July 29, 1924. 1,502,860

D. S. McCRUM

VARIABLE CONDENSER

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Fig. 1.

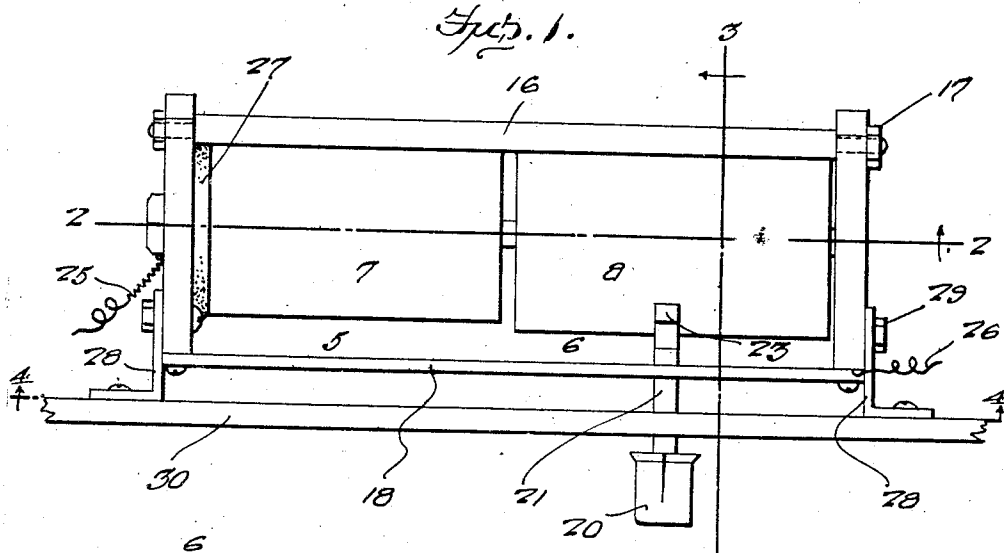


Fig. 2.

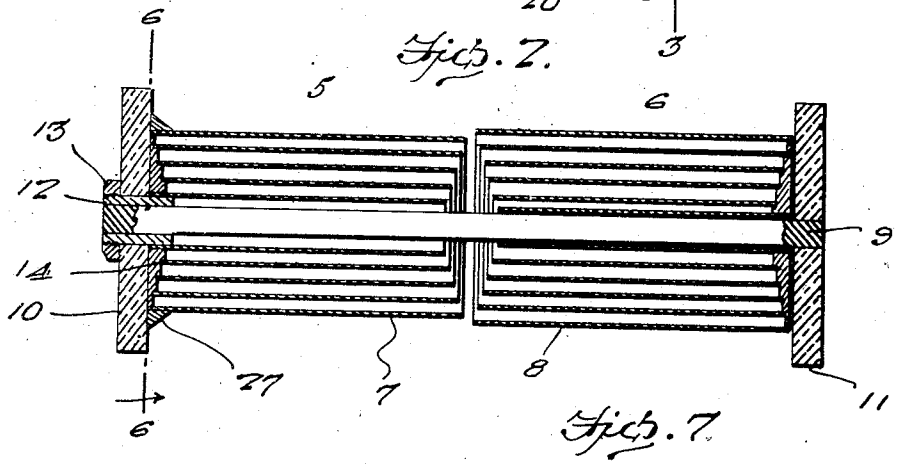
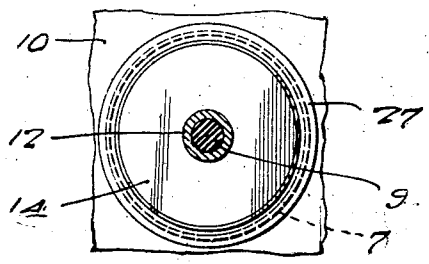
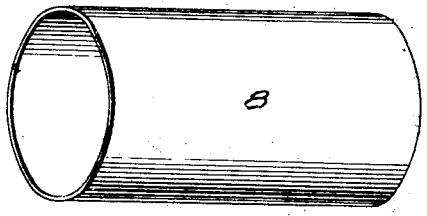


Fig. 7.

Fig. 6.





D. S. McCrum
Inventor

By Clarence A. O'Brien
Attorney

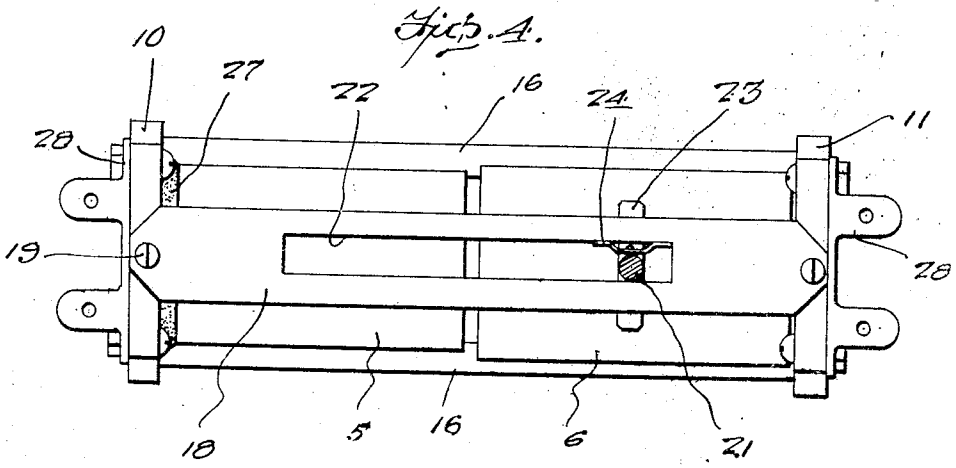
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VARIABLE CONDENSER

Filed Nov. 24, 1923 2 Sheets-Sheet 2

Fig. 4.



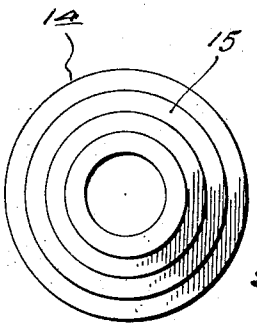


Fig. 8.

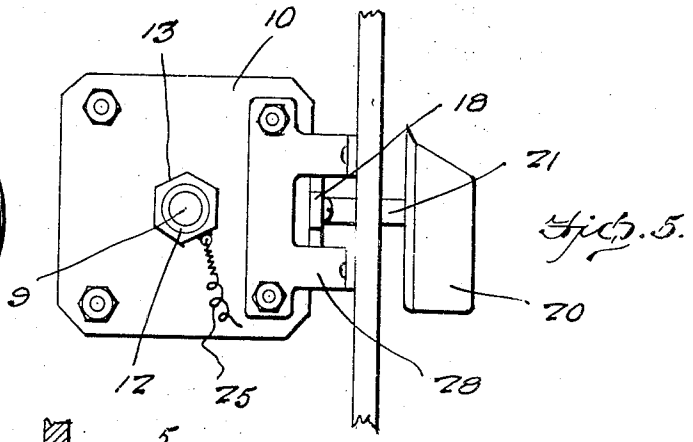


Fig. 5.

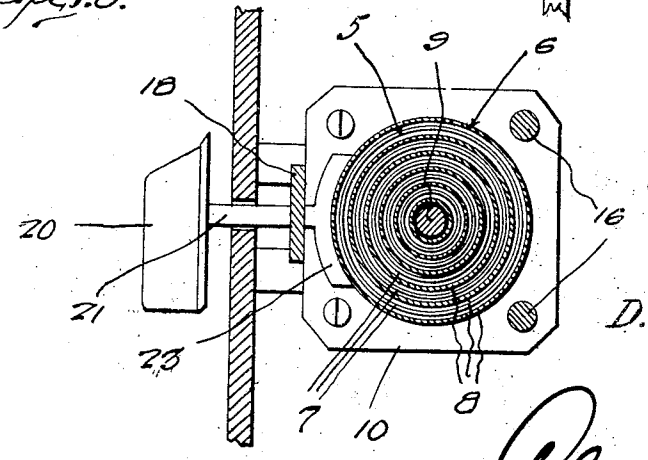


Fig. 3.

D. S. McCrum
Inventor

By

Attorney

Patented July 29, 1924. 1,502,860

UNITED STATES PATENT OFFICE.

DOUGLAS S. McCRUM, OF SARANAC LAKE, NEW YORK.

VARIABLE CONDENSER.

Application filed November 24, 1923. Serial No. 676,740.

To all whom it may concern:

Be it known that I, DOUGLAS S. McCRUM, citizen of the United States, residing at Saranac Lake, in the county of Franklin and State of New York, have invented certain new and useful Improvements in Variable Condensers, of which the following is a specification.

This invention relates to variable condensers capable of general use, but particularly adapted for use in conjunction with radio apparatus.

The primary object of the invention is to generally simplify and improve variable condensers of this kind, whereby the same may meet with all of the requirements for a successful commercial use.

Another object of the invention is to so construct a variable condenser as to reduce the usual electrical losses or leakage.

A further object of the invention is to provide a variable condenser that will be extremely simple and durable in construction as well as efficient in operation, and wherein readily and cheaply produced parts are utilized, which may be quickly assembled or taken apart for repair.

Other objects will become apparent as the nature of the invention is better understood, and the same consists in the novel form, combination and arrangement of parts hereinafter more fully described, shown in the accompanying drawings and claimed.

In the drawings wherein like reference characters indicate corresponding parts throughout the several views,

Figure 1 is a top plan view of a variable condenser constructed in accordance with the present invention.

Figure 2 is a longitudinal sectional view thereof, taken substantially upon the line 2—2 of Figure 1.

Figure 3 is a transverse sectional view, taken substantially upon the line 3—3 of Figure 1.

Figure 4 is a longitudinal section, taken substantially upon the line 4—4 of Figure 1.

Figure 5 is an end elevational view of the device shown in Figure 1.

Figure 6 is a transverse sectional view, taken substantially upon the line 6—6 of Figure 2.

Figure 7 is a perspective view of one of the electrode cylinders, and

Figure 8 is an inner face view of one of the base plates of one of the electrodes.

The device consists essentially of two electrodes 5 and 6 respectively, each of which is composed of a plurality of concentric cylindrical aluminum plates or cylinders 7 and 8 respectively, the cylinders of one electrode being arranged to move to a position within those of the other electrode without actual contact with the latter for varying the working capacity of the condenser.

As shown, the electrode 6 is made movable by mounting the same to slide on the rod 9 of hard rubber or other suitable insulating material, which rod has its ends fastened centrally within opposed end plates 10 and 11, which are made of molded insulating composition, such as bakelite. The fixed electrode or stator 5 is held in place by a metal bushing 12 that passes through the central opening in the end plate 10, and in which the adjacent end of the rod 9 is fixed, this bushing 12 being held in place by means of a nut 13 threaded upon the outer end thereof and against the outer face of the plate 10. The cylinders of each electrode are held in their proper concentric relation by means of a circular base or disc 13 having its inner face provided with cylindrical steps onto which said cylinders are telescoped and suitably secured, which base plate or disc 13 is of conducting material and the steps of which are generally indicated at 15. The disc 14 of the electrode 5 is suitably secured upon the inner end of the bushing 12, while the disc 14 of the electrode 6 slidably moves along the rod 9.

Metal rods 16 further serve to space the end plates 10 and 11 and to brace and connect the latter at the rear side of the condenser, the end plates 10 and 11 being provided with suitable openings through which the reduced ends of the rod 16 projects. By reducing the ends of the rods 16 shoulders are presented against which the plates 10 and 11 may be drawn by threading nuts 17 upon the reduced ends of the rods 16 against the outer faces of the plates 10 and 11, as shown.

At the front of the condenser, a slotted

metal plate 18 is mounted, preferably by securing the ends of the plates 18 against the front edges of the end plates 10 and 11 through the medium of screws 19 or the like, and whereby the plate extends parallel with the rod 9. A handle including a thumb knob and pointer 20 is provided for moving the electrode 6 along the rod 9, and this handle further includes a shank or rod 21 upon the outer end of which the knob and pointer 20 is fixed, and which extends inwardly thru the slot 22 of the plate 18. The shank 21 has a yoke 23 upon its inner end that partially embraces and is suitably centrally secured to the outer cylinder of the electrode 6, whereby, when lateral movement is imparted to the handle, the electrode 6 is caused to move along the rod 9. As shown in Figure 4, the slot 22 extends longitudinally of the plate 18 for a major portion of its length, and a resilient sheet metal contact strip 24 is fixed to one side of the shank 21 in position to have a sliding or wiping contact with one wall of the slot 22. This spring contact also holds the shank 21 in contact with the opposite side wall of the slot 22, so as to frictionally retain the electrode 6 in any position to which it is adjusted, and to prevent rotation of the electrode 6 about the rod 9. The electrical connection is made with the stator electrode 5, by means of a suitable wire 25 whose ends may be soldered or otherwise fastened to the base plate or disc 14 of said electrode 5, the wire 25 extending through an opening in the plate 10 for this purpose. The electrical connection with the movable electrode 6 may be made through the medium of a suitable wire 26 that is soldered or otherwise fastened to the plate 18 adjacent the end plate 11, and as the shank 21 and yoke 23 are of conducting material, the current may pass between the other cylinder 8 of the electrode 6 and the wire 26. A soft rubber ring or washer 27, which is fitted onto the outer end of the electrode 5 against the inner face of the plate 10, limits the travel of the electrode 6 and serves as a dust shield when the electrode 6 is adjusted to its limit of movement toward the electrode 5. Angular brackets 28 are suitably secured by bolting or like, as at 29, against the outer sides of the forward portions of the end plates 10 and 11, and provide means whereby the device may be clamped or otherwise secured to a panel 30 or other similar support. The panel 30 will be provided with a slot similar to the slot 22 in the plate 18, and through which the shank 21 of the handle extends whereby the indicator knob 20 will be positioned outwardly of the panel for cooperation with a suitable linear scale (not shown), which may be provided along one side of the panel slot.

From the above description, it will be seen that the working capacity of the condenser may be conveniently varied to a marked degree by sliding the electrode 6 to a desired position with any desired portions of the cylinders of the movable electrode 6 disposed within similar portions of the cylinders of the stator electrode 5 or vice versa in accordance with the usual general principle of condensers of this type.

The advantage of the present condenser consists in a reduction of the electrical losses or leakage as compared to the usual rotary types of condensers, which usual losses are mainly due to much greater length of rough edges on the plate than is presented by the present device, by reason of the cylindrical form of the plates thereof. The present device is also more nearly dust proof, and particularly so due to the fact that when the condenser is in a position of maximum capacity, it is practically sealed against the entrance of dust through the use of the washer 28, thus preventing accumulation of dust on the inner plate and the resultant loss of efficiency through leakage. Obviously, condensers of this kind having different maximum capacities may be constructed by changing the number or length of the concentric cylindrical plates employed or both.

From the above description, it is believed that the construction and operation as well as the advantages of the present construction will be readily understood and appreciated by those skilled in the art.

What I claim as new is:

1. A condenser comprising a pair of end plates connected in spaced relation by means of a rod to form a support, a plurality of cylindrical metallic members of different diameters all having their adjacent ends in electrical connection, said cylindrical members being concentrically arranged one within the other and forming one electrode, means for mounting said one electrode in fixed relation to one of the end plates and said rod, a series of similar cylindrical members concentrically arranged one within the other, and all having their outer ends electrically connected to form a second electrode, the members of said second electrode adapted to be inserted between the members of the first named electrode, means including a handle fixed to and extending laterally from the outermost cylindrical member of the electrode for adjusting the latter axially of each other, and a sealing ring mounted upon the outer end of the first named electrode for sealing relation with the adjacent end of the outermost cylindrical member of the second named electrode when said electrodes are adjusted toward each other to maximum capacity position.

2. A condenser comprising a pair of end plates connected in spaced relation by means of a rod to form a support, a plurality of

cylindrical metallic members of different diameters all having their adjacent ends in electrical connection, said cylindrical members being concentrically arranged one within the other and forming one electrode, means for mounting said one electrode in fixed relation to one of the end plates and said rod, a series of similar cylindrical members concentrically arranged one within the other, and all having their outer ends electrically connected to form a second electrode, the members of said second electrode adapted to be inserted between the members of the first named electrode, means including a handle fixed to and extending laterally from the outermost cylindrical member of the electrode for adjusting the latter axially of each other, a plate provided with a longitudinal elongated slot and rigidly connecting the forward edges of said end plate, said slotted plate being of conducting material, said handle including a shank of conducting material attached to the outer cylinder of one of the electrodes and having a resilient contact secured to one side thereof in position to have wiping contact with one side wall of the slot of said slotted plate.

3. A condenser comprising a pair of end plates connected in spaced relation by means of a rod to form a support, a plurality of cylindrical metallic members of different diameters all having their adjacent ends in electrical connection, said cylindrical members being concentrically arranged one within the other and forming one electrode, means for mounting said one electrode in fixed relation to one of the end plates and said rod, a series of similar cylindrical members concentrically arranged one within the other and all having their outer ends electrically connected to form a second electrode, the members of said second electrode adapted to be inserted between the members of the first named electrode, means including a handle fixed to and extending laterally from the outermost cylindrical member of the electrode for adjusting the latter axially of each other, a plate provided with a longitudinal elongated slot and rigidly connecting the forward edges of said end plate, said slotted plate being of conducting material, said handle including a shank of conducting material attached to the outer cylinder of one of the electrodes and having a resilient contact secured to one side thereof in position to have wiping contact with one side wall of the slot of said slotted plate, brackets fixed to the forward edge portions of said end plate for rigidly mounting the support parallel with and adjacent the rear face of a panel, and means to connect the stepped disc of one electrode and the slotted plate to wires of an electrical circuit.

In testimony whereof I affix my signature.

DOUGLAS S. McCRUM.