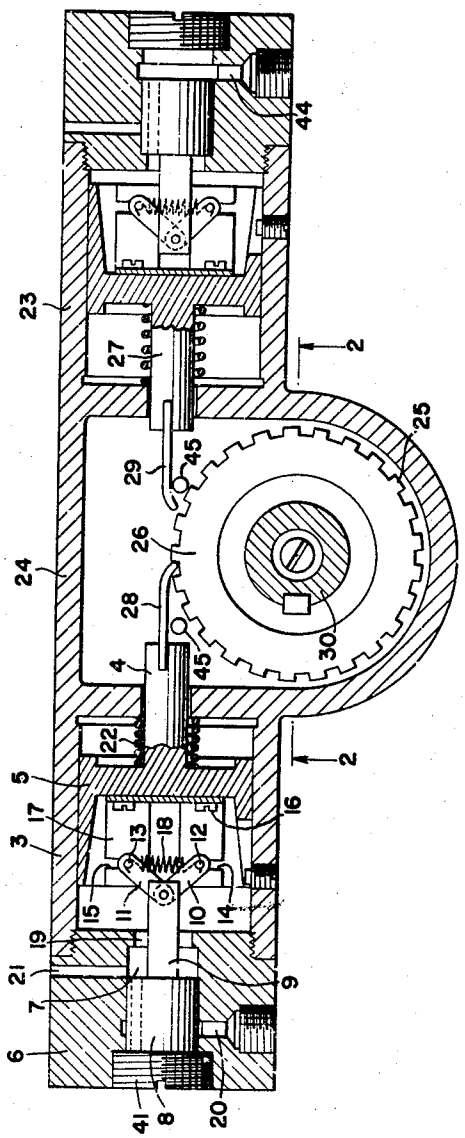
July 1, 1958 C. G. HÅRD AF SEGERSTAD 2,841,119

OPERATING MECHANISM

Filed April 26, 1950 2 Sheets-Sheet 1

FIG. 1.



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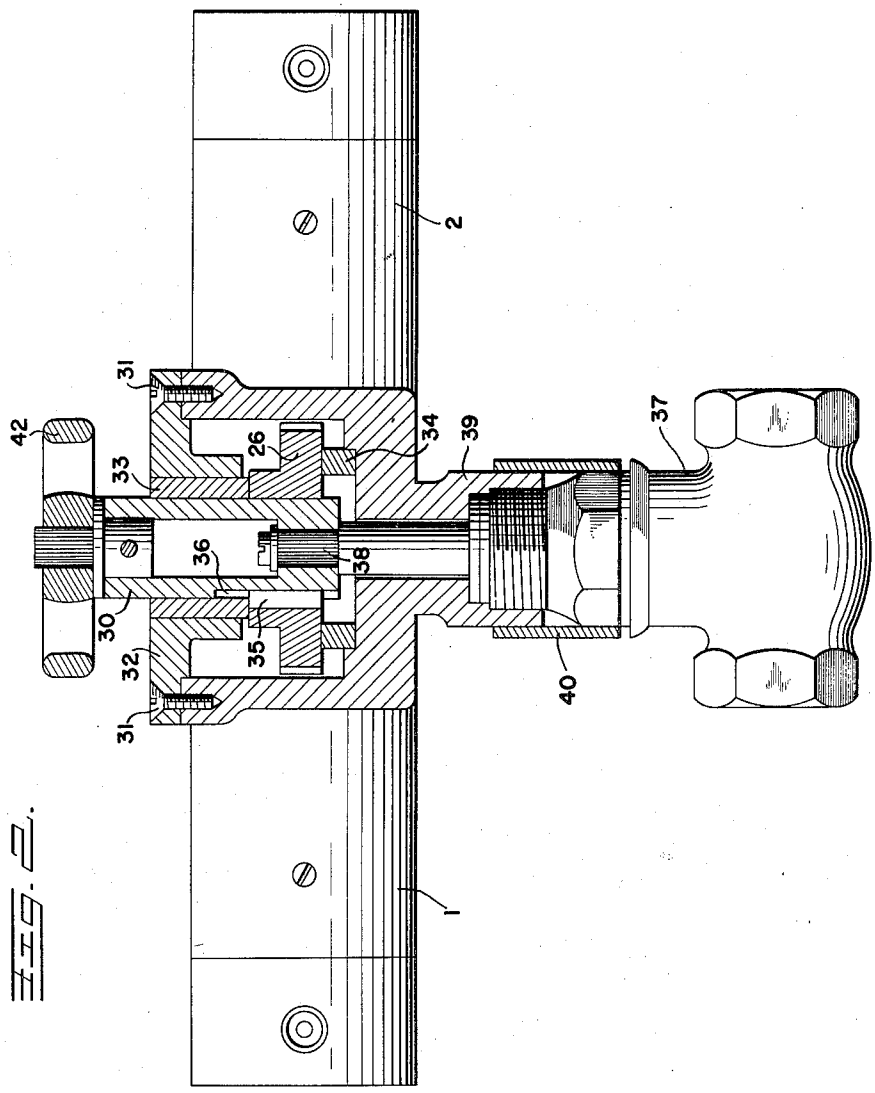


FIG. 2.

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OPERATING MECHANISM

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5 Claims. (Cl. 121—39)

This invention relates to regulators.

The hitherto known regulators are all attended with a drawback consisting in that their range of regulation is limited, i. e., they are able to regulate only between certain maxima and minima. In fact regulating devices have been proposed which are adjustable for different regulation ranges. However, adjustment of such devices while work is going on is often a very troublesome operation which might interrupt the work. Another disadvantage of the known devices is that they have considerable dimensions or weight when applied for technical purposes.

An object of the present invention is to provide a regulator which in contrast with the known regulating devices rules an unlimited regulation range due to the fact that its working principle is integrative.

Another object of the invention is to provide a regulating device the construction of which is light and simple and accordingly convenient to handle and inexpensive to manufacture.

A further object of the invention is to provide a regulating device which is readily applicable on various regulative devices even under working conditions.

According to the main feature of the invention two separately operative and reciprocating driving means are adapted to actuate in opposite directions the devices which are to be regulated.

According to a further feature of the invention each of the said driving means has reciprocating members provided with such means for actuating the devices to be regulated that regulation is performed by movement in one or both of the directions of movement of each of the reciprocating members.

The said reciprocating members can suitably be pistons of pressure medium motors or cores disposed in magnetizable solenoids or the like.

These and further objects and features of the invention will now be more fully described with reference to the accompanying drawing.

Fig. 1 is a section of a regulator according to the invention.

Fig. 2 is a section along the line I—I in Fig. 1 illustrating the regulator as applied on a valve of a common type.

As will be apparent from the drawing the regulator according to the invention comprises two driving devices, designated by 1 and 2 respectively, which are active in opposite directions. In the embodiment shown the two driving devices are of identical construction. Thus, an exhaustive description of only one of them is sufficient.

The driving device 1 consists of a cylinder 3 in which is glidable a piston 5 provided with a piston rod 4. The left end of the cylinder is closed by a cylinder head 6 having a boring 7 in which is glidably mounted a slide member 8 shaped as a piston the left dead center point of which is determined by a plug 41 screwed into the cylinder head 6, the right dead center point of the same being determined by a flange 19. Rigidly connected to the slide member 8 is a rod 9 pivotally connected to the one end of two links 10 and 11 the other ends of which

are by mean means of pins 12 and 13 respectively guided in slots 14 and 15 respectively formed in a member 17 fastened by screws 16 to the head of the piston 5. A tension spring 18 tends to force the pins 12 and 13 towards each other. The purpose of the spring 18 and the links 10 and 11 is to obtain a so called snap-action of the slide.

In the position indicated in the drawing the slide 8 of the driving device 1 is pressed against the plug 41. As readily will be seen, movement of the piston 5 to the left will cause the spring 18 to be tensioned until the links 10 and 11 are in line. If the piston 5 is moved further to the left the spring 18 will contract whereby the slide 8 is rapidly thrown to the right (see the position of the slide member of the driving device 2). As a result, an inlet 20 for pressure medium is opened which through passages 43, formed in the slide 8, acts upon the left side of the piston 5 which is thereby moved to the right. Near the end of the piston stroke the slide 8 strikes against the flange 19 causing once again the spring 18 to be tensioned and consequently a rapid movement to the left of the slide which cuts off the pressure medium inlet 20 and opens an outlet 21. A compression spring 22 mounted on the piston rod 4 and pressing on the piston 5 serves to bring the piston back to the left. The working speed of the driving device is, of course, depending on the pressure of the pressure medium and the area of the outlet opening 21.

The cylinders 3 and 23 of the driving devices are interconnected by a body or frame 24 which in the embodiment shown is made integral with the cylinders and has the form of a casing inside which is arranged an operating wheel 26 provided with teeth or cogs 25 along its periphery. Fastened to the piston rods 4 and 27 of the driving devices 1 and 2 respectively are two plate springs 28 and 29 respectively the free ends of which are slightly curved or bent in order to engage the teeth 25. The operating wheel 26 is rotatably mounted on a shaft 30 (see Fig. 2) which in turn is mounted in a bearing 33 and a bearing ring 34 mounted in the casing 24, the shaft 30 being adjustable axially in relation to the wheel 26. At axial movement of the shaft 30 the key 35 glides in a groove 36 formed in the said shaft 30.

Fig. 2 illustrates the regulator as applied on a valve device 37. In such case one end of the shaft 30 is preferably provided with a recess for driving engagement with the end of a valve spindle 38. On the other end of the shaft 30 may advantageously be mounted a hand wheel 42 or the like for manual adjustment of the valve device. As will be apparent from the figure, a portion of the casing 24 has the form of a nut 39 the purpose of which is to substitute the gland of the valve device 37. Instead of the nut 39 a rotatable nut connected to the casing 24 may be used. A coupling sleeve 40 may serve to secure rigid connection, as indicated in Fig. 2. Of course, any other mounting devices may be used, e. g. a special stand or a yoke connected to the regulator.

The function of the device described is as follows. If an adjustment of the valve is desired which involves clockwise (in Fig. 1) turning of the valve spindle 38 and the operating wheel 26 connected thereto the driving device 1 is started by supplying it with pressure medium through a line, not shown in the drawing, which is connected to the pressure medium inlet 20, the driving device 2 remaining inoperative. Thereby the spring 28 is caused to perform reciprocative motions. Obviously, the power strokes (directed to the right) will turn the wheel 26 in the desired direction. The arrangement is preferably such that the power stroke corresponds to the pitch of the wheel 26. At the following return stroke to the left the end of the spring, due to its form, glides over the next tooth without causing any rotation of the

wheel 26 which for the purpose may be retained stationary by a suitable permanent brake. At the next power stroke the spring 28 throws said next tooth a step to the right and so on. This stepwise turning or rotating of the wheel 26 and the regulation or adjustment in the desired direction caused thereby is theoretically unlimited.

If, on the other hand, an adjustment in the opposite direction is desired, involving anticlockwise turning of the wheels 26, the driving device 1 is rendered inactive while the driving device 2 is made active by supplying pressure medium to its inlet opening 44.

In order to secure disengagement of the actually inoperative spring 28 or 29 respectively these springs may be adapted to cooperate with pins 45 or the like fastened to the casing 24. In the case no regulating action being desired both driving devices are retained inactive.

The regulator can readily be adapted for remote control by the use of long supply lines for the pressure medium the supply lines may comprise a constant pressure regulator.

It is to be understood that the invention is not limited to the embodiment described and shown because many other modifications are possible within the scope of the invention. Thus, the springs 28 and 29 may be replaced by correspondingly working ratchets, pawls or the like. Moreover, the invention is not limited to pressure medium driving devices, any separately operative, reciprocating driving means may be used. The sole condition is that the driving devices are adapted to actuate in opposite directions the devices which are to be regulated or controlled. Although the invention has been shown and described as mounted on a valve it is obvious that it can be adapted to regulate arbitrary other controllable devices.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. Mechanism adapted to transmit motion between an operating member which is adapted to exert a step-by-step movement and a valve member which is adapted to control fluid which moves said operating member, comprising, in combination, a support, an operating member mounted to reciprocate on said support, a valve operating bar mounted to move freely in said support and having one end positioned so as to reciprocate substantially in alignment with the reciprocating movement of said operating member and to thereby operate said valve member, two symmetrically arranged links each pivoted at one end on said end of said valve operating bar and having their free ends diverging, bracket means mounted on said operating member and connected by a sliding interengagement with said free ends of said links, and a spring resiliently urging said free ends of said links toward each other whereby the initial movement of said operating member moves said free ends of said links apart against the action of said spring when said valve operating bar is stopped from corresponding movement and continued movement of said operating member moves said free links beyond the straight line position and then moves said valve operating bar in the opposite direction.

2. Mechanism as described in claim 2 wherein said links of the associated mechanism are positioned in a chamber to which the fluid flows to move said operating member, said valve member being rigidly mounted upon said valve operating bar and reciprocating between two positions in one of which fluid is supplied and in the other of which fluid is exhausted.

3. Mechanism as described in claim 1 which includes, means providing stops to limit the movement of said valve member, wherein said valve member is in axial alignment with said valve operating bar and is held thereby against one of said stops except during the actual movement.

4. In a device of the character described, a frame construction, a square-toothed wheel rotatably mounted thereon, a pair of operating members which are mounted in alignment on said frame construction substantially tangentially with respect to said wheel and each of which is adapted to move tangentially from a rest position toward said wheel, said operating members being oppositely related with respect to said wheel whereby said movements are arcuately opposite, each of said operating members including a tooth-engaging means which is withdrawn from contact with said wheel when its operating member is in said rest position and which is moved into engagement with a tooth during said movement and causes its operating member to impart a step movement to said wheel during the remaining portion of said movement, and a pair of independent operating units connected respectively to said operating members and each adapted to reciprocate its operating member with each reciprocation comprising said movement of said operating member from said rest position and a return movement, each of said operating units including a housing having a central operating chamber and an operating element at least a part of which is axially movable in said chamber and which has its periphery in fluid-sealing engaging relationship with said housing and together therewith defining upon one side of said operating element an operating chamber into which fluid is supplied to move its operating member and bias means to return said operating member to said rest position, each of said units also including a slidable valve means reciprocatable with a snap action between one position wherein fluid is supplied to said operating chamber and another position where said fluid is discharged therefrom, each of said operating units also including valve control means to produce said snap action mechanically connected to be moved by each movement of said operating member whereby said valve is moved as a result of the respective movements of said operating member.

5. In a device of the character described, having a frame construction and a square-toothed wheel rotatably mounted thereon and a pair of operating members which are mounted in alignment on said frame construction substantially tangentially with respect to said wheel and each of which is adapted to move tangenitally from a rest position toward said wheel, said operating members being oppositely related with respect to said wheel whereby said movements are arcuately opposite, each of said operating members including a tooth-engaging means which is withdrawn from contact with said wheel when its operating member is in said rest position and which is moved into engagement with a tooth during said movement and causes its operating member to impart a step movement to said wheel during the remaining portion of said movement, the combination therewith of a pair of independent operating units connected respectively to said operating members and each adapted to reciprocate its operating member with each reciprocation comprising said movement of said operating member from said rest position and a return movement, each of said operating units including a housing having a central chamber and an operating element enclosed within said chamber at least a part of which is axially movable in said chamber, said operating element having its periphery in fluid-sealing engagement with said housing and together therewith defining an operating chamber upon one side of said operating element into which fluid is supplied to move its operating member, and a spring to return said operating member to said rest position, each of said units also including a slidable valve means reciprocatable with a snap action between one position wherein fluid is supplied to said operating chamber and another position where said fluid is discharged therefrom, each of said operating units also including valve control means to produce said snap action mechanically connected to be moved by each movement of said operating member whereby said valve is moved

as a result of the respective movements of said operating member.

References Cited in the file of this patent

UNITED STATES PATENTS

69,007	Mason	Sept. 17, 1867
350,763	Oliver	Oct. 12, 1886
375,200	Ross	Feb. 20, 1887
941,144	Hawkins	Nov. 23, 1909
1,076,179	Whitehead	Oct. 21, 1913
1,526,025	Street	Feb. 10, 1925
1,595,939	Hukill et al.	Aug. 10, 1926
1,654,673	Barks	Jan. 3, 1928
1,719,898	McNeil	July 9, 1929
1,746,421	Garland	Feb. 11, 1930
1,851,502	Ferris	Mar. 29, 1932
1,965,751	Rush	July 10, 1934
2,316,052	Dach	Apr. 6, 1943
2,352,140	Trott	June 20, 1944
2,385,409	Gardner	Sept. 25, 1945
2,398,178	Ellison	Apr. 9, 1946
2,406,220	Hines	Aug. 20, 1946
2,475,394	Lester	July 5, 1949
2,539,913	Koepcke	Jan. 30, 1951
2,602,337	Nawman	July 8, 1952

FOREIGN PATENTS

367,315	Germany	Jan. 19, 1923
564,519	Great Britain	Oct. 2, 1944

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,841,119 July 1, 1958

Carl Gustaf Hård af Segerstad

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 1, after "by" strike out "mean"; column 3, line 61, for the claim reference numeral "2" read -- 1 --.

Signed and sealed this 4th day of November 1958.

(SEAL)
Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents