

March 25, 1930.

S. LOEWE

1,751,587

ELECTRICAL HIGH RESISTANCE UNIT

Filed Aug. 27, 1925

FIG. 1.

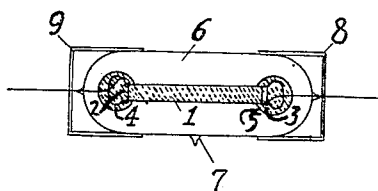
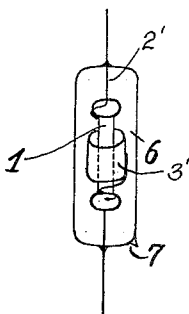


FIG. 2.



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ELECTRICAL HIGH-RESISTANCE UNIT

Application filed August 27, 1925, Serial No. 52,885, and in Germany August 30, 1924.

This invention relates to electrical high-resistance units especially for wireless telegraphy and telephony, including broadcasting and more especially to resistances of this kind, in which the resistance body proper consists of a thin conductive or poorly conductive layer, which is provided upon a carrier of insulating material preferably glass. The resistances of this kind, which have so far been obtainable in commerce, have a number of drawbacks and disadvantages and it is the main object of my present invention to design a resistance which is free of all objectionable properties, which are found in the resistances which are at present on the market or which have been known to the art.

In wireless telegraphy and other branches of electrical engineering high-resistance units are required which must combine a number of properties, which are enumerated in the following:

1. The resistance must be absolutely independent from the load,
2. A resistance of this kind must not have any electrical after-effects, that is at the ends of the resistance after the passage of a current there must exist no voltage of any kind,
3. The capacity of the resistance, if the same is to be used for instance for high-frequency work, must be extremely small,
4. The resistance also must not have any appreciable self-induction,
5. A resistance of this kind must be insensitive against influences due to temperature and moisture,
6. The connection of the leading-in and leading-out conductors must be reliable to such an extent, that neither thermo-electrical, electrolytical, nor fritter-like vibrations may take place at the places of transit,
7. The dimensions of the resistance must be extremely small, in order that, when using the resistance in connections, a compact arrangement of the parts will be possible,
8. The resistance must be of such a kind, that it may be manufactured at a small cost. In particular it has been ascertained by observation, that electrical after-effects are present to a high degree, which render these

resistances unfit for purpose of wireless telegraphy.

The present invention has for its object to provide a high-resistance unit, which complies with all the afore-enumerated requirements. Other objects of my invention will be apparent from the following detailed description when read in connection with the drawing, in which Fig. 1 diagrammatically illustrates a preferred embodiment of my invention and Fig. 2 illustrates a modification thereof.

It has been found, that a carrier of insulating material, especially glass, having the leads connected at its ends and being covered with a thin conductive layer will best meet these requirements.

The following methods of manufacturing the resistance unit are preferably employed according to this invention.

A glass-rod of small length and small diameter is connected at its ends with two leads by fusing the same thereon. The glass-rod is brought into a soot-producing flame and more particularly at first a relatively thick deposit of soot is produced at both ends, at which place the leads are fused onto the glass-rod. Thereupon the surface of the glass-rod is slightly covered with soot, preferably by simultaneously observing the temporary resistance value by means of an ohmmeter. As soon as the correct value of resistance is reached, the further deposit of soot is interrupted.

An especial advantage of this process consists therein, that the heat, to which the insulating body is exposed, will expel the moisture, which otherwise will essentially have an influence upon the resistance value.

Furthermore, there is a great advantage found therein, that the leads at the ends may be covered with a strong layer of soot in order to provide a good contact between the leads and the resistance layer proper, if no silvering of the ends of the leads or a similar treatment is employed.

Since soot is chemically inactive, a resistance made in this manner will only be subjected to the varying influences of moisture and mechanical stresses. In order to avoid

these influences the resistance body, which is made in the manner described, is fused air-tight into a small glass-tube surrounding the resistance body and the tube is there-upon evacuated. In this way mechanical injuries and at the same time influences due to moisture are excluded. It is of importance in this case, that the ends of the carrier of the resistance are at such a distance from the places at which the leads are fused into the glass-tube, that during fusing-in the leads, no considerable heating of the ends of the resistance body can take place.

The afore-described process, furthermore, possesses the great advantage, that the resistance proper may be made in the open air, and may be later enclosed in a protective casing. This protective casing may not necessarily consist of an evacuated tube. It will be sufficient, since the effects of moisture are only of subordinate importance, to eventually also employ a non-evacuated protective casing made from insulating material, which carries at its ends the devices effecting the enclosure.

Fig. 1 shows the construction of the afore-described high-resistance unit. At the points 2 and 3 the leads are fused into the glass-tube. The leads are surrounded by a strong layer of soot as indicated at 4 and 5, this layer effecting the contact between the leads and the resistance proper, which is being deposited alongside of the surface. The layer of soot forming the resistance body is indicated by shaded lines upon this surface. The resistance is fused into a glass-tube 6, which may be eventually evacuated by means of the pumping stud 7. Around the ends of the insulating protective tube 6 are placed the connecting caps 8 and 9, which are conductively connected with the leads 2 and 3 and which carry, if desired, terminals serving for the outer connection of the resistance.

The second method of manufacture is best illustrated by reference to Fig. 2.

The carrier 1 of the resistance is provided within an evacuated casing 6. A holding wire 2' is fused into the insulating body 1 and carries a cylindrically closed metal body 3', which may be heated by means of eddy currents. This metallic cylinder 3' may, for instance, consist of a sheet of nickel, which has been superficially alloyed with vapour of magnesium. Upon heating, the alloy will evaporate and deposit upon the insulating body 1. Also, other easily vaporizable materials may be employed. The material is best brought to glowing by surrounding the tube 6 with a coil through which are passed strong currents of high frequency.

Another advantageous method of manufacture consists therein, that the body of insulating material, with the leads fused into its ends is brought together with a vaporizable material into the surrounding protective casing.

I claim:

1. The method of making a high frequency resistor which consists in depositing resistance material upon an insulator encased in an evacuated tube in order to make the insulator a resistor of high ohmic value which includes the step of vaporizing a metal embodied in a cylinder surrounding the insulator by inducing eddy currents in the cylinder and condensing the vapor so formed upon the surface of the insulator.

2. The method of making a high frequency resistor which consists in encasing an insulating rod in an evacuated casing, surrounding the rod with a cylinder having a conductor connected to each end thereof, each of said conductors being affixed to an end of the rod and passing through an end of the casing, said cylinder embodying a vaporizable metal, and finally subjecting said cylinder to high frequency eddy currents whereby said rod surface is coated with said metal.

3. The method of making a resistor which consists in enclosing an insulating rod in an evacuated tube, surrounding the rod with a cylinder embodying magnesium, said cylinder having a conductor connected to each end thereof, each of said conductors being affixed to an end of the rod and passing through an end of the casing, and subjecting said cylinder to eddy currents whereby said rod surface is coated with magnesium.

4. A method of making a resistor which consists in disposing an insulator in an evacuated tube, surrounding the insulator with a cylinder having a conductor connected to each end thereof, said cylinder embodying magnesium, affixing each of said conductors to one end of the insulator and passing the conductor through an end of the tube, and finally subjecting said cylinder to eddy currents whereby said insulator is coated with magnesium.

5. A high frequency resistor comprising an evacuated casing, an insulating rod disposed within said casing, an open ended cylinder disposed within said casing and surrounding said rod, a conductor attached to each end of said cylinder and affixed to the end of the rod closest to said cylinder, each of said conductors passing through the end of the casing, said cylinder embodying a vaporizable metal, and said rod surface being provided with a coating of said vaporizable metal.

In testimony whereof I have affixed my signature.

SIEGMUND LOEWE.