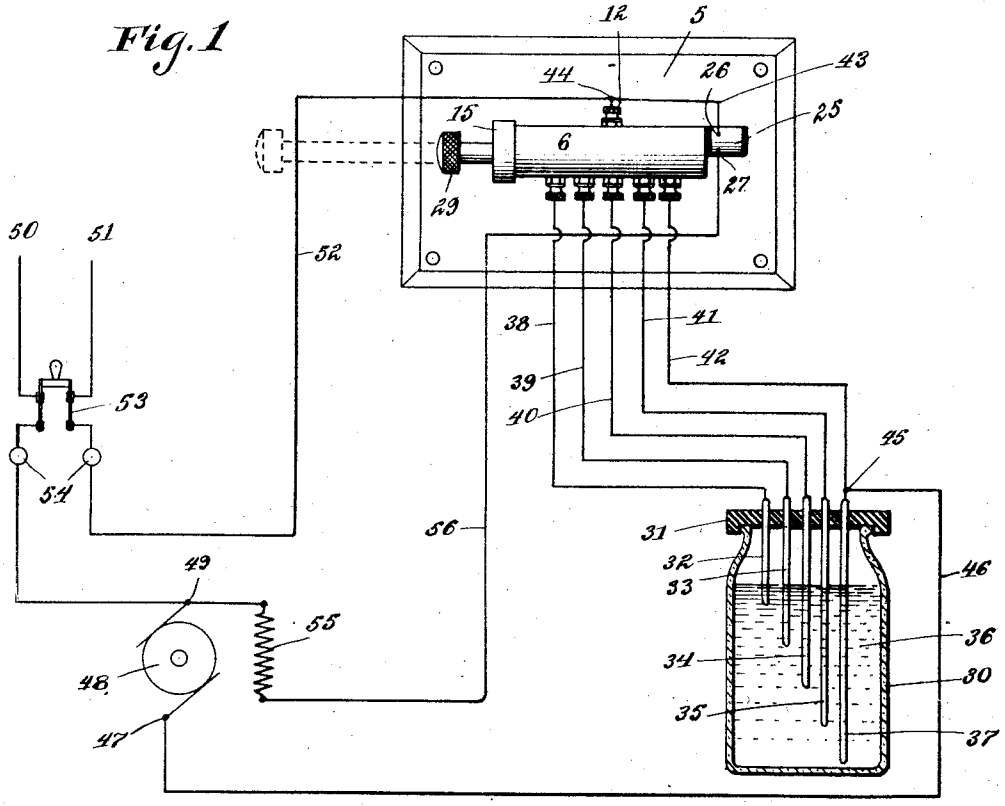
W. A. ARCHIBALD & H. W. THOM.

ALL WATER RHEOSTAT.

APPLICATION FILED SEPT. 11, 1917.

1,268,666. Patented June 4, 1918.

Fig. 1



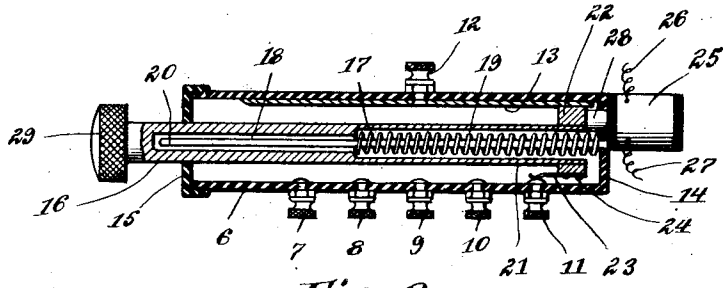


Fig. 2

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ALL-WATER RHEOSTAT.

1,268,666. Specification of Letters Patent. Patented June 4, 1918.

Application filed September 11, 1917. Serial No. 190,837.

To all whom it may concern:

Be it known that we, WILLIAM A. ARCHIBALD and HAROLD W. THOM, citizens of the United States, residing at Tyler, in the county of Clearfield and State of Pennsylvania, have invented new and useful Improvements in All-Water Rheostats, of which the following is a specification.

This invention is a liquid rheostat more particularly adapted to control the inward flow of current to a current consuming device such as an electric motor which may be employed as a load rheostat for testing purposes.

One object of this invention is to provide a liquid rheostat that may be employed in connection with the starting of electric motors whereby the amount of current passing is limited until the motor attains a sufficient speed to generate its proper counter E. M. F.

Another object is to provide a rheostat having subdivided anode plates which are spaced from each other and from a cathode plate.

A further object is to provide a step by step switching mechanism which serves to cut in and cut out the several plates according to its position and when at one end of its travel it is retained in position by means of a no-load magnet, which magnet is in series with the field of the motor and at the same time the cathode plate is shunted.

Broadly stated, the invention comprises a suitable receptacle having a cover from which depend suitable spaced plates whose lower ends are adapted to be inserted or immersed in a liquid which is preferably of a saline character, a switching mechanism comprising a movable member having a contact that is adapted to engage with spaced terminals, a spring to coöperate with the handle which is placed under compression by movement of the handle in one direction, said handle being provided at one end with an armature which is adapted to coöperate with the core of an electromagnet serving as a no-load release magnet, said spaced terminals being connected by suitable circuit wires with the several plates in the receptacle, and a terminal to connect with one side of a supply circuit and with the contact carried by the arm, the other terminal of the supply circuit being connected with one of the spaced terminals or the circuit wire connected thereto.

One practical form of construction and assembly will be described and illustrated in the accompanying drawings, in which—

Figure 1 is a diagrammatic view showing the circuiting arrangement with the rheostat in section, and

Fig. 2 is a sectional view of the switching mechanism.

In the preferred embodiment about to be described, the switching mechanism may be mounted upon a suitable base 5 that may be formed of any usual insulating material. Secured to the base 5 is a tubular member 6 formed of insulating material. Disposed at spaced intervals at one side of the tube 6 are terminals 7, 8, 9, 10 and 11 and upon another portion of the tube 6 is a single terminal 12. The single terminal 12 is preferably connected to a conducting strip 13 disposed upon the interior of the tube 6. The tube 6 may have one of its ends solid, as indicated at 14, that is formed integrally with the tube 6. The other end of the tube may be closed by a screw cap 15, as shown.

The screw cap, as shown in Fig. 2, is provided with a central opening through which passes a handle 16. The handle 16 is preferably tubular and the bores thereof, as indicated at 17 and 18 are of different diameters. The bore 17 is preferably of a sufficient size to accommodate a spring 19. This spring encircles a guide member 20 that extends through the bore 17 and into the bore 18. The length of this guide member is slightly less than the depth of the two bores longitudinally. This guide member 20 may be secured to the end 14 in any suitable manner; or if desired may be made removable therefrom.

The bore 17 in the handle 16 forms the right-hand end into a tubular member, as indicated at 21. Secured adjacent the open end of this tubular member 21 is a circular armature 22 which may be of soft iron and also serve as a conducting ring. The armature 20, by means of this periphery contacts with the strip 13.

One portion of the periphery of the armature 22 is provided with a spring contact finger 23 which may be secured to the ring in any suitable manner, one of which is indicated by the screws 24. The free end of

this contact finger 23 may be formed with a slight curved portion that is adapted to coöperate with the bases of the terminals 7 to 11, inclusive.

Mounted upon the end 14 is an electromagnet 25 which has a binding thereon and the terminals thereof are indicated at 26 and 27. One end of the core 28 projects through the end 14 a sufficient distance so as to cooperate with the armature 22 when the handle 16 is pushed into the extreme limit of its travel. The handle 16 may be provided at its outer end with a knob 29 that may have the periphery knurled. As shown in Fig. 2, the knob 29 is operated to push the handle 16 through the extreme limit of its travel and shows the armature in contact relation with the core 28 of the electromagnet 25.

The rheostat is preferably suspended within the containing receptacle 30 which may be of any suitable material and is shown in the present instance as being made of glass. The receptacle 30 is provided with an insulating cover 31 through which the anode plates 32, 33, 34 and 35 pass. To permit these plates to pass through the cover suitable openings may be provided and they may be held in position therein in any usual manner. As shown, the several plates are of different lengths, and therefore, are immersed in the liquid 36 for different depths. The liquid 36 may be any usual solution such as salt or chlorid of sodium dissolved in water.

At the right, as shown in Fig. 1, the plate 37 serves as a cathode plate relative to the plates 32 to 35, inclusive, up to a certain point when it is cut out of circuit or shunted. The plate 37 is immersed in the solution and, therefore, its surface is greater. The plates 32 to 35, inclusive, serve as anode plates and they are connected to the terminals 7 to 10, inclusive, by means of the circuit wires 38, 39, 40 and 41. The terminal 11 is connected by means of the circuit wire 42 with the plate 37.

The terminal 26 of the electric magnet 25 is connected to the circuit wire 52 by means of the jumper 43, the point of connection being indicated at 44. The circuit wire 42 has a connection at the point 45 with a conductor 46 which leads to the terminal 47 of the motor 48. The other terminal 49 of the motor is connected to one side of the service wire 50. The terminal 12 is connected to the service wire 51 by means of the conductor 52. The service wires 50 and 51 may include the usual entrance switch 53 and the safety devices indicated at 54. The motor terminal 49 is connected to one terminal of the shunt field coil 55 and the other terminal of the coil is connected with the terminal 27 of the electromagnet 25 by means of the conductor 56.

As shown in Fig. 1, the dotted lines, relative to the knob and handle, indicate that the switching mechanism is relatively inoperative so far as the rheostat is concerned. When the knob 29 is pushed to the right, the spring finger 23 successively engages with the contacts 7 to 10, inclusive. As the contact finger rests upon these terminals, one plate is put into operative relation with respect to the cathode plate 37. When the spring finger has been moved to the extreme end of its travel and engages with the terminal 11, the plate 37 is shunted or cut out of circuit as the current will then flow through the circuit wire 42 thence through the conductor 46. As the plates of this rheostat are immersed for varying depths, their immersed surfaces are of varying areas.

The plates 32, 33, 34, 35, and 37 may be curved or flat as desired and their sizes and shapes such as will best perform the functions with the object in view of spaced plates having different immersed surfaces.

What we claim is:—

1. A rheostat comprising a receptacle containing a liquid, a plurality of electrodes of varying sizes immersed in said liquid, an operating member having a plurality of terminals thereon, means for connecting each terminal with one of the electrodes, and a circuit closer adapted to have step by step engagement with said terminals.

2. A rheostat comprising a receptacle having a liquid therein, a plurality of electrodes of varying sizes immersed in said liquid, an operating device comprising a hollow body, a plurality of terminals on said body, means for connecting each terminal with an electrode, a sliding member in said body, a contact thereon adapted to have step by step engagement with said terminals and a terminal in permanent contact with said sliding device and connected with the circuit.

In testimony whereof we affix our signatures.

WILLIAM A. ARCHIBALD.
HAROLD W. THOM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."