March 21, 1939. H. W. HOUCK 2,150,973

TRIMMER CONDENSER

Filed Jan. 4, 1936

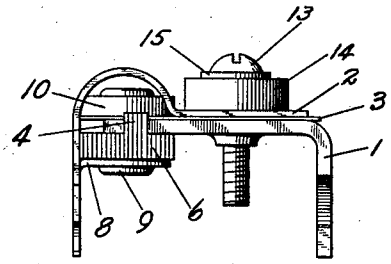



Fig. 1.

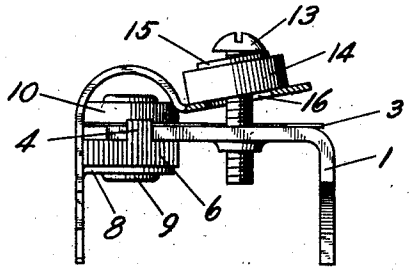



Fig. 2.

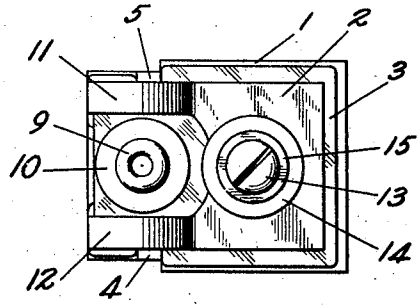



Fig. 3.

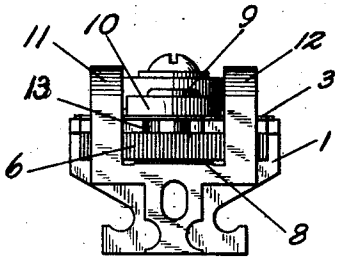



Fig. 4.

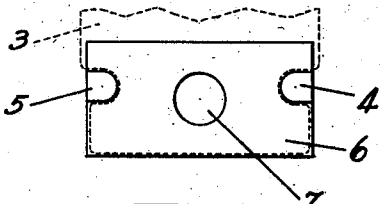



Fig. 5.

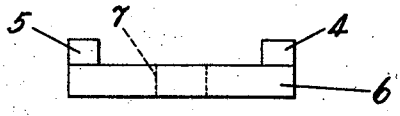



Fig. 6.

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# UNITED STATES PATENT OFFICE

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## TRIMMER CONDENSER

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Application January 4, 1936, Serial No. 57,473

1 Claim. (Cl. 175—41.5)

This invention relates to electrostatic condensers and more particularly to a condenser of the variable capacity type.

A principal object of the invention is to provide an improved form of trimmer condenser such as is usually employed in aligning a main tuning condenser or the like.

In present day radio receiving sets and the like, it is customary to employ a plurality of tuning units each including a variable tuning condenser. While these tuning condensers can be made with a very high degree of uniformity and accuracy nevertheless there is always a certain amount of unavoidable irregularity which usually necessitates the provision of a small auxiliary or trimmer condenser. Inasmuch as the trimmer condenser controls the minimum capacity of the associated tuning condenser, as well as to a certain extent the law of variation of the tuned circuit, it is highly important in the present day ultra sensitive radio receiving sets to provide a trimmer condenser which remains uniform in capacity for a given setting thereof. I have found that in this type condenser where the electrodes or condenser plates are supported on the usual insulators such as fiber, Bakelite or the like there is a certain degree of nonuniformity. This may be due to the nonuniform variations of the fiber or Bakelite at different temperatures and also to the fact that the fiber or Bakelite tends eventually to deform and change its electrical characteristics.

Accordingly another object of this invention is to provide a trimmer condenser which has a maximum of uniformity in mechanical characteristics as well as in electrical characteristics.

A feature of the invention relates to a trimmer condenser wherein the plates are interlocked with a ceramic or similar rigid spacer whereby the tendency of the condenser plates to shift relatively to each other after adjustment of the condenser, is substantially entirely avoided.

Another feature relates to a trimmer condenser which is of very small size and which is designed to have a very low minimum capacity.

A further feature relates to the novel organization, arrangement and relative location of parts which go to make up a rugged, and highly uniform condenser of the trimmer type.

Other features and advantages not specifically enumerated will become apparent after a consideration of the following detailed descriptions and the appended claims.

In the drawing which shows one preferred embodiment of the inventive concept,

Fig. 1 is a front elevational view of the condenser in its maximum capacity adjustment.

Fig. 2 shows the condenser with the movable plate in a different capacity adjustment.

Fig. 3 is a top plan view of the condenser shown in Figs. 1 and 2.

Fig. 4 is a left-hand end view of the condenser of Figs. 1 to 3.

Fig. 5 is a detail plan view of the ceramic spacer according to the invention.

Fig. 6 is a front elevational view of the spacer, Fig. 5.

Referring to the drawing the condenser consists of a fixed plate or electrode 1, a movable plate or electrode 2 and a dielectric spacer 3 of mica or similar material. The member 1 is preferably of metal such as relatively heavy gauge brass or the like so that it is capable of acting as the main supporting base of the condenser at the same time that it functions as one of the condenser electrodes, while the member 2 is preferably of spring metal such as phosphor-bronze or the like. The right hand end of member 1 is bent at right angles whereby it may be attached to a suitable support. The left hand end of member 1 is provided with oppositely disposed notches to receive correspondingly shaped lugs or projections 4, 5 of a rigid block of insulation, preferably Isolantite or similar ceramic insulating material. Block 6 is provided with an opening 7 in alignment with a corresponding slot 13 in member 1, and member 2 is provided with a struck out lug 8 having an opening in alignment with the corresponding openings in members 1, 3 and 6. These latter members are rigidly held together by means of a metal eyelet or grommet passing through the openings described, the upper and lower ends of the eyelet 9 being spun over as shown. Preferably there is interposed between the spun-over upper end of the eyelet and the mica dielectric 3, a washer 10 of Isolantite or similar ceramic insulating material. By this arrangement the various members described are rigidly clamped together and the interlocking assembly between the lugs 4 and the notches in member 1, prevents relative turning.

As shown in the drawing, the member 2 is formed intermediate its ends with a pair of looped or offset portions 11, 12. These loop portions serve two purposes, first they control the normal or open position of member 1 as shown in Fig. 2, and secondly they enable the minimum capacity of the condenser to be reduced to the greatest possible extent. Furthermore since both the loop portions rest against the flat edge of block 6 and

since the portion 8 of member 2 is clamped against the under face of block 6, the members 1 and 2 are effectively restrained against relative displacement except that which is necessary for adjustment of the condenser. For this latter purpose there is provided an adjusting screw 17 which is in threaded engagement with the member 1, the screw being insulated from member 2 by the Isolantite or similar ceramic washer 14, and if desired a smaller metal washer 15 may be provided, it being understood that the opening 16 through which the adjusting screw passes is materially larger than the diameter of the screw so as to avoid short circuiting of the condenser electrodes.

With the above described structure the condenser plate 2 is capable of hinged movement and the looped portions 11, 12 enable the condenser to be adjusted to open position without the movable plate 2 rubbing on the mica separator 3, while at the same time the various members are positively interlocked so that as the adjusting screw is turned the only movement of which the plate 2 is capable is a hinged movement. The looped portions 11, 12 also enable the condenser to be adjusted to a very wide open position without danger of relative turning between the plates, thus enabling a very low minimum capacity to be attained. Since the member 1 is of heavy gauge metal and since the member 1 is of a ceramic block formation the "creepage" between the condenser plates is substantially entirely eliminated, while providing minimum leakage resistance within the condenser.

While one specific embodiment has been described it will be understood that various changes and modifications may be made therein without departing from the spirit and scope of the invention.

What is claimed is:

In a trimmer condenser, the combination of a rigid metal base serving as one of the condenser electrodes, a ceramic block lying against one face of said base and interlocked therewith, a metal strip positioned opposite the other face of said base and one end thereof forming a cooperating condenser electrode with said base, the other end of said strip bent at right angles to the first-mentioned end and joined thereto by a bowed portion, said other end having a struck out lug disposed against the face of said block opposite the face against which the said base lies, and means passing through said lug said block and said base to rigidly clamp said block between said strip and said base.

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