Sept. 4, 1928.

1,683,059

H. R. VAN DEVENTER

RESISTOR

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Fig. 1.

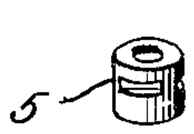


Fig. 2.

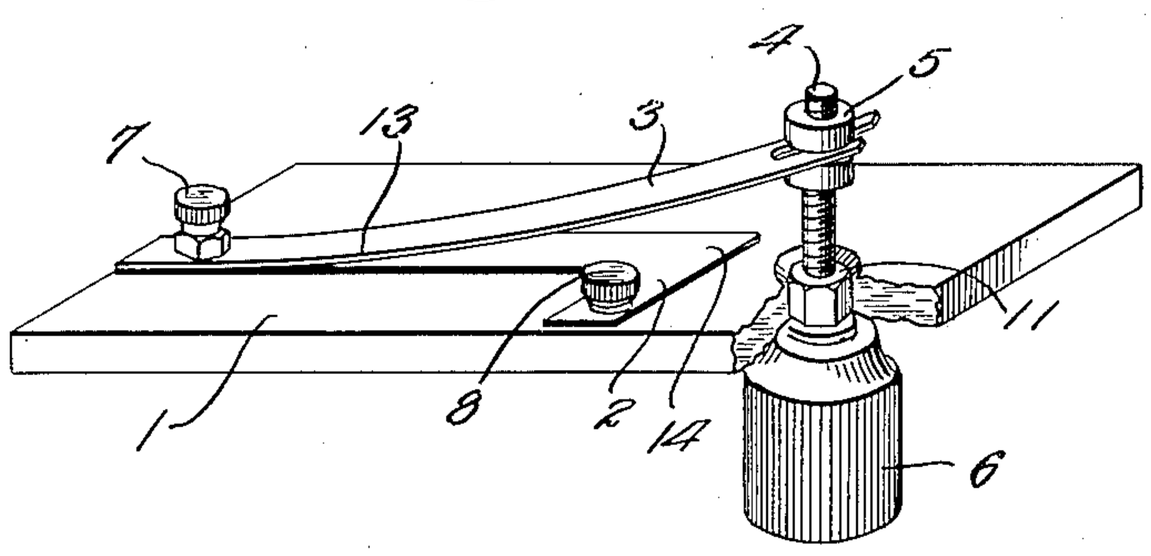
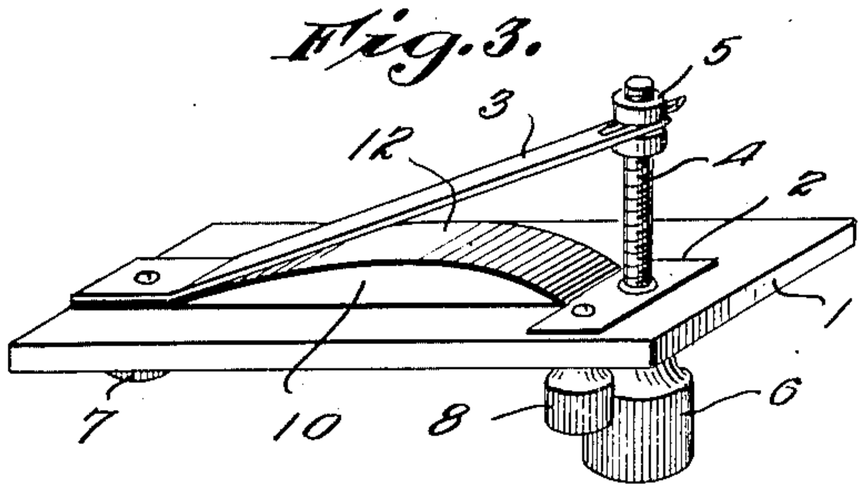


Fig. 2.

Fig. 3.



Inventor

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UNITED STATES PATENT OFFICE.

HARRY R. VAN DEVENTER, OF NEW YORK, N. Y., ASSIGNOR TO DUBILIER CONDENSER CORPORATION, A CORPORATION OF DELAWARE.

RESISTOR.

Original application filed December 1, 1922, Serial No. 604,395. Divided and this application filed November 1, 1923. Serial No. 672,161.

This application is a division of my application Serial No. 604,395, filed December 1, 1922.

My invention relates to variable resistances, such as variable grid leaks commonly employed in radio telephone and telegraph apparatus.

One of the objects of my invention is to provide an electrical resistance in which rubbing and scraping or friction of the parts is eliminated.

Another object of my invention is to provide a variable electrical resistance in which the resistance may be varied by infinitesimal strips.

A further object of my invention is to provide a variable electrical resistance of sturdy construction, which is easily and cheaply made and in which the necessity for repair or replacement is minimized.

Other objects will hereinafter more fully appear.

In the drawings:

Figure 1 is a view in perspective of a variable grid leak resistance;

Fig. 2 is a perspective view of another form of resistance;

Fig. 3 is a perspective view of another modification of the forms shown in Figs. 1 and 2.

Like figures of reference denote the same parts wherever they are shown.

Referring to the drawings, the device here shown comprises a support or base 1, carrying a fixed member 2 forming a resistance element. This said fixed member in the case of a variable grid leak, may be of paper or cardboard, coated with india ink or having thereon a suitable conducting medium, such as a coating of black lead. In some cases the base 1 may have a streak of resistance material across its top, in a well known manner.

The member 2 is clamped at one end under the binding post 7, the conducting surface of 2 being in electrical connection therewith. The remaining end of 2 is clamped under and in electrical connection with binding post 8, therefore, an electrical circuit exists across the strip 2 from 7 to 8.

Clamped under the binding post 7 and in electrical connection therewith, is the member 3—preferably a spring, comprising a flexible metallic strip of elastic metal, the outer end of which is bifurcated and engages the grooved nut 5. This grooved nut 5 is internally threaded and is engaged by the threaded shaft 4, which passes freely through the collar 11, entering a tapped hole in the knob or handle 6.

The collar 11 is secured to the handle 6, but turns freely in the plate 1. The tapped hole in the handle 6 is long enough to permit the shaft 4 to enter 6 for a sufficient distance to operate the device as hereinafter described.

Fig. 2 shows a modification of the device wherein the movable spring member 3 is positioned at the center of the member 2. Figure 3 is a further modification in which the base member has an upwardly projecting portion 10 provided with a curved contact surface indicated at 12.

In operation referring to the form of device shown in Fig. 1 (the same being connected in the circuit for which it is intended, the connection being made to binding posts 7 and 8) by turning the knob or handle 6, the member 3 will be gradually drawn down on the surface of the member 2.

As the member 3 may be of bronze or some other good conducting material, as it gradually lies down upon 2, the resistance of 2 is gradually decreased by reason of a portion of 2 becoming short-circuited.

This drawing or "lying down" action will begin at the point 13 and progress toward the right of the member 2 until the lower side of the member 3 is in contact with the extreme right hand end of the strip 2 such as at the point 14. It will be observed that the resistance of the member 2 may be varied by very small steps (in fact, imperceptibly) from a maximum to a minimum by operating the knob or handle 6 to draw the strip 3 gradually into contact with 2 whereby the under surface of 3 is caused to gradually overlay the upper surface of 2 by touch contact.

By "touch contact" I mean that the members 2 and 3 are caused to approach and recede from each other along a forwardly progressing line substantially perpendicular to

the opposed surfaces thereof, thereby eliminating the difficulties heretofore met in devices of this character wherein a movable member, the equivalent of 3, is brought into engagement with a resistance member, the equivalent of 2, by means of a rubbing or sliding contact or the like. Such rubbing or sliding contacts are very detrimental in many cases and particularly where paper or cardboard treated with india ink is employed for the member 2; for in such cases after the movable member has been rubbed along the cardbord surface a few times, the resistance characteristics of the surface is permanently varied and in many cases, the member 2 is destroyed.

It has been found in practice that by reason of the fact that the flexible metallic element 3 is sometimes intentioned away from the resistor 2, and the strip 3 is of considerable length, there may be portions of it between its fixed end and the more remote point of contact of the strip 3 with the surface of the resistor in which the strip 3 will buckle away from close contact with the resistor surface. This does not in any manner affect the operation of the device, because there is nevertheless a short circuit between the point of fixed contact of the spring 3 with the resistor surface 2 and its ultimate point of contact with such resistor surface.

Wherever the member 2 is made in the form of a coiled resistance wire, and the equivalent of the member 3 is moved over the surface of the coils in contact with the convolutions thereof, it is obvious that the resistance cannot be varied to a lesser degree than the resistance of a single convolution of the coil, whereas with my device, the resistance may be varied by infinitesimal steps depending upon the pitch of the thread of the member 4 and the degree of movement given to knob or handle 6.

In the arrangement shown in Fig. 2, the resistance of the member 2 is varied by drawing the member 3 against 2. The screw 4 is provided with a head 4′ that bears through a washer 9′ on a plate 9. The pressure of the plate 9 flexes the curved spring 3. In the midway operated position, the member 3 occupies the position shown in the dotted lines of Fig. 2. The member 3 being of metal and a good conductor as compared with the member 2 which may have a surface of comparatively high resistance, a portion of 2 will be short-circuited, whereby the resistance of the circuit between the binding posts 7 and 8 will be reduced.

The modification shown in Fig. 3 consists in providing the fixed member 2 with an upper curved or otherwise formed surface. The operation of this device is substantially the same as the device shown in the preceding figures.

While for the sake of illustration I have shown the invention as applied to a variable grid leak, it is obvious that it may be employed for other uses and that any device having members so arranged that one member is used to short circuit the other by touch rather than sliding contact, will come within the scope of the appended claims.

I claim:—

1. An electrical resistance comprising a fixed resistance element, a resilient movable element, a threaded member having grooves to engage the movable element, and a screw for moving the threaded member to cause the movable element to be progressively moved toward and away from the fixed element to vary the resistance of the device.

2. An electrical device comprising a base, a fixed resistance element thereon, a resilient movable element fastened at one end above the fixed element, and having the other end bifurcated, a nut having grooved sides to receive such bifurcations, and a screw for moving the nut to cause the movable element to be progressively moved toward and away from the fixed element to vary the resistance of the device.

3. The combination of a support, a resistance, element secured to said support, binding posts on the support engaging said element at separated points on the support to enable said element in the desired length to be connected into an electric circuit, a flexible element of greater conductivity than the first normally in contact at one end with said first element, but divergent with respect to the first element away from said end, the divergent end being bifurcated, a nut having grooved sides to receive such bifurcations, and a screw for moving the nut to cause the movable element to be progressively moved toward and away from the fixed element to vary the resistance of the device.

4. An electrical device comprising a base, a fixed impedance element thereon, a resilient, movable conducting element fastened at a predetermined point to the fixed element but normally divergent with respect to said fixed element away from said point, the conducting element having a portion removed at an end away from the predetermined point, a member having grooves which engage the conducting element at the place where the said portion was removed, and a means for moving the grooved member in such manner that the movable conducting element may be progressively moved toward and away from the fixed element to vary the impedance of the device.

In testimony whereof I affix my signature.

HARRY R. VAN DEVENTER.