March 31, 1931. J. T. FITZSIMMONS ET AL 1,799,011

IGNITION COIL

Filed Oct. 4, 1928

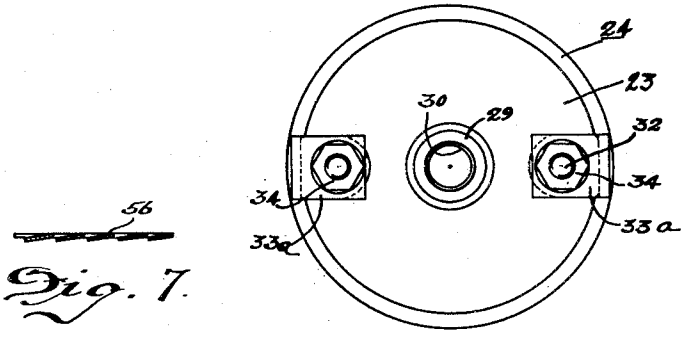


Fig. 1.

Fig. 7.

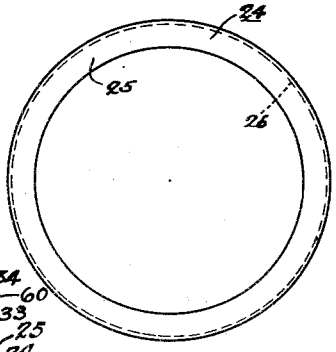


Fig. 3.

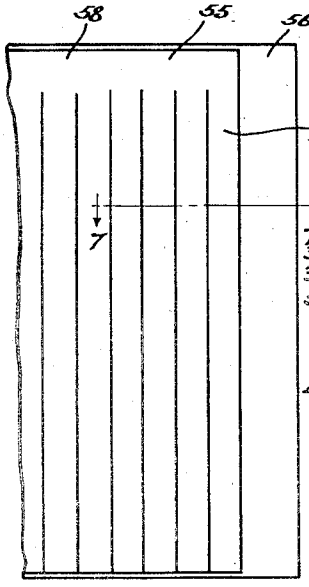


Fig. 6.

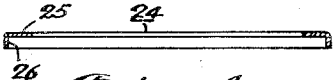


Fig. 4.

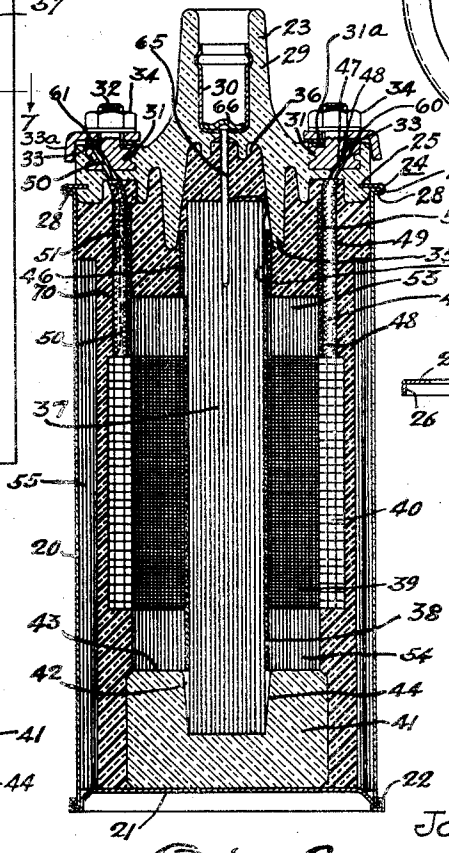


Fig. 2.

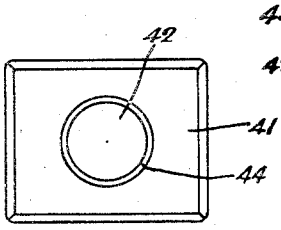


Fig. 5.

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UNITED STATES PATENT OFFICE

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IGNITION COIL

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This invention relates to ignition coils and the manufacture thereof and aims to provide a satisfactory and durable coil at low cost. More particularly, it is among the objects of the invention to improve the construction of ignition coils through the novel construction of the end member of the coil case which supports the terminals of the coil windings, and also to improve the support of the winding assembly, whereby insulation of the coil terminals is assured, and in which the coil assembly is properly insulated and supported with relation to the enclosing 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 coil.

Fig. 2 is a longitudinal sectional view thereof.

Figs. 3 and 4 are plan and cross sectional views of a metal insert around which the material, forming the terminal supporting cover of the coil case, is molded.

Fig. 5 is an insulating block which supports the center core and windings of the coil.

Fig. 6 is a fragmentary view of the material which is used to provide the external magnetic circuit of the coil.

Fig. 7 is a sectional view on the line 7—7 of Fig. 6.

The coil case includes a thin sheet metal tube 20 attached to a sheet metal bottom end wall 21 by folding a seam at 22. The upper end cover of the case is provided by a non-conducting body 23 which is formed of a moldable insulating compound molded around a sheet metal ring 24 having an inwardly extending annular flange 25 extending into the non-conducting body 23 and having, originally, a cylindrical flange 26 which is adapted to be folded around a flange 27 of the case tube 20 as indicated at 28 in Fig. 2. The body provides a cable receiving sleeve 29 having a metal lining member 30 adapted to receive a terminal clip attached to a wire for connecting the sleeve with the ignition distributor. The body 23 is also molded around the grooved heads 31 of terminal screws 32 which cooperate with washers 33, terminal clips 33*a* and nuts 34 to secure to the terminals the conductors which connect the coil with a current source and the ignition timer. Within the case 20 the body 23 is provided with an annular flange or skirt 35 which provides a central recess 36 for receiving one end of the central core of the coil which comprises a bundle of iron wires 37.

A secondary winding 39 is wound around a non-conducting tube 38 and a primary winding 40 is wound around the secondary 39. The core wires 37 are next inserted within the tube 38. A non-conducting block 41 having a central recess 42 is placed upon a suitable horizontal support and the upper surface 43 and the wall 44 defining the recess 42 are coated with a plastic insulating material such as a mixture of beeswax and rosin maintained at a temperature sufficiently high to permit spreading it with a brush. In practice the non-conducting block 41 is of rectangular formation and of a size that will be nicely received within the case and position the the inner end of the coil windings assembly, the diagonals of the block across the top surface as viewed in Fig. 5 being substantially equal to the diameter of the space within the case as it is lined with the external magnetic circuit material later described. By this structure the central support of the winding assembly within the case is assured, and provision is made for the reception of suitable sealing compound such as hydraline for the positive retention of the block and coil assembly in proper place.

The assembly of core wires and coil windings is placed upon the block 41 before placing these parts within the coil case. The inside lead 45 of the secondary coil 39 is placed against the core wires 37 and is held there by a short non-conducting tube 46. The outside lead 47 of the secondary 39 and the inside lead 48 of the primary 40 are twisted together and are enclosed by a fabric sleeve 49. The outside lead 50 of the primary 40 is inserted

through a fabric sleeve 51. A non-conducting tube 52 is placed around the spirally wound margins of paper 53 which are used to insulate the layers of secondary windings and which project beyond the ends of the layers. The lower spirally wound paper margins 54 rest directly upon the surface 43 of the block 41.

The external magnetic circuit of the coil is provided by a plurality of turns of magnetizable sheet iron 55 which is wound with a strip of insulating paper 56 into cylindrical form, the paper insulating the turns of sheet iron from each other, the outside edge of the magnetizable strip 55 being permitted to touch the metal tube 20, in order to provide a ground for the external magnetic circuit. To reduce eddy current losses, the iron sheet 55 is sheared from one side margin nearly across to the opposite side of the margin so as to provide a plurality of strips 57 which extend longitudinally of the coil and which are joined by the spirally wound margin 58.

In assembling, the rolled up iron strip 55 is first placed within the coil case, and then a quantity of melted insulating compound is poured in which partly fills the case, and following this the assembly of windings, core and insulating block 41 are inserted within the coil case and magnetic winding 55 and forced into the melted material as shown in Fig. 2. Before the non-conducting cover 23 is attached to the case tube 20, the coil leads 47 and 48 are threaded through a hole 60 in one of the terminal studs 32, and the lead 50 is threaded through a hole 61 in the other terminal stud. The remainder of the coil case is then filled with a melted insulating compound sufficiently to cover the upper end of the core 37. This insulating compound is represented in Fig. 2 by the portions cross-sectioned with heavy alternately full and broken lines as at 70.

It will be noted that this insulating compound fills all the voids between the windings, the external magnetic iron and the coil case. Before the insulating compound has had time to cool, the non-conducting cover 23 is placed upon the case tube 20. The insert ring 24 is united with the flange 27 of the tube 20 in the manner shown, and the seam 28 may be soldered if desired. The ends of the leads 47, 48 and 50 which extend through the holes 60 and 61 are soldered to the heads 31 of studs 32. The end face groove 31*a* in each stud head 31 receives the end portion of a wire and the solder material which secures the wire to the stud head. In order to connect the metal sleeve 30 with the core wires 37, upon which the secondary lead 45 is grounded, a nail 65 is driven through previously formed aligned holes in the bottom of the sleeve 30 and in the body 23 until the head of the nail engages the bottom of the sleeve 30. The shank of the nail will extend into the bundle of wires 37. A lead plug 66 is forced into the sleeve 30 in order to provide a seal which will prevent moisture from entering the coil around the nail 65.

When the cover 23 is placed on the tube 20, the skirt 35 will enter the body of molten insulating compound 70, and will displace some of it and will cause it to flow into spaces above the upper end of the core 37 and the tube 52. In this manner the inside secondary lead 45 is effectively insulated from the outside lead 47.

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 adapted, all coming within the scope of the claims which follow.

What is claimed is as follows:—

In an ignition coil, having a coil assembly and an enclosing case, a cover therefor, comprising a body of insulating material molded to embrace a flanged retaining ring, said body being provided with a centrally disposed terminal receiving cup on one side, and concentric annular skirts on the other side, one of the skirts telescopically engaging a member of the coil assembly to position it within the case, said skirts also serving to spread a filler of insulating compound, and force it into the voids between the elements of the coil assembly and insulate the leads of the coils.

In testimony whereof we hereto affix our signatures.

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