Mar. 27, 1923.

1,449,666.

C. F. GILCHRIST ET AL.

IGNITION COIL.

FILED AUG. 4, 1919.

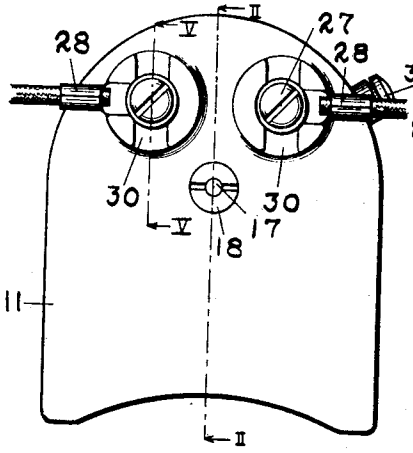


Fig. I.

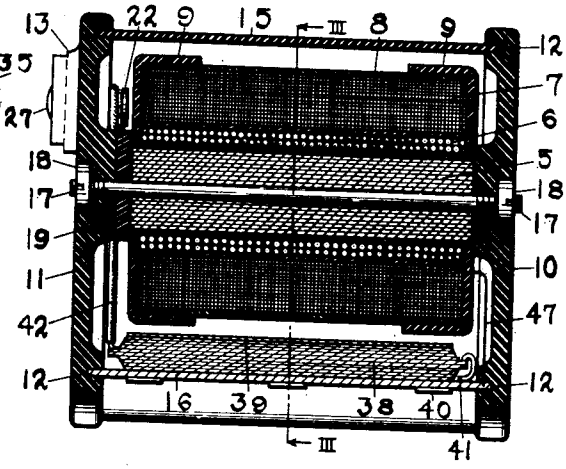


Fig. II.

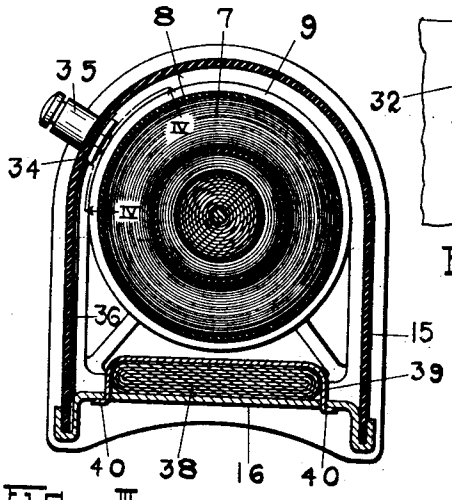


Fig. III.

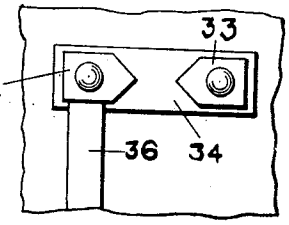


Fig. IV.

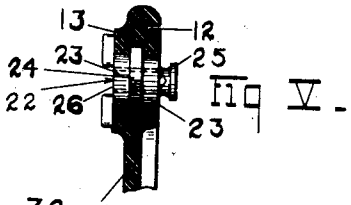


Fig. V.

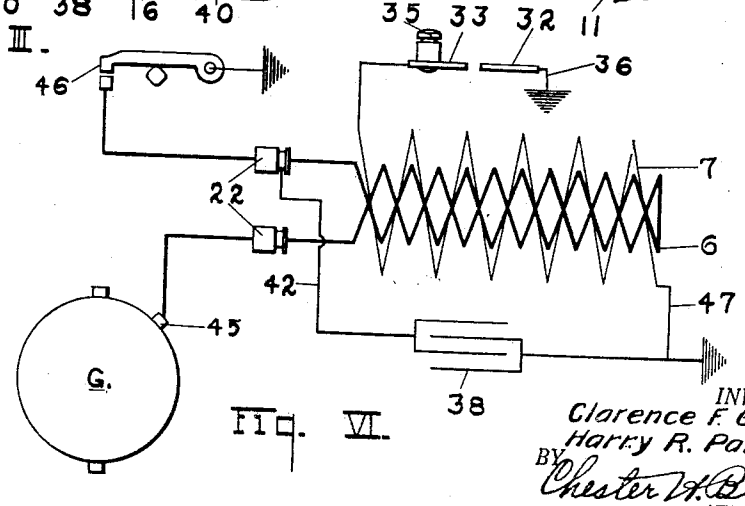


Fig. VI.

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UNITED STATES PATENT OFFICE.

CLARENCE F. GILCHRIST AND HARRY R. PATTERSON, OF TOLEDO, OHIO, ASSIGNORS TO ELECTRIC-AUTO-LITE CORPORATION, OF TOLEDO, OHIO, A CORPORATION OF DELAWARE.

IGNITION COIL.

Application filed August 4, 1919. Serial No. 315,074.

To all whom it may concern:

Be it known that we, CLARENCE F. GILCHRIST and HARRY R. PATTERSON, citizens of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Ignition Coils, of which we declare the following to be a full, clear, and exact description.

This invention relates to induction coils and particularly to those coils used to furnish the ignition spark for internal combustion engines.

An object of this invention is to provide an induction coil for that purpose which shall be of rugged construction, thoroughly protected from dust, oil and water, efficient in operation, provided with means for readily securing connecting leads thereto and constructed of few parts which, where possible, are stamped or moulded thereby facilitating its manufacture in large quantities and economically.

Further objects of this invention relate to economies of manufacture and details of construction as will hereinafter appear from the detailed description to follow. We accomplish the objects of our invention in one instance by the devices and means described in the following specification, but it is evident that the same may be varied widely without departing from the scope of the invention as pointed out in the appended claims. A structure constituting one embodiment of our invention, which may be the preferred, is illustrated in the accompanying drawings forming a part hereof, in which:

Figure I is an end elevation of the complete induction coil.

Fig. II is a longitudinal, vertical, sectional view of the same, taken on the line II—II.

Fig. III is a transverse, vertical, sectional view of the same taken on a line III—III of Fig. II.

Fig. IV is a fragmentary detail of the safety spark gap.

Fig. V is a fragmentary, sectional view of an end head showing one of the connector bushings, and taken on the line V—V of Fig. I.

Fig. VI is a circuit diagram.

In the drawings, similar reference numerals refer to similar parts throughout the several views, and the sectional views are taken looking in the direction of the arrows at the ends of the section lines.

A core 5 shown as constructed by rolling up a sheet of soft iron in the manner disclosed in the co-pending application of Harry R. Patterson, #176,795, filed June 25, 1917, is surrounded by a primary winding 6 and a secondary winding 7, suitable insulating material being interposed between these three members as is usual in the construction of such coils. The secondary winding is surrounded by a layer of suitable insulating material 8 and a cap 9 of insulating material, for instance fibre, covers each end of the coil and fits over the insulation surrounding the core member.

At the ends of the core there are provided end heads 10 and 11 of insulating material, preferable "bakelite," or a similar phenol condensation product. These end heads are moulded with grooves 12 and bosses on their inner faces, and the head 11 has two bosses 13 on its outer face. Between these end heads there is a U-shaped cover strip 15 of insulating material such as fibre or fibre impregnated with bakelite, whose side edges engage in the grooves 12 and whose ends are firmly gripped by the bent up sides of a metallic plate 16. This plate 16 forms the bottom of the enclosing casing and has its end portions extending into the grooves 12 in the end heads. A bolt 17 extends through the core 5 and through the end heads 10 and 11 and by means of a nut 18 threaded on each end of the bolt the end heads may be clamped firmly to the core and at the same time the strip 15 and the plate 16 secured in proper position. A cushioning member 19, for example of cork, is shown between the core 5 and the head 11. The end head 11 and the bosses 13 have embedded in them metallic terminal inserts 22 shown in Fig. V, each of which comprises a circular body portion 23, a square portion 24 and a wire attaching extension 25. Each of these inserts are bored and tapped at 26 to receive a screw 27 by means of which a suitable terminal 28 may be attached to the insert, while the extension 25 has wrapped about it a lead from the primary or primary and condenser. The bosses 13 are provided with three radially extending channels 30 of a sufficient width and depth to receive the terminal connector 28. By

this construction there is prevented any possible rotative movement of the terminal and consequent loosening of the screw.

The U-shaped strip 15 has riveted to it two small metallic plates 32 and 33, but separated from it by an additional insulating strip 34 such as a piece of mica. The rivet securing the plate 33 is a part of a high tension secondary terminal 35. The plate 32, which it will be noted is spaced from the plate 33 a suitable distance to provide a safety spark gap, is connected by means of a strap 36 with the metallic plate 16, this plate 16 being in effect a ground connection. A condenser 38 is supported on the plate 16 and is firmly secured thereto by a second plate 39, which fits over the condenser and has tongues 40 which extend down through suitable openings formed in plate 16 and are bent over on the opposite side of this plate. One terminal of the condenser 38 is shown grounded on the plate 16 by a wire 41, while the opposite terminal is connected by a wire 42 with one of the terminal inserts 22.

As the circuit arrangement of this coil is substantially like that in common use on ignition coils, little if any explanation need be given thereto. In accordance with the circuit diagram illustrated by Fig. VI ignition current is taken from the third brush 45 of a third brush generator G and passes through the primary winding 6 and interrupter 46 to ground. The condenser 38 is shown as usual bridged across the interrupter contacts. The secondary 7 has one end grounded by wire 47 and has its opposite end connected with the plate 33 and high tension terminal 35, the other plate 32 being grounded by the strap 36, as already explained. It is of course to be understood that the primary may be excited equally well from any other source of energy, such as a storage battery, Fig. VI being intended to show only one adaptation of the coil.

While we have described our invention in more or less detail, and as being embodied in certain precise forms we do not desire or intend to be limited thereto, as on the contrary our invention contemplates broadly all proper changes, as well as the omission of immaterial elements and the substitution of equivalents therefor, as circumstances may suggest or necessity render expedient.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent, is:

1. An induction coil comprising a core, primary and secondary windings surrounding said core, a pair of end heads having grooves on their inner faces, means for clamping said heads to said core, an intermediate covering member of insulating material engaging in said grooves, a pair of spaced conducting plates secured to said intermediate member, a high tension terminal connected to one of said plates and to said secondary winding and a ground connection to the other of said plates.

2. An induction coil comprising primary and secondary windings, a core surrounded thereby, an end head adjacent each end of said core, said heads having grooves on their inner faces, a bolt extending through said core for clamping said heads to said core, a curved plate covering said windings and engaging said grooves, a flat base plate also engaging said grooves and having its sides bent to embrace the lateral edges of said curved plate.

3. In a casing for an induction coil, an end head, a terminal insert embedded therein, one end having an extension adapted to receive a connecting wire, the other end having a screw threaded opening adapted to receive a binding screw, said insert having an intermediate laterally projecting portion to anchor it in said end head.

4. In a casing for an induction coil, an end head, a terminal insert embedded therein having a flange intermediate its ends of polygonal shape, one end of said insert having an extension for receiving a wire, the opposite end being adapted to receive a terminal securing screw.

5. In a casing for an induction coil, an end head, a terminal insert embedded therein, said insert having a threaded opening adapted to receive a binding screw for securing a terminal thereto, and said head being constructed with a channel extending from said insert adapted to receive said terminal to thereby prevent rotative movement thereof when secured to said insert.

6. In a casing for an induction coil, an end head, a terminal insert embedded therein, said insert having a threaded opening adapted to receive a binding screw for securing a terminal thereto and said head having lugs adjacent said insert adapted to engage the sides of said terminal to prevent rotative movement thereof, when secured to said insert.

7. A unitary induction coil and condenser structure comprising primary and secondary windings, a core surrounded thereby, an end head adjacent each end of said core, said heads having grooves formed on their inner faces, a cover comprising an insulating portion and a metal portion surrounding said windings and engaging said grooves, a condenser supported on said metal portion and a plate covering said condenser for firmly securing the same to said metal portion.

8. A unitary induction coil and condenser structure comprising primary and secondary windings, a core surrounded thereby, an end head at each end of said core having a groove on its inner face, a thin U-shaped member covering said windings and engaging in said grooves, a metallic plate beneath said wind-

ings whose ends also engage said grooves, and whose said edges are bent to firmly embrace the ends of said U-shaped member, a condenser mounted on said metallic plate, a cover for said condenser having tongues for interengaging with said metallic plate, a pair of terminal plates carried by said U-shaped member, a high tension terminal post secured to one of said plates, said plate being also connected with said secondary winding and a metallic connection between the other of said terminal plates and the said metallic plate.

9. In an induction coil, the combination of a core having primary and secondary windings thereon, a casing for said coil comprising a pair of end heads, a sheet of insulating material curved about said core and windings and a metal plate having opposite edges engaging the adjacent edges of said sheet, a connection between the inner end of said secondary winding and said plate and a high tension terminal mounted on said sheet of insulating material and connected to the outer end of said secondary winding.

10. In an induction coil, the combination of a core, a primary winding and a secondary winding thereon, a casing therefor comprising a pair of end heads and a sheet of insulating material curved about said secondary winding and engaging said end heads, a metal plate secured to the inner face of said sheet and connected to the outer layer of said secondary winding, a high tension terminal secured to the outer face of said sheet and connecting with said plate, a second plate secured to said sheet and spaced from said first plate and means for connecting said second plate with the opposite end of said secondary winding.

11. In an induction coil unit comprising a core having primary and secondary windings thereon and an enclosing housing, a condenser mounted on one wall of said housing and a cover plate therefor having means for engaging said housing to firmly secure said condenser to said housing.

12. In an induction coil unit comprising a core having primary and secondary windings thereon and an enclosing housing, a condenser mounted within and on one wall of said housing and a cover plate for said condenser having ears adapted to be bent into engagement with said housing to firmly secure said condenser in position and prevent deformation.

In testimony whereof, we affix our signatures.

CLARENCE F. GILCHRIST.
HARRY R. PATTERSON.