Feb. 4, 1936. R. K. ALBERT 2,029,550

CONDENSER

Filed Dec. 18, 1933

Fig. 1.

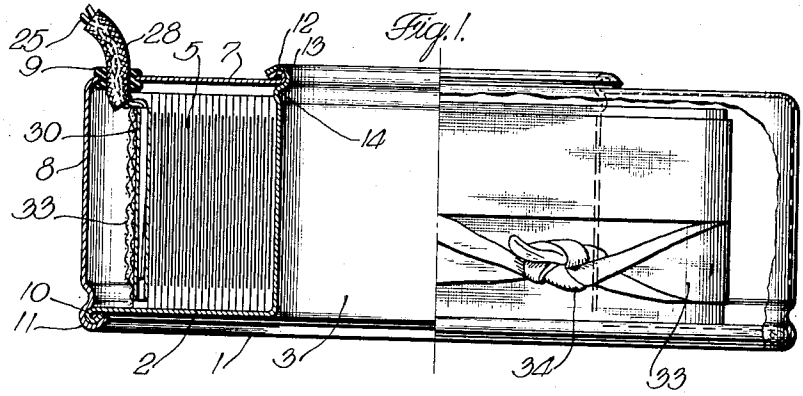


Fig. 2.

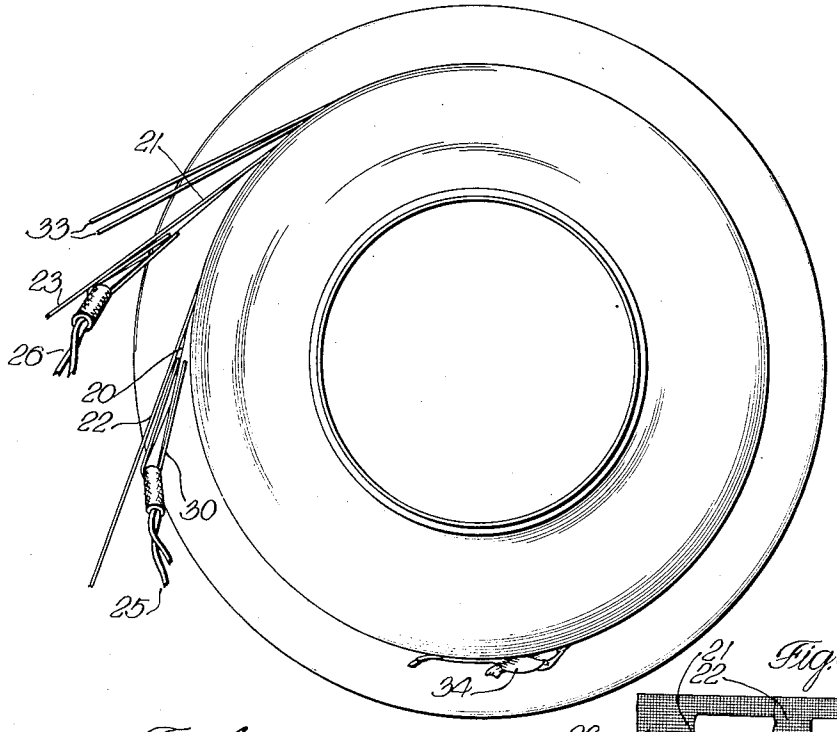


Fig. 3.

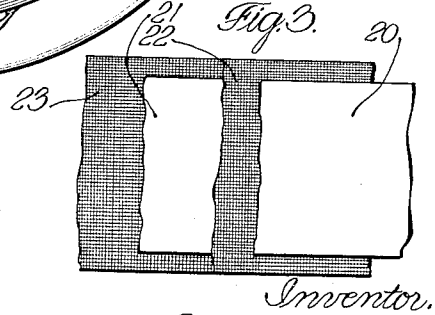
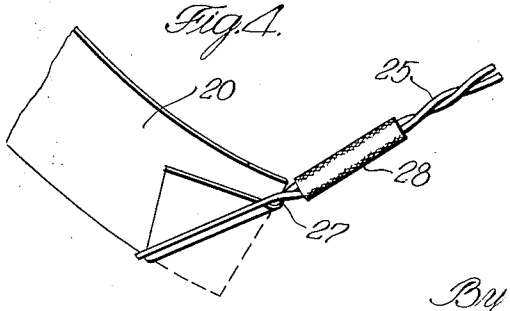


Fig. 4.



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UNITED STATES PATENT OFFICE

2,029,550

CONDENSER

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Application December 18, 1933, Serial No. 702,833

7 Claims. (Cl. 175—315)

This invention relates to electric condensers, and more particularly to the casing structure and the method of making the same.

The condenser of the present invention is of an annular or ring shape, and is adapted to be mounted within a motor casing so that the motor shaft extends through the condenser, as shown for instance, in the patent to Norman S. Yost, No. 1,972,966, issued September 11, 1934.

It is an object of the present invention to produce a condenser casing of the above type which is simple and economical in construction and into which the condenser unit may be assembled quickly and conveniently, and which will not require a distortion of the condenser roll, either at the inner turns or at the outer turns.

The casing of the condenser of the present invention comprises two pieces which, when assembled, form a complete ring shaped enclosure for a condenser roll. The two pieces comprise an inner cylinder having an outwardly extending circular flange and an outer cylinder having an inwardly extending annular flange. The two pieces are assembled with the condenser roll between them, and the adjacent edges of the two pieces are beaded over to form a sealed unit.

In the preferred form of my invention the two pieces of the condenser casing are formed of aluminum, although it is to be understood that the invention is not limited to the use of this particular material, since the pieces may be made of any other materials. The two parts of the condenser casing may be made into the required shape in any desired manner without departing from the spirit of the invention. One preferred manner is to form the casing from flat disc blanks die drawn to the required shape. While this is the preferred method of making the casing parts, it is recognized that these parts may be made by a number of different methods, and the present invention is not limited to this particular method of manufacture.

It is a further object of the present invention to provide a condenser casing so formed that the condenser roll may be wound directly upon one of the casing parts. The condenser roll of the present condenser is wound directly upon the outside of the inner cylindrical casing member. This member is provided with a small outwardly extending circumferential bead which serves to hold the wound roll against removal or against slipping out of place. This bead is also utilized in limiting the extent of telescoping action of the inner and outer members during assembly of the condenser.

The condenser illustrated in the drawing of the present application is an electrolytic condenser. Any suitable electrolyte may be used. One suitable electrolyte is disclosed in the above mentioned patent application of Norman S. Yost, to which reference may be had. Also, I have found that triethanolamine-oleate can be used as an electrolyte. However, a static condenser may be built into the casing of the present invention.

The attainment of the above and further objects of the present invention will be apparent from the following specification taken in conjunction with the accompanying drawing forming a part thereof.

In the drawing:

Figure 1 is a side view, in partial section, of my improved condenser;

Figure 2 is a top view of the condenser with the cover removed and the ends separated to show the construction thereof;

Figure 3 is a fragmentary view illustrating the positioning of the conducting electrodes with respect to the spacers; and

Figure 4 is a fragmentary view illustrating the manner of making the terminal connections with an electrode of the condenser.

Reference may now be had more particularly to the drawing. The condenser is of a generally ring shape and is contained in a can of aluminum or other suitable material. The can comprises a lower member and an upper cover member. The lower member 1 comprises an annular disc or plate 2 and a cylindrical portion 3 integral therewith and extending at right angles thereto at the inner periphery thereof. The condenser unit is indicated at 5. This unit may be wound directly upon the cylindrical portion 3, or it may be wound upon a mandrel and then inserted in place over the cylindrical portion 3. A description of the construction of the condenser unit 5 will be given as this specification proceeds. The cover comprises an annular disc or plate portion 7 open at its inner periphery and provided with a cylindrical flange 8 at its outer periphery. The cover plate has a pair of holes formed therein and spaced a few degrees apart, through which the connections from the condenser unit extend. Only one of these holes is shown in Figure 1. Each hole is provided with a rubber grommet 9 through which is extended the wire connection to the condenser unit. The grommets also provide vents for the condenser. The lead wires from the condenser are extended through these grommets as the cover is being lowered, and the cover is lowered until the cylindrical portion 8 tele-

scopes over a downwardly extending flange 10 formed at the outer periphery of the disc 2. At this time the upper part of the cylinder portion 3 extends through the central opening in the upper plate 7. The ends 10 and 11 are beaded over along the entire periphery of the condenser, and the ends 12 and 13 are also beaded over. This provides a good seal between the upper and the lower container parts. The upper end of the cylindrical portion 3 is provided with a bead 14 along the periphery thereof. This bead serves to hold the condenser unit 5 firmly against longitudinal movement within the container.

The lower and upper casing members may be made by any desired method without departing from the spirit and scope of the present invention. One preferred method is to form them from flat disc blanks which are die drawn to the required shape. It is, however, to be understood that the invention is not limited to this precise method of making the two condenser casing parts, since other methods readily suggest themselves.

The condenser within the casing may be a static condenser or an electrolytic condenser. In the drawing I have shown, for illustrative purposes, an electrolytic condenser. The condenser unit proper comprises, two film forming electrodes, of aluminum foil or the like, separated by a suitably impregnated spacer and tightly wound into a roll. In Figure 3 the aluminum electrodes are shown at 20 and 21, and the spacers are shown at 22 and 23. In this instance the spacers comprise strips of cloth, of a relative coarse mesh, impregnated with a suitable film forming impregnating compound or electrolyte. It is to be noted that the spacers project beyond both longitudinal edges of the electrodes. The portion of the cloth 22—23 that extends beyond the longitudinal edges of the electrodes serves two distinct purposes. First, it insulates the electrodes from the walls of the container. Second, it provides a surface upon which crust may form to prevent drying of the impregnating medium at the portion of the cloth between the electrodes.

The electrodes are first treated, in the usual manner, to form a film of oxide thereon. The film coated electrodes are separated by the spacers and are wound into a compact roll, with a few turns of cloth 23 interposed between the innermost turn of the wound unit and the cylindrical wall 3 of the can, said turns serving to insulate the innermost portion of the electrode 20 from the metal of the container. At this time the spacers are unimpregnated.

Terminals, indicated at 25 and 26, are connected to the electrodes 20 and 21. The terminal 25 is indicated in Figure 4, and comprises a single piece of wire looped upon itself, with the ends thereof twisted together. One corner of the electrode strip 20 is inserted through the loop 27 at one end of the twisted wire, and the wire is then rolled to coil the end of the electrode around the wire. A piece of insulating tubing 28 is inserted over the end of the twisted wire in order to provide adequate insulation of the wire at the point where it leaves the condenser casing. A piece of stiff paper 30 is folded over the end of the electrode 20 at the point where the same is wound around the wire 25, to prevent any possibility of the thickened end portion of the electrode short circuiting through the spacer to the next electrode of the roll. The wound condenser unit 5 is then held together by wrapping one or more turns of cloth 33 around the same and tying the ends as indicated at 34.

The condenser unit is then immersed in an impregnating solution, which is at a temperature necessary to give it the required degree of fluidity, usually about 80° C.–90° C., and allowed to remain there until it is fully impregnated. This takes about fifteen or twenty minutes.

It is to be understood that other forms of separator and other electrolytes may be employed without departing in anywise from the invention. The use of aluminum, of which the can is composed, provides a novel utility in, first, that to make the can of the same material as the condenser plates, that is, of aluminum or like metal, prevents contamination of the electrolyte or any interference with the electrolytic function between the active plates. The metal of the can is neutral to the electrolyte and even though an electrolyte should escape or drip from the body of the condenser coming into contact with the can, no deterioration or injury results. In fact, it is permissible to connect one of the plates to the can where that is found desirable.

Aluminum is particularly useful mechanically, in that it is ductile, easily spun, and relatively inexpensive. Any equivalent film-forming metal or alloy capable of use as an electrolytic plate and of sufficient ductility to be employed in making the can or container may be employed. For example, magnesium, or alloys of aluminum and/or magnesium may be utilized.

While I have herein described a preferred embodiment of my invention it is to be understood that the invention is not limited to the precise construction herein shown, the same being merely illustrative of the invention. What I consider new and desire to secure by Letters Patent is:

1. A ring shaped condenser can comprising an annular plate having, at its inner periphery and integral therewith, a cylindrical wall extending therefrom and merging therewith at its end and adapted to receive an annular condenser unit, a radially outwardly projecting bead formed adjacent the end of said wall for holding the condenser unit against retraction, a cover for the unit, said cover comprising an annular plate the inner periphery of which cooperates with the cylindrical wall to form a closure for one end of the condenser and the outer periphery including a cylindrical portion extending to the first mentioned annular plate and a circumferentially extending seal between each cylindrical portion and the annular plate of the other cylindrical portion.

2. A ring shaped condenser comprising a container constituting concentric inner and outer tubular members joined at their ends by annular discs comprising flanges one of which is integral with one tubular member and the other integral with the other tubular member, a ring shaped condenser roll within the container, and a circumferentially extending seal between each tubular member and the flange on the other tubular member.

3. A ring shaped condenser can comprising concentric inner and outer tubular members joined at their ends by annular discs comprising flanges one of which is integral with one tubular member and the other integral with the other tubular member, a circumferentially extending beaded joint between each tubular member and the flange of the other tubular member, one of said flanges having an opening for receiving a circuit conductor, and an insulating grommet at said opening.

4. A two-piece annular condenser container comprising a cylinder having integral therewith an outwardly extending circumferential plate at

one end and adjacent the other end an outwardly extending projection, a condenser roll wound on the cylinder and held by the projection against movement off of the cylinder, and a one-piece cover for the condenser roll, said cover comprising an annular plate portion surrounding and sealed to the cylinder and including a cylindrical portion extending along and sealed to the periphery of the first mentioned plate, the inner cylinder being open at both ends.

5. The method of forming a condenser container which comprises forming a pair of tubular cylinders of different diameters, forming annular discs integrally with said cylinders at opposite ends thereof, and forming circumferential seals between the ends of each cylinder and the disc of the other cylinder.

6. The method of forming a condenser container which comprises forming a tubular member with an integral outwardly extending circular flange at one end thereof, forming a second tubular member of a diameter substantially equal to the diameter of said flange and having an integral inwardly extending annular flange at the opposite end thereof, forming circumferential beads about the peripheral edges of said flanges and tubular members, and sealing said members together about said beads whereby the flange of each member engages the tubular end of the other member.

7. The method of forming a condenser container which comprises forming a tubular member with an integral outwardly extending circular flange at one end, forming a second tubular member of a diameter substantially equal to the diameter of said flange and having an integral inwardly extending annular flange at one end thereof, forming an outwardly extending circumferential bead about said first tubular member intermediate its ends, winding an annular condenser about said first tubular member between said bead and the flange thereof, forming circumferential beads about the peripheral edges of said flanges and tubular members, and sealing said members together about said last-named beads whereby the flange of each member engages the tubular end of the other member.

RALPH K. ALBERT.