June 9, 1931. F. H. WAPPLER 1,809,366

HIGH TENSION SWITCH

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FIGURE 1

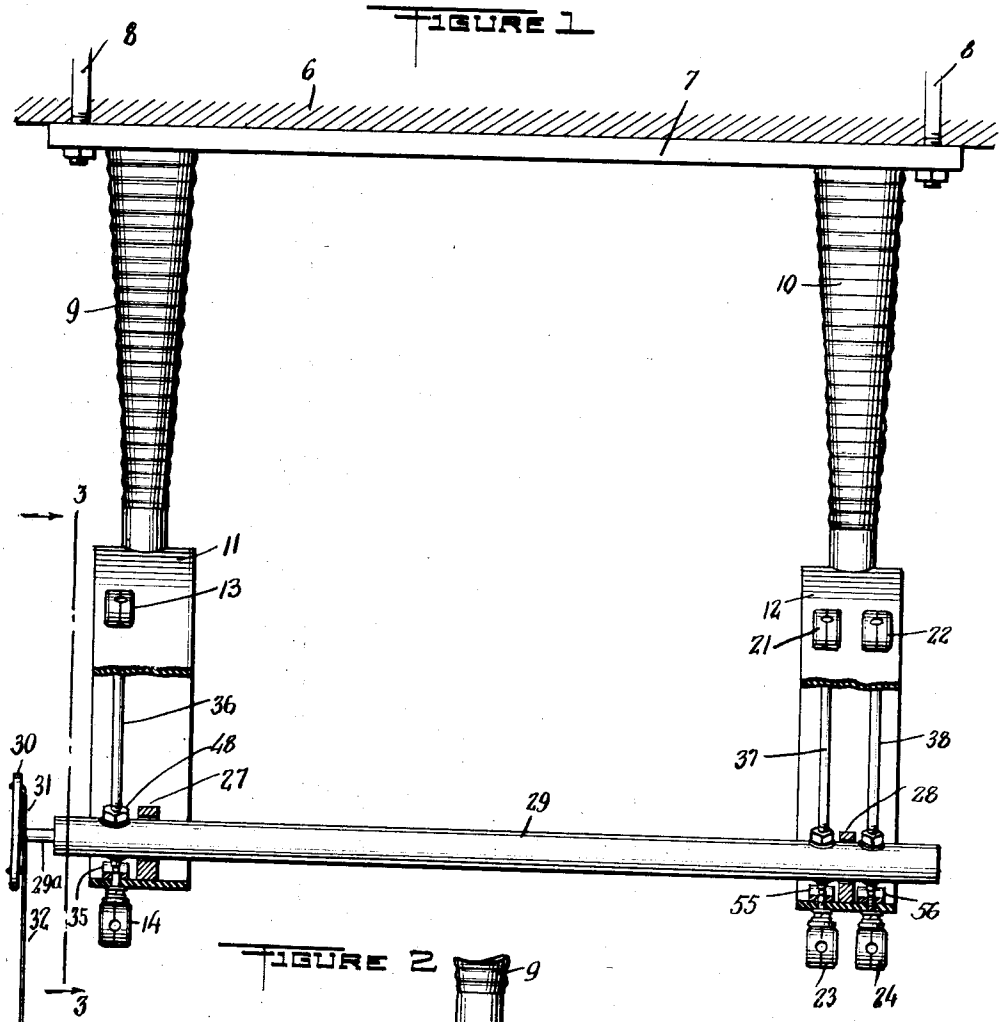

FIGURE 2

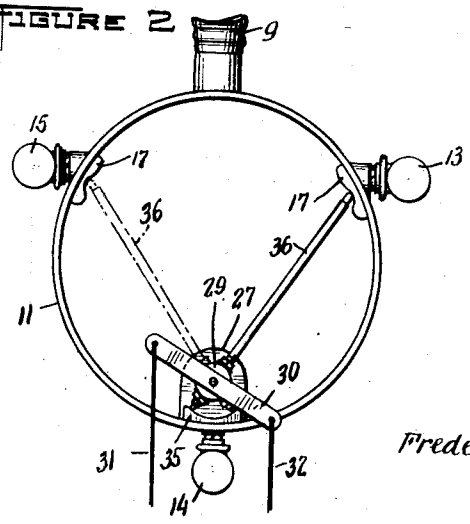

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FIGURE 3

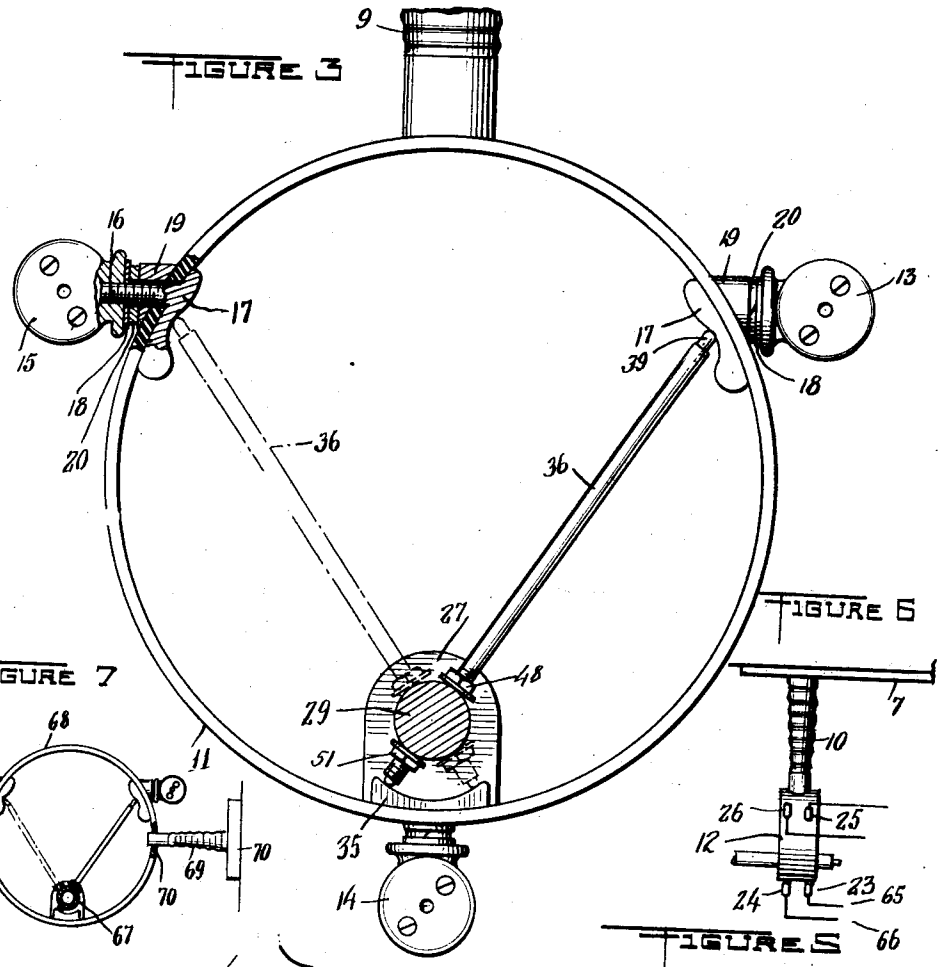


FIGURE 7

FIGURE 6

FIGURE 4

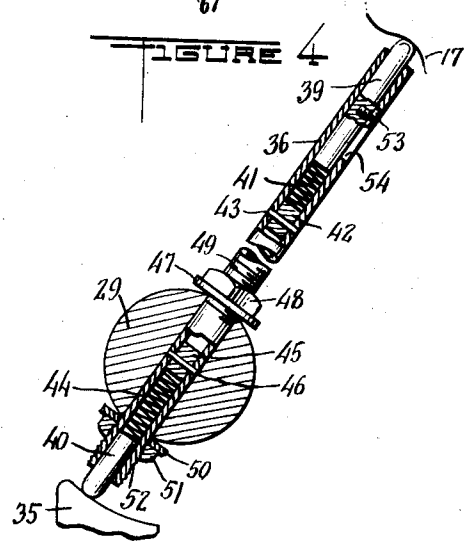
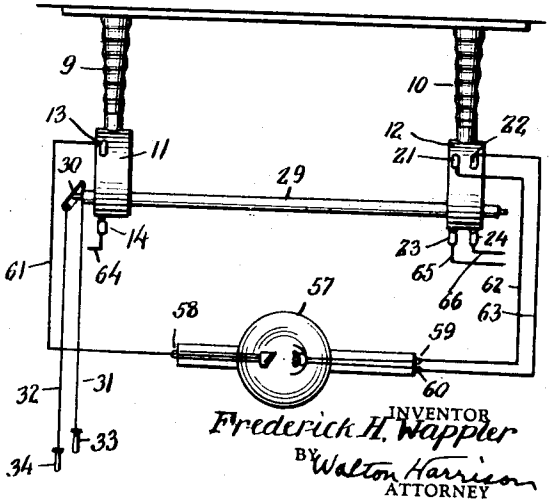


FIGURE 5



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HIGH TENSION SWITCH

Application filed June 11, 1928. Serial No. 284,443.

My invention relates to high tension switches admitting of general use, yet peculiarly adapted for work with X-ray tubes, and especially X-ray tubes of the Coolidge type, in which there are three terminals.

More particularly stated I seek to make my improved high tension switch of relatively simple construction, so as to be compact and have great mechanical strength and yet to possess a maximum dielectric strength.

Reference is made to the accompanying drawings, forming a part of this specification and in which like reference characters indicate like parts throughout the several figures.

Figure 1 is a side view, partly an elevation and partly of a section, of my improved high tension switch.

Figure 2 is an end elevation of the same.

Figure 3 is a fragmentary section, substantially on the line 3—3 of Figure 1, looking in the direction indicated by the arrows.

Figure 4 is a fragmentary section, through one of the movable switch arms.

Figure 5 is a front elevation of the high tension switch.

Figure 6 is a fragmentary side elevation of a portion of the mechanism shown in Figure 5, but as it might be seen from the far side thereof.

Figure 7 is a fragmentary side elevation of another form of my invention.

Engaging the underside of a ceiling 6 is a board 7, secured in position by bolts 8 or similar fastenings.

Carried by the board 7, which is made of dry wood or other appropriate insulating material, are a pair of high tension insulators 9 and 10. These insulators are made of conventional insulating material, such as bakelite, rubber composition, lava, earthenware, porcelain or glass.

Mounted upon the lower ends of these high tension insulators and carried thereby are two ring insulators 11, 12, each of annular form. They are simply large rings of insulating material, and may easily be made by cutting off portions of a large pipe or cylinder of insulating material.

The ring insulator 11 carries three metallic clips 13, 14, 15, alike in construction, and spaced equidistant as shown in Figure 2. Each of these clips is essentially a binding post, suitable for use with high tension currents.

The body portion of each clip is engaged by a screw 16, which extends through a hole in the ring insulator 11, and carries a contact shoe 17. Encircling the screw 16 are a pair of metallic washers 18, 19, and a metallic washer 20 of the form indicated.

The ring insulator 12 carries six clips 21, 22, 23, 24, 25 and 26, each of the same construction as the clip 15.

The clips carried by the ring insulator are arranged in pairs, each pair being substantially equidistant relatively to the other pairs, as may be understood by reference to Figures 5 and 6.

The ring insulator 11 carries a bearing 27 of insulating material. This bearing is mounted rigidly upon the ring insulator, and extends radially inward from the bottom portion thereof, as indicated in Figures 1 and 2. The ring insulator 12 is similarly provided with a bearing 28, mating the bearing 27.

A rocking shaft 29, which is a solid cylindrical rod of insulating material, extends through the two bearings 27 and 28, and thus through the lower portions of the two ring insulators 11, 12.

The rocking shaft 29 is provided with a neck 29*a*, also of insulating material, and mounted upon this neck is a cross bar 11 of insulating material.

Connected with the ends of the cross bar 30 are pull cords 31, 32 provided with handles 33, 34.

The operator by grapsing the handles 33 and 34 and pulling alternately thereupon, can rock the shaft 29 to a limited extent in two directions.

Located within and carried by the insulator ring 11 is a contact shoe 35. Located adjacent this contact shoe and carried by the rocking shaft 29 is a switch arm 36, made of metal and having a tubular form, as indicated in Figure 4. Two other switch

arms 37 and 38 are located within the ring insulator 12, as shown in Figure 1.

The switch arm 36 extends diametrically through a hole in the rocking shaft 29. Fitted slidably into the end of the tubular shaft 36 are contact bolts 39, 40. Engaging the sliding bolt 39 is a spiral compression spring 41, which abuts against a plug 42 held in position by a pin 43. Similarly a spring 44 engages the adjacent end of the contact bolt 40, and abuts against a plug 45, held in position by a pin 46.

A washer 47, engaged by a nut 48, presses against the adjacent portion of the rocking shaft 29. The nut 48 is threaded internally and fitted upon a threaded surface 49 of the switch arm. A washer 50 is engaged by a nut 51, the latter being threaded internally and fitted upon a threaded surface 52 of the switch arm.

By turning the nuts 48 and 51 the switch arm 36 may be adjusted relatively to the rocking shaft 29, and may be tightened in position relatively thereto.

The contact bolt 39 carries a guide screw 53, which extends radially outward through a slot 54 in the switch arm 36. The guide screw 53 prevents the contact bolt 39 from dropping out of place as the switch arm is moved, as hereinafter described.

Since the switch arms 37, 38 each have the same form as the switch arm 36, they need not be further described. Adjacent these switch arms 37 and 38, and carried by the ring insulator 12, are two contact shoes 55 and 56, shown more particularly in Figure 1, and in structure and action like the contact shoe 35 shown in the left hand portion of said figure and above described.

An X-ray tube is shown at 57 in Figure 5. This X-ray tube is provided at its anode end with a single terminal 58, and at its cathode end with two terminals 59, 60, these two terminals being necessary in order to supply heating current to the cathode end of the tube, in the manner well understood in this art. A conductor 61 extends from the terminal 58 to the clip 13. A pair of conductors 62, 63, extend from the terminals 59, 60 to the clips 21, 22.

For the purpose of supplying currents to the high tension switch, high tension leads 64, 65 and 66 are connected respectively with the clips 14, 23 and 24.

The X-ray tube 57 may may be located a short distance away from the high tension switch, but is preferably placed a few feet below it, and supported on a table, not shown, in the manner well known in this art.

My high tension switch can be used in more than one way.

As illustrated in Figure 5 and as above described, it may be used for energizing only a single X-ray tube 57. But if desired, another X-ray tube may be connected up with the clips 15, 25 and 26, so that the switch can be used to energize either of the X-ray tubes, or to energize them alternately, as required.

My improved high tension switch has a number of distinct advantages, among them being simplicity of construction, relatively high mechanical strength, and very high dielectric strength.

It will be noted that the rocking shaft 29 may be, and in this particular instance is, of rather large size and of massive construction. It may be made from a solid integral bar of hard rubber composition or the like. Being made entirely of insulating material, it carries no lengthy metallic parts such as might serve in the event of a breakdown or otherwise, as a means for short circuiting the high tension mechanism.

The rocking shaft 29, properly made of good material, serves every purpose of a strong mechanical brace extending from one of the ring insulators to the other.

Each ring insulator, being made entirely of insulating material, reduces to a minimum the chances for a breakdown or for an accidental short circuit. Last but not least, each ring insulator is carried bodily upon the lower end of one of the high tension insulators 9 and 10, these last mentioned insulators each having the form or a post extending downwardly for some little distance, and without the use of any metallic rod, tube or other member of conducting material extending through or disposed lengthwise of the insulator.

It will be noted that as the conductors whereby the high tension switch is energized do not extend through or alongside of the high tension insulators 9, but are simply tapped on to the clips 14, 23 and 24, as above described there is no high tension current brought into close proximity to the upper portion of the high tension switch. No part of the switch need be energized at any higher elevation than the tops of the ring insulators 11 and 12.

In this high tension switch any and all parts of conducting material which are at all likely to be energized by high tension currents, are grouped closely together and thus localized in the sense that they are limited as far as practicable to the two ring insulators, and are further localized in the sense that no electrical communication can easily be established from one of these ring insulators to the other, by means of a breakdown or an accidental short circuit.

In Figure 7 I show another form of my invention.

Here I use a tubular shaft 67 or insulating material, instead of the solid cylindrical shaft 29 above described. I also use a pair of ring insulators 68, 68, exactly like the

ring insulators 11, 12, but mounted somewhat differently. That is, each ring insulator 11, 12 is mounted upon a high tension insulator 69, carried by a base 70, and extending horizontally instead of downwardly.

The ring insulator is provided with additional holes 70, 71, to facilitate its mounting in this manner.

Except as otherwise indicated, the construction and action of the ring insulator shown in Figure 7 is like that of the other ring insulator above described.

I do not limit myself to the precise mechanism shown, as variations may be made therein without departing from my invention, the scope of which is commensurate with my claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is as follows:

1. A high tension switch comprising a pair of high tension insulators, means for supporting said high tension insulators upon the under side of a ceiling or the like, a pair of ring insulators mounted upon said first mentioned insulators and hanging therebelow, said ring insulators being parallel with each other, a rocking shaft of insulating material extending through said ring insulators, means for actuating said rocking shaft, and contact mechanisms carried by said ring insulators for opening and closing high tension electric circuits, said contact mechanisms being connected with said rocking shaft and controllable by movements thereof.

2. In a high tension switch the combination of a pair of ring insulators, a pair of bearings each carried by one of said ring insulators, a rocking shaft mounted in said bearings and supported thereby, said rocking shaft being made of insulating material and extending from the bearing in one of said ring insulators to the bearing in the other of said ring insulators, thus serving as a brace for said ring insulators, and contact mechanism carried by said ring insulators and connected with said rocking shaft, said contact mechanism being controllable by movements of said rocking shaft.

3. In a high tension switch the combination of a pair of insulators each having the form of a post and extending downwardly from a support, a pair of ring insulators carried by said first mentioned insulators and extending downwardly therefrom, said ring insulators being spaced apart and substantially parallel with each other, a rocking shaft extending through said ring insulators and journaled relatively thereto so as to brace said ring insulators relatively to each other, said rocking shaft being made of insulating material, a contact mechanism carried by one of said ring insulators and connected with said rocking shaft for opening and closing a high tension circuit, and another contact mechanism located in the other of said rings and connected with said high tension shaft for opening and closing another high tension shaft.

4. In a high tension switch the combination of a ring of insulating material, a rocking shaft of insulating material extending through said ring and journaled relatively thereto, said shaft being eccentric to the axis of said ring, a cross bar connected with said shaft, means for enabling the operator to actuate said cross bar in order to rock said shaft, a switch arm extending diametrically through said shaft and located within said ring, contact shoes carried by said ring and located internally thereof and partially within the path of travel of said contact arm in order to be engaged and disengaged thereby as such rocking shaft is actuated, and electrical connections for said contact shoes.

5. In a high tension switch the combination of a ring insulator, a rocking shaft extending through said ring insulator and journaled relatively thereto, said rocking shaft being located eccentrically within said ring insulator, a cross bar connected rigidly with said rocking shaft, pull cords connected with said cross bar for enabling the operator to actuate said rock shaft, a contact arm carried by said rocking shaft and extending radially therefrom so as to swing as said rocking shaft is actuated, a friction contact carried by said ring insulator and connected with said rocking arm, and a pair of contact members carried by said ring insulator and each disposed partially within the path of travel of said rocking arm as it swings upon said rocking shaft, said last mentioned contact members and said friction contact being spaced substantially equidistant relatively to said ring insulator and means for actuating said rocking shaft from a distance.

Signed at Long Island City, in the county of Queens and State of New York, this 21st day of May, 1928.

FREDERICK H. WAPPLER.