July 31, 1934. T. D. GIBBS 1,968,198

MEANS FOR PROTECTING RADIO RECEIVING SETS

Filed Sept. 22, 1933

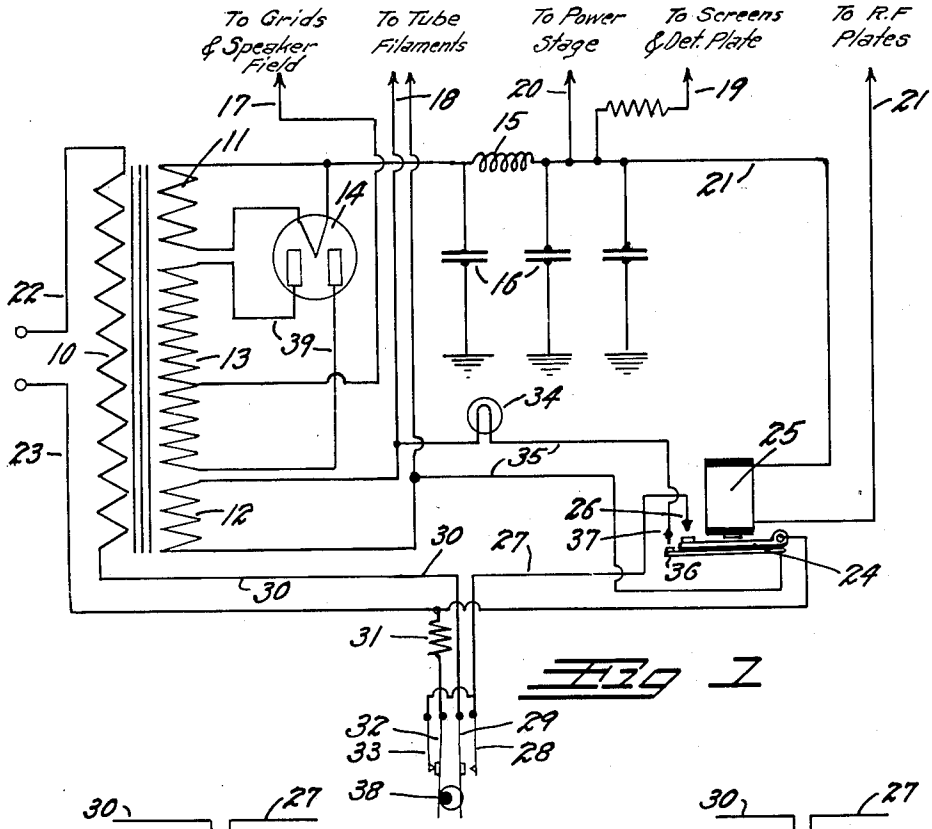


Fig 1

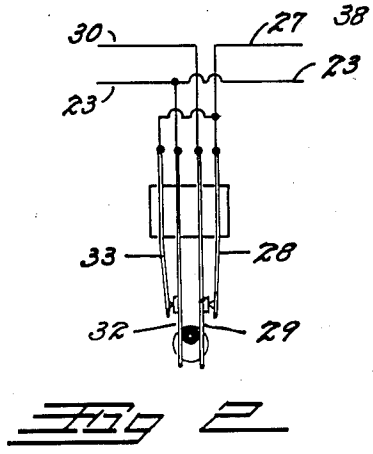


Fig 2

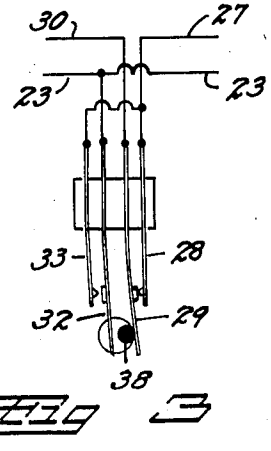


Fig 3

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Patented July 31, 1934 1,968,198

UNITED STATES PATENT OFFICE

1,968,198

MEANS FOR PROTECTING RADIO RECEIVING SETS

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Application September 22, 1933, Serial No. 690,559

5 Claims. (Cl. 250—27)

This invention relates to a protective system and devices for radio receiving sets. In the conventional receiving set short circuits occurring through condensers, choke coils, the rectifying tubes, etc., are frequent. These short circuits overload the power transformer and frequently burn out the secondary windings of the same.

The principal object of this invention is to provide a protective means which will immediately and automatically open the power supply to the transformer should an accidental short circuit occur.

Another object of the invention is to so construct the means that should a failure or open circuit occur in the plate circuit the power supply will also be cut off.

A further object is to provide a visable indicating device which will indicate to the user, at the time of starting the set, whether there are any damaging open or short circuit conditions.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy, and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention reference is had to the accompanying drawing which forms a part hereof. Like numerals refer to like parts in all views of the drawing and throughout the description.

In the drawing:

Fig. 1 is a circuit diagram illustrating the power supply circuit feeding any typical radio receiving set.

Fig. 2 is a detail diagram of the control switch illustrating the switch in the "starting" position.

Fig. 3 is a similar detail diagram of the control switch illustrating it in the operating or "safety" position.

In the drawing typical standard parts of a radio power supply circuit are diagramed and indicated by numeral as follows: power transformer primary 10, filament secondary windings 11 and 12, power secondary winding 13, rectifying tube 14, choke coil 15, filtering condensors 16.

The first filament secondary winding 11 supplies current to the filament of the rectifying tube 14. The second filament secondary winding supplies current to the filaments of the set tubes through a pair of conductors 18. The secondary power winding 13 supplies the plates of the rectifying tube through suitable conductors 39, and supplies current to the grids of the set tubes and to the speaker field through a suitable conductor 17. A conductor 19 supplies the radio frequency screens and the detector plates. A conductor 20 leads to the power stage of the set. A conductor 21 supplies the current to the plates of the radio frequency tubes of the set. The alternate current supply is fed to the primary 10 of the power transformer through a pair of conductors 22 and 23.

As thus far described the hook-up comprises a typical power supply system of a standard receiving set. In applying the invention to the above power circuit, an electro-magnet 25 is placed in series with the plate supply conductor 21 so as to actuate a switching armature 24, and a four pole double contact switch is placed in the current supply line 23 to the transformer primary 10.

The switch comprises a first pair of switch blades 32 and 33 and a second pair of switch blades 28 and 29. The members of each pair may be made to close contact with each other by the actuation of an eccentrically mounted switch button 38 of insulating material. The switch is connected into circuit by bridging the the blades 28 and 33 together and connecting them by means of a suitable conductor 27 with a contact 26 which can be closed by the armature 36. The armature is in circuit with the primary lead 23. The latter lead is connected to the switch blade 32 through a resistance coil 31. The switch blade 29 is connected to the primary 10 through a suitable conductor 30.

A pilot light 34 is provided, or this may be the usual pilot light with which all conventional sets are provided. The pilot light 34 is connected to the filament leads 18 or any other suitable source of energy through conductors 35. The conductors 35 lead through an armature contact 36 and a contact maker 37 on the armature 24. Thus, a closing movement of the armature 24 closes both contacts 26 and 37.

Operation

When the set is not operating, the switch is in the "off" position illustrated in Fig. 1. It will now be noted that in this position, current can not flow from the lead 23 to the conductor 30 and the primary 10, since the circuit is broken between the armature 24 and the contact 26. Should it be desired to operate on the set, the button 38 is rotated to the "starting" position of Fig. 2 so as to close the circuit between the blades 32 and 33 and between the blades 28 and 29. Current can now flow from the conductor 23 through choke coil 31, the blades 32 and 33, the blades 28 and 29 and the conductor 30 to the primary 10. This

of course energizes the filaments and impresses voltage on the plates. No current however flows through the plate circuit until the tube temperatures reach their ionizing points. When the latter point is reached, current passes through the plate lead 21 and energizes the electro-magnet 25 to cause it to actuate the armature 24 and close the contacts 26 and 37. A by-pass is now provided for the primary current through the armature 24 and the contact 26 and the contact 37 to the pilot light. The operator on noting the illuminated pilot light now turns the switch button 38 to the "safety" position of Fig. 3 so as to break the contact between the blades 32 and 33 and allow all of the current to flow through the by-pass 24, 26, 27, 28, 29 and 30. The set now continues to operate until either an accidental short or open circuit occurs or until the switch is again turned to the "off" position of Fig. 1.

Let us assume that metallic particles should cause a short circuit between the plates of the rectifier tube 14. This will immediately overload the secondary and stop or reduce the flow through the plate feed 21. This will allow the electro-magnet 25 to release the armature 24 and immediately break the circuit through the primary 10. Any other accidental interruption which would reduce or stop the flow through the conductor 21, such as a burnout in the choke coil 15, a cross circuit in the condensers 16, etc., will similarly open the feed circuit.

It is desired to call attention to the fact that the armature 24 does not move immediately upon the closing the feed circuit to the primary 10, since it requires an appreciable time for the electronic current to flow. The operator, however, is always advised of the termination of this time interval by the illuminating of the pilot light 34 so that he may allow sufficient interval before turning the switch to the "safety" position of Fig. 3. The heaviest current flow or greatest current consumption in the set is at the instant the set is turned on. The surge of current is damaging to the feed conductors, transformer, house fuses etc. The resistance coil 31 acts to reduce the initial potential to a safe amount and, since the coil is out of service during the operative position of the switch, the operation of the set is not interfered with.

While a specific form of the improvement has been described and illustrated herein, it is desired to be understood that the same may be varied, within the scope of the appended claims, without departing from the spirit of the invention.

Having thus described the invention, what is claimed and desired secured by Letters Patent is:—

1. Means for breaking the primary circuit of the power transformer of a radio receiving set should the secondary of said transformer become overloaded comprising: an electro-magnet in series with said secondary; an armature actuated by said magnet; a contact arranged to be closed by the actuation of said armature, said contact being in series with the supply to said primary; a manually actuated switch bridged across said contact; and means for visibly indicating the movement of said armature comprising: a pilot light; and a second contact actuated by said armature in series with said pilot light so that when said first contact is closed, said pilot light will be illuminated.

2. Means for breaking the primary circuit of the power transformer of a radio receiving set should the secondary of said transformer become overloaded comprising: an electro-magnet in series with said secondary; an armature actuated by said magnet; a contact arranged to be closed by the actuation of said armature, said contact being in series with the supply to said primary; a manually actuated switch bridged across said contact; and a choke coil in series with said switch so as to be bridged by the action of said armature and contact.

3. Means for breaking the primary circuit of the power transformer of a radio receiving set should the secondary of said transformer become overloaded comprising: a conductor conducting the secondary current from said secondary to the plate circuit of said set; an electro-magnet in series with said plate circuit; an armature adapted to be actuated by said electro-magnet; a contact adapted to be closed by said armature; a first circuit to said primary; a manually operated switch in said first circuit; a second circuit to said primary through said armature and said contact; and a switch for throwing either or both said first and second circuits in series with said primary.

4. Means for breaking the primary circuit of the power transformer of a radio receiving set should the secondary of said transformer become overloaded comprising: an electro-magnetic switch in series with said secondary; a first pair of switch blades; a second pair of switch blades; means for closing both or either of said pairs of switch blades; a conductor connecting one member of each pair to said magnetic switch; a second conductor connecting another of said switch blades to said magnetic switch and to a source of current; a third conductor connecting the remaining switch blade to said primary; and means for closing either or both said pairs of switch blades as desired.

5. Means for breaking the primary circuit of the power transformer of a radio receiving set should the secondary of said transformer become overloaded comprising: an electro-magnetic switch in series with said secondary; a first pair of switch blades; a second pair of switch blades; means for closing both or either of said pairs of switch blades; a conductor connecting one member of each pair to said magnetic switch; a second conductor connecting another of said switch blades to said magnetic switch and to a source of current; a third conductor connecting the remaining switch blade to said primary; means for closing either or both said pairs of switch blades as desired; and a pilot light arranged to be illuminated in consequence of the closing of said magnetic switch.

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