

July 22, 1941.

K. A. DUERK

2,250,329

VARIABLE ELECTRICAL CONDENSER AND METHOD OF MANUFACTURE

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FIG. 1.

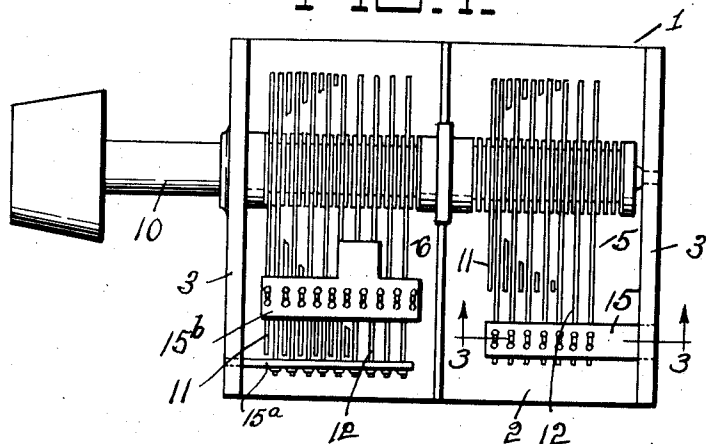


FIG. 2.

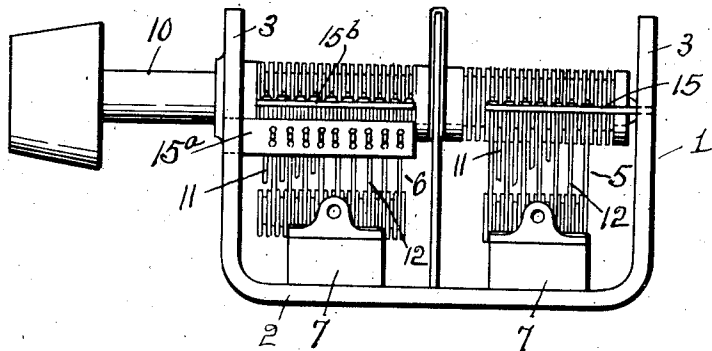
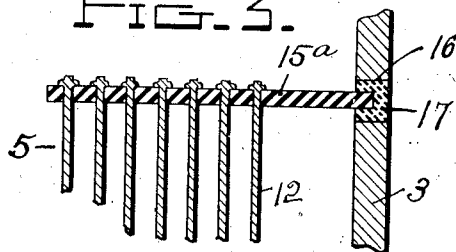


FIG. 3.



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UNITED STATES PATENT OFFICE

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VARIABLE ELECTRICAL CONDENSER AND
METHOD OF MANUFACTURE

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8 Claims. (Cl. 175—41.5)

This invention relates to electrical condensers of the variable type, and more particularly to those having a one-piece U-shaped frame wherein the stator element or elements have heretofore been supported only by the base portion of the frame, and to the manufacture of such condensers.

Condensers of this character are generally subject to two objectionable conditions,—(1) they are known to be contributory somewhat to "microphonics," which has been traced to two sources, namely, (a) vibratory movement of the top of the stator element with relation to the rotor element, and (b) vibratory movement of the ends of the frame which in turn imparts movement to the rotor element, thus displacing the rotor plates with relation to the stator plates; and (2) no matter how carefully the companion plate sets of these condensers are aligned and calibrated in the process of manufacture they are frequently thrown "out of calibration" by a warping or twisting of the frame in mounting or attaching to the chassis assembly, thus causing inaccuracies in the "track" of the dial or frequency selecting indicator in the completed receiver. This latter condition has been found to be caused by a distorting action of the frame being imparted to the rotor element, thereby moving the rotor plates from their original adjusted position with respect to the stator plates.

It is found in practice that both of these conditions are of much greater prevalence and of more serious character during the first 50% of the rotation of the rotor element from its minimum capacity position, during which portion of movement the rotor plates interengage only with the upper portions of the stator plates.

The object of this invention is to obviate the above objections to the use of condensers of the character described, by correlating the positioning of the stator element or elements with relation to the rotor element and by adding sufficient support to the top portion of the stator element plates relative to the frame ends to eliminate any vibratory tendency of one relative to the other.

The invention is fully described in the following specification and illustrated in the accompanying drawing, in which—

Figure 1 is a plan view of a condenser embodying the invention, with parts broken away; Fig. 2 is a side elevation thereof, with parts broken away, and Fig. 3 is an enlarged section on the line 3—3 in Fig. 1.

In order to attain the advantages of this in-

vention in an efficient and economical manner, I have extended the conventional stator "tie bar," which heretofore has accomplished little if anything more than to insure accurate spacing of the upper portions of the stator plates, and caused it to register with and extend loosely into a small hole in the adjacent frame end, said hole and tie bar being substantially the same height up from the frame base as the rotor shaft axis. During the process of plate alignment in the manufacture of variable condensers, this extension of the stator "tie bar" can move freely within the hole in any direction. After completion of the aligning and calibrating operations, a suitable fluent settable material such as solder, cement, or the like, is applied to the frame hole and tie bar extension therein to firmly unite the frame and tie bar without possibility of any strains or displacement whatsoever.

In the drawing, 1 designates a U-shaped variable electrical condenser frame having the base portion 2 and end members 3, 3. In the present instance, the condenser is of the two-gang type and includes the stator elements 5 and 6, each fixedly supported from the base portion 2 of the frame by one or more supports 7 of an insulating nature, as well understood in the art. The rotor element comprises a shaft 10 journaled in the frame ends and a set of condenser plates 11 for each stator element 5, 6, and interleaved with its plates 12.

It is common practice in assembling the condenser parts to mount the rotor element in the frame with its plates interleaved with the respective plate sets of the stator elements 5, 6, but at first with said latter elements free for adjustment relative to the rotor. When such adjustment has been effected, the stator elements are fixedly secured in a suitable manner to the frame. The method of mounting the stator supports 7 to permit such adjustment is shown and described in U. S. Patent No. 1,934,907.

For the purpose of the present invention, the plates 12 of one or both stator elements are tied together at or near their top edges and near one end with a tie bar 15 of suitable dielectric material and its outer end is extended to and, in the present instance, projected freely for relative floating movements in a small hole 16 in the adjacent frame end. When the stator element or elements have been properly mounted in the frame, the extended end of said tie bar is fixedly attached to the frame end by a suitable solder, cement, or other material 17 applied, in the present instance, within the hole 16.

It is desirable to apply such a tie bar at least to the "oscillator" section of a condenser, which section, in the present instance, comprises the stator element 5 and has the associated rotor plates 11 shorter than the stator plates, thus permitting the tie bar to be mounted on and fixed to the extended top edges of the stator plates. If desired, the plates of more than one of the stator elements of the condenser may be anchored to the frame, as illustrated, and in the event the interleaved rotor and stator plates are substantially of the same length, the tie bar may be attached to the end edges of the stator plates near their tops, as shown by the tie bar 15^a (Figs. 1 and 2). The tie-bar 15^b is mounted on the top edges of the rotor plates of one of the condenser sections, the left in the present instance, for engagement with the top edges of the associated stator plates to limit the adjusting movements of the rotor, as well understood in the art.

To obtain the best results, a tie bar should be placed as nearly as possible at the same height from the frame base as the axis of the rotor element.

It is apparent from the foregoing that all tendency of the plates of a tied stator element to vibrate on its support or supports will be effectually "damped;" that any tendency of vibratory motion in the frame ends, which otherwise would be transmitted solely to the rotor element, is now transmitted equally to the stator element plates, causing the frame and stator element to move in unison, thereby preventing the periodic capacity changes which result in "microphonism," and that, in event the frame is warped to any extent whatsoever in mounting upon the chassis assembly, thereby moving the rotor element in a lateral direction, the stator element will likewise be moved in the same direction practically an identical amount.

It will be understood that the invention is capable of numerous modifications and changes without departing from the spirit of the claims.

Having thus described my invention, what I claim as new, and desire to secure by United States Letters Patent, is:

1. In the manufacture of variable electrical condensers, the method of assembling a stator element having parallel plates in a frame having end members, which method consists in fixedly supporting the base portion of the stator element in the frame with the stator plates free to vibrate above the point of support, and then while said stator plates are freely supported from said base portion, rigidly tying the upper or free portion of the stator element plates to a frame end by a settable cement connection applied in situ to prevent relative vibration or movement.

2. In the manufacture of variable electrical condensers, the method of assembling a stator element having parallel plates in a frame having end members, which method consists in mounting the stator element at its base portion in proper position on one or more supports in the frame with the stator plates free to vibrate above the point of support, and then while said stator plates are freely supported from said base portion, rigidly tying the upper or free portion of the stator element plates to a frame end in outwardly spaced relation to the support by a settable cement connection applied in situ to prevent relative movements of the element and attached frame end.

3. In the manufacture of variable electrical condensers, the method of assembling a stator element having parallel plates and frame, the frame having a hole in one end member thereof and the stator element having a tie bar fixed to and projecting laterally from the top edge portions of the stator plates, which method consists in properly mounting the stator element as a unit at its base portion in the frame with the projected tie bar end adjacent to said hole, and then anchoring said tie bar end to the walls of said hole by filling the space between the walls of said hole and said tie-bar and with a settable cementing material which upon hardening prevents relative vibration of the frame end and stator plates.

4. In a variable electrical condenser having a U-shaped frame and a stator unit comprising spaced plates rigidly connected at their base edges and fixedly mounted at such edges to the frame with the plates substantially parallel to the frame ends and free to vibrate about said base edge connections relative to each other and to the frame, an insulating tie-bar rigidly connected to the outer or free portions of the stator plates and having one end thereof arranged in spaced relation to one end portion of said frame, and a rigid connection between said tie-bar and said end portion comprising hardened cementing material filling the space between the end of said tie-bar and said end portion.

5. In a variable electrical condenser having a U-shaped frame and a stator unit comprising spaced plates and base edge connecting cross strips for the plates rigidly supported by the base portion of the frame with the plates substantially parallel to the frame ends and free to vibrate about said cross strips relative to each other and to the frame ends, the combination of a tie-bar insulatingly and rigidly connected to the plates in outwardly spaced relation to the cross strips, said tie-bar having one end thereof arranged in spaced relation to one end portion of said frame, and a rigid connection between said tie-bar and said end portion comprising hardened cementing material filling the space between the end of said tie-bar and said end portion to prevent vibration of the free portions of the plates relative to each other and to the frame.

6. In a variable electrical condenser having a U frame, a rotor element between and journaled in the frame ends, and a cooperating stator element rigidly mounted at the base portion of its plates to the frame base with the major body portions of the plates free to vibrate throughout their lengths relative to each other and to the frame, the combination of a rigid connection between the outer free portions of the stator plates at an end portion thereof and a frame end at substantially the same height from the frame base as the rotor element axis and free from interference with the rotor adjustment to prevent relative vibration of the free portions of the stator plates and frame, said connection including a link of hardened cement material interposed between the frame end and the stator plates.

7. In a variable electrical condenser of the type having a frame with base and end members, the latter forming bearings for the rotor element, and a stator element having the base portions of its plates rigidly connected and fixedly mounted in the frame and its outer edge portions rigidly connected by a tie-bar and free

for lateral movement relative to the frame, the combination of an extension on said tie-bar arranged in spaced relation to one end portion of said frame, and a rigid connection between said tie-bar and said extension comprising hardened cementing material filling the space between said extension and said end portion.

8. In a variable electrical condenser of the type having a frame with base and end members, the latter forming bearings for the rotor element, a stator element having spaced plates, and mounting means for the plates fixed to the frame base and attached to the lower edge por-

tions of the plates in a plane substantially parallel to the frame base and spaced from the plane of the rotor axis, the combination of a tie-bar insulatively spacing the upper or outer portions of the stator plates and having an extension projecting into a hole formed in one of the frame end members, and a rigid connection between said extension and said frame end member comprising hardened cementing material filling the space between said extension and the wall of said hole.

KARL A. DUERK.

CERTIFICATE OF CORRECTION.

Patent No. 2,250,329.

July 22, 1941.

KARL A. DUERK.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 66, claim 6, for the word "cement" read --cementing--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 2nd day of September, A. D. 1941.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.

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