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TOUCH CONTROL CIRCUIT

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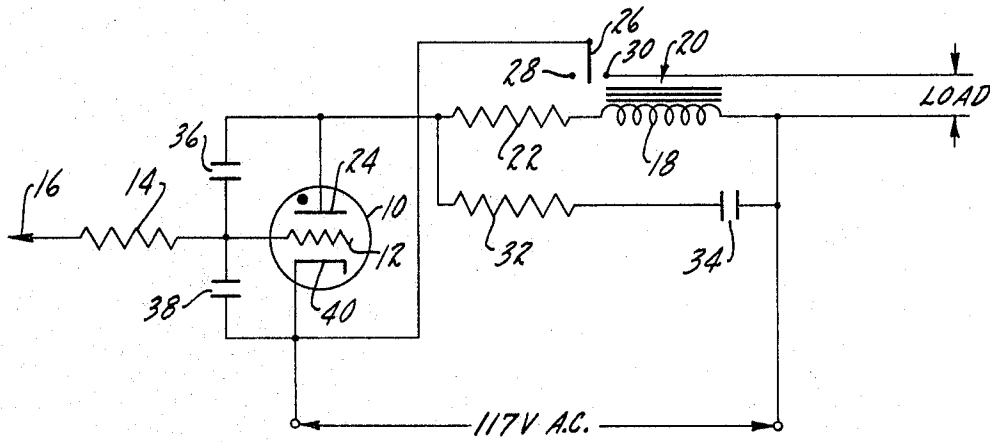


fig. 1.

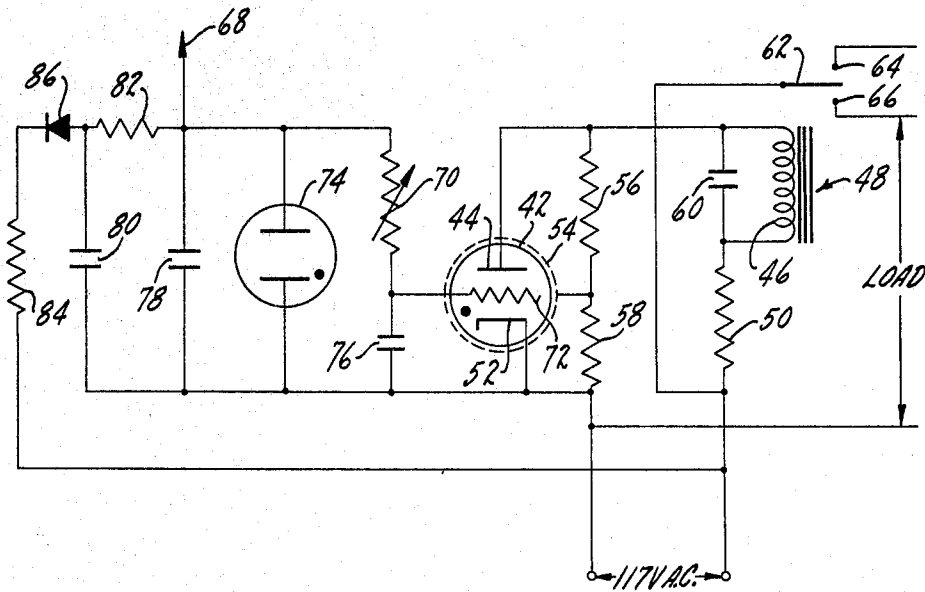


fig. 2.

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TOUCH CONTROL CIRCUIT

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This invention relates to a touch control circuit for connecting a load to a source of power.

A primary purpose of the invention is a touch control circuit utilizing a relay for connecting a load to a source of power, and a gas tube for operating the relay.

Another purpose is a touch control circuit of the type described in which a latching relay is in series circuit with a normally non-conducting gas tube and a source of voltage, human contact with the touch surface being effective to cause the tube to conduct and the source of voltage to energize the relay coil.

Another purpose is a touch control circuit of the type described utilizing a single touch surface.

Another purpose is a touch control circuit including means for preventing relay chatter.

Another purpose is a touch control circuit of the type described including means for maintaining the normally non-conducting gas tube below its ionizing potential.

Another purpose is a touch control circuit of the type described utilizing a gas tube to control operation of the relay and including a stabilizing network for the tube.

Other purposes will appear in the ensuing specification, drawings and claims.

The invention is illustrated diagrammatically in the following drawings wherein:

FIGURE 1 is an electrical schematic of a touch control circuit, and

FIGURE 2 is an electrical schematic of a second touch control circuit of the type described.

The present invention relates to a touch control circuit of the type which may be used in a home to turn on an electric light. The invention should not be so limited as to the circuits have application in connecting any type of load to any source of power. Various types of electronic equipment can be connected to various sources of power, either A.C. or D.C., by utilizing the circuits shown herein.

In FIGURE 1, a gas tube 10, preferably of the cold cathode type, may have its grid 12 connected through a suitable high resistance 14, for example a megohm or the like, to a touch surface 16. The touch surface may take any physical form that is satisfactory for human contact, and in some applications may be remote from the circuit components. The size of the resistance 14 may vary considerably, as what is important is to protect the person contacting the surface 16 from any possible harm.

A relay coil 18 forming part of a latching relay indicated generally at 20 may be connected on one side to a power source, which as shown, may be a typical 117 A.C. source. The other side of the coil 18 may be connected through a resistor 22 to the anode 24 of the tube 10.

The latching relay 20 may include an armature 26 movable between contacts 28 and 30, with contact 30 being connected to the load. The invention should not be limited to any particular type of latching relay as what is important is to provide a relay that will move to one position when the coil is energized and will then move to the opposite position the next time the coil is energized. Relays of this type will stay in a particular position until the relay coil is again energized. The armature 26 will be held against either contact 28 or contact 30 by suitable electrical or mechanical arrangements not important to the invention.

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A resistance 32 and a capacitor 34 may be connected in parallel with the series combination of the relay coil 18 and resistance 22. Resistance 22 may be termed a current limiting resistance and capacitor 34 is effective to prevent chatter of the relay. The time constant for charging capacitor 34 is determined by resistor 22 and resistor 32. When a D.C. source is used, it would not be necessary to use resistor 32 and capacitor 34 to prevent chatter.

The circuit of FIGURE 1 is completed by a stabilizing network including a capacitor 36 connected between the grid 12 and the anode 24 and a second capacitor 38 connected between the grid 12 and the cathode 40 of the tube 10. The cathode 40 is connected to the power source. The stabilizing network is effective to prevent the tube from firing or ionizing due to some sporadic radiation in the surrounding area. The tube will only fire when an appropriate signal is applied to the grid.

In operation, tube 10 will normally be held below cut-off as no voltage is applied to the grid. Human contact with the touch surface 16 is effective through the resistance 14 to apply a small signal or voltage to the grid 12 with this signal or voltage being of sufficient magnitude to cause the tube to fire. When the tube fires, the power source will be applied through the tube and through resistor 22 to the relay coil 20 to energize the coil and cause the relay to operate. The armature 26 will move against either contact 28 or 30 and will be held in that position until the next time the coil is energized.

In FIGURE 2, a gas tube 42, again preferably of the cold cathode type, has an anode 44 connected to one side of a coil 46 forming part of a latching relay indicated generally at 48. The other side of the coil 46 may be connected through a current limiting resistor 50 to the power source, which again may be either A.C. or D.C., and of any suitable magnitude. The cathode 52 of the tube 42 may be connected to the other side of the power source. The tube 42 will normally be non-conducting and upon ionization it will provide a current path through the tube to the relay coil so that the power source will operate the relay.

The tube 44 may have a shield 54 which is connected at the middle of a resistance bridge formed by resistor 56 and resistor 58 with the combination of the resistors and the shield providing tube stabilization to prevent accidental firing.

A capacitor 60 may be connected in parallel with the coil 46 to again remove any chatter from the relay when an A.C. source is used. Resistor 50 will control the charging time of capacitor 60.

Relay 48, which again may be any suitable type of latching relay, as described, may include an armature 62 movable between contacts 64 and 66 with contact 64 being open and contact 66 being connected to the load.

A touch surface 68, which again may take any physical form that is satisfactory for human contact, and may, in some applications, be remote from the circuit components, is connected through a variable resistance 70, which may be of a sufficient value to protect the person contacting the surface 68, with grid 72 of the tube 42. A suitable gas diode 74 may be connected in parallel with the gas diode 74 and a second capacitor 80 may be connected through a resistor 82 with the capacitor 78. The charging circuit for the capacitor network shown may include a resistor 84 and a diode 86, with the combination of resistor 84, diode 86 and capacitor 80 being connected across the source voltage.

In operation, capacitor 80 will charge up to a value generally equal to the peak value of line voltage. After capacitor 80 has charged, capacitor 78 will then charge up to the same value. The top of capacitor 78 is con-

nected to the touch surface and the voltage on capacitor 78, when charged, is slightly below the firing voltage of gas diode 74. Capacitor 76 will also charge and its charged value will be equal to that of capacitors 78 and 80 and slightly below the ionizing voltage of the tube 42. In this way tube 42 will be held below cut-off by the charged potential of capacitor 76. Contact with touch surface 68 is effective to add a sufficient voltage to the charged voltage of capacitor 78 to cause gas diode 74 to ionize. When this diode ionizes it provides a discharge path for capacitor 78, capacitor 80 and for capacitor 76. All of these capacitors will discharge through the diode 74 and as capacitor 76 discharges through the diode a voltage will be developed on resistor 70 which is sufficient to cause ionization of tube 42. When tube 42 ionizes or conducts, as described above, it provides a current path through the relay coil to operate the relay. The armature 62 will move from one contact to the other.

The use, operation and function of the invention are as follows:

Both of the circuits shown are effective to connect a load to any type of electrical power source. The type of load may vary considerably. As shown herein, the invention is designed for use in turning on an electric light in the home. Obviously the invention could be used to turn on any appliance in the home or could be used to connect any type of electronic equipment to any type of load, either A.C. or D.C., and of any suitable magnitude.

In general, ionization of a gas tube is effective to place the source voltage across a latching relay coil so as to operate the relay. The gas tube operates as a switch and is normally held in a non-conducting condition. In the circuit of FIGURE 1, which has relatively few components, human contact with the touch surface 16 is effective to apply a sufficient voltage on the grid of the tube to cause it to ionize. In the circuit of FIGURE 2, human contact with the touch surface 68 is effective to cause a gas diode to ionize and thus permit a capacitor network to discharge through the diode with the capacitor discharge placing a sufficient voltage on the grid through resistor 70 to cause the gas tube 42 to ionize. Other circuits providing the same result may also be satisfactory.

Both circuits have been described in connection with a single touch surface. It should be realized that two touch surfaces may be used with the circuits shown with somewhat the same results. In the case of two touch surfaces human contact will be effective to bridge or short the surfaces together and to then apply a small portion of line or source voltage back to the grid of the tube to cause it to ionize.

In the circuit of FIGURE 1, a capacitor bridge is used for stabilization of the tube, whereas in FIGURE 2, a shield and a resistance bridge is used for stabilization. Either type of stabilization may be applied to either circuit as what is important is to provide some means for

preventing accidental firing of the tube and operation of the relay. Other forms of stabilization may also be used and the invention should not be limited to a capacitance or resistance bridge arrangement.

Although the invention has been described in connection with a latching relay, other relay arrangements may also be satisfactory. A holding relay of the type in which the relay contacts are held in one position or another by electrical means may be satisfactory. Also, other types of relay devices which are effective to connect the load to the source upon being activated may be used.

Whereas the preferred form of the invention has been shown and described herein, it should be realized that there are many modifications, substitutions and alterations thereto within the scope of the following claims.

What is claimed is:

1. In a touch control circuit for connecting a load to a source of power, a gas tube having an anode, grid and cathode, a touch surface and a high resistance connection between said touch surface and said grid, a relay having relay contacts connected to the load and power source, a relay coil in series circuit with said anode, cathode and power source, a capacitor network for holding said grid below ionizing potential including a capacitor connected between said grid and cathode, a gas diode connected in parallel with the series combination of said capacitor and the high resistance between said grid and touch surface, a second capacitor in parallel with said gas diode, and a charging circuit for said second capacitor to charge it to a potential less than the ionizing potential of said gas diode, with said touch surface being connected to said second capacitor and gas diode, human contact with said touch surface applying sufficient potential to ionize said gas diode with ionization of said gas diode permitting said capacitors to discharge through it, the discharge of said capacitors providing a signal on the grid to ionize the tube and cause said power source to energize said relay coil.

2. The circuit of claim 1 further characterized in that said charging circuit includes a resistance and diode connected to said power source.

References Cited by the Examiner

UNITED STATES PATENTS

2,848,659	8/1958	Cutler	317-149
3,080,509	3/1963	Rowe	317-149

OTHER REFERENCES

Sandretto, "Touch Plate Controller," Radio-Electronics, September 1957, pp. 61, 78.

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