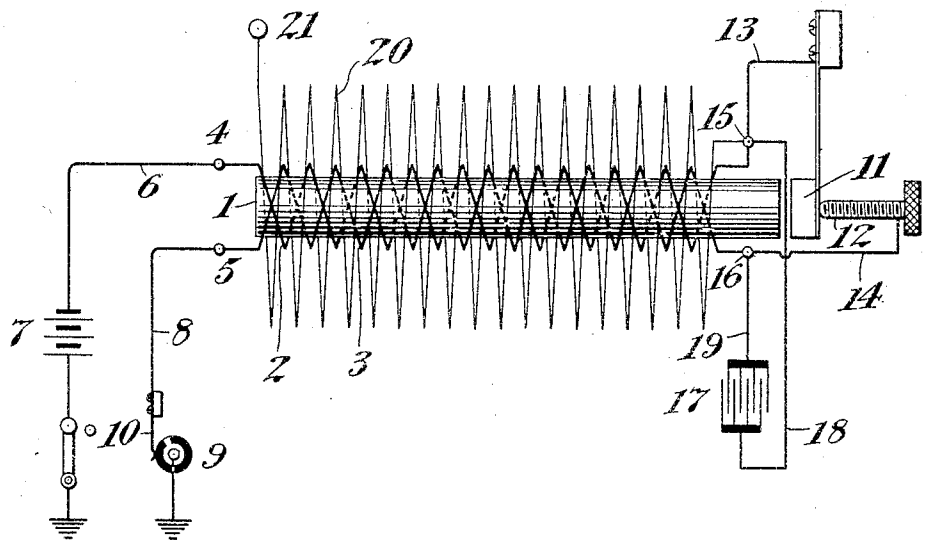
No. 779,231. PATENTED JAN. 3, 1905.

J. G. MEYERS.

INDUCTION COIL.

APPLICATION FILED AUG. 4, 1904.



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No. 779,231. Patented January 3, 1905.

UNITED STATES PATENT OFFICE.

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INDUCTION-COIL.

SPECIFICATION forming part of Letters Patent No. 779,231, dated January 3, 1905.

Application filed August 4, 1904. Serial No. 219,542.

To all whom it may concern:

Be it known that I, JOHN GEORGE MEYERS, a citizen of the United States, and a resident of East 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 specification.

This invention relates to improvements in induction-coils, and especially to induction-coils of the type ordinarily employed for igniting an explosive charge in an internal-combustion engine; and the principal object of the invention is to provide an induction-coil in which the primary is wound in sections in such a manner as to permit an electrical device, such as a vibrator, to be connected in the primary circuit between such sections and also to permit the main terminals of the primary to be brought out at the same end of the winding, but opposite the end of the coil at which such electrical device or vibrator is placed. In such an induction-coil various electrical controlling devices of different characters—such, for example, as a vibrator and a condenser—may be connected in the circuit of the primary between the sections of the primary winding.

A further object of the invention is to organize all of the parts of an induction-coil of this type in such a manner as to prevent electrical discharges and prolong the life of the coil by a more perfect protection of the terminal portions of the various conductors from cutting of the insulation and by a more perfect isolation of these terminal portions from the secondary winding of the coil, the organization of these parts also being such as to simplify the mechanical and electrical construction and connections.

Other features of the invention not hereinbefore referred to will be hereinafter described and are illustrated in the drawing, which represents diagrammatically an induction-coil embodying the present invention and the various devices which are included in circuit with the coil.

The core of the induction-coil consists, as is shown, of a bundle of soft-iron wires and is designated by 1. The primary winding is not in this case a continuous succession of uninterrupted coils, but is made up of a plurality of sections, in this case two in number and designated, respectively, 2 and 3, the coils of these two sections being so wound that the current therein will flow in the same direction. The main terminals of the primary winding are designated, respectively, 4 and 5, and it will be seen that these terminals emerge from the induction-coil in this construction at one end of the coil and constitute also the terminals of the two sections into which the primary winding is divided. One of these terminals is connected, by means of conductor 6, preferably to ground and contains a suitable source of energy, such as a battery 7, and also a hand-switch for making and breaking the circuit. The other terminal is connected to conductor 8 and to ground in a similar manner, but includes an automatic make-and-break device consisting of the usual rotary member 9 ordinarily carried by an engine-shaft and the complementary contact-maker 10, cooperative therewith. The point at which the primary winding of the coil is divided is not only remote from the main terminals of the primary, but is also preferably at the extreme opposite end of the induction-coil in order to facilitate connection in the primary circuit of one or more electrical devices for modifying or determining the flow of current through the primary coils. The principal electrical device which will be so connected is an automatic circuit-breaker, preferably of the usual vibrator type, the two principal elements of which—to wit, the armature or vibrator proper and the contact-screw—are designated, respectively, by 11 and 12. The vibratory armature 11 is attracted in the usual manner each time that the core 1 is magnetized by the flow of current in the primary winding of the induction-coil, and thus breaks the circuit at the contact 12 and is released on the consequent deënergization of the primary and the core and flies back to make the circuit again through the primary winding. One of these coacting

members of the vibrator is connected in circuit with one section of the primary winding at the point where such winding is divided, and the other of said members of the vibrator is connected with the other section of said primary winding at a corresponding point, conductors 13 and 14 being shown herein in electrical connection with the intermediate terminals 15 and 16 at the end of the induction-coil adjacent to the vibrator. It should be understood that the manner in which the two main elements of the vibrator are connected with sections of the primary winding at a point or points where such winding is divided may be any that is found desirable, the details of such connecting means being omitted from the diagram shown for simplicity and clearness. Another electrical device which forms an essential element of an induction-coil of this type is a condenser for taking care of the extra current resulting from the breaking of the primary circuit. Such a condenser is illustrated herein at 17 and is also connected in the primary winding, preferably between two sections thereof, this condenser being connected in the diagram in parallel with the vibrator by connections, such as 18 and 19, leading, respectively, to the intermediate terminals 15 and 16. As in the case of the main members of the vibrator the connecting means between said condenser and these intermediate terminals may also be any that may be found desirable. In the construction shown it will be seen, however, that the intermediate terminals 15 and 16, which may be binding-posts, constitute terminals for five connections, one section of the primary, one terminal of the secondary, and one terminal of the condenser, as well as one member of the vibrator, being connected to the intermediate terminal 15, and the other section of the primary and the other side of the condenser, as well as the other member of the vibrator, being connected to the other intermediate terminal, 16. Thus most of the connections of the various elements of the induction-coil are or may be made at a point between the induction-coil proper and the vibrator thereof substantially in a common plane. When the primary winding of the induction-coil is divided into sections in this manner, not only is it possible to connect the vibrator and the condenser readily to the adjacent short ends of sections of the primary winding, but it also renders it unnecessary to extend the main terminals of the primary winding and lead them back over the ends and sides of the secondary winding or through the tube containing the primary winding to points adjacent to the vibrator. Instead the primary terminals are led out at the end of the induction-coil most remote from the vibrator and may be immediately connected to terminals adjacent to such end of the coil. Although the secondary wires are heavily insulated, this insulation deteriorates, and it has been found in practice that when the return-wires of the primary are led over the ends and sides of a secondary winding the insulation of which has been impaired the high tension of the secondary is short-circuited to ground. It has also been found that when the extended ends of the primary winding are led back in the ordinary manner through the tube containing the primary winding the insulation of the turns of the primary winding in contact with such return-wires is liable to become chafed and cut after being used for some time, thereby cutting out more or less turns of the primary winding and correspondingly weakening the inductive effect of the coil.

It will be seen that the diameter of the induction-coil is considerably reduced as compared with the old types of induction-coils in which it is necessary to make the coil, as a whole of greater diameter in order to accommodate the two ends of the primary winding led back to the vibrator end of the coil either between the primary and the secondary or otherwise. The present mode of constructing and organizing the various elements also reduces to a minimum the number of terminals required for the different main and branch circuits, one of the terminals of the secondary coil 20 being grounded, as shown at 15, and the other terminal, 21, being electrically isolated from the primary terminals.

What I claim is—

1. An induction-coil embodying a primary winding divided into sections connected in series, and an electrical controlling device connected in the primary circuit between said sections.

2. An induction-coil embodying a primary winding divided into sections, and a plurality of electrical controlling devices of different characters connected in the primary circuit between said sections.

3. An induction-coil embodying a primary winding divided into sections, and a plurality of electrical controlling devices of different characters connected in parallel in the primary circuit between said sections.

4. An induction-coil embodying a primary winding divided into sections connected in series, and a vibrator connected in the primary circuit between said sections.

5. An induction-coil embodying a primary winding divided into sections connected in series, an electrical controlling device connected in the primary circuit between said sections, and a condenser in said primary circuit.

6. An induction-coil embodying a primary winding divided into sections, an electrical controlling device connected in the primary circuit between said sections, and a condenser also connected in the primary circuit between said sections and in parallel with said first electrical device.

7. An induction-coil embodying a primary

winding divided into sections, and a vibrator and a condenser connected in parallel in the primary circuit between said sections.

8. An induction-coil embodying a primary winding divided at one end of the coil into sections, and an electrical controlling device connected at said end of the coil in the primary circuit between said sections.

9. An induction-coil embodying a primary winding divided into sections and having its main terminals at one end of the coil, and an electrical controlling device connected at the other end of said coil in the primary circuit between said sections.

10. An induction-coil embodying a primary winding divided into sections and having its main terminals at one end of the coil, and a vibrator connected at the other end of said coil in the primary circuit between said coils.

11. An induction-coil embodying a primary winding divided into sections and having its main terminals at one end of the coil, and a vibrator and a condenser connected at the other end of said coil in the primary circuit between said sections.

Signed at New York, in the county of New York and State of New York, this 2d day of August, A. D. 1904.

JOHN GEORGE MEYERS.

Witnesses:

C. S. CHAMPION,

R. CHAMPION.