Aug. 31, 1937. H. L. HARTZELL 2,091,591

ELECTRICAL CONDENSER

Filed Nov. 26, 1934

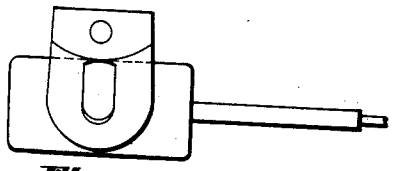


Fig. 1

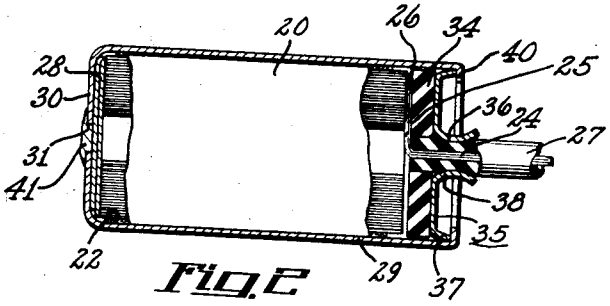


Fig. 2

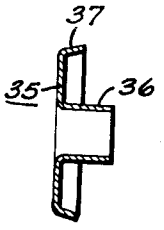


Fig. 3

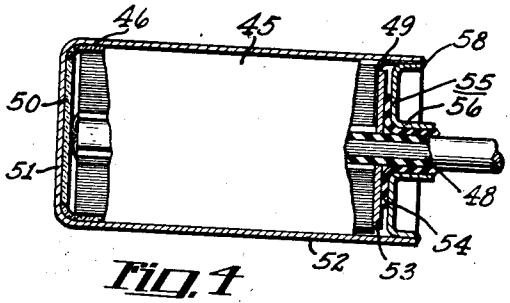


Fig. 4

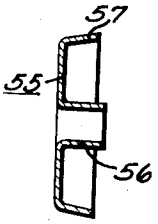


Fig. 5

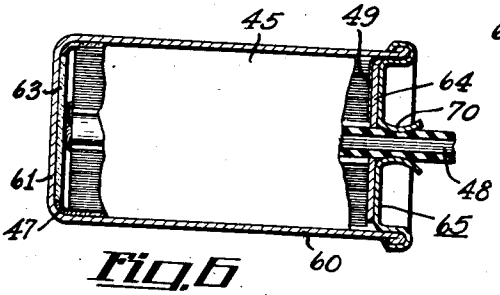


Fig. 6

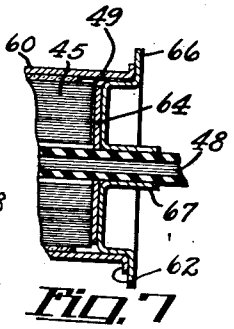


Fig. 7

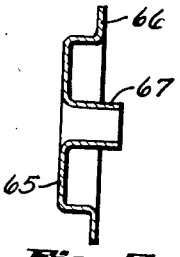


Fig. 8

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ELECTRICAL CONDENSER

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7 Claims. (Cl. 175—41)

This invention relates to improvements in electrical condensers and more particularly to electrical condensers of the cylindrically wound type adapted for use with ignition devices for internal combustion engines.

According to the present invention the condenser includes a plurality of strips of conducting material, such as tinfoil or the like wound upon a mandrel, one of the strips is electrically connected with a flexible conductor while the other strip is electrically connected with a conductor connected with a casing, and the two conducting strips are insulated from each other by insulating wrappings interposed therebetween.

It is customary in condensers of the type disclosed, after the strips of tinfoil or the like and the insulating wrappings are wound to the desired dimensions and covered with several turns of insulating paper to form a body, the body is impregnated with a wax of a low melting point after which a flexible insulated conductor is electrically connected with one of foils and placed into a casing. The flexible conductor is then threaded through an apertured cover. A quantity of sealing wax or pitch, of a high melting point is put into the casing and the cover is moved along the flexible conductor into the casing thereby displacing some of the pitch causing the same to form a seal between the cover and the flexible conductor.

It has been found however that due to the fact that when waxes of different melting points are used one of a low melting point for impregnating purposes and one for sealing purposes that has a higher melting point, there appears to be a tendency of some intermingling of the two waxes at the region where they are in contact. Thus, when the sealing wax is used that has a melting point above the temperature to which the condensers are ordinarily subjected during engine operation, the impregnating wax having the lower melting point will permit the two waxes to intermix. When this intermixing of the waxes increases, or when the intermixture becomes so extensive as to be responsive to temperatures developed within the engine hood during engine operation, there will occur a flow of waxes which will in time permit a space or an opening through the sealing wax at the point where the insulated wire extends through the end of the condenser casing. When this occurs moisture may then enter the casing.

It is an object of the present invention to overcome these difficulties without the use of a sealing wax.

It is a further object of the present invention to provide a condenser of simple, compact, strong and economic construction which will be substantially moisture-proof under all temperature conditions. More specifically it is an object to provide for a more perfect moisture proof seal at the point where the insulated wire of the condenser extends through the end of the condenser case.

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 a plan view of a condenser embodying the present invention.

Fig. 2 is an enlarged sectional view of the condenser shown in Fig. 1.

Fig. 3 is a sectional view of one of the elements shown in Fig. 2.

Fig. 4 is a sectional view of a modified form of condenser.

Fig. 5 is a sectional view of one of the elements shown in Fig. 4.

Fig. 6 is a sectional view of another modified form of a condenser.

Fig. 7 is a sectional view showing the relation of several elements with respect to each other prior to securing the elements in their position.

Fig. 8 is a sectional view of one of the elements shown in Figs. 6 and 7.

The condenser body embodying the present invention comprises convolutions of foil strips alternating with non-conducting strips, the strips being wound upon a cylindrical mandrel, not shown. The side margins of one of the foil strips preferably extend beyond the margins of the insulating strips at one edge thereof, while the margins of the other foil strip preferably extend beyond the margins of the insulating strips at the other end thereof. After winding these strips of foils and insulations upon a mandrel to form an assembly 20, the assembly is covered with a few turns of insulating paper 22.

The condenser body is then impregnated with a wax by the well known method of impregnation. After impregnating the condenser body with the wax an insulated wire 24 having a bared portion 25 is soldered or electrically connected to the projecting margins of one of the foils, the solder being indicated at 26. The insulating material which covers the wire 24 is preferably of an oil resisting insulating material 27, such as

"Duprene". A conductor or metal strip 28 is preferably electrically connected to another of the projecting margins of one of the foils.

The condenser assembly comprising the wound strips of foil and insulating paper 22 and the attached wire 24 and the metal strip 28 is now ready to be inserted into the case 29, with the metal strip 28 arranged so that it will be adjacent an end wall 30 provided with an opening 31 of the case when the condenser assembly is placed into the case 29. A disc 34 of suitable insulating material having an aperture to receive the insulated wire 24 and placed about the wire is placed adjacent the electrical connection of the bared portion of the wire and one of the foils. Then a cover or end member 35 having a neck or projection 36 apertured to receive the wire 24 is placed around the wire. The cover 35 is also provided with an inclined angular flange 37. The cover 35 is then moved along the wire 24 and forced into the case 29 until the outer edge of the flange 37 is within the case 29. The larger diameter of the inclined flange 37 is slightly larger than the inside diameter of the case so that when the cover is forced into the case, the flange will be forced inwardly so as to have a very close fit with the inner wall of the case. This operation of forcing the cover within the case will cause the disc 34 to urge the secured end of the wire 24 firmly against its respective foils and will also force the connector 28 firmly against its adjacent foils and the bottom wall 30 of the case.

The cover 35 is firmly held in position within the case 29 by deforming or spinning over a portion of the case, as clearly shown at 40, see Fig. 2. Following the deforming operation of the case, suitable tools, not shown, are used to deform the neck or projection 36 of the cover, as indicated at 38. The deformed portion 38 will grip the insulation material 27 of the wire 24 in such a manner that an air or moisture-proof seal is provided between the cover and the wire 24.

Following the operation of attaching the cover 35 and the deforming of the neck 36 the electrical connection between the strip 28 and the case is completed further by applying solder at 41 to that portion of the strip 28 which is accessible through the hole 31.

In the modification shown in Figs. 4 and 5, the construction of a condenser body 45 comprises convolutions of foil strips alternating with non-conduction strips of insulating paper wound upon a cylindrical mandrel.

The end margins of one of the foil strips preferably extend beyond the margins of the insulating paper at one end thereof, while the margins of another foil strip preferably extend beyond the margins of the insulating strips of paper at the other end thereof. After winding these strips of foils and paper upon a mandrel to a predetermined dimension to form the assembly, the assembly is covered with a few turns of insulating paper 46 with one end extending beyond the marginal ends of one of the foil strips. Then the mandrel is withdrawn. Then the body is impregnated with a wax by the well known method of impregnation.

In the modification referred to above, the bared end of a wire 48 covered with an oil resisting insulating material is first threaded through the condenser body 45. The bared end of the wire is connected to one of the marginal edges of the foil located within the extended portion of the insulating paper 46. A connector 49 is preferably electrically connected to another foil with the free end thereof free to extend without the casing.

Before placing the condenser body 45 including the wire 48 and the connector 49 electrically connected to their respective foils, a disc 50 of insulating material is placed adjacent the end wall 51 of a casing 52. The condenser body 45 is now ready to be inserted within the case 52. A metal disc 53 having an aperture to receive the wire 48 is placed about the wire and adjacent the connected end of the connector 49. A flanged bushing 54 of flexible material coated with a plastic adhesive is passed over the wire 48. A cover or end member 55 is provided with an apertured neck 56 and an annular flange 57. The apertured neck 56 is adapted to receive the small end of the bushing 54 through which the wire 48 passes. The flanged end of the bushing 54 is placed adjacent the under side of the metal cover so as to be located between the cover 55 and the metal disc 53. The cover 55, bushing 54 and the disc 53 are forced against the condenser body with substantial pressure sufficient to cause the marginal edges of the foils adjacent washer 53 and the connector 49 to be matted or crushed together so as to make a good electrical contact between the connector and the adjacent foil margins. As the cover 55 is being forced into the case, the free end of the connector 49 is clamped between the flange 57 and the case 52 so as to connect the connector with the case. The cover is forced into the case until the annular flange 57, which is preferably inclined, is substantially flush with the cylindrical end of the case. While this pressure is applied the end of the case and the end of the flange 57 are sealed preferably by soldering as indicated at 58. This soldered joint tends to prevent moisture from entering the case and also assists in making a good electrical connection between the connector 49 and the condenser case which serves as one of the condenser terminals.

Following the soldering operation, the neck 56 is then forced toward the wire 48 to force the reduced portion of the bushing 54 between the cover and the wire to close the spaces between the wire 48 and the cover 55 to provide a seal between the cover and the wire.

In the modification shown in Figs. 6, 7, and 8, the construction of the condenser assembly 45 and the electrical connection of the wire 48 and the connector 49 are substantially as described for the modification shown in Fig. 4 and Fig. 5. When the condenser assembly is ready to be placed within the case, a casing 60 having a closed end 61 and an annular flange 62 is used. Before placing the assembly 45 into the casing 60 an insulating disc 63 is placed adjacent the end wall or end 61. A metallic disc 64 having an aperture to receive the wire 48 and placed about the wire is placed adjacent the connector 49. An end member or cup-shaped cover 65 having a flange 66 and an apertured neck 67 for receiving the wire 48 is placed against the disc 64 and is forced toward the condenser body until the flange 66 abuts the annular flange 62 of the case 60. The flange 66 of the case 60 extends beyond the flange 62, as shown in Fig. 7. When the end cover or member 65 is forced into the casing 60 until the flange 66 bears against the flange 62, the end of the insulating paper 47 will be turned over as indicated at 47 in Fig. 6 to assist in keeping the foils and the wire 48 from contacting with the case 60; also, the member 65 will urge the disc

64 and the connector 49 against the foil adjacent same with sufficient pressure to cause the marginal ends to be matted together by the connector and disc so as to provide a good electrical connection between the connector and the foils. While the cover is being forced into the casing 60, the connector 49 is clamped between the cover and casing. While this pressure is applied to the cover 65 the flange 66 is spun over the flange as shown in Fig. 6 which retains the cover in position and also keeps the condenser assembly firmly supported against endwise movement within the casing 60.

The neck 67 is then deformed or forced against the insulating material, as at 70, so as to provide a moisture or air seal between the cover and wire.

It will be seen from the above description that the condensers formed in accordance therewith provide a strong durable structure that is well insulated from air and moisture especially so at the point where the insulated wire 24 and 48 passes through the members which close the open end of the casings without the use of a special sealing compound.

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. A condenser comprising a tubular metallic case having an integral end wall; a condenser body of insulated foils; a flexible wire covered with oil resisting insulating material connected with one of the foils; means connecting another foil with the case; and means for sealing the body within the case, said means comprising a cover for the case, said cover having an annular flange engaging the inner wall of the case and having an apertured neck through which the wire passes; means for securing the cover in position to provide a seal between the cover and the case; and means including a portion of the neck gripping the insulation of the wire closing the space between the neck and the wire to provide a seal between the neck and the wire.

2. A condenser comprising a tubular metallic case having an integral end wall; a condenser body of insulated foils; a flexible wire covered with oil resisting insulating material connected with one of the foils; means connecting another foil with the case; and means for sealing the body within the case, said means including a cover provided with a tapered flange to engage the inner wall of the case to close same and having an apertured neck through which the wire passes; means including a portion of the case for securing the cover in position and providing a seal between the case and the cover; and means comprising a deformed portion of the neck to close the space between the neck and the wire and providing a seal between the neck and the wire.

3. A condenser comprising a tubular metallic case having a flanged open end; a condenser body of insulated foils, each of which has an exposed marginal end; a flexible insulated conducting wire connected with one of the marginal edges and insulated from the case; a connector for connecting the other marginal edge with the case; and means for sealing the body within the case, said means comprising a cup-shaped cover having an annular flange and an apertured projection through which the conducting wire passes; means comprising the annular flange of the cup-shaped member turned over the flanged end of the case for securing the cover in position and to provide a seal between the cover and the case; and means comprising a deformed portion of the projection pressed against the insulation of the wire to form a seal between the wire and the projection.

4. A condenser comprising a tubular metallic case having a flanged open end; a condenser body of insulated foils, each of which has an exposed marginal end; a flexible insulated conducting wire connected with one of the marginal edges and insulated from the case; a connector for connecting the other marginal edge with the case; and means for sealing the body within the case, said means comprising an annular cup-shaped metallic member having an apertured neck through which the conducting wire passes, said member having its cup-shaped portion holding one end of the connector against the case and having its marginal edge turned over the flanged end of the case to secure the member in position and providing a seal between the casing and the cup-shaped member; and means comprising a deformed portion of the neck pressed against the insulation of the wire to form a seal between the wire and the neck.

5. In a condenser, the combination comprising, a tubular metallic case; a condenser body of insulated foils, each of which has an exposed marginal edge; a flexible oil resisting insulated conducting wire connected with one of the marginal foil edges; an insulated disc to insulate the connected end of the wire from the case; a metallic strip electrically connected with the other marginal foil edge; a metal disc extending over the metal strip; and means for sealing the condenser body within the case, said means comprising, a cup-shaped cover carrying an apertured projection through which the wire passes; a soft rubber bushing in the apertured projection and surrounding the wire; solder means for securing the cover in position and for holding the metal disc in good electrical engagement with the second mentioned marginal foil edge, said soldering means also providing a seal between the cover and the case; and means comprising a compressed portion of the projection for pressing the bushing about the insulation of the wire forming a second seal between the projection and the wire.

6. A condenser comprising a tubular metallic case having a closed end; a condenser body of insulated foils; a flexible wire covered with oil resisting insulating material and having a bared end in engagement with one of the foils; a conductor for connecting another foil with the case; an insulating disc within the case; means for sealing the body within the case, said means including a cup-shaped cover for closing the open end of the case and having an apertured neck through which the flexible wire passes, the closing of the case by the cover causes the disc to urge the bared end against the condenser body and the body to clamp the conductor between the body and the closed end of the case; means at one end of the case for securing the cover in position and providing a seal between the cover and the case; and means including a part of the neck to press the insulating material of the wire to form a seal between the wire and the neck of the cover.

7. A condenser comprising, a tubular metallic case having a closed end; a condenser body within the case; said body comprising a tubular body of

foils and insulating strips, the side margins extending beyond the side margins of the insulating strips, an insulated wire connected with one of the foils and insulated from the case, a conductor connected to the other foil, a closure having an annular flange for the open end of the case, a hollow extension carried by the closure through which the wire passes, said flange of the closure operating to clamp the conductor between it and the case, means adhering to the flange and the case for holding the cover in position and providing a seal between the flange and the case; and means including a part of the hollow extension deformed about the insulated wire to provide another seal between the wire and the hollow extension.

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