March 25, 1958 H. L. RUMSEY 2,828,378

ELECTRIC SWITCH

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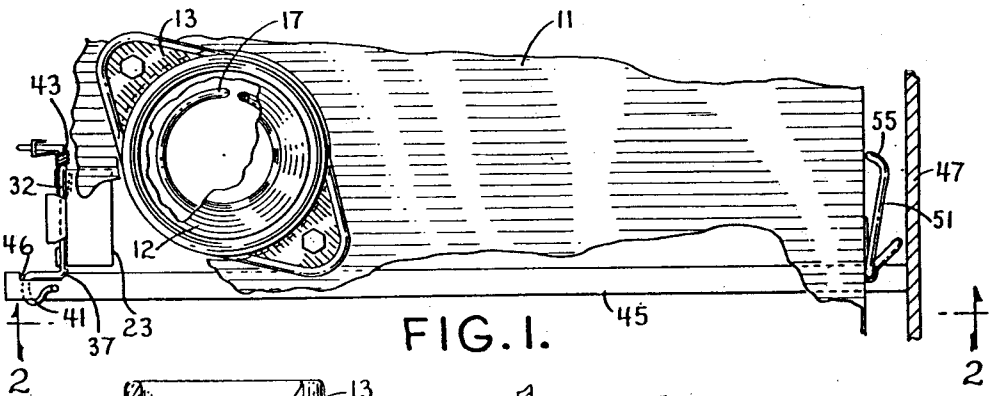


FIG. 1.

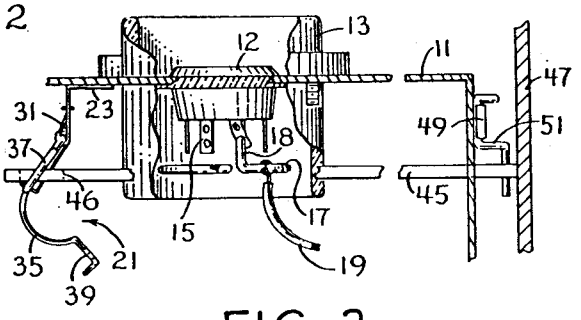


FIG. 2.

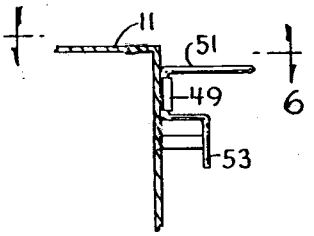


FIG. 5.

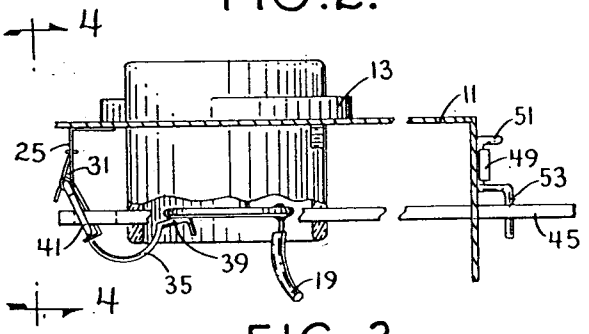


FIG. 3.

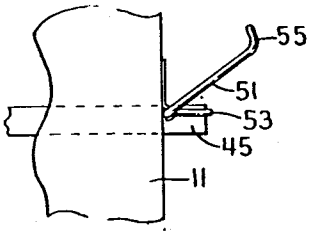


FIG. 6.

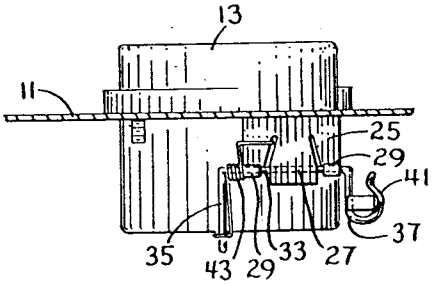


FIG. 4.

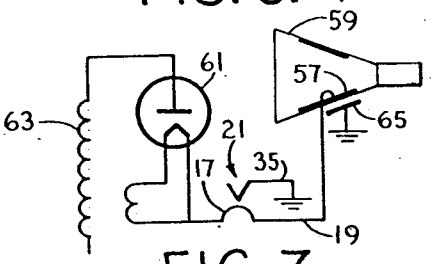


FIG. 7.

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ELECTRIC SWITCH

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Application April 23, 1956, Serial No. 579,864

6 Claims. (Cl. 200—61.79)

This invention relates to an electrical apparatus and more particularly to a switch mechanism adapted for use in a high voltage circuit of a television receiver.

The high voltage applied to the second anode of a picture tube employed in a television receiver has a magnitude generally ranging from 15,000 to 30,000 volts. This voltage is supplied from the rectified output of the high voltage transformer receiver circuit and is developed across a large capacitance. One plate of the capacitance is generally formed by the picture tube anode internal conductive coating, while the other plate is conventionally formed of an external conductive coating which is electrically connected to ground potential. Since the high voltage existing across these plates does not readily reduce to a nominal value upon removal of the voltage thereto, some means are usually provided to discharge the condenser in the event that the back panel of the television cabinet is removed. Generally, to attain this result, an interlock switch is mounted on the receiver chassis to automatically function and short out the condenser upon removal of the back panel.

Several types of interlock switch structures have been fabricated for this purpose with varying degrees of success. However, these switches are generally expensive to construct and they are not provided with means for enabling the maintenance of the switch in a non-circuit contact position when it is desired to do so. For instance, it is necessary that the switch be open during the period when internal receiver circuit testing and alignment operations are being performed by a serviceman.

Accordingly, it is an object of the invention to reduce the aforementioned disadvantages and provide an improved switch which is cheaper to construct, and which actuates in a manner to provide foolproof operation.

A further object is the provision of a switch which utilizes part of the high voltage circuit of a television chassis as a portion of the switch structure.

A still further object is the provision of a switch which is automatically operable upon removal of a closure panel or shielding member with manually operable means for holding the switch in a non-circuit engagement position after the closure member has been removed.

The foregoing objects are achieved in one aspect of the invention by the provision of a switch formed with an actuating arm which is operable upon engagement with the back cabinet panel of a television receiver to normally hold the switch in a non-circuit contact position. Additional means are provided to hold the switch in a non-circuit contact position, if desired, after the panel is removed. A spring is formed as part of the switch to normally impart movement for affecting circuit contact when the back panel or holding means are disengaged.

For a better understanding of the invention, reference is made to the following description taken in conjunction with the accompanying drawings in which:

Fig. 1 is a plan view of a portion of a television chassis incorporating one embodiment of the invention;

Fig. 2 is a view taken along line 2—2 of Fig. 1 showing the switch in a non-contact position;

Fig. 3 is a view similar to that shown in Fig. 2 illustrating the switch in a closed position;

Fig. 4 is a view taken along line 4—4 of Fig. 3;

Fig. 5 is a portion of the view shown in Fig. 3 illustrating some of the operative elements of the switch;

Fig. 6 is a top view of the drawing shown in Fig. 5; and

Fig. 7 is a portion of an electrical circuit which is adapted to be used with one embodiment of the invention.

Referring to the drawings, a chassis 11 of an electrical apparatus such as a television receiver is shown supporting a tube base 12 and a shield 13. This base serves to provide the mounting support and the electrical connections for the high voltage rectifier tube employed in the receiver. It is necessary to surround the electrical terminal tabs 15 mounted on base 12 with a corona ring 17 in order to reduce corona discharge from some of these tabs. The end portion 18 of ring 17 is generally connected to one of the tabs 15 while a lead wire 19 interconnects the ring and the second anode of the picture tube in a manner to be hereafter described.

A switch, which is designated generally by a numeral 21, is shown mounted upon chassis 11. This switch is provided with an L-shaped bracket 23, a portion of which is attached to chassis 11 adjacent shield 13. One leg of bracket 23 is illustrated as having a wall 25 slotted to form a central portion 27 and oppositely disposed end portions 29. The edge of central portion 27 is turned outwardly and the edges of end portions 29 are curled to provide a straddle type channel 31 across the bracket 25. Rotatably mounted on the bracket is a wire member 32 having a central section 33 disposed intermediate a circuit contact section 35 and a lever arm 37. This wire member may be formed from one piece of material or it may comprise several section. Although a material such as piano wire is preferred, the member may appropriately be made of other types of conductive materials having non-circular cross sections.

The wire member is mounted upon bracket 25 by means of the rotatable engagement between central section 33 and bracket elements 27 and 29 as shown in Figs. 3 and 4. Circuit contact section 35 is formed with an arc terminating in a straight leg portion 39 adapted to contact corona ring 17. Lever arm 37 projects from central section 33 at a substantially right angle and is provided with a hook 41.

A spring 43 is wound about the wire central section 33 and has portions bent to engage contact section 35 on one end and bracket portion 29 at the other end. Referring to Fig. 4, it can be seen that spring 43 biases contact section 35 to cause movement of the section toward engagement with corona ring 17 when it is free to move.

An actuating member 45 is formed at one end with a slot 46 shaped to cooperate with hook 41. The opposite end of the actuating member extends beyond chassis 11 and is slidably supported in an aperture provided in the chassis. As shown in Figs. 1 and 2, the back panel 47 of a television cabinet presses against the end of actuating member 45 during normal conditions of receiver operation. This pressure causes slot 46 to maintain hook 41 and lever arm 37 in a forward position, thereby keeping the switch in a non-contact or open position. Although actuating member 45 is shown as a separate elongated strip element, it may be formed as an integral part of lever arm 35.

Rotatably mounted on the back vertical section of the chassis 11 by means of clip 49 is an actuating member holding device 51. This device is provided at one end with an actuating member contacting section 53 and at the opposite end in a curved portion 55. Figs. 5 and 6 show how section 53 may be rotated into engagement with

the edge of member **45** to provide the means for holding the switch in a non-contact position with panel **47** removed.

Referring particularly to Fig. 7, a high voltage section of a television receiver similar to that described in co-pending application Serial No. 380,029, filed September 14, 1953, now United States Patent 2,761,090, issued August 28, 1956, and assigned to the same assignee as this application, is shown to illustrate the function of switch **21**. The anode **57** of a picture tube **59** is coupled to a filament lead of the high voltage rectifier tube **61** through corona ring **17**. Coil **63** is the secondary winding of a conventional high voltage transformer used in the receiver. The voltage provided by the circuit is developed across the capacitor formed by anode **57** and the ground potential plate **65**. Circuit contact section **35** of switch **21** is illustrated as being spaced from ring **17**, which is the normal condition during receiver operation. This part of the switch is connected to chassis ground primarily through contact section **35**, bracket **25** and spring **43**.

While the receiver is operating, a high voltage ranging from 15,000 to 30,000 volts is developed across the capacitance. To insure the dissipation of this charge after the circuit is de-energized to prevent injury to persons such as servicemen when the back cabinet panel **47** is removed, switch **21** is automatically actuated under the influence of spring **43** to cause contact section **35** to engage ring **17**. This action discharges the capacitance by connecting both condenser plates to chassis ground.

Figs. 1 through 6 inclusive show the mechanical operation of the switch. During normal receiver operation, back panel **47** is mounted on the receiver cabinet. In this position, the panel is holding the end of actuating arm **45** forward, thereby causing lever arm **37** to maintain circuit contact section **35** in the displaced position shown in Figs. 1 and 2. When back panel **47** is removed from the receiver cabinet, spring **43** forces section **35** and its associated leg **39** into contact with corona ring **17** as illustrated in Figs. 3 and 4. This action discharges the condenser as described above. With back panel **47** removed, the receiver may be put in operable condition for the performance of testing operations by pressing the end of actuating member **45** inwardly and rotating holding device **51** so that contact section **53** engages the end of the actuating member. This action affords the means for holding the switch in a non-circuit contact position as shown in Figs. 5 and 6. The replacement of panel **47** after the servicing operation has been completed causes the internal surface of the panel to trip and rotate holding device **51** inwardly by means of its contact with curved portion **55**. This action thereby replaces all of the switch operative elements to their normal positions as shown in Fig. 1.

Although one embodiment of the invention has been shown and described, it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the scope of the invention as defined by the appended claims.

What is claimed is:

1. A switch adapted for operation in a high voltage circuit of an electrical apparatus chassis which is normally shielded by a panel member to prevent access to high voltages comprising a wire member having a circuit contact section and a lever arm, an actuating member extending from said lever arm shaped to normally engage said panel and prevent circuit contact, and a spring formed to operate on said contact section to provide movement of said contact section to the circuit contact position upon removal of said panel.

2. A switch adapted for operation in a high voltage circuit of an electrical apparatus chassis which is normally shielded by a panel member to prevent access to high voltages comprising a bracket attached to said chassis, a wire member having a central section rotatably mounted upon said bracket, a circuit contact section attached to one side of said central section, a lever arm attached to the opposite side of said central section, an actuating member extending from said lever arm shaped to normally engage said panel and prevent circuit contact, and a spring formed to operate on said contact section to provide movement of said contact section to the circuit contact position upon removal of said panel.

3. A switch adapted for operation in a high voltage circuit of an electrical apparatus chassis which is normally shielded by a panel member to prevent access to high voltages comprising a bracket attached to said chassis, a wire member having a circuit contact section and a lever arm, an actuating member extending from said lever arm shaped to normally engage said panel and prevent circuit contact, and a spring formed to engage said bracket at one end and said contact section at the other end to provide movement of said contact section to the circuit contact position upon removal of said panel.

4. A switch adapted for operation in a high voltage circuit of an electrical apparatus chassis which is normally shielded by a panel member to prevent access to high voltages comprising a wire member having a circuit contact section and a lever arm, an actuating member extending from said lever arm shaped to normally engage said panel and prevent circuit contact, a spring formed to operate on said contact section to provide movement of said contact section to the circuit contact position upon removal of said panel, and a device rotatably mounted on said chassis adjacent said actuating member formed for manual engagement with said member to prevent circuit contact after removal of said panel.

5. A switch adapted for operation in a high voltage circuit of an electrical apparatus chassis which is normally shielded by a panel member to prevent access to high voltages comprising a bracket attached to said chassis, a wire member having a central section rotatably mounted upon said bracket, a circuit contact section attached to one side of said central section, a lever arm attached to the opposite side of said central section, an actuating member extending from said lever arm shaped to normally engage said panel and prevent circuit contact, a spring formed to operate on said contact section to provide movement of said contact section to the circuit contact position upon removal of said panel, and a device rotatably mounted on said chassis adjacent said actuating member formed for manual engagement with said member to prevent circuit contact after removal of said panel.

6. A switch adapted for operation in a high voltage circuit of an electrical apparatus chassis which is normally shielded by a panel member to prevent access to high voltages comprising a bracket attached to said chassis, a wire member having a central section rotatably mounted upon said bracket, a circuit contact section attached to one side of said central section, a lever arm attached to the opposite side of said central section, an actuating member extending from said lever arm shaped to normally engage said panel and prevent circuit contact, a spring formed to engage said bracket at one end and said contact section at the other end to provide movement of said contact section to the circuit contact position upon removal of said panel, and a device rotatably mounted on said chassis adjacent said actuating member formed for manual engagement with said member to prevent circuit contact after removal of said panel, said device having a portion adapted to contact said panel and automatically rotate said device away from engagement with said member upon replacement of the panel.

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