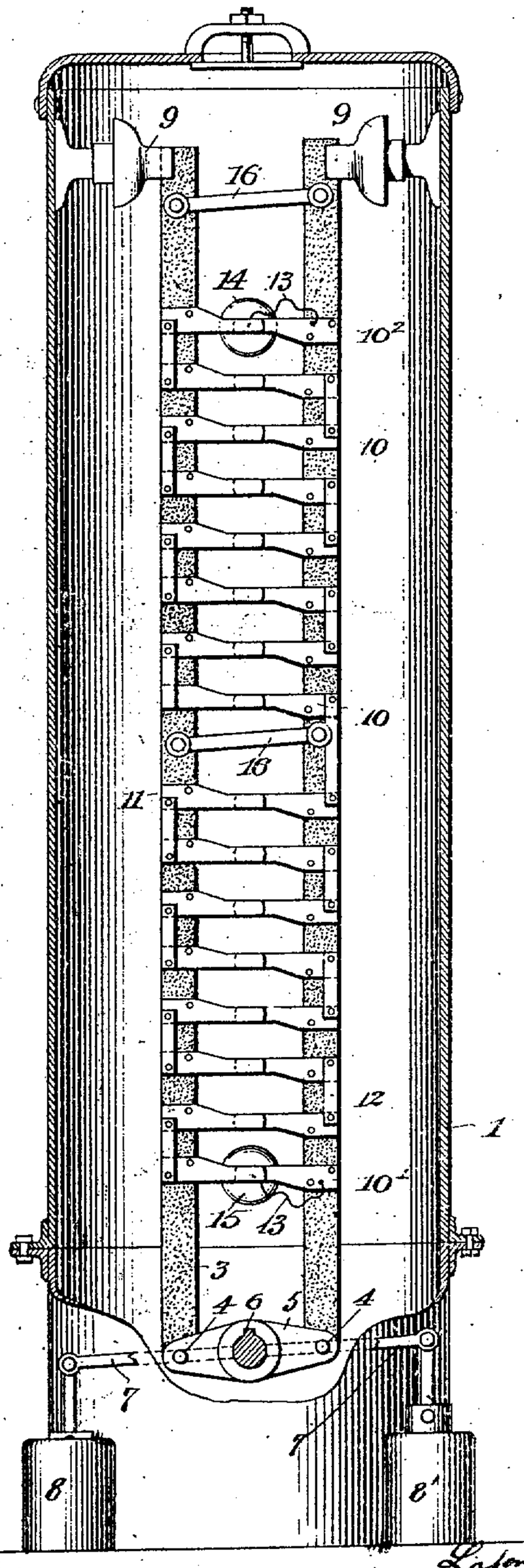
No. 862,513. PATENTED AUG. 6, 1907.

L. G. ROBINSON.

HIGH POTENTIAL CIRCUIT BREAKER.

APPLICATION FILED DEC. 12, 1906.



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HIGH-POTENTIAL-CIRCUIT BREAKER.

No. 862,513. Specification of Letters Patent. Patented Aug. 6, 1907.

Application filed December 12, 1905. Serial No. 291,384.

To all whom it may concern:

Be it known that I, LAFOREST G. ROBINSON, a citizen of the United States, residing at Plattsburg, in the county of Clinton and State of New York, have invented certain new and useful Improvements in High-Potential-Circuit Breakers, of which the following is a full, clear, and exact description.

My invention relates to interrupters or vibrators, and pertains particularly to those in which it is desired to interrupt a current of high potential at a rapid rate.

The object of the invention is to make a vibratory circuit connection of the above character, and in which the electrical resistance shall be low when connected, and rise to a very high degree of insulation when the contacts are separated.

A further object of the invention is to devise a vibrator in which the inertia of the moving parts is very low, so that a high speed of vibration is possible without jarring or excessive power or wear, or other harmful effects.

With these and other objects in view, my invention consists in the construction, combination, location and arrangement of parts, all as will be more fully hereinafter set forth, as shown in the accompanying drawing, and finally particularly pointed out in the appended claims.

The drawing illustrates a circuit breaker partly in section, which embodies the principles of my invention.

In the practice of wireless telegraphy, motor vehicle equipment, and a great many other practical industries, induction coils of high power are becoming increasingly a necessity, and coils of a very large, expensive construction are now in common use. As is well known, the power of a coil depends upon two factors, the ratio of its primary to its secondary windings, and the magnetizing effect of its primary winding. Within a given size of wire this magnetizing effect of the primary is directly proportional to the potential drop across its terminals, so that the efficiency of the coil is proportional to such potential drop. In practice, however, very low potentials have generally been used in order to avoid sparking at the contacts, and secure a sufficient abruptness of the primary break. It is evident that if a break could be devised that would be as efficient as the present break and work for larger voltages, it would multiply the power of the coil used in the proportion that the primary voltage is multiplied. In carrying out my present invention I provide means for multiplying the voltage of the primary winding to any desired extent, at the same time maintaining the same suddenness in opening the primary circuit that has hitherto been obtained.

In breaking alternating current circuits it is especially necessary that the rupture be made abruptly since otherwise dangerous oscillations are set up across the path traversed by the arc drawn when the contacts separate. In carrying out my invention I aim to provide a circuit breaker adapted to rupture the circuit within the time of a single oscillation of an alternating current, thus preventing such danger.

Referring now to the drawings and to the various views and reference signs appearing thereon in which like parts are designated by the same reference sign wherever they occur, 1 denotes a frame or casing which I make in the form of a hermetically closed receptacle adapted to contain oil, or any insulating gas which may be under pressure. Within this frame or casing I arrange a pair of insulating rocker bars 2 and 3 pivoted at 4 to a rock arm 5, keyed to a rock shaft 6 projecting through a wall of the casing.

7 designates a lever connected to the rock shaft 6 and which may be oscillated by any suitable means, such for example as the solenoid magnets 8, 8′.

The upper ends of the rocker bars 2, 3, are guided in the slotted ends of the insulators 9 conveniently supported from the casing, and which permit an independent up and down movement of the respective rocker bars. The rocker bars are made of insulating material and carry upon them spaced contact springs 10 and 11, which are directed toward one another so as to lap over and make contact at their extremities. The alternate contact springs of each series are connected by conducting straps 12, so that when the contact springs are in registered or contact position, a continuous circuit is formed in a zig-zag path through each of the straps and contact springs of the entire series. The end contacts, designated as $10'$ and 10^2 upon the drawing are electrically connected by any suitable means, as by flexible wires 13, with terminal studs 14, 15, which extend through the walls of the casing to any desired binding posts on the outside thereof.

16 designate links which connect the respective rocker bars, and serve to additionally guide and support the same.

The operation is as follows: The terminal wires being connected to the studs 14 and 15, the solenoid 8 is energized so as to depress its end of the lever 7 and move the rocker bars into the position shown in the drawing in which a continuous circuit is formed from one terminal stud to the other as above described. When now the solenoid 8′ is energized, the lever 7 is oscillated to its alternate position so that the rocker bars 2 and 3 move relatively to one another with their attached contact springs 10 and 11 which accordingly become separated at their ends along the entire length of the series. The circuit is, therefore, broken at a multitude of points, each of which operates with as much efficiency as the single circuit breaker commonly in use, so that voltages may be employed which are as many times greater than the usual voltages as the num-

ber of contact springs used. As above stated, oil or compressed air or any other insulating medium may be employed within the receptacle 1 and a condenser or condensers may be used to minimize the spark in the usual way.

While I have referred to my invention as capable of use with induction coils and similar apparatus, I do not, of course, desire to be limited or restricted to this use, since the invention is of value as a circuit breaker in all relations where it is desired to interrupt a high potential circuit in a vibratory or in a permanent manner. By the use of the solenoids 8, 8', I am enabled to operate the circuit breaker at a remote station or point, and break circuits of high potential thereat, without the use of motors or circuit breaking machinery of any sort.

When this device is used as a vibrator for an induction coil, or similar purpose, it is evident that the movement of the contact springs is divided between the two bars so that each requires only a very slight movement in order to make an efficient break. The movement for the entire series is, of course, no greater than for any single contact spring, so that the inertia of the mechanically moving parts is no greater, and possibly even less, than that of the usual circuit breaker employing a single movable contact. In this way a multiple break is imposed in the circuit whose aggregate length is many times that of a single contact circuit breaker, and at the same time the inertia of the vibrating parts is about the same. It is obvious that if a gap of the length corresponding to that of the multiple gap of this device, were to be secured by a single contact circuit breaker, a very much greater range of movement would be necessary. Inasmuch as the power required to move a vibrating part is proportional to the square of its range of movement, it is evident that to obtain a gap corresponding to that of this device with a single contact circuit breaker would require 16 times 16, or 256 times as much power as is required by this new device.

What I claim, is:—

1. A circuit breaker comprising two series of contact springs each mounted on a support, means for vibrating said supports in opposite directions simultaneously so as to break the circuit at a plurality of points, the rupture at each point being accomplished with twice the velocity of each of said bars.

2. A circuit breaker comprising a pair of insulating bars, a plurality of contact springs mounted on each bar, said contact springs being directed toward one another and capable of making electrical contact with one another at one position of the bars, electrical connections between said springs by which they are all connected in a single series circuit when they are in contact with one another, rocker arms for supporting said bars, a casing surrounding said rocker arms and inclosing the bars, said casing containing fluid under pressure, and means for tilting the rocker arms whereby the contact springs are simultaneously separated throughout the series.

3. A circuit breaker comprising a pair of insulating bars, rock arms for supporting said bars and imparting a relative movement thereto, and two series of contact springs respectively joined to the bars so as to make and break contact with one another when the bars are moved.

4. A circuit breaker comprising a pair of insulating bars, a rock arm for movably supporting said bars, insulators having grooves for guiding said bars, and contact springs connected to the respective bars so as to break contact with one another when the bars are moved.

5. A circuit breaker comprising a pair of insulating bars, a rock arm for movably supporting said bars, insulators having grooves for guiding said bars, and contact springs connected to the respective bars so as to break contact with one another when the bars are moved, said contact springs being joined in a single circuit.

In witness whereof, I subscribe my signature, in the presence of two witnesses.

LAFOREST G. ROBINSON.

Witnesses:
PAUL CHEEVER,
WALTER B. GUMP.