

April 19, 1960

S. NEWBERY
MANUALLY AND AUTOMATICALLY ACTUABLE
VALVES OR OTHER DEVICES

2,932,978

Filed Sept. 23, 1957

2 Sheets-Sheet 1

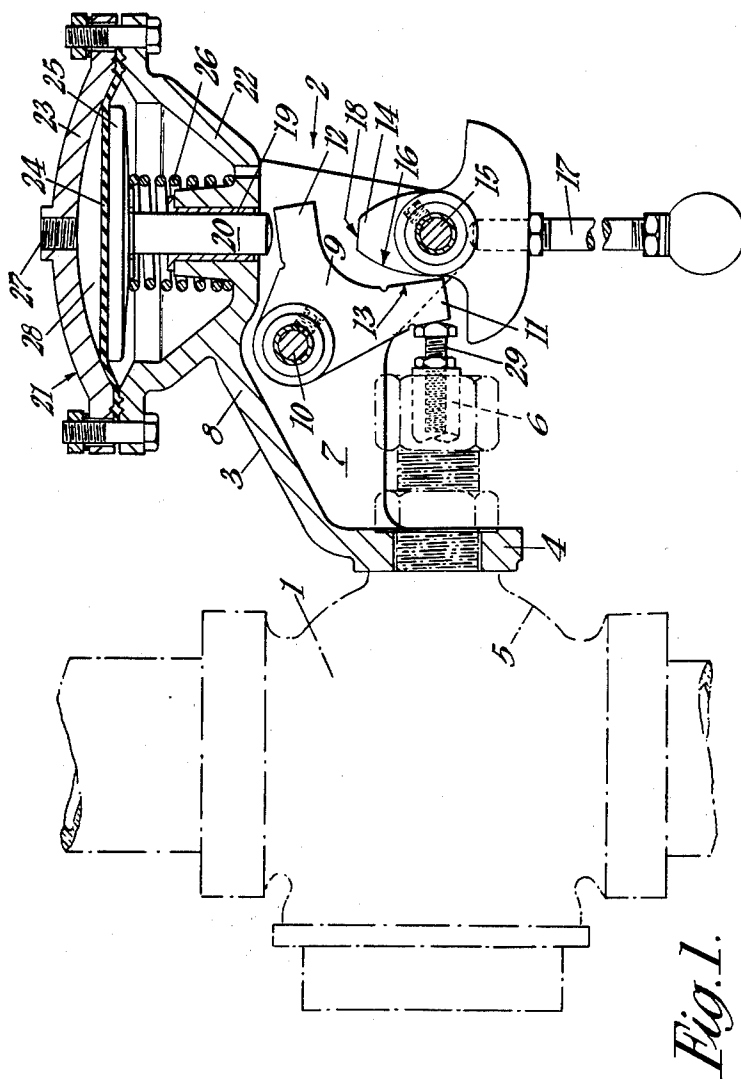


Fig. 1.

Inventor
S. Newbery
By *Glaser & Downing*
Attys.

April 19, 1960

S. NEWBERY
MANUALLY AND AUTOMATICALLY ACTUABLE
VALVES OR OTHER DEVICES

2,932,978

Filed Sept. 23, 1957

2 Sheets-Sheet 2

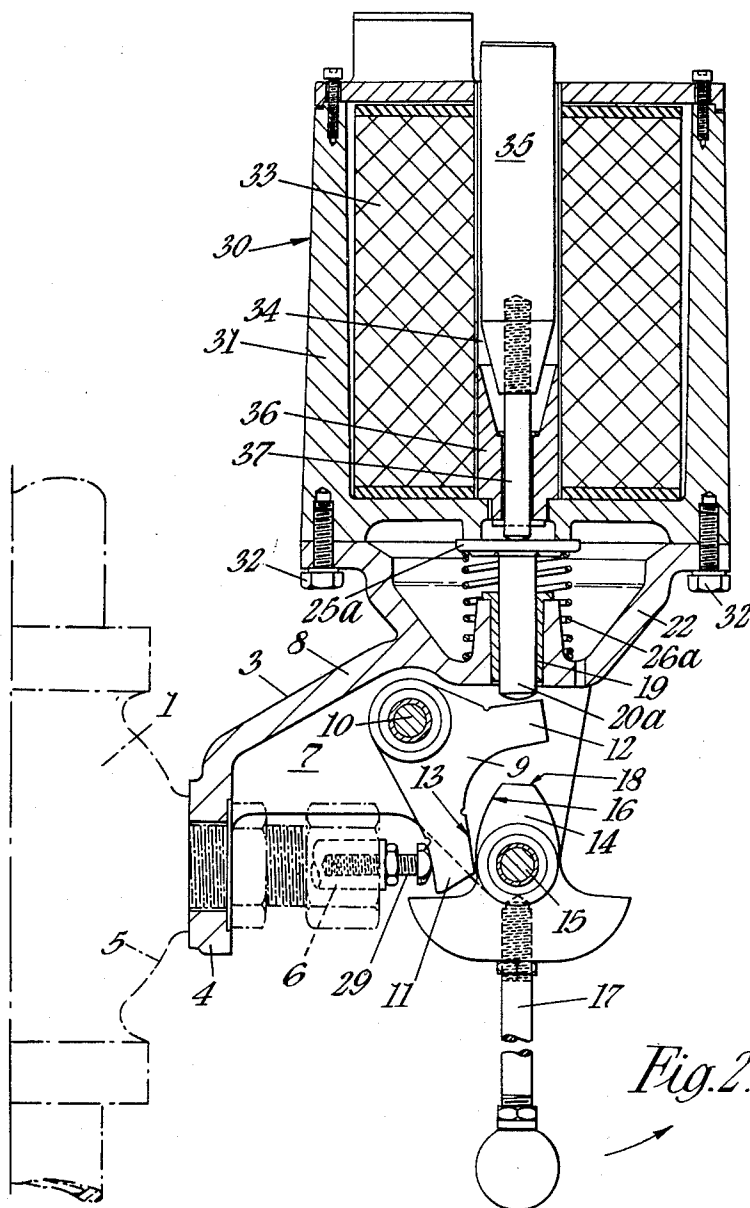


Fig. 2.

Inventor
S. Newbery
By Glasgow Downing Peabody
Attys.

1

2,932,978

MANUALLY AND AUTOMATICALLY ACTUABLE VALVES OR OTHER DEVICES

Stanley Newbery, New Barnet, England, assignor of one-half to Stanley Newbery Limited, New Barnet, England

Application September 23, 1957, Serial No. 685,553

Claims priority, application Great Britain
September 28, 1956

1 Claim. (Cl. 74—479)

This invention relates to mechanisms for actuating valves or other control devices having reciprocatory operation and has for its aim the provision of a mechanism which can be attached to a valve or other control device and which enables the valve or other device to be either manually actuated or actuated automatically through motor actuator means such as a hydraulic or pneumatic diaphragm or piston device or an electric solenoid.

A further aim of the present invention is to provide a mechanism as set out above, in which the manual actuator means and the automatic actuator means are operationally independent so that, for example, manual actuation does not upset or damage the automatic means.

A still further aim of the present invention is to provide a mechanism as set out in the two preceding paragraphs in which the automatic actuator means operates through means which provide a mechanical advantage enabling the automatic actuator means to operate on a short throw/high power basis, which basis is particularly advantageous in the case of solenoid operation.

The invention consists in mechanism for actuating valves or other control devices having reciprocatory operation comprising a bracket adapted to be mounted on or adjacent the valve or other device, a lever of the first order pivotally mounted on the bracket so that one arm (first) is locatable against the reciprocatory part operating the valve or other device, manually turnable cam, eccentric or equivalent means pivotally mounted on the bracket so that, on being turned manually, the means bear on the lever and cause it to pivot in a valve (or other device) operating direction and means for mounting motor actuator means (such as a hydraulic or pneumatic diaphragm or piston device or a solenoid) so that the thrust member thereof operatively bears on the other (second) arm of the lever, when actuated, to cause the lever to pivot and apply pressure through its first arm to the valve (or other device) reciprocatory part.

The invention further consists in actuating mechanism, according to the preceding paragraph, wherein the lever of the first order is a two-armed lever, preferably a bell-crank lever, and the manually turnable cam, eccentric or equivalent means is adapted to engage a portion of the same arm of the lever as is locatable against the reciprocatory part of the valve or other device.

The invention still further consists in actuating mechanism, according to the preceding paragraphs, wherein the motor actuating means is mounted to one side of the axis of reciprocatory operation of the valve or other device and has its axis of actuating movement transverse to said reciprocatory axis.

The invention still further consists in actuating mechanism, according to the preceding paragraphs, wherein the manually turnable means for causing the lever to pivot to operate the valve (or other device) comprises cam surface for effecting pivotal movement of the lever and a flat surface at the termination of the cam surface which can abut against the adjacent lever surface so as to hold

2

the manually turnable means in its actuating position by the pressure between the lever surface and the flat surface.

Farther, according to the present invention and the preceding paragraph, the motor actuating means preferably has an effective operating stroke of such length and/or the lengths of the lever arms are so arranged that when the lever is caused to pivot and operate the valve (or other device) the first arm of the lever is finally disposed with respect to the manually turnable means so that the flat surface on said latter means and the adjacent lever surface are spaced apart, if and when the manually turnable means are operated while the automatic motor actuating means are in operation, so that the manually turnable means will not be held in position as previously described and the possibility of accidentally maintaining the valve (or other device) actuated, through the manual means after the automatic means is released, is avoided.

In the accompanying drawings:

Figure 1 is a sectional side elevation of an hydraulic or pneumatic actuating mechanism, according to the present invention, associated with a reciprocatory valve, and

Figure 2 is a sectional side elevation of an electrically operated actuating mechanism, according to the present invention, associated with a reciprocatory valve.

In carrying the invention into effect according to one mode, by way of example, as applied to a reciprocatory valve indicated at 1, the actuating mechanism 2 comprises a bracket 3 of generally U-shaped cross-section having an apertured flange 4 at one end for securing the bracket 3 on to, say, a valve body 5 of the valve 1 actuated by a reciprocatory plunger 6, so that the bracket 3 is mounted with its U-section extending channel-wise astride the axis of the valve plunger 6, so that the side walls 7 of the bracket 3 are in effect channel flanges and the base 8 of the U the channel web.

Between the bracket side wall flanges 7 a lever 4 of the first order in the form of a bell crank is pivotally mounted on a shaft 10 so that one arm 11 extends transversely of the axis of the valve plunger 6 and engages the end of the valve plunger 6 while the other lever arm 12 extends in a direction generally parallel to and alongside the axis of the plunger 6. By this arrangement forces causing the bell crank lever 9 to pivot cause the valve plunger 6 to be operated.

Generally in line with the axis of the valve plunger 6 and adjacent the surface 13 of the arm 11 of the crank lever 9, is a cam block 14 pivotally mounted on a shaft 15 between the bracket side wall flanges 7, or lug-like extensions 15 thereof, so that on pivoting the cam surface 16 of the block 14 bears on the adjacent surface 13 of the bell crank lever arm 11 and causes the bell crank lever 9 to pivot and operate the valve plunger 6.

The cam block 14 is manually turned or pivoted and to this end a manual handle or lever 17 is operatively secured thereto, so providing manual actuating means for the valve 1. In order to hold the valve plunger 6 down in its actuated position, the cam block 14 has a flat surface 18 adjacent its cam surface 16 so that when the cam block 14 has been turned by the manual handle or lever 17 to its full actuating position (say through 90°) the flat surface 18 abuts against the adjacent (flat) surface 13 of the bell crank lever arm 11 and is held there by the reactive pressure of the valve plunger 6 so that the valve remains actuated until the manual actuation is removed by oppositely rotating the cam block 14 and the abutting flat surfaces 18 and 13 respectively on the cam block 14 and lever arm 11 become disassociated.

In the web part 8 of the bracket 3 adjacent to the end of the other bell-crank lever arm 12 an aperture 19 is provided through which an actuator 20 (post, plunger

or the like) of a motor actuating means 21, shown in Figure 1 as a pneumatic or hydraulic diaphragm, can pass to engage the bell-crank lever second arm 12. While a separate motor actuating means 21 and housing therefor can be secured as a unit to the web part 8 of the bracket 3 adjacent the aperture 19 in a manner not shown, it is preferred that the motor actuating means 21 and housing 22 may be made integral with the web part 8 of the bracket 3 as illustrated.

The hydraulic or pneumatic motor actuating means 21, as illustrated, is generally conventional and comprises the housing part 22 (formed as mentioned with the bracket 3) and a top cover 23, between which is clamped a diaphragm 24 which acts on the head 25 of the actuator post 20 which is loaded by a spring 26; an inlet 27 to a chamber 28 is provided for the actuating fluid in known manner. When the motor actuating means 21 is operated, its actuator post or plunger 20 is caused to bear on the arm 12 of the bell crank lever 9 so that the latter pivots and presses with its other arm 11 on the valve plunger 6 to actuate the same. The effective operating stroke of the motor actuating means post or plunger 20 is preferably of such length and/or the lengths of the lever arms 11 and 12 of the bell crank lever 9 are so arranged, that when the bell crank lever 9 is caused to pivot and operate the valve plunger 6, the arm 11 of the lever 9 is finally disposed with respect to the cam block 14 of the manually turnable means so that the above-described flat surfaces 13 and 18 respectively on the lever arm 11 and the cam block 14 are spaced apart so that the cam block 14 (and manual actuator means 17) cannot (if applied) be accidentally retained in position to hold the valve plunger 6 actuated in the event the motor (automatic) actuator means 21 is released.

Further the relative lengths of the two arms 11 and 12 of the bell-crank lever 9 are preferably so chosen so as to give a mechanical advantage, e.g. 2 to 1 (see Figure 2), to the motor actuating means 21 so that the latter can employ a short powerful stroke; this is particularly advantageous where the motor actuating means 21 is a solenoid as described below. Thus, for example, where the total travel of the valve plunger 6 is, say, $\frac{1}{4}$ inch, a 2 to 1 bell-crank lever 9 would require that the stroke of the motor actuating means post or plunger 20 need only be $\frac{1}{8}$ inch.

In Figure 2 of the drawings there is shown the same device as in Figure 1 but with solenoid operation; equivalent parts have been given the same references and are not redescribed. In place of the hydraulic or pneumatic motor actuating means 21, shown in Figure 1, a solenoid actuating means 30 is mounted on the housing part 22 of the bracket 3. The solenoid actuating means 30, as illustrated, is generally conventional and comprises a mounting casing 31, by which it is secured by bolts 32 to the housing part 22, enclosing a solenoid, winding 33 surrounding an axial passage 34 in which a solenoid armature 35 is axially displaceable in known manner; a block 36 is disposed at the lower end of the passage 34 to limit the downward movement of the armature 35 and through the block 36 passes an actuating post 37 secured in the end of the armature 35 to contact and operate the head 25a of the actuator post or plunger 20a which is responsible for operating the bell crank lever 9 as described previously. A loading spring 26a is provided to act against the head 25a of the actuator post or plunger 20a. The solenoid operated device functions in the same manner as described, with reference to Figure 1, as the hydraulically or pneumatically operated device.

In order to provide for adjustment of the operation of the valve plunger 6, an adjustable contact bolt 29 (see Figures 1 and 2) is provided in the head of the plunger 6 and it is against this bolt 29 that the arm 11 of the bell crank lever 9 operates.

I claim:

In or or a valve having a reciprocatory operating spring-loaded plunger, mechanism for actuating said valve comprising a bracket adapted to be mounted on said valve, a bell-crank lever having a first arm and a second arm, means pivotally mounting said bell-crank lever on said bracket so that said first arm on pivoting engages the end of said spring-loaded plunger, manually turnable cam means, a pivot shaft for said manually turnable cam means on which the cam means are freely pivotal, means weighting the cam means so that it normally lies in an inoperative position, the cam means being pivotally mounted by said pivot shaft on said bracket so that, on being turned manually, the cam means engages and displaces said first arm of said bell crank lever and causes the same to pivot and operate said spring-loaded plunger of the valve, motor means for alternatively operating said plunger of the valve, a plunger member in said motor means axially displaceable a fixed distance of throw by said motor means, and means for mounting the motor means on said bracket such that the end of the plunger member thereof operatively bears on the second arm of the bell-crank lever whereby, on operation of the motor means, the plunger member is moved axially over its fixed throw and causes the bell crank lever to pivot and apply operating force through its first arm to the spring-loaded plunger of the valve to operatively displace the same, wherein the contour of said manually turnable cam means is such that the maximum distance between the axis of the pivotal shaft of said cam means and the operative cam surface thereof is less than the distance between said axis and the adjacent surface of the first arm of said bell-crank lever, when the latter has been caused to pivot by axial movement of said plunger member of said motor means to operate the valve plunger, the arrangement being such that if the manually operated cam means is operated while the motor means is operating, the manually operated cam means swings due to its weighting means back to an inoperative position thereby preventing the accidental maintaining of the valve plunger in its actuated position after the motor means ceases operation.

References Cited in the file of this patent

UNITED STATES PATENTS

Re. 24,321	Ray	May 28, 1957
1,260,775	Jones	Mar. 26, 1918
2,167,266	Kimball	July 25, 1939
2,189,475	Saur	Feb. 6, 1940
2,211,664	Leibing	Aug. 13, 1940
2,213,412	Roskopf et al.	Sept. 3, 1940
2,239,774	Blanchard	Apr. 29, 1941
2,247,309	Robison	June 24, 1941
2,410,966	Eaton	Nov. 12, 1946
2,630,832	Lutherer	Mar. 10, 1953
2,637,332	Langworthy	May 5, 1953
2,692,113	Larkin	Oct. 19, 1954
2,774,374	Schneider	Dec. 18, 1956
2,862,684	Ander	Dec. 2, 1958