Nov. 10, 1931. C. H. KINDL 1,830,907

ELECTRICAL CONDENSER

Filed March 21, 1927

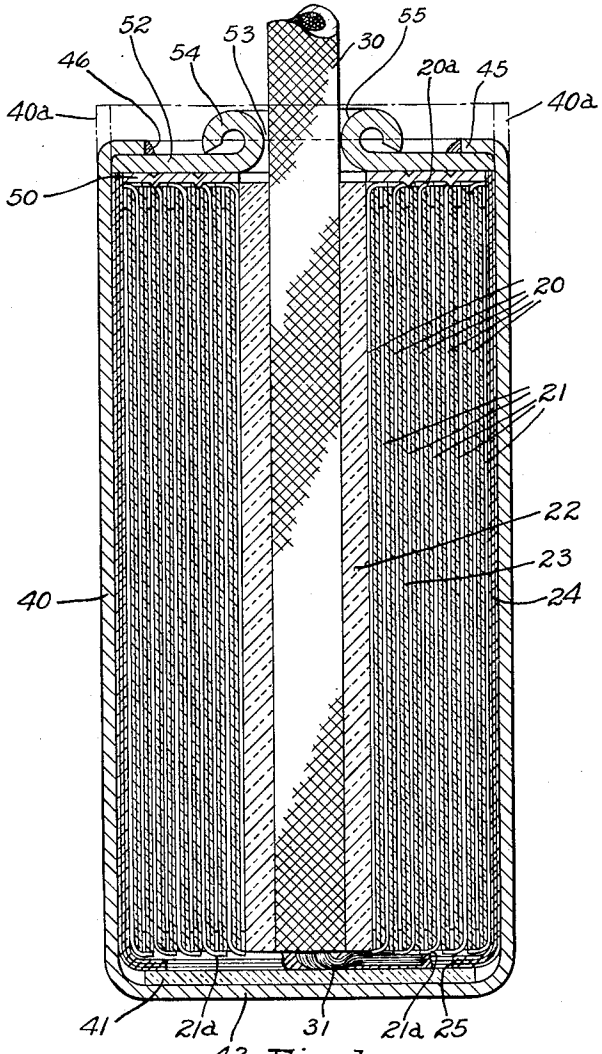


Fig. 1.

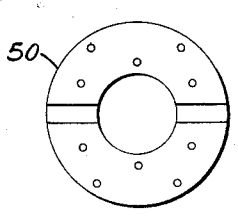


Fig. 2.

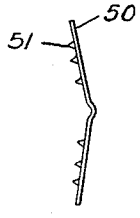


Fig. 3.

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UNITED STATES PATENT OFFICE

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ELECTRICAL CONDENSER

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This invention relates to electrical condensers of the type comprising two long insulated strips of metal foil rolled into cylindrical form, and contained within the water proof case, preferably of metal.

One of the objects of the present invention is to provide for more economical manufacture of condensers of this type.

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 longitudinal sectional view on an enlarged scale of a condenser constructed in accordance with the present invention; and

Figs. 2 and 3 are plan and edge views respectively of one of the elements of the condenser shown in Fig. 1, Figs. 2 and 3 being drawn to a scale one-half that of Fig. 1.

Referring to the drawings, the condenser is formed by winding insulated strips 20 and 21 of metal foil upon a cylindrical, tubular core 22 of insulating material. The layers of foil 20 and 21 are separated by at least two layers of insulating paper 23. After the condenser has been wound into cylindrical form, several turns of paper 24 are wound about this form. It will be noted that one side margin of the foil strip 20 extends beyond one side margin of the paper insulation 23, and that the opposite side margin of the foil 21 extends beyond the other side margin of the paper 23. As viewed in Fig. 1, the upper margin of the paper 24 extends beyond the upper margin of the paper 23 a distance sufficient to accommodate a thin metal washer, which will be described, but the lower margin of the paper wrapping 24 extends a distance below the lower margin of the paper 23 sufficient to permit the paper 24 to be rolled over the edge of the cylindrical form, thus providing an inwardly extending insulating flange 25.

As is well known to makers of this type of condenser, the side margins of the foil strips may be readily crushed together to form in effect masses of foil metal at each end of the condenser form in order to provide means for attaching other conductors to the condenser foils. An insulated stranded conductor 30 is inserted through the tubular core 22 and its bared end 33 is flattened out against the overlapping side margins of the foil strip 21, these side margins being indicated by numeral 21*a*. Then a drop of solder is placed upon this end of the condenser form in order to electrically connect the wire strands 31 with the foil margin 21*a*.

A drawn metal tubular case 40 is formed so that its inside diameter will be slightly greater than the outside diameter of the paper wrapping 24. Then a non-conducting disc 41 is placed upon the bottom or end wall 42 of the case 40. Originally the upper or open end of the case 40 is formed as indicated by the dot and dash lines 40*a*, which indicate the shape of the case before the flange 45 (to be described) has been formed. Prior to forming the flange 45, the assembly of insulated foil strips 20 and 21, core 22 and wire 30 is inserted within the case 40 and is forced toward the end wall 42 so that the paper flange 25 fits closely against the non-conducting disc 41. A resilient sheet metal washer 50, of good conducting material, is formed as shown in Figs. 2 and 3 with its two halves in separate planes and in diverging relation, as shown in Fig. 3. The washer is provided with projections or points 51. One of these washers is next placed around the upper end of the tubular core 22 and a condenser end member 52, having a central hole 53 for receiving the wire 30, is placed against the washer 50 and is forced toward the condenser form with substantial pressure sufficient to cause the spirally formed margin 20*a* of the foil 20 to be matted together, and to cause the points 51 to be forced into this matted material so as to make a good electrical contact between the washer 50 and the condenser foil 20. While this pressure is applied to the condenser end 52, the end margin of the case 40 is formed over upon the outer surface of the condenser end wall 52, in order to provide a flange 45 which retains the end wall 52 in position and the condenser material firmly supported against endwise movement within the case. The joint between the flange 45

and the end wall 52 is sealed preferably by soldering, as indicated by numeral 46. This soldered joint tends to prevent the entrance of moisture into the condenser and assists in making a good electrical contact between the foil 20 and the condenser case 40, which serves as one of the condenser terminals.

The opening 53 in the condenser end wall 52 is surrounded by a flange 54 which is reversely flared so as to provide a surface 55 which is relatively gradual in curvature so as to prevent breaking of the wire 30 due to bending it relative to the condenser. The flange 55 assists in stiffening the end wall 52.

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 electrical condenser comprising, a tubular non-conducting core two foils and foil insulation wound upon the core with the side margin of each strip projecting beyond opposite side margins of the insulation to provide terminals at each end of the condenser assembly, a conductor extending through the core and connected to one of the condenser foils, a wrapping of sheet insulating material about the assembly and having the margin, which is adjacent the condenser terminal connected with the conductor, extended beyond said terminal and folded over against it, an insulating disc located against the folded margin of the wrapping and cooperating therewith to enclose the terminal connected to the conductor, a closed-end tubular case surrounding the assembly and wrapping and having its closed end located against said disc, a resilient, normally-arched metal disc located against the other condenser terminal and within the case, and a metal end wall member apertured to receive said conductor and located against said normally-arched disc, and means for maintaining said disc and end wall member in position including an inwardly extending annular flange provided by the tubular case.

2. An electrical condenser comprising, in combination, a non-conducting tubular core, condenser material comprising condenser foils and strip insulation wound upon said core in such manner that a side margin of each foil projects from each side margin of the foil insulation, a conductor extending through said core and attached at one end to a foil margin, a tubular metallic case closed at one end, and receiving the assembly of condenser material, core and conductor, the conductor end which is attached to a foil margin being located adjacent the closed end of the case, means insulating the condenser from the interior wall surfaces of the case, and a metallic end member for closing the case and for electrically connecting the foil margin adjacent thereto with the case, and cooperating with the case to maintain the condenser material clamped between the end member and the closed end of the case, said end member having an aperture through which said conductor passes.

3. In a condenser, the combination with a tubular core member; of a plurality of insulated condenser foils wound about said core; a terminal conductor metallically joined to the coiled side margin of one of said foils, and extending through said core for mechanically anchoring said conductor, a wrapping of sheet insulating material about the wound foils including an end margin thereof folded over against the end portion of said wound foils, and an insulating disc located against the juncture of said foil and conductor, a closed end tubular case surrounding the wound foils and insulated from a portion thereof by said wrapping and disc, and an end closure for said case electrically connected with another of said foils, including a resilient, normally arched metal disc with provisions for piercing the coiled side margins of another of said foils.

4. In a condenser, the combination with a tubular, non-conducting core; of a plurality of insulated foil sheets wound about said core; a cylindrical casing enclosing the core and condenser foils; an insulated stranded wire terminal conductor passing through an opening in one end of the casing and electrically connected to a margin of one of the foils, said conductor extending through the non-conducting core for anchoring the conductor to the condenser assembly; a wrapping of non-conducting material about said foil windings and folded against the end thereof for insulating some of said foil margins, and a resilient disc engaging others of said foil margins and the end of said case providing said opening and for electrically connecting the said foil margin and the case.

5. An electrical condenser comprising elements of electrically conductive material separated by insulation and wound together, and a terminal extending through the middle of the condenser from one end to and past an edge of the insulation at the other, and having a portion bent so as to connect with one of said elements.

6. A condenser comprising a plurality of strips of electrical conductive material of opposite polarity, separated by insulation and wound together, one of said strips projecting to one end of said condenser, and one to the opposite end, and a terminal extending through the middle of the condenser and projecting from one end thereof, said terminal having an insulated covering and being bent at one end, the bent portion being connected to one of said strips at the opposite end of the condenser.

7. An electrical condenser comprising a tubular core, condenser foils and foil insulation wound with a side margin of each succeeding foil projecting beyond opposite side margins of the insulation to provide a terminal at each end of the condenser assembly, a wire extending through the core and connected to a terminal at one end of the assembly, a tubular metallic case having an integral closed end surrounding the assembly with the closed end adjacent the terminal to which the wire is connected, means insulating the assembly from the interior of the case, a conducting end wall member, said end being provided with an aperture for the wire extending through the core and said end wall closing the open end of the case, and means for electrically connecting the other condenser assembly terminal with the case including a resilient spring metal washer located between the end wall and condenser assembly terminal, said case having an annular flange formed against the end wall member to retain the same and to clamp the spring washer against the condenser assembly terminal.

8. A condenser comprising, in combination, a tubular body of windings of foil strips and insulation strips, the coiled outside margins of the foil strips extending oppositely from the coiled side margins of the insulation strips, a wire extending through the body and having an end electrically connected with a foil margin, a tubular case having a closed end adjacent the wire end, a conductor located adjacent the open end of the case and electrically connected with another foil, means for closing the open end of the case, and means including a part of the case for clamping the adjacent conductor against the body and the body against the closed end of the case.

9. A condenser comprising, in combination, a tubular condenser body, including a plurality of insulated foils, a wire extending through the body and having an end electrically connected with one of said foils, a tubular case having a closed end adjacent the wire end, a conductor located adjacent the open end of the case and electrically connected with another foil, means for closing the open end of the case and means including a part of the case for clamping the adjacent conductor against the body.

10. A condenser comprising, in combination, a tubular condenser body, including a plurality of insulated foils, a wire extending through the body and having an end electrically connected with one of said foils, a tubular case having a closed end adjacent the wire end, a conductor located adjacent the open end of the case and electrically connected with another foil, means for closing the open end of the case and for clamping the adjacent conductor against the body, said case having a flange formed against the closing means to clamp the adjacent conductor against said body.

11. An electrical condenser comprising a tubular core, condenser foils and foil insulation wound with a side margin of each succeeding foil projecting beyond opposite side margins of the insulation to provide a terminal at each end of the condenser assembly, a wire extending through the core and connected to a terminal at one end of the assembly, a tubular case closed at one end surrounding the assembly with the closed end adjacent the terminal to which the wire is connected, means insulating the assembly from the interior of the case, a conducting case cover member, said cover provided with an aperture for the wire extending through the core and said cover closing the open end of the case, and means for electrically connecting the other condenser assembly terminal with the case including a resilient spring metal washer located between the cover and condenser assembly terminal, and means including a part of said case to retain the cover in the case.

12. A condenser comprising, in combination, a tubular body comprising windings of foil strips and insulation strips, an insulated wire extending through said body, means electrically connecting an end of said wire with one of said foils, a tubular metallic case enclosing said body, said case having an integral closed end adjacent the end of said wire within the case, an insulating member between said end of the case and said end of the wire, a cover for the open end of the case, said cover having an aperture through which the wire passes, means for connecting another foil with the case, and common means including a part of said case for securing the cover to the case and for clamping the condenser body against the insulation member.

13. A condenser comprising, in combination, a tubular body comprising windings of foil strips and insulation strips, a tubular metallic case enclosing said body, said case having an integral closed end, an insulated wire extending through said body and including a conducting part electrically connected with a foil and extending along the end of the condenser body adjacent the closed end of the case, a cover for the open end of the case, said cover having an aperture through which the wire passes, means for connecting another foil with the case, common means including a part of said case for securing the cover to the case and for clamping the conducting part against the adjacent end of the condenser body.

14. A condenser comprising, in combination, a tubular body comprising windings of foil strips and insulation strips, a tubular metallic case enclosing said body, said case

having an integral closed end, an insulated wire extending through said body and including a conducting part electrically connected with a foil and extending along the end of the condenser body adjacent the closed end of the case, a cover for the open end of the case, said cover having an aperture through which the wire passes, means for connecting another foil with the case, an insulating member adjacent the closed end of the case and common means including a part of said case for securing the cover to the case and for clamping the conducting part between the condenser body and the insulating member.

15. A condenser comprising, in combination, a tubular body of windings of foil strips and insulation strips, the coiled outside margins of the foil strips extending oppositely from the coiled side margins of the insulation strips, a wire extending through the body and having an end electrically connected with a foil side margin, an integral tubular case having a closed end adjacent the wire end, a conductor located adjacent the open end of the case and electrically connected with another foil, a cover for the open end of the case and having an aperture through which the wire passes, and means including a part of said case for securing the cover and for clamping the adjacent conductor against the body, and the body against the closed end wall of the case.

16. A condenser comprising, in combination, a tubular condenser body of windings of foil strips and insulation strips, a wire extending through the body and having an end contacting with a foil strip, a tubular case having an integral closed end adjacent the wire end, a conductor located adjacent the open end of the case and electrically connected with another foil, a cover for the open end of the case and having an aperture through which the wire passes, and means including a part of said case for securing the cover and for clamping the adjacent conductor against the body.

17. A condenser comprising, in combination, a tubular condenser body comprising wound foil strips and insulation strips, an insulated wire extending through the body and having a bared end contacting with a foil, a tubular case having an integral closed end adjacent the wire end, a conductor located adjacent the open end of the case and electrically connected with another foil, means for closing the open end of the case and for clamping the adjacent conductor against the body said means including a part of the case.

18. A condenser comprising, in combination, a tubular metallic case having an integral end wall, a cover for the open end of the case, a tubular body of condenser material comprising windings of foil strips and insulation strips, and located within the case, means for connecting one of the strips with the case, a terminal conductor insulated from the case and passing through the cover, means for connecting the insulated terminal with the other foil strip, and means including a part of the case for attaching the cover to the case and for securing against disruption the means which connects a foil with the insulated terminal.

19. A condenser comprising, in combination, a tubular metallic case having an integral end wall, a cover for the open end of the case, a tubular body of condenser material comprising windings of foil strips and insulation strips and located within the case, means for connecting one of the strips with the case, a terminal conductor insulated from the case and passing through the cover, means for connecting the insulated terminal with the other foil strip, and means including a part of the case for attaching the cover to the case and for securing against disruption the means which connects a foil with the case.

20. A condenser comprising, in combination, a tubular metallic case having an integral end wall, a cover for the open end of the case, a tubular body of condenser material comprising windings of foil strips and insulation strips, and located within the case, a terminal conductor insulated from the case and passing through the cover, conducting devices for connecting the foils respectively with the case and insulated terminal, and means including a part of the case for attaching the cover to the case and for clamping the condenser body between the cover and end wall of the case.

21. A condenser comprising, in combination, a tubular metallic case having an integral end wall, a cover for the open end of the case, a body of condenser material within the case and comprising windings of foil strips and insulation strips, a terminal conductor insulated from the case and passing through the cover, conducting devices for connecting the foils respectively, with the case and insulated terminal, a non-conducting disc located between the condenser body and the closed end of the case, and means provided by a part of the case for securing the cover in position and for clamping the condenser body against the non-conducting disc.

22. A condenser comprising, in combination, a tubular metallic case having an integral end wall, a cover for the open end of the case, a body of condenser material within the case and comprising windings of foil strips and insulation strips, a terminal conductor insulated from the case and passing through the cover, conducting devices for connecting the foils respectively, with the case and insulated terminal, a non-conducting disc located between the condenser body and

the closed end of the case, a non-conducting tubular body surrounding the condenser body and having its ends abutting the disc and cover respectively, and means including a part of the case for securing the cover in position against the non-conducting tubular body and the latter against the non-conducting disc.

23. A condenser comprising, in combination, a tubular metallic case having an integral end wall, a cover for the open end of the case, a body of condenser material within the case and comprising windings of foil strips and insulation strips, conductors connected respectively with the foil strips, one of said conductors having a part extending longitudinally of the condenser body and a part extending part way across the inner end of the body, and means including a part of the case for securing the conductors and the cover in position.

In testimony whereof I hereto affix my signature.

CARL H. KINDL.