T. M. LANE.

CHEMICAL RECTIFIER.

APPLICATION FILED FEB. 9, 1920.

1,409,383. Patented Mar. 14, 1922.

FIG. 1.

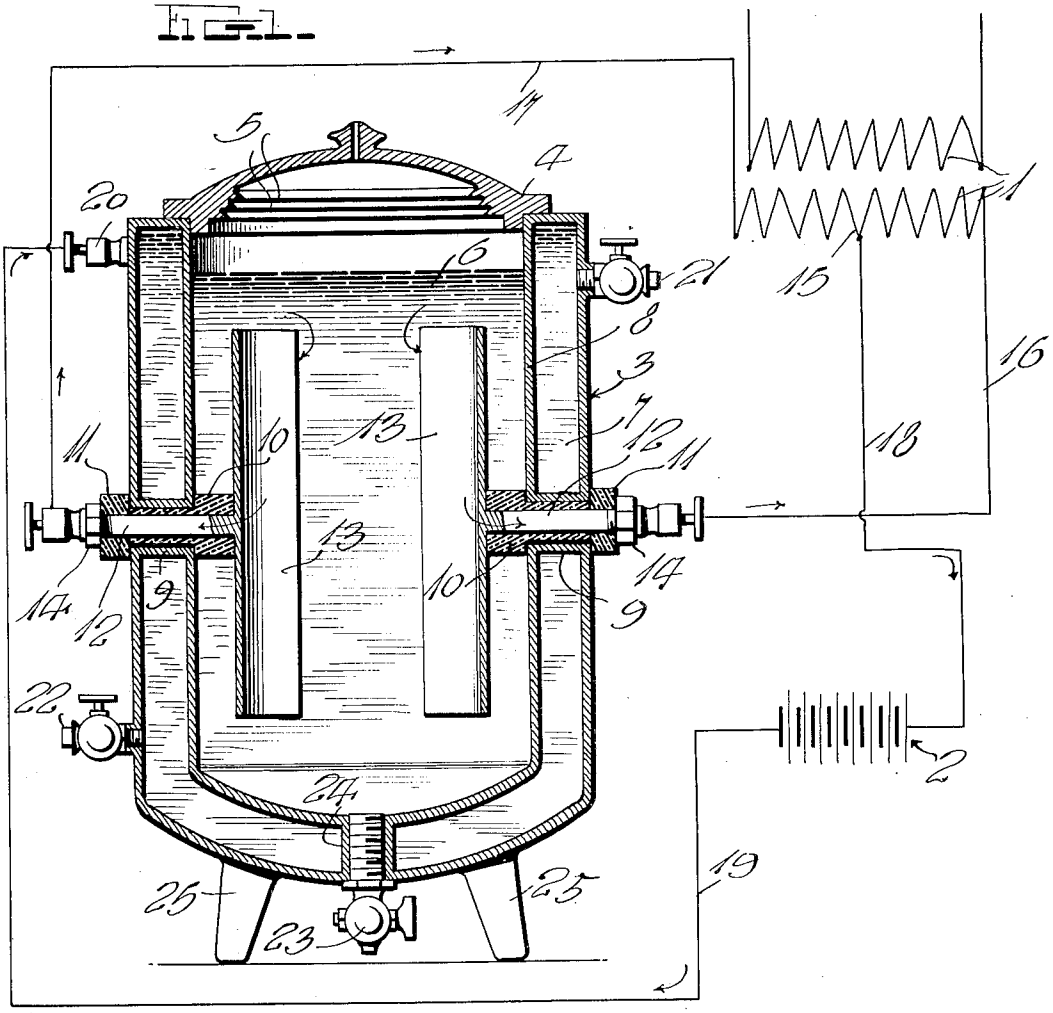
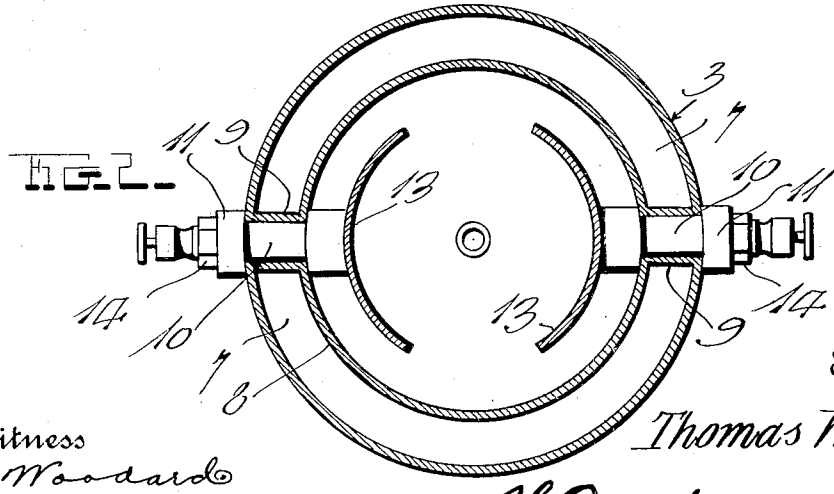


FIG. 2.



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CHEMICAL RECTIFIER.

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To all whom it may concern:

Be it known that I, THOMAS M. LANE, a citizen of the United States, residing at Alameda, in the county of Alameda and State of California, have invented certain new and useful Improvements in Chemical Rectifiers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to chemical rectifiers, and more specifically to an improved device for rectifying an alternating electric current.

One object of this invention is to generally improve upon devices of this character by taking advantage of the fact that an electric current passes with comparatively slight resistance from an ammonium-sulphate solution or the like to an aluminum terminal submerged in the solution and passes with far greater resistance from the aluminum to the solution.

Another object of this invention is to provide an improved form of receptacle or jar which is water-cooled and which constitutes an electric current or conductor.

Other objects and advantages will be specifically pointed out or implied in the following details of description, in connection with the accompanying drawings in which:

Figure 1 is a somewhat diagrammatic view illustrating my improved receptacle in vertical section.

Fig. 2 is a horizontal sectional view through the middle portion of the receptacle shown in Fig. 1.

Referring to these drawings in detail, in which similar reference characters correspond with similar parts throughout the several views, and in which a transformer of any appropriate form is designated by the numeral 1, and in which a storage battery 2 is shown merely to illustrate one of the numerous uses to which the device is applicable, the invention consists in the details of construction, arrangement and inherent characteristics hereinafter specified in detail as follows:

My improved receptacle 3 is formed mainly of iron or other comparatively good conducting material, the primarily open upper end of this jar being closed by a cover 4 which is preferably arched, as illustrated, and provided with a series of angular inwardly inclined ridges 5. The jar 3 normally contains an electric conducting solution 6, preferably an ammonium-sulphate solution, though any appropriate solution may be employed. The ridges 5 are intended to divert the water of condensation, which accumulates on and flows down the arched inner surface of the cover 4, and causes it to drip into the middle part of the solution's surface rather than run down the wall of the jar.

The jar is water-cooled by means of a water-jacket 7 which extends around the inner wall 8, and this water-jacket also extends around a pair of tubular insulator seats 9. In other words, the tubular seats 9 connect the inner and outer walls of the receptacle, and the openings through these elements 9 permit a pair of bushings or insulators 10 to be inserted through this duplex wall of the receptacle. A pair of apertured insulating members 11 is seated against the outer ends of the insulating members 10, and a pair of conducting rods 12 is seated in the insulators 10 and 11. A pair of aluminum plates or electric terminals 13 is secured to the pair of rods 12. In other words, each plate 13 is connected to and supported by one of the rods 12, and each rod 12 extends through one of the insulators 10 and one of the insulators 11. Each insulator 10 combines with its insulator 11 to substantially form a unitary insulator, and two nuts 14 are screw-threaded respectively on the rods 12, and each nut 14 substantially comprises a binding post to which the terminals of an alternating current conductor are connected as shown diagrammatically. The alternating current conductor comprises in the present instance a secondary coil 15, a lead 16 and a lead 17, these leads being connected respectively to the binding posts at the outer ends of the rods 12. A substantially direct current conductor 18 is connected to one end of the battery 2, and a similar conductor 19 is connected to a binding post 20, the latter being directly connected to and supported by the receptacle 3.

Therefore, when an impulse of electric current passes through the left hand end of the coil 15 toward the conductor 18, this impulse causes current to flow in the direction indicated by the curved arrows, that is through the conductor 18, battery 2, conduc-

tor 19, binding post 20, receptacle 3 and thence to the left hand plate 13 through the medium of the solution 6. From this plate 13, the current passes out through the left hand rod 12 and its binding post into the conductor 17. During the above described flow of electric current, there is substantially no current flowing through the conductor 16 and its connections with the right hand plate 13, owing to the fact previously mentioned that an electric current passes with extreme difficulty or resistance from the submerged aluminum plate to the solution. In other words, the aluminum plates 13 control the electric current in a manner similar to that in which a check-valve controls the flow of water, that is, permitting the water to flow freely from one direction but preventing it from flowing in the opposite direction. However, during the next succeeding pulsation, the current flows from the right-hand end of the coil 15 toward and through the conductor 18, and the direction of current is the same as previously described except that instead of flowing from the solution to the left-hand plate 13 it now flows to and through the right-hand plate 13, and thence through the conducting elements 12, 14 and 16 back to the secondary coil 15.

From the foregoing description, it will be seen that although the conducting elements 15, 16 and 17 carry an alternating current, the conductors 18 and 19 carry a direct pulsating current, and this current passing through the battery 2 charges the same, and is capable of carrying other loads than the battery.

In order that the temperature of the solution may be kept approximately at a predetermined degree, water may be kept circulating through the water-jacket 7 by connecting the same to any appropriate water supply through the medium of an inlet 21 and an outlet 22. These inlet and outlet members may be provided respectively with valves for regulating the flow or current of water. A drain-cock 23 is provided in the bottom of the receptacle, this drain-cock being preferably screw-threaded in a tubular element 24 of the receptacle, and the water-jacket 7 surrounds this tubular element.

Legs 25 are provided, so that the receptacle may be supported on a table or other level surface regardless of the fact that its bottom is concavo-convexed. Because of this formation of the bottom, a sump is formed thereby, so that the receptacle may be quickly and completely drained.

Although I have described this embodiment of my invention very specifically, it is not intended to limit this invention to these exact details of construction, arrangement and material, but changes may be made within the scope of the inventive ideas as implied and claimed.

What I claim as my invention is:

1. In an element for a chemical rectifier, the combination of a receptacle formed mainly of conducting material and having its wall provided with openings in which insulators are seated, this receptacle being formed with a water-jacket which extends around the inner cavity and around said insulators and is provided with inlet and outlet openings connectable to a water supplying source in a manner to provide a circuit of water through the water-jacket, a pair of aluminum plates in said inner cavity and spaced from one another, a pair of conducting rods each connected to and supporting one of said aluminum plates and extending thence outward through the respective insulators, said rods constituting a conducting medium to connect said aluminum plates with an alternating current conductor, and a binding post electrically connected to said receptacle and connectable with a current conductor.

2. In a chemical rectifier, a receptacle having a cover and being mainly of conducting material and adapted to contain an electrolyte, and to be electrically connected to a current conductor, a pair of insulators extending through the wall of the receptacle, aluminum plates spaced from one another within the receptacle, and means extending through said insulators to connect said aluminum plates to a source of alternating current connected to said current conductor, the lower surface of said cover being formed with annular inwardly inclined ridges.

3. A device of the class described comprising a receptacle adapted to contain an electrolyte and being made of conducting material, a water jacket surrounding the walls and bottom of said receptacle, said water jacket being provided with inlet and outlet openings, a pair of conductors passing through the opposite walls of said water jacket and said receptacle and being insulated therefrom, the outer ends of said conductors being provided with means for having the wires of an electric circuit electrically connected thereto, electrodes secured upon the inner ends of said conductors within said receptacle and in electrical contact with said conductors, and a cover for the upper end of said receptacle, the lower surface of said cover being formed with angular ridges, whereby any water of condensation which forms upon the lower surface of said cover will drip back into said receptacle.

In testimony whereof I have hereunto set my hand.

THOMAS MARTIN LANE.