Dec. 5, 1933. R. W. DEBRUNNER 1,937,874

ELECTRIC CONDENSER

Filed March 25, 1932

Fig. 1.

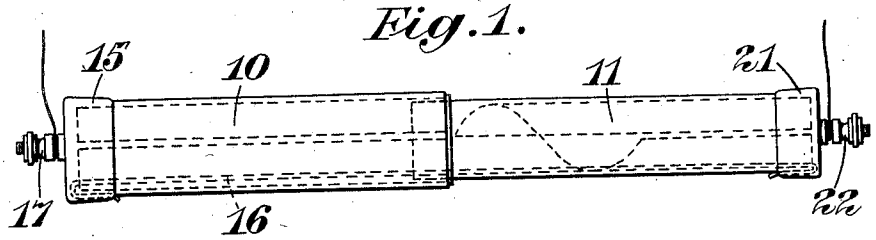


Fig. 2.



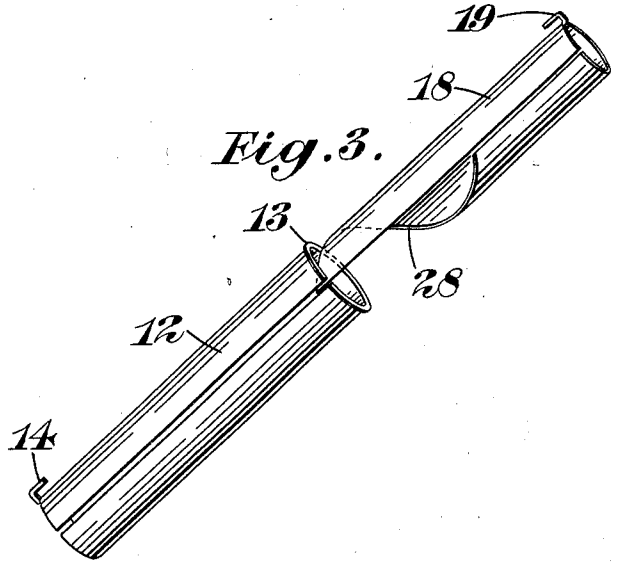


Fig. 3.

INVENTOR.

Reginald W. DeBrunner

by his attorneys

Byrnes, Stebbins, Parmelee & Blenko

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ELECTRIC CONDENSER

Reginald Walter Debrunner, London, England, assignor, by mesne assignments, to Theodore L. Genter, New York, N. Y.

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5 Claims. (Cl. 175—41.5)

The invention is for improvements in or relating to electric condensers of variable capacity and is primarily concerned with condensers in or for use in wireless receiving apparatus.

According to the invention there is provided an electric condenser consisting of axially sliding concentric electrodes of tubular form, the conducting surface of at least one of which tapers or progressively diminishes in whole or part along the axis. The condenser thus has a low minimum capacity and the relative adjustment of the electrodes produces a gradual change in capacity not strictly proportional to the adjustment of the tubes.

Further, according to the invention there is provided an electric condenser of variable capacity comprising two telescopic or otherwise interfitting supports (e. g. tubes) of insulating material which are relatively adjustable and at least two electrodes mounted one on each of the tubes.

According to a preferred form of the invention at least one of the electrodes is formed of tapering dimensions and is arranged with the part of smallest dimensions nearest the other electrode in the position of the tubes for minimum capacity. Also, a tie is preferably provided between the two tubes to prevent their complete separation.

Preferably, the electrodes are formed of non-self-supporting sheets of metal foil, metallized paper or the like, and conveniently at least one of the electrodes may be formed with a flanged end overlying the end of the tube for providing a short-circuiting contact with the other electrode.

In one specific embodiment of the construction according to the invention there is provided an electric condenser as hereinbefore set forth comprising two insulating tubes, one slidable within the other, one electrode supported on the inner surface of the larger tube, the other electrode wrapped around the outer surface of the smaller tube and an insulating layer or wrapping between the electrodes.

In this construction each electrode may conveniently be formed with a bent-over tab and a metallic terminal cap is pressed on the supporting tube in contact with this tab. Furthermore, a tie is preferably provided between the two tubes and clamped under the end caps to prevent complete separation of the tubes.

One specific construction of condenser according to the invention is illustrated by way of example in the accompanying drawing, in which:—

Figure 1 is an elevation of the condenser in the position for minimum capacity;

Figure 2 is a sectional elevation at the adjustment for substantially maximum capacity, and

Figure 3 is a perspective view of the electrodes.

Referring to the drawing, in which like references indicate like parts, the condenser comprises two insulating tubes 10 and 11 of insulating material of which the tube 11 is the smaller in diameter and is slidable telescopically into the other. On the inner surface of the tube 10 there is fixed an electrode 12 of metal foil, metallized paper or the like. This electrode is formed from a rectangular sheet bent into cylindrical form within the tube and is turned outwardly over the end of the tube to form a flange as indicated at 13. At the other end of the electrode there is provided a tab 14 for electrical connection. This tab is bent over the exterior of the tube 10 and is clamped under a terminal end cap 15 which is pressed into firm engagement with the tube 10. One end of a tape 16 of insulating material is also clamped between this cap and the tube. A connecting terminal 17 is mounted on the end cap 15.

The smaller tube 11 has an electrode 18 of metal foil, metallized paper or the like wrapped around its outer surface. This electrode is formed from a sheet of trapezoidal shape having a tapering side 28 commencing at one end of the tube. At the other end of the tube the electrode is provided with a connecting tab 19.

The electrode 18 is covered by an insulating wrapping 20, such as an adhesive fabric impregnated with insulating material, and the connecting tab 19 of the electrode is bent over the outside of this wrapping. A terminal cap 21 similar to the terminal cap 15 for the other electrode is fitted to the end of the tube 11 over the wrapping 20 and is pressed firmly on to the covered tube 11 and in electrical contact with the tab 19. The other end of the tape 16 is also clamped under the cap 21 and a connecting terminal 22 is provided on the end cap 21.

The length of the tape 16 is such that in the extended position of adjustment of the two tubes for minimum capacity as indicated in Figure 1, the tape is fully extended in order to prevent complete separation of the two tubes. To increase the capacity of the condenser the tube 11 is moved more or less into the tube 10 so that for maximum capacity the tubes will have the relative positions substantially as shown in Figure 2. When the tubes are moved one within the other to the maximum extent the flange 13 of the electrode 12 makes contact with the cap 21 so as to provide a direct metallic connection at

this position. By providing the electrode 18 of tapered form not only is the minimum capacity of the condenser reduced to a low value but also the increase in capacity is not directly proportional to the amount of overlapping of the tubes, but increases more gradually for adjustments from the minimum position for at least the lower part of the capacity range of the condenser. It will be understood that the shaping of the electrode 18, or alternatively of the electrode 12, or both, may be such as to provide any desired relationship between the capacity of the condenser and the amount of adjustment of the tubes.

It is preferred that the innermost tube 10, together with its electrode and exterior wrapping, should be a sliding fit within the other electrode 12 with slight friction so that when the condenser is adjusted it will retain such adjustment. The condenser constitutes a connecting link in the circuit or apparatus in which it is used in the sense that its only mechanical support is its electrical connections in the circuit or apparatus by means of the terminals 17 and 22.

The condenser according to the invention is particularly adapted for use in wireless receiving apparatus to be connected in series between the aerial and the input of the apparatus to serve as a means for controlling selectivity of the apparatus and also as a means for controlling the volume of the output of the receiving apparatus. Furthermore, the condenser may be employed as a "lead-in" tube for an aerial and provides a capacity feed which can be adjusted, or alternatively a direct metallic connection.

It will be appreciated that the invention is not restricted to the specific embodiment hereinbefore described, for example, an additional electrode, or electrodes, may be provided, for instance, on a tube within the tube 11, and this additional tube may also be capable of telescopic adjustment. Also, instead of a single electrode on the outer or inner tube there may be two electrodes in order to provide a condenser of a differential character.

I claim:—

1. An electric condenser comprising two tubes slidably engaging and supporting each other, each tube comprising a supporting tube of insulating material, a thin electrode wrapped around the outer surface of the inner tube, another thin electrode wrapped around the inner surface of the outer tube and an insulating sheet interposed between the two electrodes.

2. An electric condenser comprising two tubes slidably engaging and supporting each other, each tube comprising a supporting tube of insulating material, a thin electrode wrapped around the outer surface of the inner tube, another thin electrode wrapped around the inner surface of the outer tube, one of said electrodes being of tapered form, and an insulating sheet superimposed upon one of the said electrodes.

3. An electric condenser comprising two plain interfitting insulating tubes, a thin electrode wrapped around the outer surface of the inner tube, another thin electrode wrapped around the inner surface of the outer tube, a metallic terminal cap on to one end of each insulating tube, a bent over tab on each electrode engaged within the cap in electrical contact therewith and an insulating sheet interposed between the two electrodes.

4. An electric condenser comprising two plain interfitting insulating tubes, a thin electrode wrapped around the outer surface of the inner tube, another thin electrode wrapped around the inner surface of the outer tube, an insulating sheet interposed between the two electrodes and a non-rigid tie connected between the tubes to prevent their complete separation.

5. An electric condenser comprising two plain interfitting tubes, a thin foil electrode wrapped around the outer surface of the inner tube, a sheet of insulating material wrapped around said electrode, a tab on said electrode bent on to the outer surface of said insulating sheet, a terminal cap pressed on to said tube in electrical contact with said tab, a second thin foil electrode wrapped around the inner surface of the outer tube, said second electrode also having a tab, which is bent on to the outer surface of the tube and a second terminal cap pressed on to the outer tube in electrical contact with the said tab of the electrode thereon.

REGINALD WALTER DEBRUNNER.