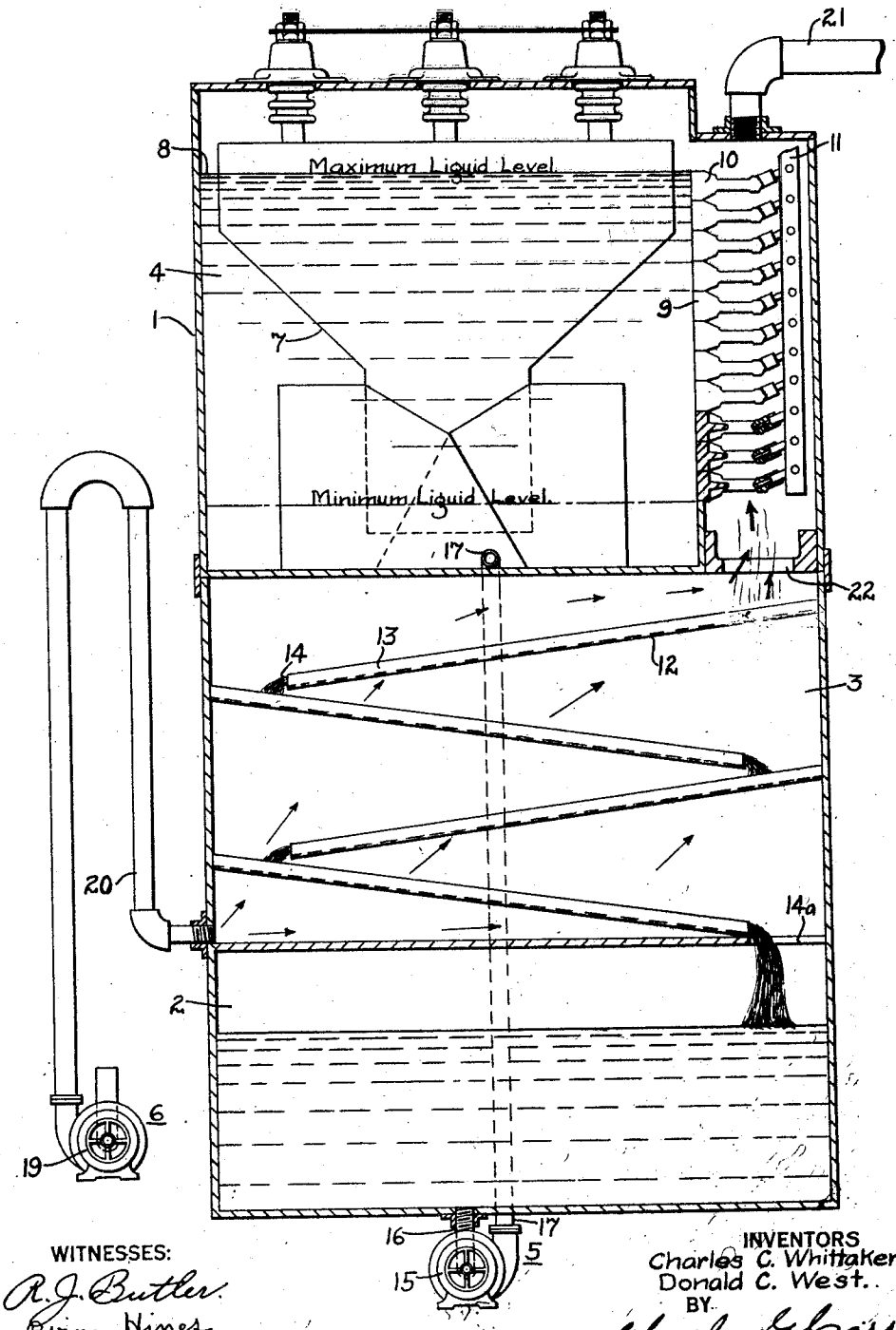
Dec. 27, 1927. 1,654,394

C. C. WHITTAKER ET AL

LIQUID RHEOSTAT

Filed Nov. 5, 1923



WITNESSES:

R. J. Butler

Birney Hines

INVENTORS

Charles C. Whittaker, &

Donald C. West.

BY

Eberley & Cain

ATTORNEY

Patented Dec. 27, 1927. 1,654,394

UNITED STATES PATENT OFFICE.

CHARLES C. WHITTAKER AND DONALD C. WEST, OF PITTSBURGH, PENNSYLVANIA, ASSIGNORS TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

LIQUID RHEOSTAT.

Application filed November 5, 1923. Serial No. 672,729.

Our invention relates to liquid rheostats for use in control systems for electrical apparatus, and it has special relation to the construction and arrangement of the various parts of the rheostat.

One object of our invention is to provide a unitary and relatively compact structure of the above-indicated character, whereby such heat as may be generated in the rheostat will be quickly dissipated and whereby the temperature of the liquid or electrolyte may be reduced to any desired degree.

Another object of our invention is to provide a rheostat in which the hottest liquid will pass through the cooling tower, thereby securing maximum cooling results.

Another object of our invention is to provide a liquid rheostat in which some of the volume of the cooling tower may be utilized to increase the main-tank or reservoir capacity, thus saving considerable space, which may be utilized for other purposes. This saving of space is important because liquid rheostats of this character are usually employed in the cabs of electric locomotives or other limited spaces.

Another advantage of our invention is that it decreases the head against which the electrolyte-circulating pump is required to operate.

Another advantage is that all of the overflow or excess liquid in the electrode-containing compartment is passed through the cooling tower and, therefore, the liquid may be safely utilized at a mean temperature somewhat higher than is possible in liquid rheostats known in the prior art.

Our invention may be best understood by reference to the accompanying drawing, the single figure of which is a semi-diagrammatic view of a liquid rheostat constructed in accordance with our present invention, one side wall being removed to make the illustration more easily understood.

Referring to the drawing, the structure shown comprises a liquid rheostat having a casing 1, preferably of rectangular form, which is provided with horizontal partitions so that the lower portion constitutes a storage reservoir 2, the middle portion a cooling tower 3, and the upper portion an electrode-containing compartment 4.

An electrolyte or liquid-circulating or pumping means 5 is attached to the lower part of the casing 1, while an air-circulating device 6 is connected to one side of the cooling tower 3.

The compartment 4 is provided with a plurality of suitable electrodes 7, and contains a body 8 of liquid or electrolyte in which the electrodes may be immersed to any desired degree.

In order that the amount of liquid in the compartment 4 may be increased or decreased, we provide, at one side of the compartment, a weir 9, preferably comprising a plurality of pivotally mounted individually or collectively movable shutters 10, and operating mechanism 11 therefor. This weir or discharge-valve 9 is not of our present invention but is fully set forth in application Serial No. 417,533, filed October 18, 1920, and assigned to the Westinghouse Electric and Manufacturing Company.

The cooling tower 3 embodies a series of suitably-mounted inclined trays 12, severally having a plurality of vertically extending partitions or guide members 13, the trays being arranged to discharge electrolyte from the lower end of each tray through an opening 14 to the upper end of the tray next below it, in accordance with a familiar practice, as indicated in the drawing. The electrolyte that is discharged from the bottom tray falls through an opening 14*a* into the reservoir 2.

The pumping means 5 preferably comprises a motor-driven centrifugal pump 15, which communicates with the bottom of the reservoir 2 through a pipe 16 and with the bottom of the compartment 4 through a pipe 17, whereby a constant flow of electrolyte from the reservoir 2 into the compartment 4 is maintained.

For producing a suitable circulation of air, the blower 6 of any suitable type, preferably driven by an electric motor 19, is provided to force a predetermined quantity of air through a conduit 20 into the bottom of the cooling tower 3, and thence upwardly through the cooling tower 3 and the compartment 4, as indicated by the arrows, and out of the rheostat through any suitable opening, or conduit such as a pipe 21. The current of air, in being forced through the cooling tower 3 and the compartment 4, materially reduces the temperature of the electrolyte, and thus, the necessary size of

the cooling tower may be considerably less than would be required if such additional ventilating means were not employed.

In operating the rheostat, the air-circulating device 6 and the pumping means 5 are started and maintained at a practically constant speed. The pumping means 5 forces the electrolyte from the reservoir 2 into the compartment 4, where it is maintained, at any level desired, by means of the weir 9, as more fully set forth in the above-identified co-pending application. The excess liquid that is pumped into the compartment 4 is permitted to escape or overflow, by reason of the position of the shutters 10, through the weir 9 and into the cooling tower 3 through the opening 22, and thence into the reservoir 2.

We have thus provided a liquid rheostat which occupies a relatively small space and provides a maximum cooling effect for the electrolyte with a minimum expenditure of power for circulating the electrolyte.

While we have shown our invention in a preferred form, it is apparent that minor modifications may be made in the arrangement of the apparatus without departing from the spirit thereof. We desire, therefore, that only such limitations shall be imposed as are indicated in the appended claims.

We claim as our invention:—

1. A liquid rheostat comprising an electrode-containing compartment, a cooling tower located at a level below the compartment and provided with trays adapted to cool the liquid, a reservoir located below the tower and adapted to receive the cooled liquid, and pumping means whereby liquid may be pumped from said reservoir into said compartment.

2. A liquid rheostat comprising an electrode-containing compartment, a cooling tower located at a level below the compartment and provided with trays adapted to cool the liquid, a reservoir located below the tower and adapted to receive the cooled liquid, pumping means whereby liquid is pumped from said reservoir into said compartment, and an air-circulating device connected to the cooling tower whereby a current of air may be forced through the cooling tower.

In testimony whereof, we have hereunto subscribed our names this 30th day of October, 1923.

CHARLES C. WHITTAKER.
DONALD C. WEST.