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METHOD OF IMPROVING THE INSULATION OF VACUUM TUBES

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Fig. 1

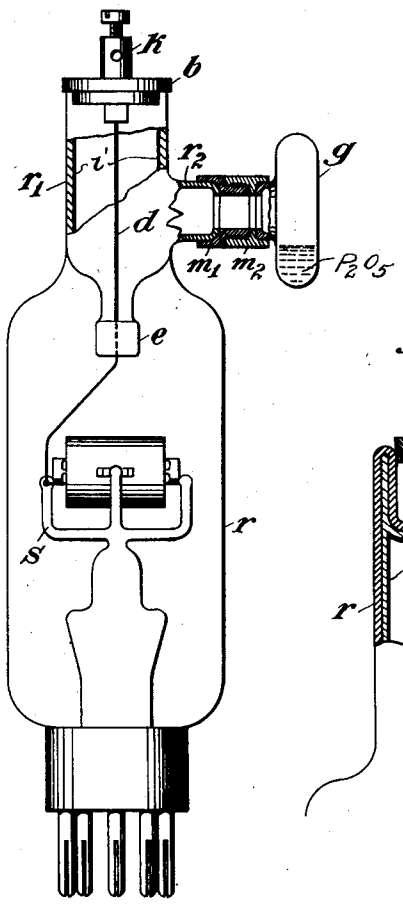
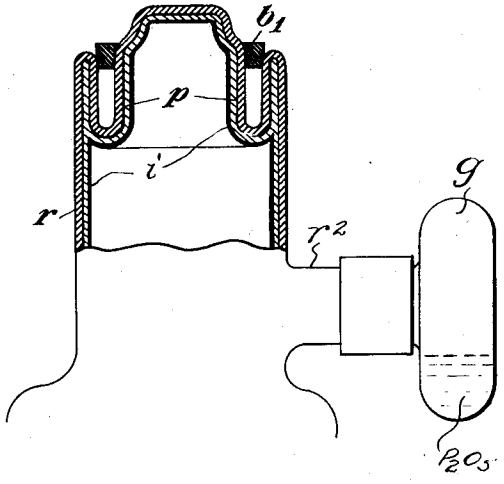


Fig. 2



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METHOD OF IMPROVING THE INSULATION OF VACUUM TUBES.

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In vacuum tubes, it is frequently very important to carefully insulate from each other the electrodes having different voltages; this applies, particularly, to the grid-tubes of vacuum tube volt-meters and, generally, to grid-tubes of which the control-grid is connected to a high-ohmic resistance, which must, however, be small comparatively to the surface resistance between grid and, for instance, cathode.

Now, it could be attempted to improve the surface insulation by coating the outer surface of the tube with bakelite, as is, for instance, done with the ebonite parts of electrical machines.

This insulation is, however, not sufficiently effective for the purpose in question, as it cannot be avoided, when using the tubes, that the bakelite layer is touched by the hands and thus a conductive layer will still be produced on the bakelite coating through a direct transmission by the hands.

The present invention overcomes this drawback by displacing at least part of the electric leakage path at the outer surface into a cavity, of which the walls are highly insulated by an appropriate coating, for instance of bakelite, and freed from the moisture film, said cavity being, moreover, closed by a non-hygroscopic insulator of high value, for instance of amber.

The accompanying drawing shows two appropriate constructional forms of the subject matter of the present invention:

Fig. 1 is a side elevation, partly in section, of one form, while

Fig. 2 is a fragmentary sectional elevation, of the other form.

Referring to Fig. 1: r designates a grid-tube, in the upper end of which the lead d to the control-grid s is molten-in at e, while the lead to the other electrodes at the lower end of the grid-tube is effected in a way known in the art. By this arrangement, a far outer electric leakage path is ensured between the electrode of the control-grid and the other electrodes. At its upper end, the grid-tube r carries a tubular extension r_1, which is closed at its outer end by an amber piece b. In the middle of the latter a connection-terminal k for the lead d to the control-grid s is provided. The inner surface of the tubular extension r_1 may be provided with a lacquer coating i of a phenol resin condensation product, as shown.

The tubular extension r_1 has a lateral branch r_2, on which a glass container g with a drying medium therein, for instance phosphor pentoxide, is arranged by means of screwed brass rings m_1 and m_2.

By the improved arrangement, first, the electric leakage path from the electrodes at the lower end of the grid tube r to the molten-in point e of the lead d to the control-grid s, is extended through the inner surface of the tubular projection r_1. Apart from this extension, however, the important fact may be added that the inner surface of the tubular extension r_1 may be highly insulated, e. g. by a lacquer of bakelite and said insulation is so arranged that it cannot be attacked by outer influences.

With the employment of the insulating amber piece b closing said insulated cavity, the insulating capacity is considerably increased, while the moisture absorbing medium in the glass container g prevents any moisture, which might still penetrate through the joining of the amber piece b to the tubular extension r_1, settling on the bakelite coating.

Referring to Fig. 2: The wall of the grid-tube r has a re-entrant portion in such a way that a ring p is formed therein, the inner surface of said re-entrant portion being coated with a lacquer of bakelite and its annular open end closed by means of an amber collar b_1.

One or a plurality of such re-entrant portions with highly insulated surface may be sufficient without the employment of an amber collar as long as the insulated surfaces cannot be directly touched from outside.

A safety against moisture in the interior of the cavities r_1, or p respectively, can also be attained by making the latter airtight and evacuating the same.

The insulating cavities may also be employed at the entrance of a plurality of electrodes, if insulation of high value is desired for the same.

What I claim is:

1. A method of improving the insulation at the outer surface of vacuum tubes, particularly of vacuum tube voltmeters, compris-

ing arranging at least part of the outer electric leakage path between the electrodes to be insulated from each other in an outwardly opening cavity, the walls of which consist of the same material as the tube, and in closing the outward opening of said cavity by means of a non-hygroscopic insulator, whose insulating resistance is considerably higher than that of the tube material.

2. A method of improving the insulation at the outer surface of vacuum tubes, particularly of vacuum tube voltmeters, comprising arranging at least part of the outer electric leakage path between the electrodes to be insulated from each other in an outwardly opening cavity, closing the opening of said cavity by means of an insulator of high value, and locating a drying agent in said cavity.

3. A method of improving the insulation at the outer surface of vacuum tubes, particularly of vacuum tube voltmeters, comprising arranging at least part of the outer electric leakage path between the electrodes to be insulated from each other in an outwardly opening cavity, closing the opening of said cavity by means of an insulator of high value, and evacuating said cavity.

4. A method of improving the insulation at the outer surface of vacuum tubes, particularly of vacuum tube voltmeters, comprising arranging at least part of the outer electric leakage path between the electrodes to be insulated from each other in an outwardly opening cavity, closing the opening of said cavity by means of an insulator of high value, and highly insulating the walls of said cavity.

5. Arrangement for improving the insulation at the outer surface of vacuum glass-tubes, particularly of vacuum tube voltmeters, comprising a re-entrant wall portion of glass forming an outwardly opening recess at the tube interposed into at least part of the outer electric leakage path between the electrodes to be insulated, and a cover of amber adapted to close the opening of said recess.

6. Arrangement for improving the insulation at the outer surface of vacuum glass-tubes, particularly of vacuum tube voltmeters, comprising a re-entrant wall portion of glass forming an outwardly opening recess at the tube interposed into at least part of the outer electric leakage path between the electrodes to be insulated, a cover of amber adapted to close the opening of said recess and a drying medium of the character of powdered phosphorpentoxide (P_2O_5) disposed in said recess.

7. Arrangement for improving the insulation at the outer surface of vacuum glass-tubes, particularly of vacuum tube voltmeters, comprising a re-entrant wall portion of glass forming an outwardly opening recess at the tube interposed into at least part of the outer electric leakage path between the electrodes to be insulated, a cover of non-hygroscopic insulating material of the character of amber adapted to close the opening of said recess, powdered phosphorpentoxide (P_2O_5), disposed in said recess and a phenol resinous lacquer coating covering the inner surface of the walls of said recess.

8. A method of improving the insulation at the outer surface of vacuum tubes, particularly of vacuum tube voltmeters, comprising arranging at least part of the outer electric leakage path between the electrodes to be insulated from each other in an outwardly opening cavity, whose walls consist of the same material as the tube, and in closing the outer opening of said cavity by means of a non-hygroscopic insulator, whose insulating resistance is of the character of that of amber.

In testimony whereof I affix my signature.

ROBERT JAEGER.