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1,459,218

G. A. KNAAK

CONTROLLING APPARATUS

Filed Dec. 1, 1919

Fig. 1.

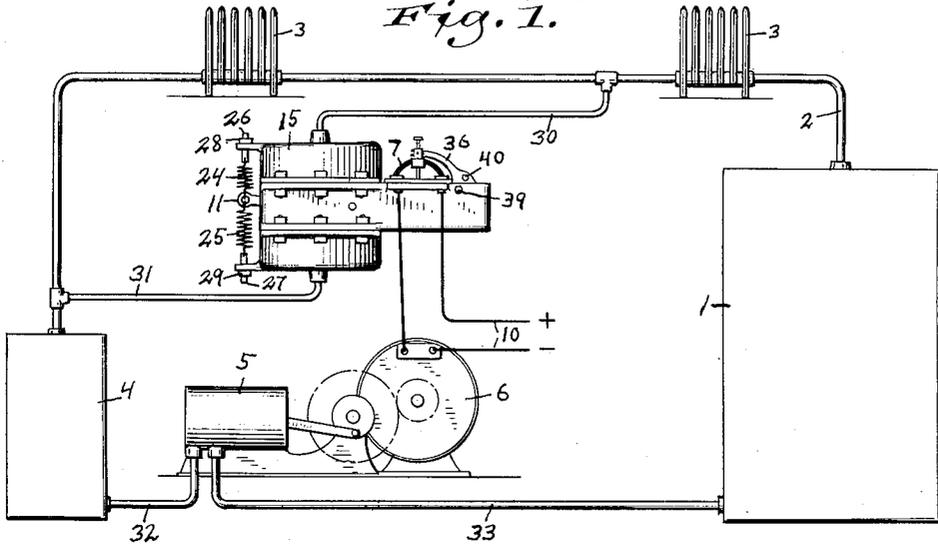
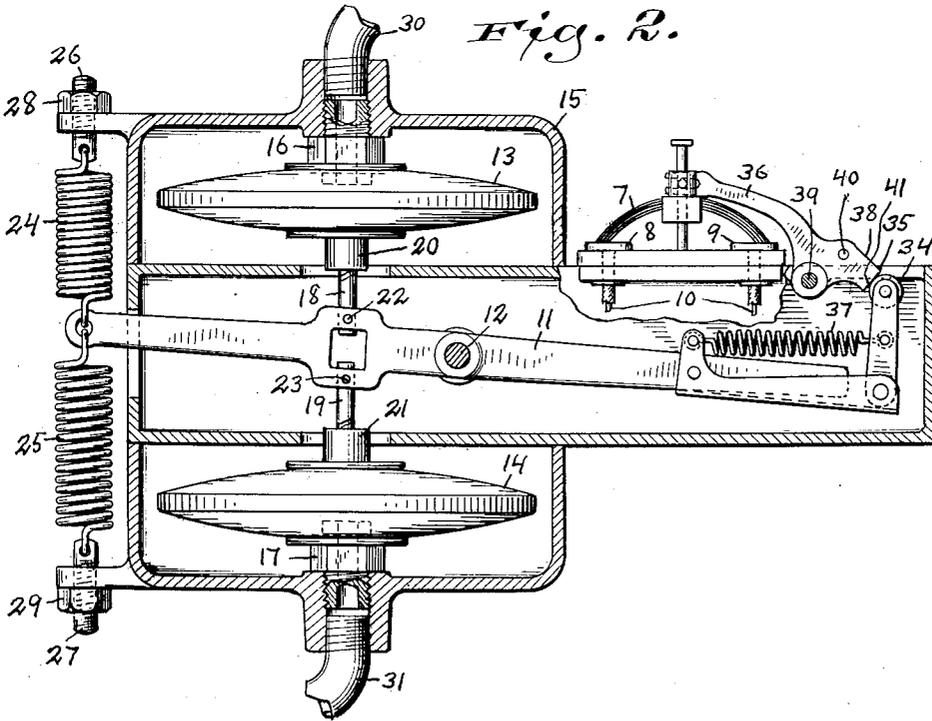


Fig. 2.



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UNITED STATES PATENT OFFICE.

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CONTROLLING APPARATUS.

Application filed December 1, 1919. Serial No. 341,701.

To all whom it may concern:

Be it known that I, GEORGE A. KNAAK, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Controlling Apparatus, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

This invention relates to controlling apparatus and the object of the invention is to improve the construction and operation of controlling apparatus in the manner to be hereinafter described and claimed.

Referring to the drawings which accompany this specification and form a part hereof, which drawings illustrate an embodiment of this invention, and on which drawings the same reference characters are used to designate the same parts wherever they may appear in each of the views, Fig. 1 is an elevation of the controlling apparatus installed for use; and Fig. 2 is a vertical section of the controlling apparatus, on an enlarged scale.

It is frequently desirable to effect a control or regulation by slight differences in pressures and this invention provides apparatus for such a purpose but the apparatus can be constructed, or adjusted, to control or regulate by any difference of pressure.

Referring to the drawings, Fig. 1 illustrates in a diagrammatic manner a vapor heating system in which the boiler is designated by the reference numeral 1, the vapor or steam pipe by 2, radiators by 3, a receiver by 4, and a pump for creating a partial vacuum by 5. The pump is illustrated as operated by an electric motor 6 which is stopped or started by the opening or closing of a switch 7 which is illustrated as adapted to contact with the contacts 8 and 9 connected with the power circuit 10. The switch 7 is opened or closed by movements of the lever 11 on its fixed pivot 12 in a manner which will be readily understood from an inspection of Fig. 2 of the drawings. The reference numerals 13 and 14 designate fluid-pressure motors which are illustrated as disk-like boxes having ends secured to the casing 15 by apertured nipples 16 and 17. The other ends of the boxes 13 and 14 are connected together so that neither is movable without a corresponding movement of the other. Stud 18 and 19 are screwed into

bosses 20 and 21 secured to ends of the boxes and the studs are connected with the lever 11 by pins 22 and 23. By removing a pin and turning a stud and then replacing the pin, an adjustment can be effected with respect to the lever 11. The reference numerals 24 and 25 designate springs which are connected with the lever 11 in opposed relation and the tension of which can be adjusted by screwthreaded members 26 and 27 and nuts 28 and 29. The fluid-pressure motor 13 is connected by a pipe 30 to some point in the system which may be selected as the desirable point to register the maximum, or required, pressure, while the fluid-pressure motor 14 is connected by the pipe 31 with some point in the system which may be selected as the point to register the desirable difference in pressure to keep the vapor properly circulating through the system.

The operation is as follows: The drawings show the switch 7 closed, the motor 6 running, and the pump 5 exhausting from the receiver 4 through the pipe 32 and discharging into the boiler 1 through the pipe 33. When the pump 5 has reduced the pressure within the box 14 sufficiently, the box 13 will bulge and rock the lever 11 upon its pivot 12 and move the antifriction roller 34 above the point 35 on the end of the switch arm 36. The spring 37, pulling the antifriction roller 34 against the upper inclined face 38 on the switch arm 36, will rock the switch arm on its pivot 39 and lift the switch from the contacts 8 and 9 until the stop pin 40 contacts with the casing 15. The motor and the pump will stop and remain at rest until the difference between the pressures in the box 14 and the box 13 has become such as to rock the lever 11 on its pivot 12 to bring the antifriction roller 34 down below the point 35 on the end of the switch arm 36. The spring 37 will then force the antifriction roller 34 against the lower inclined face 41 on the switch arm and rock the switch arm about its pivot to close the switch 7, and the motor 6 and the pump 5 will be started again to produce the required difference of pressure.

What is claimed is:

1. The combination, in controlling apparatus, of a member adapted to be moved from one position to another position, fluid-pressure operable members connected together in opposed relation and connected to said member, means for adjusting said fluid-

pressure operable members with respect to each other, and means for adjusting the fluid-pressure operable members to move the said first mentioned member at a predetermined difference between the pressures exerted by the fluid-pressure operable members.

2. The combination, in controlling apparatus, of a member adapted to be moved from one position to another position, fluid-pressure operable members connected together in opposed relation and connected to said member, means for adjusting said fluid-pressure operable members with respect to each other, and adjustable springs for opposing each other to prevent movement of the said first-mentioned member,

after adjustment, until there exists a predetermined difference between the pressures exerted by the fluid-pressure operable members.

3. The combination, in controlling apparatus, of a lever pivoted upon a fixed pivot, oppositely acting fluid-pressure operable members to move said lever in opposite directions upon its pivot, and adjustable springs acting in opposed relation to determine movements of said lever according to predetermined differences between the pressures exerted by the fluid-pressure operable members.

In witness whereof I hereto affix my signature.

GEORGE A. KNAAK.