Sept. 10, 1929. S. J. WOOD ET AL 1,727,581

FIXED CONDENSER

Filed Dec. 23, 1925

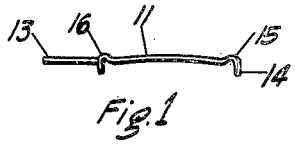



Fig. 1

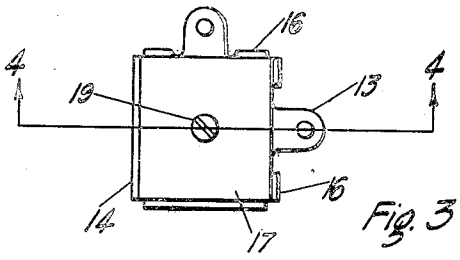



Fig. 3

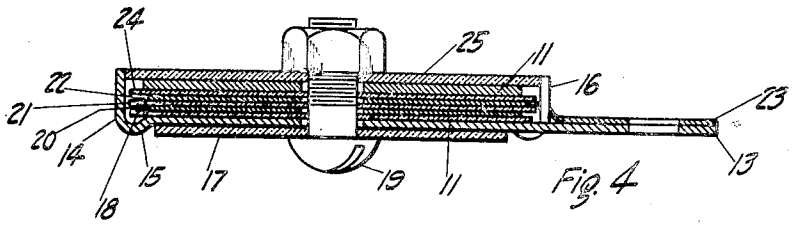



Fig. 4

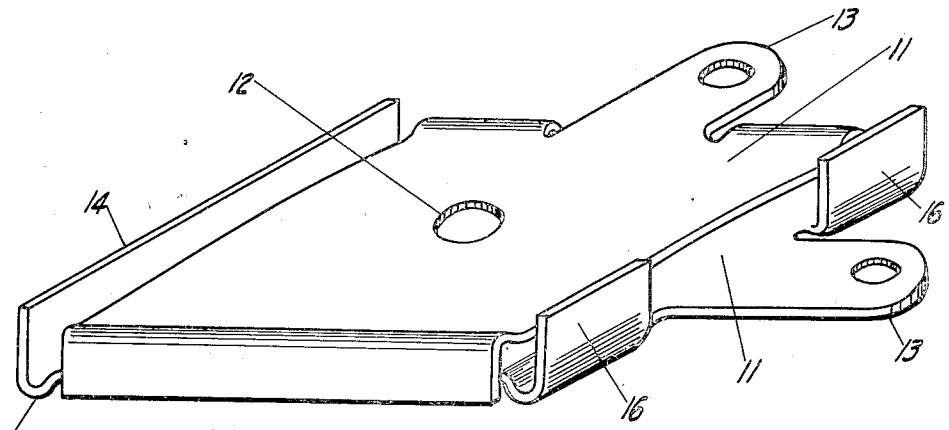



Fig. 2

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# UNITED STATES PATENT OFFICE.

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## FIXED CONDENSER.

Application filed December 23, 1925. Serial No. 77,264.

This invention relates to electrical condensers, and more particularly to condensers that are adapted to be used in connection with high frequency currents, such as in radio apparatus.

In such condensers, it has been common to use a series of interleaving plates, alternate plates connecting to a common terminal, and all of the plates being separated by a thin sheet of dielectric material, such as mica. This type of condenser is now quite common, and it is one of the objects of our invention to improve in general this kind of apparatus.

It is another object of our invention to make it possible to reduce the cost of manufacture of such condensers, as well as the time necessary to assemble them. It is common, in this regard, to use dies for stamping sheet metal forming some of the condenser plates, and the cost of manufacture is reduced, by the aid of this invention, by so designing the plates that fewer and less expensive dies are needed.

It is still another object of our invention to make it possible, during the process of manufacture, to set the value of the capacity of each condenser in a simple manner.

Our invention possesses many other advantages, and has other objects which may be made more easily apparent from a consideration of one embodiment of our invention. For this purpose we have shown a form in the drawings accompanying and forming part of the present specification. We shall now proceed to describe this form in detail, which illustrates the general principles of our invention; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of our invention is best defined by the appended claims.

Referring to the drawings:

Figure 1 is a side elevation of a stamping used as an end plate in our condenser;

Fig. 2 is an enlarged perspective view, illustrating the manner in which the end plates cooperate, but omitting all other parts for the sake of clearness;

Fig. 3 is a plan view of a complete condenser embodying our invention; and

Fig. 4 is an enlarged section of the condenser taken along plane 4—4 of Fig. 3.

The condenser is made of a plurality of plates forming a pair of electrodes, which are separated by a thin layer of dielectric. Each electrode may consist of one or more plates; in the present instance two plates per electrode are shown. The end plates 11 form an important feature of our invention, since they are so arranged that duplicate parts can be used for both end plates, and that the process of centering the plates as well as the insulation between them is greatly facilitated. Each end plate has a central aperture 12, and has an apertured ear or terminal extension 13, extending from one side of the substantially rectangular body of the plate. This extension serves conveniently as a means for making electrical connections to the condenser, as will be rendered clear hereinafter.

At the side opposite from that of the ear 13, the plate has an integrally formed extension or flange 14, extending at right angles to the plate, and having a portion 15 that projects for a substantial distance above the surface of the plate 11. In this way, the portions 14 and 15, serve as stops or guides on each side of the plate. Furthermore, the bent-up portion 15 joins the body of plate 11 with smooth curves, which provide beneficial electrical effects as will become evident hereinafter.

Complementary to the parts 14 and 15, there are, on the opposite side of plate 11, a pair of similarly bent portions 16, one on each side of the ear 13.

The two end plates 11 when assembled, are placed in the relation shown most clearly in the diagram of Fig. 2. The portions 14 and 16 of each plate serve to position the other plate by extending over, but not touching those sides of the said other plate which have no bent-up portions. Due to this arrangement, the connecting ears 13 fall at right angles to each other.

The assembly of a complete condenser with these end plates 11 is shown most clearly

in Fig. 4. First of all, a plate 11 is placed over a block of insulation 17, which is of a size just sufficient to fit between the rounded projections 15 and 16, whereby this insulation is properly centered. On the other side of plate 11, between the side extensions 14 and 16, there is first disposed a thin sheet 18 of mica or the like, which is square in form and fits fairly closely between the projections 14 and 16 of both end plates and is confined thereby in central position.

The top end plate 11 may be placed directly over the sheet 18, if a two-plate condenser is desired, in the manner shown in Fig. 2, and a bolt on screw 19 can be passed through all of the parts to hold them together. Of course, the apertures through all of the metallic parts are made with a large clearance in order to prevent this screw from short-circuiting the plates.

However, in the present instance, a few intermediate plates are shown. Thus on top of sheet 18, there is indicated a thin metallic plate 20 which has an ear similar to ear 13 extending in the direction of the ear on the top end plate 11, and arranged to be electrically connected therewith. Then another sheet 21 of insulation can be used, over which a thin plate 22 of metal is placed, having an ear 23 placed over ear 13, and forming with bottom end plate 11, one of the condenser electrodes. A further sheet 24 of insulation separates this plate 22 from the top end plate 11, over which an insulation plate 25, similar to bottom plate 17, is placed.

It is evident that the condenser plates, and the dielectric sheets, can all be very readily assembled. The insulation strips 17 and 25 are made to fit accurately between the depending projections 14 and 16, forming the reverse bends, as clearly shown in the case of the top insulation strip 25. Furthermore, it is to be noted that the surfaces of the conducting end plates 11 are placed a considerable distance from the edges of the intermediate plates, and this is due in some measure to the provision of the upwardly extending humps or rounded projections 15. In this way, the undesirable edge effect is to some extent remedied; there is no intense or irregularly large electrostatic field adjacent the edges.

We prefer to form each end plate slightly arched, as indicated in Fig. 1, in preference to a perfectly flat surface, so that by tightening screw 19, it is possible to flatten the plate only partly, and thereby to set the ultimate value of the capacity of the condenser at precisely that desired.

The condenser as thus described is simple to manufacture and to assemble; all of the parts can be superposed, and then the screw 19 passed therethrough without further adjustment.

We claim:

1. In an electrical condenser, a pair of end plates of substantially rectangular configuration, each of said plates having at opposite sides integrally formed extensions projecting substantially at right angles to the main portion of the plate, a dielectric plate between the end plates, the extensions from each plate extending across the dielectric plate so as to define a rectangular space in which the dielectric plate is located, said extensions being sufficiently long to extend beyond the edge of the opposite end plate, and a pair of insulation plates, one adjacent each of the outer surfaces of the end plates, said insulation plates being accommodated between the projecting extensions.

2. In an electrical condenser, a pair of end plates of substantially rectangular configuration, having at opposite sides, integrally formed extensions, and a series of alternate dielectric and conducting plates located in the space formed by the end plates and the extensions that project across the series, the edges of the conducting plates being spaced from the extensions, and each of said extensions being connected with the main portion of the end plate by a reverse bend, whereby a substantial clearance is obtained between the edge of the conducting plates and the place where the extension meets the main portion of the end plate.

3. In an electrical condenser, a pair of end plates, each of said plates having, at a pair of opposite edges, extensions projecting substantially at right angles to the main portion of the plate, whereby guides are formed on each of the plates for those edges of the other plate which have no depending portions, a series of alternate dielectric and conducting plates located between the end plates, each of the extensions being connected with the main portion of the end plates by a reverse bend, whereby there is maintained a substantial clearance between the place where the extension meets the end plate, and the adjacent edges of the conducting plates in the series, a pair of insulation strips, one adjacent each of the outside surfaces of the end plates, said strips also fitting between the extensions, and means for fastening the end plates, the strips, and the series of plates together.

4. In an electric condenser, a pair of end plates of substantially rectangular configuration, each of said plates having at opposite sides integrally formed extensions projecting substantially at right angles to the main portion of the plate and connected to the main portion of the plate by means of a reverse bend, a dielectric plate between the end plates, the extensions from each plate extending across the dielectric plate so as to define a rectangular space in which the dielectric plate is located, said extensions being sufficiently long to extend beyond the edge of the

opposite plate, a pair of insulation plates, one adjacent each of the outer surfaces of the end plates, said insulation plates being accommodated between the projecting extensions and the reverse bends, and means for holding the entire assembly together.

5. In an electrical condenser, a pair of end plates of substantially rectangular configuration, each plate having at opposite sides, integrally formed extensions, and a series of alternate dielectric and conducting plates located in the space formed by the end plates and the extensions that project across the series, the edges of the conducting plates being spaced from the extensions, and each of said extensions being connected with the main portion of the end plate by a reverse bend, whereby a substantial clearance is obtained between the edge of the conducting plates and the place where the extension meets the main portion of the end plate, each plate having a centrally located opening, the openings in the insulating plates being of minimum size and the openings in the conducting plates being larger, and a fastening device extending through all the plates thereby securely holding the assembly together.

6. A plate for an electrical condenser comprising a body having an opening at the center, a projection at one end serving as a terminal and mounting means, and lateral extensions projecting at substantially right angles to the body of the plate and connected therewith by a reverse bend, said bend forming, on either side of said projection, a shallow recess, said plate also being slightly arched.

7. In a device of the class described, a radio fixed condenser, comprising a plurality of rectangularly shaped plates of electrically conductive material, provided with an opening at their centers and a projection at one end, a plurality of rectangles of dielectric material inserted therebetween and superimposed thereon, said dielectric rectangles being longer than said plates, and being provided with openings in their centers of a smaller size than the openings in said rectangularly shaped plates, clamping plates formed as rectangularly shaped concave plates having openings in their centers larger than the openings in the dielectric rectangles, each of said clamping plates having a projection at one end serving as a terminal or mounting means, and longitudinal extensions projecting substantially at right angles to the body of the plate and connected therewith by a reverse bend, said bend forming a shallow recess on each side of the projection, said clamping plates being placed on each end of the stack of dielectric and conductive plates; a pair of rectangular insulating plates provided with openings at their centers and placed on the clamping plates thereby centering and squaring the clamping plates with respect to each other by virtue of the projections and reverse bends, and a suitable clamping device projecting through the openings of all the plates in the assembly and holding the assembly together.

In witness whereof we have hereunto set our hands.

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HARRY A. GREENE, JR.