No. 625,921. Patented May 30, 1899.

H. BOAS.

ROTARY CIRCUIT BREAKER.

(Application filed Oct. 20, 1898.)

(No Model.)

Fig. 1.

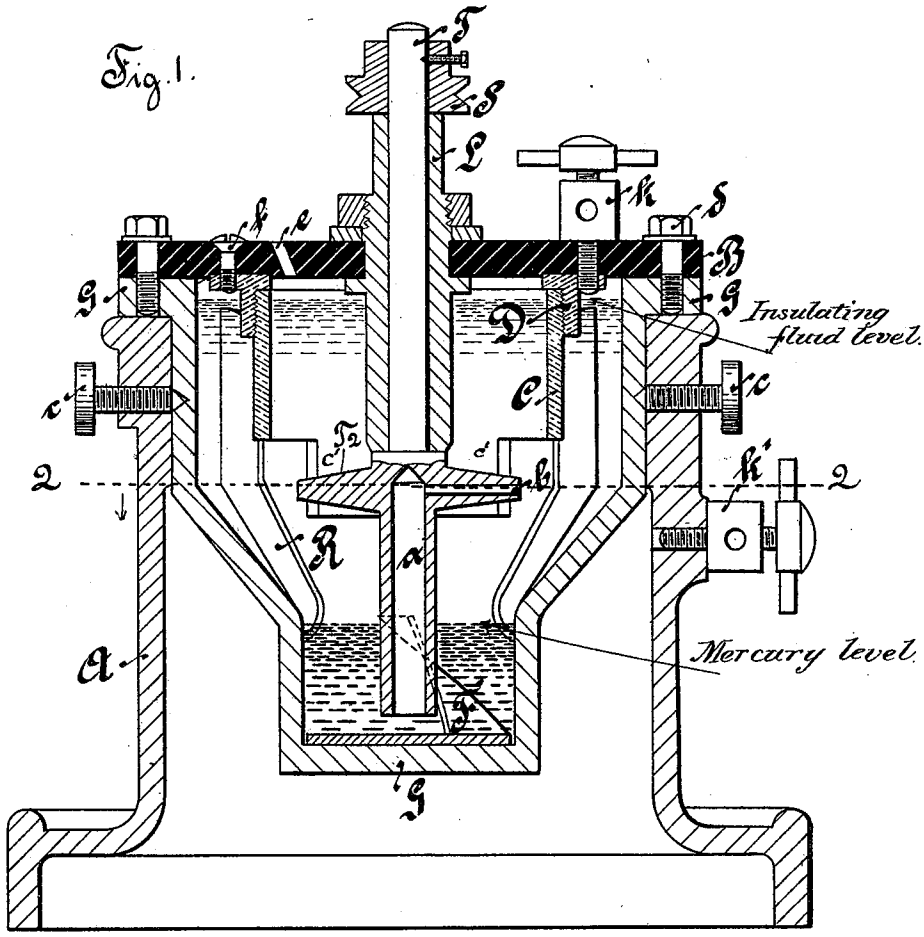
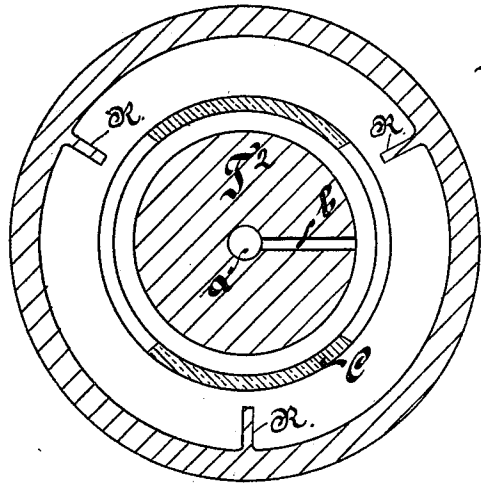


Fig. 2.



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UNITED STATES PATENT OFFICE.

HANS BOAS, OF BERLIN, GERMANY.

ROTARY CIRCUIT-BREAKER.

SPECIFICATION forming part of Letters Patent No. 625,921, dated May 30, 1899.

Application filed October 20, 1898. Serial No. 694,149. (No model.)

To all whom it may concern:

Be it known that I, HANS BOAS, residing at Schlegelstrasse 26, Berlin, in the Kingdom of Prussia and German Empire, have invented certain new and useful Improvements in Rotary Circuit-Breakers, of which the following is a specification.

Rotary fluid circuit-breakers, as is well known, have certain advantages over interrupters with two rigid contacts. First, the contact resistance when the circuit is closed is very small by reason of the large extent of the contact-surfaces and the intimate connection made between them; secondly, the interval between making and breaking contact may be changed as desired, suited to the particular requirements in each case; thirdly, strong currents may be broken by this apparatus as well as by platinum contact-breakers.

Circuit-breakers having for one contact a rigid conductor and for the other a conducting fluid, preferably mercury, may be constructed on two different principles.

The first system is to use a stationary mass of mercury, into which a rigid conductor is alternately dipped and withdrawn. The movement of such conductor may be either to and fro or rotary about a fixed axis mounted outside the mercury. In the first case the motive power has considerable work to perform proportional to the mass of the part of the conductor moved and the square of its velocity. In the second case the motion of the conductor, should it exceed a certain velocity, will set the mercury in motion also and cause the fluid to be spilled.

The second system of constructing fluid circuit-breakers consists in having a stationary conductor and causing the mercury to make the necessary motion, and where hereinafter I use the term "mercury" I mean also to include other suitable conducting fluid. One form of circuit-breaker constructed according to this second principle is described in the German Patent Specification No. 52,598 and another in the German Patent Specification No. 43,134. The present invention is based upon this last-named principle of construction.

The stationary rigid conductor is in the form of a ring or tube having one or more openings or holes. Against this perforated part, which forms a portion of the electric circuit, a jet of mercury, which rotates about the axis of the ring, is thrown. This jet of mercury in its rotation strikes at one instant against the segmental portion c' of the metal ring and at the next instant passes through an opening thereof. In this manner it alternately makes and breaks contact with the metal ring. The mercury-jet is produced by the rotation of a knee-pipe, of which one leg coincides with the axis of the ring and dips into the mercury, while the other leg rotates. The segmental ring, together with the horizontal leg of the pipe, is enveloped by an insulating fluid, with which the mercury is covered. As soon as the knee-pipe has reached a certain speed of rotation the mercury is sucked up by the centrifugal force and is ejected through the rotating leg. If the metal ring forms one pole and the mercury the other pole of the circuit, the current will be alternately made and broken. As there is here only the frictional resistance of the bearings and of the fluids to overcome and the small work of raising the mercury, there is thus a minimum expenditure of energy. One form of such circuit-breaker is illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section of a rotary circuit-breaker embodying my invention, and Fig. 2 is a horizontal section on line 2 2 of Fig. 1.

The vessel G is filled up to the lower part of the conical enlargement with conducting fluid, preferably mercury. The remaining portion of the vessel contains some suitable insulating fluid. The vessel G is closed by means of a vulcanite plate B and screws d. In the cover B is screwed a central vertical bearing L. In this bearing is the axis T of the centrifugal apparatus, which carries the grooved wheel S at its upper end. The centrifugal apparatus is in the form of a disk T^2 and is constructed with an upright suction-tube a and a delivery-tube b. Preferably concentric with this centrifugal disk T^2 is the metal segmental tube C, screwed to the flange D. This segmental tube can be changed for others having more or fewer segments. The flange D is secured by means of screws f to the vulcanite cover B. The terminal k on the latter serves to conduct the current to the

flange D and ring or tube C. The opening *e* is for the purpose of supplying the fluid. The ribs R in the interior of the vessel G prevent the rotation of the insulating fluid. In the lower part of the vessel are one or more blades F. These blades keep the mercury from rotating, and in so doing, by means of their screw-formed surfaces, assist it to rise into the vertical tube *a*. The direction of rotation of the centrifugal disk is such as corresponds to the form of the blades F. The vessel G may be constructed of cast-iron enameled inside, the enamel on the lower part being removed to form a conducting-surface for the current. This vessel is carried in a stand or case A by means of screws *c*, so that the vessel and case are in electrical contact. The screw *k'* forms a second terminal of the circuit. The mercury sucked up and thrown out flows down the sides of vessel G back into the lower part of the vessel again. By changing the number of segments of the tube C and varying the speed of rotation any degree of rapidity of current interruption of from twenty to several hundred times per second may be attained.

What I claim, and desire to secure by Letters Patent, is—

1. In a rotary circuit-breaker, the combination of a vessel containing mercury and an insulating fluid superposed upon the mercury, conducting-segments immersed in the insulating fluid and a centrifugal device dipping into the mercury and raising the same and ejecting the said mercury in a stream against the conducting-segments, substantially as described and for the purposes set forth.

2. A rotary circuit-breaker comprising a receptacle containing a conducting fluid, a centrifugal apparatus having a vertical tube dipping into said receptacle and a rotating horizontal tube in combination with a metallic segmental ring or tube, against which the conducting fluid is ejected all substantially as and for the purposes hereinbefore set forth.

3. A circuit-breaker comprising a vessel, mercury contained within the said vessel, a centrifugal apparatus having an upright suction-tube dipping into the mercury and communicating with a rotating delivery-tube set at an angle to the said upright suction-tube and conducting-segments arranged to receive the impact of fluid flowing from the delivery-tube.

4. In a rotary circuit-breaker, the combination of a fluid-containing vessel provided with ribs for preventing rotation of the fluid, conducting-segments contained within the said vessel and a rotary centrifugal device comprising in its structure an upright suction-tube *a* communicating with a delivery-tube *b* set at an angle thereto and adapted to deliver a conducting fluid against the conducting-segments.

5. In a rotary circuit-breaker, the combination of a fluid-containing vessel provided at or near its bottom with a screw blade or blades F, substantially as described, segmental conducting-sections and a centrifugal apparatus comprising an upright suction-tube *a* extending into the vessel into proximity with the screw blade or blades and provided with a laterally-extending delivery-tube for ejecting liquid against the conducting-segments.

6. In a rotary fluid circuit-breaker, the combination of suitable contacts and a fluid-containing vessel provided with ribs for preventing rotation of the fluid and with screw-blades for assisting the rise of the fluid and a centrifugal apparatus coöperating with the screw-blades and adapted to project a jet of fluid against the contacts, substantially as and for the purposes set forth.

In witness whereof I have hereunto signed my name, this 3d day of October, 1898, in the presence of two subscribing witnesses.

HANS BOAS.

Witnesses:
HENRY HASPER,
C. H. DAY.