A. F. FELLER.

CONTROLLER FOR ELECTRIC CIRCUITS.

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1,126,434.

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Fig. 1.

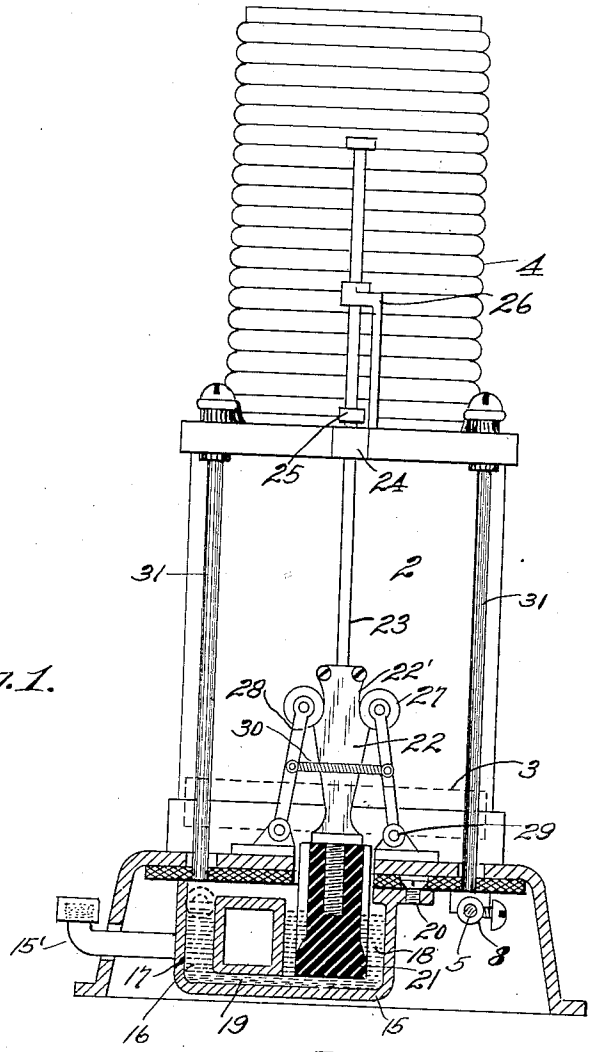


Fig. 2.

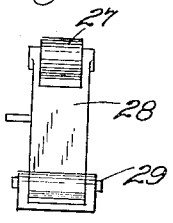
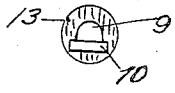


Fig. 4.



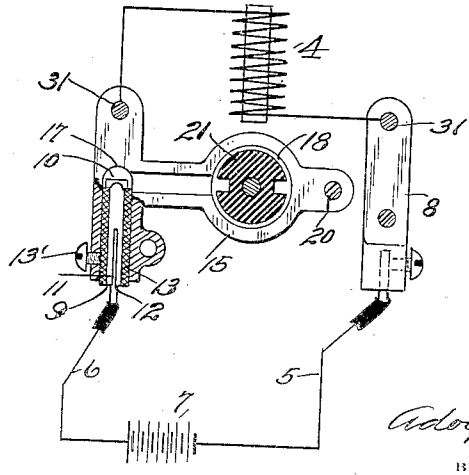


Fig. 3.

WITNESSES:

F. E. Maynard

Charles Rokles

INVENTOR

Adolph F. Feller,

BY G. H. Strong,

ATTORNEY

UNITED STATES PATENT OFFICE.

ADOLPH F. FELLER, OF BERKELEY, CALIFORNIA.

CONTROLLER FOR ELECTRIC CIRCUITS.

1,126,434. Specification of Letters Patent. Patented Jan. 26, 1915.

Application filed December 9, 1913. Serial No. 805,665.

To all whom it may concern:

Be it known that I, ADOLPH F. FELLER, a citizen of the United States, residing at Berkeley, in the county of Alameda and State of California, have invented new and useful Improvements in Controllers for Electric Circuits, of which the following is a specification.

This invention relates to controllers for electric circuits, and particularly to an automatically operable circuit closer and breaker for gas machines, compressors, and the like, and comprises a fluid, circuit-closing conductor in combination with electric terminals, so arranged that an electric circuit will be completed through said terminals when immersed in the fluid conductor.

It is an object of the present invention to provide an inexpensive, simple, quickly acting, automatically operable circuit controller, whereby the circuit may be closed and broken intermittently; to provide such a controller having a mobile circuit closing element or fluid conductor adapted to be moved or so disposed as to cause the immersion of a fixed electric terminal, automatically operable means being provided for causing the movement or displacement of the fluid substance through which the circuit is completed at the terminals; and to provide an automatically operated plunger and actuating means therefor, so designed that the closing operation of the electric circuit will be completed rapidly after a relatively slow movement of the circuit-closing mechanism.

Another object of the invention is to provide a substantially frictionless guide and accelerating device for accomplishing the rapid closure of the electric circuit at a predetermined time.

The invention consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is an elevation of a magnetic machine, including a solenoid and its movable core, showing the improved circuit controller introduced into the circuit of the solenoid coil and shown in section. Fig. 2 is a detail of one of the accelerator levers. Fig. 3 is a detail, sectional, plan view showing the terminal construction. Fig. 4 shows an end view of the submersible terminal.

It is understood that the present novel circuit controller may be introduced into any circuit which is to be intermittently opened and closed and may be mechanically automatically or manually operated. In the present case the invention is shown as applied to an electrically operated air compressor 2 in which there is a piston 3; the piston-rod being preferably of magnetic material and mounted for operation in a solenoid coil 4 on the top of the compressor cylinder 2. The solenoid coil is alternately energized by suitable connections, as lead wires 5 and 6, connected to a source of current 7, to reciprocate the plunger.

The circuit wires 5 and 6 are provided with suitable terminals which are shown in detail in Fig. 3, one comprising a metal clamp 9 with a transverse head 10 and the other a socket clip 8. The clamp is longitudinally split, as at 11, and chambered, as at 12, to receive the bared end of one of the terminals, as 6, and is inclosed in an insulating bushing 13, on which is a screw 13′ for closing the clamp upon the wire. The terminal bushing 13 is here shown as mounted in a container 15 so that the transverse exposed terminal bar 10 may be adjusted in suitably spaced juxtaposition within a portion of the container 15 which is charged with a liquid electric conductor 16, preferably mercury.

The container 15 comprises two pockets 17 and 18 of differential transverse area and capacity, the pocket 17 being smaller than the pocket 18 and having a fixed-level filling spout 15′ at one side. These pockets are transversely connected across the bottom of the chamber by a duct 19 which may be of relatively small transverse area, the container being secured to the apparatus 2 by bolts or other suitable fastenings 20.

The circuit controller, comprising the casing or chamber 15 with its fluid electric conductor 16, is here shown as mounted beneath the apparatus 2 and the upper portion of the large pocket or pot 18 is open for the reception of a displacement device or plunger 21 which is slidable in the pot 18. The plunger 21 is connected to an operating cam 22 having an upwardly extending stem 23 running in a suitable guide or guides 24.

The stem 23 is provided with adjustable shoulders or collars 25 reciprocal between which and sliding along the stem 23 is an

actuator 26, which is in the form of a collar embracing the stem 23 and which is connected to the piston 3 of the apparatus by any suitable means which will rigidly connect these parts, so that when the piston moves the actuating device 26 will engage first one and then the other of the collars 25 on the stem to lift or lower the same. As the actuating collar 26 moves downwardly with the piston it will encounter the lower collar 25 and force this downwardly with the stem cam and plunger 21. The cam 22 is provided with oppositely inclined side walls with a gradual taper and is contracted quickly at its waist or upper portion 22'.

The downward movement of the cam 22' and the plunger 21 with its associated parts will be accelerated by the downward pressure at the waist 22' by the spring pressed rollers 27 riding on the side faces of the cam 22, and which rollers are mounted upon the upper ends of links or levers 28 pivoted at 29 upon suitable bearings.

The links 28 are normally drawn toward each other by a contractile spring or other suitable means 30, the pressure of which, as soon as the rollers 27 ride over the high points of the cam, will react upon the upper converging surfaces at 22'. The action of the spring 30 upon the rollers and these in turn acting upon the contracting surfaces will accelerate the downward movement of the plunger 21 so that it will quickly displace a portion of the fluid 16 in the container 15; the displaced fluid from the chamber 18 rising in the opposite pocket 17 to a sufficient height to contact or immerse the exposed terminal bar 10 and thereby quickly and effectually close a circuit through the solenoid coil, the latter having electrical connections at 31 with the clip 8 and the container 15. The area of the terminal bar 10 is relatively large and being horizontally arranged the lower flat edge exposes a large surface to the rising fluid conductor 16 so that an ample volume of current may be transmitted instantly the contact is made.

Upon the closing of the circuit at the terminal 9 the solenoid or other apparatus 4 will be energized and its core or part connected to the piston 3 attracted so that the piston will rise and carry with it the actuator 26 which will slide along the cam stem 23 until it engages the upper collar 25 thereon when it will lift the collar and the stem, with its connected elements, and forcibly separate the rollers 27 by the spreading action of the tapering portion 22' of the cam. The continued upward movement of the cam 22 allows the rollers 27 to again approach as the lower tapering body of the cam 22 rises.

From the foregoing it will be seen that I have provided an electric circuit controller with an adjustable electric terminal which exposes large areas to and are quickly immersed by a fluid electric conductor which is adapted to be displaced so as to rise and immerse the terminal when the circuit is to be completed, and the closing of the circuit is made rapid and is automatically accomplished by a device which displaces the fluid conductor at a predetermined time.

For economy, simplicity and convenience the socket piece 8 and the terminal container 15 are attached to standards or bolts 31, insulated from the apparatus and connected at their upper ends to the coil wiring.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. An electric circuit controller for reciprocating elements, including a liquid container, a contact above the normal surface of the liquid, a vertically reciprocable plunger which operates in said container to displace the liquid to move same to engage said contact, a member rigidly connected to and extending upwardly from said plunger, said member having the sides of its upper end portion contracted and having said sides below the contracted portion tapering toward the lower end thereof, a pair of links pivoted at their lower ends to relatively fixed points and having rollers on their upper ends which ride on said sides of said member, a coil spring extending transversely of and connecting said links at points between the ends of the links, and means whereby said member is actuated by said element, said links having a space therebetween to allow the plunger to move upwardly into said space between the links.

2. In an electric circuit controller, a liquid container having a pair of vertical communicating pockets, a lateral hollow projection on the container which communicates with one of the pockets, a plunger in the opposite pocket, an insulating bushing in said projection, a clamp having a transverse head disposed in said bushing and having its head horizontally disposed so as to present a flat edge to the liquid, and a wire connected to the outer end of the clamp.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ADOLPH F. FELLER.

Witnesses:
W. W. HEALEY,
M. KANDERER.