April 5, 1927. 1,623,741

L. R. McDONALD

VARIABLE ELECTRICAL CONDENSER

Filed Nov. 10, 1922

Fig. 1.

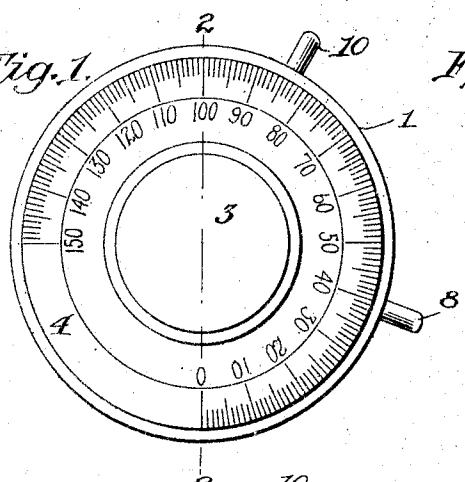


Fig. 2.

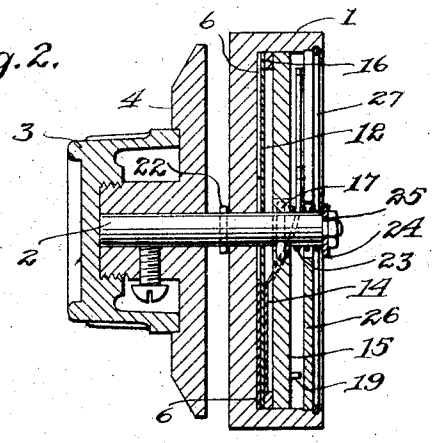


Fig. 3.

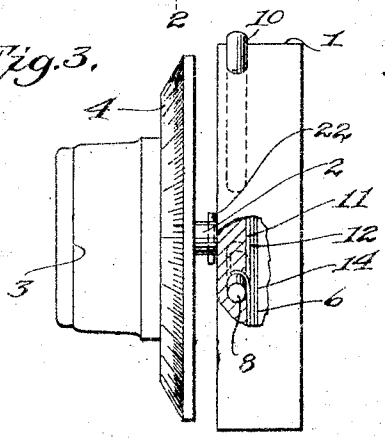


Fig. 4.

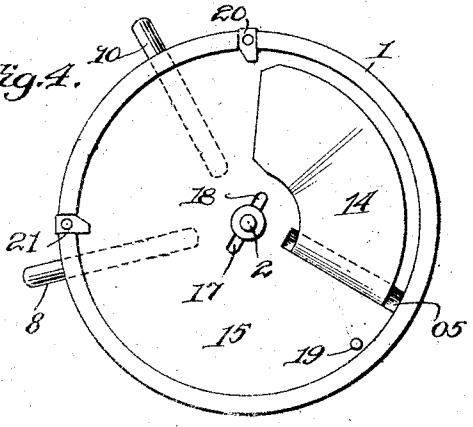


Fig. 5.

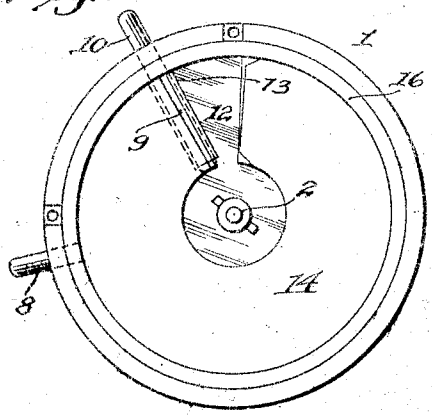
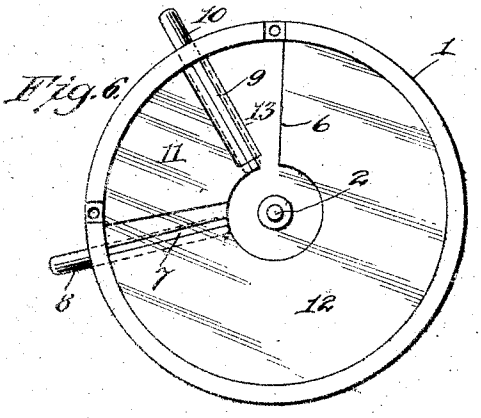


Fig. 6.



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Patented Apr. 5, 1927. 1,623,741

UNITED STATES PATENT OFFICE.

LESLIE R. McDONALD, OF WESTMOUNT, QUEBEC, CANADA.

VARIABLE ELECTRICAL CONDENSER.

Application filed November 10, 1922. Serial No. 600,095.

My invention relates to that type of condensers in which areas of conductive material are separated by a dielectric, and the capacity of the conductive areas is varied by separating them more or less widely from each other; and my improvements are particularly directed to means whereby the conductors may be separated or caused to approach each other transversely of their planes, so that any desired adjustment, within the range of the condenser, may be obtained.

In the drawings, in all the figures of which similar parts are designated by corresponding reference numerals, Fig. 1 is a front view of the condenser; Fig. 2 is a vertical sectional view, taken on the line 2—2 of Fig. 1, looking to the left; Fig. 3 is an edge view, looking to the left on Fig. 1, and partly broken away to show the interior construction; Fig. 4 is a back view, the back plate and locking ring being removed; Fig. 5 is a similar view, with the adjuster disk removed; and Fig. 6 is a similar view with the deflectable conductor removed.

The parts of the condenser are preferably mounted in a case 1, of hard rubber or similar material, centrally through which passes a suitable operating shaft 2, upon the free end of which is mounted a suitable operating knob 3, carrying an index dial 4 appropriately graduated. In the bottom of the case is placed a thin sheet-like strip 6 of conductive material, one end of which is bent down into a groove 7 in the back of the case and is held therein by a pin 8, which is forced into the groove beside it, and which may be utilized to make electrical connection with it.

Another groove, 9, in the back, accommodates another pin 10, which is pushed in beside and holds the ends of a thin sheet 11 serving to approximately fill the space between the pins to the same level as the outer face of the sheet 6. But any suitable means may be employed for leveling this space. Over the sheets 6 and 11 is placed a dielectric, which I have shown as being formed of a disk 12 of mica, centrally pierced, to accommodate the shaft 2, and provided with a slot 13, through which passes one end of a thin elastic strip or sheet 14 of suitable conductive material such as sheet copper or the like, this end being also inserted in the groove 9 and held therein by the pin 10 which serves as a connector to it. The free end of the strip 14 normally presses outward and away from the mica sheet.

Behind the strip 14 is placed a disk 15, preferably of hard rubber or other non-conductive material, spaced from the mica sheet by some suitable means, such as a ring 16, so that it will rotate evenly with the shaft 2, to which it is keyed, as by a pin 17 passed through the shaft and lying in a slot 18 in the disk.

This disk 15 is provided with a radially disposed slot 05 sufficiently large to permit the free portion of the strip 14 to pass outward through it when the disk is revolved, the limits of its rotation being fixed by suitable stops, such as a pin 19 on the disk and the arms 20, 21 on the case.

A pin 22 through the shaft 2 behind the case, and a coiled spring 23, pressed against the disk 15 by a washer 24 and nut 25 on the shaft 2, preserve the snug assembly of the parts.

A suitable plate 26 closes the back of the case, and may be held in place by a spring ring 27 expanded in an annular groove in the case. This plate is spaced away from the disk 15 so as to provide room for the strip 14 to rise freely between them.

With the parts assembled as described, it will be seen that if the shaft 2 is turned it will carry with it the disk 15; and if the movement is anti-clockwise the slot in the disk, will move from the free end toward the fixed end of the strip 14, allowing the strip 14 to pass outward through the slot and to be raised laterally away from the strip 7 to a greater or less extent depending upon the extent of the rotation of the disk. Hence a very satisfactory adjustment of the condenser can be quickly made to any desired point within the range of its rotation, which in the illustrations is shown as extending over three quarters of a circle.

It will be well understood by those familiar with the art that details of construction may be modified, as by the use of equivalents without departing from the spirit of my invention as claimed.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is:—

1. In a variable electrical condenser, the combination of a broad, flat electrical conductor, a superimposed dielectric parallel thereto, a second broad, flat and flexible conductor normally superimposed on the di-

electric, and means, movable relative to the second conductor, engaging against it to hold it in its normal position and also engaging between it and the dielectric to progressively release and shift portions of the conductor laterally from its normal position.

2. In a variable electrical condenser, the combination of a broad, flat electrical conductor, a superimposed dielectric parallel thereto, a second broad, flat and flexible conductor normally superimposed on the dielectric, and means, movable relative to the second conductor and engaging against its opposite side, to progressively shift portions of that conductor laterally from its normal plane into a parallel plane.

3. In a variable electrical condenser, the combination of a flat metallic sheet forming an electrical conductor, a superimposed, flat sheet constituting a dielectric, another and flexible metallic sheet constituting a second electrical conductor, the conductor and dielectric being normally substantially parallel, and means for progressively moving part of the second conductor into another and parallel plane, and for holding other parts of the conductor in its initial plane.

4. In a variable electrical condenser, the combination of a flat metallic sheet forming an electrical conductor, a superimposed, flat sheet constituting a dielectric, another and flexible metallic sheet constituting a second electrical conductor, the conductors and dielectric being normally substantially parallel, and non-conducting means for progressively moving part of the second conductor into another and parallel plane, and for holding other parts of the conductor in its initial plane.

5. In a variable electrical condenser, the combination of a flat metallic sheet forming an electrical conductor, a superimposed, flat sheet constituting a dielectric, another and flexible metallic sheet constituting a second electrical conductor, the conductors and dielectric being normally substantially parallel, and means, rotatable parallel to the normal planes of the conductors, for progressively moving part of the second conductor into another and parallel plane, and for holding other parts of the conductor in its initial plane.

6. In a variable electrical condenser, the combination of a flat, metallic sheet forming an electrical conductor, a flat dielectric superimposed on the sheet, another metallic sheet, normally substantially flat, forming a second electrical conductor, superimposed on the dielectric and fixed at one point relative to the dielectric, unitary means for holding the second conductor parallel to the dielectric and for optionally, progressively moving part of the conductor laterally without lateral displacement of the remaining part of the conductor.

7. In a variable electrical condenser, the combination of a flat, metallic sheet forming an electrical conductor, a flat dielectric superimposed on the sheet, another metallic sheet, normally substantially flat, forming a second electrical conductor, superimposed on the dielectric and having one end fixed and one end free, and unitary means, engaging below the free end and above the intermediate portion of the second conductor, and movable towards its fixed end, to progressively change the lateral relations of the second conductor and the dielectric.

8. In a variable electrical condenser, the combination of a fixed, metallic sheet constituting an electrical conductor, a fixed dielectric, another and flexible metallic sheet constituting an electrical conductor fixed at one end and free at the other, said conductors and dielectric being normally disposed in substantially parallel planes, and means, embodying a rotatable element provided with a slot through which the last mentioned electrical conductor passes, for optionally moving portions of the latter conductor laterally toward or away from the former.

9. In a variable electrical conductor, the combination of a fixed strip, of conducting material, curved in its own plane, a superimposed disk-like dielectric, a resilient strip of conducting material, curved in its own plane and normally parallel to the first strip, and being fixed at one end only, and means, embodying a rotatable, slotted disk, through which the said resilient strip passes, for causing an optional, lateral movement of part of the latter strip.

10. A variable condenser comprising a fixed element, an adjustable element, a rotor having a slot therein through which the adjustable element may pass, means for resiliently pressing the rotor toward the fixed element, and means to rotate the rotor.

11. A variable condenser comprising, a support, a fixed element thereon, a flexible movable element adapted to be laid down and picked up from the fixed element, a movable member adapted to move between said elements to operate said movable element, and means for preventing said movable member from contacting upon said fixed element.

12. A variable condenser comprising a pair of elements, and a slotted member through which one of the pair of elements is adapted to progressively be passed to cause the relative displacement of said elements.

LESLIE R. McDONALD.