No. 757,524. PATENTED APR. 19, 1904.

R. VARLEY.

INDUCTION COIL.

APPLICATION FILED DEC. 30, 1903.

NO MODEL.

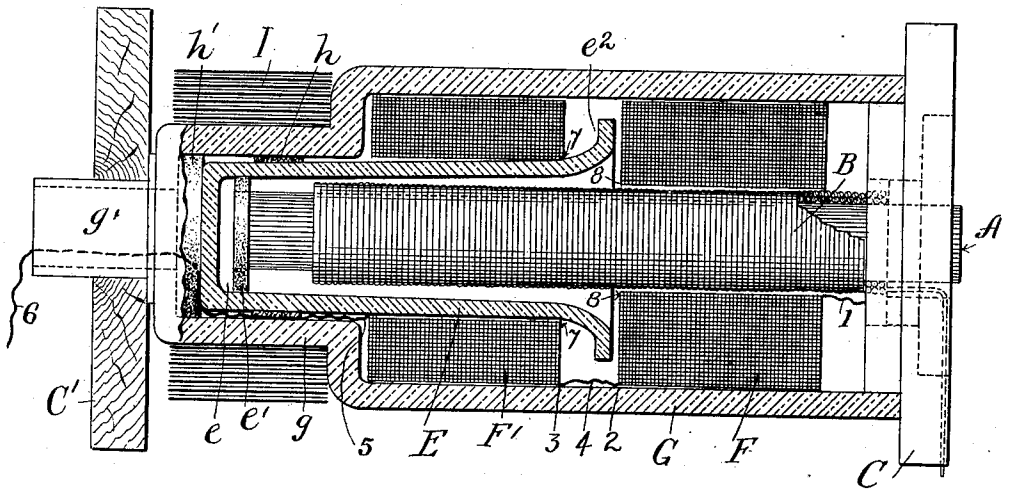

Fig. 1.

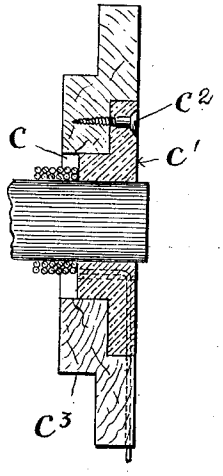

Fig. 3.

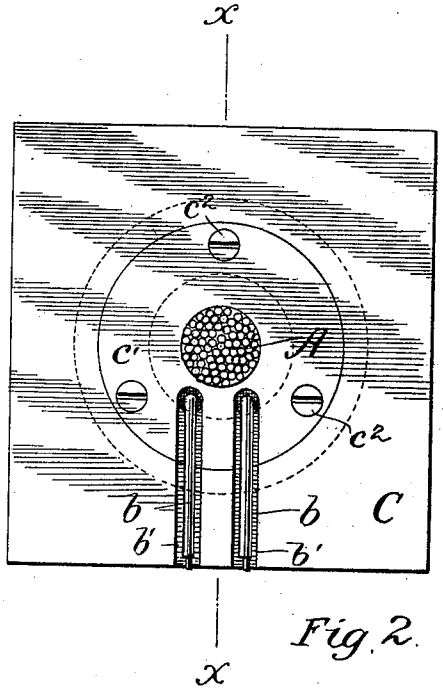

Fig. 2.

Witnesses
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No. 757,524. Patented April 19, 1904.

UNITED STATES PATENT OFFICE.

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

INDUCTION-COIL.

SPECIFICATION forming part of Letters Patent No. 757,524, dated April 19, 1904.

Application filed December 30, 1903. Serial No. 187,200. (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 the construction of spark-coils wherein high differences of potential are induced between the different portions of the secondary winding.

The principal object of the present invention is to provide a construction wherein the sectional winding of the secondary coil is effectively insulated to the end that discharging between portions of the winding having the greater differences of potential is prevented. The most approved method of winding secondary coils wherein high potentials are produced is to divide said coils into sections, each insulated or separated from the other, to thereby divide up the total difference of potential between the terminals into corresponding fractional parts thereof. These sections are commonly connected together in series, and in some coils the inner end of one section is connected to the inner end of the next, while in other constructions of coil the sections are connected in series, but with the outer end of one section connected with the outer end of the adjoining section. The difference of potential between the connected points of the sections is very small or practically nothing, while between the unconnected parts the greater differences of potential exist. In the construction of these coils it is always the object to introduce insulating or isolating means which will separate the unconnected parts of the sections from each other sufficiently to prevent the discharge between such portions of the sections.

In another application for patent filed by me, Serial No. 185,027, I have described a construction wherein the sections of the secondary winding are connected together at their inner ends, thus making the greatest difference of potential between the outer ends or diameters of the sections, and to insulate the sections in the above-mentioned case a porcelain cylinder having an inwardly-directed integral partition is used, this cylinder surrounding the winding and the partition projecting into the space between the sections of the secondary winding. Thus the distance between two points of high difference of potential from one high-potential point to another is increased by leading around the edge of the partition instead of straight across, and this distance is greater than the striking distance between the points. In the present application I describe a construction for similarly separating the points of high-potential difference in a winding where the outer ends of adjoining sections are connected together. In such a winding the greatest difference of potential exists between the adjoining inner ends at points immediately adjacent to the primary winding. These points cannot be properly isolated by simple disks or rings placed around the primary and mechanically separating the sections of the secondary, because such disks cannot make a sufficiently close fit with the outside of the primary to prevent an arc from jumping through the joint.

The primary object of this invention, therefore, is to introduce a partition between the sections of such a winding which will afford perfect insulation and isolation between sections which are directly connected at their outer ends or in which the greatest potential difference exists between their inner ends.

A secondary object of the invention is to provide a compact and solid construction of spark-coil which will withstand jarring to which it may be subjected in use, which will permit of the ready removal of the core and primary without disturbing the remaining parts, and with which a condenser may be mechanically combined without occupying extra space.

The details of the invention will be described with reference to the accompanying drawings, in which—

Figure 1 is a longitudinal section, partially

in elevation and partially broken away, of a complete induction-coil except the casing of the vibrator. Fig. 2 is a front elevation of the head of the coil, and Fig. 3 is a section on line x x of Fig. 2.

Referring to the drawings by characters, A is the core of the coil, consisting of the usual cylindrical bunch of iron wire. Upon this core is wound the primary coil B, the heads of the core projecting some distance beyond the terminals of the coil.

C is a wooden head of the box or casing which usually incloses the induction-coil. This head has an opening c of larger diameter than the core and countersunk in front. To the end of the core I permanently fix a porcelain disk c', having two external diameters adapted to fit neatly into the opening c and the countersink thereof. To securely fasten this disk upon the core and make it substantially integral with the latter, I introduce a vitrifying cement and burn or bake the end of the core into the disk. The disk is provided with three holes for screws c^2, by which the head of the core is fastened and located properly in the head of the casing. The opposite end of the core passes into a cup of glass or porcelain E, in the bottom of which cup is a felt disk e or other cushion, against which the end of the core abuts, and a hard-rubber ring e', forming a socket in which the end of the core fits and by which the core is held in a central position with respect to the walls of the cup. The cup is of such diameter as to readily receive the primary coil, over about one-half of which it extends. The edge of the cup is flared or provided with a flange e^2, extending radially outward. The secondary winding is divided into two sections, (indicated by F and F'.) One section is placed over that portion of the primary winding which is not covered by the cup E, while the other section is placed over the cup, thus bringing the flange e^2 of the cup between the two sections of winding. Surrounding the secondary winding is another cup-shaped body of glass or other suitable insulating material G. This fits closely over the secondary sections, and the edge at one end fits over a circular shoulder c^3 on the head C to center it. The opposite end of this cup is reduced in diameter, as indicated by the part g, this portion embracing the bottom or closed end of the inner cup E, fitting closely around it, but being held out of actual contact by a ring of felt h to prevent injury from shocks. The bottom of the cup G is extended in the form of a tube g', which enters an opening in the other head, C', of the casing, and, together with the flange c^3, furnishes the support for the entire structure of the coil. Between the bottom of the cup E and the bottom of the contracted portion of the cup G a disk of felt h' is interposed to hold the cup E in proper position and prevent contact between the two glass bodies.

It will be seen that with the construction described the core A, together with the primary B, can be bodily removed without interfering with the secondaries or the cups, this being done by simply removing the screws c^2 and sliding the core outward axially. To perfect this arrangement, the terminals of the primary winding (indicated by b b) pass through two perforations in the porcelain disk c' and thence lead through grooves b' in the disk and face of the head to the binding-posts of the coil, the latter not being shown. When the primary is to be removed, these wires are first detached from the binding-post. The outer cup G supports the secondary winding and cup E when the core and primary are removed, besides protecting all parts from mechanical injury and moisture at all times.

The winding of the section F begins at the inner layer, the end of the wire being indicated at 1. This winding terminates at the outer layer at the point 2 and connects with the outer layer of the section F' at the point 3 by means of the connecting-wire 4. The inner end of section F' is indicated at 5 and leads thence between the two cups and out through the tube g', as shown at 6. Thus the two ends of the secondary winding, between which the total difference of potential exists, come out at the extremes of the structure. Between the two sections F and F' the greatest difference of potential exists across the points 7 and 8, and these two points, it will be seen, are separated by the flange e^2 of the cup E, said flange projecting radially outward sufficiently far to make the distance through the air from 7 to 8 greater than can be spanned by any difference of potential existing between the two points named. Neither is there any open joint through which an arc between the said points 7 and 8 could find a shorter path, for the cup E is closed at the bottom, and even if it were open and a cylinder used instead of a cup, as I may do, the distance through the air between points 7 and 8 would be sufficiently great to prevent arcing, either around the flange or around the opposite end of such a cylinder. It will thus be seen that I have provided a construction for effectually isolating the sections of a secondary winding which are electrically connected together in series at their outer ends.

Another feature of my invention is the utilization of the annular space around the contracted part g of the outer cup for the condenser commonly used with spark-coils. The leaves of the condenser are indicated by I, and they are wound around the part g and fill out said space. I am aware that the leaves of a condenser have been wound bodily around the external diameter of an induction-coil; but in such a position the condenser adds to the diameter of the structure, whereas with my arrangement the diameter is not increased.

Having described my invention, I claim—

1. In an induction-coil, the combination with a casing-head provided with an opening, of a core and primary coil wound thereon, said core and coil being removable through the opening in the casing-head.

2. In an induction-coil, the combination with two casing-heads, of a core and primary and secondary windings, said core and windings being supported by and between said heads, one of the heads provided with an opening through which the core and primary winding can be removed without disturbing the secondary winding.

3. In an induction-coil, a core having permanently fixed to one end thereof an insulating-disk, in combination with a supporting-frame to which said disk is attached.

4. In an induction-coil, the combination of a core provided with a porcelain disk-like head, said core and head being connected by a vitreous cement.

5. In an induction-coil, the combination of a core having an insulating-disk attached to one end and a frame provided with an opening and means for securing said disk in the opening.

6. In an induction-coil, the combination of a core, a primary coil wound thereon, a cup of insulating material into which one end of the core and primary coil projects and a secondary coil divided into a plurality of sections, a portion of which surrounds the cup, while the remainder surrounds that portion of the core and primary coil not covered by the cup.

7. In an induction-coil, the combination of a core, a primary coil wound thereon, a cup of insulating material into which one end of the core and primary coil projects and a secondary coil divided into a plurality of sections, a portion of which surrounds the cup, while the remainder surrounds that portion of the core and primary coil not covered by the cup, said cup having a flange extending into a space between the two portions of the secondary winding.

8. In an induction-coil, the combination of a core and primary coil wound thereon, a secondary winding surrounding the core and primary coil and divided into two sections, said sections being electrically connected together at their outer ends, and an insulating-shield interposed between one of the sections and the primary coil and core, said shield having a flange extending radially outward between the two sections of the secondary winding.

9. In an induction-coil, the combination of a core and a primary coil wound thereon, a cup of insulating material into which one end of the core and the primary coil project, a secondary winding divided into two sections, one of which directly surrounds the covered end of the core and primary coil, while the other surrounds the cup, said cup provided with a flange extending into a space between the two sections of the secondary winding, means for supporting said cup and means for supporting the said core and primary coil in a central position within the cup.

10. In an induction-coil, the combination of two heads, a cylindrical insulating-body supported by and between said heads, a secondary winding axially arranged in and supported by said body, a cup of insulating material also supported by and centered within said body, said cup extending through a portion of said secondary winding, a core and primary coil wound thereon, one end of the core being supported in one of said heads while the other end enters a socket in said cup, substantially as described.

11. In an induction-coil, two cup-shaped bodies of insulating material, one contained within the other, one of said cups being of considerably less diameter than the other and the other having a portion of reduced diameter into which the first fits, a core and primary coil inclosed by the inner cup, a secondary coil inclosed by the outer cup and surrounding the inner cup and a condenser occupying the annular space formed by the reduced portion of the outer cup.

12. In an induction-coil, the combination of two glass cups, one of which is concentrically located within the other, cushioning material interposed between the opposing surfaces of the cups, a primary coil inclosed by the inner cup and a secondary coil occupying a space between the two cups.

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

RICHARD VARLEY.

Witnesses:

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