

cury, and the extension 8. Thus the effective length of the coating 7 in circuit can be varied, and the resistance of the device can be adjusted to be greater or smaller, according to the relative positions of the mercury and the casing, as desired.

Any suitable high resistance material can be used besides india ink and other substances besides mercury may be employed if desired, provided the materials for the coating and the liquid constituting the element 10 are so selected that they do not affect one another chemically, and are otherwise satisfactory for my purpose.

Having described my invention, what I believe to be new and desire to secure and protect by Letters Patent of the United States is:—

1. A variable resistance comprising a cylindrical casing having end walls mounted to rotate about its central axis in horizontal position, the inner surface of said casing having a conductive coating, and the inner surface of said casing also having a curved resistance coating thereon spaced from said conductive coating, and a freely movable

quantity of fluid conductive substance in said casing to connect the two coatings and vary the portion of the length of the curved coating in circuit with said substance, to adjust the value of said resistance, according to the relative positions of said substance and said curved coating.

2. The adjustable grid leak adapted for use in radio apparatus comprising a sealed multiple part insulating casing, contacts projecting from said casing to rotatably mount the same, resistance material arranged on the inside of said casing adjacent the periphery thereof, and a movable connector in said casing and making contact with said resistance material to control the resistance in circuit between said contacts.

3. The adjustable grid leak adapted for use in radio apparatus comprising a casing, thin resistance material adhesively secured in position inside of said casing, and a relatively movable liquid connector in said casing and making contact with said resistance material to control the amount of resistance in circuit.

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VARIABLE RESISTANCE.

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This invention relates to improvements in variable resistances; especially variable or adjustable resistances of the kind known as grid leaks used in radio apparatus.

- 5 An object of this invention is to provide an adjustable or variable resistance which is exceedingly simple, durable and efficient, designed to operate with a minimum of friction between its fixed and the movable con-
- 10 ductive parts, and capable of maintaining its accuracy under practical conditions.

The nature of the invention will be apparent from the following description and drawings which disclose a preferred construction in which the invention is embodied, and I reserve the right to make changes in the details of structure and operation which come within the scope and spirit of the invention as the appended claims define same.

- 20 On the drawings,

Figure 1 is a front view of a case used in the practice of my invention with the cover removed;

- 25 Figure 2 is a section on the line A—A of Figure 1;

Figure 3 is a face view of the cover for the case;

Figure 4 is a section on the line B—B of Figure 3; and

- 30 Figure 5 is an outside view of the complete device.

On the drawings, the same numerals identify the same parts throughout.

- 35 In the particular description of what the drawings present, I employ the numeral 1 to indicate the body of a cylindrical casing, the entire inner surface of the bottom of which is provided with an electrically conductive coating 2. This coating is made of
- 40 some substance of high resistance such as india ink. The opposite end or top of the casing is open, but arranged to be closed by a cover or disk 4 which fits against the shoulder 5 and can be held in position by any
- 45 suitable means. Both the bottom of the body 1 of the casing and the disk 4 are provided with projecting trunnions 6, which serve as journals, so that the casing can be mounted in bearings and revolve on these trunnions.
- 50 As shown, the casing is cylindrical, and the central axis thereof will pass through the trunnions 6 which are in line with each other and when the casing is used, it will be mounted so that this axis is in horizontal
- 55 position with the bottom of the body 1 and

the cover 4 vertical. The inner face of the cover 4 has a somewhat elongated circular coating 7, also of some material of high electrical resistance, such as india ink, one end of this coating being connected by an extension of the same material 8, to the center of the disk, and the other end being free, as indicated at 9. The body of the casing and the cover, except for the conductors 2 and 7, with the extension 8, will be of some insulating material, while the trunnions 6 will be of conductive material. Hence, if the coating 2 is connected to the trunnion in the bottom of the body 1, as by making the inner end of this trunnion flush with the bottom so that it can come into contact with the coating 2, and if the extension 8 of the coating 7 makes contact with the other trunnion 6 of the disk 4, then, if conductors are placed in circuit with the trunnions 6, and the coatings 2 and 7 are bridged in the casing, current in the circuit can flow through the casing from one coating to the other, provided some means is present in the casing to bridge the space between the coatings 2 and 7. For this purpose, I enclose in the casing a conductive element such as a drop of conductive liquid, such as mercury, which is metallic and liquid at ordinary temperatures, and will serve very well to connect the one coating to the other. This mercury on account of its fluidity and its weight is mounted to be free for bodily displacement relative to the casing and will always run down the inside cylindrical surface of the casing to the lowermost point; and current flowing between the two trunnions 6 will pass from the coating 2 to the mercury, to the coating 7, and by way of the coating 7 through the radial extension 8 to the trunnion of the disk 4; or in the opposite direction according to which trunnion is connected to be electrically positive. Therefore, if the case with the disk 4 be in such position that the end 9 of the coating is lowermost and the end 9 of the coating is the only portion of this coating touched by the mercury, the current must flow through practically the whole length of the coating 7 before it can pass out by way of the trunnion mounted in the disk 4, and if the casing be turned on the trunnions, the mercury will always run down to the lowermost point in the circumference of the casing, so as to leave a shorter and shorter portion of the length of this coating between the mer-