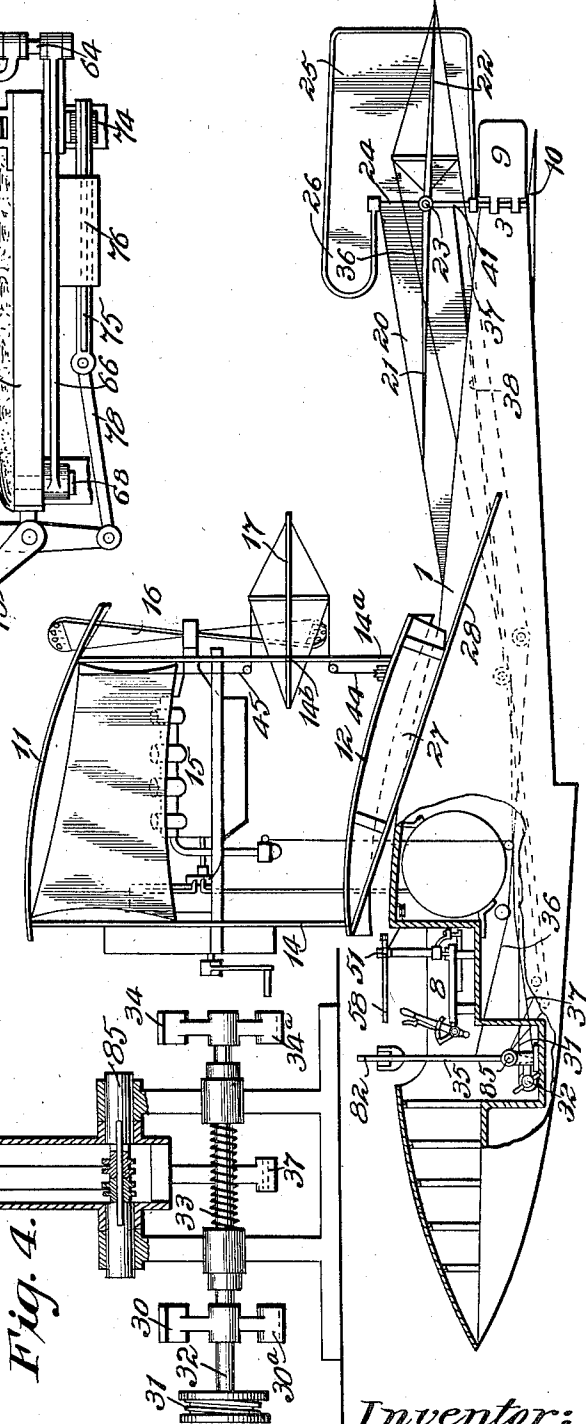
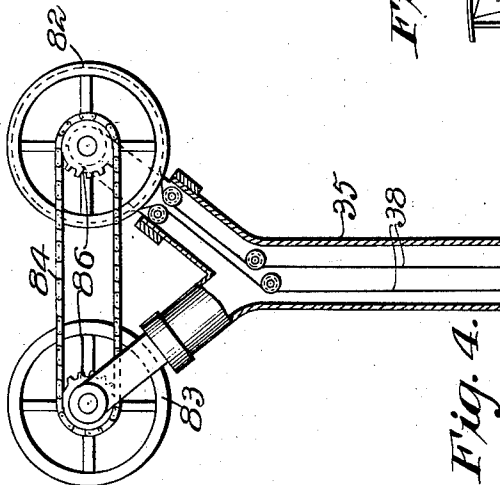


Fig. 4.



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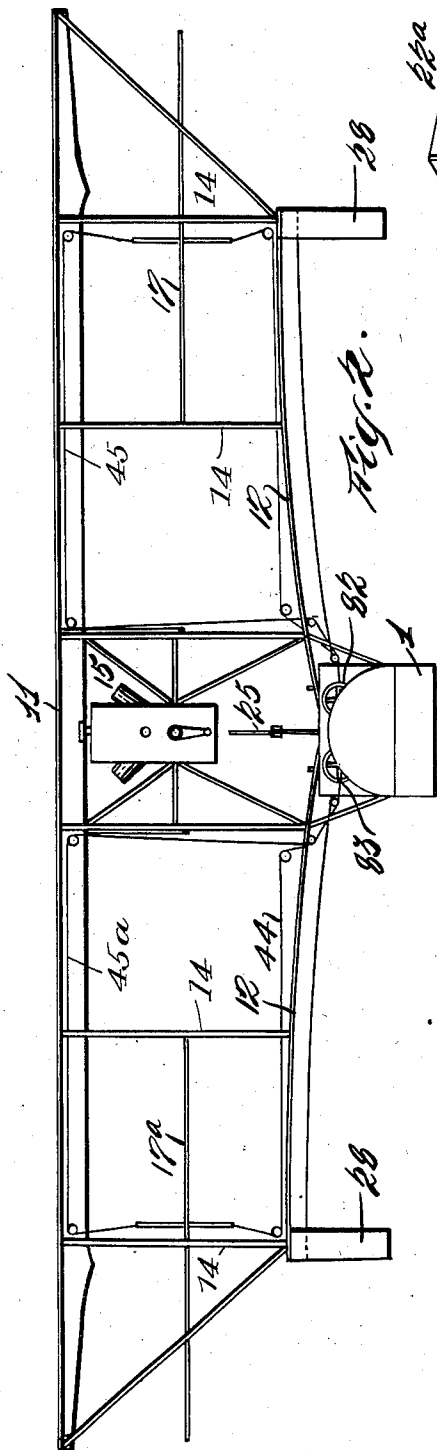


Fig. 2.

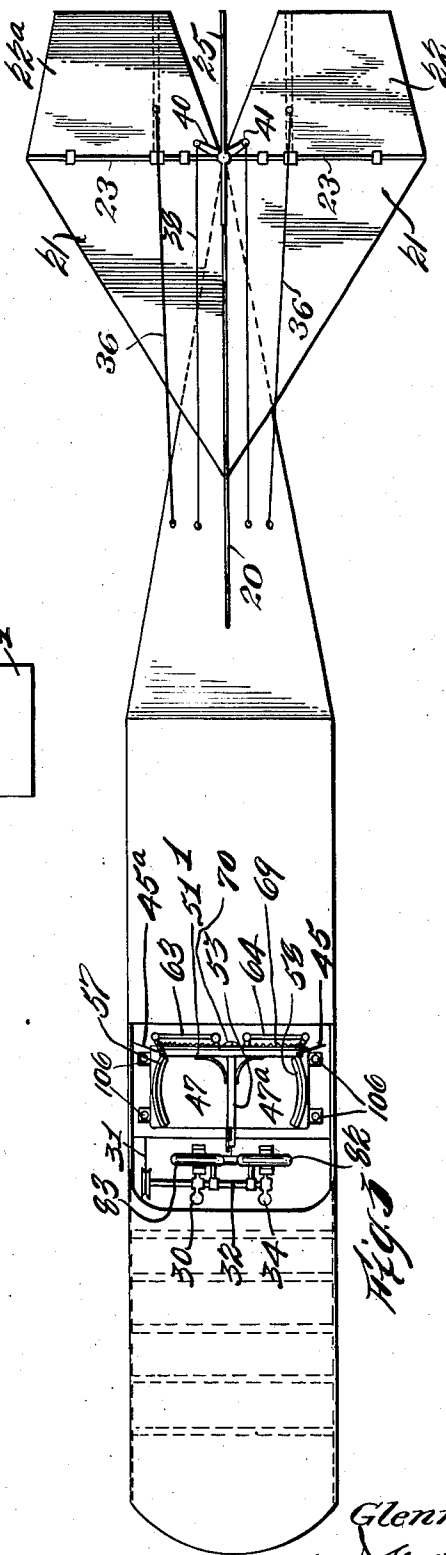


Fig. 3.

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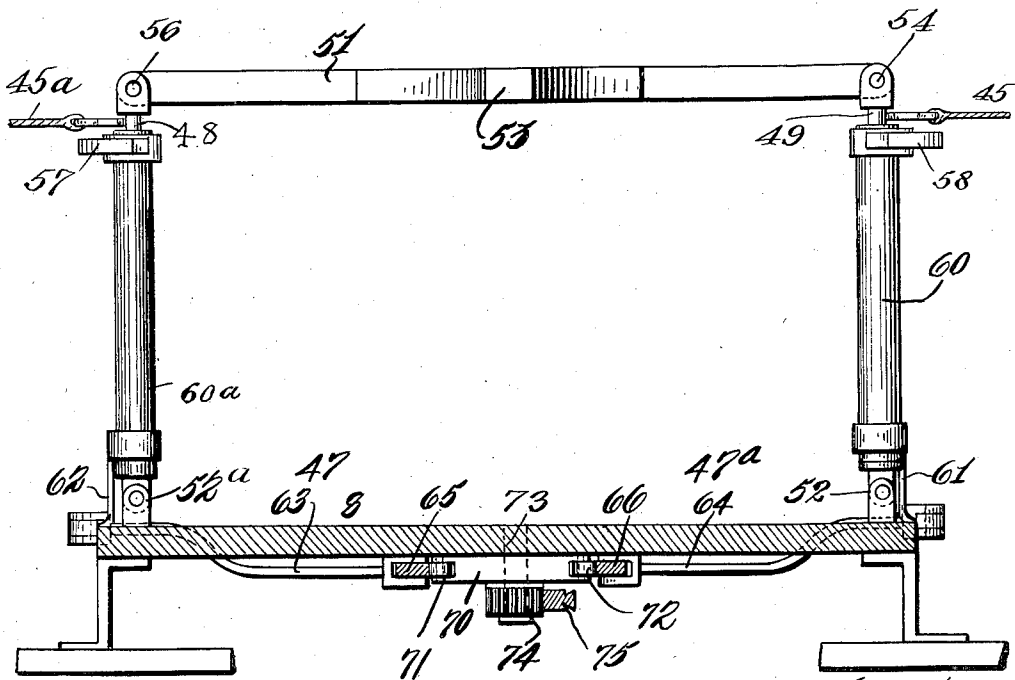
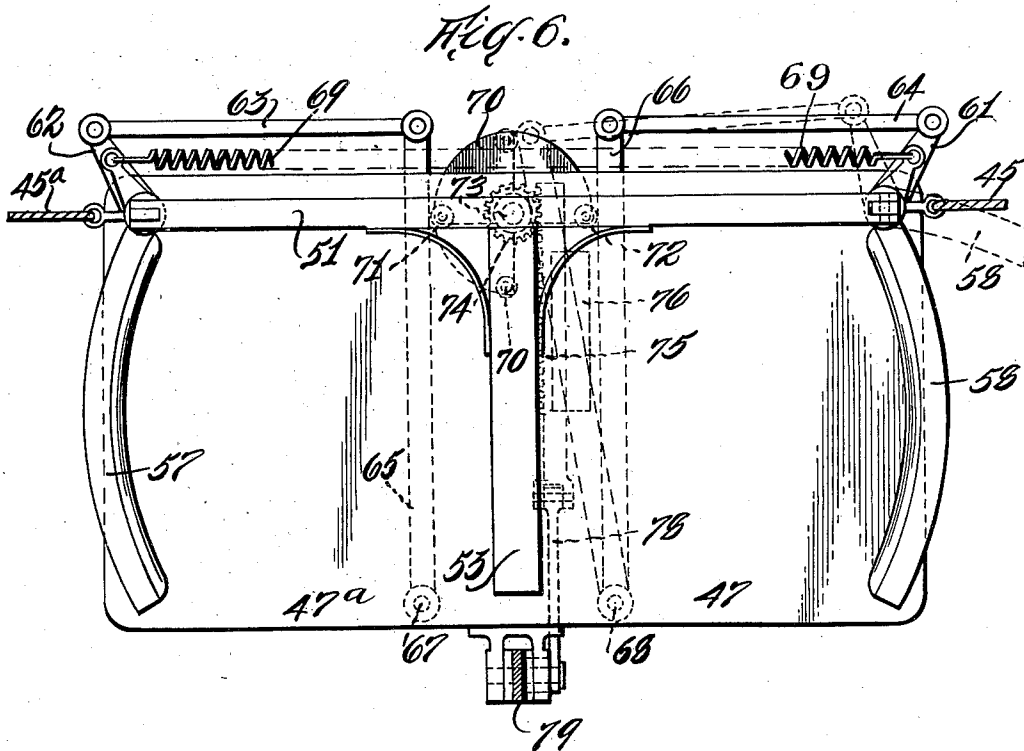
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3 SHEETS—SHEET 3.



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Fig. 7.

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UNITED STATES PATENT OFFICE.

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CONTROLLING MECHANISM FOR FLYING-MACHINES AND THE LIKE.

1,085,575.

Specification of Letters Patent.

Patented Jan. 27, 1914.

Application filed September 6, 1912. Serial No. 718,840.

To all whom it may concern:

Be it known that I, GLENN H. CURTISS, a citizen of the United States, residing at Hammondsport, New York, have invented certain new and useful Improvements in Controlling Mechanism for Flying-Machines and the like, of which the following is a clear, full, and exact description.

This invention relates to improvements in flying machines, and more particularly to a control mechanism therefor.

The several advantages of the present improvement will more clearly appear from the following specification, while the scope of the invention will be pointed out in the appended claims.

In the preferred embodiment of this invention shown in the drawings, Figure 1 is a side elevation of a flying machine with the present improvement embodied therein; Fig. 2 is a front elevation of the same; Fig. 3 is a plan of the same with the supporting planes removed; Fig. 4 is an enlarged detail of the steering lever and controls; Fig. 5 is an end elevation enlarged of the operator's seat and shoulder frame; Figs. 6 and 7 are plan and front elevations respectively of said shoulder frame.

For purposes of illustration I have shown the present improvement as combined with a flying machine of the hydro-aeroplane type, more commonly known as a flying boat, and the novel features of the flying machine *per se* will form the subject-matter of a separate application, Serial No. 771,646, which I have filed as a division of the present case.

Referring more particularly to the drawings, there is shown a boat body 1 of sufficient buoyancy for supporting the entire machine upon the water and having mounted above the same one or more supporting planes 11 and 12 connected by the usual forward and rear struts 14, 14^a forming an aeroplane. These supporting planes 11 and 12 are arranged in lifting relation to the boat when floating on the water, and are provided with suitable driving means consisting of engine 15 and air-propeller 16 of sufficient capacity to enable the same to lift said machine clear of the water in flight. The boat body 1 is of seaworthy construction for travel on the water and contains therein, preferably at its forward part, the operator's seat 8 and other controls more particularly described hereinafter, and ex-

tends as shown from the front to rear of the entire machine to serve as the fusilage therefor.

At the stern 3 of the boat is a suitable water rudder 9, preferably of rigid material carried on the pivoted rudder post 24, and beneath said rudder is preferably a projecting skegg 10 for protecting the same.

Mounted above the water rudder and preferably upon the same post 24 therewith is the vertical air rudder 25 of lighter material, such as a canvas covered frame, for steering the machine to the right and left in the air. The air rudder 25 has an extension 26 forward of its pivot to partially balance the wind pressure thereon. The rudder wires 38 connected to each side of the rudder post at 40 and 41, lead forwardly and pass up through the pivot of hollow steering lever 35 as shown in Figs. 1 and 4.

The machine is also preferably provided at its rear end with a fixed vertical surface 20 and a fixed horizontal surface 21 in front of the rudders, as shown in Figs. 1 and 3. At the rear of the horizontal surfaces 21 are mounted upon the pivotal shaft 23 two horizontal rudders 22 and 22^a for steering the machine up and down. The upper and lower connecting wires 36, 37 respectively for these horizontal rudders lead forwardly and are fastened above and below the pivotal point of lever 35 as shown.

The aeroplane attached above the boat in the present embodiment preferably consists of the superposed supporting planes as shown, and the lower plane 12 is preferably secured at its middle slightly above the upper deck of the boat and spreads outwardly therefrom in both directions at a slight upward angle so as to form a dihedral angle, as shown in Fig. 2. Mounted adjacent the lateral portions of each side of this lower plane, and preferably fixed to the wing tips thereof, are pontoons 27 of hollow construction having trailing blades 28 for the purpose of keeping the wing tips clear of the water when the machine is traveling thereon. The aeroplane as shown is also preferably provided with equilibrium-restoring devices one at each lateral edge of the machine, and consisting in the present embodiment of ailerons 17 and 17^a pivoted at 14^b upon the rear posts 14^a between the planes 11 and 12. The controlling wires 45 and 45^a attached to the upper surface of each aileron lead respectively around suit-

able guides to opposite sides of the swinging shoulder frame 51, as shown in Figs. 6 and 7. The wire 44 connects the underside of both ailerons, whereby the shoulder frame 5 when swung in either direction will throw the ailerons simultaneously to opposite angles of incidence for balancing the machine in flight, as is well understood.

Referring more particularly to Figs. 5, 6 and 7, the operator's seat and the preferred construction of the shoulder frame will now be described. This seat and shoulder frame is preferably a self-contained apparatus which may be detachably mounted in this or any other similar machine and has provision for enabling either one of two operators to control the machine exclusively or for both of said operators to control the machine at the same time, as may be desired. A pair of seats 47 and 47^a preferably located side by side, are carried upon a frame which is detachably secured by bolts 106 to the machine. See Fig. 3. Pivotaly mounted upon eyes 52 and 52^a of said seat 25 is a shoulder frame consisting of vertical rods 48, 49 pivotally connected at 54 and 56 to a back rod 51 whereby this frame may swing laterally upon the seat. The wires 45 and 45^a leading to the ailerons, as previously described, are attached to each side of this frame so as to be operated by its lateral movement, as is well understood in the Curtiss type of machine. Rigidly attached to the back rod 51 and projecting forwardly therefrom is an intermediate arm 53 which extends between the operators when seated and adapted to be engaged by the bodily movement thereof in one direction. At each end of the back rod 51 is pivotally mounted 40 a side arm 57, 58 as shown, for being engaged by the operators when moving in the other direction. Each side arm 57, 58 is similarly mounted and controlled, and a description of one will suffice. The side arm 45 58 forms an integral part of a sleeve 60 loosely mounted to rotate on the upright rod 49, see Fig. 5. The lower portion of the sleeve 60 has an integral projecting arm 61 connected by link 64 to a pivoted cam-operated lever 66, pivoted upon the forward part of the seat at 68. A similar cam lever 65 pivoted at 67 is connected by link 63 and projecting arm 62 to the opposite side arm 57. A spring 69 connected to a rearward extension of each side arm 57, 58 normally acts to throw said arms outwardly, as shown in dotted lines, Fig. 6, so as not to be in a position to be engaged by the bodily movement of an operator. A semi-circular cam 60 70 pivotally mounted at 73 between the cam levers 65 and 66 acts to throw either one or both of said cam levers outwardly and through the connections described to throw the side arm 57 or 58 or both of them inwardly to their active position. The cam 70

is provided with friction rollers 71, 72 as shown, and is preferably operated from a gear pinion 74 fixed to its lower side adapted to be engaged by a rack 75 sliding in guide 76, see Figs. 5 and 7. The rack 75 is connected by link 78 to lower end of hand lever 79, having latch bolt 81 adapted to engage in three different positions of notched quadrant 80. It will be obvious from the foregoing description that the operation of the semi-circular cam 70 through the hand lever 79 acts to throw either one or both of the side arms into active condition for being operated. When the cam is in the position shown in solid lines, both side arms will be thrown inwardly into their active position and a rigid connection will thus be formed between said side arms and the laterally swinging frame, and the parts are then adjusted so that both of said seated operators may control the ailerons. When the cam is thrown to the position shown in dotted lines, Fig. 6, the side arm 58 is swung into the dotted position by the spring 69, while side arm 57 is securely locked in its active position as shown. A reverse position of the cam 70 from that shown in dotted lines releases side arm 57 and locks side arm 58 in active position.

It is obvious that various equivalent constructions may be employed for operating and adjusting the controlling mechanism in the way described, and I do not wish to be limited to the particular embodiment shown for accomplishing the results desired.

Mounted in the cock-pit in front of the seat is a rocking shaft 32, having connections by wire 31 to the throttle of the engine. Foot pedals 30 and 34 are preferably fixed to the rock shaft one for each operator, and each foot pedal is preferably formed with an extension 30^a and 34^a to enable either operator to rock the shaft positively in either direction. A spring 33 may be also provided for automatically returning said shaft to throttle-closing position.

The steering lever 35 is preferably hollow and mounted to rock on pivotal trunnions 85. Said steering lever is also preferably forked at its upper end as shown in Fig. 4 so as to support two steering wheels 82 and 83, one on each branch of the fork. One of said steering wheels such as 82 is connected in the usual way with the cables 38 for operating the rudders, and the other steering wheel 83 is connected to turn with the wheel 82 by means of any suitable connections, such as sprocket 86 and chain 84. It will be evident from this construction that the steering wheels operate in unison. It will also be observed that the manually operated controls for the machine, including the steering wheels 82, 83, lever 35, throttle pedals 30, 34 and shoulder frame 51 are all

mounted upon the boat body adjacent the operator's seat, which is my preferred arrangement.

I wish it to be understood that my invention may be embodied in various equivalent forms other than the one herein shown which is merely a preferred disclosure to enable others to carry out my invention.

What I claim is:

1. A controlling mechanism for flying machines and the like comprising a pair of seats for seating two operators, a body-moved frame mounted adjacent said seats, and means for rendering said frame operable to be moved by the bodily movement of either one of said operators exclusively.

2. A controlling mechanism for flying machines and the like, comprising a pair of seats for seating two operators, a body-moved frame movably mounted adjacent said seats comprising side arms arranged to be in active or inactive condition for rendering said frame operable by the bodily movement of each operator, and hand-actuated means for placing either of said arms in active condition.

3. In a flying machine in combination, equilibrium-restoring devices for said machine, a pair of seats for seating two operators, a body-moved mechanism mounted adjacent said seats for operating said equilibrium-restoring devices, and means for rendering said mechanism operable by the bodily movement of either one of said operators exclusively.

4. In a flying machine in combination, equilibrium-restoring devices for said machine, a self-contained apparatus detachably mounted on said machine for controlling the movement of said equilibrium-restoring devices, comprising a pair of seats for seating two operators, a body-moved frame movably mounted on said seats and connected to said equilibrium-restoring devices for operating the same, and means for rendering said frame operable by the bodily movement of either of said operators.

5. In a flying machine in combination, equilibrium-restoring devices for said machine, a self-contained apparatus detachably mounted on said machine for controlling the movement of said equilibrium-restoring devices, comprising a pair of seats for seating two operators, a body-moved frame movably mounted on said seats and connected to said equilibrium-restoring devices for operating the same, and means for rendering said frame operable by the bodily movement of either one of said operators exclusively or by both of said operators as may be desired.

6. In a flying machine in combination, equilibrium-restoring devices for said machine, a pair of seats for seating two operators, a body-moved frame movably mount-

ed adjacent said seats and connected to said equilibrium-restoring devices for operating the same, and means for rendering said frame operable to be moved by the bodily movement of either one of said operators exclusively.

7. A controlling mechanism for flying machines and the like, comprising a pair of seats for seating two operators, a laterally movable frame mounted adjacent said seats, said frame comprising movable arms arranged to form a partial inclosure for each operator, and means for shifting said arms to open or close either inclosure as may be desired.

8. In a flying machine in combination, equilibrium-restoring devices for said machine, a pair of seats for seating two operators, a laterally movable frame mounted adjacent said seats and having connections to said equilibrium-restoring devices for operating the same, said frame comprising arms arranged to be in active or inactive condition for rendering said frame operable by each operator and means for placing either of said arms in active condition.

9. In a flying machine in combination, equilibrium-restoring devices for said machine, a pair of seats for seating two operators, a laterally movable frame mounted adjacent said seats and having connections to said equilibrium-restoring devices for operating the same, said frame comprising arms arranged to be in active or inactive condition for rendering said frame operable by each operator, means normally tending to place both of said arms in inactive condition, means for placing either or both of said arms in active condition and locking the same in said condition.

10. A controlling mechanism for flying machines and the like comprising a pair of seats for seating two operators, a laterally movable frame mounted adjacent said seats, said frame comprising arms extending by the sides of the operators and arranged to be in active or inactive condition for rendering said frame operable by the bodily movement of each operator, means normally tending to place both of said arms in inactive condition, and cam-operated devices for placing either of said arms in active condition, and a hand-lever for operating said cam.

11. A controlling mechanism for flying machines and the like comprising a pair of seats for seating two operators, a laterally movable frame mounted adjacent said seats, said frame comprising an intermediate rigid arm and two pivoted side arms one at the outside of each operator, spring means normally tending to throw said pivoted arms away from the sides of said operators, a pivoted cam adapted to operate said side arms through connections for closing either

one or both of said side arms against the sides of the operators and holding the same in this position, and a hand-lever for operating said cam.

- 5 12. In a flying machine having horizontal and vertical steering rudders and movable equilibrium-restoring devices for said machine, a pair of seats for seating two operators, the combination of a body-moved
10 mechanism mounted adjacent said seats for controlling the equilibrium-restoring devices, and having means for rendering said mechanism operable by either one of said operators exclusively as may be desired, with
15 duplicate steering mechanism for said horizontal and vertical rudders, one for each operator and connected to move in unison.

13. In a flying machine, an operator's controlling mechanism therefor, two seats for seating two operators, and adjustable devices
20 arranged to be set for rendering said controlling mechanism operable by either one or the other of said operators exclusively while seated in their respective seats.

- 25 14. In a flying machine, an operator's controlling mechanism therefor, two seats for seating two operators, and adjustable devices arranged to be set for rendering said controlling mechanism operable by either
30 one or the other of said operators exclusively while seated in their respective seats, or by both of said operators at the same time as may be desired.

- 35 15. In a flying machine, an operator's controlling mechanism therefor, two seats for seating two operators, adjustable devices arranged to be set in different positions, one position for rendering said controlling mechanism operable by one of said operators ex-

clusively, and a second position for rendering said controlling mechanism operable by said other operator exclusively.

16. In a flying machine, an operator's controlling mechanism therefor, two seats for seating two operators, adjustable devices
45 arranged to be set into three different positions, one position for rendering said controlling mechanism operable by one of said operators exclusively, a second position for rendering said controlling mechanism operable
50 by the other operator exclusively, and a third position for rendering said controlling mechanism operable by both of said operators at the same time.

17. In a flying machine in combination, 55 equilibrium restoring devices for said machine, an operator's controlling mechanism for operating said equilibrium restoring devices, two seats for seating two operators and means for enabling said controlling
60 mechanism to be operated by either one or the other of said operators exclusively while seated in their respective seats.

18. In a flying machine, an operator's controlling mechanism therefor, two seats
65 for seating two operators, adjustable devices arranged to be set by hand at all times for rendering said controlling mechanism operable by either one or the other of said operators exclusively while seated in their
70 respective seats.

Signed at New York city, New York, this 22nd day of August, 1912.

GLENN H. CURTISS.

Witnesses:

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