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W. CONSTABLE.

PROTECTIVE DEVICE FOR FRANGIBLE VESSELS.

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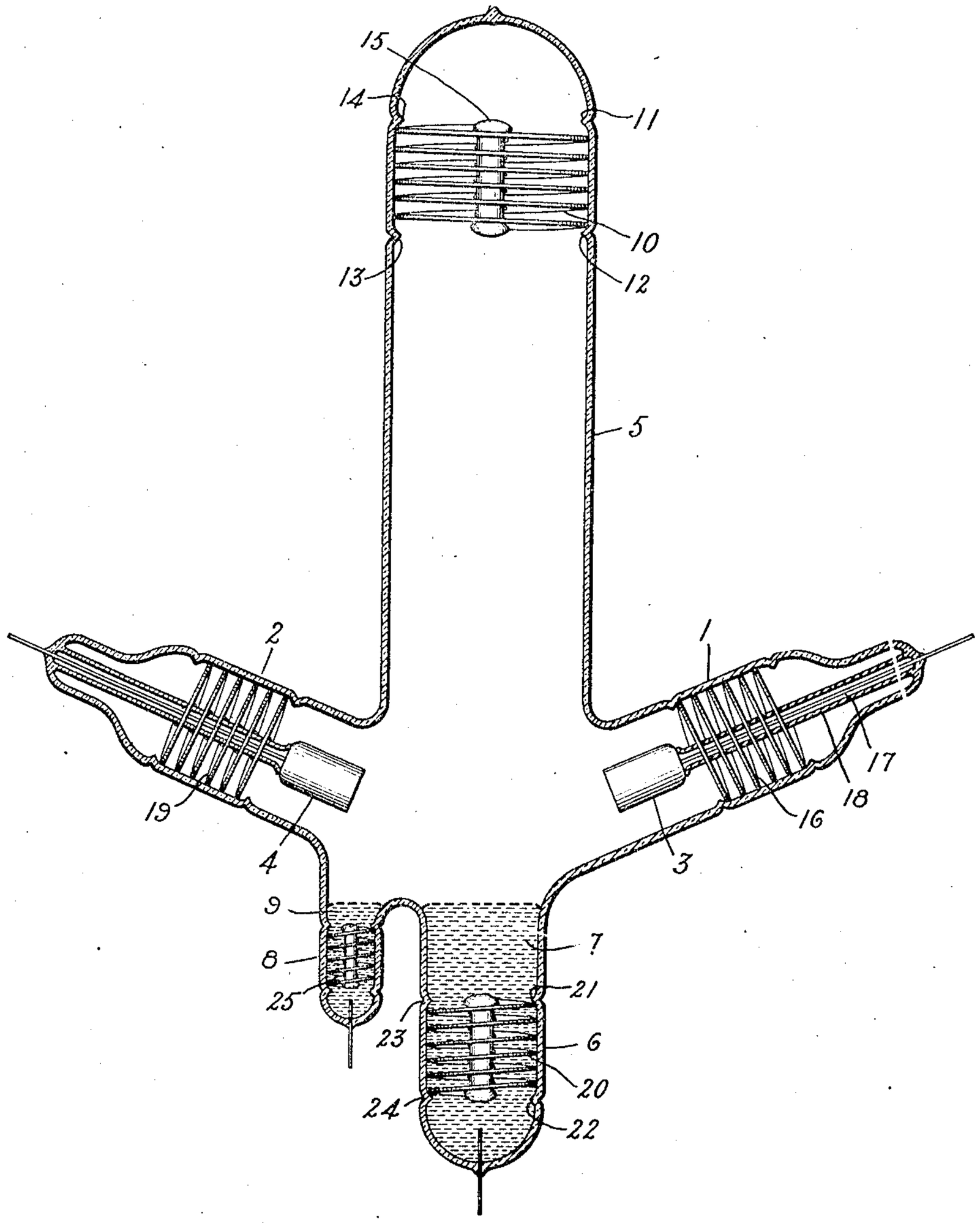

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UNITED STATES PATENT OFFICE.

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PROTECTIVE DEVICE FOR FRANGIBLE VESSELS.

No. 844,779. Specification of Letters Patent. Patented Feb. 19, 1907.

Application filed October 31, 1904. Serial No. 230,643.

To all whom it may concern:

Be it known that I, WILLIAM CONSTABLE, a citizen of the United States, residing at Schenectady, county of Schenectady, state of New York, have invented certain new and useful Improvements in a Protective Device for Frangible Vessels, of which the following is a specification.

During the transportation of glass or similar vessels or receptacles containing mercury or other fluids—such, for example, as mercury-vapor lamps, rectifiers, or the like—there is considerable danger of fracture of the containing vessel due to swashing around of the fluid in the vessel. Under conditions frequently met with this movement of fluid is apt to produce, by impact with the walls of the vessel, a considerable shock of a nature similar to that known as "water-hammer." If this shock takes place at points in the vessel which are not particularly strong—as, for example, at the sealing-off points or where leading-in conductors pass through the walls of the vessel—a cracking of the glass is apt to take place, and the apparatus is thus rendered practically inoperative. In order to provide against danger due to handling of such vessels, I have devised a novel means for preventing dangerous shocks to the containing vessel by reason of unrestricted flow of fluid therein.

The novel features which characterize my invention I have pointed out with particularity in the appended claims. The invention itself, however, will be better understood by reference to the following description, taken in connection with the accompanying drawing, which illustrates one of the numerous embodiments of which my invention is capable.

In the drawing I have represented my invention as applied to a mercury-vapor rectifier. This application of my invention, however, is merely illustrative, as the invention may be utilized in numerous other relations than that shown.

The rectifier shown in the drawing consists of a completely-exhausted glass receptacle or envelop. In its general form the receptacle consists of branches communicating with each other. The branches 1 and 2 inclose graphite electrodes 3 and 4, constituting anodes. The branch 5 serves as a condensing-chamber, while a depending portion 6 contains a body of mercury 7, constituting a cathode. A small pocket 8, located laterally of the body of mercury 7, contains a small quantity of mercury 9, constituting a supplemental or starting anode. Electrical connections with all of these electrodes are made by means of suitable leading-in wires.

The particular construction of the rectifier not being of my invention, no special description thereof is necessary, since the nature of rectifiers of this character is well understood by those skilled in the art.

In order to overcome danger of breakage or cracking of the rectifier during transportation or similar handling, I provide in each chamber, extension, or branch of the rectifier a fluid-checking device of my invention. Thus in the chamber or branch 5 I locate a helicoid 10, formed of a strip of sheet metal wound on edge. The strip need not necessarily be plane, but may, if desired, be corrugated, indented, or otherwise irregular. The outer diameter of the helicoid is such as to form a close fit with the interior of the chamber 5. The helicoid when inserted in position is held firmly in place by means of indentations in the glass envelop, as at 11, 12, 13, and 14. The diameter of the central opening through the helicoid is made as small as possible. When the opening is comparatively small, the helicoid may be left in this condition, though I prefer, as an additional measure of safety, to block the opening against the passage of fluid by filling it with a glass tube or similar body 15. This may be held in place by upsetting the ends of the tube or otherwise fashioning it when in position so as to make it self-retaining.

If during handling of the rectifier the apparatus be suddenly inverted the mercury, as at 7, will be projected into the extension or branch 5. Before it can reach the extremity of this branch, however, it comes up against the springy helicoid 10, which largely takes up the shock of impact. The mercury, if the parts are retained in inverted position, can then flow in a sort of corkscrew fashion between the turns of the helicoid and emerge at the opposite end of the exterior of the branch or chamber 5. Danger of fracture of the glass, due to the shock of impact of the mercury, is thus prevented.

In addition to the protective devices in the chamber 5 I provide other weak points of the glass receptacle with similar protective devices. Thus in the branch or chamber 1 I

provide a helicoid 16 of edgewise-wound metal strip. This is retained in position by the glass walls of the chamber and serves, as before, to take up the shock of any mercury which may flow into the chamber. The rod or wire 17, by which current is conveyed to the anode 3, passes through the central opening in the helicoid 16 and, if desired, may be insulated therefrom by a surrounding bushing or tube 18 of glass. A similar shock-absorbing device 19 is provided for the other chamber or branch 2 of the envelop.

In the extension or pocket 6, containing the body of mercury 7, I also provide a helicoid 20, similar to those already described. This helicoid is held in place by a suitable formation of the glass envelop, such as by the indentations 21, 22, 23, and 24. The parts are located so that the helicoid when the apparatus is in normal position is entirely below the surface of the mercury 7. The helicoid becomes effective as a protective device not only by delaying the escape of mercury from the part 6 when the apparatus is inverted, but also operates to take up the shock upon the return flow of the mercury. A similar protective device 25 is submerged in the mercury 9 of the starting-electrode.

It is evident that various modifications of my invention may be made without departing from the spirit thereof, for which reason I do not wish to be limited to the exact details shown and described.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination of a frangible vessel, fluid in said vessel, and means for opposing the flow of said fluid consisting of a strip formed into a helicoid.

2. A device for opposing the movement of fluid, consisting of an inclosed helicoid formed of a strip of suitable material, and with the central opening closed.

3. The combination of a frangible vessel, fluid in said vessel, and resilient walls providing a tortuous passage for the fluid.

4. The combination of a frangible vessel, fluid in said vessel, and a device inclosed by and engaging walls of said vessel and having helicoidal surfaces for absorbing shock due to movement of said fluid.

5. The combination of a frangible vessel, fluid in said vessel, and a shock-absorbing device inclosed by and engaging walls of said vessel and interposed in the path of movement of said fluid, said device offering a turning or twisting path for said fluid.

6. The combination of a frangible vessel, fluid in said vessel, and a shock-absorbing device consisting of a resilient coiled metallic strip.

7. The combination of a frangible vessel, fluid in said vessel, and a shock-absorbing device consisting of a resilient coiled strip.

In witness whereof I have hereunto set my hand this 27th day of October, 1904.

WILLIAM CONSTABLE.

Witnesses:

BENJAMIN B. HULL,

HELEN ORFORD.