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TELEVISION RECEIVER CHASSIS CONSTRUCTION

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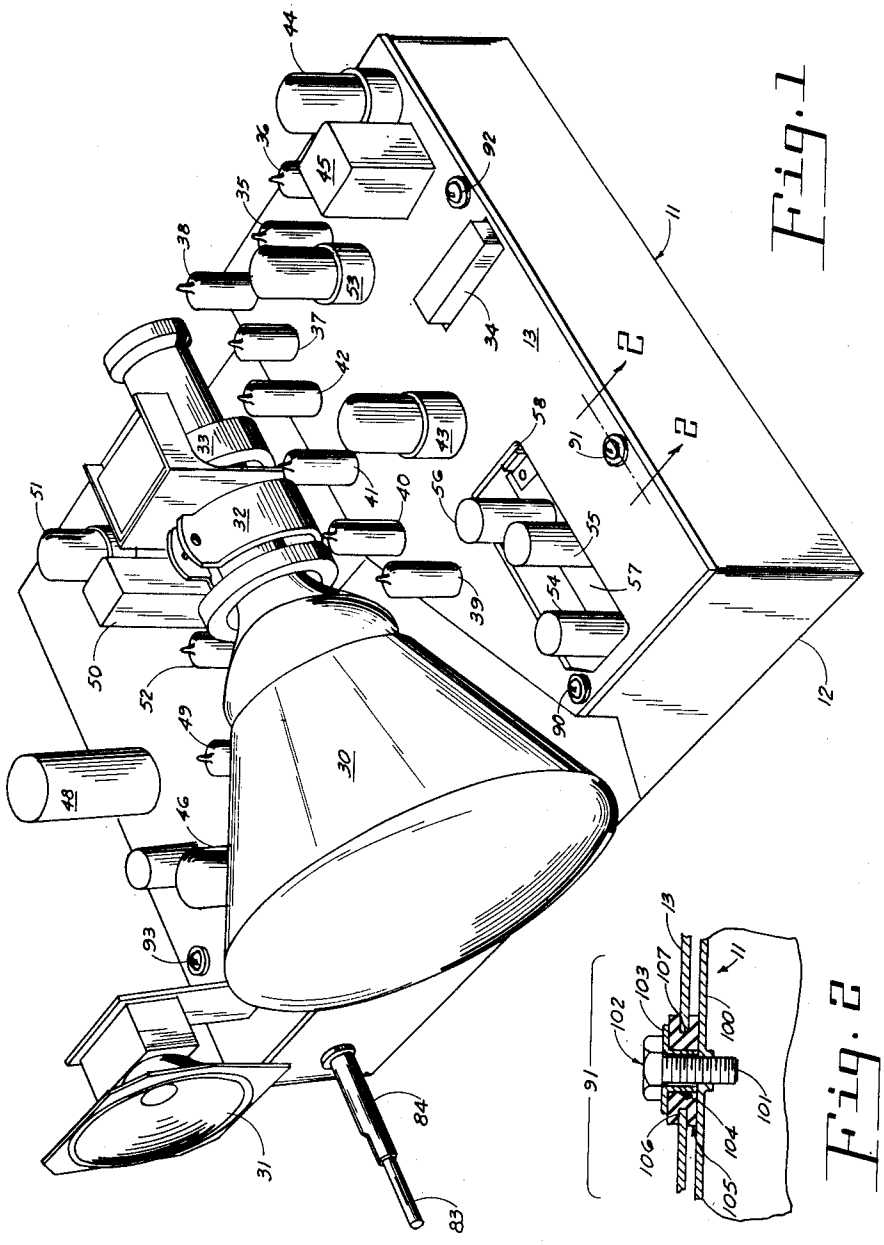


Fig. 1

Fig. 2

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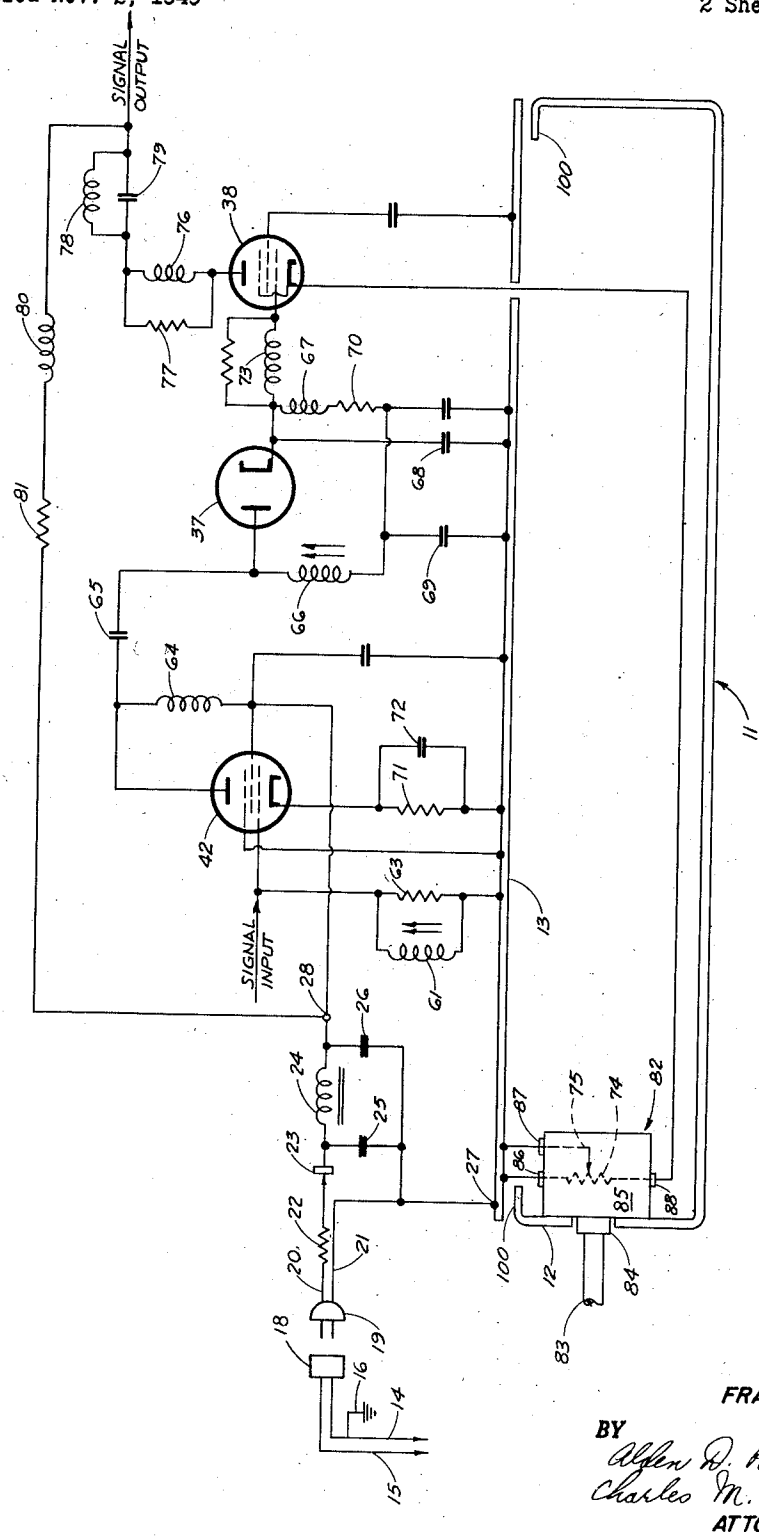


Fig. 3

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TELEVISION RECEIVER CHASSIS CONSTRUCTION

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2 Claims. (Cl. 250—16)

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The present invention relates to an improved chassis construction for direct-power-line-connected (power-transformerless) type television receivers. The primary object of the present invention is to provide such a chassis construction that a common metallic element for supporting the various receiver components may be maintained at a substantial potential difference with respect to true ground without presenting a shock hazard to the user or operator and without requiring the individual insulation of manually operative control shafts and special precautions for individually insulating the main chassis mountings from the cabinet.

Alternately stated, the primary object of the invention is to provide a simple construction for insulating the manually operative controls from a "hot" common metallic support for the various receiver components, this support being directly connected to one side of the power line.

Another basic object of the invention is to provide a chassis construction which can be directly mounted in a wooden cabinet without the taking of special precautions to insulate the bottom of the metallic chassis from the wood.

Still another object of the invention is to provide a chassis construction in which the main chassis body is "cold," i. e., at true ground potential so that it can function as part of the exterior of the receiver, in conjunction with a sub-chassis so arranged that the construction provides the lowest possible impedance in RF returns, such as those between the various tuned circuits and ground. In the interests of receiver efficiency and stability it is desirable that there be provided a low impedance path between the vacuum tube circuits and the common base plate, at least for radio frequencies. An object of this invention is to make that impedance as low as possible, because high common impedances in these circuits result in undesired stray couplings.

In the usual receiver installations one side of the supply line is connected to ground and it is impossible to connect one side of the conventional chassis construction to ground, when an unpolarized power plug is employed, because of the existence of the hazard of a direct short circuit across the supply line. This means that the usual one-piece metallic chassis construction may be "hot" and at a high potential difference with respect to true ground when the tube cathodes and power supply lines are directly connected to the chassis, for example. In order to prevent this potential difference from constituting a shock hazard to the user of the receiver, it is necessary to insulate the mannually operative parts or shafts of the various controls from the conventional "hot" chassis, also to insulate the metallic supporting mountings at the bottom of the chassis construction from the wooden cabinet, since underwriters' requirements do not permit a "hot" chassis to be mounted directly on wood, the latter being regarded as a poor insulator.

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When it is considered that a television receiver generally includes a large number of controls such as the contrast control, the brilliancy control, the volume control, the horizontal frequency control, the horizontal lock control, and so forth, it becomes apparent that the individual isolation of the manually operative shafts of the various controls from a "hot" chassis presents a very costly engineering and construction job. The cost and difficulties involved are considerably aggravated when it is borne in mind that the lower mountings which are employed to support the conventional chassis must also be individually specially insulated from a wood cabinet, since no hot metallic elements are permitted directly to contact such a receiver cabinet.

The chassis construction provided in accordance with the invention consists briefly of a common metallic plate which is connected to one side of the power line to provide an electrical ground or "chassis ground" for the various receiver components. To this plate are connected all of the circuit elements requiring a common or "chassis" ground. This plate is mounted atop a box-like main chassis or tray and the plate is insulated from the main chassis member or tray by a plurality of insulating supports. The common plate may be "hot" while the main chassis tray is "cold." The chassis tray therefore presents no shock hazard to the user and the user's controls which project forwardly from and through the tray do not have to be insulated therefrom. The very simple and inexpensive insulating means between the top plate and tray is provided in lieu of the large number of complex individual insulating expedients heretofore employed with respect to each control and each mounting between chassis and cabinet. For a better understanding of the present invention, together with other and further objects, advantages, and capabilities thereof, reference is made to the accompanying drawings, in which there is shown an illustrative preferred

form of chassis construction in accordance with the invention.

In the drawings:

Fig. 1 is a front perspective view of a television receiver having a chassis construction in accordance with the invention;

Fig. 2 is a fragmentary elevational sectional view taken along the line 2—2, looking in the direction of the arrows; and

Fig. 3 is a circuit schematic showing the connections of the power supply and other illustrative receiver components employed with a chassis construction in accordance with the invention.

Referring now specifically to Fig. 3 of the drawings, the novel chassis construction in accordance with the invention comprises a metallic chassis tray 11, the front wall 12 of which is shown in section, and a metallic top plate or lid 13, shown in section, suitably insulated from the tray. The tray is flanged inwardly at the top, as indicated at 100.

The supply mains 14, 15, one of which is connected to true ground at 16, terminate at socket 18, which receives the contact prongs of a conventional plug 19, at the end of supply conductors 20, 21. Conductor 21 is directly connected to the metallic top plate 13. Conductor 20 is in series with a resistor 22 and rectifier 23. The power supply is completed by a series choke 24 and a pair of shunt filter capacitors 25, 26. The power supply output terminals are shown at 28 (+B) and 27 (—B), the latter being shown at the point of connection of supply line conductor 21 and top plate 13. It will be understood that the whole of plate 13 constitutes a "chassis ground" for the various circuit components. This plate, as indicated, is directly connected to one side (21) of the power line.

As shown in Fig. 1, the various television receiver components are mounted on plate 13. In the specific illustrative example shown, these components may comprise:

Cathode ray tube 30
Loud speaker 31
Deflection yoke 32
Focus coil 33
Horizontal output transformer 34
Synchronizing signal separator tube 35
Synchronizing signal amplifier tube 36
Video detector tube 37
Video amplifier tube 38
First, second, third, and fourth intermediate frequency amplifier tubes 39, 40, 41, and 42
Horizontal damper tube 43
Horizontal oscillator and control tube 44
Blocking oscillator transformer 45
Audio power output tube 46
Electrolytic capacitor 48
Audio amplifier tube 49
Radio detector windings 50
Vertical oscillator and output tube 51
Radio detector tube 52
Horizontal driver tube 53

The R. F. amplifier tube 54, mixer tube 55, and oscillator tube 56 are supported on a metallic bracket 57, secured within an opening 58 on plate 13.

The specific arrangement of the components supported by plate 13, as herein described, is exemplary and the invention is not limited to the particular arrangement illustrated in Fig. 1.

Referring again to Fig. 3, there is shown a portion of the signal channel of a typical intercarrier-sound type of receiver utilizing the invention.

This channel comprises a fourth I. F. amplifier stage including a tube 42. The signal input circuit of this tube is tuned by a circuit comprising an adjustable iron core inductance 61, tuned by its own distributed capacitance and shunted by a damping resistor 63, this tuned grid circuit being returned to top plate 13, which provides a common ground. The anode of tube 42 is connected to a plate load inductance 64. The junction of the screen grid and plate load is connected to high potential terminal 28 of the power supply. The cathode is connected to top plate 13, through a bias resistor 71, by-passed by capacitor 72.

The output circuit of tube 42 is coupled to a video detector tube 37 by a capacitor 65. The detector circuit network includes peaking inductors 66, 67, capacitors 68, 69, and resistor 70, this detector network being essentially the same as that disclosed in the copending patent application of Francis A. Wissel and Norman W. Parker, entitled "Automatic Gain Control," Serial No. 102,176, filed in the U. S. Patent Office on June 30, 1949, and assigned to the same assignee as the present application and invention.

The detector output circuit is coupled by a series peaking inductor 73 to the input circuit of a video amplifier tube 38. Contrast is varied by short-circuiting various portions of cathode resistor 74 by an adjustable contact 75, connected to top plate 13. The cathode of tube 38 is returned to the common ground provided by top plate 13. The anode of tube 38 is connected to a parallel combination of peaking coil 76 and damping resistor 77, which in turn is connected to a resonant circuit comprising inductance 78 and capacitor 79. The anode of tube 38 is connected to the high-potential terminal 28 of the power supply through the D. C. path provided by inductors 76 and 78, shunt peaking inductor 80 and load resistor 81. The sound signals are taken off by a circuit (not shown) inductively coupled to winding 78. The showing of tubes 42, 37, and 38 is made for the purpose of showing typical methods by which cathodes and tuned circuits may be returned to the common ground provided by top plate 13, thereby minimizing undesired couplings between, and stray disturbances affecting, the various tube circuits. It is to be particularly noted that the invention accomplishes this advantage without presenting a shock hazard to the operator.

Resistor 74 and sliding contact 75 are symbolically shown in Fig. 3, in dotted outline, within the body of a standard control unit or rheostat 82. This unit has the usual metallic manual control shaft 83, which rotates within a journal 84 provided by a metallic boss projecting from the body 85 of the rheostat. The rheostat is of any suitable conventional construction such that the resistor 74 and contact 75, or equivalents, are insulated from the exterior of body 85 and brought out to terminal lugs 86, 87, and 88.

The boss 84 and shaft 83 project through an opening in the front wall 12 of chassis tray 11, so that the contrast control 74, 75 is located in its customary position, readily available to the operator, in fact in the position which has become standard in television receivers. This is accomplished without taking any special precautions whatever for insulating shaft 83 and boss 84 from the metallic flange 12. Heretofore, in the manufacture of television receivers, it has been necessary to take particular precautions to insulate such bosses and shafts or equivalents from

the front flange of the chassis, in order to prevent the existence of a shock hazard to the user. This shock hazard existed whenever the front flange is "hot" or may become "hot." The construction in accordance with the present invention insures that this front flange will be "cold" at all times.

In accordance with the invention the top plate 13 is mounted on and insulated from the chassis tray 11 by a plurality of mountings such as those illustrated at 90, 91, 92, and 93 in Fig. 1. Mounting 91 is illustrated in detail in Fig. 2. The main chassis tray 11 is flanged inwardly at the top as indicated at 100 and is suitably apertured and threaded to receive the shank 101 of a bolt 102. The head of this bolt reposes on the top flange 103 of a metallic bushing 104. Bolt 102 and bushing 104 are maintained in "cold" condition by an insulating washer 105 which is formed with an annular groove 106. Top plate 13 is suitably apertured to define an annular shoulder 107 which is received within groove 106. Washer 105 is made of rubber or suitable flexible insulation which may be deformed and manually pressed into place. Washer 105 performs the function of electrically isolating top plate 13 from chassis tray 11. It will be understood that the mountings 90, 91, 92, and 93 are of substantially similar construction and that other suitable mountings which isolate top plate 13 from chassis tray 11 may be employed within the spirit and scope of the appended claims. Thus it will be seen that the invention provides such a chassis construction that the common metallic element 13 for supporting the various receiver components (such as those illustrated in Fig. 1) may be maintained "hot" or at a substantial potential difference with respect to true ground (i. e., the potential level of the operator) without presenting a shock hazard to the operator and without requiring the individual insulation of manually operative control shafts such as shaft 83 in Fig. 2. Additionally, this chassis construction requires no special precautions for insulating the bottom of the tray 11 from a wooden cabinet, for example. Further, the tray 11 can function as a part of the exterior of the receiver, minimizing the expense of cabinetry. When it is considered that television receivers comprise a large number of controls (of which the contrast control herein shown is simply representative), such as the contrast control, the brilliancy control, the volume control, the horizontal frequency control, the horizontal lock control, and so forth, it will be understood that very significant economies in engineering and manufacturing may be accomplished through the practice of the present invention.

While there has been shown and described what is considered to be the preferred embodiment of the present invention, it will be obvious to those skilled in the art that various modifications and substitutions of equivalents may be made therein without departing from the true scope of the invention as defined by the appended claims.

I claim:

1. A chassis construction for a television receiver, of the type which includes radio frequency selector, frequency-changing, and amplifier circuits, which receiver is energized from two-conductor mains, one of which may be at the potential level of the operator, and which receiver includes contrast and other control units having metallic control shafts, comprising: a metallic box-like tray, formed with an open top and individual apertures, for providing a mechanical support for the manually operated shafts and outwardly projecting metal parts of said control units, said shafts projecting through said apertures, a metallic top plate which substantially closes said tray and provides a support for said circuits, means for mounting said circuits, and means comprising a plurality of insulating spacers securing said top plate to and electrically insulating it from said tray for the purpose of preventing the connection of one of said mains or an equivalent potential point to said top plate from creating a potential difference between said tray and the operator, whereby said shafts and said metal parts do not present any shock hazard to the operator and may directly contact said tray, and means for connecting one of said mains to said top plate.

2. A chassis construction for a television receiver of the type which is energized from two-conductor mains and which includes control units having projecting manually operated metal shafts, comprising a metallic box-like tray, formed with an open top and individual apertures for providing a mechanical support for said shafts, said shafts projecting through said apertures, a metallic lid panel which substantially closes said tray, means comprising a plurality of insulating spacers securing said lid panel to and electrically isolating it from said tray for the purpose of preventing the connection of one of said mains or an equivalent potential point to said lid from creating a potential difference between said tray and the operator, whereby said tray does not present any shock hazard to the operator, and means for connecting said one of said mains to said lid panel.

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