Aug. 6, 1935. S. S. CRAMER 2,010,584

VARIABLE TUNING AND TRIMMER CONDENSER

Filed April 4, 1933 2 Sheets-Sheet 1

FIG. 1

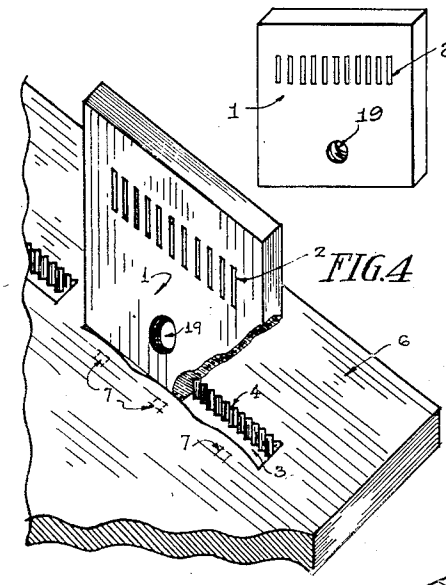


FIG. 4

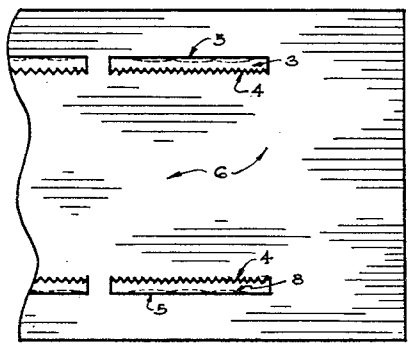
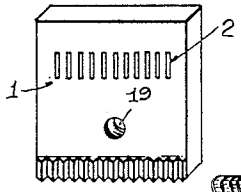


FIG. 3

FIG. 2



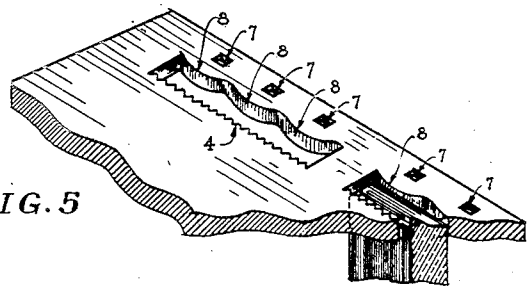


FIG. 5

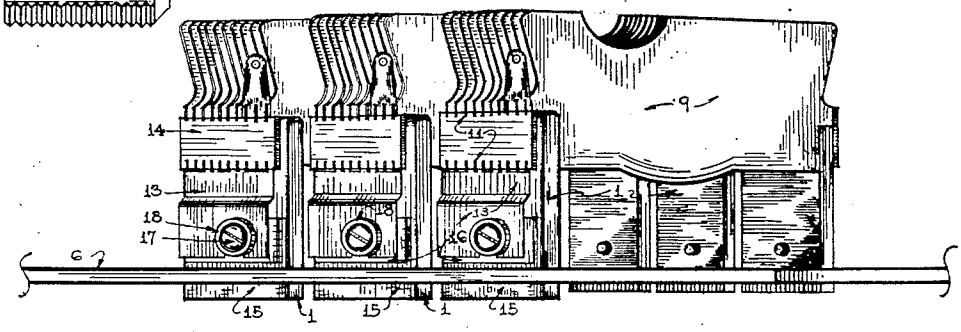


FIG. 6.

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VARIABLE TUNING AND TRIMMER CONDENSER

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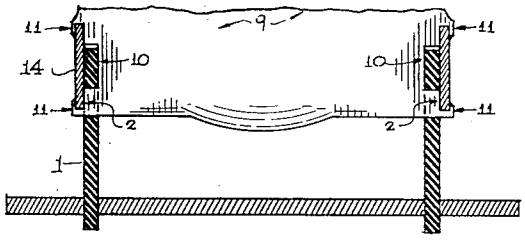

FIG. 7

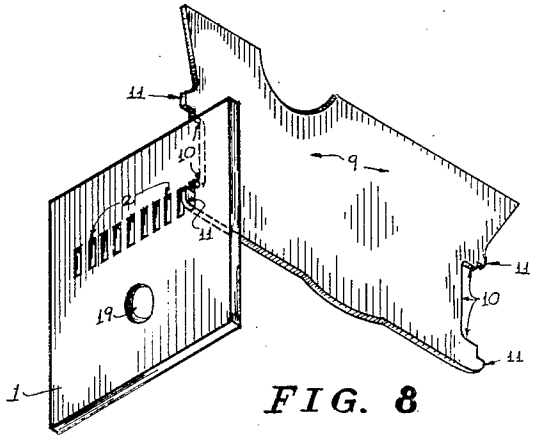

FIG. 8

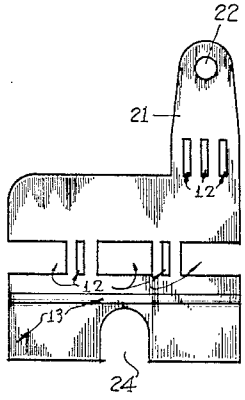

FIG. 9

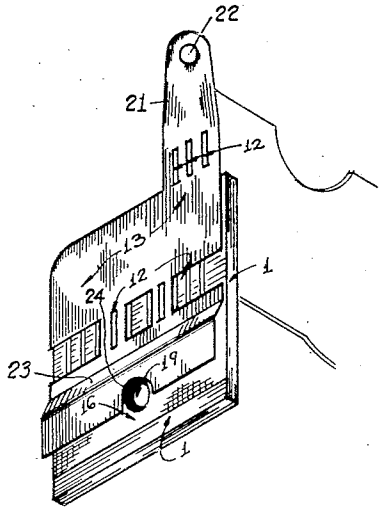

FIG. 10

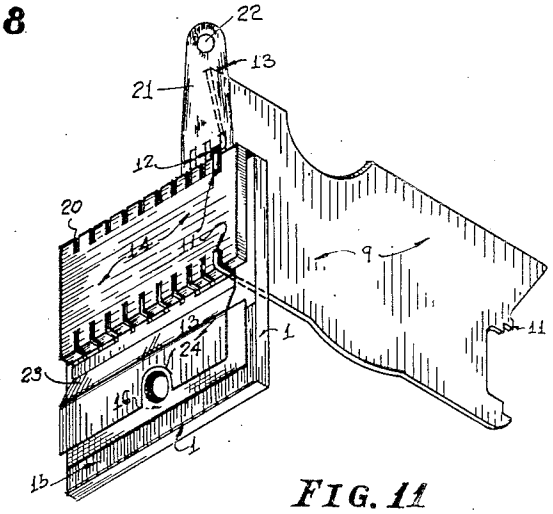

FIG. 11

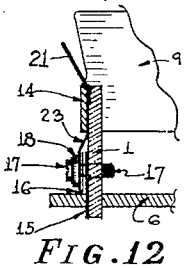

FIG. 12

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UNITED STATES PATENT OFFICE

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VARIABLE TUNING AND TRIMMER CONDENSER

Stanley S. Cramer, Haddon Heights, N. J., assignor to Radio Condenser Company, Camden, N. J.

Application April 4, 1933, Serial No. 664,329

7 Claims. (Cl. 175—41.5)

This invention relates to the construction of variable tuning condensers including their associated trimmer condensers such as are satisfactory for use in radio receiving sets.

In my Patent 1,800,719, issued April 14, 1931, I have shown and described a construction in which each group of stator plates is fastened to tiebars and these tiebars are fastened to one end of an insulator with any satisfactory means as by screws, while the opposite end of the insulator is either riveted, screwed, or otherwise fastened to a lug or part of the frame.

One of the objects of my present invention is to provide what I believe to be a cheaper form of construction, it being kept in mind that the production cost, because of the severe competition in the manufacture of variable tuning condensers, is an important factor.

While obtaining the principal object of my invention, I obtain a construction which is extremely rigid and therefore one which will maintain correct spacing of the stator plates.

These and other objects will be appreciated by one skilled in this particular art, on reading the following specification taken in connection with the annexed drawings, wherein:

Figure 1 is a perspective view of one of the insulators used in mounting the groups of stator plates.

Figure 2 is a view similar to Figure 1, but showing the insulator as it would look if it were withdrawn from its assembled position as indicated in Figure 4.

Figure 3 is a fragmentary view of one end of a frame or mounting plate.

Figure 4 is a perspective view showing the end of the frame or mounting plate with only the insulator of Figure 1 in position, a portion being broken away to show the means for gripping the insulator.

Figure 5 is a fragmentary, perspective view of the reverse side of the frame or mounting plate such as illustrated in Figure 4.

Figure 6 is a perspective view showing the three groups of stator plates assembled on the frame member.

Figure 7 is a skeleton view showing a single stator plate mounted on the insulator without any trimmer.

Figure 8 is a perspective view showing the manner in which the supporting insulator is mounted or attached to the stator plate.

Figure 9 is a perspective view of an adjustable trimmer plate which may be used with my improved stator mounting.

Figure 10 shows the plate of Figure 9 applied or lying on the insulator which carries the stator pack.

Figure 11 is a view similar to Figures 10, but showing the addition of the tiebar for holding the stator plates, insulator and adjustable trimmer plate in position.

Figure 12 is a part-elevational and part-sectional view looking at the side of one end of the frame and stator, showing the elements of the trimmer condenser in position, and means for adjusting the variable plate of the trimmer.

In the drawings, the several views are approximately twice the size of the model condenser from which the drawings were made, and in the various views, like numbers refer to corresponding parts.

In Figure 6, I have shown a mounting plate or frame member 6 on which are positioned a plurality of groups of stator packs, three such groups being shown, each group consisting of a plurality of variable condenser plates 9. The plates 9 are fastened together at their opposite ends and to the frame member 6 in what I consider to be a new and novel manner. The means for fastening the stator plates 9 together and to the frame member 6, include an insulator 1 having spaced perforations 2 to receive or through which pass the lower one of the tines 11, the plates 9 being notched out at 10 to form an abutment against the side of the insulator 1 about as shown in Figures 7 and 8.

After the insulator 1 has been put into position with respect to the stator plates 9 the tiebar 14, having notches 20 in the opposite sides thereof to receive the tines 11, is placed in position and the ends of the tines 11 are upset so as to securely anchor them to the tiebar about as shown in Figure 7, thereby anchoring the ends of the stator plates 9, the insulator 1 and the tiebar 14 to each end of the stator plates. The group of assembled stator plates may then be assembled to the mounting plate or frame member 6 which is provided with a plurality of slots or elongated apertures 3, each slot having at least a part of its boundary edges irregular in shape; for example, one side or boundary edge is made with a plurality of serrations 4, while the other side, 5, is normally relatively straight or smooth. The ends of the insulators 1, opposite those ends connected to the stator, are then pushed into the slots 3, it being understood that the insulators 1 are preferably slightly thicker and longer than the width and length of the slots 3, so that the serrations 4 will cut slightly into the insulators.

After the insulators, attached to the stator,

have been pushed into place as described, the material of the frame member 6, preferably of any suitable metal, is forced against the side of the insulators opposite the serrations 4 as indicated by the bulging portions 8, by means of a staking or expanding operation at the point 7, thereby forcing a gripping or interlocking engagement between the frame member and the insulators. Figure 2 illustrates, generally, how the bottom of the insulator will look after this staking operation has been performed.

By reason of the above-described construction, I have provided means for mounting a stator group of plates to the frame of a condenser in a very cheap and inexpensive manner and without the use of any screws or rivets, all of which are more or less expensive when the assembly operations thereof are taken into consideration.

In order to incorporate a trimmer condenser along with the main condenser, I provide a trimmer plate 13 somewhat as shown in Figure 9, provided with perforations or notches 12 through which the lower tines 11 of the plates 9 may pass. The trimmer plate 13 is provided with a lug 21 having a hole 22 therein through which the connecting wire may be passed and soldered thereto. The lug 21 also has perforations 12 spaced according to the spacing of the stator plates 9 to receive certain of the upper tines 11, three such perforations 12 being shown. When the trimmer plate is used as above described, it is positioned between the insulator 1 and the tiebar 14 somewhat as indicated in Figures 10 and 11 and as shown in the side elevation in Figure 12.

The trimmer plate 13 has an offset 23 and a notch 24 in the lower portion thereof to provide clearance for an adjusting screw 17 adapted to enter the tapped hole 19 in the insulator 1, an insulating washer 18 being provided under the head of the screw 17. A cooperating trimmer ground plate 15 is positioned in the slot 3 of the frame member 6 and is held between the frame and insulator and against the frame 6 by the staking operation which has already been described.

Located between the two trimmer plates 13 and 15, is a dielectric sheet 16, preferably of mica, to prevent the trimmer plates from being brought into electrical contact and thereby short-circuiting the stator. It will be seen that the lug 21 on the trimmer plate 13 serves the purpose of making an electrical connection to the stator, but when the trimmer is not used, a lug corresponding to lug 21 may be riveted in place under the tiebar 14 for the purpose of making connection to the stator.

It will be understood that the pair of trimmer plates may be mounted on both ends of each of the stator groups of plates.

Having thus described my invention, what I claim is:

1. In a variable condenser having a frame member and a group of plates comprising a stator, means for mounting the stator on said frame member including; tines on the ends of the stator plates, an insulator for each end of the stator and each having spaced perforations to receive at least a tine at one end of each plate, another tine at the same end of said plate passing over the top of the insulator, a tiebar fastened to said tines outside the insulator, said frame member having slots therein to receive the opposite ends of said insulators, said slots having a part of their boundary edges irregular and said frame member having portions, opposite said irregular edges, forced in a direction to cause said irregular edges to grip into the insulators.

2. In a variable condenser having a frame member and a group of plates comprising a stator, means for mounting the stator on said frame member including; an insulator for each end of the stator, cooperating means for anchoring the stator plates and insulators together including spaced openings in the insulator and portions of the plates going therethrough, with tie bars lying against said insulators and having openings therein to receive said portions of the stator plates which pass through said insulators, said portions being securely fastened to said tie bars, said frame member having slots therein to receive the opposite ends of said insulators, said slots having irregularities in some part of the boundary edges thereof, and said frame member having portions forced in a direction to cause said irregularities to grip into the material of the insulators.

3. In a variable condenser as set forth in claim 1 means for incorporating a trimmer condenser therewith comprising a trimmer plate positioned between one of said insulators and its cooperating tiebar and having notches therein through which said tines pass, said trimmer plate extending downward toward the frame member and having an offset therein away from the insulator, a cooperating trimmer ground plate held between and against the frame member and said insulator and extending toward the stator in overlapping relationship to the first-mentioned trimmer plate, and means for adjusting the relative position of said trimmer plates.

4. In a variable condenser which includes a frame member and a group of plates comprising a stator with means for mounting the stator on said frame member, said means including an insulator for each end of the stator, means for fastening the stator at each end to one end of its insulator, said frame member having an opening therein to receive the opposite ends of said insulators, said frame member being swedged into interlocking engagement with said insulator ends, said condenser being further characterized by providing means for incorporating a trimmer condenser therewith, comprising a trimmer plate held in mechanical and electrical contact with the stator and extending downwardly toward the frame member, a cooperating trimmer ground plate held between and against the frame and said insulator and extending toward the stator in overlapping relationship to the first-mentioned trimmer plate, and means for adjusting the relative position of said trimmer plates with respect to each other.

5. A variable tuning and trimmer condenser unit including, a frame member, a stator group of plates, an insulator having openings therethrough through which portions of said stator plates may pass, a trimmer plate having openings therethrough through which certain portions of said stator plates may pass, a tiebar for each end of the stator plates fastened thereto to anchor the stator plates, the trimmer plate and insulator together, said frame member having slots therein to receive the opposite ends of said insulators, a trimmer plate positioned in at least one of said slots and held against the frame member by pressure applied to the plate and insulator by swedged portions of said frame member, said last-mentioned trimmer plate extending in overlapping relationship to the first-mentioned trim-

mer plate, and means for adjusting the relative position of the trimmer plates with respect to each other.

6. In a variable condenser, a frame member having openings therein, a stator unit comprising a plurality of stator plates having recesses in the opposite ends thereof and means for interlocking with supporting tie bars, dielectric mounting strips having parts positioned in said plate recesses, single oppositely disposed metallic tie bars overlying said recesses and said parts of the mounting strips and engaged by said plate interlocking means to anchor the ends of said plates, the tie bars and said insulator parts together, said dielectric mounting strips extending into certain of said openings in the frame member, and secured thereto by gripping co-action of the walls of the openings in which the dielectrics are positioned.

7. A variable condenser as set forth in claim 6, characterized in that the fastening between the stator unit and the dielectric strips comprises spaced slots in the dielectric strips, recesses terminating in tines on each of the stator plates on opposite ends thereof, one set of tines at one end of the plates going through said slots, while the other set of tines at the same end of the plates embraces the edge of the respective strip, the tie bar lying against the surface of the strip and held thereto by upset ends of the tines.

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