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2,697,599

VALVE OPERATING MECHANISM

Filed April 24, 1952

2 Sheets-Sheet 1

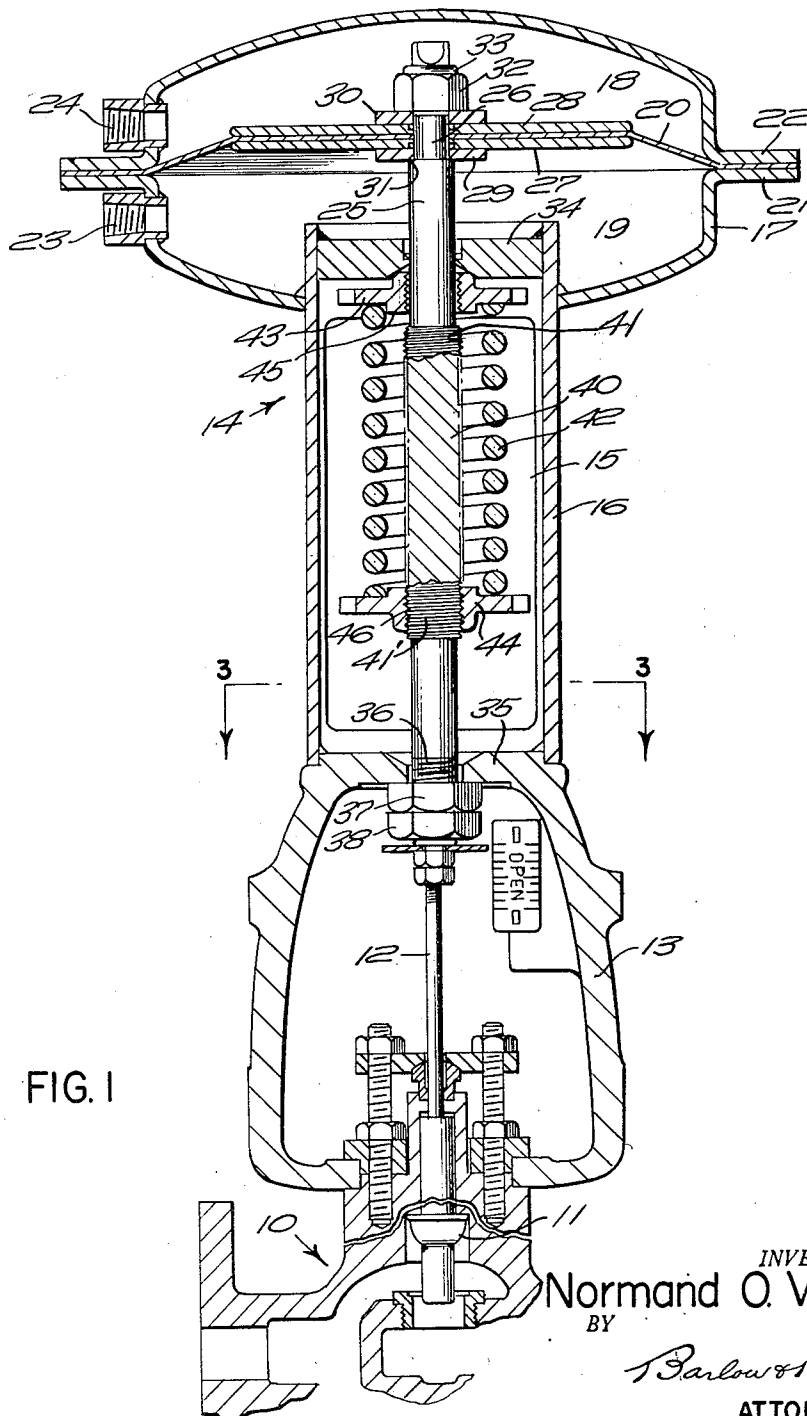


FIG. 1

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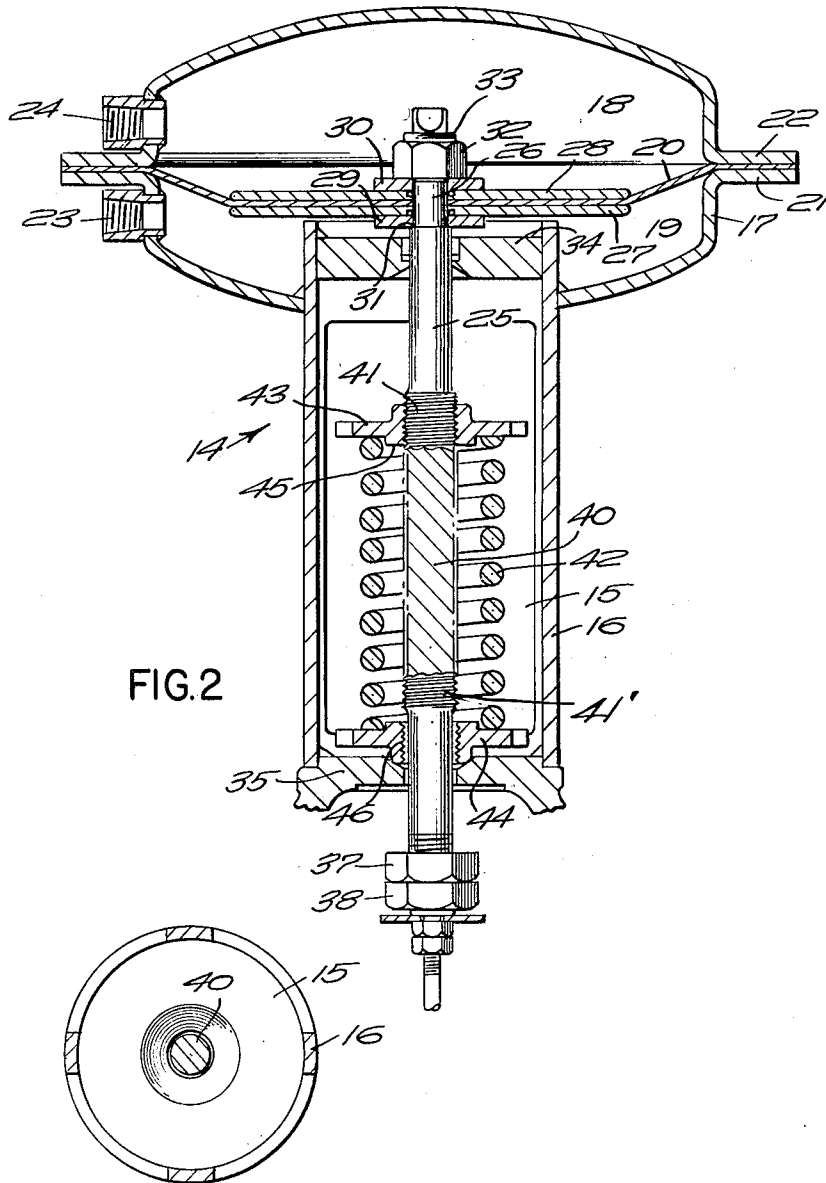


FIG. 2

FIG. 3

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VALVE OPERATING MECHANISM

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2 Claims. (Cl. 267—1)

This invention relates to a motor operated valve of the type in which some power such as fluid is utilized for the movement of the valve in one direction and a spring is utilized for the operation of the valve in the other direction.

Heretofore it has been found desirable in the use of such a valve to have a spring close the valve and some power means to open the valve for one purpose, whereas with the same valve on other work it would be desirable to have the spring open the valve and some power to close the valve. This has usually been accomplished by valves of different design.

One of the objects of this invention is to provide an arrangement so that by simple adjustment the spring may be used for either opening the valve or for closing the valve, while the motor means may be so shifted that its application of power will be in one direction or in the other direction in opposition to the action of the spring.

Another object of this invention is to provide an arrangement which merely requires releasing a member at one end of the spring and securing a member at the other end of the spring for accomplishing the desired selective movement in which a shaft will be axially urged.

With these and other objects in view, the invention consists of certain novel features of construction as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is a sectional view showing the valve operating motor, the intermediate structure, and the valve diagrammatically and illustrating the spring as arranged to move the shaft which is connected to the valve stem downwardly;

Figure 2 is a view similar to Figure 1 with the lower parts omitted but illustrating the spring as arranged to move the valve operating shaft upwardly under action of the spring; and

Figure 3 is a section on line 3—3 of Figure 1.

In proceeding with this invention, I surround the axially movable shaft which is operated by the motor with a spring which will have abutment members engageable with the opposite ends of the spring. These abutment members are arranged for attachment to the shaft so that when the lower abutment member is attached to the shaft, the spring will act on this lower abutment member at one end and will act against an end wall of the casing or chamber through which the shaft extends so as to move the shaft downwardly, whereas if I release the lower abutment member from the shaft permitting it to engage the lower end wall of the chamber and secure the upper abutment member to the shaft, then the spring will act to force the shaft upwardly. Thus by selecting which of the abutment members I secure to the shaft, I may control the direction in which the spring operates. The motor which is provided at the upper end of the shaft has a diaphragm or some movable part upon which fluid may act so as to move the diaphragm in either an up direction by applying fluid pressure beneath it or in a down direction by employing fluid pressure above the diaphragm.

With reference to the drawings, 10 designates an opening in which a valve plug 11 is located with a stem 12 extending upwardly from the plug for operating the valve. This stem extends through the intermediate structure 13 upon which a motor structure designated generally 14 is superimposed.

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This motor structure 14 comprises a spring chamber designated generally 15 formed by the cylindrical shells 16 having open sides and a fluid chamber 17 divided into an upper compartment 18 and a lower compartment 19 by diaphragm 20 which is sealed between the two halves of the shell 17 between the flanges 21 and 22. Pressure may be applied to the compartment 19 through the opening 23 or applied to the compartment 18 through the opening 24. When pressure is applied to one of these compartments, the other compartment may be left open to atmosphere in order that it may readily exhaust or draw in air as occasion may require.

A shaft 25 is secured to the diaphragm by being reduced as at 26, which reduced portion passes through buttons 27 and 28 on either side of the diaphragm and which buttons are backed up further by washers 29 and 30, the whole being forced against the shoulder 31 formed by the different sizes of the shaft by a nut 32 engaging threads 33 on the end of the shaft.

This shaft passes through the end walls 34 at the upper end of the spring casing 16 and the end wall 35 at the lower end of the casing 16 where it is secured to the stem 12 which may be threaded into an opening in the end of the shaft 25. Threads 36 on the end of the shaft also support a nut 37 for limiting the upward movement of the shaft, while a check nut 38 is also secured on these threads to hold the nut 37 in position.

Intermediate the ends of the shaft along the portion 40 the shaft is of greater diameter and is threaded at the ends of this larger portion as at 41, 41'. Also surrounding the shaft intermediate its ends there is a spring 42 which may engage with abutment members 43 at its upper end and 44 at its lower end. These abutment members are disks which have threaded hubs 45 and 46 to thread on to the threads 41, 41' of the shaft 25.

If it is desired that the spring shall exert its force to move the shaft 25 downwardly and consequently the stem downwardly, I then screw the abutment member 44 on to the threads 41' at the lower end of the enlarged portion 40, leaving the plate 43 free on the shaft which thus will be forced upwardly against the wall 34 and the action of the spring will then by pressing against the fixed wall 34 move the shaft downwardly (Fig. 1).

If it is desired that the spring act to move the shaft upwardly, I then thread the member 43 on to the threads 41 at the upper end of the enlarged portion 40, as shown in Figure 2, and unscrew and leave the abutment member 44 free of the shaft so that it moves downwardly against the end wall 35 and thus the spring action will be so as to force the shaft 25 upwardly.

Pressure may be applied either to the chamber 18 or chamber 19 to oppose the action of the spring in the direction in which it is selected the same shall operate. By this arrangement and simple adjustment I may select whether the spring will operate the valve upwardly or downwardly, and I may also choose whether the power applied may move the valve upwardly or downwardly against the spring action.

I claim:

1. Valve operating means comprising a spring chamber having spaced walls, a shaft in said chamber extending through said walls, a spring in said chamber surrounding said shaft, abutment members, one engaged by one end of the spring and the other engaged by the other end of the spring, and means to selectively secure either of said abutment members to the shaft comprising a portion on said shaft within said chamber and an opening through each abutment member cooperating with said portion to have tight interlocking engagement therewith, said shaft at either end of said portion being of a smaller size to permit said members to freely slide therealong whereby, by leaving the other abutment member free to engage the end wall nearest it, the spring may act to urge the shaft in the desired selected axial direction.

2. Valve operating means comprising a spring chamber having spaced walls, a shaft in said chamber extending through said walls, a spring in said chamber surrounding said shaft, abutment members, one engaged by one end of the spring and the other engaged by the other end of the spring, and means to selectively secure either of

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said abutment members to the shaft comprising a threaded shaft and a threaded opening through each abutment member of a size to have threaded engagement with the threaded shaft, said shaft having a portion at either end of the threaded portion of a size to permit said members to freely slide therealong whereby, by leaving the other abutment member free to engage the end wall nearest it, the spring may act to urge the shaft in the desired selected axial direction.

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