

R. VARLEY.
INDUCTION COIL.

APPLICATION FILED DEC. 30, 1903.

NO MODEL.

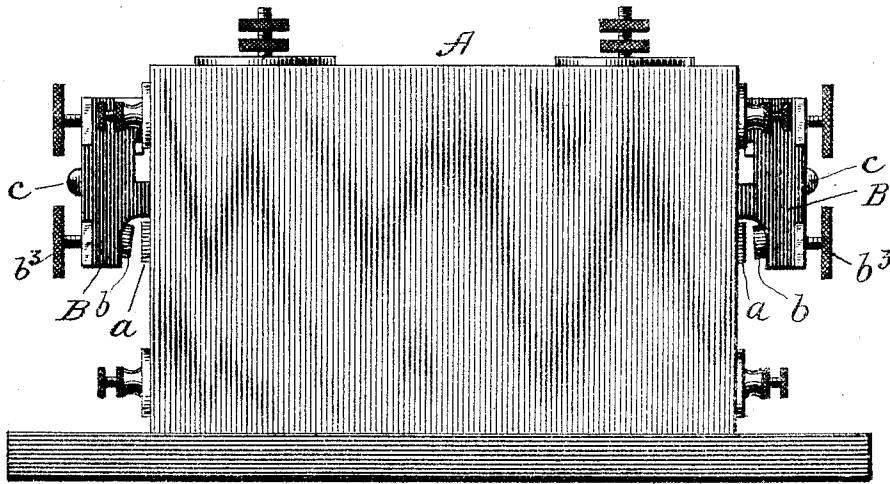


Fig. 1.

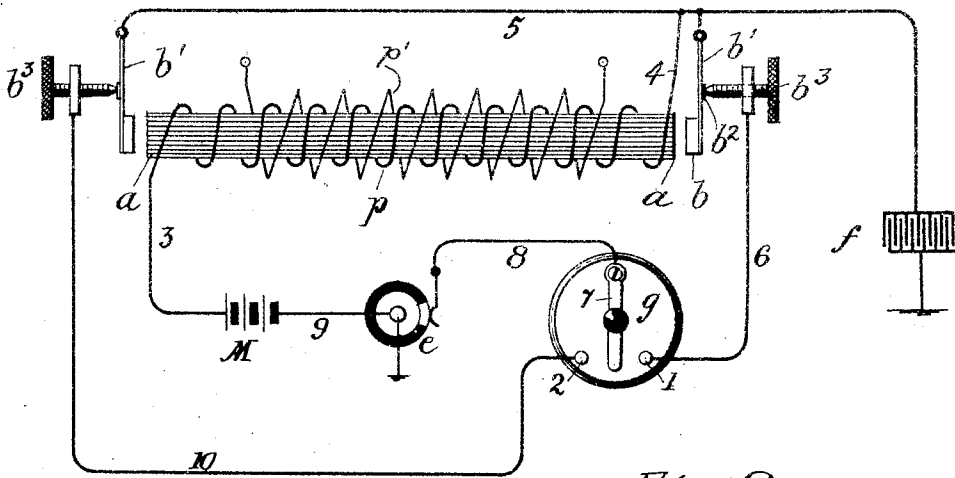


Fig. 2.

Witnesses
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 By his Attorney *M. M. Robinson*

UNITED STATES PATENT OFFICE.

RICHARD VARLEY, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO
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INDUCTION-COIL.

SPECIFICATION forming part of Letters Patent No. 776,705, dated December 6, 1904.

Application filed December 30, 1903. Serial No. 187,199. (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 Induction-Coils, of which the following is a full, clear, and exact description.

This invention relates to induction-coils, and has special reference to spark-coils used for igniting the charge in explosive-engines, and is especially adapted for use upon automobiles.

The primary object of the invention is to provide a coil which need not ever be put out of use, even for an instant, by reason of a failure of the vibrator.

To this end the invention consists of an induction-coil having two vibrators both of which are in motion during the operation of the coil, but only one of which is at the same time interrupting the primary circuit, the other being vibrated idly, its motion, however, being utilized to clean or brighten its contacts. Thus when the active circuit-controlling vibrator becomes defective by reason of the corrosion of its contacts due to the spark it may be cut out of the circuit and the second vibrator thrown into circuit by a suitable switch, the defective vibrator then continuing its mechanical vibration to polish its corroded contacts. Furthermore, in case either of the vibrators becomes deranged or incapacitated from any other cause it may be bodily removed from the coil for repairs and the other vibrator substituted for it in the circuit.

The invention will be described with more particularity in connection with the accompanying drawings, in which—

Figure 1 is a side elevation of a casing supposed to contain an induction-coil and fitted with two vibrators, and Fig. 2 is a diagram of the circuits used in carrying out my invention.

The induction-coil may be of any approved construction and, as usual, will be placed in

a suitable casing consisting of a box A and a base A'. On each end of the casing is affixed a frame B, in which is mounted any suitable type of vibrator, the armature of which is indicated at *b*, standing in front of the projecting core *a* of the induction-coil. This frame is attached to the head or end of the casing by means of screws *c* or in any other manner, so that it may be removed bodily from the casing without difficulty. Each vibrator consists, essentially, of the armature *b*, which is attached to a spring-plate *b'*, fixed at one end so that it will vibrate freely under the intermittent attraction of the magnetic core of the induction-coil. On the back of the spring-lever is a platinum contact *b²*, which is adapted to make and break connection with the end of a screw *b³*, to which another platinum contact is fixed. These contacts, through which the primary current flows, are made of platinum, because that metal resists corrosion better than any other. In time, however, the arc which forms at each opening of the circuit will roughen, pit, or corrode the surfaces so much as to make a high-resistance joint when the two contacts come together, and it then becomes necessary to clean, polish, or renew the platinum surfaces. During this operation the ordinary induction-coil is thrown out of use, and if such a coil is used to ignite the charge in a gas-engine the engine must stop until the repairs are made. I will now describe the operation of my invention, whereby this difficulty is avoided, and at the same time will describe the electric circuits and other apparatus used in connection with spark-coils.

The battery is indicated at M, the primary winding of the induction-coil at *p*, the secondary winding at *p'*, the external or mechanical circuit-controller at *e*, a condenser at *f*, and a two-point switch at *g*. Only one of the vibrators can be in circuit at the same time, the particular one being determined by the position of the switch *g*. Let it be assumed that the switch is on contact 1. We then have a

circuit from battery M by wire 3, through the primary p , wire 4, wire 5, vibrator b' , back contact-screw b^3 , wire 6, switch-lever 7, wire 8, circuit-controller e , and wire 9 to battery.

5 The circuit-controller e is a ring or disk rotated by the engine and having an insulating-rim containing a conducting-segment which is brought into contact with a brush for an instant during each rotation to thus complete
10 the circuit from wire 8 to wire 9. The tendency of vibrator b' is to rest against the screw b^3 . Hence at the moment the circuit is closed by the circuit-controller e the current flowing through the primary winding energizes the core and the vibrator is given a number
15 of movements due to its own automatic control of the circuit in the usual and well understood manner until the circuit is again opened by the circuit-controller e . Each series of vibrations produces sparks or flame
20 between the terminals of the secondary winding in the cylinder of the engine and ignites the charge. At each opening of the circuit by the vibrator between the platinum contacts a small arc is formed which eventually
25 corrodes or oxidizes the surfaces and prevents a good closure of the circuit on the backward movement of the vibrator and so lessens the spark between the terminals of the secondary
30 winding. When this occurs or before it occurs, the switch-lever 7 should be thrown to the point 2. This establishes a new circuit, which omits the vibrator at the right-hand end of the coil, but includes the vibrator at
35 the left-hand end, the circuit being as follows: from battery by wire 3, the primary coil, wire 4, wire 5, the vibrator b' at the left-hand end of the coil, the corresponding contact-screw b^3 , wire 10, switch-lever 7, wire 8,
40 circuit-controller e , and wire 9 to the battery. The circuit through the vibrator at the right-hand end of the coil, it will be observed, is open at the switch g . The new vibrator will now act in the same manner as described in
45 connection with the first-mentioned vibrator and the coil will continue its work without interruption. It will now be seen, however, that while the left-hand vibrator is controlling the circuit the right-hand vibrator continues
50 to vibrate under the intermittent magnetic attraction of the core of the coil. Consequently the idle vibrator hammers or chatters its platinum contacts, which gradually knocks off the scale and polishes the platinum surfaces. Thus
55 by the time the contacts of the second vibrator become corroded those of the first vibrator are again in good condition and the switch can be again thrown to the right, whereupon the contacts of the left-hand vibrator will be cleaned
60 and polished. If either vibrator becomes incapacitated from any other cause, such as breakage of the parts, it can be bodily re-

moved for repairs by removing the frame B, the other vibrator remaining in service and thus avoiding the necessity of a stop of the engine. 65

Many of the difficulties experienced in running automobiles can be traced to imperfect contacts at the vibrator of the induction-coil, and much time is spent on the road, when a
70 stoppage occurs, in examining and cleaning the contacts. With my improvement the time required to examine the contacts is not necessary, since by throwing the switch it can be ascertained at once whether the trouble is
75 with the vibrator or in some other part of the machinery. If the trouble is with the vibrator, it is cured by the substitution of the second vibrator. If the trouble is not with the vibrator, the operator knows it at once and does not
80 spend time examining the vibrator, but looks for the trouble at other points.

The circuit-controller e is on a shaft in electrical connection with the frame, its metal parts being therefore grounded, as shown. 85 The single condenser f serves for both vibrators by connecting one of its poles with the wire 5, as shown, and grounding the other. This shunts the condenser around either pair of contacts that happens to be in service. 90

It is obvious that my invention includes the use of two or more vibrators on a single coil and the location of them either at both ends or at one end of the coil. Two or more vibrators can readily be actuated by one end of
95 the magnetic core.

Having described my invention, I claim—

1. The combination with an induction-coil, of a plurality of vibrators therefor and a switch for throwing any one of them into circuit at
100 will.

2. The combination with an induction-coil, of two vibrators constantly subject to the magnetic attraction of the coil and a switch for determining which of the vibrators shall control
105 the circuit of the coil.

3. The combination with an induction-coil, of two vibrators both of which vibrate during the operation of the coil, while only one of which interrupts the primary circuit. 110

4. The combination with an induction-coil, of two vibrators both actuated thereby, one of which interrupts the primary circuit while the other cleans its contacts.

5. The combination with an induction-coil, 115 of two frames removably attached thereto and each carrying a vibrator, and a switch adapted to direct the primary current through either vibrator at will.

6. The combination with an induction-coil, 120 of two vibrating circuit-controllers therefor, a mechanical circuit-controller, a source of current and a switch, the switch being constructed to connect the primary winding of the

induction-coil, the source of current and the mechanical circuit-controller in series with either of the vibrating circuit-controllers, at will.

5 7. The combination of an induction-coil, two vibrators actuated thereby and each controlling a pair of contacts, a switch for directing current through the contacts of either vi-

brator at will and a condenser in shunt to the contacts of each vibrator. 10

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

RICHARD VARLEY.

Witnesses:

M. M. CROSWELL,
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