

Feb. 9, 1954

A. E. C. BENNETT
ELECTRICAL CONDENSER

2,668,946

Filed Jan. 30, 1951

Fig. 1.

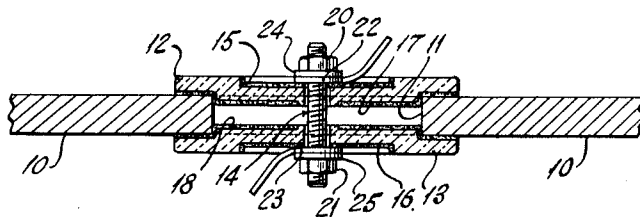
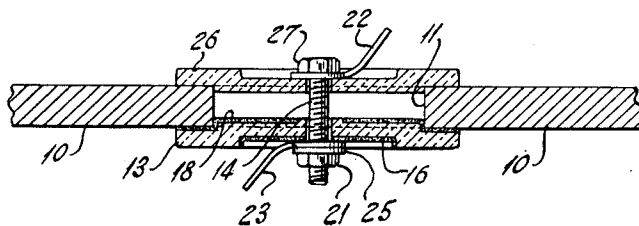


Fig. 2.



INVENTOR.
ARTHUR EDWARD CHARLES BENNETT

BY

H. W. T. A.

ATTORNEY.

UNITED STATES PATENT OFFICE

2,668,946

ELECTRICAL CONDENSER

Arthur Edward Charles Bennett, Kenton, England, assignor, by mesne assignments, to Cornell-Dubilier Electric Corporation, South Plainfield, N. J., a corporation of Delaware

Application January 30, 1951, Serial No. 208,454

6 Claims. (Cl. 333-79)

1

The present invention relates to electrical condensers such, for example, as by-pass condensers for use in ultra high frequency apparatus and of the kind cooperating with an electrical lead or conductor extending through or passing adjacent to an aperture or opening in a conducting wall, screen or the like of such apparatus.

It is an object of the present invention to provide a condenser of this type which is both simple and efficient in operation; which will avoid the more costly and elaborate fixing arrangements such as have been used hitherto with high-frequency by-pass condensers; which can be easily and quickly mounted upon a chassis or other metallic support; and which can be made of varying sizes or capacities to suit widely varying conditions and requirements.

With the above and further objects in view, the invention involves generally the provision of two rigid discs or plates of insulating material at least one of which is provided with metallic coatings on the opposite faces thereof, said discs or plates being clamped to the opposite sides, respectively, of a conducting wall by a terminal member or conductor insulated from and extending through an aperture in said wall. The terminal member is electrically connected to one metal skin or coating carried by one or both insulating discs which constitute the dielectric of the by-pass condenser between said member and said wall, the other coating or coatings being in contact with or clamped against said wall.

In a specific construction, each of said discs or plates has two conducting skins or coatings upon the opposite sides thereof, the two skins or coatings being electrically connected, respectively, to the terminal member and to the conducting wall. Preferably, one or each of the discs has an annular peripheral recess so as to cooperate with the aperture in the conducting wall. In this way the condenser is held firmly in its required position. In a preferred construction, the conducting skins on the inner surfaces of the two discs are extended into the annular recess so as to make intimate electrical contact with the conducting wall around the aperture therein.

The invention may be carried into practice in various ways, but according to a preferred construction, two dielectric discs which are conveniently circular in shape, are located, respectively, on opposite sides of an aperture cut at a suitable place in part of the conducting wall of the electrical apparatus in which the condenser is to be used. Each of the discs is preferably provided with an annular peripheral recess so

2

that a central portion projects into the said aperture and thus prevents lateral movement of the disc.

The opposing inner and outer surfaces of the dielectric discs are provided with metallic skins or coatings which are preferably applied by a metallizing process to ensure intimate and stable contact with the dielectric surfaces. Any of the well known metallizing processes which are adapted to the nature of the dielectric may be employed for this purpose. Each disc thus acts as a capacitance dielectric between the two corresponding layers or electrodes substantially independently of the mounting or position of the discs relative to the conducting wall.

The center of each disc is pierced with a hole and a bolt, rivet or similar fastening means which constitutes a conductor terminal member and extends through both discs, with ample radial clearance between said bolt or rivet and the surrounding aperture and inner electrodes, the bolt or rivet clamping the discs against the opposite faces of the conducting wall.

If desired, the outer surface of each disc may be recessed where the metallized electrode is applied. Such outer electrodes are in intimate electrical contact with the terminal member or clamping means therefore and preferably extend to the outer rim of the disc. The inner or opposed electrode skins or coatings extend into the annular peripheral recesses of the insulating discs so that, when these are in position in the aperture formed in the conducting wall, the inner electrodes both make intimate electrical contact with the conducting wall and extend towards, but not into contact with, the central terminal member.

A solder tag may be secured to each end of the terminal member. By making electrical connections to these tags a conductor is, in effect, passed through the aperture in the conducting wall, while the metallized dielectric discs provide a by-pass capacitance to said wall which may be at ground potential. If desired, a hole may be pierced longitudinally through the terminal member and a conducting wire passed there-through and connected to a solder tag at either or both ends of the terminal member.

In order to reduce the capacity for a given construction, metallized electrodes may be provided on only one of the two discs so that the second disc merely provides mechanical support without appreciably increasing the capacitance of the first disc.

The invention will be further understood from

3

the following detailed description taken in connection with the accompanying drawing, forming part of this specification, and in which:

Figure 1 is a cross-section through a combined lead-through terminal and by-pass condenser assembly constructed in accordance with the principles of the invention; and

Figure 2 is a similar view showing a modification of the invention.

Like reference numerals denote like parts in both views of the drawing.

Referring to Figure 1, the metal wall or chassis is indicated at 10 having a hole or aperture 11 cut through it. This hole may be of any convenient size, preferably circular in shape depending upon the by-pass capacitance required, but may advantageously be between a half inch and one inch in diameter, although not necessarily being limited to these dimensions.

Two insulating discs 12 and 13 having recessed rims are located on opposite sides of the aperture 11 and are bolted or screwed together by the bolt or screw 14 forming the terminal member or conductor and passing through the center of said discs. The outer surfaces of the discs may conveniently be, but are not necessarily, recessed where the metallized electrodes 15, 16, respectively, are applied to the two discs, as shown in the drawing. The areas of these electrodes may extend from the central hole 11 through which the bolt 14 is passed to the outer rims of the discs.

The opposite faces of the discs 12 and 13 which are adjacent to or facing one another in the mounted position of the discs in the aperture 11 are equally provided with metallized electrodes marked 17 and 18 which extend as indicated from the extreme outer edge of the recessed rim of each disc towards the central hole through which the terminal conductor or bolt 14 is passed, but do not reach the side of the aperture so that no electrical contact will take place between the bolt 14 and the electrodes 17, 18.

Under the heads or clamping nuts 20 and 21 for the bolt 14 solder tags 22 and 23 may be secured, whereby electrical connection can readily be made to the two electrodes 15 and 16. By making connections to these two terminal tags the conductor is effectively passed through the hole in the wall 10 and at the same time the capacitances through the dielectric discs 12 and 13 to the inner electrodes which are in contact with said wall provide a by-pass capacity between the conductor and the metal wall 10 being usually a ground potential. Items 24 and 25 are a pair of lock washers inserted between the tags 22 and 23 and the clamping nuts 20, 21, respectively, to insure a firm and stable connection of the various elements to the chassis or support 10.

Alternatively to the use of the two tags 22 and 23, or in addition thereto, the bolt 14 may have a central hole pierced through it so that the actual conductor wire or lead can be passed through the center of the bolt and may be electrically connected thereto either by soldering it directly to the end of the bolt or by soldering it to one or both of the tags 22 and 23 if these are provided in addition.

As is understood, in place of a screw or bolt serving as a central conductor and clamping means for the discs 12 and 13, any equivalent type of fastening device, such as a rivet or the like may be used for the purpose of the invention.

The dielectric material may be of any convenient substance such as a moulded plastic, but is preferably of ceramic material and in order to

4

enable a relatively large by-pass capacitance to be obtained is chosen to be one of the high permittivity ceramic materials so that the diameter of the discs need not be unnecessarily extended to obtain the desired capacitance.

There is thus provided by the invention a simple and efficient terminal and by-pass condenser assembly the chief feature of which is the provision of simple forms of discs or equivalent members which may readily be assembled by the user in any position in an electronic or radio apparatus in which grounded by-pass capacitances are required. By the special construction herein described, the electrodes are directly in contact with the surfaces of the metal wall, thus avoiding the cost of the more elaborate nut and sleeve fixing arrangements, such as have heretofore been used with high-frequency by-pass condensers of known type. The capacitance provided in this way may be selected and varied within wide limits in a simple manner by altering the thickness of the dielectric discs or using materials of different permittivities.

The capacitance may also be changed by providing electrodes on one of the pair of discs only so that the second disc provides mechanical support, without adding to the capacitance of the first disc. Thus, in Figure 2, disc 12 is replaced by an uncoated insulating disc 26, as shown in the drawing, other details of both design and operation being similar to those according to Figure 1.

In the foregoing, the invention has been described with reference to a specific illustrative device. It will be obvious, however, that variations and modifications, as well as the substitution of equivalent elements for those shown herein, may be made in accordance with the broader scope of the invention as set forth in the appended claims. The specification and drawing are accordingly to be regarded in an illustrative rather than in a limiting sense.

I claim:

1. An electrical connection through a conducting wall comprising a conductor spaced from and passing through an aperture in said wall, a pair of apertured rigid insulating members provided on both sides with opposed metallic coatings, said members encircling said conductor and engaging the opposite sides of said wall adjacent to said aperture, and means free from overlap with said wall for clamping said members against said wall by said conductor, the metallic coatings on the side of said members away from said wall being in electrical contact with said conductor and the opposite metallic coatings being in electrical contact with said wall, to provide a pair of by-pass capacities between said conductor and said wall determined solely by said metallized insulating members.

2. An electrical connection through a conducting wall comprising a conductor spaced from and passing through an aperture in said wall, a pair of apertured rigid insulating members at least one of which is provided with opposed metallic coatings on the opposite sides thereof, said members encircling said conductor and engaging the opposite sides of said wall adjacent to said aperture, and means free from overlap with said wall for clamping said members against said wall by said conductor, the metallic coating on the side opposite to said wall being in electrical contact with said conductor and the opposite metallic coating being in electrical contact with said wall, to provide a by-pass capacity between said con-

5

ductor and wall determined solely by said metallized insulating member.

3. An electrical connection through a conducting wall comprising a threaded bolt forming a conductor spaced from and centrally passing through an aperture in said wall, a pair of apertured rigid insulating members at least one of which is provided with opposed metallic coatings on the opposite sides thereof, said members encircling said conductor and engaging the opposite sides of said wall adjacent to said aperture, a pair of clamping nuts engaging the opposite ends of said bolt, to clamp said members firmly against said wall, the metallic coating on the side away from said wall being in electrical contact with said conductor and the opposite metallic coating being in electrical contact with said wall, to provide a by-pass capacity between said conductor and wall determined solely by said metallized insulating member.

4. An electrical connection through a conducting wall comprising a threaded bolt forming a conductor spaced from and centrally passing through an aperture in said wall, a pair of rigid ceramic insulating washers provided with metallic coatings on the opposite sides thereof, said washers encircling said conductor and engaging the opposite sides of said wall adjacent to said aperture, a pair of clamping nuts engaging the opposite ends of said bolt, to firmly clamp said members against said wall, the outer metallic coatings on the side of said washers away from said wall each being in electrical contact with the adjacent clamping nut and the opposite metallic coatings of said washers being in electrical contact with said wall, to provide a pair of by-pass capacities between said conductor and said wall determined solely by said metallized washers.

5. An electrical connection through a conducting wall comprising a conductor spaced from and centrally passing through an aperture in said wall, a pair of apertured rigid insulating members at least one of which is provided with

6

opposed metallic coatings on the opposite sides thereof, said members encircling said conductor and having peripheral recesses fitting said aperture, and means for firmly clamping said members against said wall by said conductor, the metallic coating away from said wall being clamped into electrical contact with the adjacent clamping nut and the opposite metallic coating being clamped into electrical contact with said wall, to provide a by-pass capacity between said conductor and wall determined solely by said metallized insulating member.

6. An electrical connection through a conducting wall comprising a bolt forming a conductor spaced from and centrally passing through an aperture in said wall, a pair of ceramic insulating washers at least one of which is provided with opposed metallic coatings on the opposite sides thereof, said washers encircling said conductor and having peripheral recesses fitting said aperture, a pair of clamping nuts engaging the ends of said conductor, to firmly clamp said washers against said wall and to effect electrical contact connections between the metallic coating on the side away from said wall with said conductor and between the opposite metallic coating and said wall, respectively, to provide a by-pass capacity between said conductor and wall determined solely by said metallized washer.

ARTHUR EDWARD CHARLES BENNETT.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,107,353	Vatter	Feb. 8, 1938
2,221,105	Otto	Nov. 12, 1940
2,348,693	Minnium	May 9, 1944
2,448,766	Burke	Sept. 7, 1948
2,480,523	Tubbs	Aug. 30, 1949

FOREIGN PATENTS

Number	Country	Date
478,602	Great Britain	Jan. 21, 1938