

R. VARLEY.
 VIBRATOR FOR INDUCTION COILS.
 APPLICATION FILED NOV. 6, 1903.

NO MODEL.

Fig. 3.

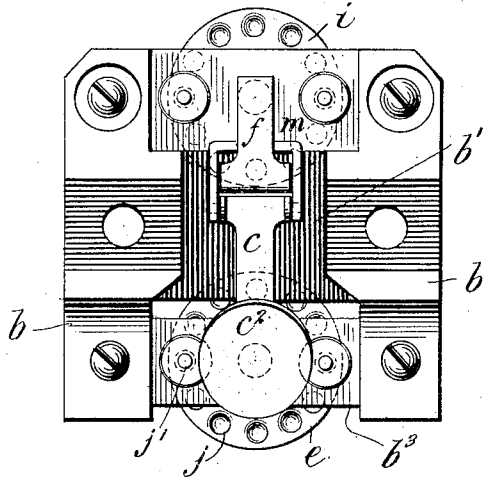


Fig. 1.

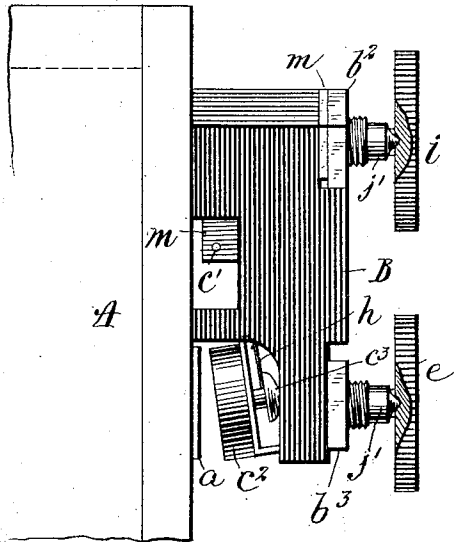
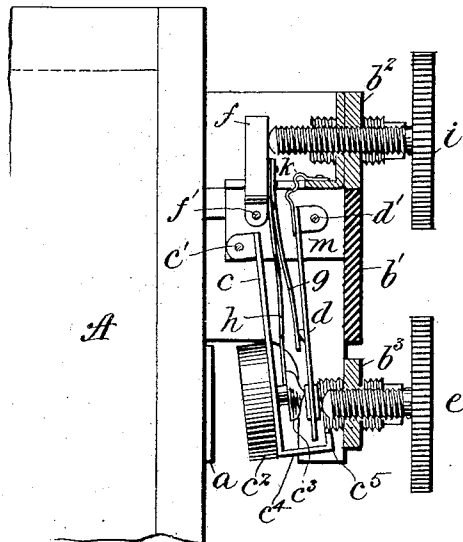


Fig. 2.



Witnesses
 Frank S. Ober
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 Richard Varley
 By his Attorney
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UNITED STATES PATENT OFFICE.

RICHARD VARLEY, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO VARLEY
 DUPLEX MAGNET COMPANY, A CORPORATION OF NEW JERSEY.

VIBRATOR FOR INDUCTION-COILS.

SPECIFICATION forming part of Letters Patent No. 748,442, dated December 29, 1903.

Application filed November 6, 1903. Serial No. 180,116. (No model.)

To all whom it may concern:

Be it known that I, RICHARD VARLEY, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Vibrators for Induction-Coils, of which the following is a full, clear, and exact description.

This invention relates to vibrators for induction-coils, the object being to provide a circuit-breaker which will be held in its closed circuit position by a comparatively strong force, while the armature which actuates the circuit-controller is retracted by a comparatively light force, so that comparatively slight magnetic force is required to move the armature, but by taking advantage of its momentum to strike a hammer-like blow upon the strongly-held circuit-closer the latter is forced away from its companion contact and a quick opening of the circuit obtained. I accomplish this by using a comparatively rigid pivoted circuit-controlling plate held in its closed position by a strong spring and an armature-lever held in its retractile position by a comparatively light spring, the armature-lever being so positioned or formed with respect to the circuit-controlling plate that it only strikes the latter to open the circuit after it has nearly completed its stroke under the magnetic attraction of the coil.

My invention also includes certain details of construction concerning the mounting of the aforesaid springs in a manner to be adjusted simultaneously by a single adjusting-screw, also in a flexible permanent connection of the circuit-conductor with the pivoted circuit-controlling plate, all as will be hereinafter fully pointed out.

In the accompanying drawings, Figure 1 is a side elevation of the frame in which the vibrator is mounted and which is attached to the head of the induction-coil. Fig. 2 is a central section of the same, parts being shown in elevation; and Fig. 3 is an elevation of that side of the frame and its mechanism which abuts against the head of the induction-coil.

A portion of the casing containing the induction-coil is indicated by A, and the head of the core of the coil by a. Against the head

of the casing is secured a frame B, of hard rubber, fiber, or other suitable material, consisting, essentially, of two side pieces *b b*, connected together by a cross-plate *b'*. In addition to this the frame also consists of metallic plates *b²* and *b³*, in which the adjusting-screws work.

c is an armature-lever pivoted at *c'* to a bracket *m*, secured to the plate *b²*. This lever carries a soft-iron armature *c²*, facing the pole *a*. On the back of the lever is a button *c³*, presenting a shoulder beneath which a spring, to be referred to, may rest. At the extremity of the armature-lever there is a rearward extension *c⁴*, terminating in a hook *c⁵*.

d is a substantially rigid plate pivoted at *d'* to the bracket *m* and bearing at its forward end against the end of a screw *e*, which passes through and works in plate *b³*. The end of the screw and the surface of the plate have corresponding platinum contacts in the circuit to be controlled. The extremity of lever *d* projects under the hook *c⁵* of the armature-lever, the latter, however, in its retractile position being some distance to the rear of the end of the plate, as shown in Fig. 2. *f* is a lever pivoted at *f'* to said bracket *m* and carrying two springs *g* and *h*, respectively, the former bearing against the plate *d*, tending to hold it against the screw *e*, and the latter engaging with the shoulder beneath button *c³* on the armature-lever. Spring *g* is stronger than spring *h* in comparison with the amount of work they have to do, spring *g* being intended to hold the rigid plate *d* firmly against the end of screw *e* to maintain the integrity of the circuit, whereas spring *h* is sufficiently light to be readily put under momentum by the attraction of the pole *a*.

i is an adjusting-screw passing through the plate *b³* and bearing against the lever *f*, so that by setting the screw inward or outward the tension of both springs *g* and *h* can be simultaneously adjusted without modifying their relative strengths. Each of the set-screws *e* and *i* are provided on the under faces of their heads with a row of sockets *j*, with which spring-bolts *j'*, set in the plate *b³*, engage to hold the screws at any point of adjustment. These friction-locks have been

described in other applications filed by me, and no claim is made herein for them.

The plate *d*, while being pivoted directly to the metallic bracket *m* and being therefore electrically connected therewith, is for greater security connected by means of a flexible conductor *k*, which is soldered or pivoted at one end to the plate and at the other end to the bracket.

10 The operation is as follows: The circuit commanded by the vibrator leads from bracket *m* through plate *d* and screw *e*. It may be understood also to include the primary winding of the induction-coil. The primary circuit being closed externally, core *a* is energized and attracts armature *c*². The light spring *h* readily yields, and the lever moves forward, quickly gathering momentum. Near the end of its traverse the hook *c*³ strikes a hammer-like blow on the end of lever *d* and causes the latter to very suddenly leave the end of screw *e* and break the circuit without an appreciable spark at the contacts. On the opening of the circuit the magnetic attraction ceases and spring *h* retracts the armature, plate *d* being at the same time carried forcibly against the end of screw *e*, where a good contact is made by reason of the force of the spring and the stroke of button *c*³. The backward movement of the armature carries the hook *c*³ beyond the end of the lever *d*, and the circuit being again complete the same operation is repeated and continued indefinitely in the well-understood manner. The force exerted by spring *g* is sufficient to crush any foreign particles that may enter between the contacts, and the momentum provided for in the action of the armature-lever enables it to overcome the strong spring. By using a light spring for the armature-lever it will respond to comparatively weak magnetic attraction; but this will always be sufficient to open the circuit, because of the momentum created in the lever before it engages the plate *d*.

45 Having described my invention, I claim—

1. In a vibratile circuit-controller for induc-

tion-coils, the combination of a circuit-controlling plate, an armature-lever independent thereof and two springs, one acting upon the plate and the other upon the armature-lever, the former being stronger than the latter. 50

2. In a vibratile circuit-controller for induction-coils, the combination of a circuit-controlling plate, an armature-lever independent thereof and two springs, one acting upon the plate and the other upon the armature-lever, the former being stronger than the latter, in combination with means enabling the armature-lever to strike a hammer-like blow on the circuit-controlling plate, for the purpose set forth. 55

3. In a vibratile circuit-controller for induction-coils, the combination of a circuit-controlling plate, an armature-lever independent thereof and two springs, one acting upon the plate and the other upon the armature-lever, the former being stronger than the latter, in combination with a single screw for simultaneously adjusting the tension of both springs. 60

4. In a vibratile circuit-controller for induction-coils, a circuit-controlling pivoted plate and an immovable metallic frame, in combination with a flexible conductor permanently secured to the plate and to the frame, for the purpose set forth. 65

5. In a vibratile circuit-controller for induction-coils, the combination of an armature-lever, an independent circuit-controlling plate, another pivoted lever having attached thereto two springs, one of which bears against the armature-lever and the other against the circuit-controlling plate and an adjusting-screw bearing against said spring-carrying lever. 70

In witness whereof I subscribe my signature in presence of two witnesses. 75

RICHARD VARLEY.

Witnesses:

M. M. CROSWELL,
WILLET CHADWICK.