

Dec. 21, 1948.

C. E. FOWLER

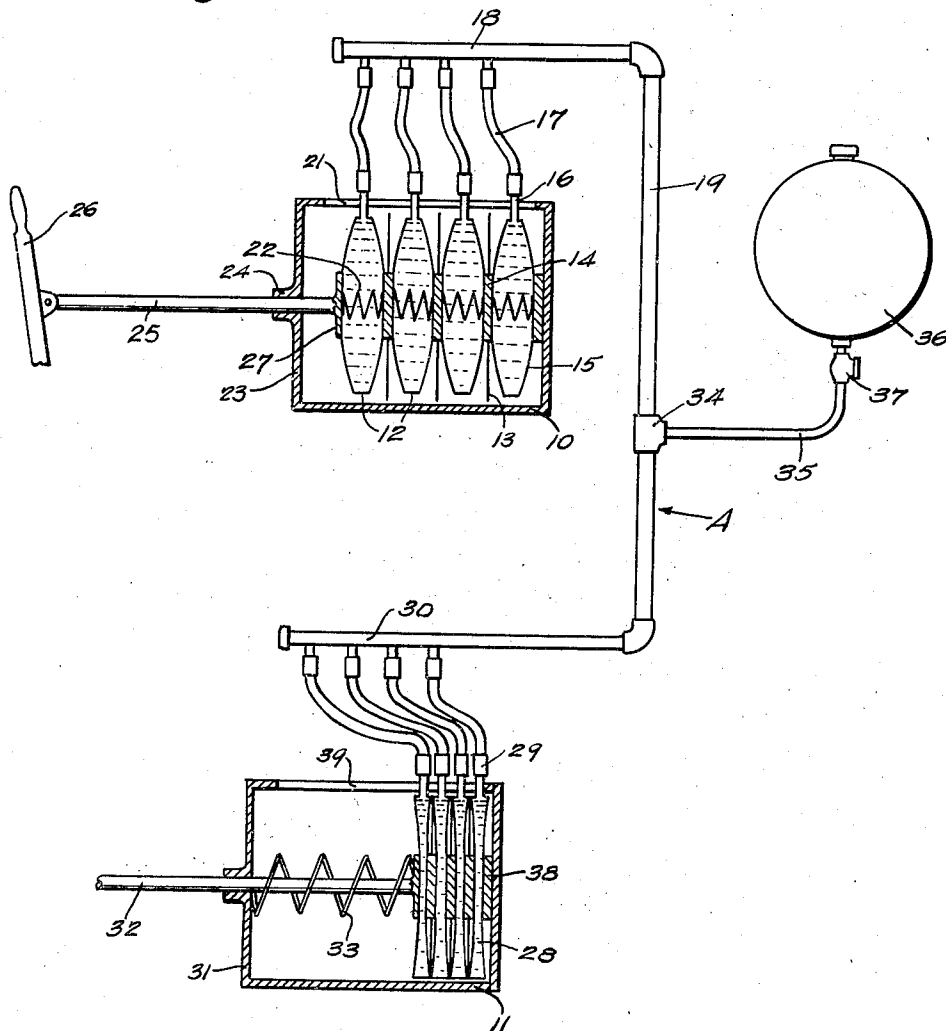
2,456,869

HYDRAULIC PULSATOR SYSTEM

Filed April 12, 1944

2 Sheets-Sheet 1

Fig. 1



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Fig. 2

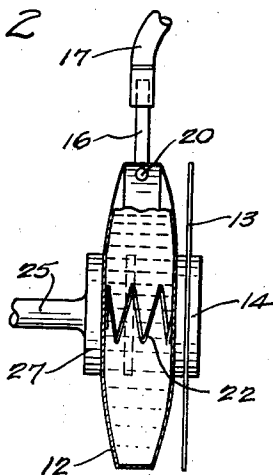


Fig. 4

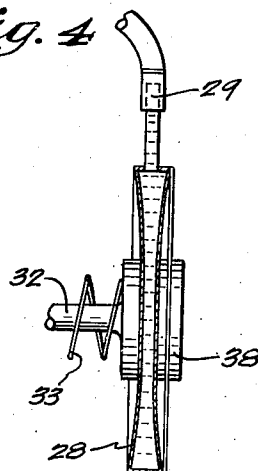


Fig. 3

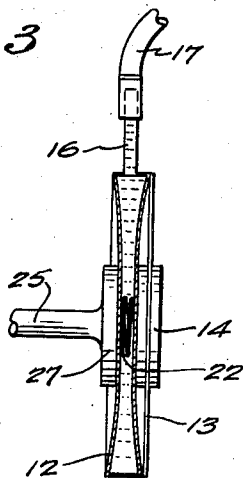
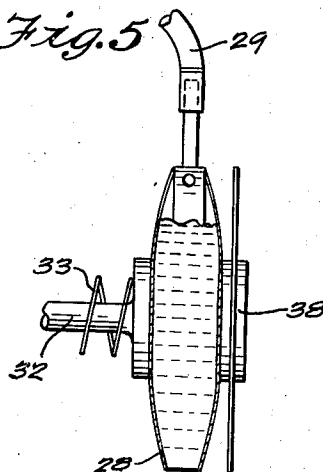


Fig. 5



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UNITED STATES PATENT OFFICE

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HYDRAULIC PULSATOR SYSTEM

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5 Claims. (Cl. 60—54.5)

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The invention relates to an actuating unit and more especially to a metallic hydraulic actuating mechanism for valve, vanes, switches or the like control.

The primary object of the invention is the provision of mechanism of this character, wherein the remote control of valves, vanes, switches or any other movable device or the like, can be had with certainty, and control is automatically effected, through the use of fluid, in a supply system, under pressure of the fluid therein in association of an expansible diaphragm set-up.

Another object of the invention is the provision of mechanism of this character, wherein through diaphragm displacement through fluid pressure thereon, a control of a remote device can be had, thus relieving manual operation of the latter for this purpose, which is automatically cared for in the working.

A further object of the invention is the provision of mechanism of this character, wherein the same functions in the nature of a pump through fluid pressure for serving as a remote control, the mechanism being of unique and novel construction, and is compact and usable for many purposes.

A still further object of the invention is the provision of mechanism of this character, which is simple in construction, thoroughly reliable and efficient in operation, having maximum throwing power for remote control, strong, durable, positive in the working thereof, and inexpensive to manufacture and install.

With these and other objects in view the invention consists in the features of construction, combination and arrangement of parts as will be hereinafter more fully described, illustrated in the accompanying drawings, which show the preferred forms of construction of the invention, and pointed out in the claims hereunto appended.

In the accompanying drawings:

Figure 1 is an elevation of the control system having the mechanism associated therewith constructed in accordance with the invention.

Figure 2 is a detail enlarged sectional view through one of the diaphragms in an expanded condition.

Figure 3 is a similar view to Figure 2 showing the diaphragm contracted.

Figure 4 is a view similar to Figure 2 showing another of the diaphragms contracted.

Figure 5 is a view similar to Figure 4 of this diaphragm expanded.

Similar reference characters indicate corre-

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sponding parts throughout the several views in the drawings.

Referring to the drawings in detail A designates generally a system involving the mechanism constituting the present invention and hereinafter set forth.

The mechanism constituting the invention comprises a pair of cylinders 10 and 11, respectively, and within the cylinder 10 is arranged a series of normally expanded double walled hollow substantially circular shaped expansible chambers or cells 12 having thin flexible metallic walls or diaphragms, which are disposed side-by-side, while interposed between the latter are disk partitions 13, each having a thickened center area 14 contacting with the centers of the flexible walls 15 of the respective expansible chambers or cells 12. These expansible chambers or cells 12 are displaceable longitudinally within the cylinder 10, and each is formed with a nipple 16 to which is connected a flexible hose 17, the group of the latter being extended from a head 18 which is a terminal of a supply line 19 for fluid to and from the said expansible chambers or cells. A closable fluid vent valve 20 is located in the rigid wall portion of the expansible chamber, as shown in Figs. 2 and 5. The closable bleed vent 20, on opening permits air to escape from within the expansible chambers or cells initially to the placement of fluid therein. The partitions 13 move concurrently with the expansible chambers or cells 12 when being expanded and contracted through admission and omission of fluid to and from the same. The cylinder 10 is formed with a slot 21 serving as a clearance for the nipples 16 which extend therethrough.

Centrally anchored within each expansible chamber or cell 12 is an expansible spring 22 of the coiled type and the latter normally expands the said expansible chambers or cells.

Working through the end 23 of the cylinder 10 in a gland 24 thereon is a plunger 25, which is hand operated by a throw lever 26, pivotally supported in any desirable manner in convenient reach of an operator. This plunger 25 has an abutment terminal 27 contacting with the expansible chambers or cells of the series next thereto, so that by movement of the lever in one direction the series of expansible chambers or cells 12 can be contracted and in this the fluid therein is expelled therefrom into the line 19.

In the cylinder 11 is a series of contractible expansible chambers or cells 28, each being alike to the expansible chambers or cells 12, excepting that it is devoid of the center spring 22, and the

nipples 29 of these expansible chambers or cells 28, being flexible, are connected to the head 30, which is at the other terminal of the line 19. Working through the end 31 of the cylinder 11 is the remote control plunger 32, which is suitably lever connected to a device to be controlled by the mechanism and not shown in the drawings. The plunger 32 carries an expanding spring 33 which normally maintains the expansible chambers or cells 28 collapsed or contracted, until the fluid from the expansible chambers or cells 12 is forced under pressure into the expansible chambers or cells 28 through the supply system, causing these to expand and control the said device.

Through union connection 34 an elbow 35 from a supply tank or fountain 36 is connected to the line 19, so that when the initial fluid filling the expansible chambers or cells 12 is low a fresh quantity can be delivered thereto. The elbow 35 is fitted with a non-return check valve 37 to avoid any back flow of fluid to the tank or fountain, and this provision is made to relieve leakage in the system.

The cylinder 11 has therein the disk centered thickened partitions 38 which function identical to the partitions 13 in the cylinder 10.

The mechanism is operated by the lever 26 which displaces the fluid in the expansible chambers or cells 12 into the expansible chambers or cells 28, and inverse order takes place by the action of the springs 22 and 33, respectively. The lever 26 may be otherwise operated than manually if found desirable.

It is of course understood that the action of the fluid takes place under pressure.

Due to the external connections 16, 17, 18, 19, 30 and 32 of the individual expansible chambers any number of chambers may be easily utilized in the cylinders 10 and 11. Thus, the overall stroke or movement of the plungers 25 and 32 may be varied during the operation of the mechanism.

If the cells intermediate the ends of cylinder 11 were centralized and an additional plunger 32 was added to the other end of the cells, it would be possible to obtain a thrust in both directions simultaneously to permit the unit to be used to expand brake shoes for automobiles and the like. The expansible chambers or cells 12 and 28 are alternately expanded and contracted in the working of the mechanism as should be apparent.

The cylinder 11 is slotted at 39 for the clearance of the nipples from the expansible chambers or cells 28 similar to the cylinder 10.

What is claimed is:

1. A mechanism of the kind described, comprising cylinders, a series of separate and independent expansible and contractible chambers having thin flexible metallic walls arranged interiorly of the cylinders, a transmission fluid in said chambers, external parallel outlet connections for each of one series of chambers, a common outlet conduit adapted to be connected to said outlet connections, external parallel inlet connections for each of the other series of chambers, a common inlet conduit adapted to be connected to said inlet connections, a common supply line connected to the ends of said inlet and outlet conduits whereby one series of chambers is normally contracted, and the other series of chambers are normally expanded, fluid exchange between the chambers on expansion and contraction thereof, means for contracting the normally expanded chambers,

and means operated by the expansion of the normally contracted chambers.

2. A mechanism of the kind described, comprising cylinders, a series of separate and independent expansible and contractible chambers having thin flexible metallic walls arranged interiorly of the cylinders, a transmission fluid in said chambers, external parallel outlet connections for each of one series of chambers, a common outlet conduit adapted to be connected to said outlet connections, external parallel inlet connections for each of the other series of chambers, a common inlet conduit adapted to be connected to said inlet connections, a common supply line connected to the ends of said inlet and outlet conduits whereby one series of chambers is normally contracted, and the other series of chambers are normally expanded, fluid exchange between the chambers on expansion and contraction thereof, means for contracting the normally expanded chambers, means operated by the expansion of the normally contracted chambers, and a fluid supply system between the series of chambers.

3. A mechanism of the kind described, comprising cylinders, a series of separate and independent expansible and contractible chambers having thin flexible metallic walls arranged interiorly of the cylinders, a transmission fluid in said chambers, external parallel outlet connections for each of one series of chambers, a common outlet conduit adapted to be connected to said outlet connections, external parallel inlet connections for each of the other series of chambers, a common inlet conduit adapted to be connected to said inlet connections, a common supply line connected to the ends of said inlet and outlet conduits whereby one series of chambers is normally contracted, and the other series of chambers are normally expanded, fluid exchange between the chambers on expansion and contraction thereof, means for contracting the normally expanded chambers, means operated by the expansion of the normally contracted chambers, a fluid supply system between the series of chambers and partitions between the chambers of each series.

4. A mechanism of the kind described, comprising cylinders, a series of separate and independent expansible and contractible chambers having thin flexible metallic walls arranged interiorly of the cylinders, a transmission fluid in said chambers, external parallel outlet connections for each of one series of chambers, a common outlet conduit adapted to be connected to said outlet connections, external parallel inlet connections for each of the other series of chambers, a common inlet conduit adapted to be connected to said inlet connections, a common supply line connected to the ends of said inlet and outlet conduits whereby one series of chambers is normally contracted, and the other series of chambers are normally expanded, fluid exchange between the chambers on expansion and contraction thereof, means for contracting the normally expanded chambers, means operated by the expansion of the normally contracted chambers, a fluid supply system between the series of chambers, and partitions between the chambers of each series and having thickened centers.

5. A mechanism of the kind described, comprising cylinders, a series of separate and independent expansible and contractible chambers having thin flexible metallic walls arranged interiorly of the cylinders, a transmission fluid in

said chambers, external parallel outlet connections for each of one series of chambers, a common outlet conduit adapted to be connected to said outlet connections, external parallel inlet connections for each of the other series of chambers, a common inlet conduit adapted to be connected to said inlet connections, a common supply line connected to the ends of said inlet and outlet conduits whereby one series of chambers is normally contracted, and the other series of chambers are normally expanded, fluid exchange between the chambers on expansion and contraction thereof, means for contracting the normally expanded chambers, means operated by the expansion of the normally contracted chambers, a fluid supply system between the series of chambers, partitions between the chambers of each series and having thickened centers, and means for normally holding the chambers of the respective series expanded and contracted.

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