R. W. EBELING.

MULTIPLE CIRCUIT RESISTANCE CONTROL.

APPLICATION FILED SEPT. 18, 1917.

1,329,168.

Patented Jan. 27, 1920.

2 SHEETS—SHEET 1.

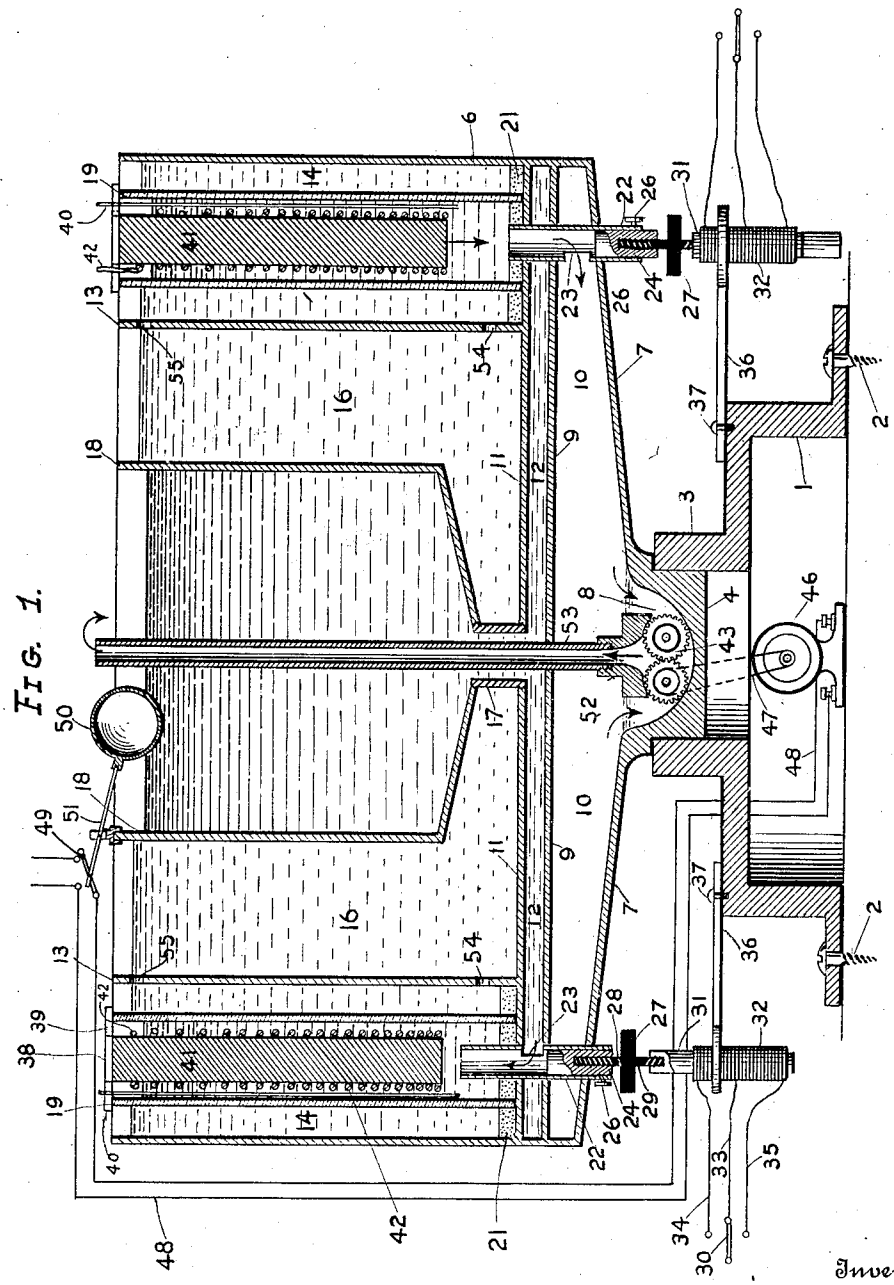


FIG. 1.

Inventor

ROBERT W. EBELING.

By Henry Schroeder

Attorney

R. W. EBELING.

MULTIPLE CIRCUIT RESISTANCE CONTROL.

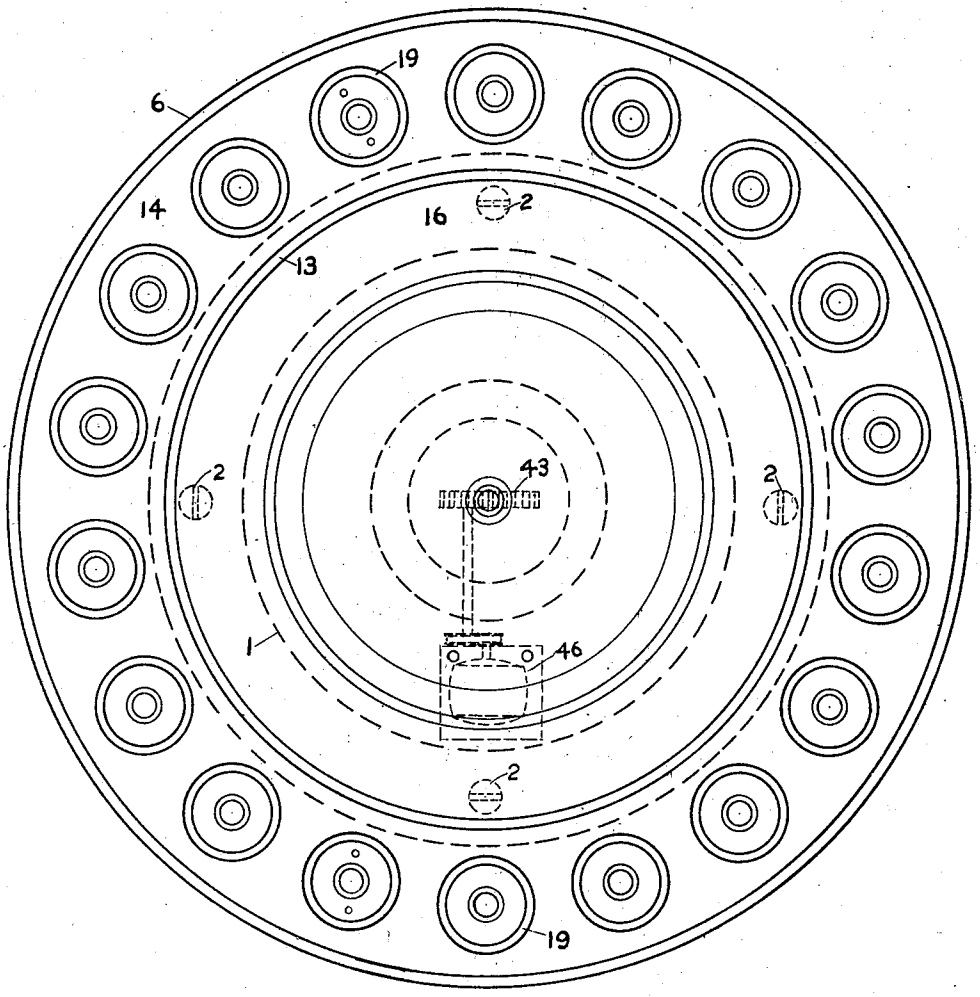
APPLICATION FILED SEPT. 18, 1917.

1,329,168.

Patented Jan. 27, 1920.

2 SHEETS—SHEET 2.

FIG. 2.



Inventor

ROBERT W. EBELING.

By Harry D. Schroeder

Attorney

UNITED STATES PATENT OFFICE.

ROBERT W. EBELING, OF OAKLAND, CALIFORNIA, ASSIGNOR TO R. W. EBELING COMPANY, INCORPORATED, A CORPORATION OF CALIFORNIA.

MULTIPLE-CIRCUIT-RESISTANCE CONTROL.

1,329,168. Specification of Letters Patent. Patented Jan. 27, 1920.

Application filed September 18, 1917. Serial No. 191,953.

To all whom it may concern:

Be it known that I, ROBERT W. EBELING, citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented certain new and useful Improvements in Multiple-Circuit-Resistance Controls, of which the following is a specification.

This invention is an improved variable resistance regulating device and is an improvement of my inventions embodied in Letters Patent No. 1192876 and an application for patent, Serial Number 134,958.

The invention has for its object the provision of means for varying voltage passing through individual units of a coördinated series of circuits. The invention also has for its object the providing of means for the dimming or brightening of varicolored incandescent lights, upon the units of said series, in varying proportions, to produce blended colors.

The invention will be hereinafter fully set forth and particularly pointed out in the claims.

In the accompanying drawings:—

Figure 1 is a vertical central section of my improved multiple circuit control. Fig. 2 is a plan view thereof.

Referring to the drawings, 1 indicates a hollow base secured by suitable means such as screws 2, to a floor or suitable support. The base 1 has an upwardly projecting sleeve 3, integral therewith and adapted to receive a downwardly projecting member 4, of a container 6. The said container 6 is circular in form and has conical bottom 7, in the center of which is a drain pit 8. At a suitable distance above the bottom is a floor 9, extending throughout the vessel and forming with the bottom 7 a receptacle or cell 10. A short distance above the floor 9, and on a plane parallel therewith, is an additional floor 11, which with the side walls of the vessel 1, and the floor 9, forms a cell 12.

Integral with the floor 11, and at right angles thereto, is a circular wall 13, dividing that portion of the container 6, above the said floor 11, into two distinctly separate annular compartments; an outer compartment 14 and an inner compartment 16.

Into a hole in the center of the floor 11 is threaded one end of a nipple 17, the opposite end of which is threaded into the bottom of a circular vessel 18, the top of which is open.

At suitable intervals within the compartment 14, are placed (as shown in Fig. 2) circular tubes or chambers 19, of insulative material such as porcelain. The said tubes are open at each end and are secured within compartment 14, by cement 21, surrounding the bottoms of said tubes on the floor of the compartment 14. Slidable through holes in the cement within each tube 19, and holes in the floors 9 and 11, extend cocks consisting of pipes or casings 22, having ports 23, in their side walls. Slidable within said casings are plugs 24, designed to reduce the size of said ports 23, to any desired degree. The plugs 24 are secured to the casings by means of set screws 26. Into the lower end of each plug 24 is screwed one end of a turn buckle of insulative material, having a wheel 27, an upper bolt 28 and a lower bolt 29, threaded respectively with right and left threads. The purpose of the turn buckles is to adjust the opening of ports 23, by raising or lowering the plugs 24 in casing 22. The bolts 29 of the turn buckles are threaded into ends of cores 31, of solenoids 32, having central wires 33, and end wires 34 and 35. The solenoids are secured to arms 36, secured as shown at 37 to the base 1. The wire 33 has a switch 30 at its terminal.

The tops of the porcelain tubes 19 are suitably closed by covers or caps 38, of insulative material having vents 39. The covers 38 have reduced members 41, extending downwardly in the tubes and around said members are wound coils 42 of resistance wire. The said coils are wound at intervals which decrease gradually as the coils descend, thereby providing a progressive graduation of the resistance.

The vessel 18 is filled with mercury or other conductive fluid, to a level near the top. By the force of gravity the said mercury descends through the nipple 17, into the cell 12, and through the open ports 23, into the casing 22, and up into the interior of the tubes 19, surrounding the coils of resistance contained therein. It is obvious that the mercury, being a conductive element, will short circuit the coils 42, at the level of the surface of the mercury. This action will be progressive as the mercury ascends, and because of the convolu-

tions of the coils being gradually spread apart to a greater degree in an upward direction, the current passing through the unsubmerged portions of the coil is slowly varied at the start and increases more rapidly as the mercury rises. This operation may be regulated by adjusting the plug 24, to control the size of the port 23, and thus diminishing or increasing the influx of mercury.

When it is desired to reduce the level of the mercury to increase the resistance or dim a light on any given circuit, an operator closes the switch 30 connecting the wires 33 and 35, which energizes the lower half of the solenoid 32, causing the piston 31, to descend and opening the port 23 into the cell 10. This allows the conductive fluid within the tube 19, to empty through the port 23, into said cell 10, where it gravitates to the pit 8 and encounters gears 43, of a gear pump, having its bearings in the base 1.

The said pump is operated by a motor 46, within the hollow base 1, being connected therewith by a belt 47. The motor is driven by an electric circuit delivered through wires 48, said circuit being closed by a switch 49, which is opened and closed by one end of a lever 51, pivoted as shown on the edge of the wall of the vessel 18.

At the opposite end of the said lever is a ball float 50, resting on the surface of the mercury in the vessel 18. As the said mercury is lowered to fill a tube 19, the ball is lowered closing the switch 49, and the pump 4 then forces the mercury up into a housing 52, supported by a bridge to the floor 7. The mercury is delivered, through a vertical pipe 53, one end of which is threaded into the housing 52, to the surface of the vessel 18. When the normal level is reached the ball float throws the switch 49 and stops the motor 46.

In order to prevent the overheating of the device by reason of the resistance coils, a system of siphon radiation is provided. For this purpose, the compartment 16 is filled with water, which flows as the compartment is being filled through ports 54 into compartment 14, to a level of ports 55 connecting the compartments 14 and 16.

It will be seen that an operator can control the amount of resistance on any circuit by the operation of the solenoid belonging to said circuit. In order to repeat a timed operation or to operate a series of circuits to a predetermined schedule of time, a suitable circuit make and break means may be connected to all or any number of the solenoids, or a suitable timing means may be connected to the respective switches of the various solenoids to operate the latter either separately or in unison.

Having thus explained the nature of the invention, and described an operative manner of constructing and using the same, although without attempting set forth all of the forms in which it may be made, or all of the forms of its use, the following is claimed:—

1. An improvement in means for controlling electrical resistances comprising a reservoir containing a conducting liquid, a resistance chamber, means for selectively placing said chamber in communication with said reservoir or for draining said chamber of the liquid therein, and a resistance element within said chamber positioned to be submerged by said liquid.

2. An improvement in means for controlling electrical resistances comprising a reservoir containing a conducting liquid, a resistance chamber, a valve communicating with said chamber, means for selectively operating said valve to place the chamber in communication with said reservoir or to drain the liquid from the chamber, and a resistance element within the chamber positioned to be submerged by said liquid.

3. An improvement in means for controlling electrical resistances comprising a reservoir containing a conducting liquid, a resistance chamber, means for selectively placing said chamber in communication with said reservoir or for draining the liquid from the chamber, a resistance element within said chamber positioned to be submerged by said liquid, and means for returning the drained liquid to said reservoir.

4. An improvement in means for controlling electrical resistances comprising a reservoir containing a conducting liquid, a cell in communication with said reservoir, a resistance chamber, means for placing said resistance chamber in communication with said cell, and a resistance element within said chamber and positioned to be submerged by said liquid.

5. An improvement in means for controlling electrical resistances comprising a reservoir containing a conducting liquid, a cell in communication with said reservoir, a resistance chamber, a valve communicating with said chamber, means for selectively operating said valve to place the chamber in communication with said cell or to drain the liquid from the chamber, and a resistance element within the chamber positioned to be submerged by said liquid.

6. An improvement in means for controlling electrical resistances comprising a reservoir containing a conducting liquid, a cell in communication with said reservoir, a resistance chamber, a slidable tube communicating with said chamber and having a port therein, means for moving said tube to place the port in and out of register with said cell, and a resistance element within said chamber positioned to be submerged by said liquid.

7. An improvement in means for controlling electrical resistances comprising a reservoir containing a conducting liquid, a cell in communication with said reservoir, a second cell, a resistance chamber, means for selectively placing said chamber in communication with either of said cells, and a resistance element within said chamber positioned to be submerged by said liquid.

8. An improvement in means for controlling electrical resistances comprising a reservoir containing a conducting liquid, a cell in communication with said reservoir, a second cell, a resistance chamber, a slidable tube communicating with said chamber and having a port therein, means for moving the tube to place said port selectively in register with either of said cells, and a resistance element within said chamber positioned to be submerged by said liquid.

9. An improvement in means for controlling electrical resistances comprising a reservoir containing a conducting liquid, a cell in communication with said reservoir, a second cell, a resistance chamber, means for placing said chamber selectively into communication with said cells, a resistance element within said chamber positioned to be submerged by said liquid, and means within the second cell for delivering any liquid therein to said reservoir.

10. An improvement in means for controlling electrical resistances comprising a reservoir containing a conducting liquid, a resistance chamber, a slidable tube communicating with said chamber and having a port therein, means for moving the tube to place the port into and out of communication with said reservoir, means for varying the size of said port, and a resistance element within said chamber positioned to be submerged by said liquid.

11. An improvement in means for controlling electrical resistances comprising a reservoir containing a conducting liquid, a resistance chamber, a slidable tube communicating with said chamber and having a port therein, means for moving the tube to place the port into and out of register with said reservoir, a plug within said tube for varying the area of the discharge port, and a resistance element within said chamber positioned to be submerged by said liquid.

12. An improvement in means for controlling electrical resistances comprising a reservoir containing a conducting liquid, a plurality of resistance chambers each provided with a resistance element, and means for selectively placing said chambers in communication with said reservoir to submerge the resistance elements therein.

13. An improvement in means for controlling electrical resistances comprising a reservoir containing a conducting liquid, a plurality of resistance chambers, a cell in communication with said reservoir, means for selectively placing a chamber in communication with said reservoir and simultaneously draining the other chambers of any liquid therein, and resistance elements within said chambers positioned to be submerged by said liquid.

14. An improvement in means for controlling electrical resistances comprising a reservoir containing a conducting liquid, a plurality of resistance chambers, a supply cell in communication with said reservoir, a drain cell, means for selectively placing any chamber in communication with said supply cell and the remaining chambers in communication with said drain cell, resistance elements within said chambers positioned to be submerged by said liquid, and means for transferring liquid from said drain cell to said reservoir.

15. An improvement in means for controlling electrical resistances comprising a reservoir containing a conducting liquid, a plurality of resistance chambers, means for selectively placing any of said chambers in communication with said reservoir and simultaneously draining the remaining chambers, resistance elements within said chambers positioned to be submerged by said liquid, and means controlled by the level of liquid within said reservoir for returning the drained liquid thereto.

In testimony whereof I affix my signature.

ROBERT W. EBELING.