G. HOTALING AND W. D. COOLIDGE.

X-RAY APPARATUS.

APPLICATION FILED JUNE 30, 1919.

1,430,550. Patented Oct. 3, 1922.

Fig. 1.

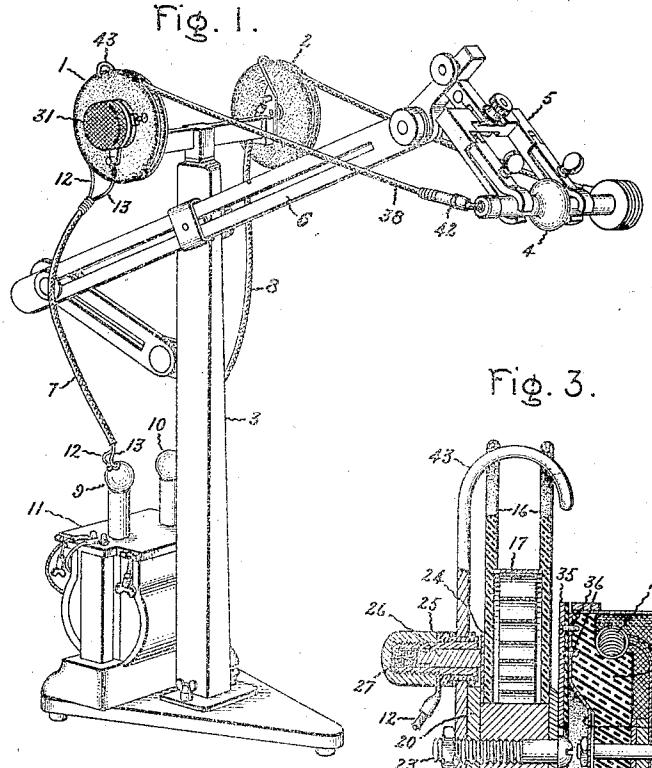


Fig. 4.

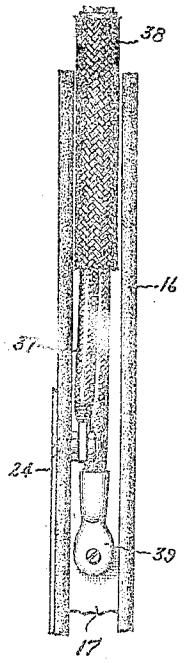


Fig. 3.

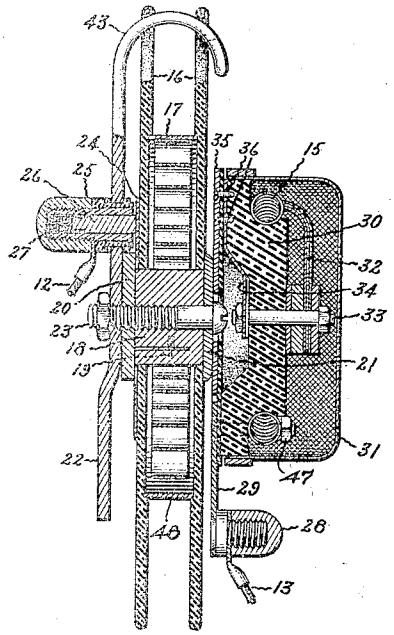


Fig. 2.

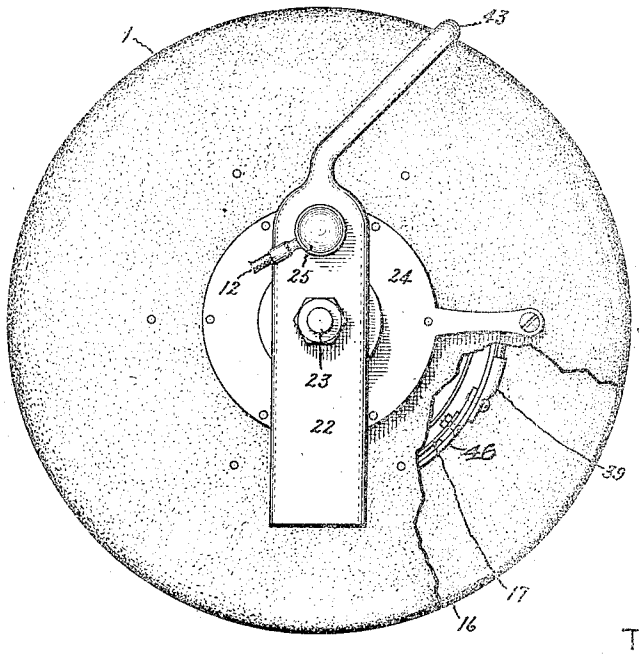
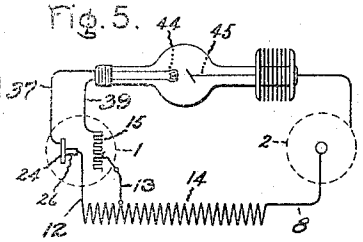


Fig. 5.



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UNITED STATES PATENT OFFICE.

GEORGE HOTALING AND WILLIAM D. COOLIDGE, OF SCHENECTADY, NEW YORK, ASSIGNORS TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

X-RAY APPARATUS.

Application filed June 30, 1919. Serial No. 307,813.

To all whom it may concern:

Be it known that we, GEORGE HOTALING and WILLIAM D. COOLIDGE, citizens of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in X-Ray Apparatus, of which the following is a specification.

The present invention relates to X-ray apparatus and in particular to the structure which is adapted to carry the electrical conductors between the source of current supply and an X-ray tube.

It is the object of our invention to provide a compact, reliable device which may be detachably mounted upon an X-ray apparatus, and which will reduce to a minimum the danger of serious injury by electric shock to those concerned with the operation of an X-ray device. Our invention is concerned with structural features, the novel details of which will be pointed out with greater particularity in the appended claims.

A more complete understanding of our invention may be had from the following specification taken in connection with the accompanying drawing in which Fig. 1 is a perspective view of the complete X-ray outfit of which the reel constituting our invention forms a part; Fig. 2 is a side view of the reel with part of the side wall broken away; Fig. 3 is a sectional view of one of the reels carrying a resistor; Fig. 4 is a detailed view showing the electrical connection of a conductor coupled to the reel, and Fig. 5 is a diagram of electrical connections.

As shown in Fig. 1, conductor reels 1, 2, comprising our invention, may be used in connection with a pedestal stand 3 on which is mounted an X-ray tube 4 supported by clamps 5 carried by an extension arm 6. To the reels 1, 2, are attached cable conductors 7, 8, respectively serving for connection to the terminals 9, 10 of a transformer 11. The cable 7 comprises two conductors 12, 13, connected to different taps of a transformer secondary 14 (Fig. 5), and conveying a heating current to the cathode of the X-ray tube through the reel, as will be hereinafter described. One of the reels is provided with an adjustable impedance 15, either ohmic or inductive, the parts of which are shown in detail in Fig. 3, whereby the cathode heating current may be regulated. The reel 2 is provided with a single conductor cable.

As shown in Fig. 3, the cable reel comprises a frame or spool 16 made of suitable insulating material such, for example, as hard rubber, or bakelite. Connected to the spool 16 is a flat spiral spring 17, the inner end of which is attached in any convenient way to a stationary barrel 18, for example, by means of a screw 19. The opposite end of the spring 17 is connected by a brass ring 46 to the spool 16. The barrel 18 is connected to spacing plates 20, 21, and to a supporting plate 22 by means of a screw bolt 23. The spacing plate 20 may consist of suitable insulating material such as hard rubber, or bakelite. The plate or washer 21 consists of metal.

Between the spacing plate 20 and the reel side wall is a contact plate 24 (Fig. 2). Connected to the supporting plate 22 is a sleeve 25 containing a sliding contact or brush 26 which is connected to the conductor 12 and is pressed into electrical contact with the plate 24, by a spring 27, the electrical circuit being completed by a conductor as indicated. The conductor 13 is connected to a terminal 28 mounted on a plate 29 located on the opposite side of the reel. The plate 29 is in turn connected by a screw 47 to a coiled resistance wire 15 mounted on a base 30 of suitable insulating material, as for example, asbestos compound. A screen 31 covers the resistor 15 and prevents unintentional movement of the adjustable rheostat arm 32. This arm is rotatably mounted on a pin 33 and electrically connected by said pin to a conductive plate 34. The rheostat arm is ordinarily adjusted only once for any given X-ray tube and circuit voltage, and, therefore, preferably is not made easily accessible.

The plate 34 is electrically connected to a conductive plate 35 by screws 36. The plate 35 is connected through the plate 21, the barrel 18, and the spring 17 to one of the conductors 39 of the cable 38 mounted on the reel, as shown in Fig. 4. The other cable conductor 37 is connected to the plate 24, which, as has been explained above, is in contact with the brush 26. The two conductors 37 and 39 are united to form a single cable by a surrounding insulating sheath 38 having a diameter approximating the distance between the side walls 16 of the reel. The end of the cable 38 is provided with a suitable contact-making coupling 42. When not extended the cable 38 is wound upon the reel

by the rotative effort of the spring 17 and when fully wound the end of the cable is retained by the curved guard 43 so as to prevent the cable from unwinding. Heavy insulation is used for the high tension leads to prevent electrical corona discharges in order to avoid the attendant noise and the odor of gaseous products of electrical discharges.

The electrical circuits from the transformer secondary to the electrodes 44, 45, of the X-ray tube 4 will be understood without further explanation by a comparison of Fig. 5 with Figs. 1 and 3. It will be observed that the electric circuits of the reel conductors are maintained complete and independent whether the conductors are partly or wholly unwound and no slack conductors are present as a source of danger.

What we claim as new and desire to secure by Letters Patent of the United States, is,—

1. A reel for X-ray apparatus comprising a support, a rotatable holder mounted thereon, and a cable adapted to be wound on said holder, an electric circuit for conveying electric current to said cable, and means mounted on said reel for regulating the current in said circuit.

2. A reel for X-ray apparatus comprising a rotatable frame, two flexible insulated conductors wound on said frame, an impedance mounted on said frame, an electrical connection between said impedance and one of said conductors, means for maintaining said conductors taut, and conductive means for completing circuits through said conductors independent of the rotation of said reel.

3. A reel for X-ray apparatus comprising a rotatable non-conductive frame, a conducting plate mounted on said frame, a brush making electrical contact with said plate, two flexible insulated wires adapted to be wound on said frame, one of said wires being electrically connected to said plate, and means for completing an electrical circuit through the second wire electrically insulated from the wire connected to said plate.

4. A reel for X-ray apparatus comprising a rotatable non-conducting frame, a spring connected to resist rotation of said frame, a conductive plate mounted on said frame, a brush making electrical contact with said plate, an adjustable impedance mounted on said frame, a conductor connected to said plate, a second conductor connected to one end of said spring, and a series electrical connection between said resistor and one of said conductors.

5. An X-ray apparatus comprising a pedestal, extensible means for supporting an X-ray tube in a desired position upon said pedestal, outwardly extending arms carried by said pedestal, reels adapted to be demountably supported upon said arms, conductors carried by said reels for connection to the terminals of said tube, a sliding contact for one of said conductors, and current regulating means mounted on one of said reels.

In witness whereof, we have hereunto set our hands this 27th day of June, 1919.

GEORGE HOTALING.
WILLIAM D. COOLIDGE.