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J. T. HOOD

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ELECTROLYTIC CONDENSER

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Fig. 1

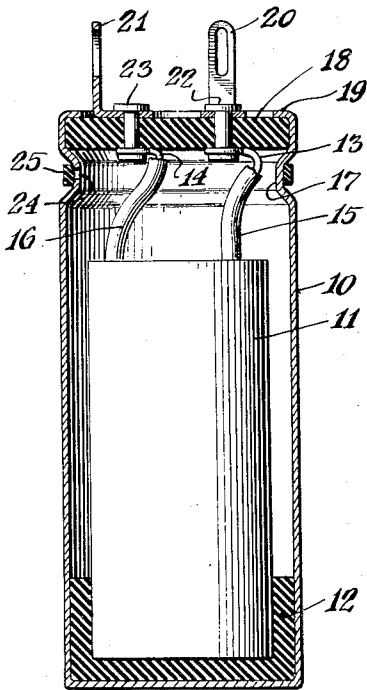


Fig. 2

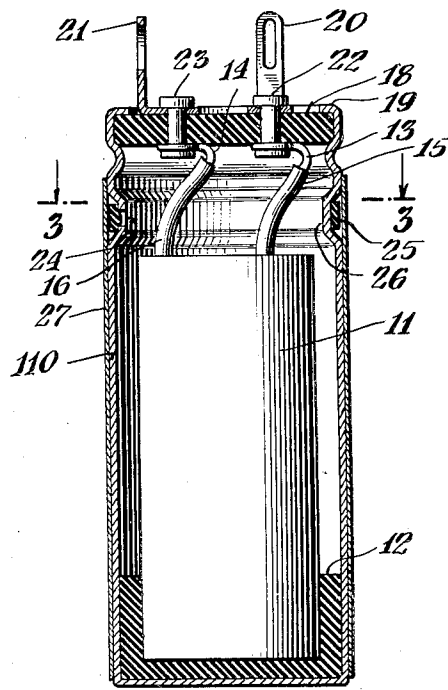


Fig. 4

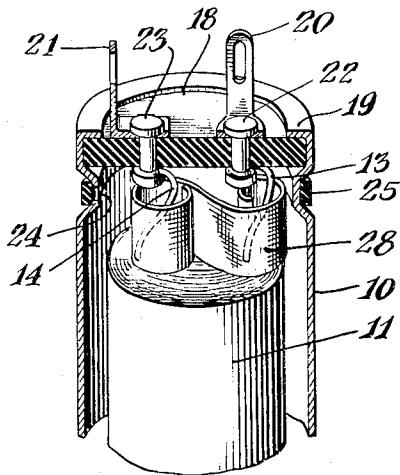
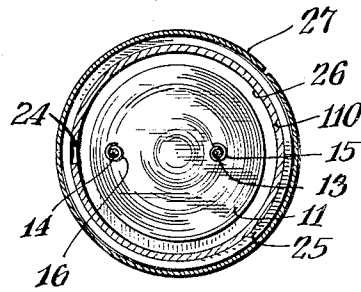


Fig. 3



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ELECTROLYTIC CONDENSER

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8 Claims. (Cl. 175—315)

This invention relates to electrolytic condensers and more particularly to the structures thereof.

An object of the invention is to provide an electrolytic condenser of improved construction.

5 Other objects of the invention will be apparent from the following description and accompanying drawing taken in connection with the appended claims.

10 The invention comprises the features of construction, combination of elements, arrangement of parts, and methods of manufacture and operation referred to above or which will be brought out and exemplified in the disclosure hereinafter set forth, including the illustrations in the drawing, the scope of the invention being indicated in the appended claims.

15 For a fuller understanding of the nature and objects of the invention as well as for specific fulfillment thereof, reference should be had to the following detailed description taken in connection with the accompanying drawing, in which:

20 Figure 1 is a longitudinal section of a dry electrolytic condenser embodying the invention;

25 Figure 2 is a longitudinal section of a modified form;

Figure 3 is a section on the line 3—3 of Figure 2; and

30 Figure 4 is a perspective view, with parts broken away, of a dry electrolytic condenser of modified form.

Like reference characters denote like parts in the several figures of the drawing.

35 While a preferred embodiment of the invention is described herein, it is contemplated that considerable variation may be made in the method of procedure and the construction of parts without departing from the spirit of the invention. In the following description and in the claims, 40 parts will be identified by specific names for convenience, but they are intended to be as generic in their application to similar parts as the art will permit.

45 In operation of electrolytic condensers under certain conditions, some gas may be evolved within the unit. If the condenser elements were confined in a hermetically sealed container an excessive pressure might develop over a period of time, in some cases reaching dangerous proportions. In order to prevent such an occurrence 50 some form of vent is necessary which will relieve excess pressures and still prevent evaporation of the electrolyte and exclude foreign matter which might contain corrosive impurities or excess moisture.

According to one aspect of the present invention a novel vent construction is provided, one form of which is shown in Figure 1. The dry electrolytic condenser here illustrated comprises 5 a metal can or container 10, preferably of aluminum, having therein a condenser section or roll 11, comprising a pair of foils of film-forming metal, such as aluminum, rolled together with a pair of porous sheet spacers therebetween, said spacers being saturated with an electrolyte. At 10 least one of the foils is film-formed.

The condenser section 11 is held at its base in a mass of pitch or other insulating material 12 and a pair of terminal conductors 13 and 14, preferably of the same metal as the electrodes, 15 are connected, respectively, to the two electrodes. These are covered with sheaths 15 and 16 which prevent direct metallic contact between the terminal conductors and the container wall.

20 An annular groove or bead 17 previously rolled into the container 10 near its open upper end supports a circular cover disc 18. Disc 18, of insulating material, such as sheet Bakelite or other resin, is fitted into the open end of container 10 and rests on internal bead 17. The free edge 19 of 25 container 10 is spun over the top edge of disc 18 thereby securely holding disc 18 in place and sealing the top of container 10.

A pair of terminals 20 and 21 are riveted to the outer face of disc 18 for providing external 30 circuit connections, rivets 22 and 23 passing through disc 18 and being connected to terminal conductors 13 and 14 respectively within the container.

35 The vent construction is provided by piercing a small hole 24 in the side of container 10 at the bottom of annular groove 17. A rubber band 25 of suitable tension is then stretched around container 10 in groove 17 so as to cover hole 24. The tension of the rubber band causes it to be de- 40 formed within the hole, effecting a perfect seal against external pressures. The seal thus provided will also resist a certain amount of internal pressure but before such internal pressure becomes excessive the rubber will yield sufficiently 45 to let out the gas developed inside the unit thereby reducing the pressure to a normal value. The seal will then again be closed by the rubber band tension. The amount of internal pressure required to cause venting can be predetermined by 50 selecting a rubber band of the required tension.

The band is prevented from dislodgement by being placed in groove 17 below the general surface of the container 10.

Figures 2 and 3 illustrate a modification gen- 55

erally similar to that of Figure 1 except that a special groove 26 is provided for holding the rubber band. Additional protection against dislodgement is also provided in this instance by a paper label 27 which is pasted around the container 10 and over groove 26, the depth of the groove preferably allowing a slight spacing between the rubber band and the label.

The present vent construction, while described in connection with a dry electrolytic condenser may also be applied to other condensers of the prior art, such as wet electrolytic condensers.

A further feature of my invention lies in the method of preventing metallic contact between terminal conductors 13 and 14 and the container 10 or between each other.

Heretofore, it has been the general practice to attempt to insulate these connecting tabs from themselves, and from the conductive container, which in some instances forms the negative side of the circuit, by means of non-conductive insulators, that is, paper or gauze or fabric, sheet or tubing, either laid between, around or inserted over the tabs, these absorbent non-conductive materials being impregnated with wax or varnish, or some such material, in an attempt to prevent the absorption of electrolyte or condensation of electrolyte vapors that occur within the condenser. This type construction has the following disadvantages:

Some impregnated materials are non-flexible and thus must be handled hot in order to assemble within the unit. Other materials crack when bent, allowing a path of low resistance in case this crack falls opposite another tab or comes in contact with the container. In case such a weakness exists in a condenser, as quite common where a number of tabs are forced down into a narrow space so as to be pressed against the container sides, it is likely that a spark may occur through the weakened insulator. In the case of materials impregnated with insulating compounds or non-impregnated materials, the tendency is for the separator to carbonize, eventually causing a permanent short circuit.

Another fault lies in the fact that it is almost impossible to obtain an impregnating compound that is absolutely impervious to the absorption of moisture, or electrolyte. Consequently, it is quite common for condenser using the construction generally used in the past, to have the tab insulators absorb sufficient electrolyte or moisture caused by condensation, to become partially conductive. In such cases, the impurities in the separator and the impregnating compound, and the incomplete impregnation with a good electrolyte, tends to cause corrosion, resulting in a severance of the tab, which causes an open circuit, rendering the condenser inoperative.

It has also been found that the insulation of these terminal conductors or tabs in the ways heretofore employed has been a very sizable item of expense. According to the present invention a more economical sheathing has been provided which is free from the above mentioned disadvantages.

The sheaths 15 and 16 of Figures 1, 2 and 3, according to this invention, are made of strips or sleeves of highly purified absorbent sheet material such as very fine gauze muslin or absorbent paper. Other materials such as are used as spacers in dry electrolytic condensers may also be suitable.

These sheaths are impregnated with a film-forming electrolyte preferably of the same com-

position as the electrolyte used to impregnate the porous spacer between the electrodes in condenser section 11.

With this arrangement if the sheathed tabs 13 and 14 come into contact with each other or with the wall of container 10 the metal surfaces are separated by the electrolyte-impregnated absorbent sheet layer or layers and will, in effect, act as small electrolytic condensers. The tabs 13 and 14 may be film-formed before assembly. The electrolyte in the sheaths has all the self-healing characteristics of the condenser itself.

It may be desirable to provide a small excess of electrolyte within the container 10 to keep the sheaths saturated with electrolyte at all times. This excess electrolyte may be the same as that used for impregnation of the condenser section or may be more fluid, if desired. Due to the freedom from impurities made possible by this invention no corrosion will take place.

Figure 4 shows a modification in which a single strip of electrolyte impregnated porous material 28 is interposed between the tabs 13 and 14 and the container 10 instead of the individual sheaths illustrated in the other figures. The result is the same.

While the present invention, as to its objects and advantages, has been described herein as carried out in specific embodiments thereof, it is not desired to be limited thereby but it is intended to cover the invention broadly within the spirit and scope of the appended claims.

What is claimed is:

1. A dry electrolytic condenser comprising a condenser section comprising a pair of electrodes of film-forming metal, spacing means and a film-maintaining electrolyte between said electrodes, a pair of terminal conductors connected respectively to said electrodes and extending outwardly from said condenser section, a protective sheath of porous material between said terminal conductors in the region outside said condenser section and a film-maintaining electrolyte held within the pores of said sheath.

2. A dry electrolytic condenser comprising a condenser section comprising a pair of electrodes of film-forming metal, a porous sheet spacer therebetween, a film-maintaining electrolyte held in said spacer, a pair of terminal conductors connected respectively to said electrodes and extending outwardly from said condenser section, a protective sheath of porous material between said terminal conductors where said conductors extend beyond said condenser section and a film-maintaining electrolyte held within the pores of said sheath, said sheath being substantially free of corrosive agents.

3. A dry electrolytic condenser comprising a pair of sheet electrodes of film-forming metal, porous sheet spacers therebetween and a film-maintaining electrolyte held in said spacers, terminal conductors of film-forming metal connected to said electrodes and extending beyond the edges of said spacers and a porous electrolyte-holding protecting layer between at least one of said terminal conductors and surrounding parts protecting said terminal conductor beyond the edge of said spacer.

4. A dry electrolytic condenser comprising a pair of sheet electrodes of film-forming metal, porous sheet spacers therebetween and a film-maintaining electrolyte held in said spacers, terminal conductors of film-forming metal connected to said electrodes and extending beyond the edges of said spacers and a porous electrolyte-

pervious sheath over at least one of said terminal conductors and extending beyond the edges of said spacers.

5 5. A dry electrolytic condenser comprising a pair of sheet electrodes of film-forming metal, porous sheet spacers therebetween and a film-maintaining electrolyte held in said spacer, said electrodes and spacers being rolled into a compact substantially cylindrical roll, terminal con-
 10 ductors of film-forming metal connected to said electrodes and extending out from an end of said roll and a porous electrolyte-pervious protecting layer surrounding at least one of said terminal conductors beyond the end of said roll.

15 6. A dry electrolytic condenser comprising a pair of sheet electrodes of film-forming metal, porous sheet spacers therebetween and a film-maintaining electrolyte held in said spacer, said electrodes and spacers being rolled into a com-
 20 pact substantially cylindrical roll, integral terminal tabs of film-forming metal connected to said electrodes and extending out from an end of said roll and a porous electrolyte-pervious protecting layer surrounding at least one of said integral
 25 terminal tabs beyond the end of said roll.

7. A dry electrolytic condenser comprising a pair of sheet electrodes of film-forming metal, porous sheet spacers therebetween and a film-maintaining electrolyte held in said spacer, said
 30 electrodes and spacers being rolled into a com-

pact substantially cylindrical roll, terminal con-
 ductors of film-forming metal connected to said electrodes and extending out from an end of said roll, a container surrounding said roll and terminal conductors and having securing terminals ex-
 5 tending through a wall thereof, said terminal conductors being secured to said securing terminals, and a porous electrolyte-pervious protecting layer surrounding at least one of said terminal
 10 conductors between the end of said roll and said securing terminals.

8. A dry electrolytic condenser comprising a pair of sheet electrodes of film-forming metal, porous sheet spacers therebetween and a film-maintaining electrolyte held in said spacers, said
 15 electrodes and spacers being rolled into a compact substantially cylindrical roll, elongate terminal conductors of film-forming metal connected at one end to said electrodes and extend-
 20 ing out from an end of said roll, a container surrounding said roll and terminal conductors, securing terminal lugs extending through a wall of said container said terminal conductors being
 25 secured at their outer ends to said securing terminal lugs, and a porous electrolyte-pervious sleeve surrounding each of said terminal conductors within said container between the end
 of said roll and said securing terminal lugs.

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