Dec. 2, 1941. J. A. POITRAS 2,264,405

DRY ELECTROLYTIC CONDENSER

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Fig. 1.

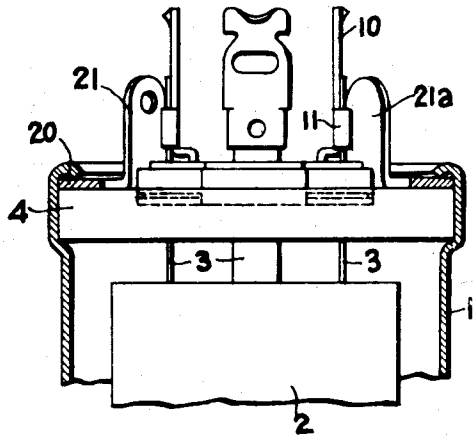


Fig. 2.

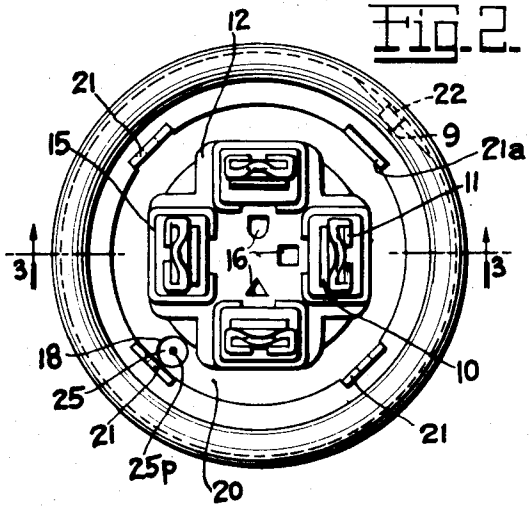


Fig. 3.

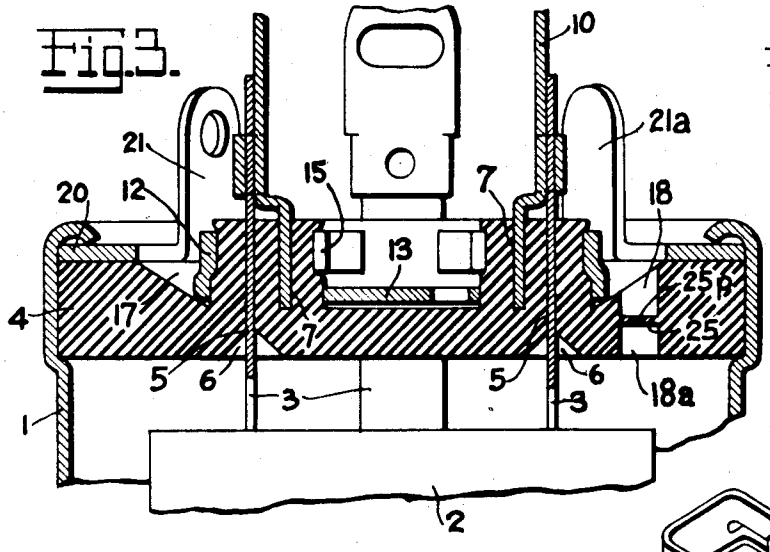


Fig. 7.

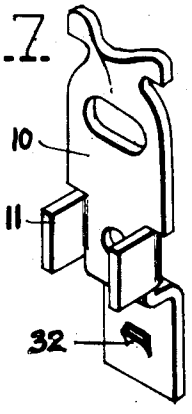
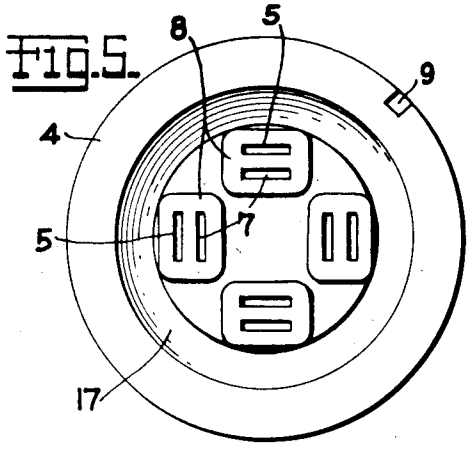


Fig. 5.



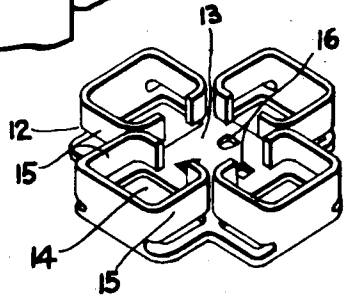


Fig. 6.

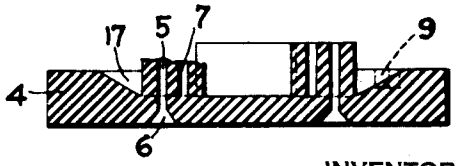


Fig. 4.

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Dec. 2, 1941. J. A. POITRAS 2,264,405

DRY ELECTROLYTIC CONDENSER

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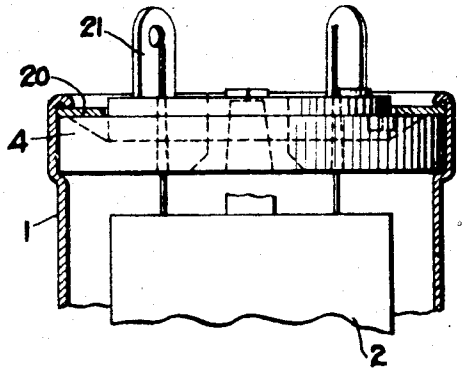


Fig. 8.

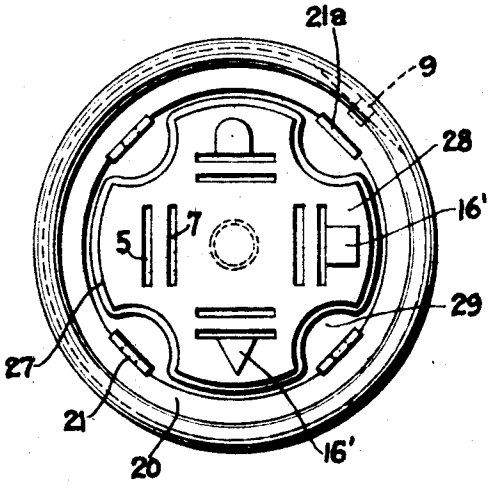


Fig. 9.

Fig. 11.

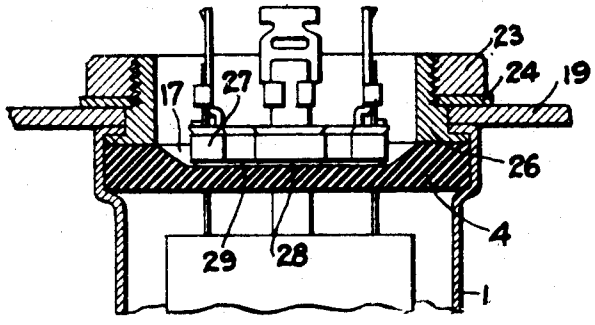


Fig. 10.

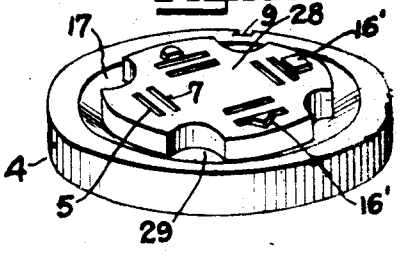
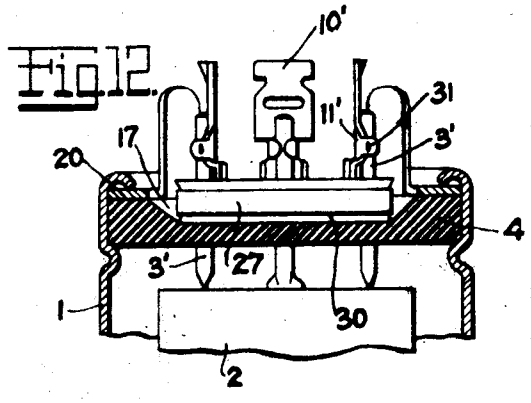


Fig. 12.



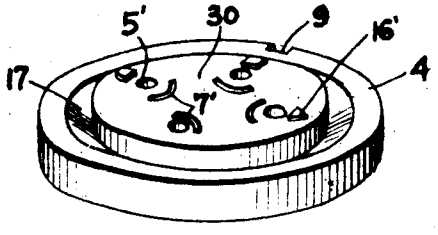


Fig. 13.

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2,264,405

DRY ELECTROLYTIC CONDENSER

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Application August 22, 1939, Serial No. 291,319

14 Claims. (Cl. 175—315)

This invention relates to dry electrolytic condensers and is directed to constructional features principally concerning the suspension of the plate sections from the top of the container, the securement of the top to the container, the attachment of the anode terminals to the top and their juncture to the risers or tabs of the several plate sections, the provision of venting and other features which will be hereinafter pointed out. One of the objects of the invention is to devise a dry electrolytic condenser construction affording fewer parts than heretofore used in commercial practice; in addition to a direct reduction in manufacturing costs, the fewer number of parts further affords economy in manufacture, assembling and replacement costs. A further object is to devise a dry electrolytic condenser manufacturable at a low productive cost, and which, by reason of constructional features and improvements herein pointed out, will stand up better, and will last longer, in operation. A further and incidental object of the invention is to devise a dry condenser construction which would speed up production by making for ease in assembling and also by permitting a single processing operation heretofore performed successively (these manufacturing steps will be more fully described in the following specification).

For the attainment of these and such other objects as may appear or be pointed out, I have shown an embodiment of my invention in the accompanying drawings, wherein:

Fig. 1 is a front view of the condenser, with the container cut away to expose the inside parts;

Fig. 2 is a plan view of the condenser;

Fig. 3 is an enlarged section on the line 3—3 of Fig. 2;

Fig. 4 is a section through the molded rubber top;

Fig. 5 is a plan view of the molded rubber top;

Fig. 6 is a perspective view of the clamping member;

Fig. 7 is a perspective view of a terminal;

Fig. 8 is a front view (with the container cut away) of a condenser, in which the molded rubber top has a single boss;

Fig. 9 is a top view of the condenser showing the single boss top provided with a scalloped edge;

Fig. 10 is a perspective view of the single boss scalloped edge rubber top;

Fig. 11 is a longitudinal section of the condenser showing a threaded nut connection to the chassis;

Fig. 12 is a longitudinal section of a condenser having a single boss molded top with a straight (unscalloped) edge and round risers; and

Fig. 13 is a perspective view of the single boss top of Fig. 12.

The condenser comprises the container or can 1 (to which the cathode connection or connections is made in the usual manner, not shown) and the plate section 2, shown in the drawings as having four risers or tabs 3 (corresponding to the number of sections), although it will be clear that the invention is applicable to a condenser section having a single riser or any required number of risers. For convenience the risers or tabs are shown in most figures of the drawings to be of the flat type; the invention is equally applicable to round type risers such as is shown io Fig. 12. As is customary, the condenser section is suspended from the condenser cover or top 4 by means of its risers. The top 4 is seated on a shoulder formed in the can either as an externally expanding mouth such as is shown in most of the figures or as an internal bead such as appears in Fig. 12.

Heretofore, condenser tops have been made of hard rubber, Bakelite or other stiff material. To my knowledge, I am the first to have made a dry electrolytic condenser top from soft, flexible rubber or molded rubber. A number of advantages and inventive features flow from this invention, which will be presently pointed out. The molded top 4 is provided with a number of slots or holes 5 equal to the number of section risers (four shown in the drawings) of a shape corresponding to the risers (being of the flat type as shown in most of the figures of the drawings, or the round type shown in Fig. 12). The size of the riser slots or holes 5 in the flexible rubber top is such that the risers when inserted therein, will be held frictionally by the resilient rubber of the top.

The frictional engagement of the risers in the appropriate riser slots or holes is also of advantage in expediting and speeding up manufacturing operations. Heretofore, the risers were permanently secured to their respective terminals concurrently with the passing of the riser through the top of the container, and consequently had to be done one at a time; this, in addition to the longer time required, often caused displacement and loosening of the other plate sections and risers. In the use of the novel flexible rubber top of this invention, all the risers—four as illustrated—are inserted through the slots or holes simultaneously and are, together

with the entire plate section, firmly secured (or suspended) from the top of the condenser, and are subsequently secured to the terminals; it should be noted that the molded rubber top itself holds the risers in place. To facilitate the insertion of the risers, the underside of the top may be provided with beveled entrances 6 to the slots or holes.

The upper surface of the top is provided with a number of recesses 7 equal to the number of terminals (which is, of course, equal to the number of section risers; four as shown) and of a shape corresponding to the terminals (which are shown on the flat type, as are the section risers). The terminal recesses 7, unlike the riser slots, do not extend through the top; they serve to seat the lower ends of the terminals 10.

Like the riser slots or holes, the terminal recesses 7 are made of such size that the terminals will be frictionally held in the flexible rubber top. Thus, there is provided a quick securement for the terminals, as is provided for the risers.

The portion of the terminal which is received in the terminal recesses is provided with a punched out or lanced tab 32 (Fig. 7) which serves to hold the terminal in place and prevents its removal from the molded top by reason of the digging in of the lanced tab in the rubber.

After the risers are temporarily secured to the underside of the top (to suspend the condenser section) and the terminals temporarily held in their recesses, the terminals and risers are secured to each other by means of a pair of ears 11 on the terminal which is clinched about the risers (or anode tabs) to make a mechanical and electrical connection between the two.

The terminal recess may be combined with the tab slots (although not going completely through the top as in the case of the slots). I prefer, however, to separate the terminal recess and the slot, see Figs. 3 and 5; one advantage of this arrangement is that greater resiliency and holding ability is imparted to the top in securing both the tab and the terminal. By reason of the spacing of the recess from the slot, a slight offset is provided in the terminal, see Figs. 3 and 7.

The securement of the anode tabs and terminals is completed by means of a clamping member 12, fabricated of a suitable metal such as steel, which effects a tight liquid proof closure. The pairs of tab slots 5 and terminal seats 7 may be grouped together in separate bosses 8, see Fig. 5, or they may be all placed in a single boss 28, Fig. 9. First describing the separate boss construction (there being four bosses 8), clamping member 12, or rather its floor plate 13 is provided with four holes 14 slightly larger than the rubber bosses 8. After the temporary securement of the tabs and terminals as described, the clamping ring is slipped over the molded top, as perhaps best shown in Fig. 2. The clamping member has upstanding walls 15 almost completely surrounding the holes 14 (i. e., except for a portion of one side, the inner, of the holes). The wall 15 is integral with the floor plate 13 at only one side, the outer, of the holes; the remaining portions of the wall being entirely free of the plate, as clearly seen in Fig. 6. The central portion of the top, which contains the bosses, has a countersunk annulus or depression 17 in which the clamping member is received, see specially Fig. 3. After being positioned over the bosses 8, the walls 15 are clinched round the bosses (preferably by a suitable tool, in a single operation) to form a permanent and leakproof connection of the tabs and terminals to the top.

Then, a mounting ring 20 is placed upon the molded top, and the assemblage seated in the shoulders of the can, and the edges thereof spun over the mounting ring, see esp. Fig. 3. Four mounting clips 21 are shown, one of them, viz., 21*a*, being blind.

It is customary in the trade to use certain conventional insignia to indicate the various terminals; these are usually painted upon some convenient part of the condenser top. These conventions, designated 16 in the figures, I have stamped or punched out of the floor plate 13 of the clamping member. The section tabs are colored or otherwise identified according to a code bearing a relation to the said conventions 16. The molded top is provided with a notch 9 (presently more fully described in connection with its cooperation with the mounting ring 20). The colored section tabs are inserted in the slots 5 of the top in a definite prescribed relation to the notch 9 of the top. The clamping member, bearing the conventions 16, is then slipped onto the molded top, the angular coordination between the clamping member and the various plate sections being ascertained by the colored section tabs which project through the molded top (and also by the notch 9 of the top).

Inasmuch as the trade requires a definite relation to be maintained between the conventional insignia 16 and the blind mounting clip 21*a*, provision must be made for maintaining a fixed angular relation between the clamping member which bears the conventions 16 (and, of course, the molded top to which the clamping member is clinched) and the mounting ring 20, which bears one blind clip 21*a*. For this purpose, the notch 9 is provided in the upper surface of the molded top near the edge thereof, and the mounting ring is provided with a lug 22 which is received in the said top notch 9.

Still another advantage flows from the use of a molded rubber (resilient) top and that is in the provision of a very simple and effective vent. For this purpose I provide a counterbore 18, Fig. 3, from the top surface of the molded top and a similar counterbore 18*a* from the underside of the molded top, the two providing a thin diaphragm 25 of resilient, flexible rubber. The center of the diaphragm is pierced by a needle to provide a pierce-hole 25*p* of minute dimension. Under normal conditions, the pierce hole will be closed, by reason of the resiliency of the flexible rubber diaphragm and the minuteness of the hole. However, upon excess pressure being created, the diaphragm will bulge outwardly sufficiently to cause the pierce hole to open up and relieve the pressure.

Instead of a plurality of bosses, a single boss 28 (Figs. 9–11) or 30 (Figs. 12–13) may be used, the former having a plurality of scallops 29 (four shown) around its edge. Encircling the boss of the molded top is a clamping member or ring 27 which is crimped as shown, Figs. 9 and 11, to fit tightly around the boss and its scallops. A mounting ring 20 having clips 21 is then placed around the boss of the top, and the assemblage seated in the can 1, Fig. 8, and the container wall spun over the mounting ring as shown (see also Fig. 11, where a nut mounting is used, presently described). The scallops are omitted in Figs. 12–13, the edge of boss 30

being smooth. In both cases (28 or 30) the boss is surrounded by a countersunk annulus 17 in which the clamping ring 27 is received.

Where the smooth (non-scalloped) single boss is used, Figs. 12–13, I prefer to use the round type of riser 3', see Fig. 12; in this case, round slots 5' is provided through the molded top, Fig. 13. The terminals 10', Fig. 12, used in conjunction with the round risers are preferably arcuate and received in arcuate shaped recesses 7' in the top surface of the molded top, see Fig. 13. The ears 11' of the terminals are clinched around the risers 3', Fig. 12, and crimped (31) into the softer metal of the riser (the terminals and risers being made of steel and aluminum, respectively).

In place of the clip mounting ring, the condenser may be secured to the chassis 19, Fig. 11, by means of a nut 23 which is threaded onto a threaded bushing 26. The bush 26 and molded top 4 are seated together in the can 1 and the container wall spun over the flange of the bushing. The condenser is mounted on the chassis, with the bushing passing through an appropriate hole in the chassis; a washer or gasket 24 of resilient material is placed around the bushing and the nut 23 screwed down to form the mechanical and leak-tight mounting.

The terminal conventions in the case of the single boss top (28 or 30) may be molded on the top surface of the top, designated 16', Figs. 9 and 10.

I claim:

1. A terminal closure construction for dry electrolytic condensers of the type which includes a container having a plurality of condenser sections each having a riser and a plurality of terminals equal to the number of risers, the said terminal closure construction comprising a molded top of resilient rubber provided with openings for the said section risers whereby the sections are suspended from the molded top, the risers being frictionally held in their said opening, the upper surface of the molded top being provided with recesses for the said terminals whereby the terminals are frictionally held in their said recesses, the terminals being provided with ears clinched over the risers extending through the molded top to form a permanent mechanical and electrical connection between the two, the upper surface of the molded top being formed into a single boss provided with a scalloped edge, and a clamping member encircling the said scalloped boss and crimped therearound to form a permanent leak-tight connection.

2. A terminal closure construction for dry electrolytic condensers of the type which includes a container having a plurality of condenser sections each having a riser and a plurality of terminals equal to the number of risers, the said terminal closure construction comprising a molded top of resilient rubber provided with openings for the said section risers whereby the sections are suspended from the molded top, the risers being frictionally held in their said openings, the upper surface of the molded top being provided with recesses for the said terminals whereby the terminals are frictionally held in their said recesses, means for forming a permanent mechanical and electrical connection between the terminals and the risers, the upper surface of the molded top being formed into a single boss provided with a scalloped edge, and a clamping member encircling the said scalloped boss and crimped therearound to form a permanent leak-tight connection.

3. A terminal closure construction for dry electrolytic condensers of the type which includes a container having a plurality of condenser sections each having a riser and a plurality of terminals equal to the number of risers, the said terminal closure construction comprising a molded top of resilient rubber provided with openings for the said section risers whereby the sections are suspended from the molded top, the risers being frictionally held in their said openings, the upper surface of the molded top being provided with recesses for the said terminals whereby the terminals are frictionally held in their recesses, the terminals being provided with ears clinched over the risers extending through the molded top to form a permanent mechanical and electrical connection between the two, and a clamping member for permanently securing the said risers and terminals in the said molded top.

4. A terminal closure construction for dry electrolytic condensers of the type which includes a container having a plurality of condenser sections each having a riser and a plurality of terminals equal to the number of risers, the said terminal closure construction comprising a molded top of resilient rubber provided with openings for the said section risers whereby the sections are suspended from the molded top, the risers being frictionally held in their said openings, the upper surface of the molded top being provided with recesses for the said terminals whereby the terminals are frictionally held in their said recesses, means for forming a permanent mechanical and electrical connection between the terminals and the risers the upper surface of a molded top being formed into a single boss, and a clamping member encircling the said boss and crimped therearound to form a permanent leak-tight connection.

5. A terminal closure construction for dry electrolytic condensers of the type which includes a container having a plurality of condenser sections each having a riser and a plurality of terminals equal to the number of risers, the said terminal closure construction comprising a molded top of resilient rubber provided with openings for the said section risers whereby the sections are suspended from the molded top, the risers being frictionally held in their said openings, the upper surface of the molded top being provided with recesses for the said terminals whereby the terminals are frictionally held in their said recesses, a pair of the said riser slots and said recesses being separated by a wall of resilient rubber, and the terminals being offset to contact their respective section risers.

6. A terminal closure construction for dry electrolytic condensers of the type which includes a container having a plurality of condenser sections each having a riser identified according to a predetermined scheme and a mounting ring of stiff material having a plurality of mounting clips one of which is blind, the said terminal closure construction comprising a molded top of resilient rubber provided with a notch and provided with openings for the said section risers inserted therein according to their said identifications in a predetermined angular relation to the said top notch, and a clamping member bearing conventional insignia positioned on the molded top in a predetermined angular relation to the identified section risers and the said top

notch, the said mounting ring having a depending lug received in the said top notch to maintain the said blind clip of the mounting ring in a predetermined relation to the said conventional insignia of the clamping member.

7. A terminal closure construction for dry electrolytic condensers of the type which includes a container having a plurality of condenser sections each having a riser identified according to a predetermined scheme and a mounting ring of stiff material having a plurality of mounting clips one of which is blind, the said terminal closure construction comprising a molded top of resilient rubber provided with a notch and provided with openings for the said section risers, and a clamping member bearing convention insignia positioned on the molded top, the said mounting ring having a depending lug received in the said top notch to maintain the said blind clip of the mounting ring in predetermined relation to the said conventional insignia of the clamping member.

8. A terminal closure construction for dry electrolytic condensers of the type which includes a container having a plurality of condenser sections each having a riser, a plurality of terminals equal to the number of risers and a mounting ring of stiff material having a plurality of mounting clips, the said terminal closure construction comprising a molded top of resilient rubber provided with a notch and openings for the said sectional risers whereby the sections are suspended from the molded top, the risers being frictionally held in their said openings, and a clamping member positioned on the molded top for permanently securing the said risers and terminals therein, the said mounting ring having a depending lug receivable in the said notch of the molded top.

9. A terminal closure construction for dry electrolytic condensers of the type which includes a container having a plurality of condenser sections each having a riser identified according to a predetermined scheme and a plurality of terminals equal to the number of risers, the said terminal closure construction comprising a molded top of resilient rubber provided with openings for the said section risers whereby the sections are suspended from the molded top, the risers being frictionally held therein, and a clamping member for permanently securing the said risers and terminals in the said molded top, the said member having punched out conventional insignia correlated to the said identified section risers.

10. A terminal closure construction for dry electrolytic condensers of the type which includes a container having a plurality of condenser sections each having a round riser and a plurality of terminals equal to the number of risers, the said terminal closure construction comprising a molded top of resilient rubber provided with holes for the said section risers whereby the sections are suspended from the molded top, the risers being frictionally held in their said holes, the upper surface of the molded top being provided with recesses for the said terminals whereby the terminals are frictionally held in their said recesses, the terminals being provided with ears clinched over the risers extending through the molded top to form a permanent mechanical and electrical connection between the two, the upper surface of the molded top being formed into a single boss, and a clamping member encircling the said boss and clinched therearound to form a permanent leak-tight connection.

11. A terminal closure construction for dry electrolytic condensers of the type which includes a container having a plurality of condenser sections each having a riser identified according to a predetermined scheme, the said terminal closure construction comprising a molded top of resilient rubber provided with openings for the said section risers whereby the sections are suspended from the molded top, the risers being frictionally held in their said openings, the upper surface of the molded top being formed into a single boss provided with a scalloped edge, and a clamping member encircling the said scalloped boss and crimped therearound to form a permanent leak-tight connection, the top surface of the top being provided with conventional insignia correlated to the said risers.

12. A terminal closure construction for dry electrolytic condensers of the type which includes a container having a plurality of condenser sections each having a riser identified according to a predetermined scheme, the said terminal closure construction comprising a molded top of resilient rubber provided with openings for the said section risers whereby the sections are suspended from the molded top, the risers being frictionally held in their said openings, the upper surface of the molded top being formed into a single boss, and a clamping member encircling the said boss and crimped therearound to form a permanent leak-tight connection, the top surface of the top being provided with conventional insignia correlated to the said risers.

13. A terminal closure construction for dry electrolytic condensers of the type which includes a container having a plurality of condenser sections each having a riser, the said terminal closure construction comprising a molded top of resilient rubber provided with openings for the said section risers whereby the sections are suspended from the molded top, the risers being frictionally held in their said openings, the top surface of the molded top being provided with a large central cavity presenting a depressed surface, a plurality of bosses equal to the number of said section risers upstanding from the said depressed surface, and a metallic clamping member received in the said cavity and provided with walls clamped about the said bosses to form a permanent leak-tight connection.

14. A terminal closure construction for dry electrolytic condensers of the type which includes a container having a plurality of condenser sections each having a riser, the said terminal closure construction comprising a molded top of resilient rubber provided with openings for the said section risers whereby the sections are suspended from the molded top, the risers being frictionally held in the said openings, the top surface of the molded top being annularly countersunk to leave a large central boss, and a metallic clamping member received in the said annular countersink to encircle the said central boss and clamped therearound to form a permanent leak-tight connection.

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