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E. E. TEACH ET AL

2,293,574

CONTROLLING DEVICE

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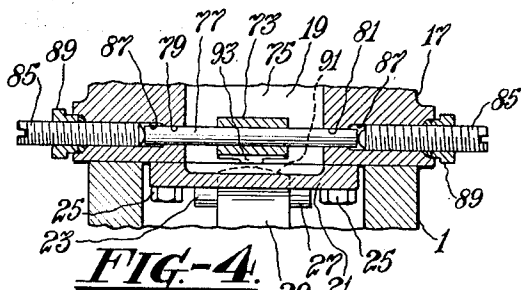


FIG-4.

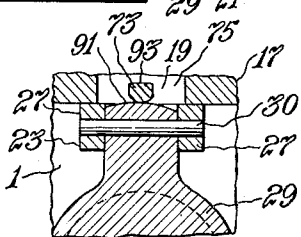


FIG.-3.

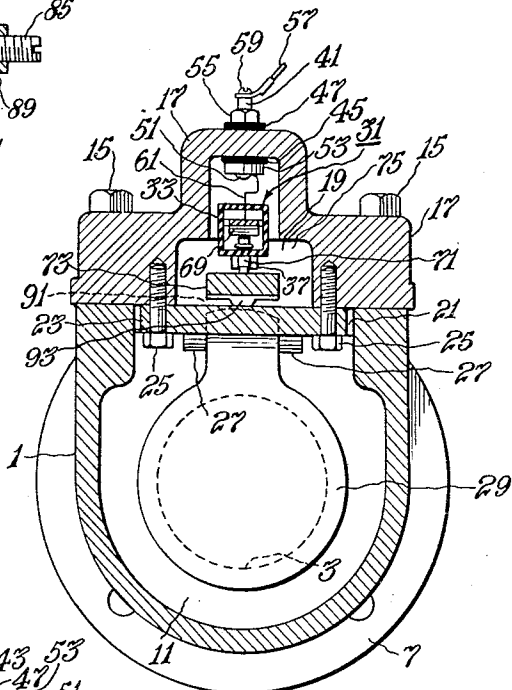


FIG.-2.

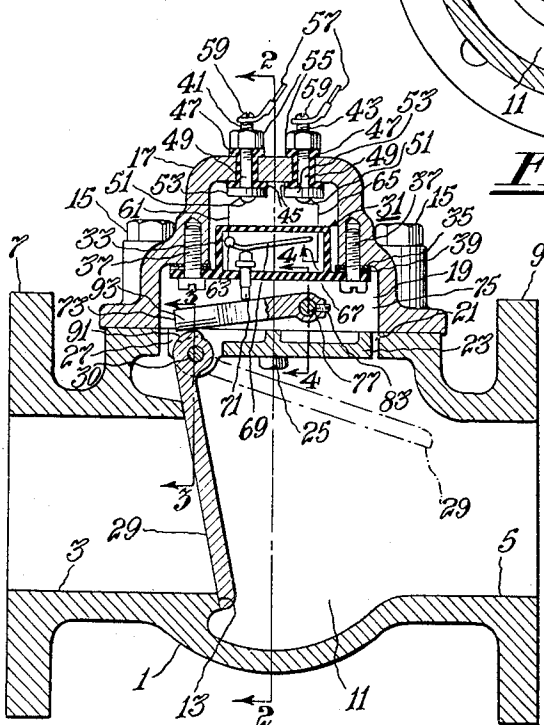


FIG-1.

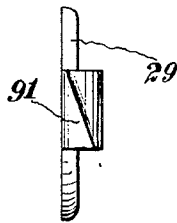


FIG-5.

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CONTROLLING DEVICE

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12 Claims. (Cl. 200—81)

The present invention relates to a controlling device and, more particularly, it relates to a device which controls the operation of an apparatus or machine in accordance with variations in the flow of fluid.

Although the device of the present invention is capable of a variety of applications, it is especially adapted for the regulation of a fluid compressor. In such an apparatus it may be employed to maintain operation of the compressor as long as there is a predetermined flow of fluid under pressure from the compressor to the load. For such an arrangement, it is desirable to provide a device which will operate at any selected flow and when the pressure of the fluid actuating the device may be comparatively high.

Accordingly, it is an object of the present invention to provide a device actuated by the flow of a fluid.

Another object is to provide a device wherein the amount of fluid flow actuating the device may be varied.

Still another object is to provide a device actuated by the flow of fluid under high pressure wherein the amount of flow necessary to actuate the device may be predetermined.

A further object is to provide a device of novel and simple construction which is highly efficient in operation.

These and other objects of the invention will be apparent from the following description of which the drawing is a part, and wherein,

Figure 1 is a view in section of the device of the present invention,

Figure 2 is a view in section taken along line 2—2 of Fig. 1.

Figure 3 is a view in section taken along line 3—3 of Fig. 1, and

Figure 4 is a view in section taken along line 4—4 of Fig. 1.

Figure 5 is a plan view of the flapper.

As shown in the Figure 1 of the device, the present invention consists of a body 1 having an inlet bore 3 and outlet bore 5. The flanges 7 and 9 on the body are adapted to be secured to a conduit (not shown) conveying fluid. The flange 7 is secured to the portion of the conduit nearest the source of supply. Both bores 3 and 5 communicate with a central chamber 11 and the end of bore 3 terminates in the chamber at seat 13.

Surmounting the body 1 and secured thereto by bolts 15 is a cap 17. The cap has a chamber 19 which opens through aperture 21 in the body 1 into the control chamber 11. In this aperture is a plate 23 secured on the cap 17 by bolts 25.

Two arms 27 extend from this plate and journal a pin 30 on which is mounted an oscillatable member, or flapper, 29. When there is no flow of fluid through the body 1, the flapper rests on seat 13, but if any flow occurs, the fluid will move the flapper away from its seat in order that the flow may not be impeded in its passage through the central chamber 11 to the discharge bore 5 and the amount of movement of the flapper will depend on the amount of fluid flowing.

Within the cap 17 is a switch 31 of the "Micro-Switch" type. The casing 33 of the switch is of insulating material and is secured against a shoulder 35 in the cap 17 by the screws 37. The shims 39 surrounding the screws and lying between the casing and the shoulder serve to adjust the position of the switch 31 in relation to the cap 17.

Extending through the upper wall of cap 17, above the switch 31, are two electric terminals 41 and 43 arranged for connection to the switch and an external electric circuit (not shown). Each of the terminals 41 and 43 are insulated from the cap 17 by a washer 45 and a bushing 47. The terminals themselves consist of a bolt 49 having a head 51, which rests on a washer 53 of conducting material, and is threadedly engaged at the outer end by a nut 55. The wires 57 of an external circuit may be secured to the terminals by the screws 59, which engage the bolts 49. A wire 61 connects terminal 41 to a terminal 63 in the switch 31 and the wire 65 connects terminal 43 to another terminal 67 in the switch. Connected to terminal 63 is a spring leaf 69 which is arranged to contact terminal 67 to close the circuit through the switch, but which is normally held open by the plunger 71 extending through the switch casing 33.

The plunger 71 is movable and is held in engagement with an arm 73 in chamber 75 formed in cap 17. The arm is supported on the rock shaft 77 which extends into the bores 79 and 81 in the cap 17 and is fastened to the rock shaft by means of a set screw 83. An adjusting screw 85 threadedly engages an enlarged portion 87 of each bore 79 and 81 and bears against each end of the rock shaft. Each screw 85 is locked in position by a bushing 89 engaging the cap 17.

With this arrangement the rock shaft can be moved laterally to the right or left and, as a result, the position of the arm 73 may be changed with respect to the flapper 29 without disassembly of the device, it merely being necessary to loosen the locking bushings 89 and turn adjust-

ing screws 85 to move the rock shaft to the position desired.

This construction is important in that the flapper 29 has a cam surface 91 against which a cam follower 93, formed on arm 73, is pressed by the interaction of the spring leaf 69, the plunger 71 and the arm proper 73.

This cam is so designed that when the flapper 29 has been moved to a predetermined distance the arm 73 is lowered, permitting the spring leaf 69 to contact terminal 67. Furthermore, the cam is so constructed that the arm may be lowered at any predetermined movement of the flapper 29, depending on the position of the cam follower 93 with respect to the cam surface.

Thus, movement of the follower toward one end of the cam will increase the distance that the flapper 29 must be moved by the fluid to close the switch 31, whereas moving the follower to a position near the other end of the cam will decrease the distance. As a result, the fluid flow necessary to close the circuit through the switch 31 may be predetermined and may be varied to meet different conditions.

We claim:

1. In a device of the character described, oscillatable means responsive to variations in fluid flow, an electric switch for controlling a circuit, actuating means for the electric switch, means on the oscillatable means to releasably hold the actuating means, and means to shift the actuating means with respect to the last means to vary the angular relationship of the actuating means with respect to the oscillatable means and thereby predetermine the fluid flow for releasing the actuating means.

2. In a device of the character described having a body provided with a fluid passage, a member in the passage responsive to variations of the fluid flow therethrough, a cam on the member, a pivotally movable member releasably held by the cam, an electric switch releasably held by the pivotally movable member, and means to change the position of the pivotally movable member with respect to the cam to predetermine the fluid flow actuating the switch.

3. In a device of the character described, the combination of an oscillatable member responsive to the variations in a fluid flow, a cam on the oscillatable member, a rock shaft, an arm on the shaft resting on the cam, a movable plunger resisting on the arm, an electric terminal, a co-acting electric spring terminal normally held away from the electric terminal by the plunger adapted to engage the electric terminal upon predetermined movement of the oscillatable member, and adjusting screws to move the rock shaft longitudinally to predetermine the position of the arm with respect to the cam and predetermine the fluid flow for bringing electric terminals into contact.

4. In a device of the character described, oscillatable means movable in response to variations in fluid flow, separate pivotal means associated with the oscillatable means, a surface on the oscillatable means arranged to normally hold the pivotal means and to release the pivotal means upon any predetermined movement of the oscillatable means, and means to selectively vary the position of the pivotal means with respect to said surface to predetermine the portion of said surface releasing the pivotal means and thereby predetermine the movement of the oscillatable means for releasing the pivotal means.

5. In a device of the character described, an

oscillatable member movable in response to variations in fluid flow, separate pivotal means associated with the oscillatable member, a surface on the oscillatable member arranged to release the pivotal means upon any predetermined movement of the oscillatable member, and means to selectively vary the position of the pivotal means with respect to said surface to predetermine the position of the pivotal means with respect to said surface and thereby predetermine the movement of the oscillatable member for releasing the pivotal means.

6. In a device of the character described, oscillatable means responsive to fluid flow, movable means normally maintaining an electric circuit open, a pivotal arm for holding the movable means against movement, a cam on the oscillatable means to normally hold the pivotal arm and adapted to release the pivotal arm at any predetermined fluid flow, and means to vary the position of the arm with respect to the cam and predetermine the fluid flow for releasing the pivotal arm and movable means.

7. In a device of the character described, oscillatable means responsive to variations in fluid flow, a cam on the oscillatable means, and an arm normally held against movement by the cam and laterally movable along the cam surface to predetermine the position of the arm with respect to the cam surface.

8. In a device of the character described, oscillatable means responsive to variations in fluid flow, separate pivotal means associated with the oscillatable means, means on the oscillatable means to normally hold the pivotal means and adapted to release the pivotal means at any predetermined fluid flow, and means to predetermine the position of the pivotal means with respect to the last said means and thereby predetermine the fluid flow for pivoting the pivotal means.

9. In a device of the character described, oscillatable means responsive to variations in fluid flow, movable means for controlling an electric circuit, a rock shaft, an arm on the rock shaft to normally hold the movable means against movement, a cam on the oscillatable means to hold the arm adapted to release the arm upon a predetermined fluid flow, and means to predetermine the position of the arm with respect to the cam to predetermine the fluid flow for releasing the arm and the movable means.

10. In a device of the character described, oscillatable means responsive to variations in fluid flow, pivotal means associated with the oscillatable means, means on the oscillatable means having a surface to normally hold the pivotal means against movement and release the pivotal means upon a predetermined movement of the oscillatable means, and means to vary the position of the pivotal means with respect to said surface to predetermine the movement of the oscillatable means for releasing the pivotal means.

11. In a device of the character described, an oscillatable member responsive to variations in fluid flow, a shaft, a pivotal arm on the shaft, a cam on the oscillatable member having an arm holding surface adapted to release the arm upon a predetermined movement of said member, and positioning members for the shaft to predetermine the position of the arm with respect to the arm holding surface and thereby predetermine the fluid flow for releasing the arm.

12. In a device of the character described, a

body provided with a fluid passage, an oscillatable member in the passage movable in response to variations in fluid flow therethrough, a rock shaft on the body, a pivotal arm for controlling an electric switch on the shaft, a cam on the oscillatable member having an arm holding surface arranged to release the arm upon a predetermined movement of the oscillatable member, 5

and movable members for positioning the rock shaft to predetermine the portion of the arm with respect to the arm holding surface and thereby predetermine the flow of fluid for releasing the arm.

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