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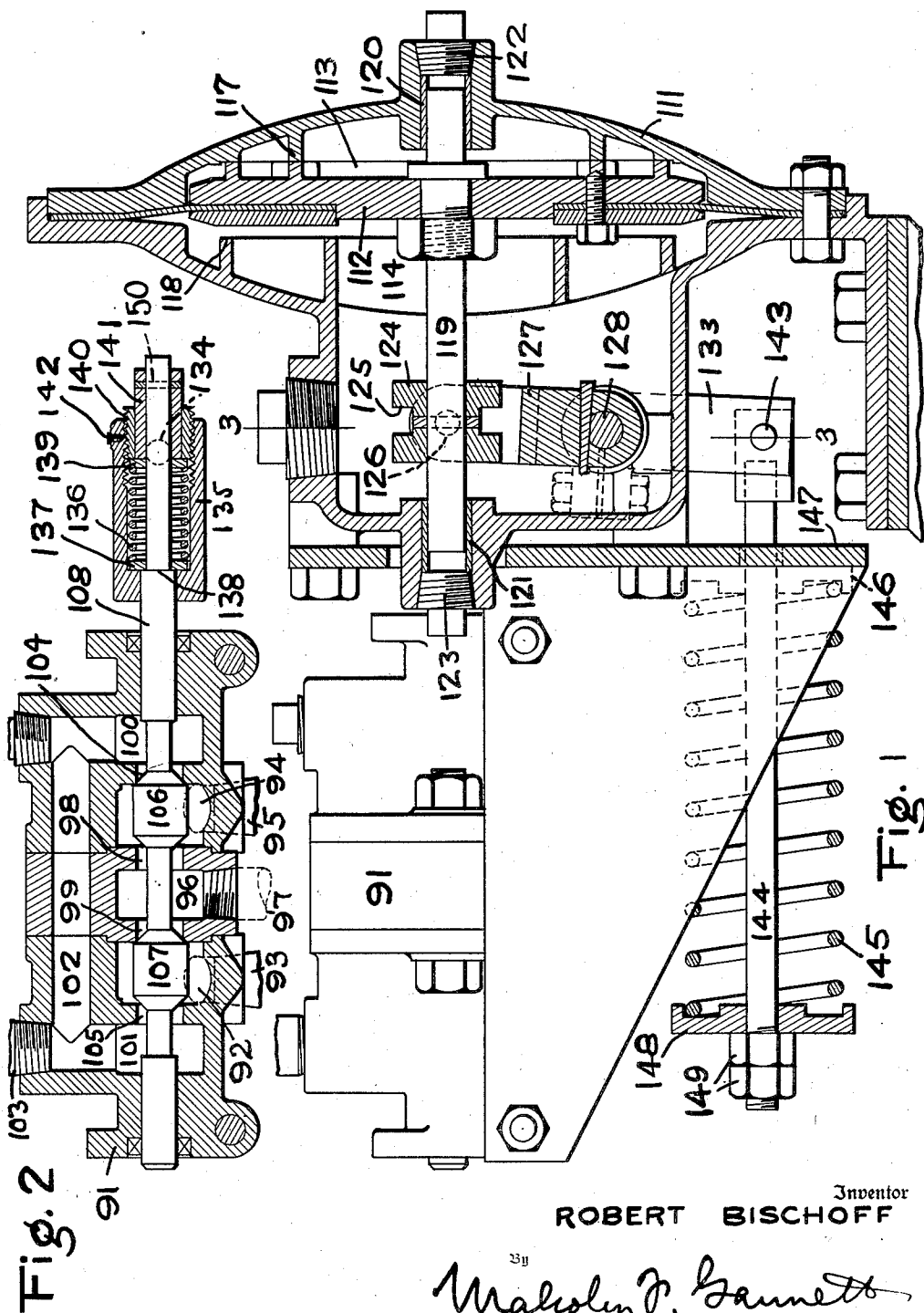
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2,227,055

FLUID OPERATED MECHANISM

Filed Aug. 19, 1937

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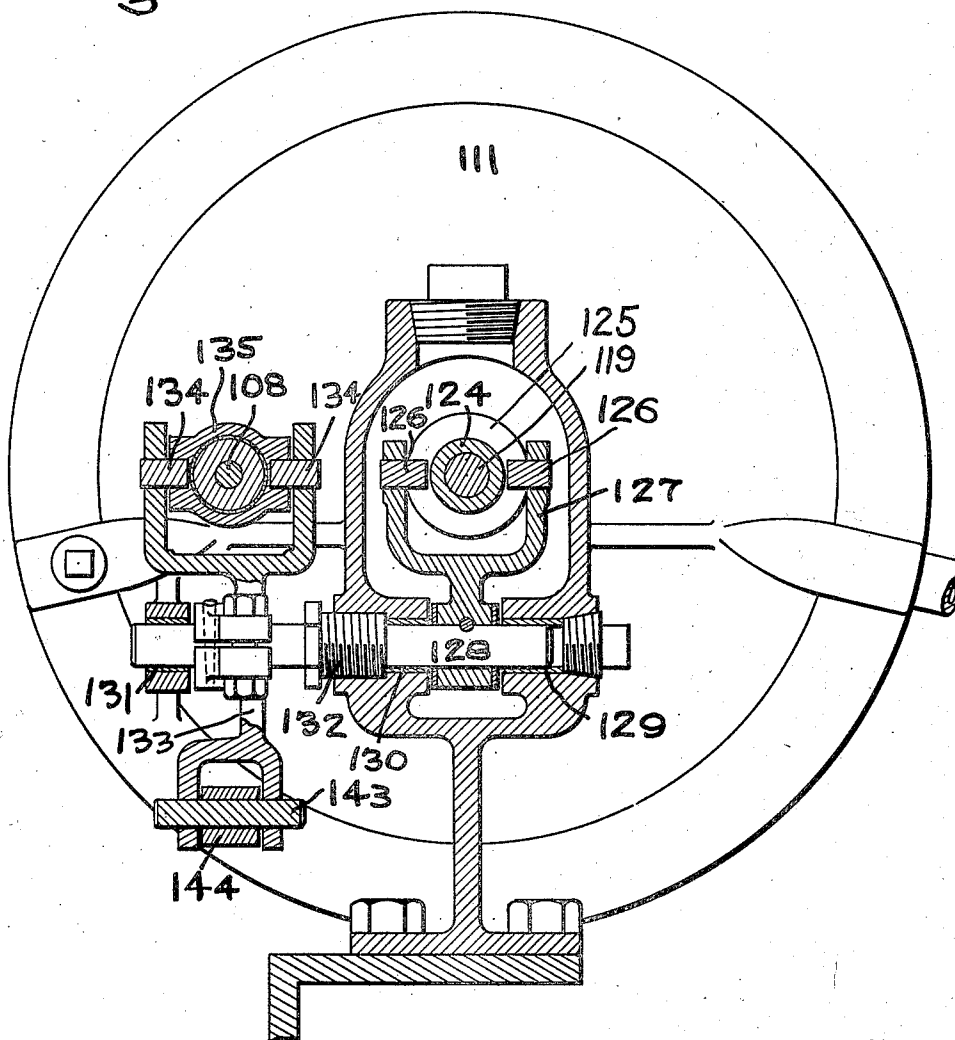
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Fig. 3



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FLUID OPERATED MECHANISM

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1 Claim. (Cl. 287—86)

This invention relates to valve devices, and more particularly to fluid operated mechanism for controlling the operation of the valves.

An object of the invention is to provide an improved fluid operated mechanism and control valve device operated thereby.

Another object of the invention is to provide an improved pilot valve device and diaphragm mechanism therefor.

Another object of the invention is to provide an improved diaphragm operated valve mechanism which is compact and positive in its operation.

With the foregoing and other objects and advantages in view, the invention consists in the construction and arrangement of the several parts which will be hereinafter more fully described and claimed.

In the accompanying drawings:

Fig. 1 is an elevation, partly in section, of the diaphragm and associated parts;

Fig. 2 is a section of the valve device operated by the diaphragm shown in Fig. 1; and

Fig. 3 is a vertical transverse section taken on the line 3—3 of Fig. 1.

Referring to the drawings, the invention embodies a suitable control valve device 91 formed with a chamber 96 which is adapted to be connected to a suitable source of fluid supply by a pipe 97.

On one side of the chamber 96 there is a chamber 92, and on the other side of the chamber 96 there is a chamber 94.

Chambers 92 and 94 are respectively connected to chamber 96 by ports 98 and 99.

One end of a pipe 93 can be connected to chamber 92, and one end of a pipe 95 can be connected to chamber 94.

The control valve device 91 is also formed with chambers 100 and 101 which are connected by a passage 102, and said passage is connected to a sewer or other free discharge by a pipe 103.

Chamber 92 is connected to the chamber 100 by a port 104 and chamber 94 is connected to the chamber 101 by a port 105.

Communication through ports 98 and 104 is controlled by a valve head 106, and communication through ports 99 and 105 is controlled by a valve head 107.

The valve heads 106 and 107 are mounted on a rod 108 adapted to be reciprocated in such a manner as to shift said valve heads to alternately close and open the ports. Thus, when the valve heads are in one extreme position, communication through ports 99 and 104 will be cut off, and

ports 98 and 105 will be open, and when the valve heads are in their other extreme position, communication through the ports 98 and 105 will be cut off, and ports 99 and 104 will be open.

In the present instance, the valve operating rod 108 is shown operatively connected to a fluid pressure operated device, such as a diaphragm device 111.

The diaphragm device 111 has a diaphragm 112 mounted in a suitable casing between two chambers 113 and 114. Both of said chambers 113 and 114 are adapted to be connected to operating fluid under pressure in a well known manner (not shown).

The movement of the diaphragm 112 is limited by stops 117 and 118 formed in the casing of the diaphragm device on opposite sides of said diaphragm.

Fixed to the diaphragm 112, is a rod or stem 119, the ends of which rod are slidably mounted in bushings 120 and 121 carried in the casing on opposite sides respectively of the diaphragm. The ends of the rod 119 do not extend through the diaphragm casing, and the openings in the casing in which the bushings 120 and 121 are mounted, are closed by threaded plugs 122 and 123, respectively, so that the diaphragm chambers 113 and 114 will be fluid-tight.

Mounted on the rod 119 is a collar 124 having an annular groove 125 formed therein for the reception of a pair of diametrically disposed pins 126 carried by the upper spaced arms of a yoke 127.

The yoke 127 is keyed to a rock shaft 128 mounted transversely in the diaphragm casing with respect to the rod 119, said shaft being disposed beneath said rod (see Fig. 3).

One end of the rock shaft 128 projects outwardly through a wall of the casing of the diaphragm device 111, said shaft being rotatably mounted in spaced bushings 129, 130 and 131. Leakage of fluid around the shaft 128 is prevented by a packing nut 132.

Mounted on the portion of the rock shaft 128 which is disposed exteriorly of the casing of the diaphragm device 111, is a lever 133.

The upper end of the lever 133 is forked, as shown in Fig. 3, and this forked portion of the lever carries diametrically disposed pins 134 which operatively engage a sleeve 135 mounted on the rod 108 of the control valve device 91.

The sleeve 135 is mounted on the rod 108 in such a manner that reciprocating movements imparted to the rod 108 and the valves 106 and 107

by the mechanism of the diaphragm device 111, will be cushioned.

For the purpose of resiliently mounting the sleeve 135 on the rod 108, the outer portion of the rod is somewhat reduced in diameter, as shown in Fig. 2, and mounted on the outer end of the reduced portion is a smaller cylindrical sleeve 141 secured in place by a pin 150. On said reduced portion are slidably fitted two washers 137 and 139, of larger outside diameter than the diameter of the rod 108 and the sleeve 141, with their inner margins abutting respectively the shoulder 138 formed by the reduced portion of the rod and the end of the sleeve 141, and held in place between said washers is a helical spring 136. The sleeve 135 has a portion at one end slidably fitting the rod 108 and the remainder of its length is counterbored to slidably receive the spring 136 and the washers 137, 139, and is retained in longitudinal position thereon by a short screw threaded sleeve 140 engaging internal threads in the other end of the sleeve 135, and locked in adjusted position by a set screw 142, the sleeve 140 slidably fitting on the sleeve 141.

The outer marginal portions of the washers 137 and 139 abut, respectively, the inner end of the counterbore of the sleeve 135 and the inner end of the sleeve 140, the distance between which is, by adjustment of the screw sleeve 140, made the same as the distance between the shoulder 138 and the sleeve 141 on the rod 108. It follows from the arrangement of parts just described that movement of the sleeve 135 longitudinally in either direction will be communicated to the valve rod 108 only by force transmitted through the spring 136, the sleeve 135 itself being otherwise freely slidable on the rod, and after the valve rod has been moved in one direction far enough to effect closing of the valve heads 106 and 107 against their seats in one direction, any further movement of the sleeve 135 will be cushioned by compression of the spring 136, and the same action will take place upon movement of the sleeve 135 in the opposite direction.

The lever 133 extends downwardly from the rock shaft 128 a suitable distance and has connected thereto, as at 143, one end of a rod 144.

Encircling rod 144 is an expansible coil spring 145, one end of which bears against a washer 146 which abuts a wall 147 of a bracket supporting the valve device 91 and the diaphragm device 111. The other end of the spring 145 bears against a washer 148, adjustably positioned on the outer portion of the rod 144, by means of nuts 149 threaded on to said rod. The spring 145 is operatively associated with the diaphragm 112 in the manner to be hereinafter described.

When the fluid pressure in the diaphragm chamber 113 exceeds the combined pressure of fluid in the diaphragm chamber 114, plus the pressure of spring 145, the diaphragm 112 is moved towards the left, as viewed in Fig. 1, and this diaphragm movement is transmitted to the control valve device 91, and the latter is operated

so that fluid is vented to the sewer or other free discharge from chamber 92, through pipe 103, and fluid under pressure is supplied to chamber 94, from the source of supply pipe 97 and chamber 96.

When the fluid pressure in diaphragm chamber 114 is increased so that the fluid pressure on both sides of the diaphragm 112 becomes substantially equal, the force of the spring 145 on one side of the diaphragm 112 will move the diaphragm against the seat 117 and thus the valve heads 106 and 107 of the control valve device 91 will be returned to the position shown in Fig. 2.

One of the salient features of the present invention is in the construction of the diaphragm device 111 and its associated parts. In the usual form of diaphragm device, in which the operating rod which is connected to the diaphragm projects outwardly through the diaphragm casing, considerable difficulty has been experienced in preventing leakage of fluid around the rod from the diaphragm chamber. The packing gland usually used at the point where the rod passes through the diaphragm casing must be kept tight, and consequently when the packing gland is tight, the friction is so great as to greatly retard the free movement of the rod and the diaphragm connected thereto.

Accordingly, instead of transmitting the movements of the diaphragm to the control valve device 91 by a reciprocating rod projecting outwardly through the casing of the diaphragm device 111, in the instant case, the movements of the diaphragm 112 are transmitted out of the diaphragm casing by means of the rock shaft 128 which turns through a small angle and consequently requires a type of packing gland where such shaft projects through the casing of the diaphragm device which does not hinder the free movements of the several parts of the diaphragm device. Thus, the controlling mechanism for the valve will be more sensitive than would be the case were the control valve device 91 directly connected to the operating rod of the diaphragm.

Having thus described my invention, what I claim is:

A resilient operating connection for a reciprocating rod comprising a portion of reduced diameter on a free end of said rod forming a shoulder, an outer sleeve having one end slidable on the main part of the rod and having a counterbore forming an internal shoulder, slidably interfitted inner sleeves secured respectively on the end of the reduced portion of the rod and within the end of said counterbore, one of said latter sleeves being adjustable to space the said inner sleeves at equal distance from the shoulders on said rod and outer sleeve respectively, a compression spring on said reduced portion of the rod between said shoulders and inner sleeves, means for transmitting the pressure of either end of said spring to either the rod or the outer sleeve, and means for reciprocating the outer sleeve.

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