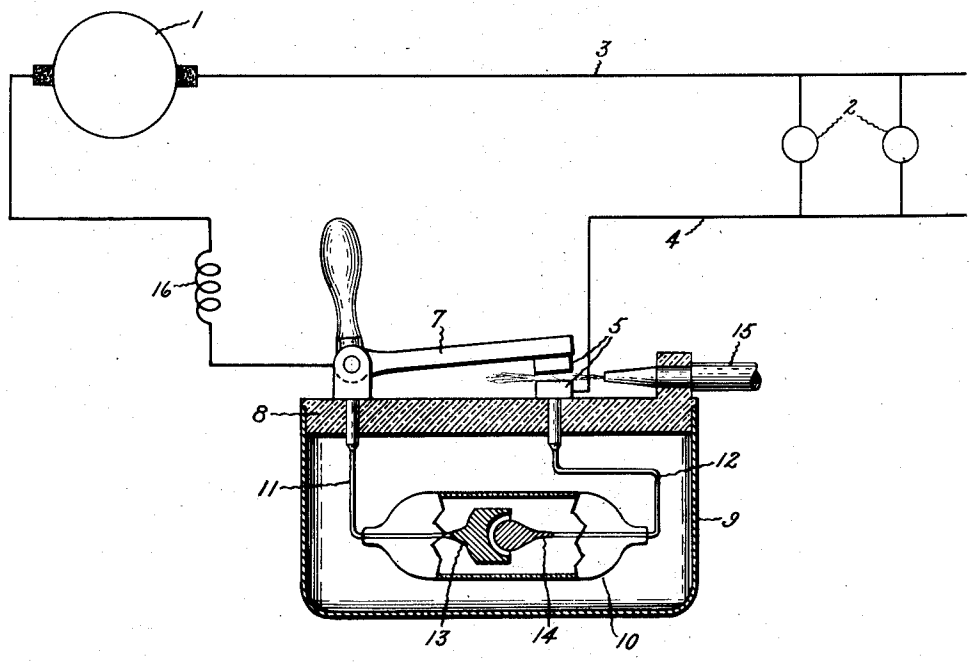
April 22, 1924. 1,491,440

E. THOMSON

SWITCHING APPARATUS

Filed June 2, 1921



Inventor,
Elihu Thomson,
by Albert G. Davis
His Attorney.

Patented Apr. 22, 1924. 1,491,440

UNITED STATES PATENT OFFICE.

ELIHU THOMSON, OF LYNN, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

SWITCHING APPARATUS.

Application filed June 2, 1921. Serial No. 474,366.

To all whom it may concern:

Be it known that I, ELIHU THOMSON, a citizen of the United States, residing at Lynn, in the county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Switching Apparatus, of which the following is a specification.

The present invention relates to an improvement in circuit breaking apparatus for electric circuits, and its object is to obviate so far as possible any injury to a switch on opening a circuit due to the arc which generally follows such opening until the switch terminals are so far apart as to exceed the potential which sustains the arc. To this end the switching contacts are provided with shunt means, such as a vacuum discharge device, and a jet of air, or other fluid, is caused to play between the switch contacts as they open. The accompanying drawing illustrates one embodiment of my invention in a simple hand-operated switch.

In the figure, a source of current 1 may be represented by a dynamo or like apparatus supplying a load 2 by a circuit 3, 4, containing a switch controlling the passage of current to this load and having contacts 5. The switch arm 7 is mounted upon the insulating plate 8 of a receptacle 9 containing a vacuum discharge device 10 connected in shunt to switching contacts 5 by the conductors 11, 12. The electrodes 13, 14 of the discharge device, consisting respectively of brass and graphite, are separated by a small space, and have a considerable surface where opposed to each other. The discharge device 10 contains a suitable attenuated gas, for example, argon. This well-known form of vacuum discharge device is described in general in U. S. patent to Creighton No. 1,144,028 of 1915, and in patent application, Serial No. 240,664, filed June 18, 1918, by George B. Phillips.

At the time of opening the switch contacts 5 a jet of air or other gas supplied by the pipe or conduit 15 passes between the contacts. The operation is as follows: Immediately upon the slightest separation of contacts, the jet from the pipe 15, forces any spark or arc discharge over to the farthest point away from the jet. This action greatly raises the impedance of the ionized air gap. Consequently, the potential across the contacts will rise considerably above the normal, especially if there is any reactance in the circuit as diagrammatically indicated at 16. This increase of potential causes a discharge in the vacuum tube in which a blue or purplish flash appears, and the circuit is then open. The energy which would go to damage the switch is thus transferred instantly to the vacuum discharge device and is there disposed of harmlessly. If, for example, the circuit to be opened is 220 volts, this voltage would tend to maintain a considerable arc at the breaking or opening of the contacts. At the very incipiency of such an arc, the jet drives it over from between the contacts, and the potential takes such a sudden rise that the vacuum tube gap, though set for say, 500 or 600 volts, is jumped, but the discharge immediately ceases because it cannot be maintained by the normal voltage of the line through the vacuum chamber. It has been found that the operation of such a switch may be performed many thousands of times without appreciably interfering with the integrity of the switch surfaces.

The utility of my invention to the commutation of high voltage alternating currents and various other applications will appear from the foregoing without further explanation.

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

1. A circuit breaking apparatus comprising the combination of switching contacts, a vacuum discharge device connected in shunt thereto, and means for increasing the impedance of the gap between said contacts to an electrical discharge occurring between said contacts.

2. A circuit breaking apparatus comprising the combination of switching contacts, cooperating electrodes in shunt thereto separated by a gap, and surrounded by an attenuated gas, and a blow out device for lengthening an electric discharge between said contacts.

3. A circuit breaking apparatus comprising the combination of switching contacts, cooperating electrodes in shunt thereto separated by a gap and surrounded by an attenuated gas, and a nozzle delivering a blast

of gas transversely to said contacts whereby an electrical discharge between the same will be lengthened.

4. A circuit breaking device comprising the combination of a pair of switching contacts, a discharge device connected in shunt with said contacts and having a breakdown voltage above the normal voltage of said circuit, and means for causing a sudden increase in the impedance of the gap formed by the separation of said contacts whereby the resulting energy discharge of said circuit is transferred to said discharge device.

In witness whereof, I have hereunto set my hand this 31st day of May, 1921.

ELIHU THOMSON.