E. B. JACOBSON.

INDUCTION COIL.

APPLICATION FILED DEC. 17, 1918.

1,335,837. **Patented Apr. 6, 1920.**

FIG. 1

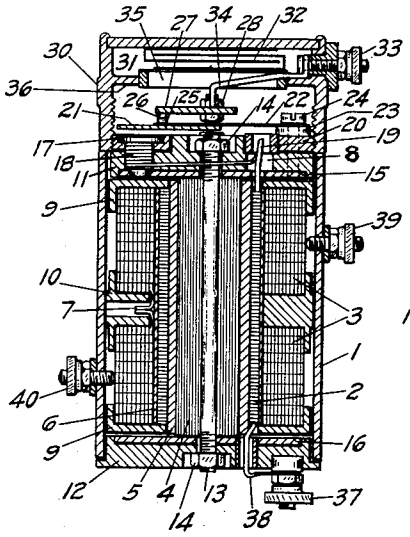


FIG. 2

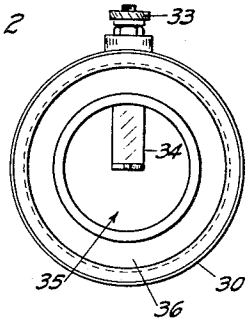


FIG. 3

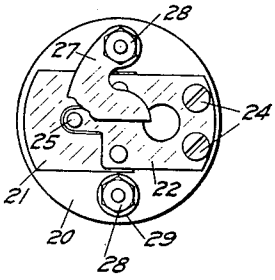


FIG. 4

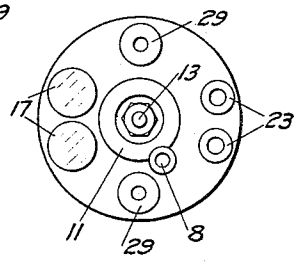


FIG. 5

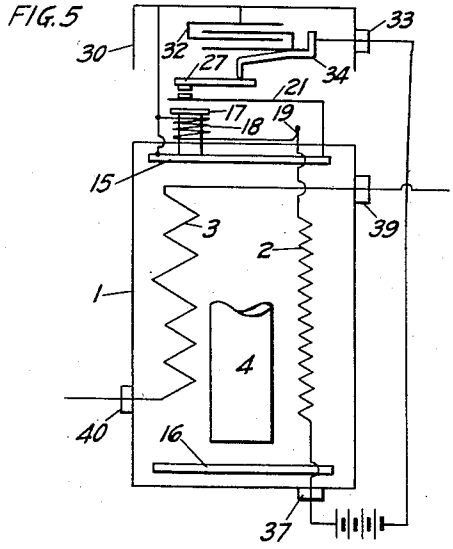
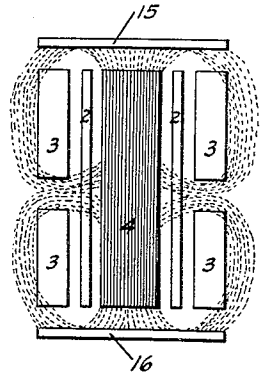


FIG. 6



WITNESSES:

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INDUCTION-COIL.

1,335,837. Specification of Letters Patent. Patented Apr. 6, 1920.

Application filed December 17, 1918. Serial No. 267,099.

To all whom it may concern:

Be it known that I, EDWARD B. JACOBSON, a citizen of the United States, residing at Pittsfield, in the county of Berkshire and State of Massachusetts, have invented certain new and useful Improvements in Induction-Coils, of which the following is a specification.

The present invention relates to induction coils of the type known as spark-coils, employing a vibratile element for interrupting the primary circuit, and is adapted to all the usual purposes of a device of this class, and especially for ozonating and ignition. Coils of this class commonly comprise primary and secondary windings arranged with reference to a magnetic induction core, a vibrator mechanism, including an armature, arranged in the field of the magnetic flux produced by the induction core, and a condenser included in the primary circuit. A considerable portion of the lines of magnetic force in the common type of coil construction is employed to operate the armature and hence is lost to the maximum flux available for building up the secondary current. One of the chief features of my invention resides in the provision of auxiliary or independent magnets for separately exciting the armature, thus releasing that portion of the magnetic flux of the main core ordinarily employed for operating the vibrator mechanism.

A further feature of my invention is the provision of flux shields in conjunction with the foregoing arrangement, whose function is to collect and guide the lines of magnetic force in effective courses.

A still further feature of the invention is the novel construction, arrangement and combination of the parts of the condenser. Novel features of structure and adaptation to coil construction of the primary or low tension winding illustrated herein, are reserved as the subject of a separate application. The remaining features of novelty above referred to are effective in producing new and beneficial results of great value in the art, including greater economy of space, increased current value and operative efficiency.

Referring to the accompanying drawings, Figure 1 is a vertical longitudinal section of an induction coil constructed in accordance with my invention; Fig. 2, a bottom view of the casing cap or removable condenser portion; Fig. 3, a top view of the device with the casing cap removed, showing the vibrator mechanism, a part of the bridge element being cut away to disclose the construction of the vibratile element; Fig. 4, a similar view, with the vibratile mechanism entirely removed and showing the auxiliary magnets for exciting the armature; Fig. 5, a diagrammatic plan view showing the circuit connections of a coil constructed in accordance with my invention, and Fig. 6, a similar view illustrating the effect of the magnetic shields in collecting and directing the distribution of the magnetic lines of force, thereby increasing the strength of the magnetic field and the resulting electromotive force produced in the secondary winding.

The principal object of the invention is the provision of means, exclusive and independent of the main winding core, for exciting the armature or vibrator. The main core is thus relieved of performing the usual functions of a magnet, in addition to those of an inductor, thereby largely augmenting the magnetic flux available for generating current in the secondary or high-tension winding.

To these ends I provide a casing 1, preferably cylindrical in formation and constructed of fiber or other non-conductive substance, in which are mounted primary and secondary windings, 2, 3, concentrically arranged about an iron core 4. As shown, the core 4 is inclosed in an insulation tube 5 upon which the primary winding 2 is wound, while the secondary winding 3 is separated from the primary winding by a layer of separate insulation 6, upon which the secondary winding is wound, preferably in separate removable sections arranged in series and suitably connected by opposing leads 7 uniting their inner ends. A sectional inner casing comprising end-caps 9, 9, and an intermediate portion 10, adapted to seat the separate sections of the secondary windings, is employed to provide additional support and insulation for the windings.

The outer casing 1 is closed at both ends by removable insulation plates 11, 12, sealing the interior of the casing and are held together by a non-conductive rod 13 extending centrally through the core 4 and plates 11, 12, the ends of the rod being threaded to carry nuts 14, 14, seated in suitable recesses

provided in the outer faces of the plates. The contents of the casing 1, including the end plates 11, 12, form a unitary structure which may be removed in a body from the casing for inspection or repairs.

Seated in suitable recesses provided centrally on the inner faces of the end plates 11, 12, I provide separate field plates 15, 16, of soft iron or other magnetic metal, arranged adjacent opposite ends of the core 4 and extending over the secondary windings, said plates being adapted to operate as baffle-plates or keepers of opposite polarity to concentrate and direct the magnetic lines of force upon the secondary windings. That portion of the flux which is usually lost or utilized in exciting the armature or vibrator is thus collected and added to the general magnetic field employed for creating voltaic current in the secondary winding.

Mounted in parallel on the upper field plate 15 are a pair of small spool magnets 17, 17, each magnet being separately provided with a winding 18 included in the primary circuit and connected at one end to a lead 19 from the main primary winding 2 and grounded at the opposite end on the field plate 15 which forms a path for the current, said lead from the primary winding being extended upward for the purpose through a suitable opening in the field plate 15 in alinement with a well 8 provided in the end plate 11 for the reception thereof and left open for inspection. Mounted on the end plate 11 is a metallic vibrator base plate 20 provided with suitable transverse openings for the reception of the magnets 17, 17, which are arranged directly under the armature 21 and exposed at their upper surface, said armature being carried at the outer end of a vibratile element 22 secured at its rear end to posts 23, 23, provided on the margin of the plate 20, the vibrator mechanism and mounting being secured and electrically connected to the field plate 15 by the screws 24, 24.

The armature 21 carries on its upper face a contact point 25 adapted normally to engage a separate contact point 26 carried centrally on the lower face of a transversely arranged bridge 27 straddling the vibrator and secured at opposite ends to the end plate 11 by inverted screws 28, 28, said screws being insulated from the base plate 20 by fiber collars 29, 29, seated in suitable openings provided in the base plate for the reception of the screws. The casing 1 is provided with a removable metallic cap 30 having an interior closed compartment 31 located in its upper portion over the vibrator and inclosing a condenser 32. Exteriorly provided on the cap 30 and suitably insulated therefrom is a primary terminal 33 which extends into the interior of the upper compartment of the cap and automatically establishes electrical connection with the bridge 27, thereby closing the primary circuit when the cap is secured in position on the casing, by means of a flexible metallic finger 34 secured at its upper end to the terminal and extending downward at an angle through a central opening 35 in the wall 36 separating the cap compartments, the lower end of said finger 34 being free to yieldingly engage the bridge 27 when the cap is secured in position on the casing, for which purpose the cap is provided interiorly on its lower rim with a screw-thread to engage a corresponding thread provided exteriorly on the vibrator base 20. Circuit connections with the condenser are established by the engagement of the contact finger 34 with the lower face of the condenser within the upper cap compartment, while the upper face of the condenser of opposite polarity is arranged to engage the underside of the top of the cap, the condenser circuit being completed through the vibrator base 20 and thereby exciting the magnets 17, 17, as illustrated in Fig. 5.

Suitable inlet and outlet terminals 39, 40, carried laterally on the casing 1 and extending into the interior are provided for adjustable contact connection with the secondary winding, while battery connection with the primary winding is established by a terminal 37 mounted on the bottom end-plate 12, a lead 38 thereto being drawn through suitable alined transverse openings in the end-plate and lower field plate 16.

The operation of the invention will be sufficiently understood from the foregoing description.

Attention is called to the novel structure and arrangement of the condenser by which the usual dangers of cross-induction and puncture of the windings resulting from high potential energy stored in the condenser, when arranged in proximate relation thereto within the coil housing, are avoided. Moreover by the present arrangement and construction the condenser and the windings may be separately removed and examined without disturbing one another.

I claim:

1. An induction-coil comprising a housing; a core within the housing; a low-tension winding arranged about the core within the housing; a separate high-tension winding inclosing the core and the low-tension winding and adapted to be removed without disturbing the position of the low-tension winding; and a stationary plate of magnetic metal arranged in the magnetic field at one end of the core within the housing and adjacent the high-tension winding.

2. An induction-coil comprising a housing; a core within the housing; separate high-tension and low-tension windings with-

in the housing, said high-tension winding comprising a plurality of separable sections removable from their normal position without disturbing the position of the low-tension winding; and a plate of magnetic metal arranged in the magnetic field at each end of the core within the housing and adjacent the high-tension winding.

3. An induction-coil comprising a housing, a core within the housing, primary and secondary windings grouped about the core within the housing, a vibratile element for interrupting the primary circuit mounted on the housing, a separate housing inclosing the vibratile element and detachably secured to the first-mentioned housing, and a condenser arranged in said separate housing over the vibratile element for connection with the primary circuit.

4. An induction-coil comprising a housing, a core within the housing, primary and secondary windings grouped about the core within the housing, a vibratile element for interrupting the primary circuit mounted on the housing over the windings, a separate housing detachably secured to the main housing and inclosing the vibratile element, a condenser arranged in said separate housing over the vibratile element for connection with the primary circuit and means carried by said separate housing for automatically closing the primary circuit when said housing is attached to the main housing and for breaking said circuit when detached from the main housing.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

EDWARD B. JACOBSON.

Witnesses:
JNO. J. WHITTLESEY,
MICHAEL S. EISNER.