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W. A. CHRYST ET AL

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IGNITION COIL

Filed Nov. 29, 1927

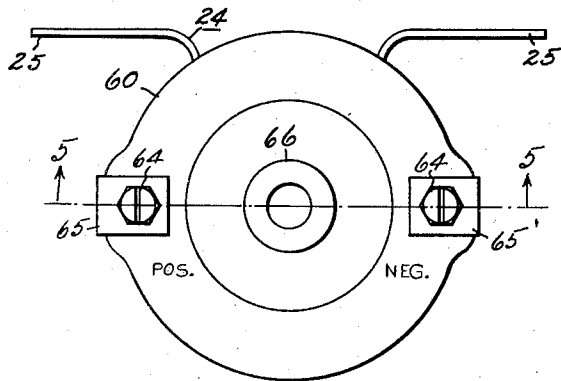


Fig. 1

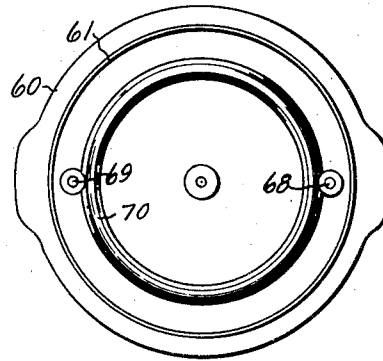


Fig. 2

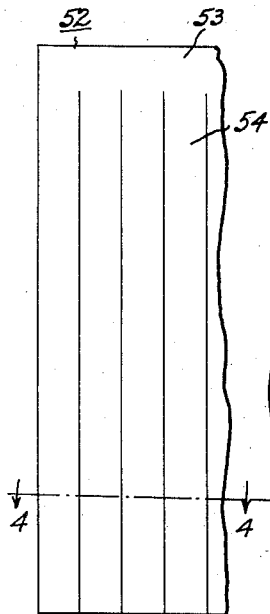


Fig. 3

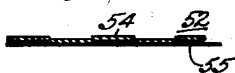
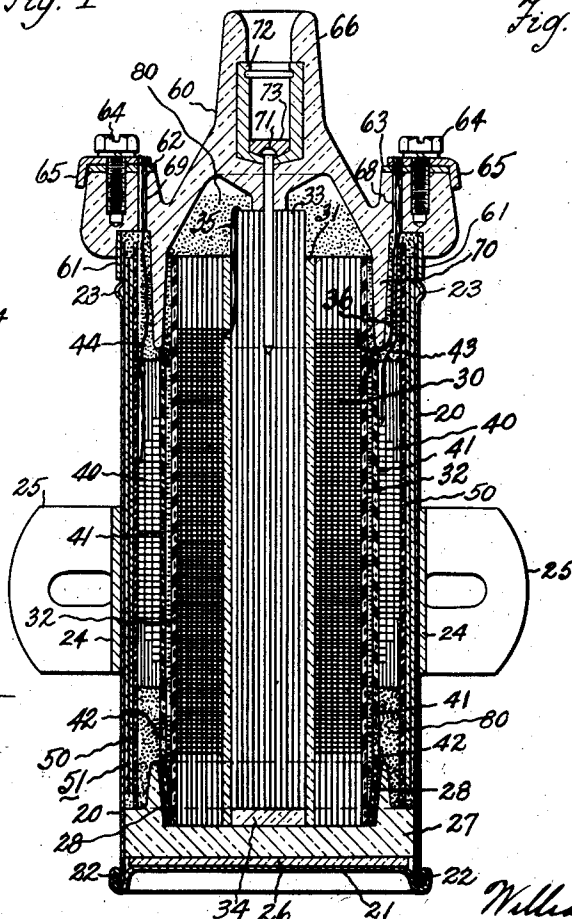


Fig. 4



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IGNITION COIL

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This invention relates to improvements in the manufacture of ignition coils particularly for automobiles and includes among its objects the provision of improved means for supporting the coil windings and magnetic structure within the case and for providing adequate insulation for the secondary winding. A further object is to provide for the ready passage of a sealing compound such as hydrolene to the bottom of the ignition coil case when said sealing compound is poured in after the parts of the ignition coil have been assembled within the case.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of one form of the present invention is clearly shown.

In the drawings:

Fig. 1, is a plan view of the coils embodying the present invention.

Fig. 2 is an underside view of the coil case cover.

Fig. 3 is a fragmentary plan view of a portion of the material used in the external magnetic circuit.

Fig. 4 is a sectional view on the line 4—4 of Fig. 3.

Fig. 5 is a longitudinal sectional view of the coil taken on the line 5—5 of Fig. 1.

The coil housing comprises a tubular case 20 closed at the bottom by a disc 21 joined to the case by a seam 22 which may be soldered. The case 20 is provided at its upper edge with an annular bead 23 for a purpose to be described. The case 20 is welded to a mounting bracket 24 having apertured ears 25.

A non-conducting fiber disc placed upon the bottom of the container or upon the upper surface of the disc 21 and is coated with insulating varnish such as shellac. An insulating block 27 preferably of glass is placed upon the disc 26 while the varnish is still wet. When set the varnish tends to hold the insulator 27 in position. The insulator 27 provides a recess 28 for receiving a sub-assembly which comprises a secondary coil 30 wound upon a non-conducting tube 31 and covered with a wrapping of several turns of insulating paper 32. The tube 31 receives the center core of the magnetic circuit of the coil which comprises a bundle of iron wires 33 projecting above the upper end of the tube 31 and terminating slightly short of the lower end of the tube to provide a space within the tube for receiving a fiber plug 34. The inner end lead 35 of the secondary winding 30 is grounded upon the core 33. The outside lead 36 is brought out through a suitable opening in the wrapping 31.

Before assembling the secondary and center core assembly within the container as shown there is placed within the case 20 a primary winding 40 which has been wound upon a non-conducting tube 41 having its inside diameter a little larger than the outside diameter of the wrapping 32 of the secondary coil 30. The lower edge of the tube 41 will be received within the recess 28 in the block 27. Near its lower edge the tube 41 is provided with side openings 42 for a purpose to be described. A tube 50 about which the external magnetic structure 51 has been wrapped is placed around the primary winding so that it will occupy the annular space between the case 20 and the primary 40. The magnetic structure 51 comprises a strip of sheet iron 52 which, as shown in Figs. 3 and 4, is slit transversely to its longer dimension so that it comprises a marginal portion 53 which may be wound into spiral form and from which extend longitudinally of the coil case a plurality of strips 54 which are located alternately in different planes as shown in Fig. 4 so that no two adjacent strips will occupy the same plane. This formation interrupts the eddy current circuits. The material 52 is placed upon a strip of paper insulation 55, and both strips 52 and 55 are wound together upon the non-conducting tube 50. The external magnetic circuit assembly may be placed in the container after the primary assembly has been placed therein; or the external magnetic circuit assembly may be placed around the primary assembly and both these assemblies placed together within the case. The wall of the recess 28 tends to hold the tubes 41

and 32 in concentric relation so that there will be an annular space between them.

Before placing the secondary and center core assembly in the case within the primary assembly, the assembled case, external magnetic circuit assembly and the primary assembly are heated to a temperature of about 300 degrees Fahr. or to a point a little below the temperature of the melted sealing compound such as hydrolene. While the assembly is still approximately at this temperature, a small quantity of melted sealing compound is poured into the case so that at least the recess 28 in the glass block 27 is completely filled. Then the secondary and center core assembly is immediately forced through the mass of melted sealing compound until its lower end rests upon the glass block 27 as shown. Some of the sealing compound in the recess 28 will be forced into the voids between the tubes 32 and 41 and out through the holes 42 into the voids below the primary coil 40 as indicated by the portion covered by the small dots 80. The secondary and center core assembly may be warmed, but not sufficiently to melt the impregnating wax, before placing this assembly within the case.

The wire 43 leading from the inside turn of the primary 40 is located near the outside lead 36 of the secondary. The outside lead 44 of the primary 40 is located diametrically opposite the inside lead.

The cover for the container comprises a body 60 of molded insulating material which is provided with an insert in the form of a sheet metal ring 61 adapted to telescopically engage the upper end of the can 20. Other inserts are the terminal plates 62 and 63 which receive screws 64 for attaching terminal clips 65. The body 60 is provided centrally with an insulated cable receiving socket 66 which is lined with a conducting sleeve 72 provided as an insert. Before attaching the cover 60 to the case 20, the wires 36 and 43 are passed through a hole 68 leading through the plate 63 and the wire 44 is passed through a hole 69 leading to the plate 62. Then melted sealing compound, such as hydrolene represented by the portions covered by small dots 80, is poured while in a fluid state upon the assemblies within the case 20. Some of this material will pass between the primary and secondary assemblies through the space between the wrapping 32 and the tube 41. Before the sealing compound has solidified, the cover 60 is assembled as shown and its long skirt or flange 70 will enter this sealing material above the primary assembly and will cause some of it to be forced into the spaces between the cover 60 and the coil assemblies at the top of the case. Thus the skirt 70 serves to spread the sealing compound to cause it to be more effective in providing a firm anchorage for the coil assemblies, and also serves more

effectively to insulate the inside lead 35 of the secondary from the outside lead 36 which is forced to take a position exterior to the skirt 70.

Following the operation of assembling the cover 60 upon the case 20, the lead wires are attached by soldering to respective terminal plates 62 and 63. A nail 71 is driven through a previously formed hole in the body 60 and socket lining member 72 so as to make an electrical connection between the member 72 and the core 33 upon which the inside lead 35 of the secondary is grounded. Then the cover 60 is permanently joined to the case 20 by soldering between the head 23 and the ring 61. A conducting plug 73 is driven through the socket lining 72 to hold the nail 71 permanently in position and to aid in excluding moisture from the interior of the case. The coil is then ready for painting and inspection.

While the form of embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. An ignition coil comprising, in combination, a tubular case, insulating bodies located adjacent each end of the case, one of the insulating bodies providing a cover for the case and carrying terminals for the windings and provided with a depending annular skirt which surrounds the upper end of the secondary assembly, the skirt serving to spread a filler of insulating compound which is poured while in a fluid state upon the windings in the case, and the skirt serving to insulate the secondary leads from each other.

2. An ignition coil comprising, in combination, a tubular case, insulating bodies located adjacent each end of the case one of the insulating bodies provides a cover for the case and carries terminals for the windings and is provided with an annular metal flange adapted to telescopically engage one end of the case and to be joined thereto, said cover having an annular, depending skirt concentric with the metal flange and defining a recess for receiving the upper end of the secondary assembly, said skirt serving to insulate the secondary leads from each other.

3. An ignition coil comprising, primary and secondary windings wound upon separate tubes, a tubular case, and insulating members located adjacent the ends of the case and having provisions for receiving end portions of one of the windings and the tubes in order to hold the windings in concentric relation one within the other with an annular space between them, said annular space providing a passage for a sealing compound which is poured while in a fluid state upon the upper end of the windings after being assembled within the case.

4. An ignition coil according to claim 3 in which the tube upon which the primary is wound surrounds the secondary and extends below the primary turns and is provided with side openings to permit the passage of sealing compound into the space below the primary turns.

5. The method of making an ignition coil having separately formed windings one adapted to be located within the other, which comprises placing the outer winding within a case, heating the case and outer winding, pouring upon the bottom of the case a quantity of melted sealing compound, and then forcing the inner winding through the outer winding and the melted compound in the bottom of the case before the compound solidifies.

6. An ignition coil comprising, in combination, a tubular case, insulating members located adjacent each end of the case and provided with facing, aligned recesses, an assembly comprising a secondary winding and a central core confined between said insulators, the ends of the assembly being received by said recesses, and a primary winding upon a non-conducting tube surrounding and spaced from the secondary winding, said tube being received by the recess of one of said insulating members.

7. An ignition coil according to claim 6 in which the said insulating members maintain the windings in their spaced concentric relation.

8. An ignition coil according to claim 6 in which one of the insulating members has provisions for receiving an end of the assembly embodying an annular skirt surrounding and positioning one end of the secondary winding with respect to the primary winding.

9. An ignition coil comprising, in combination, a tubular case, insulating members located adjacent each end of the case and provided with facing, aligned recesses, a bottom disc between one of said insulators and an end closure of said case, the other insulating member providing a cover for the other end of said case, a winding assembly confined between and rigidly supported by said insulators, the end portions of said assembly being disposed within the recesses of said insulators.

10. An ignition coil comprising, in combination, primary and secondary windings located concentrically around a central core, an external magnetizable body comprising an oblong strip of sheet iron slit transversely and wrapped together with a strip of insulating paper into a tube which surrounds the windings, and a tubular case enclosing the windings and magnetizable bodies, said case supporting a skirted insulating member against an end closure thereof, and a skirted cover for said case, said cover and insulating member providing aligned opposing recesses

within their respective skirts, for engaging end portions of the windings, whereby the magnetizable body and windings will be concentrically disposed, and the said skirts will be disposed between one of said windings and the tube of said magnetizable body.

In testimony whereof we hereto affix our signatures.

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