May 9, 1944. A. S. KESTER 2,348,392

VARIABLE CONDENSER

Filed July 8, 1942

Fig. 1.

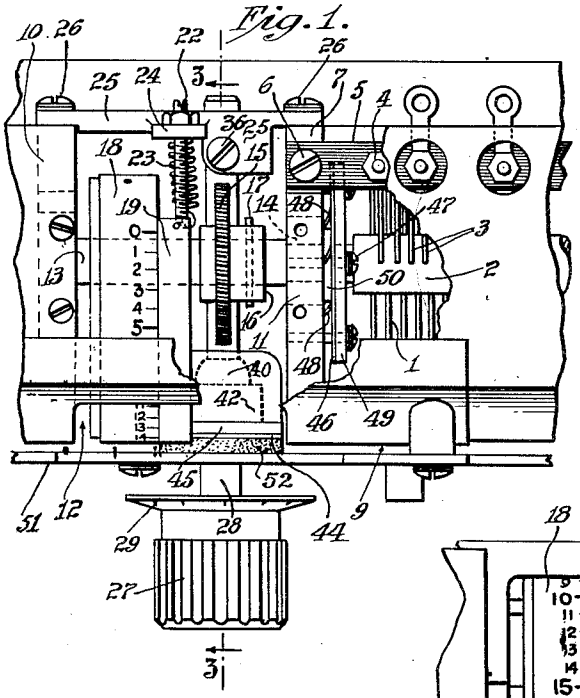


Fig. 4.

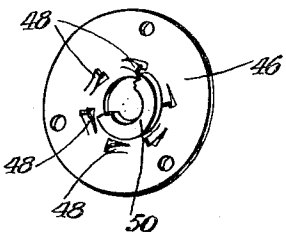


Fig. 2.

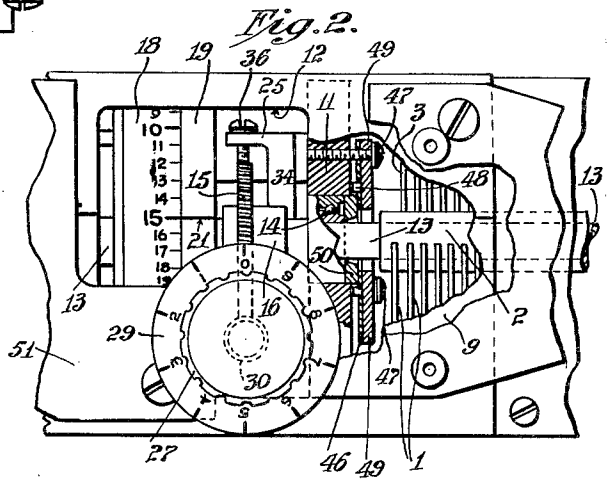


Fig. 5.

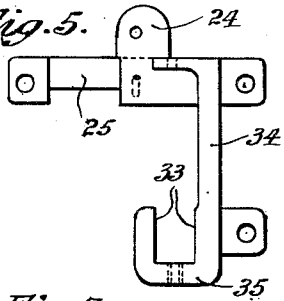


Fig. 3.

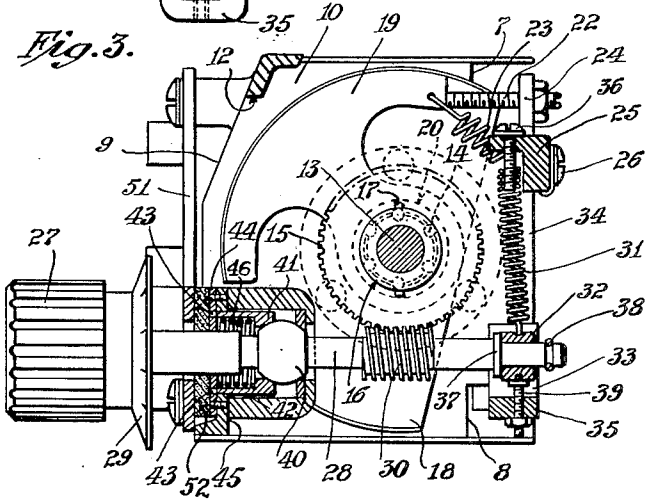
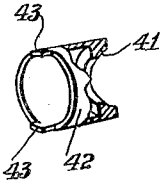


Fig. 6.



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2,348,392

VARIABLE CONDENSER

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Application July 8, 1942, Serial No. 450,169

2 Claims. (Cl. 74—10)

This invention relates to new and useful improvements in variable condensers.

The object of the present invention to effect certain improvements in the condenser structure disclosed in my copending application Serial No. 425,987, filed January 8, 1942.

To carry out this object, means are provided to prevent the movement of the condenser plates, and thus the varying of the capacitance, except under the wishful control of the operator and for simplifying the mounting of the control or driving shaft.

A preferred embodiment of the invention will now be described with reference to the drawing in which

Fig. 1 is a side elevation with parts broken away;

Fig. 2 is another side elevation partly in section;

Fig. 3 is a section taken along lines 3—3 of Fig. 1;

Fig. 4 is a perspective view of the disc for taking up the end thrust on the main shaft;

Fig. 5 is a side elevation of the support for one of the bearings of the driving shaft; and

Fig. 6 is a perspective, with parts broken away, of a bearing of the driving shaft.

The condenser consists of rotor plates 1 mounted on a long sleeve 2 and cooperating with stator plates 3 which are fastened by means of screws 4 between two opposite strips of insulation, one of which is shown at 5 in Fig. 1. One end of strip 5 is fastened by a screw 6 to a shoulder 7 (Figs. 1 and 3) of the main frame, which in the structure illustrated is a casting carrying the control elements. The other end of the strip 5 is fastened to an end plate (not shown). The other insulating strip which is not shown is fastened to a shoulder 8 (Fig. 3) of the main casting and the above mentioned end plate.

A similar stator rotor assembly is provided on the left-hand side of the main casting (Figs. 1 and 2).

The main casting has a front wall 9 and two spaced transverse wings 10 and 11. The front wall has a central window opening 12. The wings 10 and 11 have their corners cut-off to form said shoulders 7 and 8. The sleeve 2 surrounds and is fastened to the right-hand portion of a shaft 13 which traverses the whole length of the condenser through openings in the wings 10 and 11 where it is seated in ball bearings like 14 (Fig. 2).

Between the wings 10 and 11, the shaft 13 carries a gear 15 hub 16 of which is pinned to the shaft at 17. This portion of the shaft 13 carries also a semi-circular casting 18 provided with a number dial or scale and a quadrant 19 rotatably mounted on a hub 20 (Fig. 3) of the casting 18, the latter being fastened to the shaft 13 by a set screw. The edge of the quadrant 19 which is visible through the window 12 has a reference line 21 (Fig. 2) cooperating with the scale on dial 18. The position of quadrant 19 and, therefore, of the reference line 21 is determined by a set screw 22 against which 19 is pulled by a coiled spring 23. The set screw projects through an ear 24 of a cross-piece 25 which is fastened to the wings 10 and 11 of the main casting by screws 26. One end of spring 23 is fastened to quadrant 19 and the other end to the cross-piece 25 below screw 22.

The shaft 13 and thus the rotors of the condenser and dial 18 may be rotated by turning a knob 27 fastened to one end of a transverse driving shaft 28. A dial 29 is integral with knob 28 and serves to indicate the angular displacement of the driving shaft which has a worm 30 engaging the teeth of gear 15 against which it is pulled by a coiled spring 31. The teeth of the worm and gear being wedge-shaped, back-lash is prevented.

One end of spring 31 is attached to a square bearing 32 on the end of shaft 28. The bearing 32 is held within two lateral guides 33 (Figs. 3 and 5). The guides are formed in a vertical arm 34 of the cross-piece 25 and they are closed at the bottom as shown at 35. The other end of spring 31 is wrapped around an adjusting screw 36 in the cross-piece 25. The bearing 32 is allowed a limited lateral movement between a shoulder 37 and a ring 38 on the shaft.

In order to guard against the rotation of the condenser by a downward thrust on the projecting end of the shaft or an upward thrust on the knob 27, a screw-threaded stop 39 is provided in the bottom 35 of the guide 33. If the stop 39 were not provided, then the bearing 32 would be free to move far enough to cause the rotation of the main shaft owing to the torque exerted by worm 30 on gear 15. The stop can be set for allowing up and down movement of the ends of shaft 28 to any desired extent.

The spring 31 will lift the back end of the shaft 28 so as to insure good contact between 15 and 30. The slight bodily displacements of the driving shaft are made possible by providing a ball shaped bearing surface 40 thereon, the worm 30 being intermediate the two bearings 40 and 32. The ball 40 engages a cup-shaped seat 41 on a sleeve 42. The sleeve is anchored in position by

two lugs 43 projecting in slots of a retaining plate 44. The plate 44 is fastened to a bushing 45 formed in the main casting and is spaced from plate 51 by a felt or rubber pad 52. The sleeve 42 houses a coiled spring 46 which presses seat 41 into contact with ball 40. The curvature of the seat 41 is such that no torque is apparent when the knob 27 is free.

The end thrust in the rotor shaft 13 is absorbed by a disc 48 (Figs. 2 and 4) on shaft 13 between sleeve 2 and wing 11 and which together with its supporting rigid washer 49 is fastened to the latter by screws 47. Spring fingers 48 stamped out of disc 46 bear against wing 11 adjacent the outer race of the ball bearing 14. A washer 50 is within the circle formed by spring fingers 48 and prevents the pressing of disc 46 towards bearing 14 to such an extent as to distort the spring fingers 48.

The main casting is mounted on a plate 51 which may be attached to a panel.

What I claim is:

1. In a drive for variable condensers and the like, a main shaft, a driving gear fastened to the shaft, a driving shaft having a worm intermediate its ends engaging said gear, a bearing for one end of said driving shaft, a guide confining one end of said bearing for movement in one plane, resilient means forcing said bearing in said plane in a direction to press the worm into engagement with the gear, a movable stop limiting the motion of said bearing in the opposite direction in said plane, a ball formed on the driving shaft between the worm and its other end, a cup shaped seat for said ball, and a knob fastened to said other end of the shaft for rotating it.

2. In a drive for variable condensers and the like, a frame having two spaced transverse wings, a main shaft projecting through the wings, a bearing for the shaft in each wing, a driving gear fastened to the shaft between the two wings, a horizontal transverse shaft between the wings at right-angles to the main shaft and having a worm intermediate its ends engaging said gear, a bearing for one end of said transverse shaft, a guide having a bottom and side walls between which the bearing is mounted free to move vertically, a coiled spring attached to said bearing and tending to pull it up vertically and thus the worm into engagement with the gear, a screw-threaded stop projecting through the bottom of the guide into engagement with said bearing limiting its downward movement, a ball formed on the transverse shaft between the worm and its other end, a sleeve on said transverse shaft and having a cup-shaped seat for said ball and two positioning lugs, a coiled spring within said sleeve surrounding the shaft, and a retaining plate fastened to said frame having notches for said lugs and an opening for the passage of the transverse shaft.

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