Oct. 28, 1924. 1,513,361

T. S. AIREY

PRESSURE OPERATED CIRCUIT CLOSER

Filed Dec. 3, 1920

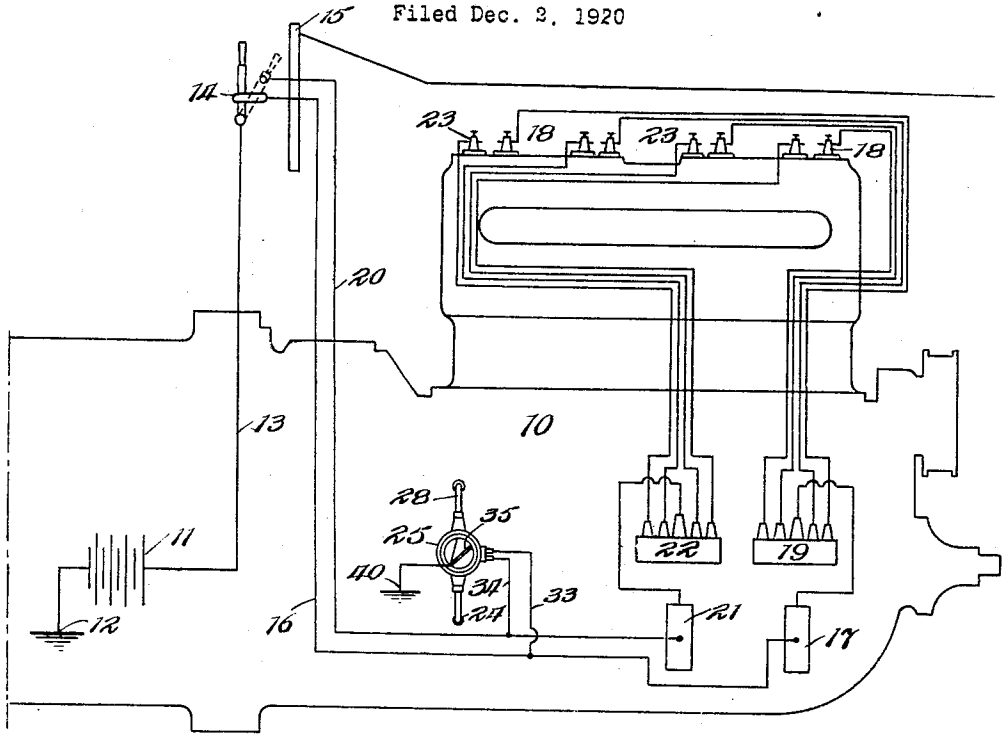


Fig. 1.

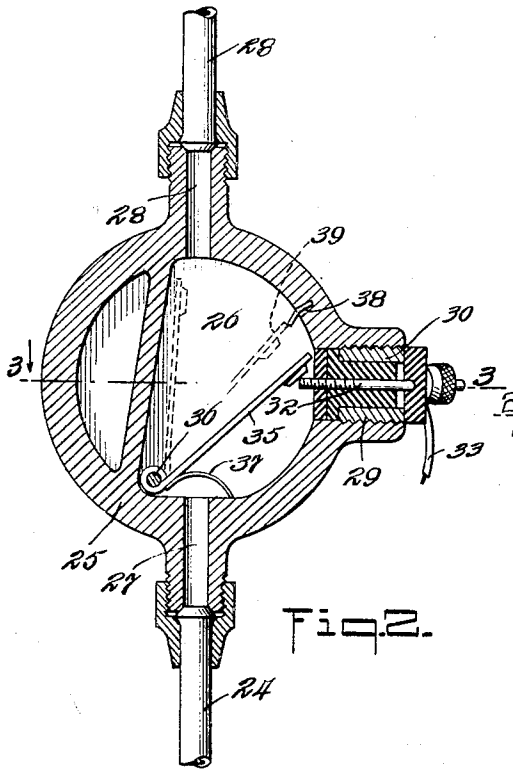


Fig. 2.

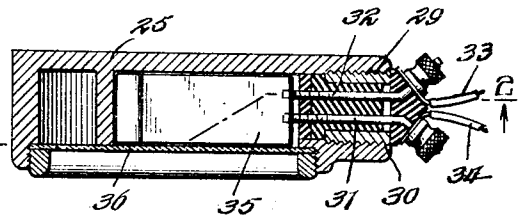


Fig. 3.

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PRESSURE-OPERATED CIRCUIT CLOSER.

Application filed December 2, 1920. Serial No. 427,665.

To all whom it may concern:

Be it known that I, THOMAS STANLEY AIREY, a citizen of the United States, and resident of Elmhurst, in the county of Queens and State of New York, have invented certain new and useful Improvements in Pressure-Operated Circuit Closers, of which the following is a specification.

The invention relates in general to a safety control device for regulating an electrically energized mechanism by a fluid flow and the invention is illustrated herein in connection with the ignition system of an internal combustion engine.

One of the objects of the invention is to provide a simple form of circuit closer constituting part of a fluid conduit and containing a fluid actuated contact member which will be sensitively responsive to any liquid flow through the device and in which the movable contact member of the circuit closer will be held positively in circuit breaking position by any fluid pressure therein however weak.

Broadly, I attain this invention, first by causing a primary valve to be operatively associated with the intake port to the device so as to close the inlet when free of pressures therein, but which will immediately open a circuit closer as soon as any liquid pressure occurs at the inlet port. It is further proposed to provide an extension from the primary valve disposed so as to form a secondary valve which offers its maximum restrictions to the flow through the device when the movable element of the contact has moved from its circuit closing position and which will cause the movable contact member to be maintained in said spaced relation to its fixed contact so long as there is any flow whatsoever through the conduit.

Various other objects and advantage of the invention will be in part obvious from an inspection of the accompanying drawings and in part will be more fully set forth in the following particular description of one form of mechanism embodying my invention, and the invention also consists in certain new and novel features of construction and combination of parts hereinafter set forth and claimed.

In the accompanying drawings:—

Figure 1 is a view in side elevation of an internal combustion engine mounted on an automotive vehicle and provided with an attachment constituting a preferred embodiment of my invention shown installed on an engine of the duplex firing type;

Figure 2 is a vertical sectional view taken through the attachment shown in Figure 1 taken in the plane of the showing in said figure, and on line 2—2 of Fig. 3; and

Figure 3 is a transverse sectional view taken on the line 3—3 of Figure 2.

In the following description and in the claims, parts will be identified by specific names for convenience of expression but they are intended to be as generic in their application to similar parts as the art will permit.

Referring particularly to Figure 1 there is disclosed a conventional form of an internal combustion engine 10, equipped with a duplex ignition system which includes a source of electric energy 11, one side of which is grounded as shown at 12, and the other side of which leads by means of a conductor 13 to a duplex manual control switch 14 on the instrument or dash-board 15 of the vehicle. From the switch 14 a conductor 16 leads to a magneto 17 which in turn supplies spark plugs 18 from a distribution box 19. Similarly a conductor 20 leads from the switch through a magneto 21 and distributing box 22 to the firing plugs 23, all as is well known in conventional forms of such devices.

Still following known constructions the engine is provided with a lubricating system and includes a force pump not visible from the outside of the engine casing but the discharge port of which is indicated symbolically by the conduit 24 through which oil or other lubricant is fed to the different movable parts of the engine not shown in the present disclosure.

The attachment featured in this disclosure is in the form of a metallic shell 25 positioned in the conduit 24 so as to form a part thereof. The casing is of a flat cylindrical form, somewhat resembling a watch and is provided centrally thereof with a mechanism containing chamber 26 into which extend aligned bores one of which 27 constitutes an inlet port leading from the discharge end of the pump into the chamber at one side thereof. In the present disclosure the inlet is shown at the bottom of the chamber so as to feature the use of a falling or gravity actuated contact member hereinafter more fully described. The other bore 28, in this instance at the top of the casing, constitutes a discharge port from

the chamber and leads to the movable parts of the engine to be lubricated.

The side of the attachment is provided with a threaded aperture 29 opening into the chamber 26 into which aperture is demountably positioned a plug 30 resembling the usual spark plug except that it contains two terminal points 31 and 32 projecting at their inner ends into the chamber, and insulated from each other and from the shell 25. The outer ends of the points are threaded and provided with nuts to form external binding posts.

A grounding circuit adapted to be controlled by the fluid flow through the attachment is formed in part by a conductor 33 leading from the conductor 16 to the point 32 of the plug 30.

Similarly a conductor 34 leads from the conductor 20 to the binding post at the outer end of the other point 31 of the plug.

The movable element 35 of the circuit closer is of the falling switch type and is in the form of a flat, metal strip pivotally mounted on a pin 36 positioned in the lower part of the chamber 26 and on the side of the inlet port opposite the relatively fixed contact found by the points 31 and 32. It is obvious, in order to meet imperfections in commercial production, that there be some flexibility between the primary and secondary valve in order that the valve 37 be in its position securely closing the inlet 27 at the time that valve 35 is in engagement with the electric terminal points 31 and 32. This simultaneous engagement at different points is readily attained by making the valve 37 of thin metal as shown in Figure 2 to give the desired flexibility. Similarly the valve 35 may have sufficient pliability to insure the simultaneous contact with both of the points 31 and 32.

The movable contact is overbalanced so that normally it will fall due to its own weight into circuit closing contact against both of the contact points 31 and 32.

A primary valve 37 is secured to the underside of the element 35 and is so disposed that it will completely close the inlet port 27 when the element 35 is in circuit closing agreement with the points 31 and 32.

From this construction it will be noted that no liquid can enter the chamber 26 except that it raises the member 35 off the contact points and thus breaks the grounding circuits.

A projection 38 extends into the chamber between the plug and the outlet port 28 and is positioned so that a slight movement of the member 35 away from the contact points will bring its free end 39 opposite the projection as shown in dash lines in Fig. 2. When in this position the free end 39 is sufficiently close to the projection to choke the passageway and act as a secondary valve to intercept the flow through the chamber unless the flow is of sufficient strength to sweep the valve 39 past the projection and into a fully open position shown in dotted lines in Fig. 2.

The movable element 35 is grounded as shown at 40 in Fig. 1 so that with the member in its normal circuit closing position the battery is grounded on both sides.

In operation and assuming that the device is mounted on an internal combustion engine to control both of the ignition systems of a duplex firing system, the turning over of the engine will cause the pump to actuate and some lubricant pressure will appear at the inlet port. This will be sufficient to act on the primary valve and lift the movable element of circuit closer off the contact points thus permitting one or both spark plugs to fire depending upon the position of the control switch. With the engine in active operation and a full force of lubricant flow acting on the member 35 this member will be held in open position as described in the preceding application.

However, let it be assumed that the engine is throttled down and the pump acting slowly and sending merely a trickle of fluid through the device. The member 35 will tend to close and will move towards the projection. It cannot pass the projection in its closing movement as long as there is any fluid flow in the oposite direction past the projection. The upwardly flowing liquid is compelled to pass between the projection and the secondary valve thus holding the valve from passing the projection and from moving into engagement with the contact points. It will be appreciated that the circuit closer cannot shut off the engine as long as there is any lubricant flowing through the system.

Having thus described my invention, I claim:

1. In a device of the class described, the combination of a casing provided with a mechanism-containing chamber having a fluid inlet port and an outlet port, mechanism mounted in said chamber and including a primary valve normally closing the inlet port and movable by the fluid pressure admitted through said inlet port into two succeeding open positions, means for forming an electric circuit, a combined movable electric contact constituting part of said circuit forming means and a secondary valve both operatively connected to said primary valve to move therewith, a coacting relatively fixed electric contact also constituting part of said circuit forming means engaged by the movable electric contact when the primary valve is closed to complete said electric circuit, an obstruction in the chamber in spaced relation to the fixed contact and coacting with the secondary valve to choke the pas-

sageway between the inlet and outlet ports when said primary valve is in the first of its succeeding open positions, said secondary valve being movable past said obstruction in the movement of the primary valve to its fully open position.

2. In a device of the class described, the combination with a mechanism-containing chamber having an inlet and an outlet port, a pivotally mounted member provided with a part normally closing said inlet port, said member constituting the movable electric contact of a circuit closer, a relatively fixed contact member projecting into the chamber and normally engaged by the movable contact when the inlet port is closed, a projection in spaced relation to the fixed contact and coacting with said member when the member is out of engagement with the fixed contact and adjacent to said projection to obstruct the free flow between the inlet and outlet.

3. In a device of the class described, the combination of a fluid conducting conduit, means for forming an electric circuit including a circuit affecting member disposed in said fluid conduit and movable by the fluid pressure therein from a normal circuit controlling position into two succeeding abnormal positions, means coacting with said member when in the first of said abnormal positions to restrain the flow through the conduit and said member when in the second of said positions permitting a free flow through the conduit.

4. In a device of the class described, the combination of a fluid conducting conduit, means for forming an electric circuit including a circuit affecting member disposed in said fluid conduit and movable by the fluid pressure therein from a normal circuit controlling position into two succeeding abnormal positions, means coacting with said member when in the first of said abnormal positions to restrain the flow through the conduit and said member when in the second of said positions permitting a free flow through the conduit and said member including means controlled by the fluid pressure to move said member from normal circuit controlling position past the second fluid restraining position and into its fully open position.

5. In a device of the class described, the combination of a casing provided with a mechanism-containing chamber having an inlet port and an outlet port, a fixed contact member extending into the chamber between the ports, an obstruction extending into the chamber between the contact and the outlet port, and a member pivotally mounted on the side of the inlet port opposite the contact and obstruction, said member constituting a movable contact adapted to engage the fixed contact to constitute a normally closed electric circuit closer, said member provided with a valve for closing the inlet when the contacts are in engagement and disposed so that fluid pressure at the inlet port will act thereon and tend to move the member towards and past said obstruction, said member coacting with the obstruction when oppositely disposed to the same to intercept the flow through the chamber and thus tend to maintain the circuit closer in open position as long as there is pressure on the member sufficient to resist its tendency to move into circuit closing position.

6. In a device of the class described, the combination of a casing provided with a mechanism-containing chamber having an inlet port and an outlet port, a fixed contact member extending into the chamber between the ports, an obstruction extending into the chamber between the contact and the outlet port, and a member pivotally mounted on the side of the inlet port opposite the contact and obstruction, said member constituting a movable contact adapted to engage the fixed contact to constitute a normally closed electric circuit closer, said member coacting with the obstruction when oppositely disposed to the same to intercept the flow through the chamber and thus tend to maintain the circuit closer in open position.

7. In a device of the class described, the combination of a fluid conduit having a projection extending into the same, said conduit having an outlet on one side of the projection and an inlet on the opposite side, a valvular member mounted to swing past said projection and when opposite the same to close the conduit, and the inlet end of said conduit adapted to contain fluid under pressure directed by the conduit to act on said valvular member to move the same past said projection and into an operative position.

8. In a device of the class described, the combination of a fluid conduit with a fluid inlet at one end an outlet at the opposite end and having a projection extending into the same between the inlet and outlet, a valvular member having an operative position mounted to swing past said projection and when opposite the same to close the conduit, and the inlet end of said conduit adapted to contain fluid under pressure directed by the conduit to act on said valvular member to move the same past said projection and into its operative position in a direction towards said inlet.

Signed at New York city, in the county of New York and State of New York, this 24th day of Nov. A. D. 1920.

THOMAS STANLEY AIREY.