

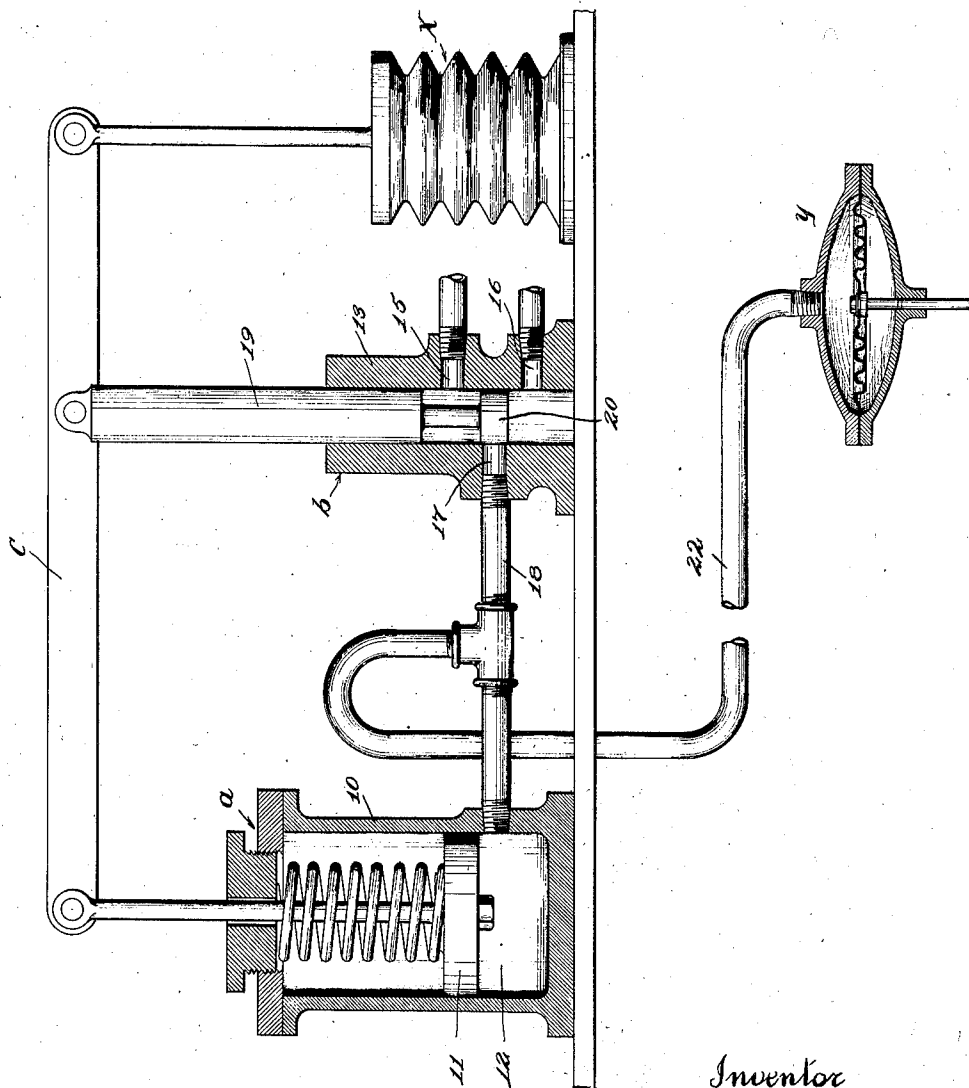
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RELAY DEVICE

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UNITED STATES PATENT OFFICE.

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RELAY DEVICE.

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To all whom it may concern:

Be it known that I, MAYNARD D. CHURCH, a citizen of the United States, and a resident of Hartford, county of Hartford, State of Connecticut, have invented certain new and useful Improvements in a Relay Device, of which the following is a specification.

This invention relates to a relay device and has as its aim to provide a device of this sort which is simple in construction and efficient in operation, and which is particularly sensitive to small variations in physical forces. The device of the present invention will be described with reference to its use in the particular embodiment herein selected for purpose of illustration and wherein it is employed to relay the movements of an actuating device to a point more or less distant. It is to be understood however that the invention is susceptible of other embodiments, the present disclosure being by way of example only and therefore it is not to be taken in any sense as restrictive.

In the accompanying drawing the figure is a sectional view of the preferred embodiment of the present invention.

Referring to the drawing in detail, the device of the present invention is shown as being responsive to the movement of an actuating or sending apparatus *x* and relays such movement to an actuating or receiving apparatus *y*. The particular construction of the apparatus *x* forms no part of the present invention, but by way of illustration it is shown as being in the form of a collapsible diaphragm, movement of which may be affected by variations in pressure or otherwise. The apparatus *y* is in the form of a pressure responsive device of any desired or suitable type.

Referring now more particularly to the construction of the device of the present invention, *a* denotes generally a fluid pressure responsive mechanism, herein shown for example, as having a cylinder 10 within which operates a spring loaded piston 11 the movement of this piston being effected by change of pressure within the chamber 12 of the cylinder. *b* denotes generally a valve mechanism having a valve casing 13 provided with a fluid inlet port 15, a drain opening 16 and a port 17 positioned vertically between the ports 15 and 16. The chamber 12 of the mechanism *a* and the valve chamber within the casing 13 are in communication with each other through

the port 17 and the tube 18. The fluid inlet 15 is connected with a suitable source of fluid pressure, this source not being shown as it may be of any appropriate kind. Closely fitting within the valve casing 13 is a valve stem 19 carrying a valve head 20, the stem 19 being reduced back of the head as shown so as to permit of communication between the port 15 and the port 17 when the valve is lowered slightly from position shown in the figure.

Pivotally secured to the valve stem 19 and the stem of the piston 11 is a rod or floating lever *c* and this lever is connected at one end to the actuating or sending apparatus *x* which, as stated, comprises a collapsible diaphragm.

Variations in pressure of the fluid within the chamber 12 and tube 18 are communicated to the apparatus *y* through the pipe 22 branching from the tube 18.

The operation of the device is briefly as follows:—

Assuming that the parts are in normal position and that there is no leakage, the valve head 20 will be in a position where it blanks the port 17 and as long as this head remains in this position the fluid pressure within the chamber 12 will remain uniform. Upon an increase of pressure within the diaphragm *x* the floating lever *c* will be actuated and the head 20 of the valve will be raised so that the port 17 will be uncovered whereupon the fluid within the chamber 12 will begin to drain out through the opening 16 and, therefore, the pressure within the pipe 22 and the receiving device *y* will be reduced. When the pressure within the chamber 12 drops, the piston 11 will respond by moving downwardly thereby moving the valve head 20 downwardly until it again blanks the port 17 and then the system is in equilibrium. On the other hand, when the pressure within the diaphragm of the actuating device *x* drops the valve head 20 moves downwardly towards the position between the drain opening and the port 17 thus establishing communication, about the reduced portion of the stem, between the inlet port 15 and the chamber 12 which results in building up a greater pressure within the tube 18 and the chamber 12, and this increase of pressure is communicated by the fluid through the pipe 22 to the receiving apparatus *y*. The resultant upward movement of the piston

will again reset the valve head 20 in neutral position, and the system is again in equilibrium. Should there be any leakage, the pressure in chamber 12 will slightly drop whereupon the downward movement of the piston 11 will slightly lower the valve head 20 admitting sufficient fluid to the chamber 12 to maintain the pressure therein substantially constant. The pressure responsive device *a* constitutes what may be termed, for convenience, as a pressure weighing mechanism or device. Owing to the spring behind the piston 11, the movement of this piston is a direct function of the pressure in the chamber 12.

It is, of course, obvious that my invention is susceptible of various modifications and changes which are within the spirit of my invention without departing from the scope of the following claims.

I claim as my invention:

1. In combination, actuating means, a plurality of pressure responsive devices, one of which comprises a fluid pressure weighing device provided with a movable member actuated by variations in pressure, a valve controlling the pressure within said device, and an operative connection between said actuating means, movable member and valve arranged to place the system in equilibrium when the movement of the movable member of said fluid pressure weighing device is a function of the movement of the actuating means.

2. In combination, actuating means, a plurality of pressure responsive devices, one, at least, of which consists of a fluid pressure weighing device provided with a movable member actuated by variations in pressure, a valve controlling the admission and discharge of fluid to and from said pressure responsive devices and in one position closing said devices, and an operative connection between said actuating means, movable member and valve, and arranged to close said valve when the movement of said movable member of said fluid pressure weighing device is a function of the movement of said actuating means.

3. In combination, actuating means, a plurality of pressure responsive devices having pressure chambers in free communication with each other, one, at least, of said devices comprising a fluid pressure weighing device provided with a movable member actuated by variations in pressure, a valve controlling the admission and discharge of fluid under pressure to and from said chambers, and in one position closing said chambers, and an operative connection between said actuating means, movable member and valve arranged to place the system in equilibrium when said movable member has been brought into a predetermined relation to the movement of said actuating means.

4. In combination, actuating means, a plurality of pressure responsive devices spaced from one another and having chambers in open communication, one, at least, of said devices having a movable member actuated by variations in pressure and constituting a weighing element for determining the pressure in the chamber of that device, a valve controlling the fluid pressure within said chambers, and a floating lever operatively connected to said actuating means, movable member and valve.

5. In combination, actuating means, a plurality of pressure responsive devices spaced apart and having fluid pressure chambers in open communication with each other, one of said devices being provided with a movable member actuated by variations in pressure and constituting a weighing element for determining the pressure within the chamber of that device, a valve controlling the admission and discharge of fluid to and from said devices, and in one position closing said devices, and a floating lever so operatively connected to said actuating means, movable member and valve that said movable member has a predetermined position for each corresponding position of said actuating means with the valve in position closing said devices.

6. In combination, actuating means, a weighing device comprising a cylinder, a piston within said cylinder, a spring behind said piston, and a fluid pressure chamber in front of the same, a valve controlling the admission and discharge of fluid to and from said chamber, a pressure responsive device spaced from said weighing device and having a chamber in free, unobstructed communication with the chamber of said weighing device, and a floating lever operatively connected to said actuating means, piston and valve.

7. In combination, actuating means consisting of a pressure responsive device, a second fluid pressure responsive device, and valve means for controlling the pressure of a fluid on the second fluid pressure responsive device and on other pressure responsive devices connected to the same conduit system, the moving parts of the primary pressure responsive device, the second pressure responsive device and the valve means being so interconnected that when movement of the primary pressure responsive device causes the valve means to change the fluid pressure on the second pressure responsive device the resulting movement of the second pressure responsive device will act on the valve means to stop the pressure change when the change in fluid pressure on the second pressure responsive device is a function of the change in pressure which caused the movement of the first pressure responsive device.

MAYNARD D. CHURCH.