April 16, 1935. R. MITSUDA 1,997,831

ARC COMMUTATOR

Filed June 20, 1929

Fig. 1.

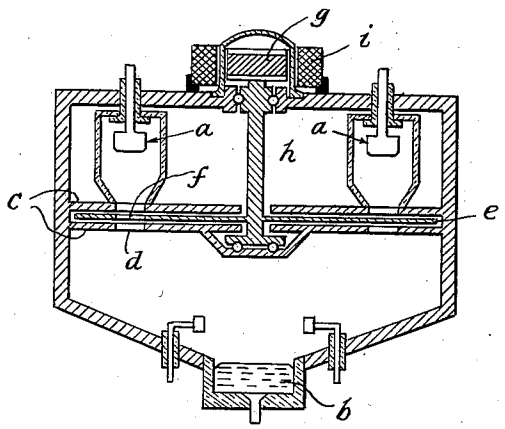
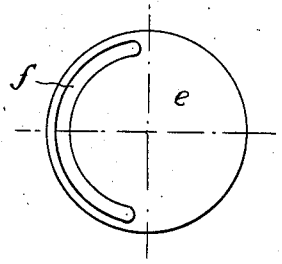


Fig. 2



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ARC COMMUTATOR

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3 Claims. (Cl. 250—27.5)

This invention is concerned with arc commutators, and particularly with vacuum mercury arc commutators.

The chief object of the invention is to provide a device which will effectuate sure periodic interruption and ignition of the arcs, and in which the wave-form of the current will be controllable and changeable at will.

My improved commutator is shown in the accompanying drawing, in which

Fig. 1 is a diagrammatic sectional view of the device, and Fig. 2 is a plan view on reduced scale of a part of the device.

This invention consists essentially of a device having a disc rotating in a vacuum chamber to make or break an electric current by respectively igniting or interrupting mercury arcs in succession, and comprises a mercury-arc vacuum chamber in which anodes *a* and a cathode *b* are mounted and separated by suitable barriers *c*, forming upper and lower rooms. The upper and lower rooms can be put in communication only through the arc holes *d* on the barriers, and then only when the arc hole *f* of a rotating disc *e* mounted to rotate between the barriers, comes into coincidence with the holes *d*. Arc holes corresponding to holes *d* and bored in the metallic barrier, open just under the respective anode covers, and the arc hole *f* of the rotating disc, shown in Fig. 2, is always covered by the barriers except when registering with holes *d*.

When arc holes *d*, bored in the metallic barriers and hole *f* bored in the rotating disc come into coincidence with each other, a passage for the mercury arc is opened and an arc may hence be ignited between the corresponding anode and the cathode from a D. C. source. When the arc holes *d* and *f* are not in register the arc passage is closed, and the arc naturally extinguishes, with the effect that the corresponding electric circuit is opened. If the mercury arc chamber be provided with two main anodes, and an auxiliary arc is continuously maintained down near the cathode, the extinction and ignition of main arcs can be made to occur periodically, and alternately between the two main anodes and the cathode when the rotating disc is revolved with a certain speed. The period of commutation between the arcs depends upon the number of arc holes *f* and the number of revolutions per minute of the rotating disc. In order to control or vary the wave-form of the current passing out of the device, it is only necessary to suitably vary the size and shape of the arc holes.

The disc can be rotated either by means of a reaction motor, or by the mutual action between a rotor *g* attached to the top of the rotating axis *h* and an externally revolving magnetic field *i*.

When the device is suitably combined with transformers and condensers, the inversion of current from D. C. to A. C. of any required frequency and voltage may be achieved. When the device is applied to the ordinary mercury arc rectifier, the arc interruption of the rectifier may be made positive and the back firing of the rectifier can be effectively prevented as when under an excessive D. C. load.

Having thus described my invention what I claim is:

1. An arc commutator comprising a cathode and a plurality of anodes each in a separate compartment, a double wall between said cathode and the anode compartments having a passage therethrough from each anode compartment to the cathode compartment and a rotatable perforated disk between the sections of said double wall to open and close said passages.

2. An arc commutator comprising a cathode and a plurality of anodes each in a separate compartment, stationary obstruction means between said cathode and the anode compartments having a passage therethrough from each anode compartment to the cathode compartment, and a rotatable perforated disk adjacent said obstruction means to open and close said passages.

3. An arc commutator for changing direct current to alternating or pulsating current comprising a vacuum chamber subdivided into a cathode chamber and a plurality of anode chambers with passages between the cathode and anode chambers, stationary obstruction means between said cathode and anode chambers having passages therethrough from each anode chamber to said cathode chamber, and a rotatable perforated disk adjacent said obstruction means and having openings for registering with the openings in said obstruction means for opening and closing said passages.

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