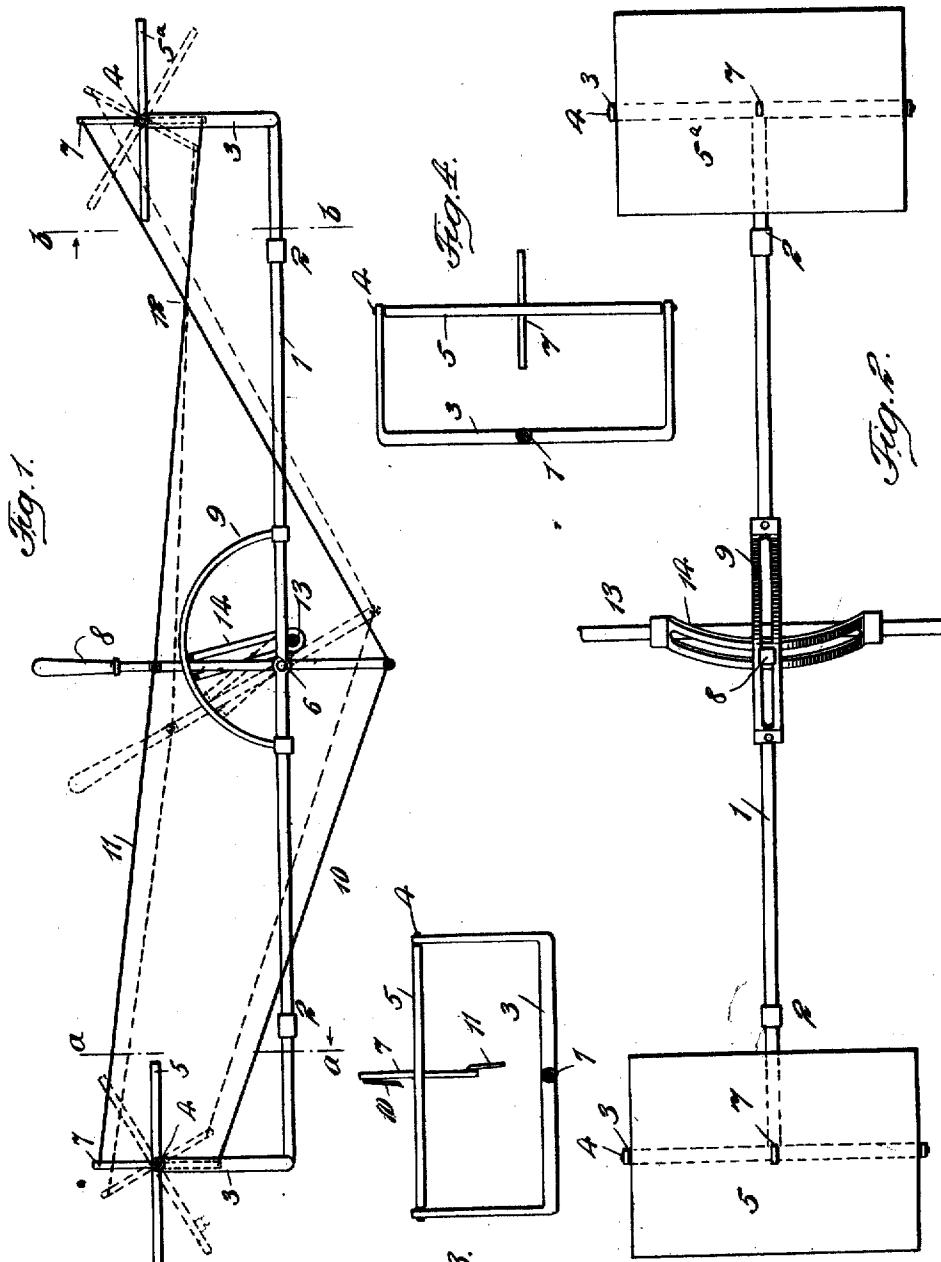


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 DOUBLE ACTING RUDDER.  
 APPLICATION FILED JUNE 22, 1910.

999,959.

Patented Aug. 8, 1911.



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# UNITED STATES PATENT OFFICE.

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## DOUBLE-ACTING RUDDER.

999,959.

Specification of Letters Patent.

Patented Aug. 8, 1911.

Application filed June 22, 1910. Serial No. 568,409.

To all whom it may concern:

Be it known that I, JULIUS C. CHRISTIANSEN, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Double-Acting Rudders, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates especially to the construction and arrangement of steering mechanism for air or water craft, and has for its object the provision of a double-acting rudder simple in construction, while very effective in operation.

To attain the desired end my invention consists in the application of a rudder to each extremity of a craft, means being provided to operate the rudders simultaneously, moving them in opposite directions both horizontally and vertically; also means for moving one rudder independently of the others. I have shown two rudders operated by a single rod or lever. But I do not wish to confine my movements to the movement of the rudders simultaneously, as in some cases only one rudder is necessary to effect the movement. To do this, one of the rudders is disconnected from the manipulating lever 8, leaving the other to move; and my invention also involves certain novel and useful combinations or arrangements of parts, and peculiarities of construction and operation, all of which will be hereinafter first fully described, and then pointed out in the claims.

In the drawing, Figure 1 is a side elevation of an aeroplane, provided with my double-acting rudder. Fig. 2 is a plan view thereof. Fig. 3 is a vertical, sectional view at line *a-a*, looking from the right; Fig. 4 is a vertical, sectional view at line *b-b* of Fig. 1, looking from the left, showing the rudder turned perpendicularly.

Similar numerals of reference, wherever they occur, indicate corresponding parts in all the figures.

I have shown my double acting rudder as applied to an aeroplane, but the same may be applied to water craft, such as submarines, the object of the invention being to

provide steering means whereby the craft can be given a circular, upward or downward movement, by turning the rudders upon their horizontal axes, or a side movement by turning the axes of the rudders out of the horizontal, means being provided for imparting such movement or movements simultaneously, by a single operating lever.

1 is a longitudinal rod supported by bearings 2 carried by any suitable framework. At each extremity of the rod 1 are fixed yokes 3, at right angles to said rod.

4 are the axes of rudders 5 5<sup>a</sup>, pivoted in the yokes 4.

7 is a manipulating bar fixed to the center of each of the rudders, and extending through it.

At 6 the center of the rod 1, is pivoted a manipulating handle 8, extending through a guide 9 shown a segment but can be of any other form or shape secured to the rod 1.

10 and 11 are cords, chains or wires fixed to the handle 8, and extending to the bars 7, said cords being crossed at one side, as shown at 12.

13 is a fixed rod of the frame bearing a slotted segment 14 loosely mounted thereon, and through which the handle or lever 8 extends.

Although I have shown the segmental guides 9 and 14, it should be understood that they are not essential to the movements of the rudder or rudders sidewise or up or down, as the manipulating lever 8 can operate without the assistance of either one of the segments. These segments were only shown for the purpose of showing a means for locking the manipulating lever in any direction.

The longitudinal segment 9 is rigidly connected to the rod 1 and is intended to lock the longitudinal movement of the lever, the lateral segment 14 is loosely mounted on the fixed rod 13, and able to swing forward and backward so as not to interfere with the longitudinal movement of the lever 8, the segment 14 cannot move sidewise and locks the lateral movement of the lever. The notch lock and the notches in the segments are not shown for two obvious reasons, that

it is an old thing and to make the drawing more easily understood.

When constructed and arranged in accordance with the foregoing description, the operation of my device is as follows: The parts being in the position shown in full lines in Fig. 1 of the drawing, and the craft wherewith it is employed being in motion toward the right, such movement is horizontal. If it is desired to descend in a straight line, the handle 8 is moved as indicated by the dotted lines, throwing the back part of the rear rudder downward, and the front part of the forward rudder also downward, causing the craft to move in the arc of a circle instead of in a straight line. If it is desired to move in a curve to the right or left downward at the same time, by throwing the handle 8 to the side, the rudders are simultaneously tilted to the side the requisite distance, producing the desired movement of the craft. If the front end goes down to the left then the rear end will go up to the right or vice-versa causing a quick double action in contrary direction. The rudders can be given the two movements at the same time by means of the handle 8; and if required, the rudders may be turned to substantially a vertical position. If it is desired to move the air or water craft in a strictly horizontal plane sidewise, then move the lever 8 to one side until the rudders are in a vertical plane and then move the lever forward or backward.

The rudders can be operated as above described without crossing the cords as described. In that case a rod is used, which is connected at one end to the upper portion of lever 8, and at the other end to the lower fulcrum arm of rudder 7. Another rod is used which is connected at one end to the upper portion of lever 8, and the other end to the upper fulcrum arm of rudder 5<sup>a</sup>. This modification does not affect the principle of my invention which is in the operation of the rudders as above described.

The object of the segmental guides 9 and 14 on the drawing is simply for the purpose of using a notch lever on the main lever 8 to hold same in a fixed position.

I am aware that the lever 8 can be weighted at its lower member for the purpose of allowing it to automatically act when the operator has lost control of it, and the aeroplane is at the mercy of the air currents.

I am aware that the fore rudder can be operated as described independently of the aft rudder or vice versa.

Having now fully described my invention, what I claim as new therein, and desire to secure by Letters Patent, is:

1. In a double acting rudder mechanism for operating fore and aft rudders simul-

taneously said mechanism consisting of a laterally tiltable frame to which the rudders are pivotally mounted on transverse axes one at each end, a lever fulcrumed to the frame to swing longitudinally said lever adapted when swung laterally to tilt the frame and means for connecting the rudders to the lever.

2. In a double acting rudder mechanism for operating one rudder, said mechanism consisting of a frame supporting the rudder pivotally on a transverse axis, said axis resting at the end of a longitudinal rod and a manipulating lever fulcrumed on the rod to swing longitudinally said lever when swung laterally to tilt the frame a slotted segment mounted rigidly on the frame means for connecting the lever to the rudder consisting of cords, wires or chains, substantially as shown and described.

3. In a double acting rudder mechanism for operating fore and aft rudders simultaneously, said mechanism consisting of a laterally tiltable frame supporting at each end pivotally a rudder on a transverse axis a manipulating lever fulcrumed on said frame to swing longitudinally, said lever when swung laterally to tilt the frame, a pair of slotted segments crossing each other mounted on the frame rod 1 and transverse rod 13 and means to operate the rudders simultaneously in opposite position, said means consisting of cords wires or chains secured to said lever and being crossed at one end.

4. In a double acting rudder, a rudder on a transverse axis supported on a longitudinal rod in combination with a lever mounted pivotally on said rod to swing longitudinally adapted to turn the rod and tilt the rudder when moved laterally and connection from the rudder to the lever to move the rudder on its transverse axis.

5. In a double acting rudder a rudder on a transverse axis supported on a longitudinal rod a lever mounted pivotally on said rod to swing longitudinally adapted to turn the rod and to tilt the rudder when moved laterally connection from the rudder to the lever to move the rudder on its transverse axis a pair of slotted segments crossing each other, mounted on the rod 1 and transverse rod 13.

6. In a double acting rudder a fore and a aft rudder each of said rudders mounted on a transverse axis said axis resting at the ends of a longitudinal rod a lever pivotally mounted on said rod to swing longitudinally to tilt the rod with the rudders when moved laterally and connection from the rudders to the lever adapted to move said rudders simultaneously.

7. In a double acting rudder a fore and aft rudder each of said rudders mounted on

a transverse axis said axis resting at the  
ends of a longitudinal rod a lever pivotally  
mounted on said rod to swing longitudinally  
and adapted to tilt the rod with the rudders  
5 when moved laterally and connection from  
the rudders to the lever to move said rudders  
simultaneously in opposite direction.

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

JULIUS CHRISTIAN CHRISTIANSEN.

Witnesses:

ISIDORE WINFELD,

ISRAEL TEPPER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."