J. PARKIN, JR.

VARIABLE CONDENSER.

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APPLICATION FILED MAR. 29, 1920.

1,433,224. Patented Oct. 24, 1922.

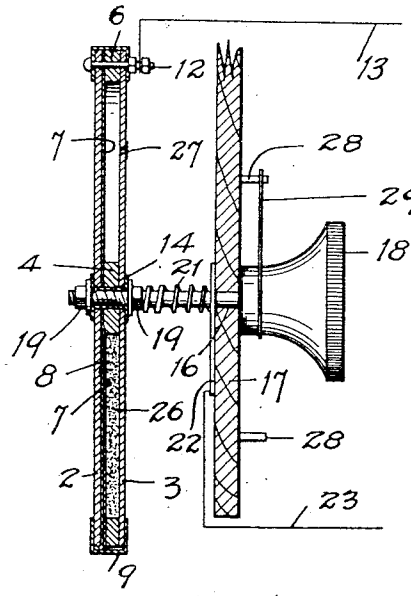


Fig. 1.

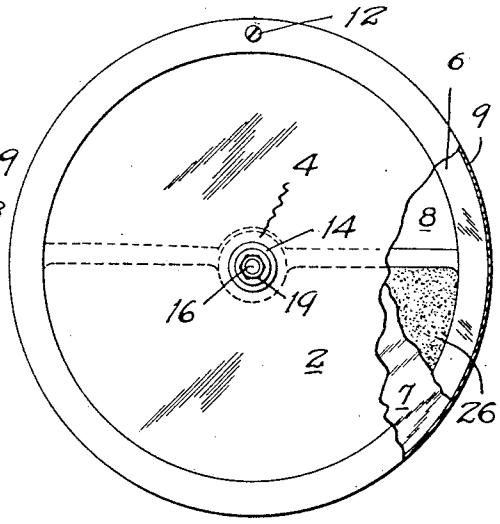


Fig. 2.

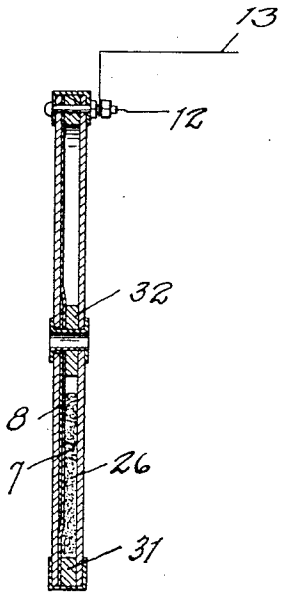


Fig. 3.

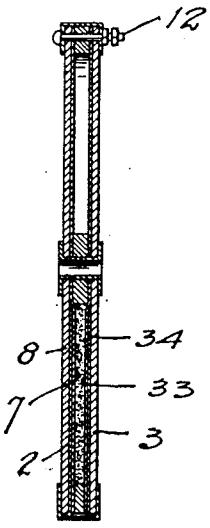


Fig. 4.

WITNESS

H. A. Sherburne.

INVENTOR

John Parkin, Jr.

BY

White Prout & Evans

his ATTORNEYS

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UNITED STATES PATENT OFFICE.

JOHN PARKIN, JR., OF SAN RAFAEL, CALIFORNIA.

VARIABLE CONDENSER.

Application filed March 29, 1920. Serial No. 369,562.

To all whom it may concern:

Be it known that I, JOHN PARKIN, Jr., a citizen of the United States, and a resident of San Rafael, county of Marin, and State of California, have invented a new and useful Variable Condenser, of which the following is a description.

My invention relates to devices for varying the capacity in an electric circuit.

Owing to the large number of persons engaged in experiments in electric arts especially in radio signaling, there is a great demand for a variable capacity device which is of rugged simple construction and capable of being made and sold at a very low price. One of the objects of my invention therefore is to provide a variable condenser to supply this demand, and in which the elements are reduced to the least possible number and are of the greatest possible simplicity.

Another object of the invention is to provide a variable condenser of balanced construction and one which is not easily damaged by rough handling. Another object is to provide a condenser of large capacity for its size.

The invention possesses other objects and features of advantage some of which, with the foregoing, will be set forth in the following description of the preferred form of my invention which is illustrated in the drawings accompanying and forming part of the specification. It is to be understood that I do not limit myself to the showing made by the said drawings and description as I may adopt variations of the preferred form within the scope of my invention as set forth in the claims.

Referring to the drawings:

Figure 1 is a vertical section through the center of my variable condenser. The condenser is shown mounted upon a panel, the parts being in the position of maximum capacity. Figure 2 is a rear elevation of the variable condenser, the parts being in the position of minimum capacity. Figures 3 and 4 are vertical sectional views showing modified forms of my device.

My variable condenser comprises two housing disks 2 and 3 of non-conducting material spaced apart at the center and periphery by the annular rings 4 and 6 respectively. The center spacing ring is of conducting and the peripheral spacing ring of non-conducting material. A dielectric, preferably a thin disk 7 of mica, lies between the annular spacing ring and the disk 2 and a semi-circular metallic plate 8 preferably of foil, is interposed between the disks 2 and 7. The foil which preferably is adhesively united to the dielectric disk, extends outwardly and is turned about the periphery of the disk 2 so as to establish electrical contact with the annular metallic flanged rim 9, which binds the peripheral edges of the housing disks. A binding post 12 passing through the rim provides means for attaching the conductor 13, comprising one side of an electric circuit. Instead of using a separate plate 8 adhesively united to the disk 7, I may deposit on a portion of the dielectric disk, a metallic coating, thus bringing the metal into the closest possible contact therewith.

Passed through the center of the device and securing the parts firmly together at that point is a metallic grommet or eye 14 which is in electrical contact with the annular ring 4.

The device is mounted on a shaft 16 journaled in the panel 17, and digitally controlled by a knob 18 in which the outer end of the shaft is embedded. The other end of the shaft passes through the grommet 14 and is fixed therein by nuts 19 on each side. A spring 21 on the shaft is interposed between the nut 19 and the solder plate 22 lying against the panel and through which the shaft passes. A conductor 23 comprising the other side of the circuit on which the condenser is used, is connected to the solder plate. The spring thus resiliently presses the knob against the panel and insures an electrical connection between the plate 22 and the annular ring 4.

From the above it will be clear that the foil plate 8 constitutes one of the condenser plates, the other condenser plate comprising a body of mercury 26 confined in the chamber between the dielectric disk 7 and the housing disk 3. The mercury is introduced into the chamber through an aperture in the disks subsequently closed by the plug 27, and the chamber is filled about half full so that the mercury is always in electrical contact with the annular ring 4.

Since the weight of the mercury causes it to always remain in the lower half of the chamber, that is, in substantially fixed or stationary position, it follows that by rotation of the device, by manipulation of the

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knob, the semi-circular condenser plate 8 may be brought into full or partial registration with the fixed semi-circular condenser plate 26, or placed completely out of registration therewith, varying the capacity of the condenser in accordance with the areas in register. Stop pins 28 on the panel engaged by the arm 29 fixed on the knob, provide means for limiting the rotary movement of the device between points of maximum and minimum capacity.

A condenser in accordance with the above description, ¼ of an inch thick and 3 inches in diameter has a capacity of approximately .001 microfarads. It is in substantially perfect balance; cannot be short circuited in normal use; is readily mounted; and its construction permits it to be handled without injury. For demonstration purposes, especially in school laboratories, I prefer to make the plate 3 of mica, mounting the device so that the movement and inter-relation of the parts may be watched by the young experimenter.

In Figure 3 I have shown a modified form of my condenser in which the outer spacing ring 31 is of metal, the mercury plate 26 making contact with it. The inner ring 32 is of non-conducting material, and the plate 8 is electrically connected to the shaft through the grommet with which it is in contact.

In Figure 4 I have shown a condenser having double the capacity of that just described. A disk 33 similar to disk 7 is arranged adjacent housing disk 3, and semi-circular foil plate 34, similar to plate 8 is disposed between the plates 33 and 3. The rest of the structure is similar to that already made clear.

I claim:

1. A variable condenser comprising a stationary mercury condenser plate and a rotatable condenser plate.

2. In a condenser, a rotatable dielectric, a condenser plate fixed on one side of said dielectric, and a stationary mercury condenser plate on the other side of said dielectric.

3. A variable condenser, comprising a stationary mercury condenser plate, a dielectric disk, a condenser plate fixed on said disk, and means for rotating the disk to position the plate fixed thereon with reference to said mercury plate.

4. A variable condenser, comprising a rotatable shaft, a pair of spaced disks one of which is a dielectric fixed on the shaft and forming a chamber between the disks, a quantity of mercury in said chamber forming one condenser plate, and a semi-circular condenser plate fixed on the opposite side of said dielectric disk.

5. A variable condenser, comprising a rotatable shaft, a pair of spaced disks one of which is a dielectric fixed on the shaft and forming a chamber between the disks, a quantity of mercury in said chamber forming one condenser plate, a semi-circular condenser plate fixed on the opposite side of said dielectric disk, and means for electrically connecting the mercury to one side of a circuit and the semi-circular plate to the other side of said circuit.

6. A variable condenser, comprising a rotatable shaft, a pair of spaced disks one of which is a dielectric fixed on the shaft and forming a chamber between the disks, a metallic ring for spacing the disks, a quantity of mercury in said chamber in contact with said ring, a semi-circular condenser plate on the opposite side of said dielectric disk, and electrical conductors connected to said ring and to said semi-circular plate.

7. A variable condenser, comprising a rotatable shaft, a pair of spaced disks one of which is a dielectric fixed on the shaft and forming a chamber between the disks, a metallic ring in contact with the shaft for spacing the disks, a quantity of mercury in said chamber in contact with said ring, a semi-circular condenser plate on the opposite side of said dielectric disk, a metallic rim for binding the peripheral edges of the disks and connected to said semi-circular plate, and means for connecting one side of an electric circuit to said rim and the other side to said shaft.

8. A variable condenser, comprising a rotatable shaft, a pair of spaced disks one of which is a dielectric fixed on the shaft and forming a chamber between the disks, a metallic ring in contact with the shaft for spacing the disks, a quantity of mercury in said chamber in contact with said ring, a semi-circular condenser plate on the opposite side of said dielectric disk, a metallic rim for binding the peripheral edges of the disks and connected to said semi-circular plate, means for connecting one side of an electric circuit to said rim and the other side to said shaft, means for digitally rotating said shaft, and means for limiting the rotary movement of said shaft.

9. A variable condenser, comprising a rotatable shaft, a pair of housing disks of non-conducting material on said shaft, annular rings at the center and periphery for spacing said disks apart, the inner ring being a conductor and the peripheral ring being a non-conductor, a rim of conducting material for binding the peripheral edges of the disk upon the peripheral ring, a grommet of conducting material fixed on said shaft for binding the centers of the disks upon the central ring and forming an electrical connection between the ring and said shaft, a dielectric disk interposed between the rings and one of the housing disks, a semi-circular condenser plate interposed be-

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tween the dielectric disk and contiguous housing disk and connected to said rim, a quantity of mercury disposed between the dielectric disk and the other housing plate and forming contact with said central ring, a knob for turning said shaft, means for limiting the turning movement of the shaft, and means for connecting one side of an electric circuit to said rim, and the other side to said shaft.

In testimony whereof, I have hereunto set my hand.

JOHN PARKIN, JR.