

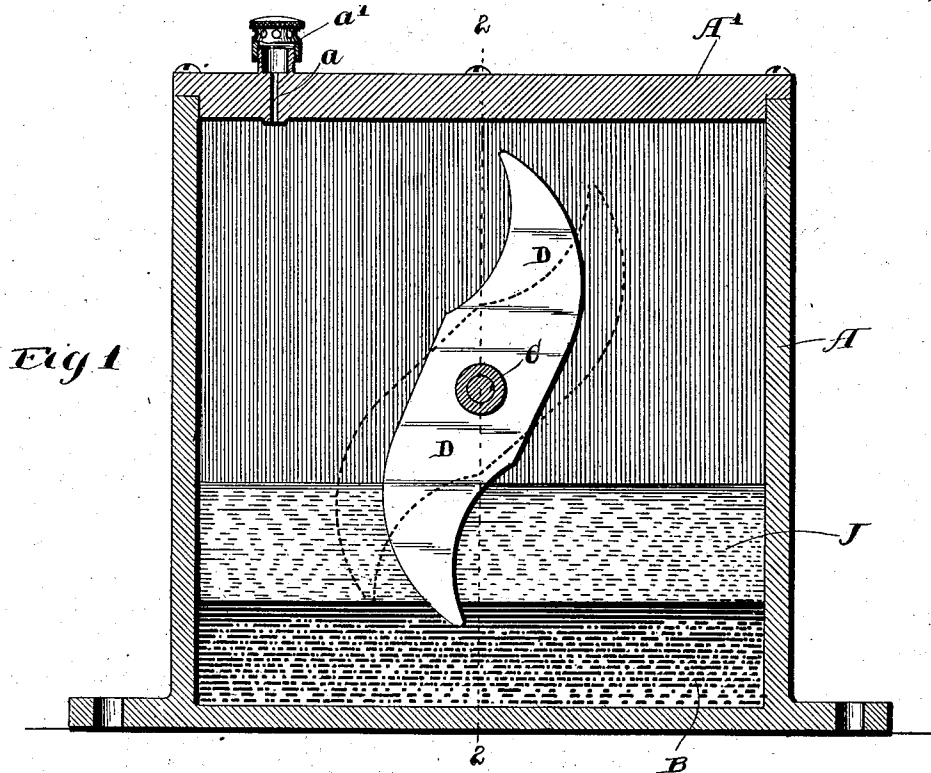
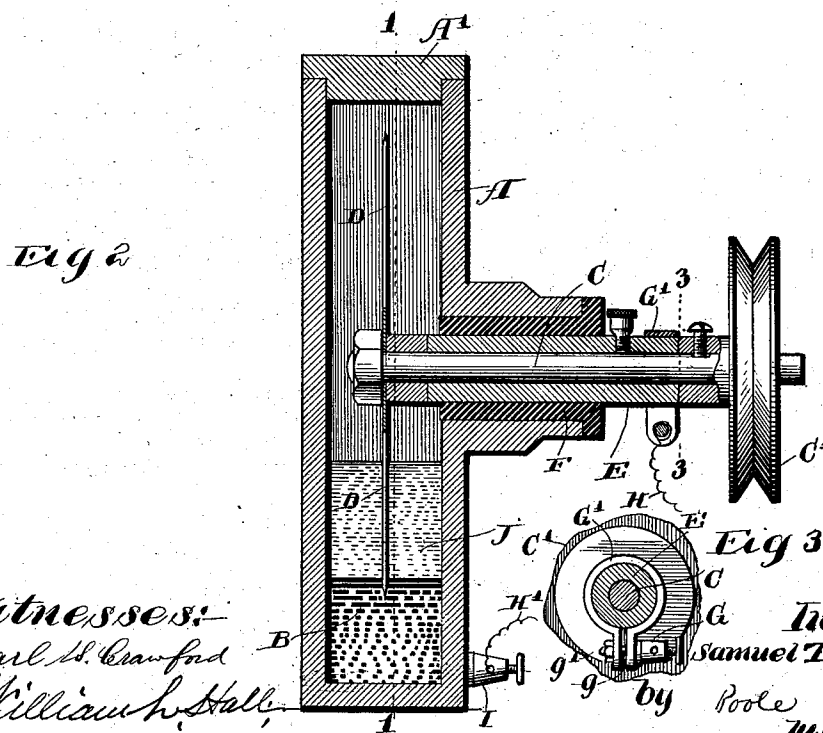
No. 724,704.

PATENTED APR. 7, 1903.

S. T. HUTTON.
CIRCUIT BREAKER.

APPLICATION FILED MAR. 15, 1902.

NO MODEL.



Witnesses:

Carl W. Crawford

William H. Hall

Inventor:

Samuel T. Hutton

by *Boole & Brown*
his Attorneys

UNITED STATES PATENT OFFICE.

SAMUEL T. HUTTON, OF CHICAGO, ILLINOIS.

CIRCUIT-BREAKER.

SPECIFICATION forming part of Letters Patent No. 724,704, dated April 7, 1903.

Application filed March 15, 1902. Serial No. 98,279. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL T. HUTTON, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Circuit-Breakers; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in rotary circuit-breakers adapted for high-tension currents and for use in connection with induction-coils or for like purposes.

My improvements relate to circuit-breakers of that class embracing a power-driven rotative part and in which the current when the circuit is closed passes through a body of mercury or other conducting liquid.

The invention consists in the matters hereinafter described, and pointed out in the appended claims.

In the accompanying drawings, illustrating my invention, Figure 1 is a view in central vertical section, taken on line 1 1 of Fig. 2, of a circuit-breaker embodying my invention. Fig. 2 is a vertical section of the same, taken upon line 2 2 of Fig. 1. Fig. 3 is a detail cross-section taken on line 3 3 of Fig. 2.

As shown in the said drawings, A is a metal casing or receptacle which contains a body of mercury B, and C is a shaft which extends through and is adapted to turn in one of the side walls of the receptacle and which is provided with oppositely-extending metal contact-arms D D, which are arranged to successively dip into the mercury as the shaft C revolves. The shaft C is mounted in a tubular bearing E, which extends through the side wall of the receptacle and is insulated therefrom by means of an insulating-sleeve F. Said bearing is provided with a binding-post G, with which is connected one terminal H of the electric circuit, the opposite terminal H' being connected with the receptacle A by means of a binding-post I. Said terminals H and H' being connected with the shaft C and with the metal wall of the receptacle, it follows that when the contact-arms D D are both above the surface of the mercury in the receptacle the circuit will be broken; but

when either arm dips into the mercury the circuit will be closed through the same and the mercury in the receptacle. Said shaft C will be provided with means, such as the belt-pulley C', through which rotary motion is given to the shaft from suitable actuating means to revolve the contact-arms. It is obvious that said arms will by successively entering and leaving the mercury alternately open and close the circuit, the rapidity of the interruptions depending on the rate of rotation of the shaft. The parts of the arms D D which enter the mercury have the form of flat or thin metal plates, arranged with their flat faces in a plane perpendicular to the axis of rotation of the shaft, so that said arms in their passage through the mercury will have little tendency to displace or violently agitate the same. Moreover, the margins of said arms are sharpened or beveled to an acute edge on both sides thereof, so that they will act to divide the mercury in entering the same and will pass easily and cleanly through the mercury without liability of splashing the mercury or with a minimum effect in displacing the same.

I prefer to place in the receptacle above the body of mercury B a body J of some non-conducting liquid, such as alcohol or kerosene, it being found that the presence of such a body of superposed liquid tends to prevent sparking and to lessen liability of the mercury being splashed or displaced by the passage of the contact-arms therethrough. The said arms are shown as made flat or of thin sheet metal throughout the entire length of the same; but manifestly it is essential that only such parts of the arms as enter the mercury or the superposed liquid layer J need be made thin, as described.

While the arms D may be made of any suitable conducting metal, I prefer that they should be made of steel or other metal which is incapable of being amalgamated by the mercury, so that the mercury will not adhere thereto, it being found that blades of steel or like material will pass more freely and smoothly through the mercury than arms of copper or other metal capable of becoming amalgamated or covered with an adherent coating of mercury. As a further improvement I also propose to make the terminals of

the arms with laterally-directed tapered points so arranged that as the arms revolve the pointed extremities thereof will leave the surface of the mercury approximately at right angles thereto, this construction insuring more certain and positive breaking of the current at the time the arms pass out of or above the surface of the mercury. The laterally-directed points referred to are shown as formed by making the advance edges of said arms of convex and the rear edges of concave form, this construction giving to the arms the shape of a half-crescent; but the same effect may be obtained by otherwise shaping the arms.

I have shown the receptacle A as consisting of a single casting forming integral bottom, side, and end walls and as provided with a movable top or cover A', the purpose of the latter being to provide a complete inclosure for the revolving contact-arms and to prevent drops or particles of the liquid which may be dislodged from the arms by centrifugal action from being thrown out of the receptacle in the rapid rotation of said arms. The receptacle is, however, provided with a vent-aperture a , intended to permit the escape of air or vapor from the interior of the receptacle and prevent the existence of pressure therein through changes in temperature or other causes, said aperture being provided with a laterally-perforated cover or cap a' to prevent any of said liquid from passing out of said aperture should the particles of the same be thrown upwardly from the arms during their rotation.

The binding-post G is shown as secured to the outer end of the tubular bearing E by means of a split ring or strap G', passing around the said bearing, and is provided with outwardly-extending lugs, to which the binding-post G is attached. As a convenient construction the binding-post is provided at its base with a screw-threaded stem g , which passes through the lugs on the ring G' and to which is applied a nut g' , which when tightened serves to draw the ends of the split ring together and to bind the ring tightly around the bearing.

The device shown may have only one or more than two contact-arms, the result being the same so long as the arms are so arranged that the extremity of one arm only will be immersed in the mercury at any one time.

In a circuit-breaker embracing the general features of construction described, if intended for use in cases where the shaft need not rotate with great speed, the contact-arms may be of any desired shape, inasmuch as the action of said arms on the mercury will not tend to greatly agitate the same when the arms move slowly through it. Where the arms are driven rapidly, however, the making of the same with flattened extremities is of great advantage, for the reason that a very high rate of speed may be maintained in an apparatus

having such flattened arms without disturbing the mercury to an extent which will at all interfere with the passage of the current or the complete breaking of the current when the arms pass above the normal level of the mercury in the receptacle.

I claim as my invention—

1. A circuit-breaker comprising a metal receptacle for a conducting liquid and a rotative shaft which passes through one of the walls of the receptacle and is provided with a contact-arm adapted for immersion in the liquid during the rotation of the shaft; said shaft being insulated from the metal receptacle.

2. A circuit-breaker comprising a receptacle for a conducting liquid, and a rotative shaft provided with a contact-arm adapted for immersion in the liquid during the rotation of the shaft, the extremity of said arm which enters the liquid being flattened in the plane of its rotation and sharpened at its edges.

3. A circuit-breaker comprising a receptacle for a conducting liquid, and a rotative shaft provided with a contact-arm adapted for immersion in the liquid during the rotation of the shaft, said arm being made flat or thin and having a pointed, rearwardly-directed extremity.

4. A circuit-breaker comprising a metal receptacle for a conducting liquid, a rotative shaft which extends through one of the walls of the receptacle, a tubular bearing for said shaft supported on said wall, and an insulating-sleeve between the bearing and said wall of the receptacle, said shaft being provided with a contact-arm adapted for immersion in the liquid when the shaft is rotated.

5. A circuit-breaker comprising a closed metal receptacle for a conducting liquid, and a rotative shaft which extends through one of the walls of the receptacle and is provided within the receptacle with a contact-arm adapted for immersion in the liquid when the arm is rotated, said shaft being insulated from the receptacle.

6. A circuit-breaker comprising a closed metal receptacle for a conducting liquid, a rotative shaft which extends through one of the walls of the receptacle and which is provided with a contact-arm adapted for immersion in the liquid when the shaft is rotated, and a bearing for the shaft which is attached to and insulated from said wall.

7. A circuit-breaker comprising a closed metal receptacle for a conducting liquid, a rotative shaft which extends through one of the walls of the receptacle and is provided within the receptacle with a contact-arm adapted for immersion in the liquid and outside of the receptacle with a pulley, a tubular bearing for the shaft, and an insulating-sleeve interposed between the wall of the receptacle and said bearing.

8. A circuit-breaker comprising a metal receptacle for a conducting liquid, a rotative

shaft provided within the receptacle with a
contact-arm, a tubular bearing for the shaft
which is supported on and insulated from the
receptacle, and conductor-terminals attached
5 one to the receptacle and the other to the shaft-
bearing.

In testimony that I claim the foregoing as

my invention I affix my signature, in presence
of two witnesses, this 13th day of March, A. D.
1902.

SAMUEL T. HUTTON.

Witnesses:

C. CLARENCE POOLE,
BERTHA A. PRICE.