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CONDENSER

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This invention relates to foil paper wax condensers and especially to relatively small sized condensers such as are used with internal combustion engine ignition systems.

It is an object of the invention to improve the automotive ignition condenser especially with respect to the exclusion of all moisture from the condenser which would work rapid deterioration of the condenser. In the manufacture of automotive ignition condensers the practice has been to impregnate the condenser winding with wax, such as halowax, for the purpose of improving the dielectric properties of the paper insulation layers between the foils and to fill all the interstices of the condenser winding so as to exclude moisture therefrom. After impregnation the condenser winding is assembled with a condenser case and terminals to which the condenser foils are electrically connected. In spite of the care taken in properly sealing the insulated terminal of the condenser which is usually mounted on the end or cover of the condenser case, moisture sometimes finds its way into the interior of the condenser causing the condenser eventually to fail. In order to avoid the presence of moisture in the condenser of the automotive ignition type, I have provided a construction which is well adapted for the impregnation of the condenser winding after assembly in the container, the container being sealed except for a small hole through which the wax can enter. In this way, the voids in the condenser winding and within the container are so filled with wax as to exclude all air and moisture from the condenser. After impregnation of the condenser assembly, the small hole through which the wax enters is sealed with a drop of solder.

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

In the drawing:

Fig. 1 is an end view of a condenser embodying the present invention.

Fig. 2 is a longitudinal sectional view on the line 2-2 of Fig. 1.

Fig. 3 is a cross sectional view on the line 3-3 of Fig. 2.

The condenser winding comprises paper layers 20 and 21 alternating with metal foil layers 22 and 23 which are rolled upon a mandrel and are then covered by a wrapping of heat insulating paper 24. The foils are so positioned during winding with respect to the paper layers that the

foil margins of foil 22 extend to the right of the paper layers 20 and 21 so that these foil margins may be bent over as indicated at 22a to provide one terminal of the condenser winding. Similarly the margin of foil 23 extends to the left of the paper layers so that this foil margin may be bent or crushed down as indicated at 23a to provide the other terminal for the condenser winding. It will be understood that each paper layer 20 or 21 comprises a plurality of sheets of paper superimposed as is the usual practice and well known to those experienced in the art.

After winding the condenser section or condenser winding, it is removed from an arbor or mandrel so that the condenser winding is provided with a hole through its center. The condenser winding is then assembled with a lead 25 in the form of a metal ribbon, one end of which is pressed against the foil margin 23a and held there by a cork button 26. The lead 25 is passed around the outside of the paper layer 24. These parts are then passed into a condenser case 30, the free end of the metal ribbon 25 being allowed to extend outside the case and to be soldered thereto at the time of attaching the case cover assembly 31 thereto.

The case cover assembly 31 comprises a metal plate 32 having flange 33 adapted to be formed together with the flange 34 of the case 30 into a joint which is sweated together, the parts having been tinned before assembly. The plate 32 is provided with a square boss 35 having a round central hole 36 larger in diameter than the shank of a metal terminal piece 37 which extends through it. The piece 37 extends through round holes provided in nonconducting washers 38, 39, 40, 41 and metal washer 42. The washers 38, 40, 41 and 42 are circular and the washer 39 is rectangular and fits in the rectangular depression provided by the rectangular boss 35 of plate 32. The shank of terminal 37 is spun over at 43 so as to bind all of the washers and the plate 32 together. In this way the plate 32 insulatingly supports the terminal 37. Terminal 37 receives a binding screw 44 by which a condenser lead is attached to the terminal 37. The turning of the terminal 37 with respect to the plate 32 is resisted when the screw 44 is turned due to the tight fit between the terminal 37 and the washers referred to. The external surface of the shank of terminal 37 is rough-knurled so that, when the shank of terminal 37 is press fitted into the washers 38, 39, 40 and 41, this terminal is practically integral with the washers. Since washer 39 is rectangular and fits within the rectangular

recess provided by the rectangular boss 35, the turning of the terminal 37 with respect to the plate 32 is prevented.

Before the cover assembly 31 is attached to the case 30 one end of a flexible, braided or stranded wire conductor 50 is placed in a notch 51 provided by a lug 52 integral with the terminal 37; and the wire 50 is soldered in place. Then a cork disc 53 is placed against the wire 50 thus confining it between the large disc portion 37a of the terminal 37 and the cork disc 53. Wire 50 is then brought around against the face of the disc 53 remote from the terminal 37. Then the cover assembly together with the wire 50 and the cork disc 53 are assembled with the can so that the loose end of wire 50 engages the foil margin 22a, and the flanges 31 and 33 are spun together while the cover assembly 31 is firmly pressed against the can 30 thereby compressing the cork discs 53 and 26, and thus holding the condenser winding firmly between the compressed cork discs 26 and 53 in order to prevent endwise movement of the condenser winding and in order to force the connections 25 and 50 into contact with the foil margins 23a and 22a respectively. Endwise movement of the condenser winding is resisted also by rolling a groove 55 in the condenser case 30 which squeezes the paper wrapping 24 as indicated at 24a firmly against the winding.

The case 30 is soldered to a bracket 60 which serves also as the grounded condenser terminal.

After the assembly of the condenser has been completed, it is placed in an impregnating vessel within which it is first evacuated. Air and moisture within the condenser assembly is sucked out through the small opening 70 provided in the plate 32 of the cover assembly 31. While the assembly is still being subjected to vacuum the impregnating wax is introduced into the vessel, the wax being heated to render it fluid. The wax is forced into the condenser assembly under pressure (generally atmospheric) and the wax indicated at 80 fills substantially all of the voids and interstices of the assembly in order to improve the di-electric properties of the paper layers of the condenser winding and also to exclude all air and moisture. While the condenser is still hot and before the wax has had time to cool and shrink appreciably, the assembly is removed from the impregnating wax and the hole 70 is sealed by a drop of solder indicated at 71 so as to hermetically seal the condenser. Although the wax may shrink on cooling, no moisture laden air can enter the condenser because it has been sealed previously to the shrinking of the wax; and consequently no moisture can thereafter enter the condenser.

From the foregoing description of the construction, method of assembling and impregnating the condenser, it is apparent that I have provided a moisture proof condenser of simple construction which can be built economically. My new condenser has longer life on account of the elimination of moisture difficulties. Further-

more, by the elimination of these difficulties it is possible to use thinner condenser paper and thus reduce the size of the condenser and the cost of manufacture.

While the 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 electrical condenser construction especially adapted for wax-impregnation after assembly which comprises the combination of a case having one integral and impervious end, a case end-cover insulatingly supporting a terminal including a metal disc located within the case, a condenser-winding providing a passage through its center for the passage of impregnating wax and having its foil margins overlying the ends of the winding, annular discs of non-conducting resilient cork material located, respectively, adjacent the foil margins, conductors located, respectively, between the foil margins and the annular discs, one of the conductors passing around the outside of the condenser winding and contacting with the condenser case, the other conductor passing around the adjacent resilient annular disc and located between said disc and the adjacent terminal disc carried by the condenser case cover, said cork discs being compressed by the assembling of the cover with the case in order to hold the condenser winding firmly between them and thus prevent endwise movement of the winding within the case, and also hold the conductors firmly against the foil margins and one of them against the insulated terminal disc, both discs being thereafter maintained in compressed condition by the attachment of the cover to the case.

2. An electrical condenser construction especially adapted for wax-impregnation after assembly which comprises the combination of a cup-like casing providing impervious integrally formed bottom and side walls, a condenser winding disposed within the casing, an end cover for closing the casing, a terminal including a metal disc within the casing, insulators supporting the terminal in insulated relation upon the end cover, a pair of cork discs, one at each end of the winding, and one of which engages the bottom wall of the casing, a pair of connectors each having an end disposed between the winding and the adjacent cork disc, means electrically connecting one of the connectors to the casing, and the other connector to the terminal disc, the assembly of winding, cork discs and end cover being normally greater in longitudinal dimension than the length of the casing side wall, and means including an hermetic seal for rigidly joining the end cover to the open end of the cup member, whereby the cork discs are both compressed, and the connectors are forceably pressed against the condenser winding.

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