No. 773,123. PATENTED OCT. 25, 1904.

A. F. CHRISTMAS.

ROTARY MERCURY CIRCUIT BREAKER.

APPLICATION FILED DEC. 4, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

FIG. 2

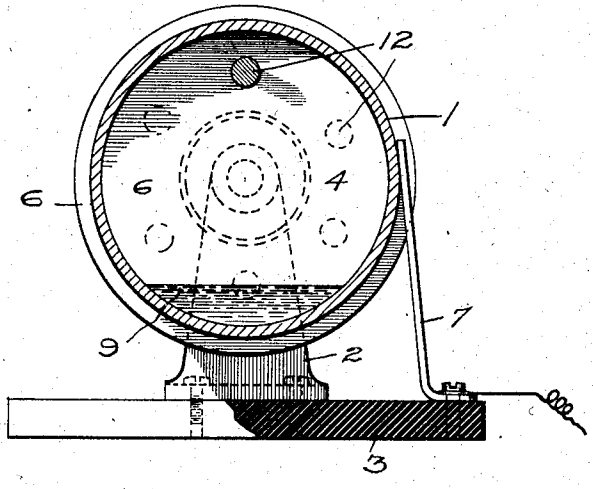


FIG. 1

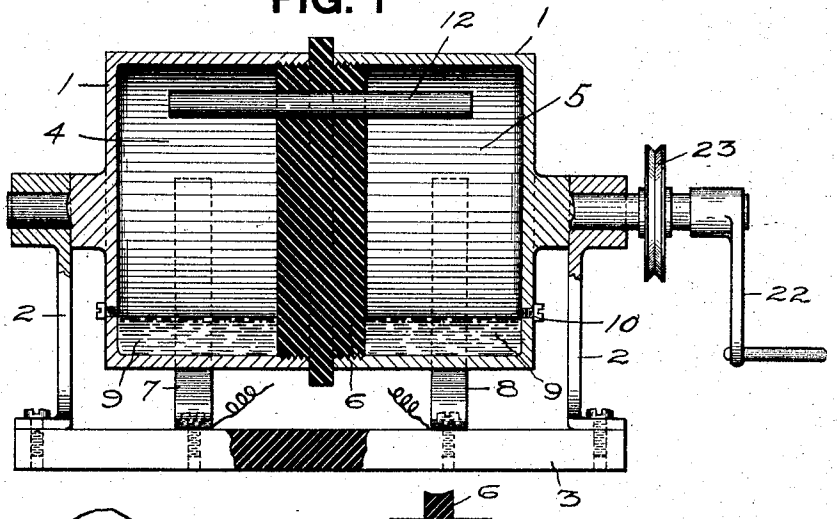


FIG. 3

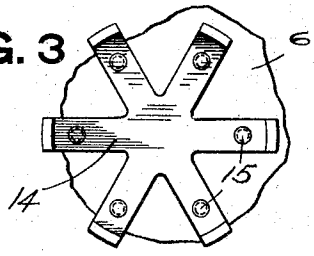
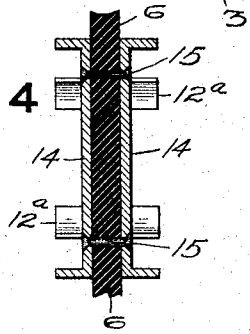


FIG. 4



WITNESSES

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NO MODEL. 2 SHEETS—SHEET 2.

FIG. 8

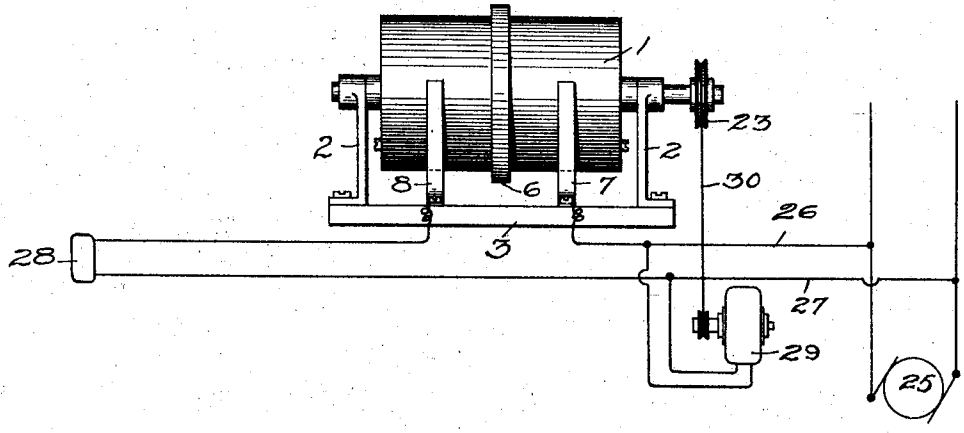


FIG. 7

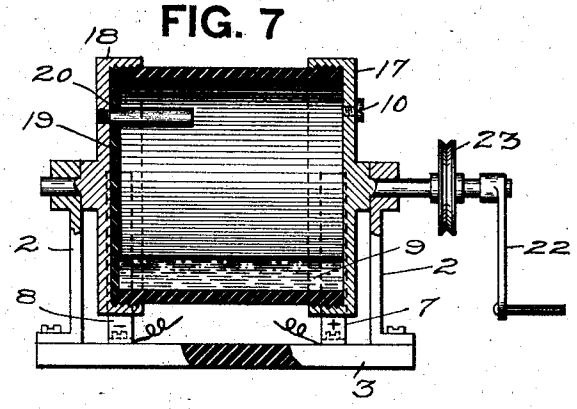


FIG. 6

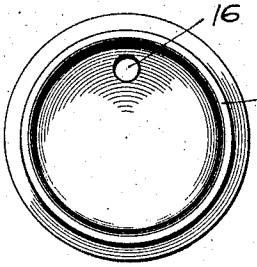
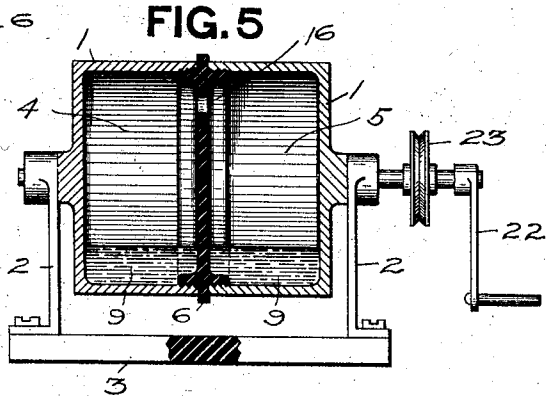


FIG. 5



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No. 773,123. Patented October 25, 1904.

UNITED STATES PATENT OFFICE.

ADOLPH F. CHRISTMAS, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR OF TWO-THIRDS TO FRANK R. McFEATTERS, OF WILKINSBURG, PENNSYLVANIA.

ROTARY MERCURY CIRCUIT-BREAKER.

SPECIFICATION forming part of Letters Patent No. 773,123, dated October 25, 1904.

Application filed December 4, 1903. Serial No. 183,835. (No model.)

To all whom it may concern:

Be it known that I, ADOLPH F. CHRISTMAS, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Rotary Mercury Circuit-Breakers; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to circuit-interrupters; and its object is to provide a device of this character whereby an ordinary commercial current can be continuously broken and again made and which is so constructed that no evil effects will result from the arcs which are formed when the circuit is broken.

With many translating devices, such as reciprocating motors and the like, it is either necessary or desirable to break and make the circuit rapidly. One difficulty in doing this is that the arcs which are formed when an ordinary commercial circuit is broken detrimentally affect the terminals of the circuit-interrupter, thus soon destroying the same and making the interrupter useless. This difficulty has prevented the commercial use of translating devices which depend upon a rapid interruption of a commercial current for their operation.

The object of my invention is to so construct circuit-interrupters for these purposes that the evil effects of the arcs which are formed when the circuit is interrupted are overcome.

To this end the invention consists, generally stated, in breaking the circuit between suitable metallic terminals, one at least of which is a body of mercury inclosed in a closed chamber, so that the arcs which are necessarily formed will expend themselves in volatilizing the mercury; but as the latter is contained in a closed chamber the vapor will immediately condense and again join the main body of mercury.

The invention also comprises certain details of construction hereinafter specifically described and claimed.

In the accompanying drawings, Figure 1 is a longitudinal section through one form of my circuit-interrupter. Fig. 2 is a transverse section of the same. Fig. 3 is a side view, and Fig. 4 a section of a portion, of the interrupter, showing a modification. Fig. 5 is a longitudinal section through still another modification. Fig. 6 is a face view of the insulating-partition of the same. Fig. 7 is a longitudinal section through still another form of interrupter; and Fig. 8 is a side view of the interrupter, showing a diagram of the circuits in which the same is used.

Preferably the circuit-interrupter will be of the rotary type and has been so shown. This interrupter comprises a suitable body 1, rotatably mounted in bearings or standards 2, secured to an insulating-base 3. The body will be provided with either one or two chambers, as desired. In Figs. 1 and 2 the body is shown as provided with two chambers 4 and 5, these chambers being separated by means of a partition 6, of suitable insulating material. Each chamber is provided with metallic cylindrical walls, and bearing against these walls are brushes 7 and 8, which are connected in the circuit to be interrupted. In each chamber is a body of mercury 9, which, however, only partially fills the chamber, drain-holes closed by means of screws 10 being provided to regulate the level of the mercury. Suitable connections will be provided between the chambers 4 and 5, so as to electrically connect the two bodies of mercury at intervals in the rotation of the body. Various forms of electrical connections may be provided, and in Figs. 1 and 2 a metallic rod 12 is shown extending through the insulating-partition 6, the ends thereof projecting into or being exposed in the chambers 4 and 5.

It will be obvious that in the rotation of the body the exposed ends of the rod 12 will dip at intervals into the mercury, thus electrically connecting the same, and as these bodies of mercury are in constant electrical connection in the circuit through the brushes 7 and 8 bearing on the cylindrical metallic walls of the chambers 4 and 5 it will be obvious that the circuit will be made when the rod 12 is immersed in or in contact with the bodies of mercury and that as soon as said rod leaves

the bodies of mercury the circuit will be interrupted. At the breaking of the circuit an arc will necessarily be formed; but this will merely expend itself in vaporizing a portion of the mercury; but as the latter is contained in a practically sealed chamber it will again condense and join the main body of mercury.

It will be obvious that the rapidity of making and breaking the circuit will depend upon the rapidity of rotating the body 1. If desired, more than a single rod 12 may be used, six being indicated in dotted lines in Fig. 2, thus resulting in making and breaking the circuit six times for each rotation of the body.

If desired, the contacts projecting into the chambers 4 and 5 may be separate metallic pieces, such as the spiders 14, (shown in Figs. 3 and 4,) these metallic pieces being united through the insulating-partition 6 by means of a suitable metallic connection, such as the rivets 15. These metallic pieces 14 may have either a single terminal projection 12^a or a plurality thereof, six projections being shown in Figs. 3 and 4.

In place of having a metallic connection between the chambers 4 and 5 the partition 6 may be perforated, as shown at 16, Figs. 5 and 6, thus permitting the bodies of mercury to come in direct contact to establish the circuit. Only one opening 16 is shown in the partition in Figs. 5 and 6; but it will be obvious that any number thereof within limits may be used.

Instead of two chambers 4 and 5 a single chamber, as shown in Fig. 7, may be used. In this case the walls of the body are mostly of insulating material. One head, 17, however, is of metal and has bearing on its outer surface the brush 7, connected to the positive main. The other metallic head, 18, has bearing against it the negative brush 8. This head is insulated from the chamber by means of insulating material 19; but a portion or portions of said head or a metallic member or members connected to said head will be exposed in the chamber. In the drawings a pin 20 is shown projecting into the chamber and connected to the head 18, this pin during the rotation of the body dipping into or contacting with the mercury at intervals, and thus establishing the circuit. It will be obvious by comparing Fig. 2 with Fig. 7 that if the pin 12 be extended and secured to one of the heads of the rotating body mercury in that chamber will not be necessary, thus forming, in effect, a structure identical with Fig. 7.

My circuit-interrupter may be rotated in any suitable manner—such, for instance, as by means of a crank 22, connected to one of the trunnions of the body, or by means of a pulley 23 for receiving a belt coming from any suitable source of power, such as the counter-shaft in a shop or any other suitable source. When used in an electric system, however, it is convenient to rotate the interrupter from a motor bridged across the circuit, and in Fig. 8 is shown a diagram illustrating this manner of rotating the interrupter. In this diagram 25 represents the generator, and 26 and 27 the mains leading to the translating device 28. The interrupter is connected in this circuit by dividing one of the mains, such as the main 26, and connecting the ends thereof to the brushes 7 and 8. Bridged across the mains 26 and 27 between the interrupter and the generator is a motor 29, whose shaft is connected, by means of a belt 30, with the pulley 23 of the interrupter, or which may be connected to the interrupter directly or by any suitable intermediate gearing.

It will be obvious that my interrupter can be used on circuits of any character or description and that by means thereof any circuit may be constantly broken and made and at any desired rapidity. The circuit will be closed only a short interval of time, thus preventing overheating of the translating device and adapting the interrupter to various kinds of work. The terminals cannot be detrimentally affected or destroyed by the arcs formed when breaking the circuit, the only effect of such arcs being to volatilize a portion of the mercury; but as the latter is contained in a practically sealed chamber it will again be condensed, and therefore not lost.

Various modifications may be made in the details of construction of the interrupter without departing from the spirit of my invention.

What I claim is—

1. A circuit-interrupter comprising a rotatable body provided with a chamber, mercury in said chamber but only partially filling the same, constant electrical connections to said mercury, means for rotating said body, a circuit-terminal exposed in said chamber and arranged to come into contact with the mercury at intervals in the rotation of the body, and means for rotating said body.

2. A circuit-interrupter comprising a rotatable body provided with a closed chamber, a body of mercury in said chamber but only partially filling the same, a circuit-terminal of small section in its arcuate path and exposed in said chamber, and means for rotating said body to bring said circuit-terminal into momentary contact with the mercury.

3. A circuit-interrupter comprising a rotatable body provided with a chamber having the walls thereof in part of insulating material, a body of mercury in said chamber but only partially filling the same, an annular metallic face exposed in said chamber with which the mercury is in constant contact, electrical connections to said annular metallic face, another metallic contact portion exposed only at a point or points in said chamber and arranged in the rotation of the body to come into contact with the mercury at intervals, electrical connections to said contact portion or portions, and means for rotating said body.

4. A circuit-interrupter comprising a rota-

table body provided with two chambers, a body of mercury in each of said chambers but only partially filling the same, means providing electrical connections between the mercury bodies of said chambers at intervals in the rotation of the body, and circuit-terminals exposed in both of said chambers.

5. A circuit-interrupter comprising a rotatable body provided with two chambers insulated from each other, a body of mercury in each chamber but only partially filling the same, a metallic connection having portions exposed in both chambers and arranged to contact with the mercury therein on the rotation of the body, an annular metallic wall portion for each chamber with which the mercury is in constant contact, electrical connections to said annular wall portions, and means for rotating said body.

6. A circuit-interrupter comprising a rotatable body, a transverse partition of insulating material dividing the same into two chambers, a body of mercury in each chamber but only partially filling the same, means providing electrical connection between the mercury in the two bodies at intervals in the rotation of the body, and an annular circuit-terminal exposed in each chamber with which the mercury is in constant contact.

7. A circuit-interrupter comprising a rotatable body, a partition of insulating material dividing the same into two chambers, a body of mercury in each chamber but only partially filling the same, metallic connections extending through the partition and exposed in both chambers, an annular circuit-terminal exposed in each chamber with which the mercury is in constant contact, and means for rotating said body.

In testimony whereof I, the said ADOLPH F. CHRISTMAS, have hereunto set my hand.

ADOLPH F. CHRISTMAS.

Witnesses:
F. W. WINTER,
ROBERT C. TOTTEN.