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PRESSURE AND TIME CONTROLLED CIRCUIT MAKER AND BREAKER

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Fig. 1

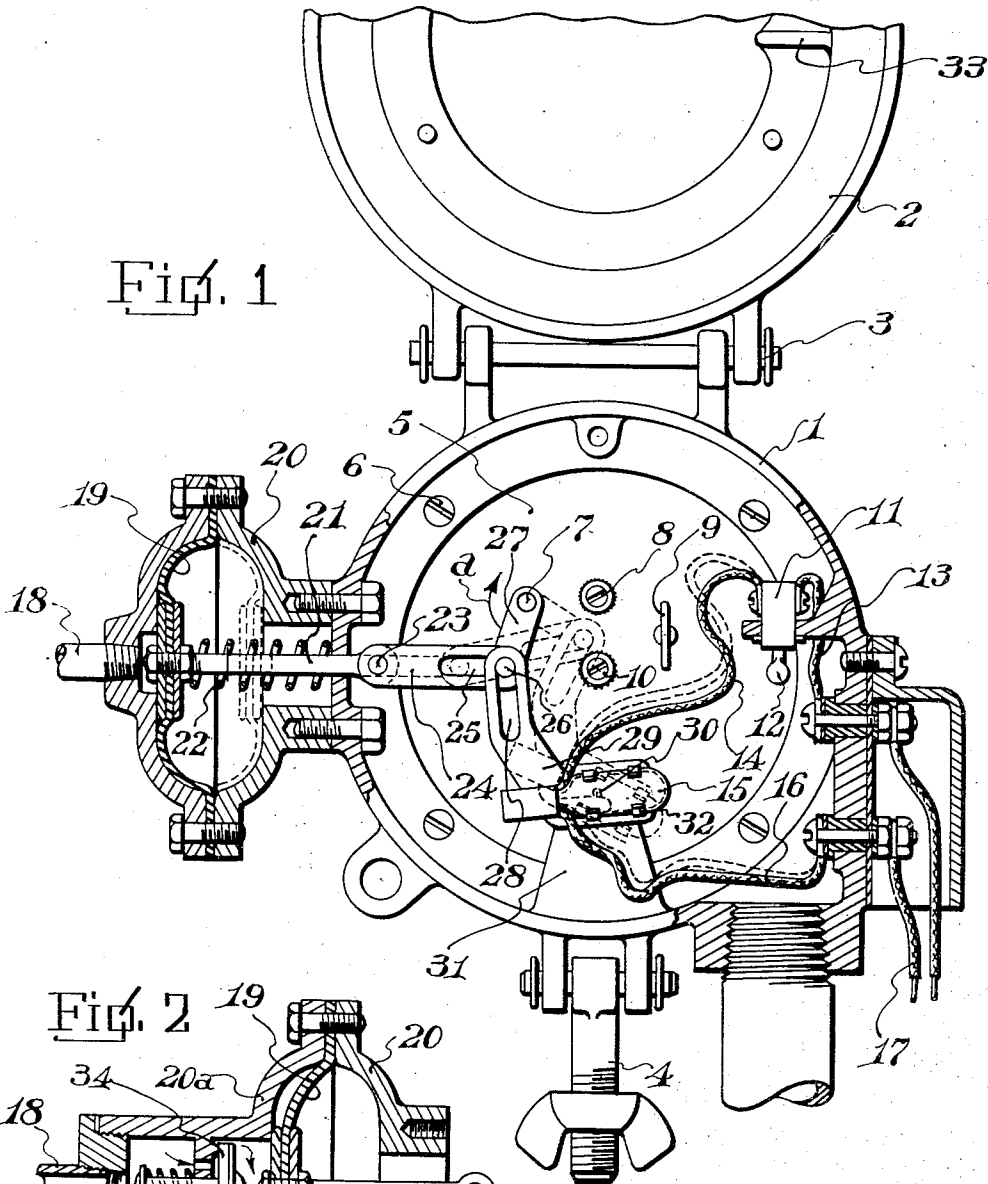
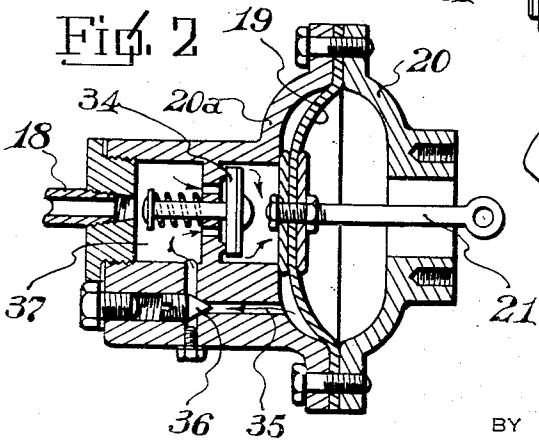


Fig. 2



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PRESSURE AND TIME CONTROLLED CIRCUIT MAKER AND BREAKER

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6 Claims. (Cl. 200—81.5)

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The invention relates to pressure and time controlled circuit makers and breakers particularly adapted for controlling the supply of current to a pump engine which pumps fluid, for instance oil, through a pipe line, and has for its object to provide a ground wire in the circuit having a mercury switch therein, which switch is normally open, and held open by pressure in the pipe line, and automatically closed when pressure drops below a predetermined amount, thereby grounding the circuit.

A further object is to provide time controlled means in connection with the switch whereby the grounding wire can be automatically grounded by the switch at a predetermined time.

A further object is to mount the mercury switch and tube on a rock lever, and to connect the rock lever to an alarm wind arm having a lug extending into an elongated slot in the rock lever, and also through an elongated slot in a link connected to a slidable diaphragm rod, and to provide means whereby pressure will be applied to the outside of the diaphragm for normally maintaining the ground wire out of circuit until there is a reduction in pressure on the diaphragm.

A further object is to provide means whereby the alarm arm will move the rock arm to close and ground the circuit at a predetermined time without a reduction of pressure on the diaphragm.

A further object is to provide means whereby the reduction of pressure on the diaphragm may be regulated so the parts will slowly move.

With the above and other objects in view the invention resides in the combination and arrangement of parts as hereinafter set forth, shown in the drawing, described and claimed, it being understood that changes in the precise embodiment of the invention may be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawing:

Figure 1 is a view in elevation and partially in section of the switch and control mechanism, showing the switch box open.

Figure 2 is a vertical longitudinal sectional view through a modified form of diaphragm valve or control, showing a bleeding arrangement for slow operation.

Referring to the drawing, the numeral 1 designates the main body of the casing, 2 a closure and 3 a hinge. The closure is maintained closed by a conventional form of toggle bolt 4. Disposed within the casing is a time clock 5, the rear side of which is shown. The clock is held in position by screws 6. Clock 5 has the usual alarm

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wind shaft 7, alarm set 8, time winder 9, and time set 10, all conventional structure. However the shaft 7 of the alarm wind is urged in the direction of the arrow *a*, the purpose of which will presently appear.

Secured within the casing 1 is a conventional form of toggle switch 11 having a toggle 12, which toggle is pulled outwardly for opening the circuit leading from the electric power line 13 going to the pumping engine. The other side of switch 11 has connected thereto a ground wire 14 leading to a mercury switch 15. The other side of the mercury switch has connected thereto a ground wire 16 leading to a ground wire 17. It is to be kept in mind that the ground circuit is maintained open through the mercury switch when there is proper pressure on the pipe line 18, or until there is a specific time set for stopping the engine. Referring to figure 1, it will be seen that the parts are shown with the ground wires grounded, hence the engine has stopped, incident to loss of pressure.

Assuming the toggle switch 11 is opened by pulling outwardly on the toggle 12, the engine circuit will not be grounded, hence the engine can be started. As pressure builds up in the pipe line 18, which pipe line communicates with other lines, the pressure acts against the outer side of the diaphragm 19 within the diaphragm casing 20 and pushes the diaphragm rod 21 inwardly against the action of the expansion spring 22. Pivotaly connected to the inner end of the rod 21 at 23 is a link 24 having an elongated slot 25 in its inner end, and extending through the slot 25 is a lug 26 carried by the alarm shaft arm 27. The lug 26 also extends through an elongated slot 28 in the upwardly extending rock lever 29, which rock lever is pivoted at 30 to a support 31, and on which rock lever is clipped, at 32, the mercury switch 15, which is to be tilted. As the link 24 moves inwardly, incident to built up pressure, the inner end of the slot 25 will engage the lug 26 and force the parts to the dotted line position shown in Figure 1, and at which time the rock lever 29 is rocked to its dotted line position, and the mercury switch 15 reversely inclined, thereby breaking the circuit. Following this operation, the closure 2 may be closed, and as the closure reaches closed position, the lug 33 carried thereby will engage the toggle 12 and force the same inwardly, thereby closing the circuit through the toggle switch 11. This will not ground the circuit, as the mercury switch 15 has been previously tilted to open position.

It will be seen that when there is a reduction of

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pressure on the outer side of the diaphragm 19, that the expansion spring 22 will force the diaphragm and rod 21 outwardly, thereby imparting a pull on the link 24, arm 27, and rock lever 23, thereby moving the parts to the full line position shown in Figure 1, and tilting the mercury switch 15 to ground the circuit through the ground wires. It will be seen the pump or engine may be stopped upon loss of pressure in a fluid line.

When the clock or time control is used the arm 27 is moved in the direction of the arrow *a*, therefore it will be seen, referring to the dotted lines in Figure 1, that the lug 26 which extends through slots 25 and 28 will move towards the diaphragm side of the device and will move the arms 27 and rock lever to the full line position at the same time the lug 26 will freely move longitudinally in the link 24, therefore it will be seen that the parts will not be working against a pressure in the pipe line, and the circuit may be grounded at a predetermined time for stopping the engine.

Referring to Figure 2, wherein a delayed action structure is shown for the diaphragm, the casing 20a is provided with a back pressure check valve 34 which unseats, under pressure from the line 18 for applying pressure to the outer side of the diaphragm 19. Upon loss of pressure in the pipe line the pressure to the outside of the diaphragm is slowly bled through port 35, past regulating valve 36, into the chamber 37 and to the pipe 18, therefore it will be seen that there is a delayed action, consequently the speed of operation of the toggle switch arrangement can be regulated.

From the above it will be seen that a pressure and time controlled circuit maker and breaker is provided for the purpose stated, which is simple in construction, positive in its operation, and one wherein a circuit may be positively controlled, upon loss of pressure, or at a predetermined time.

The invention having been set forth what is claimed as new and useful is:

1. A pressure and time controlled circuit maker and breaker comprising a casing, a time mechanism within said casing, said mechanism having a spring actuated shaft, an arm carried by said spring actuated shaft, the outer end of said arm having a lateral lug, a rock lever below the arm, said rock lever having an upwardly extending slotted arm through the slot of which said lateral lug extends, a mercury switch mounted on said rock lever, a diaphragm casing,

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a diaphragm in said casing and against one side of which pressure acts, a diaphragm controlled rod extending into the casing, a link carried by said rod and extending towards the arms, said lateral lug extending through an elongated slot in the link, said link forming means whereby said rock lever and spring actuated shaft arm are simultaneously moved inwardly for opening a circuit through the mercury switch upon inward movement of the diaphragm controlled rod.

2. A device as set forth in claim 1 wherein the elongated slot carried by the link forms means whereby the arm carried by the spring actuated shaft and upwardly extending arm of the rock lever may be independently moved without outward movement of the link for breaking the circuit through the mercury switch through the movement of the spring actuated shaft arm.

3. A device as set forth in claim 1 including a toggle switch within the casing and in circuit with the mercury switch, a closure for the casing and means carried by the closure and cooperating with the toggle switch for closing the circuit to the mercury switch when the closure is moved to closed position.

4. A device as set forth in claim 1 including an expansion spring surrounding the diaphragm rod within the diaphragm casing and normally urging said diaphragm outwardly.

5. A device as set forth in claim 1 including means for supplying pressure to one side of the diaphragm and means for slowly bleeding the pressure from said side of the diaphragm.

6. A device as set forth in claim 1 wherein the mercury switch extends across the axis of the rock lever, said mercury switch being attached to the rock lever and movable therewith.

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