No. 768,048. PATENTED AUG. 23, 1904.

G. R. HOGAN.

X-RAY TUBE STAND.

APPLICATION FILED NOV. 30, 1903.

NO MODEL.

Fig. 1.

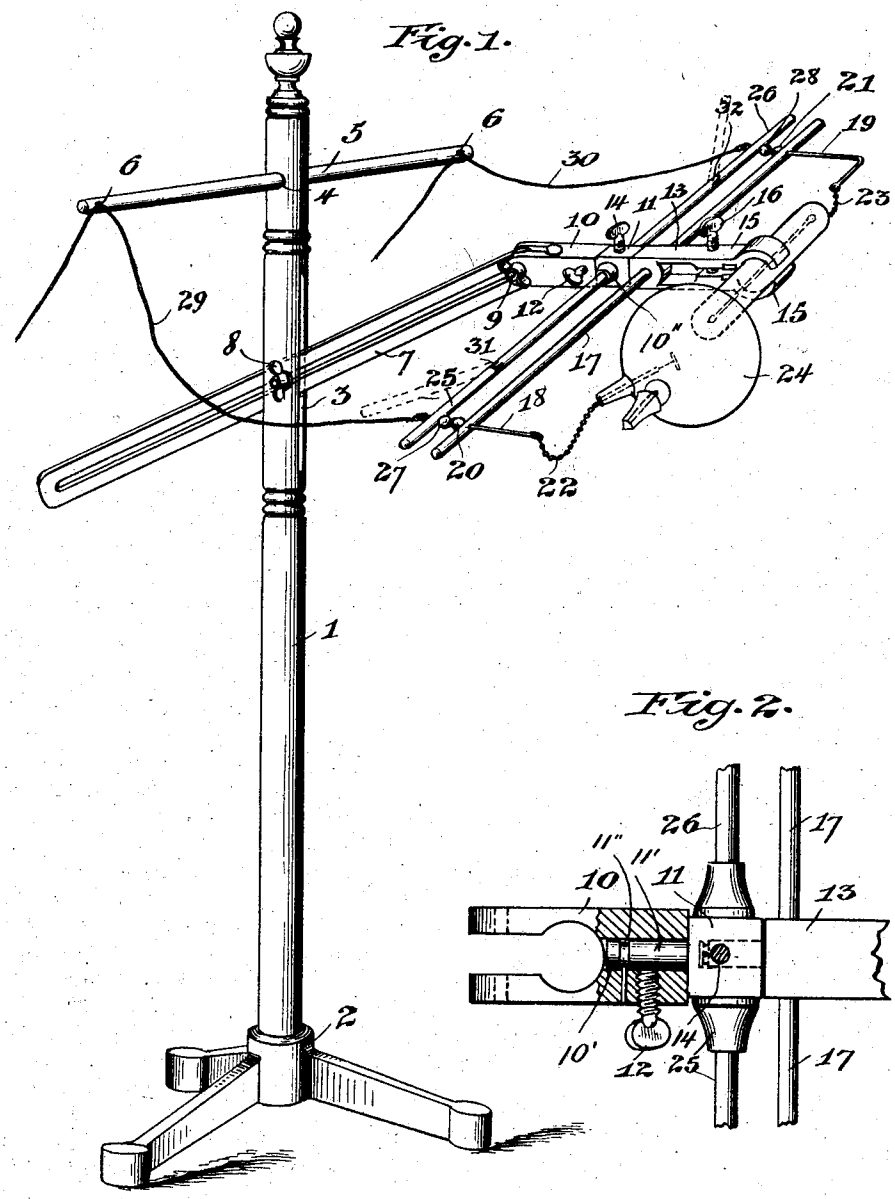


Fig. 2.

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No. 768,048. Patented August 23, 1904.

UNITED STATES PATENT OFFICE.

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X-RAY-TUBE STAND.

SPECIFICATION forming part of Letters Patent No. 768,048, dated August 23, 1904.

Application filed November 30, 1903. Serial No. 183,185. (No model.)

To all whom it may concern:

Be it known that I, GEORGE R. HOGAN, a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in X-Ray-Tube Stands, of which the following is a specification.

This invention relates to X-ray-tube stands, and refers more particularly to an adjustable stand provided with means for holding tubes of various shapes and for arranging the electrical circuit connections with the tube in an improved manner.

Among the salient objects of the invention are to provide a construction in which the circuit through the tube may be instantly reversed without mechanically disconnecting and reconnecting the conductors; to provide a construction in which one or more spark-gaps are interposed in the working circuit in such way as to facilitate the reversal of the circuit connections through the tube and at the same time afford a more convenient means of adjusting the sparking distance, and therefore the tension of the current; to provide a construction in which the conductors directly connected with the terminals of the tube are connected to a supporting member and the main leads which form continuations of the conductors leading from the tube are connected with an immovable or substantially immovable member, so that the electrical connections are never disturbed during the manipulation of the tubes into various positions, and in general to provide a simple and improved device of the character referred to.

As is well known in the art, it is necessary to vary or regulate the tension of the current to suit varying conditions, and it has heretofore been common to employ a spark-gap for so regulating the tube. So far as I am aware, however, the spark-gap has always been arranged either at the poles of the machine or in shunt or bridging relation to the main conductors between the poles and the tube-support. It has never been proposed to use two spark-gaps, one arranged in series with each of the two main leads and located at the tube-support.

By means of the present invention I accomplish the several objects hereinbefore set forth and others, as will hereinafter appear.

The invention consists in the matters hereinafter described, and more particularly pointed out in the appended claims, and will be readily understood from the following description, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of an X-ray-tube stand embodying the invention, a tube and its connections being shown mounted upon a stand. Fig. 2 is a fragmentary detail view of the bracket-joints whereby the swiveling movement of one part relatively to the other is secured.

Referring to the drawings, 1 designates a standard mounted upon a suitable base 2 and having in its upper portion a longitudinally-extending slot 3 and a transverse aperture 4, through which latter is placed a supporting-bar 5, provided with conductor-apertures 6 6.

7 designates a slotted bracket-arm slidably mounted in the slot 3 of the standard and adjustably clamped in position by means of a thumb-screw 8, which extends through the standard and slot of the bracket-arm and serves both as a clamping-screw and pivot-support. Upon the end of the arm 7 is pivotally mounted a bracket extension member 10, which is pivotally united with the arm 7 by means of a thumb-screw 9. With the end of the extension-block 10 is movably connected a coupling-block 11, which in the preferred embodiment of the invention has swiveling connection with said block and may also be locked against turning by means of a thumb-screw 12. In order to provide such swiveling connection, the block 10 is socketed, as indicated at 10′, and the coupling-block 11 is provided with a cylindric stud 11′, fitting said socket and provided with an annular groove 11″, which is engaged by a suitable retaining-pin, as shown clearly in Fig. 2.

13 designates a jaw-block, which is movably connected with the coupling-block 11, preferably by means of a shank-and-socket connection similar to the connection between the coupling-block 11 and extension 10, as indi-

cated in Fig. 2. The jaw-block may be also locked against rotation by means of a thumb-screw 14, threaded into the side of the coupling-block and impinging against the shank of the jaw-block. The jaw-block is provided with a pair of spring-jaws 15 and a clamping-screw 16, extended therethrough, as usual.

Describing now the conductor-supports, 17 designates a rod arranged to extend transversely through or mounted upon the jaw-block and carrying at each end a conductor-rod, as 18 and 19, it being understood that the rod 17 is of insulating material, as wood, or else insulated from the conductors 18 and 19. The conductor-rods 18 and 19 are desirably provided with spherical terminals 20 21, and with their opposite ends are connected flexible conductors, (indicated as chains 22 and 23, respectively.) The conductors 22 and 23 are to be connected with the terminals of an X-ray tube, as 24, of any desired construction. Upon the coupling-block 11 is also mounted another supporting-rod, consisting in the present instance of two halves 25 and 26, rigidly connected with the opposite sides of the coupling-block by means of suitable sockets 10″ and extending in alinement with each other. Each rod member 25 and 26 is provided with a conductor-terminal, as indicated at 27 and 28, with which are respectively connected flexible conductors 29 and 30. In order that the outer ends of the two conductor-supporting rods may be adjusted with relation to each other, so as to separate the pairs of terminals 20 27 and 21 28, the two-part rod is provided with jointed end portions, as indicated at 31 and 32, which permit the outer ends to be flexed backwardly, as indicated in dotted lines in Fig. 1. The joints 31 and 32 are of the rule-joint type and made sufficiently tight to hold the ends of the rods frictionally in any position into which they are adjusted, and this two-part rod is likewise of insulating material.

In operation the X-ray tube is clamped between the jaws of the bracket, as shown clearly in Fig. 1, and the conductors connected as shown. The movable ends of the jointed supporting-rod are then moved backwardly to separate the terminals 20 27 and 21 28 to the required distance. If preferred, only one pair of terminals may be separated to provide a spark-gap; but preferably both will be separated, it being obvious that the total sparking distance may be divided between the two pairs of terminals, since both pairs of terminals are in series with each other. With the parts thus arranged it will be obvious that the circuit through the tube may be reversed instantly by simply loosening the set-screw 14 and turning the jaw-block and connected supporting-rod and tube a half-revolution, thus bringing the terminal 20 into register with the terminal 28 and the terminal 21 into register with the terminal 27. This, it will be seen, does not in any wise disarrange the electrical connections nor disturb the adjustment of the tube in the clamping-jaws. Should it be desired to readjust the position of the tube or change the connections of the conductors with the tube-terminals, this may be readily accomplished without turning off the current by simply turning the jaw-block and connected parts at right angles to the coupling-block and its supporting-rods or by turning the jaw-block far enough to separate the terminals so widely as to prevent the passage of current. Obviously the tube and its connections may then be manipulated without danger. It will also be noted that by means of the rotatable connections described the jaw-block, coupling-block, and supporting-rods, together with the tube, may be rotated as a whole without changing or affecting the circuit connections by simply loosening the set-screw 12 and rotating the parts to the required angle and then clamping them into position. It will also be noted that the jaw-block and its supporting-rod may be rotated relatively to the companion supporting-rod for the purpose of adjusting the sparking distance between the pairs of terminals; but the adjustment of the flexible ends of the jointed rod is more convenient and preferable.

By reason of the facility with which the circuit through the tube may be reversed a device embodying my invention is especially useful in connection with a static generator, in the use of which the polarity frequently becomes reversed, rendering the tube practically inoperative until reversed back. However, the device is very useful in connection with a system employing induction-coils for producing the high-tension current, since in practice the tube will by continued use become polarized and the resistance therethrough greatly increased, and this polarization can be destroyed or minimized by occasionally reversing the direction of the current through the tube.

While I have herein described and shown a preferred embodiment of the invention, yet it will be understood that within the broader spirit of the invention the details of construction shown are not essential and may be changed. I do not, therefore, limit myself to the construction except as these details are made the subject of specific claims.

I claim as my invention—

1. In an X-ray-tube support, a two-part frame, each member of which is provided with a pair of terminals, means for supporting an X-ray tube on one frame member, electrical connections for connecting said tube in series with the pair of terminals carried by said frame member, conductors connecting the terminals of the other frame member with a suitable source of electrical energy and adjustable connections between said frame members whereby the relations between the terminals carried thereby may be transposed without disconnecting the conductors therefrom.

2. In an X-ray-tube support, a relatively stationary frame member and a relatively movable frame member, a pair of terminals supported at separated points on one of said frame members and electrical conductors connected therewith, means for supporting a tube and a pair of connected terminals on the other frame member, and adjustable connections between said frame members whereby the relations between the terminals connected with the tube and those of the other frame may be transposed.

3. In an X-ray-tube support, a relatively stationary frame member and a relatively movable frame member, a pair of terminals supported at separated points on one of said frame members and electrical conductors connected therewith, means for supporting a tube and a pair of connected terminals on the other frame member, a revoluble joint connection between said frame members whereby the relations between the terminals connected with the tube and those of the other frame may be transposed.

4. In an X-ray-tube support, the combination of a two-part frame structure, means for supporting an X-ray tube on one part of said structure, circuit connections extending across the line of division between the two parts of the frame structure, connected with said tube and supported upon said structure, means for arranging two spark-gaps in series with the circuit connections, one at each side of the tube, and adjustable connections between the two members of the structure whereby the parts at one side of the two spark-gaps are adjustable relatively to those at the other side of the two spark-gaps.

5. An X-ray-tube stand, comprising a supporting member, an arm adjustably mounted upon said supporting member, a coupling-block adjustably mounted upon said arm, clamping members swivelingly mounted upon said coupling-block, laterally-projecting rods mounted upon said coupling-block and said clamping members adjacent each other, electric contacting-points upon said rods, and means for connecting said contacting-points in circuit with a source of electricity, substantially as described.

6. An X-ray-tube stand, comprising a supporting member, an arm adjustably mounted upon said supporting member, clamping members swivelingly mounted upon said arm, laterally-projecting rods upon said arm and said clamping members, one of said rods being provided with hinged end sections, electric contacting-points mounted upon the ends of said rods, and means for connecting said contacting-points in circuit with a source of electricity, substantially as described.

7. An X-ray-tube stand, comprising a supporting member, an arm adjustably mounted upon said supporting member, a coupling-block swivelingly mounted upon said arm, clamping members swivelingly mounted upon said coupling-block, laterally-projecting rods mounted upon said coupling-block and said clamping members adjacent each other, electric contacting-points mounted upon said rods, and means for connecting said contacting-points in circuit with a source of electricity, substantially as described.

8. An X-ray-tube stand, comprising a supporting member, an arm adjustably mounted upon said supporting member, a coupling-block swivelingly mounted upon said arm, clamping members swivelingly mounted upon said coupling-block, laterally-projecting rods mounted upon said coupling-block and upon said clamping members and extending parallel with and adjacent to each other, one of said rods being provided with hinged end sections, electric contacting members mounted upon said rods near their ends, whereby the moving of said hinged sections creates a spark-gap between said contact members, and means for connecting said contacting members in circuit with a source of electricity, substantially as described.

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