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L. J. BARWOOD

2,014,409

FILM CUT-OUT

Filed June 8, 1932

Fig. 1.

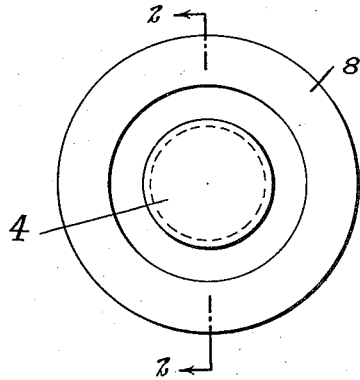


Fig. 2.

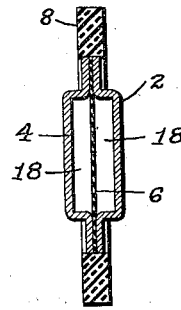


Fig. 3.

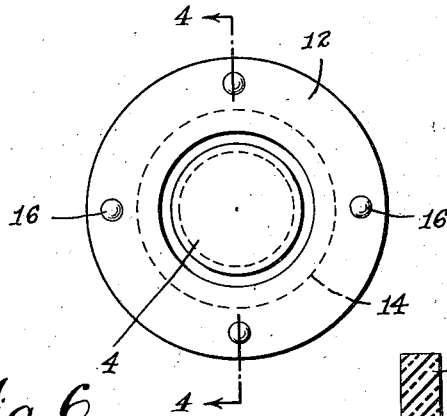


Fig. 4.

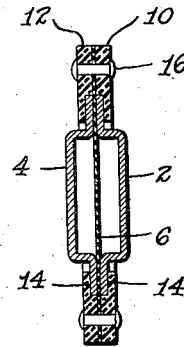


Fig. 6.

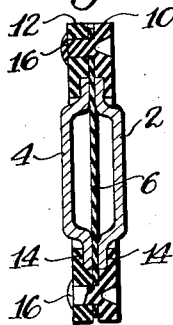
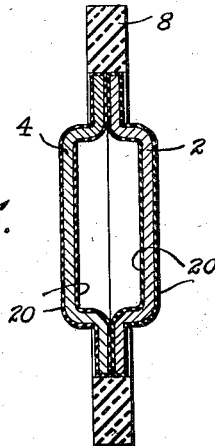


Fig. 5.



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# UNITED STATES PATENT OFFICE

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## FILM CUT-OUT

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23 Claims. (Cl. 200—118)

The present invention relates to film cut-outs, and its object is to provide a new and improved film cut-out that shall be simple in construction, cheap to manufacture, very efficient in operation, and exceedingly uniform in its dielectric characteristics and consequent break-down voltage.

The invention will be more fully described in connection with the accompanying drawing, in which Fig. 1 is an elevation of a film cut-out embodying the present invention; Fig. 2 is a diametrical section taken upon the line 2—2 of Fig. 1, looking in the direction of the arrows; Fig. 3 is a view similar to Fig. 1 of a modification; Fig. 4 is a section taken upon the line 4—4 of Fig. 3, looking in the direction of the arrows; Fig. 5 is an enlarged and exaggerated section of a further modification corresponding to the embodiment shown in Figs. 1 and 2; and Fig. 6 is a section of another modification.

A film cut-out may comprise two members 2 and 4, of conducting material, like metal, insulated from each other in any desired manner, as by means of an insulating film 6 disposed between and separating the conducting members, as illustrated in Figs. 1 to 4 and 6. The separating film 6 may, however, be omitted and the surfaces of the metal members 2 and 4 may be covered with a suitable insulating coating 20 of an oxide of the metal instead, as illustrated in Fig. 5. The metal may, for example, be aluminum. The oxide coating 20 is shown as completely encasing the metal members 2 and 4 (except possibly, where the outer surfaces of the members 2 and 4 may be engaged by suitable electrodes) but, in practice, it is only necessary to have the insulating coating along the contacting inner surfaces of the members 2 and 4. It will be understood that the oxide coating may also be employed in the modification illustrated in Figs. 3, 4 and 6.

The film 6 may be of silk or any other desired material, but it is preferred, according to the present invention, to employ a thin film of paper, such as tissue paper. According to the present invention, furthermore, the members 2, 4 and 6 are held together mechanically as a unit in novel fashion and by novel mechanical means embodying an element or elements separate from the conducting members 2 and 4 and preferably, also, the insulating film 6. The mechanical holding means comprises an annular insulating disc 8, Figs. 1 and 2, or two annular insulating discs 10 and 12, Figs. 3, 4 and 6, or any equivalent mechanism, as will be understood, for engaging the conducting members 2 and 4 at their peripheries and for holding the conducting and the insulat-

ing members together as a unit. As it is preferred to have the conducting members 2 and 4, and also, if desired, the insulating member 6, circular or disc-shape in form, the members 8, 10 and 12 are shown as ring-shaped or annular. The members 8, 10 and 12 may be of any desired insulating material, but sufficiently stiff to hold the parts together. A suitable fibre has been found very satisfactory in practice. In this manner, the conducting discs 2 and 4 and the insulating film 6 are held together as a unit in the opening in the annular fibre disc 8, or in the opening or openings of the annular fibre discs 10 and 12.

According to the form of the invention shown in Figs. 1 and 2, the discs 2 and 4 and the film 6 are held together as a unit merely by the peripheries of the discs 2 and 4 frictionally engaging the wall of the opening in the annular disc 8. To this end, the said wall of the opening in the annular disc 8 may be slightly torus-shaped or concave, but this is not essential, for the parts will be held together very effectively with any shaped opening in the annular disc 8, provided that the diameter of the discs 2 and 4 is slightly greater than the diameter of the opening in the annular disc 8. The peripheral edges of the said torus-shaped or concave walls provide projections between which the discs 2 and 4 are held. Though the parts are thus effectively held together frictionally as a unit, it is nevertheless possible quickly to detach the parts 2, 4 and 6 from the annular disc 8 and as quickly to reassemble the same or other like parts, if desired. All that is necessary is to slide the annular disk 8 frictionally over the said peripheries of the discs 2 and 4.

According to the modification of Figs. 4 and 6, however, the annular discs 10 and 12, of the same or similar construction, are each provided with an annular recess 14 surrounding the opening in the corresponding annular discs 10 and 12, and the peripheries of the discs 2 and 4 are held together, as shown more particularly in Figs. 4 and 6, in the recesses 14. The annular discs 10 and 12 are rigidly secured together, with the conducting discs 2 and 4 in assembled position, in any desired manner, as by means of rivets 16. The rivets 16 need not necessarily be separate members, as illustrated in Figs. 3 and 4, but they may be formed integral with, or pressed out from, one of the discs 10 and 12, as the disc 10, and embedded in the other disc, as the disc 12, to hold the parts together in assembled relation, as illustrated in Fig. 6. If desired, the insulating film 6 may be of the same diameter as, or of slightly less diameter than, the diameter of the annular

discs 10 and 12, so that the rivets 16, or the corresponding pressed-out rivets (not shown) may extend through the insulating film 6, as illustrated in Figs. 4 and 6.

5 It will be noted that the use of rivets is really not necessary, because the friction method of holding the parts together, illustrated more particularly in Figs. 1 and 2, is found to be very effective, in practice.

10 It is preferred to have the conducting discs 2 and 4 centrally-bowed-out, with the bowed-out portions disposed opposite to, and out of contact with, each other, and the peripheral non-bowed-out portions adjacent to each other, as clearly shown in both Figs. 2, 4, 5 and 6. According to  
15 this construction, therefore, the insulating film contacts with the non-bowed-out peripheral portions, but is out of contact with the bowed-out portions. An air chamber 18 is thus provided between the insulating disc 6 and each centrally-  
20 bowed-out portion of the disc 2 and 4.

A film cut-out made in accordance with the present invention has a remarkably uniform break-down voltage.

25 It will be understood that the invention is not limited to the exact embodiments thereof that are herein illustrated and described, but that further modifications may be made without departing from the spirit and scope of the invention as  
30 defined in the appended claims.

What is claimed is:

1. A film cut-out comprising two conducting members, an insulating film disposed between and separating the conducting members, and insulating  
35 means for frictionally engaging the peripheries of the conducting members to mechanically hold the conducting members, the insulating film and the insulating means together as a unit, the insulating means being slidable frictionally over  
40 the said peripheries to permit quick frictional detachment of the insulating means and the conducting members and the insulating film.

2. A film cut-out comprising two conducting members, an insulating film disposed between and separating the conducting members, and means  
45 separate from the conducting members for frictionally engaging the peripheries of the conducting members to mechanically hold the conducting members, the insulating film and the means together as a unit, the means being slidable frictionally over the said peripheries to permit quick  
50 frictional detachment of the means and the conducting members and the insulating film.

3. A film cut-out comprising two conducting  
55 members, an insulating film disposed between and separating the conducting members, and means comprising a concave wall engaging the conducting members at their peripheries for mechanically holding the conducting members, the insulating  
60 film and the means together as a unit.

4. A film cut-out comprising two conducting members, an insulating film disposed between and separating the conducting members, and means having an opening in which the conducting and  
65 the insulating film are disposed, the wall of the opening being torus-shaped to mechanically hold the conducting members and the insulating film together as a unit in the opening.

5. A film cut-out comprising two insulated conducting members, and a member having an opening in which the conducting members are disposed, the wall of the opening being concave to mechanically hold the conducting members together as a unit in the opening.

75 6. A film cut-out comprising two insulated con-

ducting discs, and a member having an opening in which the conducting discs are disposed, the wall of the opening being slightly smaller than the diameter of the discs and being peripherally engaged by the discs to frictionally hold the conducting discs together as a unit in the opening. 5

7. A film cut-out comprising two conducting members, an insulating film disposed between and separating the conducting members, two similar members each having a similar opening, and 10 means for mechanically holding the similar members together with the openings opposed to each other and with the conducting members and the insulating film disposed as a unit between the similar members in the openings. 15

8. A film cut-out comprising two insulated bowed-out conducting members disposed adjacent to each other with the bowed-out portions disposed opposite to and out of contact with each other, and means for frictionally engaging the  
20 peripheries of the conducting members to mechanically hold the conducting members together as a unit.

9. A film cut-out comprising two centrally-bowed-out conducting discs disposed adjacent to  
25 each other with the bowed-out portions disposed opposite to and out of contact with each other, an insulating film disposed between the conducting discs and separating the non-bowed-out peripheral portions, and means for frictionally engaging the peripheral edges of the discs for holding  
30 the conducting discs and the insulating film together as a unit.

10. A film cut-out comprising two centrally-bowed-out conducting discs disposed adjacent to  
35 each other with the bowed-out portions disposed opposite to and out of contact with each other, an insulating film disposed between the conducting discs and separating the non-bowed-out peripheral portions, and annular means having a  
40 torus-shaped wall of slightly smaller diameter than the diameter of the discs for engaging the discs at their peripheries for holding the discs and the insulating film together as a unit.

11. A film cut-out comprising two centrally-  
45 bowed-out metal discs disposed adjacent to each other with their bowed-out portions disposed out of contact with each other, an insulating paper film disposed between the metal discs and separating the non-bowed-out peripheral portions, 50 and an annular fibre disc having a torus-shaped wall of slightly smaller diameter than the diameter of the metal discs for engaging the peripheral edges of the metal discs for holding the discs and the insulating film together as a unit. 55

12. A film cut-out comprising two conducting members, an insulating film disposed between and separating the conducting members, and insulating means for frictionally holding the conducting members and the insulating film together as a  
60 unit, the insulating means being slidable frictionally with respect to the conducting members and the insulating film to permit quick frictional detachment of the insulating means, and the conducting members and the insulating film. 65

13. A film cut-out comprising two conducting discs, an insulating film disposed between and separating the conducting discs, and means having an opening in which the conducting discs and the insulating film are disposed, the wall of the opening being concave and slightly smaller than the diameters of the discs and being peripherally engaged by the discs to frictionally hold the conducting discs and the insulating film together as a unit in the opening. 75

14. A film cut-out comprising two insulated centrally-bowed-out conducting discs disposed adjacent to each other with the bowed-out portions disposed opposite to and out of contact with each other, and annular means having a torus-shaped wall of slightly smaller diameter than the diameter of the discs for engaging the discs at their peripheries for frictionally holding the discs and the insulating film together as a unit.

15. A film cut-out comprising two insulated conducting members, and means for frictionally engaging the peripheries of the conducting members to mechanically hold the members together as a unit, the said means being slidable frictionally over the said peripheries to permit quick frictional detachment of the said means and the conducting members.

16. A film cut-out comprising two conducting members in contact with each other and each having an insulating coating at the contacting surfaces, and means frictionally engaging the peripheries of the conducting members to hold the members together as a unit, the said means being slidable frictionally over the said peripheries to permit quick frictional detachment of the said means and the conducting members.

17. A film cut-out comprising two insulated conducting members, and means having an opening in which the conducting members are disposed, the walls of the opening engaging the conducting members at their peripheries for frictionally holding the conducting members and said means together as a unit, said walls of the opening being slidable frictionally over the said peripheries to permit quick frictional detachment of said means and the conducting members.

18. A film cut-out comprising two conducting members, an insulating film disposed between and separating the conducting members, and means comprising a wall engaging the conducting members at their peripheries for mechanically holding the conducting members and the means together as a unit, the wall being provided with projections between which the conducting members are held.

19. A film cut-out comprising two insulated conducting members, and means having an opening in which the conducting members are disposed, the wall of the opening being provided with

projections between which the conducting members and the means are held together as a unit.

20. A film cut-out comprising two insulated conducting discs, and means having an opening in which the conducting discs are disposed, the wall of the opening being slightly smaller than the diameter of the discs and being peripherally engaged by the discs to frictionally hold the conducting discs together as a unit in the opening, the wall being provided with projections between which the conducting members are held.

21. A film cut-out comprising two insulated conducting members, and means having an opening in which the conducting members are disposed, the walls of the opening engaging the conducting members at their peripheries for frictionally holding the conducting members and said means together as a unit, said walls of the opening being slidable frictionally over the said peripheries to permit quick frictional detachment of said means and the conducting members, and said walls of the opening being provided with projections between which the conducting members are held.

22. A film cut-out comprising two conducting members, an insulating film disposed between and separating the conducting members, and insulating means having an opening in which the conducting members and the insulating film are disposed, the walls of the opening engaging the conducting members at their peripheries for frictionally holding the conducting members, the insulating film and said means together as a unit, said walls of the opening being slidable frictionally over the said peripheries to permit quick frictional detachment of said means and the conducting members, and said walls of the opening being provided with projections between which the conducting members are held.

23. A film cut-out comprising two insulated conducting members, and means for frictionally engaging the peripheries of the conducting members to mechanically hold the conducting members together as a unit, the said means being slidable frictionally over the said peripheries to permit quick frictional detachment of the said means and the conducting members, and the said means having projections between which the conducting members are held.