June 24, 1930. H. E. NORVIEL 1,766,833

COIL AND SWITCH UNIT

Filed Oct. 31, 1927

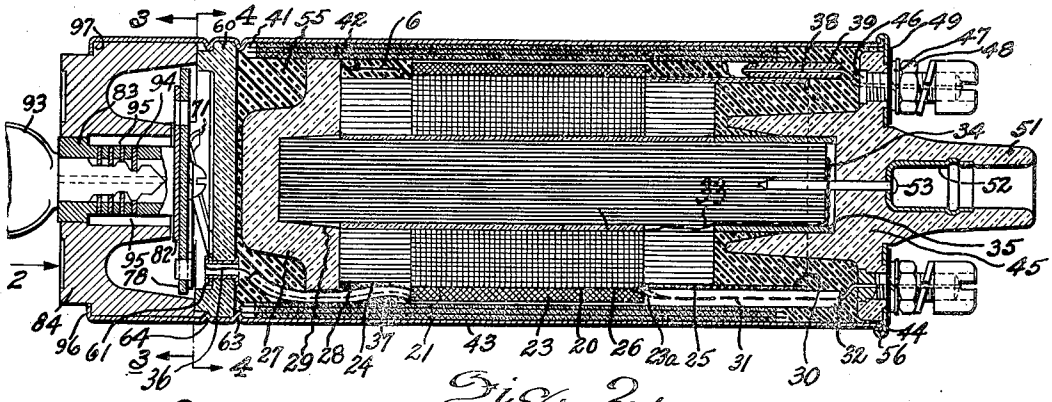


Fig. 2.

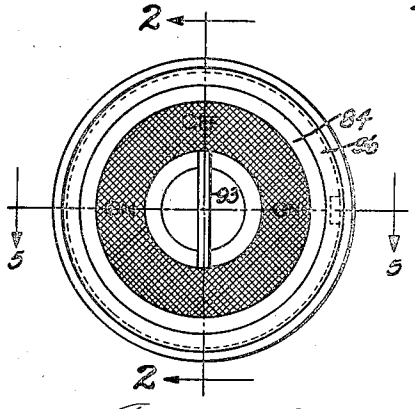


Fig. 1.

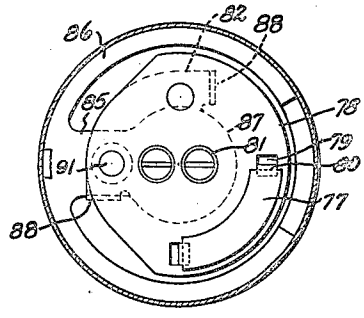


Fig. 3.

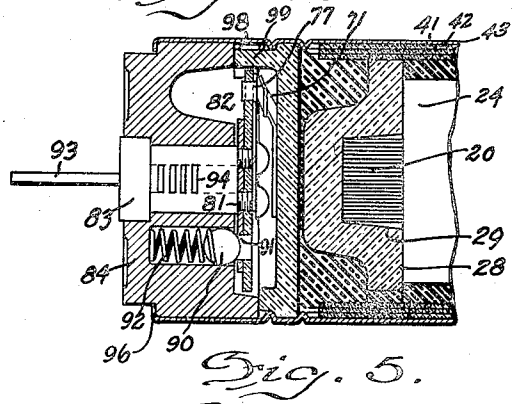


Fig. 5.

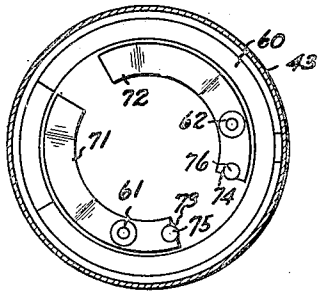


Fig. 4.

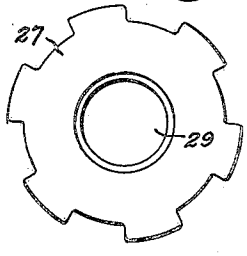


Fig. 6.

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UNITED STATES PATENT OFFICE

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COIL AND SWITCH UNIT

Application filed October 31, 1927. Serial No. 229,867.

This invention relates to ignition apparatus for internal combustion engines and more particularly to ignition coil and lock switch units adapted for use on an automobile.

One object of the present invention is to simplify the construction and reduce the cost of manufacture of ignition switch and ignition coil units for automobiles.

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 form of embodiment of the present invention is clearly shown.

In the drawings:

Fig. 1 is a front elevation of a lock switch and coil unit embodying the present invention;

Fig. 2 is a sectional view on the line 2—2 of Fig. 1;

Figs. 3 and 4 are sectional views on the lines 3—3 and 4—4 of Fig. 2;

Fig. 5 is a fragmentary sectional view on the line 5—5 of Fig. 1; and

Fig. 6 is an end view of an insulating lock in the ignition coil case, looking in the direction of the arrow 6 in Fig. 2.

The ignition coil comprises a central non-conducting tube 20 upon which a secondary coil 21 is wound, and a primary coil 23 is wound upon the secondary coil 21 and insulated therefrom. The layers of the secondary coil 21 are separated by windings of non-conducting paper the side margins of which extend beyond the ends of the layers of secondary turns. The projecting spirally wound margins of the paper are indicated at 24 and 25. This assembly of windings is mounted upon a central magnetizable core comprising a bundle of iron wires or strips 26. The assembly of windings and core are secured to a non-conducting block 27, the end face 28 of which abuts the ends of the paper margins 24. The block 27 is provided with a central recess for receiving one end of the core 26. The block 27 is attached to the core and paper margins by a coating of a mixture of beeswax and rosin which is placed upon the surface 28 and within the recess 29 of the block.

A non-conducting tube 30 is placed around the coil margins 25. The inner end 23^a of the primary coil 23 and the outside end of the secondary 21 are connected together at 31 and are surrounded by an insulating tube 32. The inside end 33 of the secondary 21 is located against the core 26 and against the end thereof as indicated at 34 and a non-conducting tube 35 is placed around the core and secondary end 33. The outer lead 36 of the primary 23 is brought out at the end of the winding opposite to the direction in which the leads 31 and 33 are brought out and the lead 36 is enclosed by an insulating sleeve 37. A wire 38 enclosed by a tube 39 is laid against the coil assembly and is long enough to extend beyond the right hand end of the coil assembly as far as the lead 31 extends and to extend beyond the left hand end of the coil assembly as far as the lead 36 may extend. The leads 36 and 38 pass through notches 40 in the block 27.

The assembly of parts thus far described are enclosed by a wrapping of a plurality of turns of sheet iron 41 separated by paper insulation 42 to provide an external magnetic circuit, the external magnetic circuit retaining the wire 38 in position. The assembly of parts thus far described is inserted within a tubular metal case 43 which is adapted to be closed at its right hand end as viewed in Fig. 2 by cover member comprising a sheet metal disc 44 to which a non-conducting body 45 is attached by hollow terminal screws 46, lock washers 47 and nuts 48, there being insulation washers 49 between the lock washers 47 and the metal disc 44. The body 45 provides a tubular member 50 having a central recess for receiving the tube 35 and the right hand end of the core 26. Externally, the body 45 provides a cable receiving sleeve 51 having a metallic lining 52 which is electrically connected with the core 26 and hence with the secondary lead 33 by a nail 53.

Before the body 35 is assembled with the coil as shown in Fig. 2, the lead wires 31

and the wire 38 are passed through the tubular bolts 46 and, while the coil assembly is held in a vertical position with the right hand end of the coil 26 uppermost, a quantity of sealing wax such as hydrolene 55 is poured into the space left within the case 43 above the windings and core members. While the hydrolene is still hot the body 45 is assembled as shown and the disc 44 is attached to the case 43 by joining these members at a seam 56 and this seam is soldered. Following this operation, the lead wires 31 and the wire 38 may be electrically connected with the terminal bolts respectively by soldering.

The position of the coil assembly is reversed so that the left hand end of the core 26 is uppermost, and a quantity of sealing material such as hydrolene is poured into the space within the case 43 above the non-conducting block 27. Some of this hydrolene will pass through the notches of the block into the space between the surface 28 of the block and the upper end of the primary coil 23. There should be sufficient hydrolene to cover the block 27. A non-conducting end cover 60 having holes for receiving tubular rivets 61 and 62 through which the wires 36 and 38 respectively are first threaded, is placed within the case 43 and is forced against the mass of hydrolene 55 forcing the surplus through the notches of the block 27 and into the spaces around the coils adjacent the surface 28 of the block 27. The movement of the cover 60 toward the block 27 is limited by the cover striking an internal annular bead 63 with which the case 43 is initially provided. After the cover 60 has been assembled as shown in Fig. 2 the material of the case 43 is distorted by a spinning operation in order to form a second internal annular bead 64 so that the cover 60 will be confined between the beads 63 and 64.

The hollow rivets 61 and 62 secure to the cover 60 switch members 71 and 72 respectively. These members are prevented from turning about their securing rivets by providing them with notches at 73 and 74 which engage pins or lugs 75 and 76 respectively provided by the cover 60. The wires 36 and 38 are attached to the rivets 61 and 62 respectively by soldering after the cover 60 has been attached to the case 43. In order to complete the ignition primary circuit to the ignition coil the switch contacts 71 and 72 are bridged by a movable switch contact 77 which is attached to a non-conducting plate 78 by providing the plate with holes 79 each receiving a tang 80 provided on each end of the contact 77. The tang 80 is inserted through a hole 79 and is bent over against the side of the plate 78 opposite to that which receives the contact 77. Screws 81 secure the plate 78 and a stop and detent plate 82 to a switch operating shaft 83 which is journalled centrally within a frame 84. The frame 84 is provided with a boss or lug 85, extending from the peripheral flange 86 of the frame to a central boss 87 which provides a bearing for the shaft 83. The stop plate 82 is provided with inwardly extending ears 88 adapted to abut the lug 85 and thus to limit the rotation of the shaft 83 to a quarter turn. The shaft 83 is indexed in its "off" and "on" positions by a ball 90 adapted to be received by either of two openings 91 with which both the non-conducting plates 78 and the indexing plates 82 are provided. The ball 90 is urged by a spring 92 against the plate 82.

The shaft 83 is turned by a suitable key 93 which, when inserted in a key hole in the shaft 83, will retract a plurality of locking bars 94 from grooves 95 and locate them so that their ends are flush with the cylindrical periphery of the shaft 83 so that the shaft 83 may be turned from "off" to "on" position as is usual with that type of lock switch, and as noted in Fig. 1. When the key is turned in a clockwise direction as viewed in Fig. 1 to "on" position, the contact 77 will be turned 90° in a counterclockwise direction as viewed in Fig. 3 or in a clockwise direction as viewed in Fig. 4 in order to bridge the contacts 71 and 72.

The key shaft frame 84 is retained within the case 43 by shaping the left hand end of the case 43 by spinning operation so as to provide a flange 96 which engages a shoulder 97 provided by the frame 84. The frame 84 is located properly with respect to the cover 60 by providing the frame with a recess 98 (see Fig. 5) which receives a lug 99 extending toward the left from the cover 60.

It is apparent from the foregoing description of the construction and method of assembly of the lock switch and coil unit that improvements have been made which are conducive to economy in manufacture. It should be noted that the tubular case 43 not only provides a cylindrical side wall of the coil housing but also provides a cylindrical housing which clamps the switch frame 84 to the switch base 60. It will be noted that the base 60 provides an end cover for the coil housing. The construction permits the assembling of the end covers of the coil housing with the tubular case 43 after the windings and core and insulating body 27 have been inserted within the case. This method of assembly permits pouring the sealing wax into the coil housing from both ends so as to insure that the core and windings are properly anchored at both ends of the coil housing.

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 and lock switch unit comprising a tubular case enclosing windings and magnetizable parts, an end cover carrying coil terminals closing one end of the case and having means for holding one end of the magnetizable parts, a non-conducting block, positioning and supporting the other end of said parts, a partition closing the coil housing within the case and attached to the case a substantial distance within the case from the other end of the case, said partition carrying a switch contact, and a switch frame providing a cover for the other end of the case and carrying a key controlled movable switch contact.

2. An ignition coil according to claim 1 having sealing material in both ends of the case and within the voids of the assembly of windings and magnetizable parts to secure the elements of the assembly in insulated relation.

3. An ignition coil and switch unit comprising a tubular case, windings surrounding a central magnetizable core located within the case, an end cover carrying coil terminals and having means for holding one end of the core in fixed relation to the case, a non-conducting block located adjacent the other end of the core and having a recess for receiving that end of the core and having a portion adapted to be surrounded by a sealing compound introduced into the adjacent end of the case, the sealing compound when solid fixing the block and the core relative to the case, a wall member carrying switch contacts connected with one of the windings and located against the mass of sealing compound contiguous to the block and attached to the case, and a switch frame carrying a movable contact and an operating member attached to the case with the movable contact located for engagement with the stationary contacts.

4. A unit according to claim 3 in which the block has a notched flange bearing against the windings, the notches permitting the passage of sealing material past the block so that this material may fill the spaces around the windings adjacent the block.

5. An ignition coil and switch unit comprising, a tubular case enclosing windings and magnetizable parts, an end cover carrying coil terminals closing one end of the case, the opposite end of the case being closed by an electric switch having a shaft supported by a frame, a non-conducting plate attached to the shaft, and a movable conducting strip attached to the plate by providing the plate with apertures through which there extend tangs provided by the conductor, the tangs being bent against the plate in order to retain the conductor.

6. An ignition coil and switch unit comprising, a tubular case enclosing windings and magnetizable parts, an end cover carrying coil terminals closing one end of the case, the opposite end of the case being closed by an electric switch having a frame, a shaft supported by the frame, a metal plate bearing directly against the one end of the shaft and having a plurality of indexing holes, a non-conducting plate bearing directly against the metal plate, screws passing through both plates and threaded into said shaft, a spring actuated member supported by the frame and movable into each of the indexing holes as the metal plate is turned, a movable contact supported by the non-conducting plate, a stationary contact located for engagement by the movable contact, and a member attached to the frame for supporting the stationary contact.

7. An ignition coil and switch unit comprising in combination, a tubular case partitioned into compartments by a nonconducting wall having provisions for electrical communications between said compartments, a pair of nonconducting blocks secured within one of said compartments having means for holding coil windings and magnetizable ports of said coil in fixed relation to said case, one of said blocks providing coil terminals and closing off said compartment, means operable within the other compartment for controlling electrical communication through the provisions of said nonconducting partition.

In testimony whereof I hereto affix my signature.

HARRY E. NORVIEL.