July 3, 1923. 1,460,785

J. BUCKLEY

CONTROL MECHANISM

Filed March 25, 1921

Fig. 1.

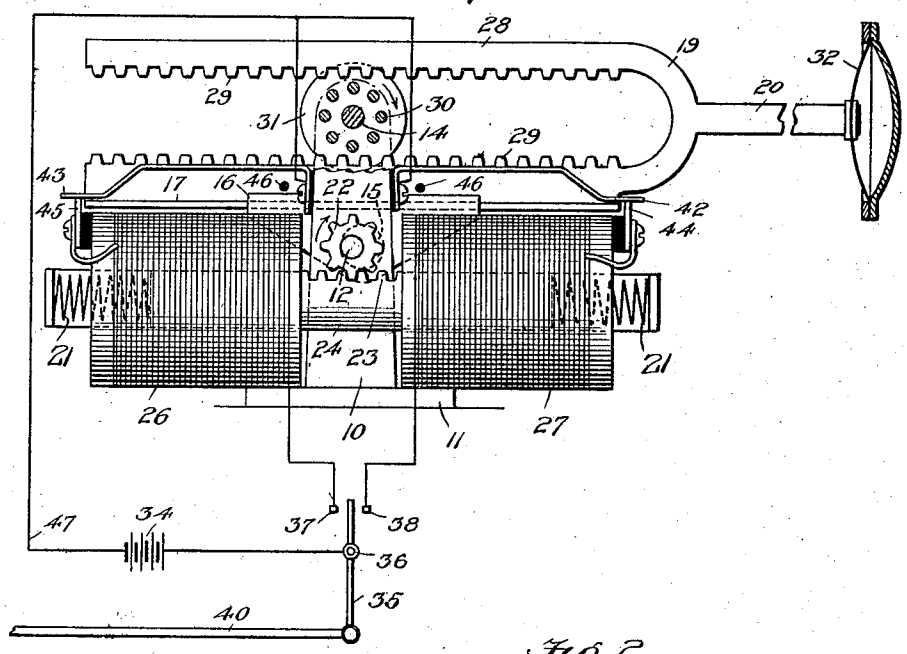
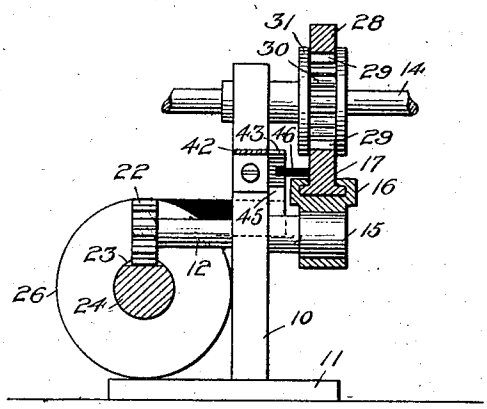


Fig. 2.



Inventor

John Buckley

By Church & Church

his Attorneys

Patented July 3, 1923. 1,460,785

UNITED STATES PATENT OFFICE.

JOHN BUCKLEY, OF MATTAPAN, MASSACHUSETTS.

CONTROL MECHANISM.

Application filed March 25, 1921. Serial No. 455,425.

To all whom it may concern:

Be it known that I, JOHN BUCKLEY, a citizen of the United States, residing at Mattapan, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Control Mechanism; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to a control mechanism, which while particularly intended for the stabilizing of aeroplanes by warping of the wings and by control of the aerial rudders is also intended for general control operation, as for example the governing of a steam valve or a damper for any purpose whatsover.

The object of the present invention is to provide a mechanism of this type which while relatively simple in construction will act positively and with sufficient power for the purpose required upon slight or delicate movement of the governing mechanism.

In the drawings,—

Figure 1 is a side view of my device partly in section.

Fig. 2 is a central vertical section.

The standard 10 rises from the base 11 and rotatably supports the shafts 12 and 14. On one side of the standard 10, the shaft 12 carries a crank or eccentric 15 which operates to raise or lower the slotted retainer 16 which slidably receives the lower T-shaped end 17 of a toothed yoke 19 integral with or rigidly secured to the rod 20. At its other end the shaft 12 carries a pinion 22 driven by a rack 23 cut in the upper face of an armature 24 sliding within the solenoids 26 and 27.

The arms 17 and 28 of the yoke 19 are formed with rack teeth 29 spaced apart a sufficient distance to clear the teeth of the pinion 30 which is keyed to the shaft 14. The yoke is pivotally mounted and may be raised or lowered to bring the rack teeth on either 17 or 28 into contact with the constantly rotating pinion 30. As illustrated in Fig. 2, the pinion 30 is conveniently formed in spool shape with a guiding flange 31 at either side to guide the yoke in its pivotal movement and insure the meshing of the pinion and rack. The rod 20 which is integral with the yoke 19 or permanently secured thereto is directly connected to the diaphragm 32 or any other form of control mechanism depending upon the specific application of the device.

Electric power is supplied by the battery 34 which is directly connected to the lever switch 35 pivoted as at 36 so as to engage either the contact 37 connected with the coil of the solenoid 26 or with the contact 38 similarly connected to the coil of the solenoid 27. The free arm of the switch or lever 35 is connected by a link 40 to the mechanism which governs the operation of the control mechanism, such mechanism being, for example, a thermostat, pressure gage, float, an inclinometer, a compass or some such mechanism.

The other side of the battery 34 is connected to the spring contacts 42 and 43 one on either side of the double solenoid and normally pressing against the conductors 44 and 45 respectively, forming the free end of the coils of 27 and 26. The pins 46 permanently secured to the yoke 19 are of insulating material and move in a path so as to raise the free ends of the springs 42 and 43 and thereby to break the circuit including the solenoid. If desired a single pin may be used which would then be placed centrally of the yoke and would operate either of the springs.

The operation of the device is as follows: When the governing means moves a sufficient distance to bring the end of the switch 35 into engagement with one of the contacts, say 37, the solenoid 26 is energized, the current passing from the battery 34 to the contact 37 through the solenoid to conductor 45 and through the spring 43 and wire 47 back to the battery. The energizing of the solenoid 26 causes the armature 24 to be drawn to the left in Fig. 1 rotating the pinion 22 in a clock-wise direction. By means of the crank or eccentric 15 this motion of the pinion is translated into a downward movement of the slotted member 16 thus drawing the upper arm 28 of the yoke into contact with the pinion 30 which constantly rotates at a slow speed in a clock-wise direction. The movement of the armature 24 is such that when it is in mid-position the slotted member 16 is in neutral with neither of the racks engaging the pinion 30, but when the armature 24 is at either end of its travel the pinion 30 is in mesh with the rack. A spring 21 or other mechanism is provided to maintain the yoke in neutral position when no

current is flowing, the strength of this spring being sufficient to return the armature 24 to mid-position when no current is flowing through the coils.

Movement of the pinion 30 under the circumstances just stated will move the rod 20 to the right in Fig. 1 and will compress the diaphragm 32 and cause the appropriate movement of the governing mechanism, which in turn will operate the mechanism connected to the switch 35 breaking contact with the point 37, at which time the spring will return the yoke to normal position. If by any reason the switch 35 is not restored to neutral position in time to check the movement of the rod 20 the insulating pin 46 will raise the spring contact 42 from the conducting member 44 connected to the end of coil 27 at which time the spring will return the yoke to mid-position, thus freeing the rack from the teeth of the pinion 30.

What I claim is:—

1. In a device for connecting a governing mechanism with a mechanism controlled thereby, a yoke including two substantially parallel arms provided with rack teeth, a pinion adapted to mesh with either of said racks to drive said yoke, a member having a groove and slot connection with said yoke, and electro-magnetic means responsive to movement of the governing mechanism for moving said member so as to bring either of said racks into engagement with said pinion.

2. In a device for connecting a governing mechanism with mechanism controlled thereby, a yoke formed of a pair of oppositely disposed racks and operatively connected with said controlled mechanism, a pinion adapted to mesh with either of said racks, means for moving said yoke to mid-position so that neither of said racks will be in mesh with said pinion, and means responsive to movement of the governing mechanism for moving said racks into and out of mesh with said pinion against the force of said means.

3. In a device for connecting a governing mechanism with mechanism controlled thereby, a rack operatively connected to said controlled mechanism, a pinion adapted to mesh with said rack, means for holding said rack out of mesh with said pinion, electro-magnetic means greater in strength than the last-mentioned means and adapted to move said rack into mesh with said pinion, and means carried by said rack for rendering the last-mentioned means inoperative.

4. In a device for connecting a governing mechanism with mechanism controlled thereby, a rack operatively connected to said controlled mechanism, a pinion adapted to mesh with said rack, means for holding said rack out of mesh with said pinion, electro-magnetic means greater in strength than the last-mentioned means and adapted to move said rack into mesh with said pinion, and means carried by said rack for rendering the last-mentioned means inoperative at a predetermined point in the travel of said rack in either direction.

5. In a device for connecting a governing mechanism with mechanism controlled thereby, a rack operatively connected with said controlled mechanism, a pinion adapted to mesh with said rack, a solenoid, an armature for said solenoid, means operatively connecting said armature and said rack to move same into and out of mesh with said pinion, a circuit making and breaking device responsive to movement of the governing mechanism for energizing said solenoid, and means carried by said rack for breaking the circuit through said solenoid at a predetermined point of travel of said rack.

JOHN BUCKLEY.