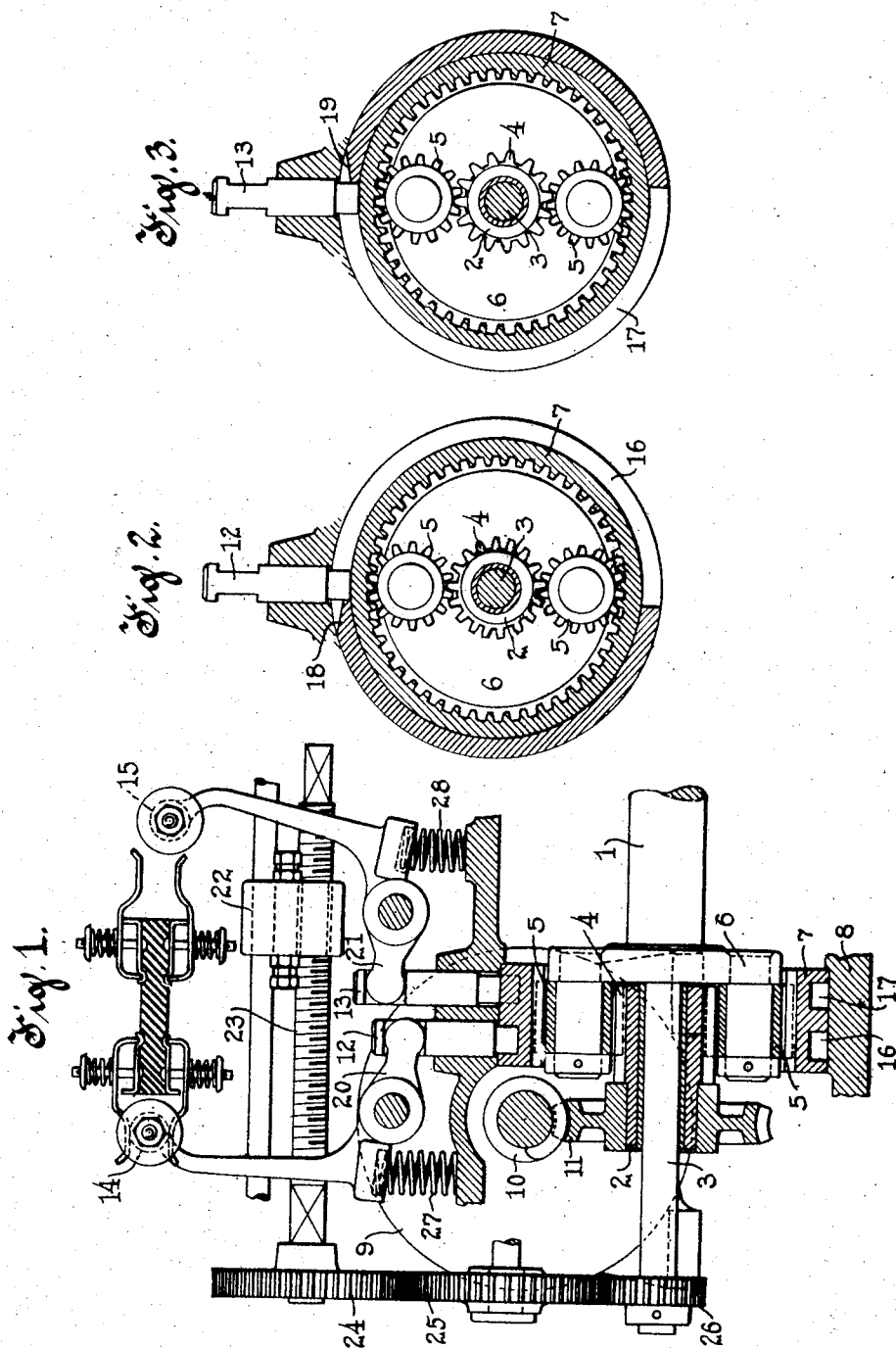


C. T. EVANS.
DRIVING MECHANISM.
APPLICATION FILED NOV. 18, 1918.

1,325,010.

Patented Dec. 16, 1919.



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DRIVING MECHANISM.

1,325,010.

Specification of Letters Patent.

Patented Dec. 16, 1919.

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To all whom it may concern:

Be it known that I, CLARENCE T. EVANS, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Driving Mechanisms, 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.

More particularly the invention relates to control means for driving mechanisms of the type disclosed in Patent No. 1,245,574, granted to Peter P. Dean on Nov. 6, 1917, which includes a normally restrained member releasable to effect substantially instantaneous release of the driven member from the driving member.

One of the objects of the invention is to provide simplified limit means for effecting release of such normally restrained member and also arrest of the driving member.

A further object is to provide limit means of the aforesaid character wherein provision is made to insure against the possibility of the same becoming out of step with the driving mechanism.

Other objects and advantages of the invention will hereinafter appear.

The accompanying drawing illustrates more or less schematically one embodiment of the invention and the same will now be described, it being understood that the embodiment illustrated is susceptible of various modifications falling within the scope of the appended claims.

In the drawing, Figure 1 shows partially in section and partially in elevation the driving mechanism including its control means; and,

Figs. 2 and 3 show in section the normally restrained member in conjunction with its restraining means.

The driving mechanism comprises a driven shaft 1, a hollow driving shaft 2 mounted upon a reduced extension 3 of shaft 1 and a planetary speed reducing gear including a pinion 4 fixed to shaft 2, a plurality of pinions 5 carried by a disk 6 fixed to shaft 1 and an internally toothed ring 7, said pinions 5 being arranged between and in mesh with the pinion 4 and the toothed ring 7. The ring 7 is revolubly mounted in

a bearing 8 and when restrained renders the planetary gear effective as a driving connection between the driving shaft 2 and the driven shaft 1. On the other hand, release of said ring allows rotary play thereof for release of the driven shaft from the driving shaft. As shown, the driving shaft is operable by a motor 9 through a worm 10 and worm wheel 11.

The control means includes two stop plugs 12 and 13 for the ring 7, limit switches 14 and 15 for the motor 9 and means whereby said plugs are selectively operated at given limits to release the ring and to also selectively operate the switches 14 and 15. In these respects the control means is like that disclosed in an application filed by Peter P. Dean on Sept. 10, 1917, Serial No. 190,507, but differs therefrom in respects now to be described.

The ring 7 is provided with two peripheral grooves 16 and 17 to respectively receive the plugs 12 and 13, said grooves in this instance being each limited to approximately one-half the circumference of the ring instead of extending substantially around the ring as in previous mechanisms. As illustrated in Figs. 2 and 3, the grooves are arranged in an opposed relation with a slight overlap thereof whereby with the plugs 12 and 13 alined as shown, both may be projected into their respective grooves at the same time. This provides for locking the ring against rotation in either direction while on the other hand, selective withdrawal of the plugs from their respective grooves provides for release of the ring for rotation in either direction but subject to arrest by the other plug after approximately 180 degrees of rotation. Accordingly each plug so limits the free play of the ring when released by the other plug as to prevent the latter from reëntering its respective groove until the ring is rotated the same number of degrees in a reverse direction. Adjacent to one end of groove 16 the ring has a beveled face 18 and adjacent to one end of groove 17 it has a similar beveled face 19 for a purpose hereinafter set forth.

The plugs 12 and 13 are respectively provided with lifting members 20 and 21 comprising bell crank levers and as illustrated said levers are operable by a traveling nut 22 mounted upon a screw threaded shaft 23 connected by reduction gears 24, 25, and

26 to the extension 3 of driven shaft 1, although it is to be understood that any other preferred type of operating means might be employed.

5 The switches 14 and 15 have their movable contacts fixed to the levers 20 and 21 respectively and said switches are designed for closure by springs 27 and 28 respectively when the plugs connected to their respective
10 levers are set to lock the ring and for opening upon withdrawal of their respective plugs from the grooves in the ring.

With the arrangement described the traveling nut acts upon operation of the
15 driven mechanism to either of two predetermined limits, to operate the levers 20 and 21 selectively for selective withdrawal of the plugs from the grooves in the ring. Assuming operation of the mechanism with
20 the ring held under restraint by the plug 12, and consequent movement of the traveling nut 22 to the left, said nut serves to operate lever 20 at one limit to lift said
25 plug 12. This releases the ring for clockwise rotation (Fig. 2) as soon as said plug clears the lower edge of the inclined surface 18 and when said ring rotates in the direction mentioned said surface 18 lifts
30 the plug 12 to open switch 14. This provides for releasing the driven shaft from the driving shaft and for arresting the motor 9. On the other hand, assuming operation of the mechanism with the ring held under restraint by plug 13, the traveling
35 nut 22 serves to operate the lever 21 at the other limit, to lift said plug 13 with the same result.

Furthermore with the arrangement described the ring when freed acts during its
40 continued rotation in the same direction, and during its return to initial position, to restrain the lifted plug against descent and hence to hold the tripped limit switch in open position. When, however, the ring is
45 returned to initial position the lifted plug is permitted to reënter its respective groove in the ring and is projected thereinto by the spring 27 or 28, as the case may be, such spring also acting to effect reclosure of the
50 tripped limit switch.

Thus it will be apparent that the structure described positively prevents the limit mechanism from becoming out of step with the driven mechanism and also obviates the
55 necessity for the heretofore provided switch latching means and lost motion connections between the plugs and their respective switches.

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

1. In combination, a driving motor, a driven member, a driving connection therebetween including a part subject to operation by said motor and restrainable and releasable to respectively render said connec-
65 tion effective and ineffective and a switch operable by said part when released to arrest said motor, said switch being also restrained by said part against return movement pending reverse operation of the latter.

2. In combination, a driving motor, a driven member, a driving connection therebetween including a rotatable part subject to operation by said motor and restrainable and releasable to respectively render said connection effective and ineffective, a switch operable by said rotatable part when released, to arrest said motor, said rotatable part pending return thereof to a given rotary position also acting to restrain said switch against return movement.

3. In combination, a driving motor, a driven member, a driving connection therebetween including a part subject to operation by said motor and restrainable and releasable to respectively render said connection effective and ineffective, a restraining element for said part operable to release the same and also operable by said part upon operation of the latter and a switch responsive to the latter operation of said element to arrest said motor, said part co-acting with said restraining element to hold said switch against return movement pending return of said part to a given position.

4. In combination, a driving motor, a driven member, a driving connection therebetween including a rotatable part subject to operation by said motor and restrainable and releasable to respectively render said connection effective and ineffective, a restraining element for said rotatable member and a limit switch for said motor operatively connected to said element, said rotatable part having means to actuate said element for operation of said switch when said part is released and for restraint of said switch against return movement pending return of said part to a given rotary position.

5. In combination, a reversible motor, a driven member, a driving connection therebetween including a rotatable part subject to operation by said motor and restrainable and releasable to respectively render said connection effective and ineffective, stop plugs for jointly restraining said rotatable part against rotation in either direction and operable to release said part for rotation in opposite directions selectively, said rotatable part when released coacting with the operated plug to maintain the latter ineffective pending return of said part to a given position.

6. In combination, a reversible motor, a driven member, a driving connection therebetween including a rotatable part subject to operation by said motor and restrainable and releasable to respectively render said
125 connection effective and ineffective and a switch operable by said part when released to arrest said motor, said switch being also restrained by said part against return movement pending reverse operation of the latter.

7. In combination, a driving motor, a driven member, a driving connection therebetween including a rotatable part subject to operation by said motor and restrainable and releasable to respectively render said
130 connection effective and ineffective, a switch operable by said rotatable part when released, to arrest said motor, said rotatable part pending return thereof to a given rotary position also acting to restrain said switch against return movement.

connection effective and ineffective, stop plugs for jointly restraining said rotatable part against rotation in either direction, limit switches for said motor each operatively connected to one of said plugs and means to operate said plugs selectively to free said rotatable part for operation in the opposite direction selectively, each of said plugs when so operated being further operable by said rotatable part for tripping its respective switch and also restrainable by said part for holding its switch against return movement pending return of said part to a given position.

7. In combination, a driving motor, a driven member, a driving connection therebetween including a part subject to operation by said motor and restrainable and releasable to respectively render said connection effective and ineffective, a restraining element for said part operable at a given limit of the driven mechanism to release said part and a limit switch for said motor rigidly connected to said element, said element being operable by said part when released, to operate said switch and to control the return thereof to initial position.

8. In combination, a driving motor, a driven member, a driving connection therebetween including a part subject to operation by said motor and restrainable and re-

leasable to respectively render said connection effective and ineffective, a restraining element for said part operable at a given limit of the driven mechanism to release said part and a limit switch for said motor rigidly connected to said element, said element being operable by said part when released, to operate said switch and to delay its return to initial position pending return of said part to initial position.

9. In combination, a reversible motor, a driven member, a driving connection therebetween including a rotatable part subject to operation by said motor, stop plugs for jointly restraining said rotatable part against rotation in either direction, said part having grooves to receive said plugs and inclined faces to actuate said plugs, limit switches for said motor operable by said part through the medium of said plugs and means for selectively withdrawing said plugs from their respective grooves in said rotatable part to free said part for operation in opposite directions selectively, each of said plugs limiting the free rotation of said part to prevent reentry of the withdrawn plug pending reverse rotation of said part.

In witness whereof, I have hereunto subscribed my name.

CLARENCE T. EVANS.