Oct. 26, 1926. 1,604,508

G. J. ZISCH

VERNIER CONDENSER

Filed March 25, 1924

Fig. 1.

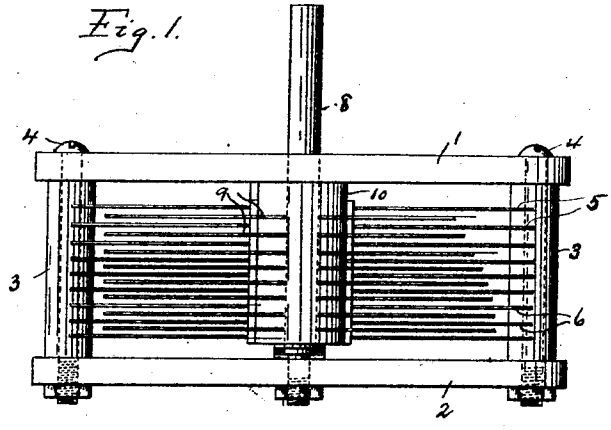


Fig. 2

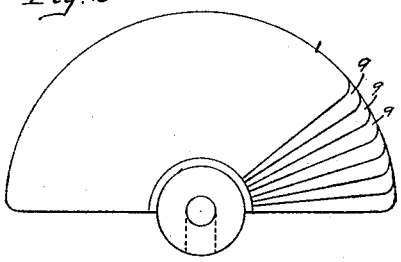


Fig. 3

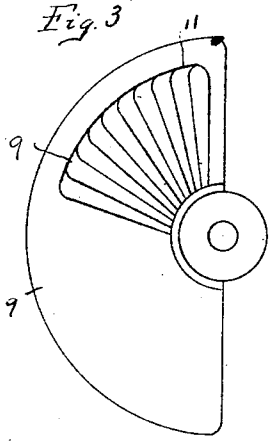


Fig. 4

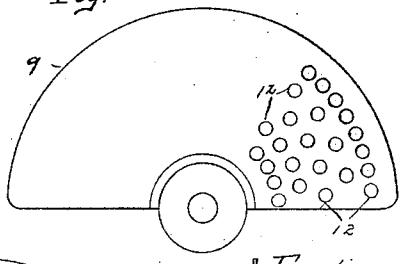


Fig. 7.

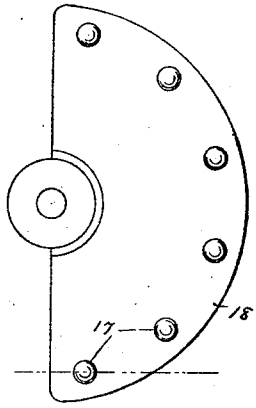


Fig. 8.

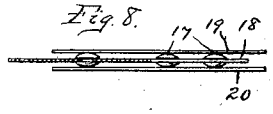


Fig. 5

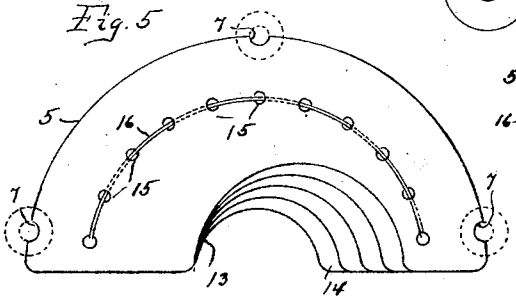


Fig. 6.



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Patented Oct. 26, 1926. 1,604,508

UNITED STATES PATENT OFFICE.

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VERNIER CONDENSER.

Application filed March 25, 1924. Serial No. 701,665.

The object of the invention is to provide the multiple plate condenser at present so widely used in radio-telephony with minute capacity variation adjusting means, so that the adjustments for capacity may be readily accomplished without the use of additional plates or other instrumentalities.

It is well known that capacity factors of variable condensers of the type to which the improvement relates, are, 1st, the thickness of the air-gaps between the adjacent plates respectively of the rotor and the stator; and, 2nd, the combined areas of said air-gaps. Hitherto, it has been the general practice in the construction of variable condensers of this type to make all of the plates of the rotor of exactly the same size and shape, and likewise the plates of the stator of exactly the same size and shape, and then provide an extra pair of stator plates and a single rotor plate with separate and independent manipulating means therefor, to make the finer adjustments.

It has been found that by making one or the other of said sets of plates of graduated areas, finer capacity adjustments can be made without the extra sets of plates or means for separate and independent manipulation, and a correspondingly reduced cost of manufacture.

Again, since one of the capacity factors resides in the thickness of the air-gaps between the respective plates of the rotor and stator, by the simple means described, it is possible to materially reduce the thickness of the air-gaps, and thereby increase the faradic capacity of the condenser by the use of the same number of plates, or obtain the usual capacities with a fewer number of plates.

These and other objects will be more fully set forth in the following specification in connection with the accompanying drawing, in which—

Fig. 1 is a plan view of a condenser, showing the plates of the rotor as graduated areas.

Fig. 2 is an end view of a detached rotor, showing the graduated areas of the plates.

Fig. 3 is a similar view showing a modified form for accomplishing the same results.

Fig. 4 is another modified form of plate construction.

Fig. 5 shows a form of stator plate construction for accomplishing the same results, and one form of means employed for positively separating the stator plates from the rotor plates in the completely assembled condenser.

Fig. 6 is an edge view of one of the stator plates of Fig. 5.

Fig. 7 is a plan of a rotor plate, showing a modified form of separating means as applied thereto.

Fig. 8 is an edge view of a rotor plate interleaved between two stator plates and having the separating means of Fig. 7 applied thereto.

In Fig. 1, is shown a common form of condenser frame as made up of insulating end plates 1, 2, spaced apart by spacing thimbles 3, and rigidly held together by bolts 4. The plates 1, 2 are of substantially triangular form, and between them stator plates 5 are rigidly held spaced apart in thin cross-slots 6, cut about half way through the spacing thimbles 3. The plates 5 are circumferentially notched, as shown in Fig. 5, at 7, so that when in place, the bolts 4 will enter said notches 7 and rigidly hold them in position.

The rotor consists of a shaft 8, journaled in the plates 1, 2, with one end projecting some distance outside of the plate 1 for the convenient attachment of a turning knob thereon. Upon the shaft 8, the rotor plates 9 are mounted and secured in spaced relation, so that as the shaft 8 is turned, said plates will interleave with the stator plates 5, as will be seen in Fig. 1. Any convenient means for securing the rotor plates to the shaft 8 may be employed, the means shown being the common one of a hub 10.

In Fig. 2 the rotor plates 9 are shown as of progressively graduated areas, so that when the rotor is turned to interleave said plates between the stator plates, first the full sized plate will be inserted then the next adjacent, and so on until all of the rotor plates are interleaved completely. Likewise, further turning of the shaft will first project the edge of the full plate from between the two bottom plates of the stator, then the next and so on.

In Fig. 3 is shown a modified form of rotor plate. In this form, a sector of each plate is punched out as at 11, with such sectors of gradually increasing size, so that the effective areas of the plates are progressively changed throughout the series.

The same results may be obtained by punching out a series of radial holes, as at 12 in Fig. 4, with each succeeding plate having an additional row of such openings.

In Fig. 5, the improvement is applied to a series of stator plates to accomplish the same results. The plates of the stator are, as shown, of semi-circular outline and, as usually constructed, have a semi-circular notch as 13 at the middle of the straight side, to afford clearance for the hub of the rotor. The improvement consists in progressively enlarging these notches, that is to say: the notch of one plate 14 is of the usual size; that of the next adjacent is larger, and so on through the series. The successive notches, however, while progressively larger, are at the same time of progressively greater eccentricity, so that the areas of the stator plates are graduated from bottom to top.

Fig. 5 also shows the separating means for the rotor and stator plates, whereby the thickness of the air gap between adjacent plates may be materially reduced, and the faradic capacity of the assembled condenser correspondingly increased. To accomplish this, the stator plate has a series of apertures 15, arranged in the arc of a circle as shown, and through these apertures a silk thread 16 is run from one end of the series of apertures to the other. The stator plates may be set in the condenser frame much closer together, in fact close enough so that the plates of the rotor may slide between the slik thread insulators 16 of adjacent stator plates without fear of actual metallic contact with said stator plates.

In Figs. 7 and 8, is shown small button shaped insulating rivets 17 arranged in the arc of a circle in the face of a rotor plate 18, so that said plate may freely rotate between adjacent stator plates 19, 20, without danger of metallic contact therewith.

From the foregoing description, it will be seen that means are disclosed to accomplish the results sought in a very simple manner and of such simple character as to add very little to manufacturing costs. The form of the condenser as commonly used in radio-telephony lends itself admirably to the employment of the invention therein.

The graduation of the plate areas may be either upon the stator plates or the rotor plates, as desired without departing from the invention, and the methods of so graduating the plate areas may be employed upon condensers of any capacity, the size and style of condenser shown being only illustrative.

I claim:—

1. A condenser comprising a set of stator plates and a set of rotor plates rotatably interleaved with said rotor plates, one of said sets being composed of sheet metal sectors of equal radii and of equal arcs, each sector having openings of progressively differing areas, formed within the boundaries of their margins.

2. A condenser comprising a set of stator plates and a set of rotor plates rotatably interleaved with said stator plates, said rotor plates being in the form of sectors of circles of equal radii and arcs, each having openings of progressively differing areas within their marginal boundaries.

3. A condenser comprising a set of substantially semi-circular stator plates and a set of rotor plates adapted to be rotatably interleaved with said stator plates, one set of said stator plates having semi-circular openings of unlike radii and focal length in their straight edges to progressively reduce their surface areas.

4. A condenser comprising a set of stator plates and a set of rotatably interleaved rotor plates having enclosed openings to produce progressively reduced surface areas, in combination with independent insulating knobs applied to both faces of each plate of one set to prevent metallic contact with the other set.

5. A condenser comprising a set of stator plates and a set of rotor plates rotatably interleaved with said stator plates, in combination with an insulating strand threaded through apertures arcuately arranged in each of one of said sets of plates to prevent metallic contact with the adjacent plates of the other set.

6. A condenser comprising a supporting frame, a plurality of fixed parallel sheet metal plates mounted in said frame, a similar set of plates mounted in said frame to rotate in interleaved relation with said fixed plates, one of said sets of plates being cut out within their margins to progressively reduce their respective surface areas, and a plurality of spaced insulating knobs applied to both faces of each plate of one of said sets of plates to prevent metallic contact with the other set of plates.

7. A condenser comprising a supporting frame, a plurality of parallel metal plates mounted in said frame, a similar set of plates mounted in said frame to rotate in interleaved relation with the first named plates, one of said sets of plates being respectively in the form of sectors of circles of equal radii and like arcs and containing openings of progressively differing areas, in combination with insulating material inserted through arcuately arranged apertures in each of one of said sets of plates to prevent metallic contact with the adjacent plates of the other set.

GEORGE J. ZISCH.