

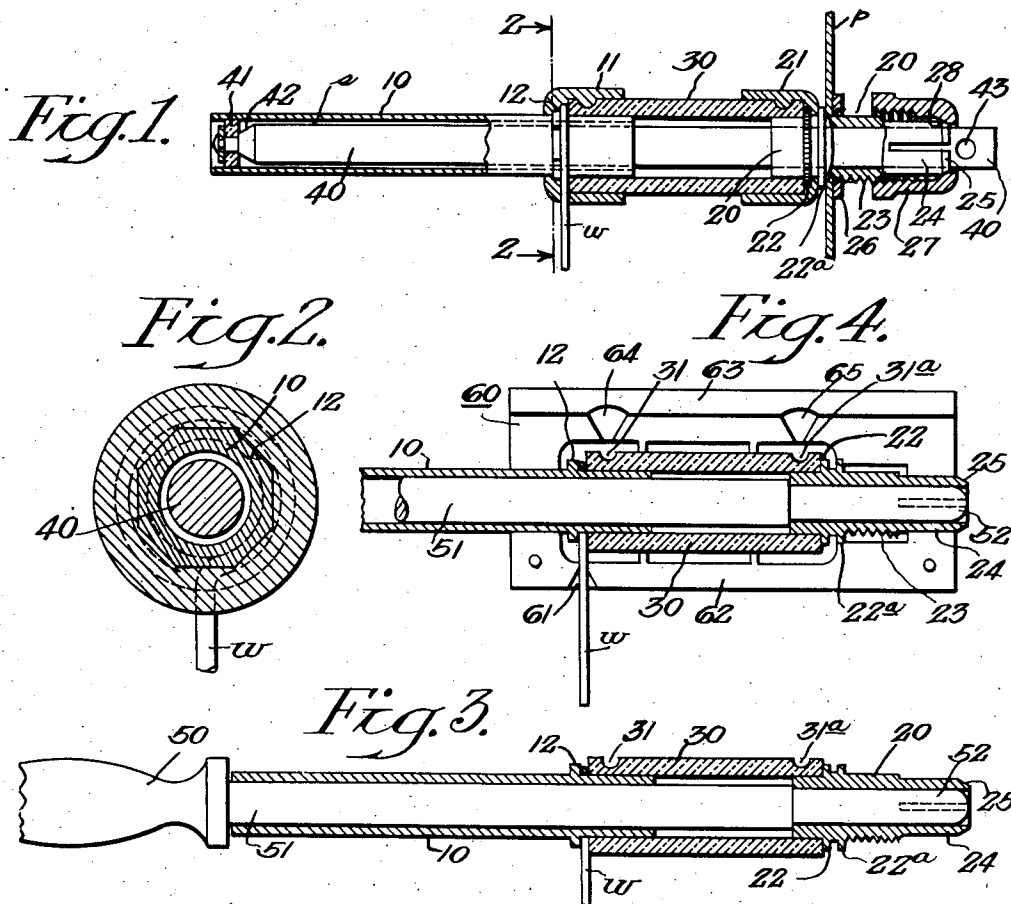
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E. S. MARIS

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VARIABLE CONDENSER

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Inventor

Elwood S. Maris

By

J. J. Jeff

Attorney

UNITED STATES PATENT OFFICE

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VARIABLE CONDENSER

Elwood S. Maris, Upper Darby, Pa., assignor to
Radio Corporation of America, a corporation of
Delaware

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This invention relates to electrical condensers and particularly to variable air-condensers of the so-called "trimmer" type.

An object of the invention is to provide a capacitor, the operation of which is characterized (a) by a high degree of stability under extreme conditions of climate, (b) by ease of adjustment and (c) by absence of microphonic and other parasitic disturbances.

Another object of the invention is to provide a simple, inexpensive, compact, trouble-free capacitor and one which lends itself readily to mass production methods.

A more specific object of the invention is to provide a variable condenser having a fixed armature, a slidable armature and a guideway for the latter molded in rigid permanent alignment with the fixed armature.

Other objects and advantages of the invention together with certain details of construction and assembly will be apparent and the invention itself will be best understood by reference to the following description and to the accompanying drawing, wherein

Figure 1 is a longitudinal sectional view of an air-type variable condenser constructed in accordance with the principle of the invention,

Fig. 2 is an enlarged cross-sectional view taken on the line 2—2 of Fig. 1,

Fig. 3 is a longitudinal sectional view of certain of the parts of the condenser of Fig. 1 mounted on a mandrel and illustrating the manner of aligning these elements during assembly, and

Fig. 4 is a longitudinal sectional view of the condenser parts and mandrel of Fig. 3 inserted within a mold within which metal lugs are cast for maintaining the elements constituting the fixed parts of the capacitor in permanent alignment.

Referring now to the drawing in which like reference characters represent the same or corresponding parts. The body of the variable condenser of Fig. 1 is constituted by a pair of conductive tubes 10 and 20 arranged in spaced end-to-end relation and a hollow insulating member 30 spanning the space therebetween. Conductive tubes 10 and 20 each has a metal cup shape member designated at 11 and 21, respectively, intimately joined thereto and in which the opposite ends of the hollow insulating member 30 are immovably seated.

Conductive tube 10 constitutes one armature or electrode of the condenser; the diameter of its bore is greater than that of conductive tube 20. Armature tube 10 is provided with an outwardly

extending peripheral rim 12. A wire lead 10 looped about tube 10 is clamped between the outer wall of this rim 12 and the adjacent circumferential edge of the insulating tube 30. The other conductive tube 20 is provided with a pair of rims 22 and 22a; the inner side wall of the first rim 22 contacts the opposite circumferential edge of insulating tube 30. Rims 12 and 22 preferably have non-circular peripheries (see Fig. 2), or they may be knurled to prevent movement with respect to the cup shape members 11 and 21 in which they are embedded. The other or second armature comprises a conductive rod 40 having a diameter corresponding substantially to that of the bore of the smaller conductive tube 20. Armature 40 slidably contacts the inner wall of conductive tube 20, which tube is of sufficient length to constitute a support capable of maintaining that part of rod 40 which extends therebeyond against undesired lateral movement with respect to the inner wall of the tube-like armature 10. The diameter of the rod-like armature 40 is less than that of the bore of the armature 10 whereby an air gap is established therebetween. The terminal end of that portion of rod 40 which is presented to the interior of tube 10 carries an insulating annulus 41 of a diameter sufficient to close the air space between these two armatures against moisture and dust. Annulus 41 further prevents displacement of armature 40 with respect to the inner walls of armature 10. The end portion 42 of the rod-like armature 40 adjacent the annulus 41 is preferably beveled, as shown in Fig. 1 to provide a receptacle for such dust and minute metal particles as may result from abrasive contact between 41 and the inner wall of tube 10. The opposite terminal end of rod 40 is provided with a key-hole 43 adapted to receive a key (not shown) which may be used to facilitate movement of rod 40, whereby to achieve a desired capacitance by altering the effective armature area presented by 40 to the inner walls of conductive tube 10.

That portion of the outer wall of the conductive supporting tube 20 which extends beyond insulating tube 30 and its supporting cup 21 is provided with a D-shape screw-threaded portion 23 and a bifurcated cylindrical end section 24 which terminates in a beveled edge 25. The screw-threaded portion 23 receives a nut 26 for clamping the device to a panel or base of the radio apparatus (not shown) to which the condenser lead 10 extends. Screw threads 23 also receive a second nut 27 which has a beveled collet or shoulder portion 28 which engages the beveled edge 25 of the

bifurcated portion 24 of the conductive armature supporting tube 20, and compresses it tightly against the slidable rod-like armature 40, whereby to clamp it securely against movement in a desired relative position.

One very important feature of the condenser of the invention is that the parts 10, 20 and 30 constituting its main body portion are joined one to another in permanent fixed alignment by molding the cup-shape members 11 and 21 (in which the insulating shell 30 is seated) in position on conductive tubes 10 and 20 during manufacture. The manner of assembling the several parts is indicated in Figs. 3 and 4.

The parts are first assembled on a mandrel 50 which has an inner portion 51 of a diameter corresponding to the bore of armature 10 and a terminal portion 52 corresponding to the bore of the conductive tube 20. The armature tube 10 is first fitted on the mandrel and the pre-formed looped end of conductive lead *w* placed about the outer surface of tube 10 in contact with its peripheral rim 12. The hollow insulating shell 30 is then slid into position with its inner end overlapping a portion of the armature tube 10 and its inner edge against the wire lead *w*. Conductive tube 20 is then placed over the reduced diameter portion 52 of the mandrel 50 with its inner end fitted within the insulating shell 30 and its inner rim 22 in contact with the edge of this shell 30.

With the armature 10, lead wire *w*, insulating shell 30 and conductive tube 20 positioned in the described manner on mandrel 50 the assembly is inserted in a mold 60 (Fig. 4) with the lead wire *w* projecting through a hole 61, provided for the purpose, in its lower section 62. The upper section 63 of the mold is provided with two holes 64 and 65 to permit the introduction of the molten metal which eventually forms the cup-shape members 11 and 21 (Fig. 1) which surround the terminal edges of the insulating shell 30. Preferably the shell 30 is provided with semi-peripheral grooves 31, 31a adjacent its ends and into which the metal flows. These grooves 31, like the non-circular peripheral contour of metal rims 12 and 22 prevent the possibility of relative axial movement of the parts after the metal cups 11 and 21 have been cast.

When the casting operation has been completed and the assembly removed from the mold, the mandrel 50 is withdrawn and the rod-like armature 40 slidably inserted into the conductive

supporting tube 20 so that a portion of its surface extends within, but out of contact with, the tube-like armature 10.

It is to be understood that the foregoing description of a preferred embodiment of the invention is to be interpreted as illustrative and not in a limiting sense except as required by the prior art and the spirit of the appended claims.

What is claimed is:

1. A variable condenser comprising a pair of hollow conductive tubes arranged in spaced coaxial relation, a hollow insulating member spanning the space therebetween, means including said insulating member for maintaining said tubes in rigid insulated alignment, said tubes having bores of different diameter, a terminal end of the tube of smaller bore being bifurcated to render it resilient and the tube of larger bore constituting an armature of said condenser, a second armature for said condenser comprising a conductive rod extending into both said tubes for a variable distance adjustable by sliding said rod in contact with the inner surface of the tube of smaller bore, the diameter of said second armature being substantially less than the diameter of the bore of said first mentioned armature whereby an air gap is established therebetween, and a clamping member for the bifurcated end of the tube of smaller bore whereby said slidable armature is clamped within said tube upon the application of clamping force to said bifurcated tube end through said clamping member.

2. A variable condenser comprising a pair of conductive tubes arranged in spaced end-to-end relation, one of said tubes constituting an armature of said condenser, a hollow insulating member spanning the space between said tubes, a pair of cup-shape members intimately joined respectively to said tubes and in which the opposite ends of said insulating member are immovably seated, and a rod-like armature extending through one of said tubes in slidable contact with the inner wall thereof and into, but out of contact with the walls of, said armature tube.

3. A variable condenser in accordance with claim 1 and wherein a terminal connection for said armature tube extends outwardly therefrom through the body of one of the cup-shape members in which said hollow insulating member is seated.

ELWOOD S. MARIS.