

W. A. WINTER & C. M. PEABODY.
VACUUM TUBE.

APPLICATION FILED APR. 14, 1910.

984,726.

Patented Feb. 21, 1911.

FIG. 1

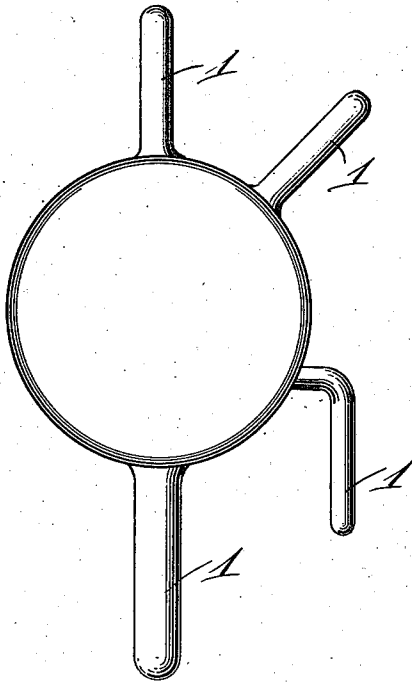


FIG. 2

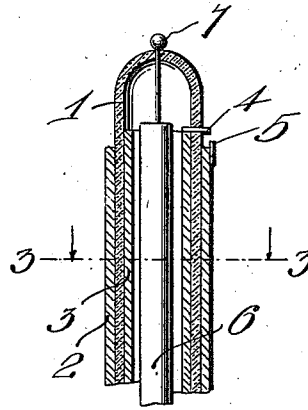


FIG. 3

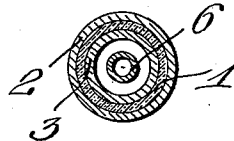


FIG. 4

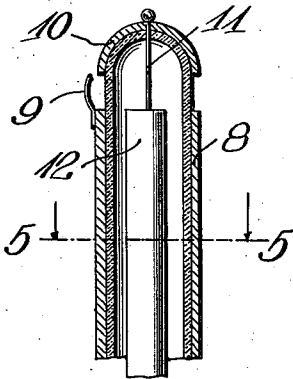
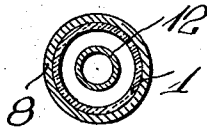


FIG. 5



Witnesses

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UNITED STATES PATENT OFFICE.

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VACUUM-TUBE.

984,726.

Specification of Letters Patent.

Patented Feb. 21, 1911.

Application filed April 14, 1910. Serial No. 555,375.

To all whom it may concern:

Be it known that we, WILLIAM A. WINTER, a citizen of the United States, residing at New York, New York county, New York State, and CHARLES M. PEABODY, citizen of the United States, residing at South Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Vacuum-Tubes; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

15 This invention relates to vacuum tubes and particularly to that type used in X-ray apparatus.

When operating with tubes especially those in which the vacuum is high there is a tendency to puncture due to the potential strain to which the glass is subjected especially in the parts of the tube adjacent to the positive electrode, thereby destroying the usefulness of the tube.

25 It is the object of this invention to avoid this difficulty by providing a conducting medium at the points of greatest strain, arranged in such a manner as to cause a harmless discharge of static charges through a suitable resistance, or to receive and conduct a high potential charge from the opposite end of the tube, to such a place as it may be harmlessly discharged.

Specifically, the invention consists in applying either to the inner or outer surfaces of the tube, a current conducting medium, either chemical or metallic, and arranging the same in such manner that either the inner or outer surface may be readily discharged of its accumulated electricity.

40 The invention is particularly advantageous when placed near the current carrying terminals of a vacuum tube such as the anode, cathode, anti-cathode or regulating device, singly, in pairs, or all of them, and the inner and outer layers of conducting material, may be either connected directly, or the current discharged from one to the other with an interposed resistance.

50 With the foregoing and other objects in view, the invention consists of certain novel features of construction, combination and arrangement of parts, as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings, Figure 1 shows the ordinary form of X-ray tube; Fig. 2 is a longitudinal section of one form of the terminal tubes employed therein; Fig. 3 is a section on the line 3—3 of Fig. 2; Fig. 4 shows a modified form of the tube in longitudinal section; Fig. 5 is a sectional view thereof on the line 5—5 of Fig. 4.

Referring more particularly to Figs. 1, 2 and 3, 1 represents a terminal-tube of glass which is covered on its outer face with a current conducting layer 2 and on or adjacent to its inner face with a similar layer 3. In this instance, the inner layer has connected to it a discharge terminal 4 which is fused through the glass in position to be juxtaposed with relation to the discharge terminal 5 carried by the other layer. These discharge terminals are preferably of platinum, but may be of any other suitable material, and it will be readily understood that by disposing the terminal 5 at different points along the tube the spark gap between the terminals may be made larger or smaller and the resistance of the tube varied. In these figures, 6 represents the generally used support for the terminals of the vacuum tube and 7 indicates the line terminal. It must be further understood that this spark gap or other suitable resistance does not necessarily need to be positioned outside of the tube, but may be located therein if found to be convenient, but in practice, the outside arrangement has been found to be advantageous and the conducting material as employed is preferably plated upon the surfaces of the glass, their sizes and positions being governed entirely by the circumstances.

95 In Figs. 4 and 5, the glass tube 1 has only a single conducting medium 8 arranged upon the outside, which is provided in this instance with a terminal finger 9 of platinum or other suitable material, extending upwardly from its upper end in position to discharge the current of the layer 8 onto the terminal cap 10 which covers the upper end of the tube 1 and is of the type generally used in the manufacture of these vacuum tubes, being connected by a conductor 11 with the terminal supports 12, which is fused through the glass of the tube.

From the foregoing description, taken in connection with the accompanying drawings, the construction and operation of the

invention will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of the invention, as defined in the appended claims.

Having thus particularly described our invention, what we claim is:

1. A vacuum tube having a conducting medium mounted on its inner and outer surfaces, and a discharge terminal passing through the tube and connected to one of said conducting mediums.

2. A vacuum tube having an external conducting medium, a conducting medium on the inside of the tube, a discharge terminal which may also be used as the electrode, a terminal fused through the tube and con-

nected to the outer medium and arranged to coact with the first discharge terminal to form a resisting air gap.

3. A vacuum tube having a conducting element mounted upon one surface thereof and adapted to hold a charge of a given polarity, a second conducting element upon the other surface of the tube, a terminal passing through the tube and carried by one of said elements, and a terminal connected to the other element.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

WILLIAM A. WINTER.
CHARLES M. PEABODY.

Witnesses:

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C. DREESEY.