

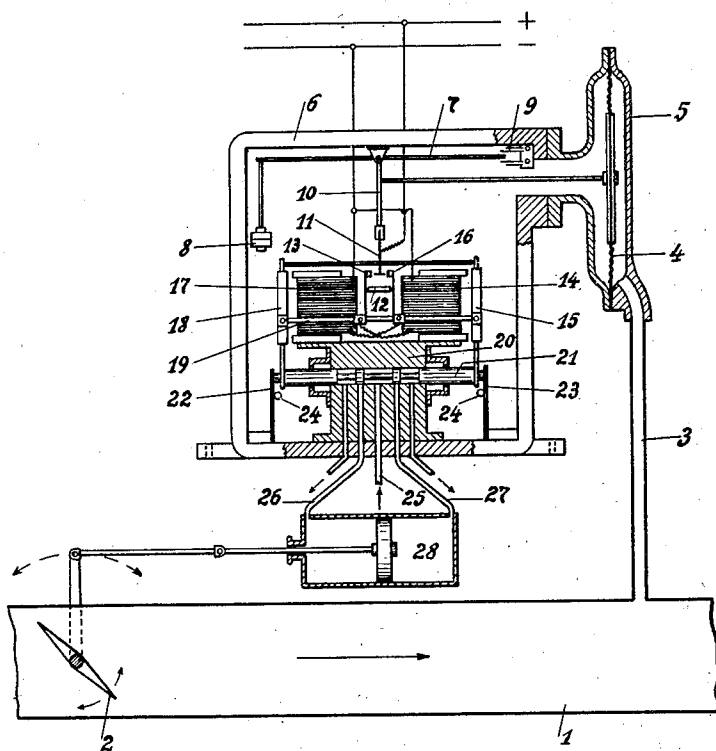
April 29, 1930.

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1,756,824

DEVICE FOR REGULATING FLOW OF FLUIDS

Filed Oct. 30, 1929



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DEVICE FOR REGULATING FLOW OF FLUIDS

Application filed October 30, 1929. Serial No. 403,647.

This invention relates to a device for regulating the flow of fluids through conduits under the influence of the pressure in the latter and of the kind wherein the regulation is effected by hydraulic and magnetic means controlled by a diaphragm. The object of the invention is to produce a device whereby even the smallest variation in the pressure can be rectified without causing fluctuations, and the invention consists in arranging two contact springs, through which and through a diaphragm controlled pendulous contact, different magnets are energized, in a frame which carries the armatures of the magnets and which is connected to the spring controlled slide valve of an hydraulic piston whereby the regulating valve is operated, the contact springs being arranged in the frame so as to be moved by the latter under the influence of an energized magnet away from the current-supplying pendulous contact so as to cause an intermittent movement of the valve and of the regulating piston. This arrangement will have the effect, on a small variation of the pressure and also at the commencement and end of all variations, to bring about a very fine regulation of the gas supply and a quick but steady restoration of pressure to the normal.

The invention is illustrated in the accompanying drawing which represents a sectional view of the arrangement.

The flow of gas or other fluid through a conduit 1 is regulated by means of a throttle 2 the position of which is controlled by an hydraulic piston arranged in a cylinder 28. The ends of the latter communicate through pipes 26 and 27 with a valve chest 20 to which fluid under pressure is supplied through a pipe 25. A slide valve 21 is arranged in the chest so as to lead the liquid to either end of the cylinder 28 according as the valve is moved from a neutral position in one or the other direction. Normally the valve is maintained in the neutral position by two springs 22 and 23 which bear normally against opposite ends of the valve and against stops 24.

The slide valve carries a frame 19 within which two electromagnets 14 and 17 are ar-

ranged on a stationary support. The armatures 15 and 18 of the magnets form part of the frame and move the latter and the slide valve in opposite directions, in opposition to the springs 22 and 23, on an energization of the magnets. Current is supplied to the magnets through contact springs 13 and 16, which are carried by the frame 19, and through a contact 11 which is arranged between the two springs and carried by a pendulum 10. The latter is controlled by a diaphragm 4 which is arranged in a casing 5 and which is exposed through a pipe 3 to the gas pressure in the conduit 1. A double armed, horizontal lever 7 which is connected to the pendulum so as to turn about the same pivot, carries at one end weights 8 whereby the position of the contact 11 between the springs 13 and 16 is regulated, equal gaps being maintained between the contact 11 and the springs so long as the pressure in the conduit 1 and in the pipe 3 remains normal. The opposite arm of the lever 7 is situated between springs 9 which form abutments for the same and which oppose the deflection of the contact 11 beyond a given angle. Preferably several springs are arranged one behind another so as to come successively into operation and form a resistance which increases both in gradual proportion to deflection and stepwise. A rigid abutment 12 is arranged between the contact springs 13 and 16 so as to limit their movements in the direction of the abutment.

The contact springs energize different magnets when touching the contact 11 and are arranged in the frame 19 so as to be moved by the latter and by the magnets away from said contact. Thus, in the case of an increase in the pressure, the contact 11 will be moved by the diaphragm to the left into contact with the spring 13. The latter then energizes the magnet 14 the armature of which causes the frame and the slide valve to move also to the left so as to supply liquid to the left side of the piston and produce a closing movement of the valve 2. Unless the increase in the gas pressure should happen to be considerable and sudden, the movement of the frame to the left causes the spring 13 to separate from the

contact 11 and thus to break the circuit where-
upon the frame and the valve will be moved
back by the spring 22 until contact is again
made between the spring 13 and the contact
11. In this manner an intermittent forward
5 motion of the piston will take place until the
pressure has been restored to the normal.
The movements will get smaller and smaller
in proportion as the pressure is reduced, and
10 the operation of the device will cease on nor-
mal pressure being reached. Should the pres-
sure continue to increase in spite of the inter-
mittent operation of the valve, the spring 13
will finally be unable to break the circuit, and
15 the regulating piston will then move steadily
forward until the throttle has been suffi-
ciently closed. A reduction of the pressure
below the normal will cause the contact 11 to
energize the magnet 17 and to move the frame
20 and slide to the right so as to effect an open-
ing movement of the throttle. The springs 9
prevent an excessive deflection of the con-
tact 11.

While one of the contact springs co-oper-
25 ates with the contact 11 in the above-described
manner, the other spring is prevented by the
abutment 12 from interfering with the oper-
ation.

Since the diaphragm has no other function
30 than that of deflecting the pendulously sus-
pended electric contact, it will move without
material impedance and render the regulat-
ing device extremely sensitive.

I claim:

35 1. A device of the character described for
regulating flow of fluids, comprising a throt-
tle arranged in the fluid conduit, a hydraulic
piston controlling said throttle, a slide valve
adapted to admit liquid to either side of the
40 piston according to its movement in one or
the other direction from a neutral position, a
pair of springs tending to maintain the valve
in its neutral position, a frame carried by the
slide valve so as to follow its movements, a
45 pair of electromagnets supported in a sta-
tionary position within said frame, armatures
for said magnets connected to the frame and
adapted to move it under the influence of the
magnets in opposite directions, a pair of con-
50 tact springs carried by said frame and ar-
ranged in the magnet circuits one in each, a
pendulously supported contact arranged be-
tween said contact springs and adapted to
supply current to the respective magnets on
55 contact with said contact springs, and a dia-
phragm controlling the position of said pen-
dulously supported contact under the influ-
ence of the pressure in the fluid conduit, the
contact springs being arranged in the frame
60 so as to be moved by the latter away from the
pendulously supported contact on an energiz-
ation of one of the magnets.

2. The structure claimed in claim 1 in com-
65 bination with a lever arm adapted to move to-
gether with the pendulously supported con-

tact, and a plurality of springs arranged one
behind another at opposite sides of said arm
so as to form abutments therefor and sepa-
rated so as to produce a step-wise increase of
resistance to the movement of the arm.

3. The structure claimed in claim 1 in com-
70 bination with a rigid abutment arranged be-
tween the contact springs so as to limit the
movement of the latter in the direction of said
abutment.

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