

Oct. 18, 1960

C. R. BOYLAN

2,957,110

TELEVISION PROTECTIVE DEVICE

Filed March 12, 1957

FIG. 1.

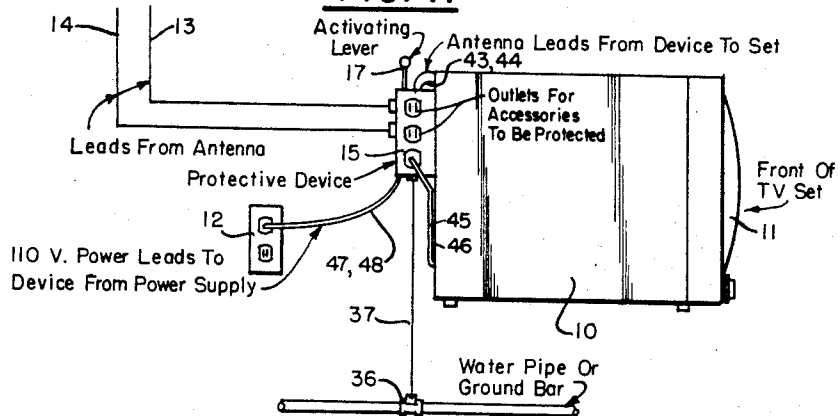


FIG. 2.

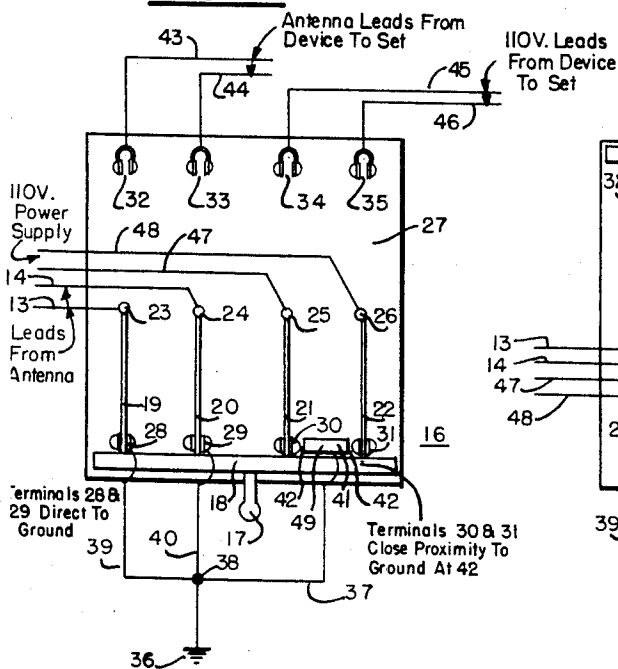


FIG. 3.

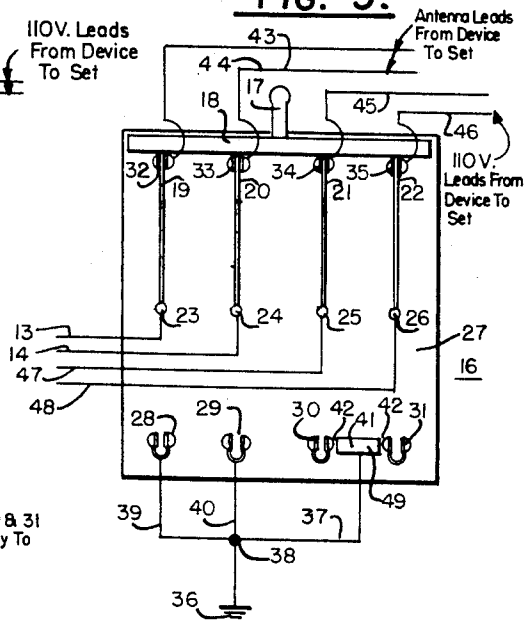
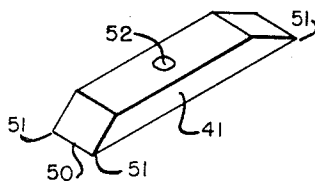


FIG. 4.



INVENTOR

Chester R. Boylan

BY

Thomas G. Hall

ATTORNEYS

1

2,957,110

TELEVISION PROTECTIVE DEVICE

Chester R. Boylan, 717 Woodlawn Road,
Steubenville, Ohio

Filed Mar. 12, 1957, Ser. No. 645,465

1 Claim. (Cl. 317—61)

The present invention concerns protective devices for television sets.

It is an object of the invention to provide a television set with means to isolate the mechanism of the set, including accessories, from the extended masses of electrical conductor ordinarily connected thereto even when the set itself is not in operation and to place the set in operation merely by closing a switch.

It is an object of the invention to protect the mechanism and wiring of TV sets, and such accessories as may be properly connected through the device, from damage resulting from electrical surges or discharges that are not usual and necessary to the operation of the TV set and such accessories. This protection is not afforded when the set is in operation or when the device is switched into position to permit operation of the set or accessories.

It is an object of the invention to provide a television set with means which will add to general fire protection and personal protection during lightning storms in the immediate vicinity of the TV set by providing a direct ground with only a small arc contemplated between ground and electric service wires within the device itself. The disconnecting and dropping of antenna wires in close proximity to electric service wires or extension cords sometimes results in arcing which might cause fire, or shock to a person happening to be in position to receive it.

It is an object of the invention to provide protection to a television set at all times when the set is turned off.

It is an object of the invention to provide a device for protection of a television set at all times when the device is used as a shut-off switch.

It is an object of the invention to provide a disconnecting means and method for television sets which is quick, easy, and safe, preventing wear and tear on lead wires and connecting posts which can and has resulted in impaired reception of signals. Use of this device provides protection not supplied by any other device which allows uninterrupted extended conductors to extend into the TV set chassis. This device contributes to the personal safety of TV set operators by enabling them to disconnect all extended conductors and ground the antenna without prolonged and close exposure to these conductors at times when it is evident that ground and cloud charges are active, as during a lightning storm. Some people have refrained from making these disconnections at times, following the thought that damage to the set is less important than risk of personal injury. When used as a shut-off switch for the set, the invention provides in one simple operation, protection now only obtained by several operations performed by the set owner often at considerable inconvenience. Because of this inconvenience set owners who would ordinarily make disconnections some-

2

times neglect to do so at the wrong time, or are not present at the location of the set at the proper time. Some persons who would desire this protection are just not mechanically equipped to disconnect and reconnect wiring to their sets. Use of this device eliminates need for tools or mechanical ability to enjoy its benefits.

It is recognized that a cloud can become highly electrically charged, and that in this case the earth becomes highly charged with electricity of opposite polarity in an area under such a cloud. When the difference in potential becomes sufficient between the cloud and earth charges to bridge the air gap between them, a spark, commonly called lightning, is formed. The effect at the earth end of this spark is not confined to the point at which the spark apparently touches the earth. Earth charges, rushing from distances that may be as much as several miles, follow lines of reduced resistance to meet the cloud charge. (See Farmer's Bulletin No. 1512 of U.S. Dep't of Agriculture—Handbook No. 46 of U.S. Dep't of Commerce—National Fire Protection Code for Lightning Protection No. N.F.P.A. 70—"Nature's Artillery" published by National Board of Fire Underwriters.) When such lines of relatively low resistance are reduced in cross section or less conductive material is substituted, resistance increases at that area, and damage can result from passage of the electrical current. Arcs at such points to more attractive conductors can further contribute to damage. This same principle applies to the grounding of induced or bound charges that accumulate on extended metallic masses such as power lines, and distribution of cloud charges reaching the earth through the lightning spark.

Continuous reports of damage to TV sets by such electrical surges and discharges, particularly during lightning storms have brought out discussions of details of such losses. In most cases the sets were equipped with usual antenna lightning arrestors and of course whatever protection the power companies have found economically sound to provide on their lines. A great many people follow the practice of disconnecting both antenna and electric lead wires on approach of storm.

A great amount of satisfaction will accrue to persons who are regularly being made aware of this hazard to their TV sets by these reports of losses, in knowing that their set is protected by using the protective device as a shut-off switch.

This is done not by just breaking a circuit that leaves uninterrupted conductors extending into and through the mechanism of the set or accessories, but by actually disconnecting all extended metallic masses from the mechanisms, and actually grounding the ones that can be grounded when the set is not in use. Masses that cannot be directly grounded, such as power lines, are brought into close proximity to ground with sufficient separation from the ground not to cause any electrical disturbance when usual potentials are present. This allows the destructive charges to by-pass the mechanisms to be protected, thereby preventing arcs and damage within the mechanism due to restricted areas of conductivity therein. To be best effective this device should preferably not be located within the metal chassis housing mechanisms to be protected.

The device comprises a four gang switch—two of which are double pole double throw, and two of which are double pole single throw, so constructed that in the open position the conducting poles are in close proximity to ground, and relatively distant from leads into the mechanism of set or accessories.

As an item to be produced for sale, it should be housed in a neat metal or plastic case with provision for mounting on a flat vertical surface such as the rear of the set case, and with the controlling button or lever at a position easily and conveniently reached by the user. Instructions, ground wire and clamp could be included in a kit.

The invention may be incorporated in a television set as part of the whole or supplied as a separate unit to be attached to existing unprotected sets.

The accompanying drawings are intended to be illustrative and are not to be taken as limiting. Like numerals refer to like parts throughout.

Figure 1 is an elevation of the invention forming part of a television set.

Figure 2 is a schematic circuit diagram of one form of gang switch and circuit connections forming part of the invention shown in position, with the set inoperative and protected from line surges.

Figure 3 is a schematic diagram of the circuit of Figure 2 with the gang switch shown in reversed position with the set operative.

Figure 4 is an illustration of one form that the grounding bar of Figures 2 and 3 may assume.

A normal television set 10 has a viewing screen 11 and is positioned near a suitable power outlet 12 and antenna leads 13, 14. A suitable receptacle 15 houses a switch 16 provided with a suitable projecting operating knob 17. Switch 16 is provided with a bar 18, having knob 17 mounted thereon, and four copper knife elements 19, 20, 21 and 22 pivoted at terminal members 23, 24, 25 and 26, respectively, mounted in a base block 27 of suitable insulating material. Switch 16 is provided with eight terminals 28-35 positioned in pairs to receive the knife elements in their two extreme positions as shown in Figures 2 and 3.

Terminals 28 and 29 are grounded at 36 by a suitable wire 37, having a junction 38 and leads 39 and 40 connected to the terminals. Terminals 30 and 31 are floating or unconnected, but are both in close proximity to a bar 41, which is grounded at 36 by wire 37 which is joined by wires 39 and 40 at junction 38. Bar 41 is of suitable conducting material, which may be copper, and is spaced from terminals 30 and 31 by narrow spark-over gaps 42. If desired, projecting points may be used to promote discharge. Terminals 32 and 33 are connected to antenna leads 43 and 44. Terminals 34 and 35 are connected by wires 45 and 46 in the television set in the usual way for 110 volt 60 cycle power supply and additional accessories or appliances as desired.

Terminal pivot members 23 and 24 are connected to antenna leads 13 and 14. Terminal pivot members 25 and 26 are connected to power supply leads 47 and 48 arranged to be plugged in to power outlet 12. The assembly comprising switch 16 is preferably contained within a suitable receptacle as housing 15, but may of course be enclosed within the television cabinet proper with the knob 17 or an equivalent structure being connected to or itself comprising the sole on-off switch of the set, whether combined with the volume control or not. Underwriters' standards and requirements as well as general safety considerations, may determine positioning all connections to the control.

With the television provided with the invention either as an integral part of its circuit or as an added attachment, it will be seen that with the switch in the position shown in Figure 2, the set is inoperative and fully protected. Both television circuit antenna signal conducting wires 43, 44, together with television circuit power supply conducting wires 45, 46 are entirely disconnected, leaving the set and any auxiliaries or accessories completely isolated from any lead-in antenna wire or power main supply. The antenna leads 13 and 14 are grounded

at 36 through knife elements 19 and 20 in the position shown, contacting terminals 28 and 29. Any surge on the television antenna due to lightning, a falling power line, or other cause, is directly grounded at 36 and does not pass through the television set, the reactance of any possible condenser path being far greater than the impedance offered by the circuit portion comprising terminals 23, 24; knife elements 19, 20, wires 39, 40, junction 38 and ground 36.

In somewhat the same manner live power supply leads 47 and 48 may be effectively grounded with respect to surges large enough to spark across one or both of the gaps 42, which may be made adjustable by providing a selection of bars 41 of differing lengths or mounting the bar 41 so that it may be pivoted about its axis by means of a suitable wing or ordinary nut at 49. Breakdown areas may thus be supplied by the edges at the squared ends of the bar normal to base block 27. Where the ends of bar 41 are beveled to a line parallel to block 27, rotation of bar 41 can provide substantially point discharge at substantially lower voltages. Although the ends of bar 41 may be rounded the beveled form providing adjustment of this gap and point discharge is preferred.

One such beveled form of bar 41 is shown in Figure 4 with sharp edges 50 with point 51 and central hole 52 for pivotal mounting. Lock nuts may of course be provided to fix the desired angular position of bar 41. Again bar 41 is preferably constructed of such length and width that it can turn without actually contacting the terminals 30 and 31, to prevent accidental grounding of a live supply line.

When switch 16 is in the position shown in Figure 3 the set is operating and knife elements 19-22 have been rotated into contact with terminals 32-35. Automatic operation of switch 16 from operative to inoperative grounded position based upon a relay operated solenoid operable at a selected elevated potential level which usually occurs many seconds or even a minute or more before a potentially destructive surge, falls within the purview of this invention. Such a relay would respond to a potential-sensing device of known construction. The invention can be used in both television sending and receiving sets.

It will be understood that the switch 16 may be operated or activated manually by lever, button, knob, remote control, by extended lever or wire, electrically, by motor, solenoid and the like.

While there has been described above what are presently believed to be the preferred forms of the invention, variations thereof will be obvious to those skilled in the art and all such changes and variations which fall within the spirit of the invention are intended to be covered by the generic terms in the appended claim.

I claim:

In combination with a television receiver requiring when in normal operation both a connection to an external antenna and to a power line and including, switching circuit means being selectively operable to either of two distinctive conditions, antenna terminal means associated with said receiver, power input terminal means associated with said receiver, said switching means in a first of its said two distinctive conditions being effective to connect both said external antenna to said antenna terminal means and said power line to said power input terminal means, grounding circuit means, said switching means when operated to the second of said distinctive conditions being effective to connect substantially simultaneously said external antenna to said grounding circuit means and said power line to a close physical spacing from said grounding means to thereby provide a spark gap grounding of said power line, said grounding circuit means including further means to permit variable adjustment of said spacing, said further means compris-

ing a fixed terminal and an arm having a bevelled end and also including means for rotating said arm to vary thereby the spacing between said fixed terminal and said beveled end, said fixed terminal and said arm being connected in series between said power line and said grounding circuit means when said switching circuit means is in said second condition.

5

References Cited in the file of this patent**UNITED STATES PATENTS**

637,794	Hughes -----	Nov. 28, 1899
946,418	Wood -----	Jan. 11, 1910
1,296,362	Bryant -----	Mar. 4, 1919
2,237,426	Grassnick -----	Apr. 8, 1941