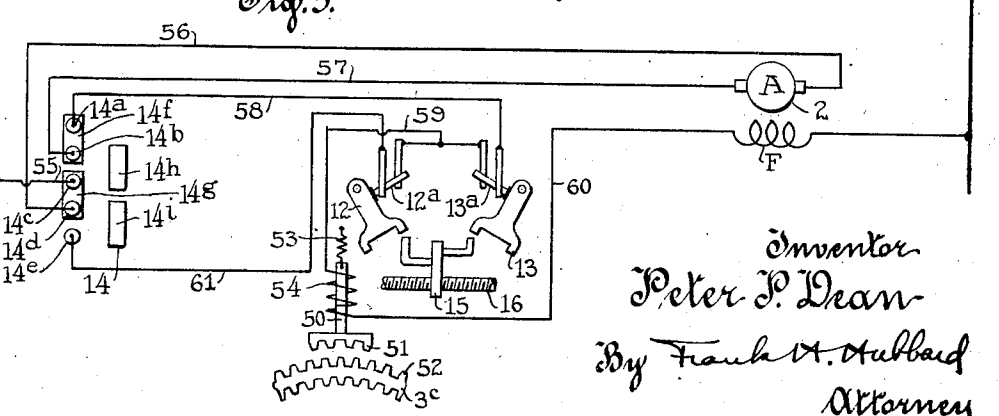
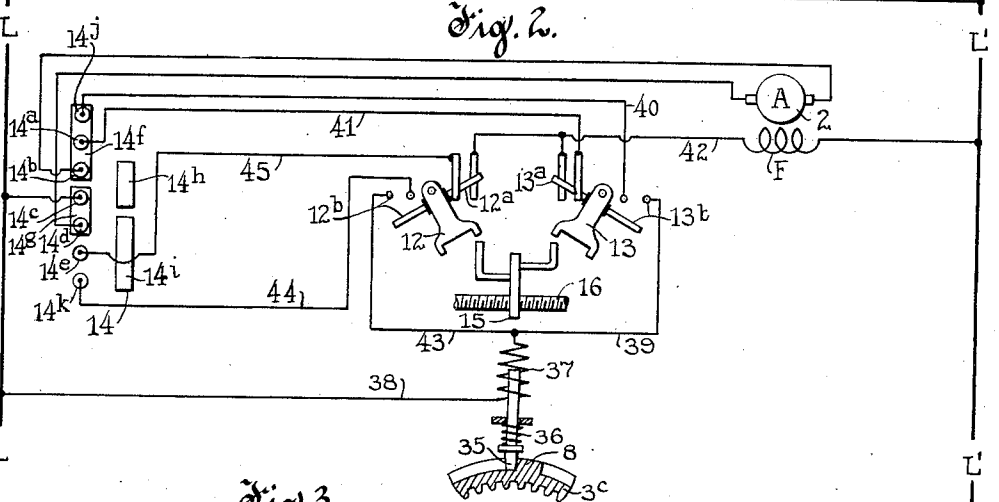
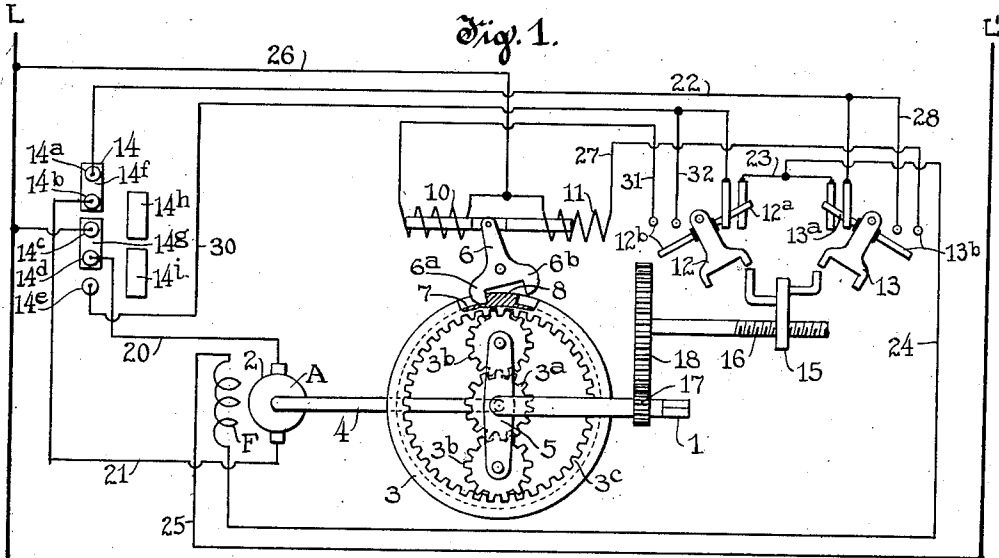


P. P. DEAN.  
 DRIVING MECHANISM FOR VALVES AND OTHER DEVICES.  
 APPLICATION FILED OCT. 1, 1917.

1,330,790.

Patented Feb. 17, 1920.



Inventor  
 Peter P. Dean  
 By Frank H. Hubbard  
 Attorney

# UNITED STATES PATENT OFFICE.

PETER P. DEAN, OF NEW YORK, N. Y.

DRIVING MECHANISM FOR VALVES AND OTHER DEVICES.

1,330,790.

Specification of Letters Patent. Patented Feb. 17, 1920.

Application filed October 1, 1917. Serial No. 194,212.

*To all whom it may concern:*

Be it known that I, PETER P. DEAN, a subject of the King of England, residing at New York, in the county of Bronx and State of New York, have invented new and useful Improvements in Driving Mechanisms for Valves and other Devices, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

This invention relates to driving mechanisms for valves and other devices.

In my prior Patent No. 1,245,574, issued Nov. 6, 1917, there is disclosed a driving mechanism including a normally restrained member releasable to effect substantially instantaneous release of the driven member from the driving member, together with alternative mechanical and electrical control means for said normally restrained member, and said electrical control means forms in part the subject matter of this application.

Also, this application discloses a modification of such electrical control means together with a modification of the driving mechanism.

In the accompanying drawing,

Figure 1 shows schematically the aforesaid driving mechanism and shows diagrammatically one of the forms of electrical control means shown in said copending application;

Fig. 2 shows diagrammatically another form of electrical control means shown in said prior patent; and,

Fig. 3 shows diagrammatically and schematically the aforesaid modifications.

Referring to Fig. 1, the same schematically illustrates a driven shaft 1, a driving motor 2 and planetary speed reducing gear 3 for connecting the same. The planetary gear includes a pinion 3<sup>a</sup> driven by the motor 2, as by a shaft 4, a plurality of pinions 3<sup>b</sup> carried by a member 5 fixed to the driven shaft and an internally toothed ring 3<sup>c</sup>. The pinions 3<sup>b</sup> are arranged between and in mesh with the pinion 3<sup>a</sup> and toothed ring 3<sup>c</sup> and said ring is revoluble and forms the aforesaid restrainable and releasable member. Thus as will be apparent, restraint of the ring will render the planetary gear effective as a driving connection between the motor 2 and shaft 1 and for so restraining

the ring there is provided a pawl 6 adapted to be projected into a peripheral groove 7 in said ring and into the path of a block 8 fixed in said groove. On the other hand, release of the ring by the pawl will allow rotary play thereof for release of the driven shaft from the driving motor. The pawl has two extremities 6<sup>a</sup> and 6<sup>b</sup> to cooperate with the block 8 of the ring and the arrangement is such that whenever the pawl is rocked from either extreme position to the other it will withdraw one extremity from the path of said block and project the other extremity thereof into the path of said block. Thus the pawl when so operated provides for release of the ring and relocking thereof but subject to a given rotary play of said ring in reverse directions.

Considering now the control means shown in Fig. 1, the same includes solenoids 10 and 11 for shifting the pawl 6 from one extreme position to the other selectively, limit switches 12 and 13 for terminating the power supply to the motor and controlling said solenoids and a master switch 14 for starting said motor in opposite directions selectively. The limit switches 12 and 13 are operable by a traveling member 15 mounted upon a screw threaded shaft 16 which is driven from the shaft 1 through a pinion 17 and gear 18. The limit switch 12 has two electrically independent sets of contacts 12<sup>a</sup> and 12<sup>b</sup>, the former controlling the continuity of the motor circuit and both cooperating to control the continuity of circuit of solenoid 10, the arrangement being such that the latter contacts engage prior to disengagement of the former contacts. The limit switch 13 has similar sets of contacts 13<sup>a</sup> and 13<sup>b</sup>, the former controlling the continuity of the motor circuit and both cooperating to control the circuit of solenoid 11. Thus when either limit switch is operated it will energize one of the solenoids to shift the pawl and thereupon simultaneously interrupt the motor circuit and deenergize such solenoid. And the relation of parts is such that the pawl has given positions for reverse operations of the driven member whereby whenever the same is shifted as described, in response to the limit switches, it will release the ring for rotation in a direction corresponding to the direction of concurrent operation of the motor. This

will effect instantaneous release of the driven member, which will be immediately followed by interruption of the motor circuit and assuming sufficient inertia of the motor to rotate the ring until the latter is rearrested a hammer-like blow will be imparted to the driven mechanism. Then if the motor be started in a reverse direction it will rotate the ring in a reverse direction for substantially one revolution until the block 8 engages the opposite side of the projected pawl extremity whereupon the driving connection will be reestablished and the driven mechanism will be started in a reverse direction and with a hammer-like blow. Also, reversal of the driven shaft will reverse the drive of the traveling device 15 for resetting of the tripped limit switch.

Describing the circuit arrangement illustrated in Fig. 1, positioning of the master switch 14 as shown completes circuit from line L to contact 14<sup>c</sup> through segment 14<sup>f</sup> to contact 14<sup>d</sup>, by conductor 20 through the motor armature A, by conductor 21 to contact 14<sup>b</sup>, through segment 14<sup>f</sup> to contact 14<sup>a</sup>, by conductor 22 through contacts 13<sup>a</sup> of limit switch 13, by conductors 23 and 24 through the series field winding F of the motor, by conductor 25 to line L'. Such connections, it may be assumed, effect operation of the motor tending to rotate the ring 3<sup>c</sup> in a counter-clockwise direction for operation of the driven shaft in a direction to move the traveling device 15 to the right for actuation of limit switch 13. Actuation of limit switch 13 opens the motor circuit, but prior thereto completes the circuit of solenoid 11. This circuit may be traced from line L by conductor 26 through winding 11, by conductor 27 through contacts 13<sup>b</sup> of switch 13, by conductors 28 and 22 through contacts 13<sup>a</sup>, by conductors 23 and 24 through the series field winding of the motor to line L'. Accordingly the pawl will be shifted to the right to free the ring with the results above described, and the circuit of solenoid 11 will be interrupted upon disengagement of contacts 13<sup>a</sup> for interruption of the motor circuit. With the master switch in its other position the motor circuit may be traced from line L to contact 14<sup>e</sup> through segment 14<sup>b</sup> to contact 14<sup>b</sup>, by conductor 21 through the motor armature in a reverse direction to that previously described, by conductor 20 to contact 14<sup>a</sup>, through segment 14<sup>f</sup> to contact 14<sup>e</sup>, by conductor 30 through contacts 12<sup>a</sup> of limit switch 12, by conductors 23 and 24 through the series field winding to line L', as previously traced. Thus the flow of current through the motor armature is reversed for reverse operation of the motor and consequent reverse operation of the shaft 1. Such operation of the shaft 1 moves the device 15 to the left for actuation of limit

switch 12 and said limit switch when operated interrupts the motor circuit at contacts 12<sup>a</sup>. Previously to so doing said limit switch completes circuit from line L by conductor 26 through solenoid 10, by conductor 31 through contact 12<sup>b</sup>, by conductors 32 and 30 through contacts 12<sup>a</sup>, by conductors 23 and 24 through the series field winding to line L' as already traced. This provides for shifting the pawl 6 back to the position shown, with the result of again releasing the ring for arrest of the driven shaft.

In the arrangement shown in Fig. 2, a reciprocating plug 35 is substituted for the pawl 6 and said plug is provided with a spring 36 normally projecting the same into the groove in the ring 3<sup>c</sup> and with an electromagnetic winding 37 for withdrawing the same from said groove. The limit switch mechanism is identical with that shown in Fig. 1 but in this instance the limit switch controls parallel circuits for said winding 37 and operation of either limit switch serves to energize said winding prior to interruption of the motor circuit and to deenergize said winding upon interruption of the motor circuit. In consequence the retraction of the plug will be only momentary to permit the block 8 of the ring to pass beneath the same, the plug being thereupon again projected into the groove for effecting the same control of the driving connection as that effected by the pawl 6. Also, in this instance the master controller is provided with additional contacts 14<sup>i</sup> and 14<sup>k</sup> for cooperation with the limit switches to control the parallel circuits. With the master switch in the position shown, tripping of limit switch 13 completes the circuit of winding 37 from conductor L by conductor 38, through said winding, by conductor 39 through contacts 13<sup>b</sup> of said limit switch, by conductor 40 to contact 14<sup>i</sup>, through segment 14<sup>f</sup> to contact 14<sup>a</sup>, by conductor 41 through contacts 13<sup>a</sup> of said limit switch, by conductor 42 through the series field winding to line L'. On the other hand, with the master switch in its other position, tripping of limit switch 12 completes the circuit of winding 37 from line L by conductor 38 through said winding, by conductor 43 through contact 12<sup>b</sup> of limit switch 12, by conductor 44 to contact 14<sup>k</sup> through segment 14<sup>f</sup> to contact 14<sup>e</sup>, by conductor 45 through contacts 12<sup>a</sup> of said limit switch to conductor 42 and thence to line L' as already traced. The motor connections in this instance are precisely the same as those described in connection with Fig. 1 and as will be apparent the master switch limits the control of the winding 37 to one or the other of its parallel circuits according to the direction of operation of said motor.

In the arrangement shown in Fig. 3 there

is provided a reciprocating plug 50 having at its end teeth 51 to engage teeth 52 provided on the periphery of ring 3<sup>c</sup> in lieu of the groove and block above described.

5 The teeth of the ring and plug are adapted when engaged to lock the ring against rotation in either direction and hence the plug provides for locking the ring in any angular position thereof for immediate establishment of a driving connection without the necessity of taking up any play of the ring. Also, in this instance, the plug is provided with a spring 53 for retraction thereof to release the ring and with an electromagnetic winding 54 to project the same into engagement with the ring. The winding 54 is adapted for series connection with the motor and is controllable by the contacts 12<sup>a</sup> and 13<sup>a</sup> of the limit switches which in this instance require no additional contacts. The arrangement is such that when the motor circuit is completed through either limit switch the winding 54 will be energized to project the plug 50 into locking position for immediate establishment of a driving connection between the motor and driven shaft whereas tripping of the active limit switch will simultaneously interrupt the motor circuit and deenergize the winding 54 for release of the plug and consequent immediate interruption of the driving connection. Also the arrangement is such that the winding 54 is placed under the control of the master switch 14 whereby the mechanical drive may be at any time interrupted by positioning the master switch to interrupt the motor circuit. And as will be apparent, such control of the driving connection enables the driven mechanism to be inched or otherwise intermittently operated at will.

30 The circuit arrangement shown in Fig. 3 is such that with the master switch positioned as illustrated circuit may be traced from line L, by conductor 55 to and through contacts 14<sup>c</sup>, 14<sup>e</sup>, and 14<sup>d</sup>, by conductor 56 through the motor armature from right to left, by conductor 57 to and through contacts 14<sup>b</sup>, 14<sup>f</sup> and 14<sup>a</sup>, by conductor 58 through contacts 13<sup>a</sup> of limit switch 13, by conductor 59 through winding 54, by conductor 60 through the series field winding of the motor to line L'. On the other hand, with the master switch in its other circuit closing position circuit may be traced

5 from line L by conductor 55 to and through contacts 14<sup>c</sup>, 14<sup>b</sup> and 14<sup>b</sup>, by conductor 57 to and through contacts 14<sup>d</sup>, 14<sup>f</sup> and 14<sup>e</sup>, by conductor 61 to and through contacts 12<sup>a</sup> of limit switch 12, by conductor 59 through winding 54 and thence through the series field of the motor to line L'. Thus movement of the master switch to an intermediate position provides for interruption of all of said circuits to deenergize winding 54 and

35 terminate the power supply to the motor.

What I claim as new and desire to secure by Letters Patent is:

1. In combination, a reversible driving element, an element to be driven thereby in opposite directions, a driving connection between said elements including a member to be respectively restrained and released to render said connection effective and ineffective, an electromagnetic restraining device for said member and means operable by one of said elements upon operation thereof in either direction to a given limit to control said restraining device.

2. In combination, a reversible driving element, an element to be driven thereby in opposite directions, a driving connection between said elements including a member to be respectively restrained and released to render said connection effective and ineffective, an electromagnetic restraining device for said member and circuit controlling means for said device operable by one of said elements after operation thereof in either direction to a given limit to effect releasing operation of said device, said controlling means providing for disconnection of said device from circuit during subsequent idleness of said connection.

3. In combination, driving and driven elements, a driving connection therebetween including a member to be respectively restrained and released to render said connection effective and ineffective, and electromagnetic restraining means for said member controlled by one of said elements for effecting release of said member at given limits and for thereafter restraining said member for effectiveness of said connection upon reverse operation of said driving element.

4. In combination, a reversible driving element, an element to be driven thereby in opposite directions, a driving connection between said elements including a member to be restrained to render said connection effective and to be released to render said connection ineffective, a device movable to different positions to restrain and release said member selectively, said device being biased to one of said positions and electromagnetic means controlled by one of said elements upon operation thereof in either direction to a given limit to move said device to another of said positions.

5. In combination, driving and driven elements, a driving connection therebetween including a member to be restrained to render said connection effective and to be released to render said connection ineffective, a device movable to one position for restraint of said member and to another position for release of said member, said device being biased to one of said positions, electromagnetic means for moving said device to the other of said positions and means operated by one

of said elements to control said electromagnetic means for release of said member at a given limit and for subsequent restraint of said member upon reverse operation of said driving element.

6. In combination, an element to be driven, reversible power driving means therefor to operate the same in opposite directions, a driving connection between said element and said means including a member requiring restraint to render said connection effective, an electromagnetically controlled restraining device for said member and means operated by said element after operation thereof in either direction to a given limit to control the power supply to said driving means and to control said restraining device.

7. In combination, an element to be driven, reversible power driving means therefor to operate the same in opposite directions, a driving connection between said element and said means including a member to be restrained to render said connection effective and to be released to render said connection

ineffective, an electromagnetically controlled restraining device for said member and means operated by said element to control both said driving means and said restraining device to effect release of said member and termination of the power supplied to said driving means upon operation of said element in either direction to a given limit.

8. In combination, an element to be driven, reversible power driving means therefor, a driving connection therebetween including a member to be restrained to render said connection effective and released to render said connection ineffective, limit means for said driving means operable by said element and an electromagnetic restraining device for said member also controlled by said limit means to provide for release of said member at given limits and for subsequent restraint of said member upon reversal of said driving means.

In witness whereof, I have hereunto subscribed my name.

PETER P. DEAN.