Feb. 11, 1930. W. H. REID ET AL 1,746,967

ELECTRIC CONDENSER

Filed Dec. 23, 1927

Fig. 1.

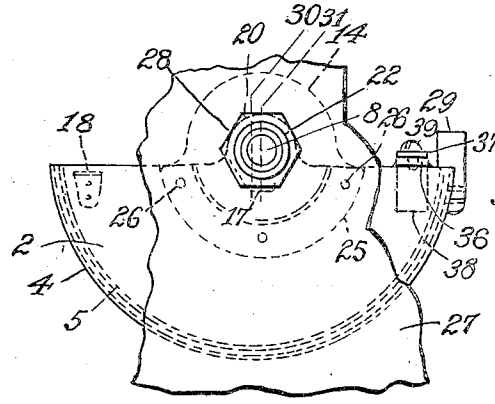


Fig. 2.

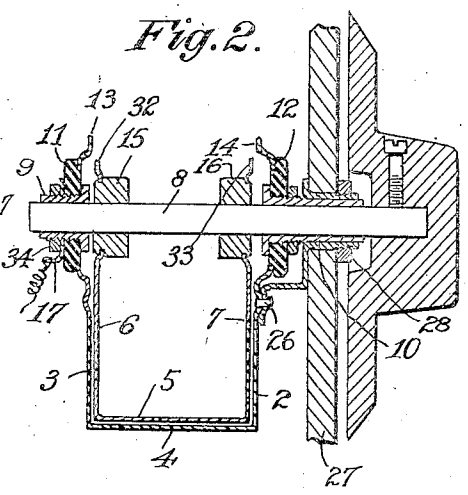


Fig. 3.

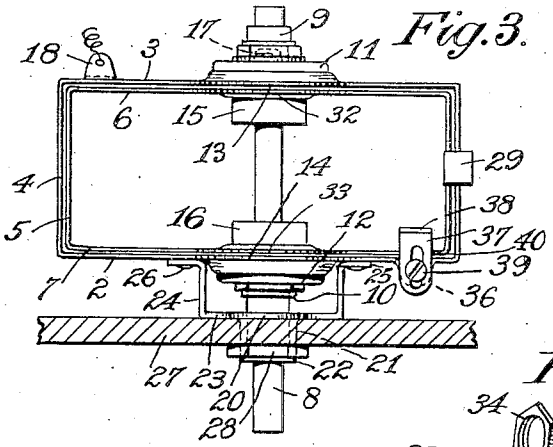


Fig. 5.

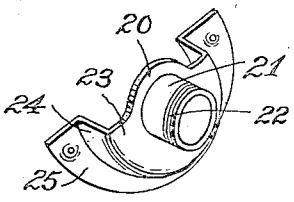


Fig. 6.

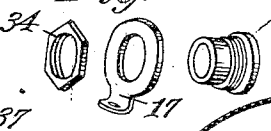


Fig. 4.

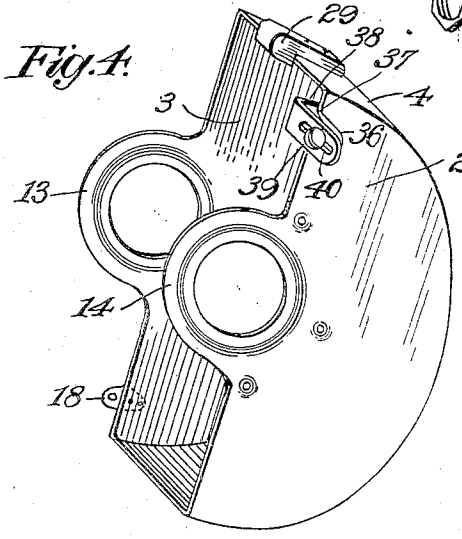
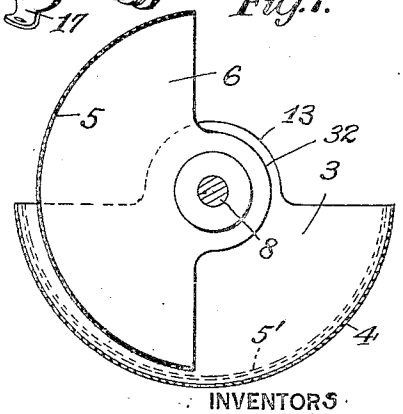


Fig. 7.



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UNITED STATES PATENT OFFICE

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ELECTRIC CONDENSER

Application filed December 23, 1927. Serial No. 242,083.

This invention has reference to variable condensers, such as used in radio apparatus, and for other purposes, that will vary the capacitance of the circuit in which used.

The main object of this invention is to provide an improved condenser of this character in which the surfaces in apposition, or a portion of them, will vary their distance apart at the same time that such surfaces vary the area in apposition.

Another object of this invention is to provide a device of this nature in which the two elements generally known as the rotor and the stator, are each a simple concrete member, that can be readily formed as an integral structure, by die press operation, or by die casting or similar processes; in contrast with the form of condensers in general use that comprise a series of parallel plates, that are assembled on a shaft, or on a frame, and must be in accurate relative position.

Another object is to provide an improved form of mount for the device on the panel, by means of which the stator can be readily mounted at the opening through which the shaft passes, by what is known as a one-hole mount, and which can be readily secured to the stator adjacent to the shaft support.

In the accompanying drawing showing one embodiment of our invention;

Figure 1 is a side elevation.

Fig. 2 is a vertical axial section.

Fig. 3 is a top plan view.

Fig. 4 shows the stator separately.

Fig. 5 shows the one-hole mount.

Fig. 6 shows journal parts.

Fig. 7 is a diagram showing the eccentricity of the parts.

The condenser as set forth comprises essentially a stator having a curved or segment surface; and a rotor having a similar segment face and mounted in movable relation to the stator to bring such surfaces in close apposition in the closed position of the device for full capacitance effect; and upon swinging the rotor the amount of the area of said faces in apposition is gradually reduced, at the same time the actual distance apart of such faces increases as the area decreases, and vice versa when swung together. In the arrangement set forth we further provide side plates or faces that are and remain parallel, and do not vary their actual distance apart. The stator is shown formed of two side plates 2 and 3 that are parallel, and which connect with a segment plate 4, shown as tubular of form; which three parts are preferably integral, and may be produced by a die press operation, or by die casting or similar operation. The rotor is a similar structure, comprising a segment 5, connected at the edges with parallel side plates 6 and 7, also preferably integral. The rotor is slightly smaller than the stator, to swing inside of the same, to bring the several corresponding faces of them into capacitance relation. For this purpose we mount a shaft on the stator, to which the rotor is secured. A shaft 8 turns in journal bearings 9 and 10, carried by bushings 11 and 12 of insulating material such as hard rubber, and which are secured in apertured ears 13 and 14 on the side plates 3 and 2. The rotor has ears 32 and 33 apertured to be secured to metal bushings 15 and 16, in which the shaft 8 is secured, so that the shaft is in circuit with the entire rotor. A suitable connection is made for the shaft, such as an ear on a washer 17, held against the bearing 9 by nut 34, see Fig. 6. A stud 18 on the stator is the other terminal for the condenser.

The relative arrangement of the shaft on the rotor, and of the journals on the stator, is such that the axis of rotation is eccentric to both; but is arranged so that in the closed position the curved faces 4 and 5 of the stator and the rotor are substantially equidistant, and practically concentric; but as the rotor is swung by the shaft and the area of these segment faces in close position or apposition, is reduced, the actual radial distance apart of these two faces 4 and 5, increases; so that the reduction of the capacitance by the reduction of the area in apposition is still further reduced by the reduction of the dielectric. Obviously the opposite effect results as the rotor is swung to increase the capacitance. It will be understood that as the segments vary the surfaces in apposition, the side plates will vary their area of opposed faces in the same relative amount. This eccentric arrangement

is indicated in Fig. 1 where the line 31 passes through the axis of the shaft 8, while the line 30 passes through the center of the curved face 4 of the stator, and also through the center of the curved face 5 of the rotor; in other words, the centers of these two members are shifted the same distance, between the lines 30 and 31, for the mounting of the shaft 8 on the rotor, and for the mounting of the two journals of the stator, for the shaft bearing. In Fig. 7 the lines 4 and 5' indicate the closed position of the rotor, while the rotor is shown in full lines in a position as half way advanced, and it will be readily understood that the face 5 increases its distance from the face 4 as swung.

In Fig. 5 is shown separately the one-hole mounting plate, that comprises a disc 20 with a sleeve 21, projecting therefrom, that has external screw threads 22. The disc 20 is extended in the form of a semi-circle 23, that has a flange 24 in the form of a half cylinder; and a semi-annular flange 25 extends outwardly with suitable holes for bolts 26 to secure it to the side plate 30 of the rotor, as shown. The sleeve 21 is passed through the hole in the panel 27 and a nut 28 is screwed on the sleeve to securely clamp the mount to the panel and thus support the device.

To further vary the capacitance, an angle plate 37 is secured to an ear 36 by bolt 39 adjustable in slot 40 and the side plate 2 whereby a bent arm 38 is moved to and from the inner wall 6 of the rotor.

What we claim is:—

1. In a condenser, a stator having an inner curved surface, a journal on the stator insulated therefrom, a rotor having an outer curved surface, a shaft on which the rotor is secured arranged to turn in said journal to bring said curved surfaces closely adjacent in the closed position for full capacitance effect, and as the rotor swings by its shaft bearing its curved surface moves away from the stator curved surface to reduce the area of the faces in apposition, said faces in the said movement also having a radial separation to gradually increase the distance apart radially of the faces in apposition and thereby further reduce the capacitance effect.

2. In a condenser, a stator having an inner curved surface of a cylindrical form, a journal on the stator insulated therefrom, a rotor having an outer curved surface of cylindrical curved form, a shaft on which the rotor is secured arranged to turn in said journal to bring said curved surfaces closely adjacent in the closed position for full capacitance effect in which the curved surfaces are concentric and equidistant, the shaft axis of the rotor being eccentric to said curved surfaces whereby as the rotor swings its curved face swings away peripherally from the stator face to reduce the area in active effect, said faces in the said movement also having a radial separation to gradually increase the distance apart radially of the faces in apposition and thereby further vary the capacitance effect.

3. In a condenser, a stator having an inner curved surface, and radial side plates, a journal bearing on the side plates insulated therefrom, a rotor having an outer curved surface and radial side plates, a shaft secured to the rotor side plates arranged to turn in said journal bearings to bring said curved surfaces closely adjacent in the closed position and also said side plates closely adjacent for full capacitance effect, and as the rotor swings by its shaft bearing its curved surface moves away from the stator curved surface peripherally to reduce the area of the curved faces in apposition and also reduce the area of the side surfaces in apposition, said curved surfaces in the said movement also having a radial separation to gradually increase the distance apart radially of the faces in apposition and thereby further reduce the capacitance effect.

4. A one-hole mount for a condenser or like device having a side plate and a shaft with a journal sleeve therein, comprising a disc having an externally threaded sleeve extending therefrom adapted to surround the shaft, a semi-circular extension on the disc, a semi-cylindrical sleeve extension on the disc extension projecting in the opposite direction from the disc than said sleeve, and a semi-circular flange with apertures for securing to said side plate of the device, and a nut on said threaded sleeve to clamp the panel against the disc.

5. In a condenser, a stator having an inner curved surface, a rotor having an outer curved surface, the rotor being mounted to swing on an axis to bring said curved faces closely adjacent in the closed position for full capacitance effect, and as the rotor swings on its axis its curved face moves away peripherally from the stator curved face to reduce the area of the faces in apposition, said faces in the said movement also having a radial separation to gradually increase the distance apart radially of the faces in apposition and thereby further reduce the capacitance effect, an extension plate on the stator at one end portion arranged to be adjacent the rotor end portion when brought to the closed position, and means for adjusting said plate to vary the capacitance effect produced thereby.

6. In a condenser, a stator having an inner curved surface of a cylindrical form and radial side plates, a rotor having an outer curved face of a cylindrical form and radial side plates, the rotor being mounted to swing on an axis to bring said curved faces closely adjacent in the closed position for full capacitance effect in which the curved faces are concentric and equidistant, and the side plates also closely adjacent, the axis of the rotor

being eccentric to said curved faces whereby as the rotor swings its curved face swings away peripherally from the stator face to reduce the area in active effect and the side plates also reduce the area of adjacent faces in active effect, said curved faces in the said movement also having a radial movement of separation to gradully increase the distance apart of such faces in apposition and thereby further vary the capacitance effect, an extension plate on the stator at one end portion arranged to be adjacent the rotor end portion when brought to the closed position, and means for adjusting said plate to vary the capacitance effect produced thereby.

Signed at New York city, N. Y., May 3, 1927.

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