

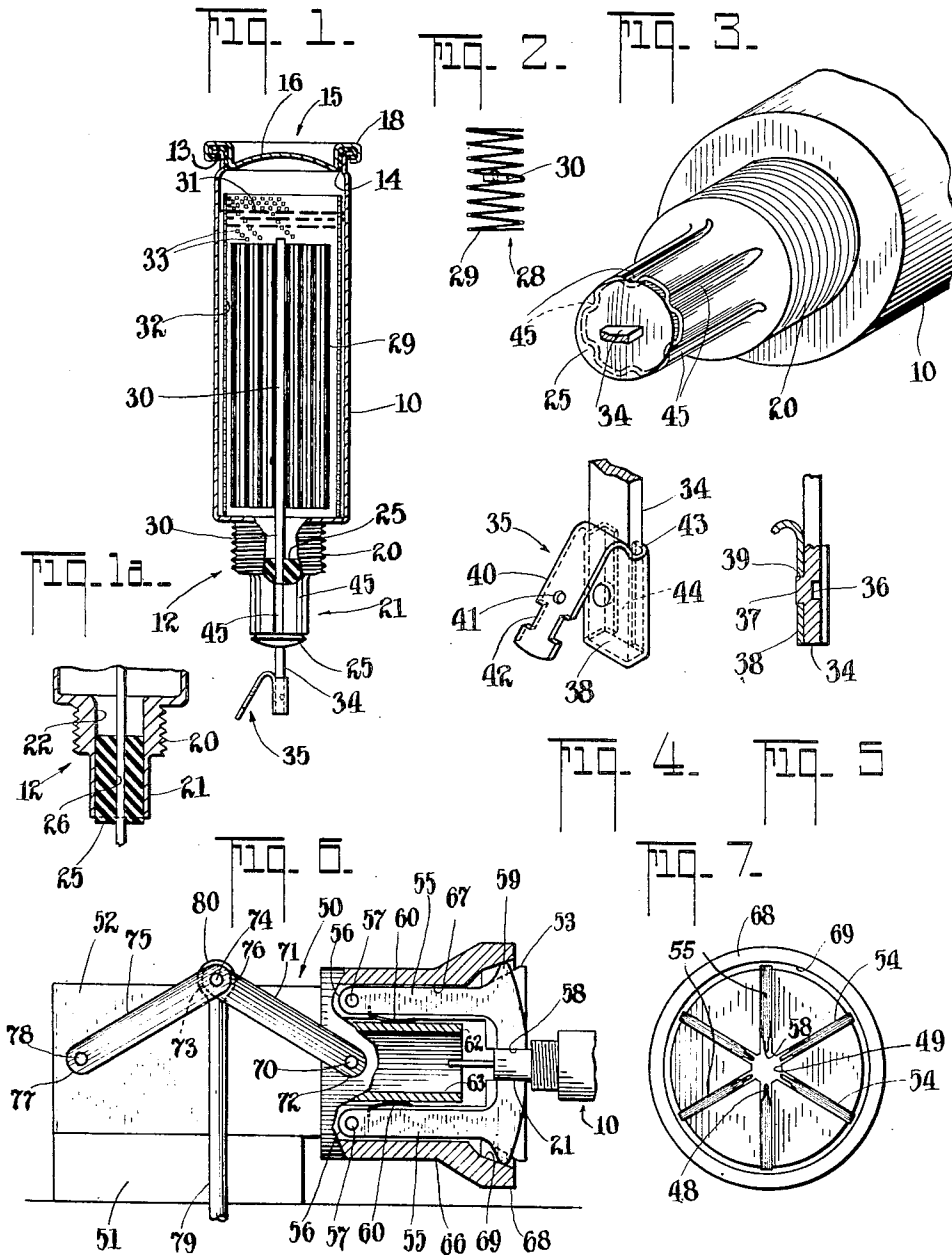
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ELECTROLYTIC CONDENSER

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ELECTROLYTIC CONDENSER

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Our invention relates to electrolytic devices and more particularly to improvements in the construction of electrolytic condensers.

Our invention will be described in connection with "wet" electrolytic condensers as used for filter circuits of radio receiving devices, but is not restricted thereto.

Electrolytic condensers of the aforesaid type consist as a rule of one or more film-forming electrodes, immersed in a suitable electrolyte and having a closed and sealed metallic container. An extension of the electrode or electrodes, usually referred to as the anode riser, projects from the container for the outside connection of the electrode.

The air and liquid-tight closure and sealing of an electrolytic condenser around the anode riser is a problem the difficulty of which is well recognized and which has been approached in different ways.

While there are various satisfactory seal constructions available for this purpose, these constructions are comparatively expensive and the cost of the parts performing the sealing functions constitute a relatively large portion of the total cost of the condenser.

One object of the present invention is to provide a novel construction and method for sealing the container where the anode riser protrudes therefrom, which requires few and inexpensive parts, is easy to assemble and which at the same time provides for a seal, the effectiveness of which is equal or superior to those of the best available seal constructions.

Another object of our invention is to provide an anode riser of great simplicity, and means for its outside electrical connection.

Other objects and novel features of our invention will appear as the specification progresses.

In the drawing forming part of the specification:

Figure 1 is a side elevation partly in section of an electrolytic condenser embodying our invention.

Fig. 1a is a fractional section of the lower end of the condenser of Fig. 1, prior to the fluting of the seal.

Fig. 2 is a top view of the anode assembly.

Fig. 3 is a fractional perspective view of the end of a condenser embodying the fluted seal construction of our invention.

Fig. 4 is a perspective view of the free end of the anode riser with a lug secured thereto according to the invention.

Fig. 5 is a partly sectionized side elevation of Fig. 4.

Fig. 6 is a side view, partly in section, of a tool to form a fluted seal according to the invention, also showing the condenser end as inserted in the tool for its fluting.

Fig. 7 is an end view of the tool of Fig. 6 seen from the right.

Referring more particularly to the drawing, the condenser comprises a cylindrical metallic container 10, which preferably constitutes the cathode of the condenser and which may be either of film-forming or non-film-forming metal. The container 10 is provided with a reduced tubular extension 12.

The anode assembly 28 consists of a corrugated thin aluminum foil 29 having the shape of an accordion pleating, which is secured by means of welding or by rivets to the anode riser 30 consisting of a straight rod of rectangular shape, which projects with its end 34 beyond the extension 12. The anode riser 30 consists of aluminum or of other, preferably film-forming, metal.

Interposed between the container 10 and the anode assembly 28 is an insulator, for instance, a thin hard rubber cylinder 32, which is provided with perforations 33.

The extension sleeve 12 comprises an intermediate threaded portion 20, and an end or neck portion 21. The portion 20 is adapted to receive a nut by means of which the condenser may be attached to a suitable base.

The neck 21 has preferably the same inside diameter as the intermediate threaded portion 20, so that the two have a common uniform bore 22; however, the wall thickness of the neck portion 21 is much less than that of the intermediate portion 20. The diameter of the bore 22 is preferably not much in excess of that required for the passage of the anode riser 30.

Disposed within the neck 21 is a plug 25 of soft rubber or similar resilient gasket-material. The plug 25 is provided with a bore 26 through which is forced the anode riser end 34. The plug 25 slightly extends, on both ends, beyond the neck portion 21; while the diameter of the plug 25 may be slightly in excess of that of the bore 22, so that a certain sealing effect is obtained when the plug with the riser is inserted in the neck, however, the proper liquid and air-tightness of the seal between the plug 25 and the neck 21 and anode riser 30 is obtained by the fluting operation more fully described hereafter.

At its end 34 the anode riser 30 is provided with

a connection lug 35 for the outside electrical connection of the anode.

The lug 35 (see Figs. 4 and 5) comprises a shoe portion 38 which is crimpedly surrounding the end 34 of the anode riser 30, except for an opening 44 left on one of the flat sides of the shoe. The other flat side of the shoe is provided with a hole 39 which opposes the opening 44. At one point the end 34 of the riser 30 is beforehand provided by a simple punching operation with a pin-shaped protuberance 37, thus causing a corresponding depression 36 on the other side of the riser. The protuberance 37 fits in the hole 39 of the lug 35 and is riveted over the lug. The sides 43—43 of the lug are then crimped around the end 34 of the riser, thus forming an intimate mechanical and electrical connection between the riser 30 and the lug 35 without requiring special rivets or other attachment means.

The bent or offset portion 40 of the lug 35 serves for the attachment of suitable electric conductors such as wires or bands (not shown.) The portion 40 may be provided with a hole 41 and notches 42, into and around which the wires or bands may be suitably secured; furthermore, the wires or bands may also be soldered to the lug.

A liquid electrolyte 31 is provided in the container, for instance, an aqueous solution of ammonium-borate and boric acid, with which the container is filled close to its top.

The cylindrical container 10 is provided with a flange 13 at its open top end. To close the container, a metal cap 15 is provided which is crowned or arched at its central portion 16 and which has a flange 18, which with the interposition of a vent-gasket 14, is crimped around the flange 13. Such a vent-gasket has been disclosed in the copending application of Robert C. Sprague and Joseph L. Collins, Ser. No. 655,978, filed February 9, 1933, now Patent No. 1,969,630, and as is fully set forth in said patent, provides for a liquid-tight seal, which, however, permits the escape of the gases which are liberated in the operation of the condenser.

Such a vent-gasket may consist of finely meshed gauze, impregnated with wax and in conjunction with a crowned cap, permits the liberated gases to build up in the condenser to considerable pressures. This, as has been explained in the above-referred to patent, greatly reduces the usual loss in the volatile components of the electrolyte.

Referring now to our novel fluted sealing means provided around the anode riser, these sealing means form an important improvement on the sealing means disclosed in the copending application to Robert C. Sprague and John F. McCann, Ser. No. 606,943, filed April 22, 1932.

In said application the seal is obtained by crimping a sleeve extension of the container around a rubber plug through which the anode riser projects in such a manner that two opposing axial ridges are formed in the sleeve, thereby so squeezing the rubber of the plug that a liquid and air-tight seal is obtained between them.

According to the present invention, the anode riser is forced through a rubber plug, said rubber plug being then forced into the container neck. The neck containing the plug and riser is then crimped or fluted to form axial depressions or "flutes", uniformly and closely spaced around the surface of the neck. This fluting operation impresses the inside of the fluted portions into the rubber plug, said plug being deformed in its portion falling within the neck, to the contour of

the inside of the flutes, beyond which the plug slightly expands or bulges.

The fluting operation is done by a device 50 shown in Figs. 6 and 7, and consists of a suitable base 51 on which is horizontally mounted a cylindrical and partly hollow member 52, the right end of which is outwardly tapered at 53. At its right end the member 52 is provided with six radial slots 54 uniformly spaced and joining a central circular bore 49. A set of forming or "fluting" fingers 55 approximately equal in width to the slots 54 are pivotally disposed therein, the ends 56 fitting pivots 57 secured to the horizontal member 52. The free ends of the fingers terminate at the outside in cam-shaped ends 59 and at the inside in an edge 58 of reduced width shaped to form the desired flute in the neck of the condenser container. Near the pivotal ends the fingers are provided with springs 60 suitably fastened thereto and bearing with their free ends on the outer surface of a hollow cylindrical sleeve 62 of the member 52.

A collar 66, having a bore 67, is slidably mounted on the member 52, and is enlarged at one end at 68 and provided with a flaring opening, the inner surface 69 of which engages the cam-like projections 59 of the fingers 55.

The movement to the right of the collar 66 is effected through a link arrangement controlled by a rod 79 connected for instance, to a foot-pedal (not shown). Two pairs of links may be used, one on either side of the member 52, but as here illustrated, only one pair is shown. The rod 79 is provided with an enlarged end 80 carrying a pivot 74. The ends 73 and 76 of two links 71 and 75 are both pivoted about the pin 74 while their other ends 72 and 77 are pivoted on pivots 70 and 78 respectively, the former being mounted on the collar 66 and the latter on the member 52.

It will appear that the downward movement of the rod 79 results in the rightward movement of the collar 66, which forces the fingers 55 inwardly, whereby their ends 58 are pressed into the neck 21 of the condenser. The movement of the collar 66 is suitably stopped by its engagement with the tapered edge 53, which fixes the depth of the flutes 45 formed in the neck 21 by the edges 58 of the fingers 55. In this simple manner a highly satisfactory liquid and air tight seal is provided between the neck 21 the plug 25 and anode riser 30.

If desired the threaded portion 20 may be omitted, in which case the fluted neck 21 may extend directly from the lower portion of the container. In this case other holding means are preferably supplied, as for instance, a simple form of clamp encircling the body of the condenser itself, as described in the above referred to application of Sprague and McCann.

While we have described a particular embodiment of our invention in connection with a "wet" electrolytic condenser, it will be understood that the invention is capable of variations and changes in the construction, combination and arrangement of parts thereof, and is applicable to other types of electrolytic condensers, as well as other electrolytic devices in general, and therefore the appended claims should be construed as broadly as permissible in view of the prior art.

What we claim as new and desire to secure by Letters Patent is:

1. An electrolytic condenser having a metallic container provided with an integral sleeve extension, an electrode within said container and a rod member connected to said electrode, a plug

of resilient material disposed in said sleeve, said rod member extending through said plug, said sleeve being provided with axially extending flutes which are impressed in said plug.

5 2. An electrolytic condenser comprising a container having a neck portion, an electrode within said container and a rod member supporting said electrode, a plug of gasket material disposed in said neck and said rod member extending through said plug, said sleeve having alternate longitudinal flutes and ridges along its periphery, said flutes being impressed in said plug.

10 3. An electrolytic condenser having a container and an electrolyte in said container, said container being provided with a reduced hollow neck portion, a plug of resilient material disposed in said neck portion, and longitudinal flutes and ridges impressed in said neck and plug to provide a liquid and air-tight seal for the condenser.

15 4. An electrolytic condenser comprising a container having an integral extension, said extension having a threaded intermediate portion and a reduced end portion, and a bore of uniform diameter through said intermediate and end portions, a plug disposed within said bore and said end portion being axially fluted, said flutes being impressed in said plug to provide a liquid and air-tight seal for the container.

20 5. An electrolytic condenser having a metallic container provided with an integral extension neck, an electrode within said container and a rod member supporting said electrode, a rubber plug disposed in said neck, said rod member extending through said plug, said sleeve and plug

being provided along their periphery with alternate axially extending flutes and ridges, said rubber plug bulging out at the end of the neck.

6. An electrolytic condenser having a container and an electrolyte therein, said container being provided with a hollow integral neck portion, a plug of resilient material disposed in said neck portion and axially extending flutes and ridges impressed in said neck and in said plug, said flutes and ridges having substantially the same width.

7. In the manufacture of an electrolytic condenser, the process which comprises the steps, snugly inserting in a plug of gasket material an electrode supporting rod, inserting the electrode supported by said rod into a container provided with a sleeve-like extension in such a manner that the plug is forced within said sleeve, and subjecting said sleeve and plug to axial fluting by simultaneously pressing in said sleeve a plurality of equidistantly spaced fluting members.

8. In the manufacture of an electrolytic condenser the process which comprises the steps, inserting a rubber plug in a hollow neck extension of the condenser container, subjecting said neck to deformation by simultaneously and gradually pressing equidistantly spaced fluting fingers into said neck to impress axially extending flutes in said neck and plug and limiting the movement of said fingers to obtain a predetermined depth of the flutes.

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