Oct. 13, 1953 T. F. THOMPSON 2,655,565

RADIO-PHONOGRAPH ADAPTER

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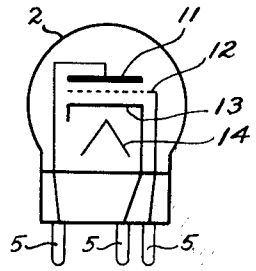
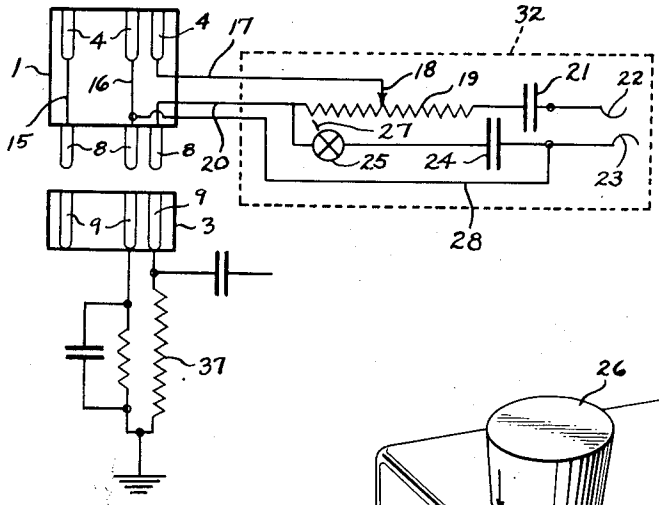
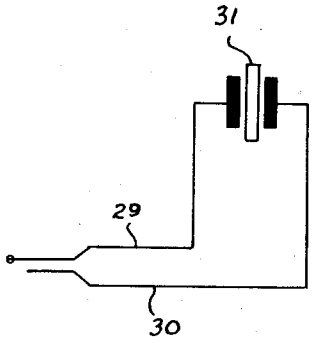


Fig. 1.





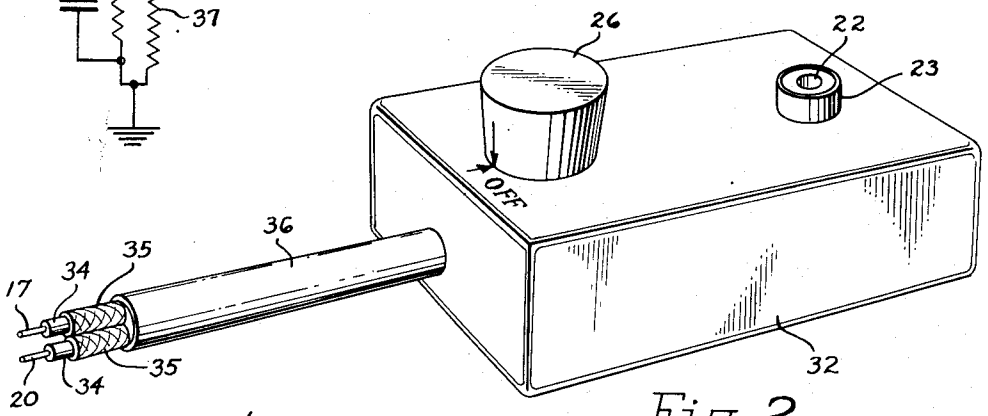


Fig. 2.

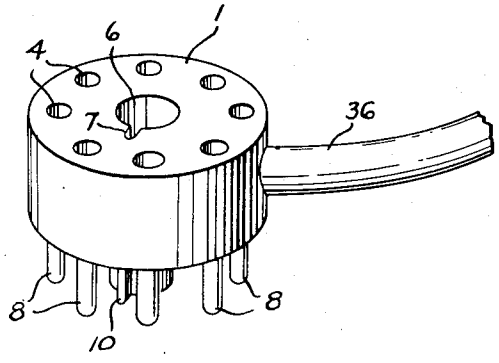


Fig. 3.

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RADIO-PHONOGRAPH ADAPTER

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12 Claims. (Cl. 179—100.11)

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This invention pertains to radio-phonograph adapters, and relates particularly to a novel adapter by which a radio and record player may be interconnected without the necessity of modifying or otherwise disturbing the electrical circuit of said radio.

Many makes of portable record players of the type which has no self-contained amplifier are now available for attachment to conventional home radio receivers. The audio amplifying system of said receiver is thereby utilized to amplify the signal created as the needle travels over the record, in manner well-known in the art. The primary disadvantage with present day systems of the type described resides in the fact that substantial modification of the radio receiver is necessary in order to couple the record player thereto. For example, the prevailing practice comprises the installation at the back of the receiver of a switch by which to disconnect temporarily the stages preceding the audio amplifier. A phono jack is also installed at the back of the receiver to accommodate releasable attachment of the record player. These and other similar modifications represent a considerable cost to the owner of the radio.

It is a principal object of the present invention to provide an adapter by which a radio and a record player may be interconnected detachably merely by interposing an adapter plug between the audio amplifier tube and its socket base.

Another important object of this invention is the provision of a radio-phonograph adapter which includes control means for varying the volume of phonograph reception independently of the radio broadcast volume control.

A further important object of this invention is to provide a radio-phonograph adapter which includes means by which the grid bias established in the audio circuit of the radio receiver is maintained when the adapter is in operation.

A further object is the provision of an adapter for detachably interconnecting a record player and a radio receiver, said adapter being constructed in such manner as to permit the use of the radio receiver for conventional broadcast reception without disconnecting the adapter therefrom and without impairing or otherwise disturbing the fidelity, volume, or other actions and qualities characteristic of the radio receiver per se.

A still further object is the provision of a portable radio-phonograph adapter which is of simplified construction for economical production and which affords maximum fidelity of phonograph reception.

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A further general object of this invention is to provide a novel electrical circuit by which to interconnect a signal generator and an amplifier.

These and other objects and advantages of the present invention will appear from the following detailed description taken in connection with the accompanying drawing, in which:

Figure 1 is a schematic diagram showing the electrical circuit embodying the present invention and illustrating the manner in which the same is arranged for coupling together a radio receiver and a record player;

Figure 2 is a fragmentary perspective view showing a container in which the electrical circuit of this invention is housed for use as a portable adapter; and

Figure 3 is a fragmentary perspective view of a tube adapter plug employed in the present invention.

Stated broadly, the present invention comprises an electrical circuit arranged detachably to interconnect the output of a record player with the grid and cathode elements of the input audio tube of the audio amplifier of a radio receiver.

Referring to the drawing, the adapter plug 1 selected for a particular installation must correspond with the type of audio amplifier tube 2 and its complementary socket base 3. Since various types of audio tubes are presently used in diverse makes of radio receivers, it is necessary that various types of adapter plugs be provided. In any event, the adapter plug 1 is provided with female sockets 4 proportioned and arranged to receive the male contacts 5 extending from the base of the audio tube 2. A central hole 6 having an offset groove 7 is also provided in the female end of the adapter plug to receive the complementary shaped central positioning stud of tube 2, in manner well-known in the art. Positioning means other than the central hole and stud illustrated are also well-known. For example, various types of miniature tubes are provided with contact prongs either of polarized shape or position. The type of tube base and socket base used is immaterial, and does not form a part of this invention.

The end of adapter plug 1 opposite the female sockets 4 is provided with male contacts 8 which correspond in position with said sockets 4. The male contacts 8 also correspond in position with the female sockets 9 of the audio tube socket base 3. A central positioning stud 10 is also provided in the adapter plug 1 for reception in a complementary hole provided in the socket base 3.

Referring now particularly to Figure 1 of the

drawing, the principal elements of the audio amplifier tube 2 are shown to consist of a plate 11, grid 12, cathode 13 and heater element 14. The female socket 4 and its complementary male contact 8 for the plate 11 are interconnected by an electrical lead 15. In similar manner the complementary female and male connections for the cathode 13 are interconnected by lead 16.

The female socket 4 complementing the male contact 5 for the grid 12 is connected by lead 17 to the adjustable contact 18 of the variable resistor 19 which functions as a volume control in the manner described hereinafter. The male contact 8 complementing the female socket 4 for grid 12 is connected by lead 20 to one end of the variable resistor 19.

The end of resistor 19 opposite the connection of lead 20 is connected through coupling condenser 21 to the central contact 22 of a phono jack. The outer contact 23 of the phono jack is connected through bypass condenser 24 to one side of switch 25. The opposite side of switch 25 is connected to the end of variable resistor 19 to which the lead 20 is secured. Said switch is preferably of the type which is incorporated at the low volume end of the volume control resistor 19 and is actuated by the volume control knob 26 shown in Figure 2. Accordingly, the switch 25 and resistor 19 are shown interconnected by the dotted line 27. The outer contact 23 of the phono jack is also connected electrically to the lead 16 of the cathode 13 by means of lead 28.

The inner and outer female contacts 22 and 23, respectively, of the phono jack are proportioned and arranged to receive the complementary inner and outer male contacts of a phono jack for detachable connection therewith. Said inner and outer male contacts are connected, respectively, by leads 29 and 30 to the output of the record player. For purposes of illustration, the output of the record player is shown to comprise a piezoelectric crystal 31.

It is to be observed that coupling condenser 21 and the terminal contacts 22, 23 form a series combination, and that bypass condenser 24 and switch 25 form a second series combination. Bypass condenser 24 and terminal contact 23 are connected to the cathode 13 through lead 28. Coupling condenser 21 and switch 25 are connected together through variable resistor volume control 19, and the movable contact 18 of said volume control is connected to grid 12 through lead 17. Thus, the said two series combinations are connected in parallel at one end through volume control 19 and its movable contact 18 to grid 12 and at the opposite end to cathode 13.

Referring now to Figure 2 of the drawing, the female contacts 22 and 23 of the phono jack, the coupling condenser 21, the bypass condenser 24 and the variable resistor 19 and switch 25 are mounted in a small box 32. Said box is indicated in dotted outline in Figure 1. The phono jack projects through the upper face of the box, as shown, for convenience in connecting the record player. The volume control knob is secured to the adjustable contact 18 of the variable resistor 19 to facilitate adjustment of the latter, as indicated hereinbefore.

The wires 17 and 20 leading from the adjustable contact 18 and variable resistor 19, respectively, are preferably separately encased in rubber 34 and then covered with metallic shielding 35. The two shielded wires are then enclosed together in a fabric or other type of covering 36.

The shield 35 of one of the wire leads is utilized as electrical lead 28 which interconnects the cathode 13 and the outer female contact 23 of the phono jack.

Although the circuit elements described hereinbefore may vary in accordance with specific installations, the values chosen for the circuit illustrated are as follows: Coupling condenser 21 is 0.01 microfarad; bypass condenser 24 is 0.1 microfarad; and the variable resistor 19 is one megohm.

The installation and operation of the adapter embodying the present invention is as follows: The audio amplifier tube 2 is first removed from its socket base 3. The male contacts 8 of the adapter plug 1, which corresponds to the type of audio amplifier tube provided in the receiver, is then inserted in the socket base 3. The male contacts 5 of the audio tube 2 are now inserted in the female sockets 4 of the adapter plug, whereby the adapter plug 1 becomes interposed between the tube 2 and its socket base 3.

With the adapter plug 1 installed as described and the volume control knob 26 turned to the "off" position, i. e. with contact 18 at the extreme left of resistor 19 as shown in Figure 1 and switch 25 open, the radio receiver may be used in conventional manner for broadcast reception. It is to be noted that, in this position of the volume control knob 26, the series combination of variable resistor 19, coupling condenser 21 and the crystal pickup 31 are placed in shunt across the grid resistor 37 provided in the radio receiver. The resistance of said series combination is of such high magnitude as to effect very little change in the characteristic grid resistance 37 of the receiver. Moreover, the resistances of the volume control resistor 19 and the crystal pickup are such as to reduce the effective capacitance of the coupling condenser 21 to such a small value that the slight attenuation of high audio frequencies thereby produced is of no consequence. Thus, it is apparent that the radio receiver may be used for conventional broadcast reception without detaching the adapter of the present invention and without loss of fidelity and other qualities inherent in the receiver per se.

When it is desired to use the radio receiver for amplifying the sound signal of the record player, the volume control of the receiver may be turned down, if desired, and knob 26 of the adapter is turned to the position at which swtich 25 becomes closed. With switch 25 closed, bypass condenser 24 becomes placed in shunt across the grid resistor 37 of the input audio tube of the radio receiver audio amplifier. The impedance of said grid resistor 37 is reduced to a low value and the volume control resistor 19 becomes the entire grid load. The electrical energy developed, for example, in the crystal pickup 31 of the record player is thereby passed to the audio amplifier through the coupling condenser 21 and volume control resistor 19. Coupling condenser 21 functions primarily to isolate the grid bias voltage from the crystal 31 and to prevent damage to the crystal in the event that the adapter 1 is placed accidentally in the wrong tube socket. The coupling condenser functions additionally to filter out undesirable needle noise and other disturbances from the record player.

From the foregoing description it will be apparent that the present invention provides a device of simplified and economical construction by which a radio receiver and a record player may be interconnected with rapidity and ease,

Modification of the radio receiver, as required heretofore, is obviated completely, with the result that adaptation of the receiver for use with a record player is achieved at lower cost and greater convenience to the owner.

It will be apparent to those skilled in the art that various modifications may be made in the structure described hereinbefore without departing from the scope and spirit of this invention. For example, if the circuit described hereinbefore is to be used with the type of amplifier which operates in Class A with the cathode and grid at equal potentials, the coupling condenser 21 may be omitted if desired. Its inclusion in the circuit under this condition is not detrimental, however. As a second example, the device may function with equal facility to couple any type of signal generator to a corresponding amplifier merely by selecting the proper values of circuit elements. An illustration of such use is the coupling of an electrical musical instrument to an audio amplifier. When used for this purpose, many players prefer to turn the control 19 to full volume and then regulate the volume from the control provided on the musical instrument. In these cases it is apparent that the volume control 19 may be replaced by a fixed resistance. It is also apparent that the adapter circuit described hereinbefore may be incorporated as an integral part of either a radio receiver or a record player, rather than forming a unit detachable from said receiver and record player. It is intended, therefore, that the foregoing description is primarily illustrative and is not to be construed in a limiting sense.

Having thus described my invention and the manner in which the same may be used, what I claim as new and desire to secure by Letters Patent is:

1. An adapter for detachably interconnecting a signal generator and an amplifier wherein said amplifier includes a cathode and a grid circuit, said adapter comprising a resistance, a bypass condenser, terminal means for connecting the output of the signal generator, and means for detachably connecting at least part of the resistance in series in the grid circuit to amplify the generated signal and for detachably connecting the bypass condenser and the terminal means between the cathode and grid circuit at opposite ends of the series portion of the resistance.

2. An adapter for detachably interconnecting a signal generator and an amplifier wherein said amplifier includes a cathode and a grid circuit, said adapter comprising a resistance, a bypass condenser, the series combination of a coupling condenser and terminal means for connecting the output of the signal generator, and means for detachably connecting at least part of the resistance in series in the grid circuit to amplify the generated signal and for detachably connecting the bypass condenser and the series combination between the cathode and grid circuit at opposite ends of the series portion of the resistance.

3. An adapter for detachably interconnecting a signal generator and an amplifier wherein said amplifier includes a cathode and a grid circuit, said adapter comprising a resistance, the series combination of a switch and a bypass condenser, terminal means for connecting the output of the signal generator, and means for detachably connecting at least part of the resistance in series in the grid circuit to amplify the generated signal and for detachably connecting the bypass condenser and the terminal means between the cathode and grid circuit at opposite ends of the series portion of the resistance.

4. An adapter for detachably interconnecting a signal generator and an amplifier wherein said amplifier includes a cathode and a grid circuit, said adapter comprising a resistance, the series combination of a switch and a bypass condenser, the series combination of a coupling condenser and terminal means for connecting the output of the signal generator, and means for detachably connecting at least part of the resistance in series in the grid circuit to amplify the generated signal and for detachably connecting the respective series combinations between the cathode and grid circuit at opposite ends of the series portion of the resistance.

5. An adapter for detachably interconnecting a signal generator and an amplifier wherein said amplifier includes a cathode circuit, a grid circuit, an amplifier tube and tube base, said adapter comprising a resistance, a bypass condenser, terminal means for connecting the output of the signal generator, and adapter plug means proportioned and arranged to be interposed between said amplifier tube and tube base for detachably connecting at least part of the resistance in series in the grid circuit to amplify the generated signal and for detachably connecting the bypass condenser and the terminal means between the cathode and grid circuit at opposite ends of the series portion of the resistance.

6. The adapter of claim 4 wherein the signal generator is a record player, the amplifier is the audio amplifier of a radio receiver, and the resistance is a volume control.

7. An adapter for detachably interconnecting a record player and the audio amplifier of a radio receiver wherein said amplifier includes a cathode circuit, a grid circuit, an amplifier tube and tube base, said adapter comprising a potentiometer volume control, the series combination of a switch and a bypass condenser, the series combination of a coupling condenser and terminal means for connecting the output of the record player, and adapter plug means proportioned and arranged to be interposed between said amplifier tube and tube base for detachably connecting at least part of the volume control in series in the grid circuit to amplify the record player signal and for detachably connecting the respective series combinations between the cathode and grid circuit at opposite ends of the series portion of the volume control.

8. In combination with an alternating current signal generator and a radio receiver having an audio amplifier wherein said amplifier includes a cathode and a grid circuit; a resistance, at least part of the resistance being connected in series in the grid circuit for amplifying the generated signal, and a radio signal bypass condenser connected between the cathode and grid circuit at one end of the series portion of the resistance, the output of the signal generator being connected between the cathode and grid circuit at the opposite end of the series portion of the resistance.

9. In combination with an alternating current signal generator and a radio receiver having an audio amplifier wherein said amplifier includes a cathode and a grid circuit; a resistance, at least part of the resistance being connected in series in the grid circuit for amplifying the generated signal, a radio signal bypass condenser connected between the cathode and grid circuit at one end of the series portion of the resistance,

and the series combination of a coupling condenser and the output of the signal generator connected between the cathode and grid circuit at the opposite end of the series portion of the resistance.

10. In combination with a signal generator and a radio receiver having an audio amplifier wherein said amplifier includes a cathode and a grid circuit; a resistance, at least part of the resistance being connected in series in the grid circuit for amplifying the generated signal, and the series combination of a switch and a radio signal bypass condenser connected between the cathode and grid circuit at one end of the series portion of the resistance, the output of the signal generator being connected between the cathode and grid circuit at the opposite end of the series portion of the resistance.

11. In combination with a signal generator and a radio receiver having an audio amplifier wherein said amplifier includes a cathode and a grid circuit; a resistance, at least part of the resistance being connected in series in the grid circuit for amplifying the generated signal, the series combination of a switch and a radio signal

bypass condenser connected between the cathode and grid circuit at one end of the series portion of the resistance, and the series combination of a coupling condenser and the output of the signal generator connected between the cathode and grid circuit at the opposite end of the series portion of the resistance.

12. The combination of claim 11 wherein the signal generator is a record player, the amplifier is the audio amplifier of a radio receiver, and the resistance is a volume control.

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