

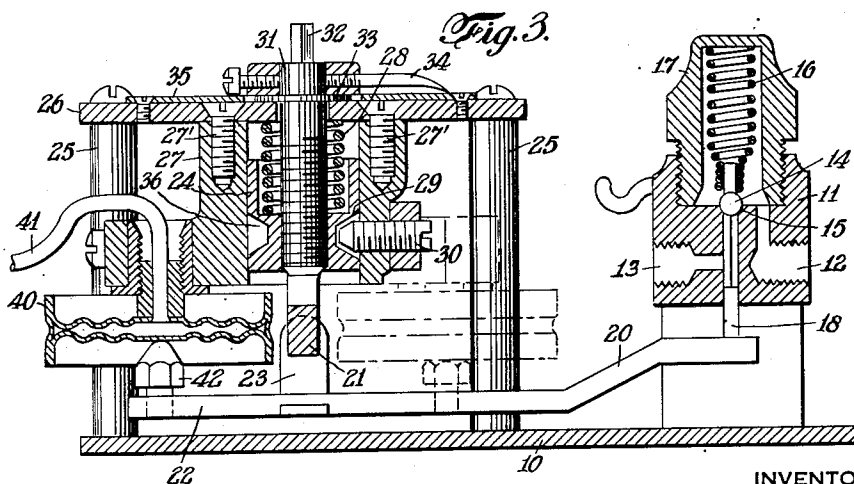
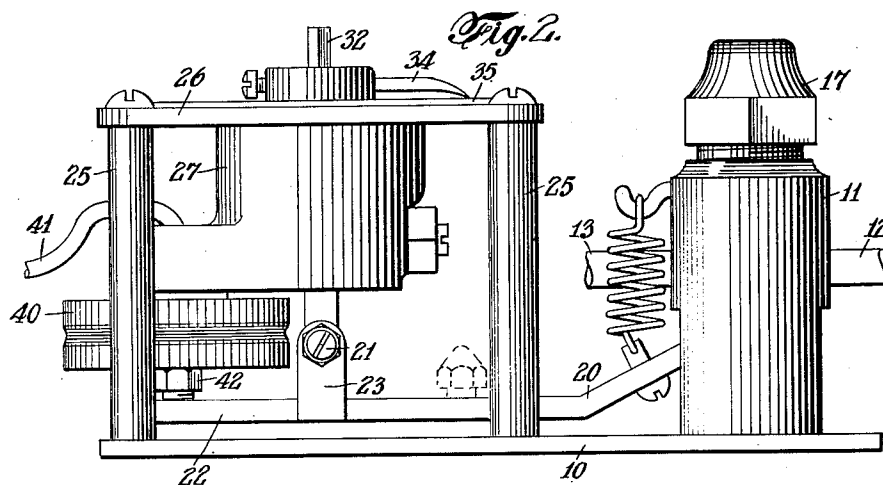
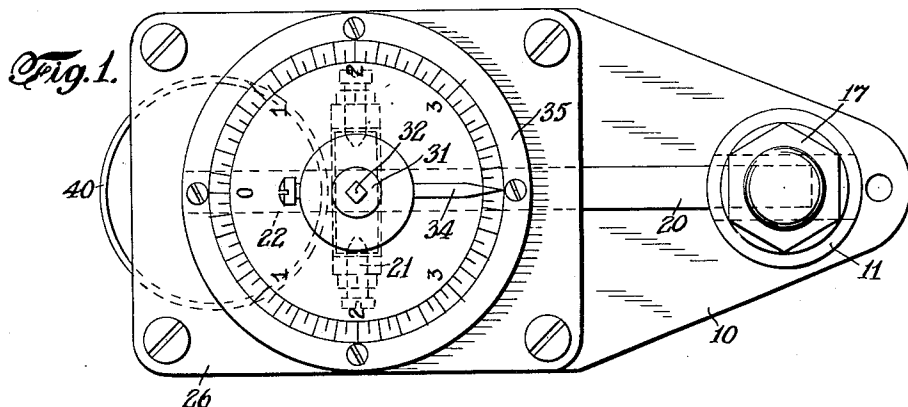
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REVERSIBLE CONTROLLER UNIT

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REVERSIBLE CONTROLLER UNIT

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The invention relates to control apparatus operating under the influence of a variable condition to control through a valve-operated member a further condition or device. Apparatus of this character generally comprises a lever-actuated valve unit for controlling the flow of fluid medium, with the said lever maintained under the influence of a member affected by the primary controlling condition.

It is the object of the present invention to so construct and arrange a controller unit of the aforesaid character that the lever actuating the valve unit may be changed from a lever of one order to one of another order without disturbing the position of its fulcrum or the ratio of its two arms. A reversal in the action of said lever upon the valve unit may thereby be effected.

In carrying out the invention, provision is made for so mounting a lever that its one end will engage with and actuate a suitable valve device for controlling a fluid medium, while its opposite end is designed to be acted upon by a suitable member under the influence of some condition which is to affect the flow of the fluid medium through said valve unit. This influenced member is, furthermore, so mounted as to be capable of revolution about the fulcrum as an axis for reengagement with the lever at a position intermediate its said fulcrum and the valve-actuating end. By this expedient, the position of the fulcrum of the lever remains undisturbed and the ratio of its arms is unaffected notwithstanding the fact that the order of the lever has been changed so that it will operate in reverse manner with respect to its actuation of the valve unit.

Provision has, furthermore, been made for effecting a slight adjustment of the fulcrum in a direction parallel to the movement of its actuating end.

The nature of the invention, however, will best be understood when described in connection with the accompanying drawings, in which:

Fig. 1 shows the novel unit in plan.

Fig. 2 is a front elevation thereof.

Fig. 3 is a longitudinal section through the unit.

Referring to the drawings, 10 designates a suitable supporting base upon which is mounted a valve unit 11 having the inlet 12 and outlet 13 for a suitable fluid medium designed to control or affect some external condition or apparatus, as is well understood. The flow of the fluid medium through the valve 11 is controlled by a suitable valve piece as the ball 14, held normally to its seat 15 by a spring 16 acting thereon and mounted in a removable head 17 of the valve unit. A stem 18 from said valve piece 14 is adapted to be elevated to lift it off its seat and permit the flow of fluid medium through the valve unit, said stem to this end being engaged by the one arm 20 of a lever, whose fulcrum is at 21, and which has also the arm 22 extending in the opposite direction from said fulcrum.

The lever comprising the arms 20, 22 and fulcrum 21 is carried also upon the supporting base 10 by being pivotally mounted, through a yoke 23 of the lever, to a nut 24. Nut 24, moreover, is capable of a slight axial adjustment to raise and lower the fulcrum 21, and is mounted on the base 10 in the following manner. Suitable supporting posts 25 extend upwardly from the base and have removably secured thereto at the top a cover plate 26 from which depends a revoluble tubular or body member or collar 27 and within the lower portion of which is mounted the said nut 24. The said body member 27 is held to the cover plate by means of removable screws 27' counter-sunk in the cover plate and normally rigidly securing the body member in position.

Nut 24 is slidably mounted in the said body member and is recessed at its inner end to receive and retain a coil spring 28 compressed between the nut and underface of the cover plate 26 to urge outwardly, or downwardly, the said nut. Motion thereof, however, is limited through engagement of an elongated groove 29 in the periphery of the nut with a stop screw 30 carried by the body member.

Passing axially through the nut 24 is a screw 31 having the squared outer end 32 pro-

jecting beyond the cover plate and adapted to receive a suitable wrench for rotating the screw. Said screw, moreover, is provided beyond the cover plate with an integral flange 33 adapted to contact with its outer surface; and there is secured also to said outer or head portion of the screw a suitable indicating arm or pointer member 34 designed to afford an indication of the degree of adjustment of said screw, as with reference to the graduations of a plate 35 secured to the top of the cover plate 26.

By rotating the screw counter-clockwise (looking downwardly upon the controller unit) the fulcrum 21 will be depressed due to the action of the spring 28, which is under compression; and the axial adjustment may be continued until limited by the engagement of the stop screw 30 with the upper end of the groove 29, the said stop screw also preventing rotation of the nut and allowing of its axial movement. The force exerted by spring 28, which is considerable, holds the flange 33 against the cover plate 26 and secures the screw in adjusted position over the range permitted by the groove 29. When nut 24 has been adjusted as aforesaid to cause the fulcrum to reach the lower limit of travel, as allowed by engagement of the stop screw with the end of the groove, the thrust of the spring is then carried by said stop screw and any further rotation of the screw will merely cause it to move axially upward. This introduces no objectionable features as the limit of the required adjustment has already been attained.

By rotating the screw clockwise, the said fulcrum will correspondingly be elevated until the nut 24 reaches the upper limit of travel permitted through the stop and groove engagement, where no further rotation of the screw can take place. By means of the foregoing adjustment, the stem 18 of valve 14 may be suitably set with reference to the lever arm 20 for the desired control of the fluid medium passing through said valve.

The nut 24, furthermore, is provided with a similar groove 36 which is located diametrically opposite the groove 29; and the collar 27 at said latter grooved nut portion has securely attached thereto a responsive member 40 adapted to be subject to some external condition to move the lever through one of its arms as in being in contact therewith.

For example, the member 40 may comprise a pressure-actuated diaphragm element containing a fluid medium subject to some external condition, as through an intermediate tube connection 41, to cause said diaphragm element to expand or contract in accordance with the variations of the external condition.

In order to communicate the movement of the diaphragm element to the lever, an adjustable stud 42 is secured in the arm 22 of the lever bearing with its pointed end pref-

erably at the center of said diaphragm element. Opposite arm 20 of the lever will then respond accordingly, and will control thereby the position of valve 14 with respect to its seat 15.

If it be desired to make the valve unit reverse-acting rather than direct-acting, the arrangement hereinbefore described is such that it is necessary merely to revolve the collar 27 about nut 24 through 180°, that is to say until the screw 30 registers with the groove 36. To effect this change, the top plate, of course, must first be removed as well as the screws 27', so that the collar 27 will be free to revolve; and arm 22 of the lever is pressed downwardly to permit of removal of stud 42 which is reinserted then in the arm 20 and a like distance from the fulcrum or, of course, a separate stud may be provided in the arm 20. The body portion with attached diaphragm element is then swung around to its new position (indicated by the broken lines), arm 20 being depressed and then released to allow the stud end to contact with the diaphragm element. The latter thus acts in its new position on the opposite side of the fulcrum 21, providing a lever of a different order so that the action on the valve unit is the reverse of that with the diaphragm element in its previous position. However, the ratio of the arms has not been disturbed.

I claim:

1. The combination with a valve unit, a lever for actuation of the same, and a member adjustable independently of the lever controlled by some external condition; of means for mounting said controlled member to adapt the same for engagement with the lever alternatively in positions upon opposite sides of its fulcrum.

2. In combination: a valve unit, a lever for actuation of the same, and a member controlled by some external condition and comprising a revolvable body portion, a member secured thereto and responsive to an external condition, and means for effecting contact between said member and the lever alternatively upon opposite sides of its fulcrum.

3. In combination: a valve unit, a lever for actuation of the same, and a member controlled by some external condition comprising a central, relatively fixed member pivotally carrying said lever, a collar rotatable thereon over 180° and adapted to be fixed relatively thereto, said relatively fixed member having peripheral grooves disposed 180° apart, a stop screw carried by the collar adapted for registry with one or the other of the said grooves, and a member responsive to an external condition secured to the said collar and adapted for engagement with the lever in either of the positions corresponding with the said grooves.

4. In combination: a valve unit, a lever for actuation of the same, and a member con-

trolled by some external condition comprising a centrally disposed screw, a nut in threaded engagement therewith, a relatively fixed cover plate through which said screw
5 freely passes, a spring included between the nut and cover plate, said screw being provided with a flange bearing against the outer face of the cover plate and said nut with peripheral grooves 180° apart, a collar adapted
10 to be secured to the cover plate and rotatable on said nut over 180°, a stop screw carried by the collar adapted for registry with one or the other of the said grooves, and a member responsive to an external condition
15 secured to the said collar and adapted for engagement with the lever in either of the positions corresponding with the said grooves.

5. In combination: a valve unit, a lever for actuation of the same, and a member controlled by some external condition comprising
20 a centrally disposed screw, a nut in threaded engagement therewith, a relatively fixed and graduated cover plate through which said screw freely passes, a spring included between the nut and cover plate, said
25 screw being provided with a flange bearing against the outer face of the cover plate, the said nut being provided with peripheral grooves 180° apart, a collar adapted to be secured to the cover plate and rotatable on
30 said nut over 180°, a stop screw carried by the collar adapted for registry with one or the other of the said grooves, a member responsive to an external condition secured to the said collar and adapted for engagement
35 with the lever in either of the positions corresponding with the said grooves, and a pointer element rotatable with the screw over the graduated cover plate.

40 In testimony whereof I affix my signature.
ARTHUR R. MABEY.

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