

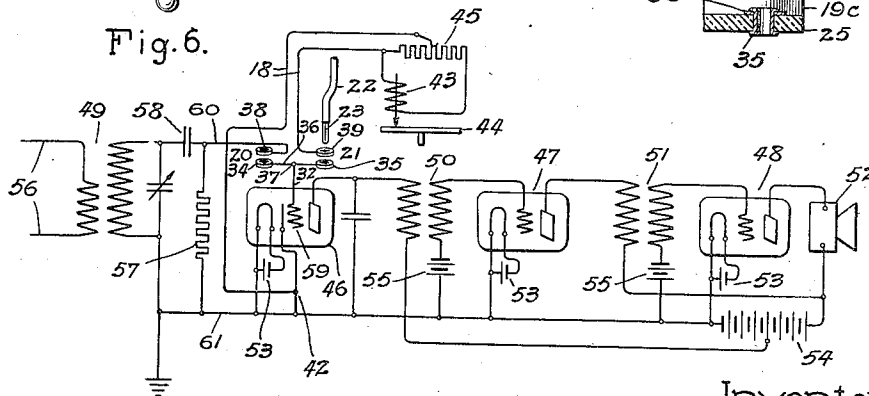
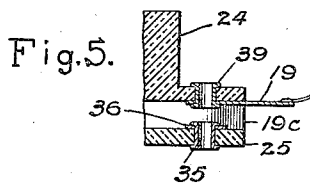
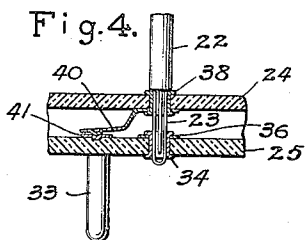
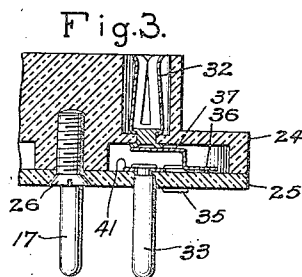
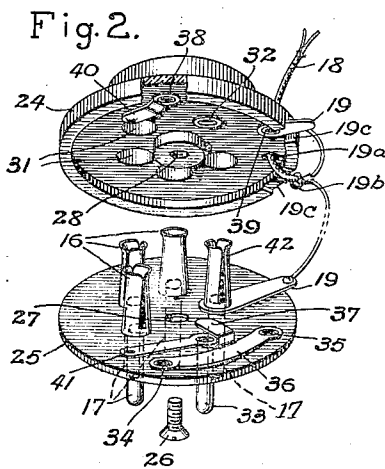
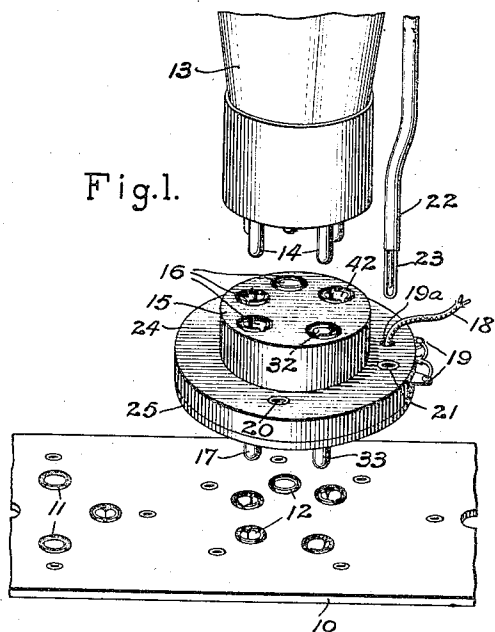
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ADAPTER UNIT

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UNITED STATES PATENT OFFICE

1,934,498

ADAPTER UNIT

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7 Claims. (Cl. 173-344)

The present invention relates to means whereby signals may be supplied to radio apparatus and the like from different sources and without change in the mechanical arrangement of the various parts of the apparatus. More particularly the present invention relates to a device for applying signals directly to one of the tubes or electric discharge devices of such apparatus selectively from either an external signal producing apparatus such as a phonograph pickup or the normal signal channel of the apparatus.

Devices of this character have found extensive use in connecting electrical phonograph pick-up devices with existing radio receiving apparatus for the reproduction of phonograph records, and for this purpose usually take the form of adapter units of the plug-in type arranged to be inserted between the terminals of an intermediate tube of the apparatus to which the signals are to be applied and the socket in which such tube is normally located. The term "externally produced signals" is used here, throughout the specification and in the claims to include signals or control impulses other than the normal signals applied through the normal transmission or signal channel of the apparatus.

Adapter devices of known types for applying externally produced signals to existing vacuum tube apparatus are inconvenient to use since they necessitate the removal and replacement of a tube each time a change is made from the normal signal channel of the apparatus to the source of externally produced signals, the unit being removed and the tube being replaced in its socket on each occasion for the normal reception of signals. In addition, poor electrical contact in the tube socket and adapter unit often develops as the result of the constant removal and replacement of the parts above mentioned.

It is the object of my invention to provide an improved adapter device or unit arranged to be interposed between the terminals of a vacuum tube and the terminals of a vacuum tube socket for supplying signals from different sources to said tube in an existing apparatus. This adapter unit is preferably so arranged that it may be permanently mounted and connected between the tube and its socket, while at the same time providing a selective connection for the purpose above named.

My invention will be better understood from the following description when considered in connection with the accompanying drawing and its scope will be pointed out in the appended claims.

In the drawing, Fig. 1 is a view in perspective

of an adapter device or unit embodying my invention and showing its relative position between the tube to which signals are to be applied and the tube socket in an electrical apparatus; Fig. 2 is an exploded view in perspective and partly in section, on the same scale as Fig. 1, showing the interior construction of the device of Fig. 1; Figs. 3, 4 and 5 are sectional views on the same scale, of certain details of construction of the device shown in Figs. 1 and 2; and Fig. 6 is a wiring diagram of a portion of a radio receiving apparatus and a source of externally produced signals, showing a switching arrangement provided by the adapter device in connection with a tube of such apparatus.

Referring to Fig. 1, 10 is a tube mounting strip of an electrical apparatus such as a radio receiver, having a line of tube sockets indicated by groups of contact means or terminals 11 and 12 for receiving the terminals or prongs of a vacuum tube. By way of example, group 12 may be taken to represent the socket terminals for the tube to which it is desired to apply externally produced signals, and is represented by a five terminal group for receiving a tube 13 which has a corresponding number of terminals or prongs 14. Interposed between the tube and its socket is an adapter device or unit 15 which includes a group of contact means or terminals 16, 42 and terminal 32 providing a tube socket and contact means or terminal prongs 17 and prong 33 respectively, for engaging the socket 12. When the adapter unit 15 is in use it is seated in the socket 12 and the tube is in turn inserted in the adapter unit. Means within the adapter provide suitable electrical connections between the socket terminals 16, 42 and terminal 32 and the terminals or contact prongs 17 and prong 33 respectively, whereby a tube mounted in the adapter may be connected with either the normal signal channel of the apparatus or with a source of externally produced signals without removing the adapter unit or the tube after the initial installation.

A pair of leads 18 which are secured to suitable terminals 19 mounted in the adapter unit provide means for connection with a source of externally produced signals. The leads 18 are secured to the terminals 19, after being passed through an opening 19a in the adapter cover member and after being knotted as indicated at 19b, the knot being larger than the opening 19a, so that strains upon the leads which may extend some distance to the source of signals will not be transmitted to the terminals 19 but will be taken by the knot. The terminals 19 are carried

out through the cover portion through suitable recesses 19c, as shown in Fig. 2.

The switching means provided in the adapter includes a pair of pin jacks 20 and 21 adapted to receive a switching or contact pin 22 having a resilient electrical contact means 23 at one end for engaging the jacks 20 and 21, and effecting an electrical connection therein, the arrangement being such that when the contact means of the switching pin is inserted in jack 21 the tube is connected with external circuit terminals 19 and leads 18, and when the switching pin is inserted in jack 20 the tube is connected in the normal manner with the signal channel provided in the apparatus, as if it were inserted directly in its socket 12 without the intermediary of the adapter unit.

In order that the adapter unit 15 may be inserted in any one of the tube sockets of an existing apparatus, it is made in the form of a base of convenient size, and in the present example is annular in form and includes two major parts 24 and 25 of suitable insulating material, part 24 being a flanged and recessed cover and 25 being a disk-like body.

Referring now to Figs. 2, 3, 4 and 5 along with Fig. 1, the body and cover portions or members of the adapter unit are secured together by suitable means such as a central screw 26 which passes through an opening 27 in the body portion and enters a tapped hole 28 in the cover portion. The parts are thus readily separable to expose the interior by removing the screw. One of the socket terminals designated at 32 in the adapter unit, is carried by the cover portion, while its corresponding contact prong 33 is carried by the body portion, and the intermediate connection between them within the adapter unit is arranged to be broken for the purpose of applying to contact means 32 either the external signal input through leads 18 or the normal signal input from the apparatus through a contact prong 33.

Any suitable tube electrode may be selected for the purpose of being controlled selectively by the external and normal signals, and in the present example, the grid or control electrode terminal has been chosen for this purpose. In carrying out this arrangement, pin jacks 20 and 21 respectively are provided with lower contacts 34 and 35 respectively which are mounted upon the body portion of the adapter unit and connected by a metal strip 36 having a tab 37 which engages adjacent its end, as shown more particularly in Fig. 3, the base of grid contact terminal 32 of socket group 16, 32, 42 of the adapter unit. This provides an electrical connection between one terminal of the adapter socket group and one contact of each of the pin jacks 20 and 21. These last named contacts are carried by the body 25 in order that they may be the lower or secondary contacts of each jack, and are so spaced in the base 25 that they fall directly below and in alignment with their corresponding upper contacts 38 and 39 respectively, as indicated in Figs. 4 and 5.

Contact 38 is provided with a spring contact or terminal 40 which is arranged to engage a connector strip 41 carried by body 25 and connected with the terminal prong 33. This connection is indicated more clearly in Fig. 4. With this arrangement, electrical connection is complete from jack contact 38 through terminal prong 33 of the adapter. In the present example as above mentioned, this is intended to be the grid or control electrode connection for re-

ceiving signals or control voltages from the normal signal channel of the apparatus.

One of the input contact terminals 19 for the externally produced signals is connected with the upper contact 39 of pin jack 21, while the other terminal 19 is connected with one of the terminals of socket group 16, 32, 42 and designated at 42. In the present example this socket terminal 42 is the contact means which receives the cathode terminal of the tube.

From the foregoing description it will be seen that in the improved adapter arrangement forming the present embodiment of my invention, the circuit connection between one of the adapter socket terminals 32 and its corresponding terminal prong 33 is broken and that said socket terminal 32, is connected with the lower contacts 34 and 35 of a pair of pin jacks 20 and 21 respectively carried by a flanged portion 24 of the adapter unit 15. The high potential side of the normal signal channel is connected through one of the socket terminals 12, the terminal prong 33 of the adapter 15, the connector strip 41 and spring connector 40 to the upper terminal 38 of the pin jack 20. One side of an external circuit 18 is connected through one of the input terminals 19 to the upper contact 39 of the pin jack 21. The opposite sides of the normal signal channel and the external circuit are connected with one of the tube terminals, which is preferably the cathode terminal. In the present example, the normal signal channel is connected through one of the socket terminals 12, the terminal prong 17 of the adapter unit 15, and the socket terminal 42 to the cathode terminal 14 of the tube 13. The external signal circuit 18 is connected through the input terminal 19 and the socket terminal 42 to the cathode terminal 14 of the tube. Thus, it will be seen that with the pin 22 inserted in the jack 21 the external circuit indicated by leads 18 will be connected to apply signals between the terminal 32, to which connects the terminal of the control electrode of the tube, and the terminal 42, to which connects the cathode terminal of the tube, while with the pin 22 removed from jack 21 and inserted in jack 20, the terminal 32 and prong 33 will be connected, whereby the normal connection between the control electrode and its corresponding socket connection in the apparatus will be established.

Referring now to the circuit diagram of Fig. 6, in which for like parts the same reference numerals are used as in the preceding figures for more clearly illustrating the application of the switching arrangement to the adapter unit. A source of externally produced signals is represented by a phonograph pick-up unit 43 arranged to be operated in connection with a suitable record turn table 44, and provided with a volume control potentiometer 45. The apparatus in conjunction with which this source of externally produced signals is used, is indicated by a radio receiving apparatus embodying vacuum tubes 46, 47 and 48 which are connected in cascade by suitable transformers 49, 50 and 51. The output device or loud speaker is indicated at 52.

The apparatus is supplied with suitable filament, anode and control voltages, by means represented in the present example by batteries 53, 54 and 55 respectively. The signal input to the receiving apparatus is through leads 56, and in the present example tube 46 is the detector tube being provided with the conventional grid leak and condenser 57 and 58 respectively. This tube is arranged in the normal signal channel of the

receiver and receives the signal input as supplied through leads 56 and transformer 49, and the detected or rectified output therefrom is transmitted through transformers 50, 51 and tubes 47 and 48 to the loud speaker 52, when the control grid 59 of the tube is connected with the high potential side 60 of the signal channel. If this grid connection with the signal channel is broken and externally produced signals such as may be provided by the phonograph pick-up device 43 are applied between the grid or control electrode and the cathode of the tube, its signals will be transmitted in the same manner through the apparatus to the reproducer.

To provide this switching arrangement the adapter unit herein before described may be used. Through its use one side of the normal signal channel is connected through terminal 33, connector 41 and spring connector 40 with contact 32 of pin jack 20, while contact 39 of pin jack 21 is connected through terminal 19 with one of the leads 18 of the external signal circuit, the remaining lead 18 being connected with the cathode of tube 46. Contacts 34 and 35 are connected together by the strip 36 which in turn is connected through connection 37—32 with grid 59. From the circuit diagram it is obvious that the pin 22 may be inserted in either of the jacks to effect a switching from the one source of signals to the other, the pin remaining in the jack corresponding to the desired source of signals.

By connecting the one side of the circuit 18 to the cathode or other common circuit terminal of the adapter, one side of the circuit leading from the source of externally produced signals is at once connected with the common cathode or ground lead of the apparatus as soon as the adapter unit is inserted in the tube socket. In the circuit of the present example, this common ground lead is indicated at 61.

While the adapter has been described in connection with a radio receiving apparatus and with a phonograph pick-up device, it should be understood that it may be applied to other forms of electrical apparatus embodying vacuum tubes or other electric discharge devices, having in connection therewith other sources of signals. In any application the arrangement is such that the adapter unit may be easily and quickly inserted between a tube and its socket or receptacle, and that the subsequent changes in input to the tube may be effected without removing the adapter or replacing the tube in its socket.

The changes in input are made preferably through the medium of jacks, as shown in the present embodiment of the invention, and these jacks are preferably located in the flanged edge of the adapter unit and arranged with their axes parallel with the axis of the adapter and the latter being that of the tube when it is located in the socket. With this arrangement the pin used in connection with the jacks to effect the switching may be inserted and removed in the same direction as the tube is inserted and removed from its socket, this direction being that in which the pin is most easily reached and operated in an apparatus such as a radio receiver. Other switching means may be arranged to be carried by the adapter unit for the same purpose although the arrangement shown and described is that which is at present preferred.

It will be noted in the pin jack arrangement, that the lower or unexposed contacts of each jack are connected with the adapter socket terminal corresponding to and connected with the

control electrode of the tube, while the upper contacts of each of said contacts leads to the separate signal supply circuits. With this arrangement, the switching pin 22 through the medium of its resilient contact end 23 first engages the jack contact, either 38 or 39, connected with a signal circuit and then with the contact, either 34 or 35, connected with the control electrode or its adapter socket terminal 32, thereby completing the connection. This has been found to be the preferred arrangement for the reason that with the jack contacts reversed so that the switching pin engages first the contact corresponding to the control electrode, a high pitched audio frequency whistle or other disturbing noise is produced by contact with the pin. The arrangement shown does not have this undesirable characteristic when in use. The preferred switching arrangement is therefore one in which the switching change is made toward and away from the contacts which are connected with the control electrode of the tube when in use, and not through such contacts.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. In a device adapted to be interposed between the terminals of a vacuum tube and the terminals of a vacuum tube socket including contact means for engaging said tube terminals and terminal prongs for connection with said socket terminals, the combination of a pair of terminals for connection to different circuits, and means carried by said device arranged to connect selectively one of said contact means to either one of said circuit terminals.

2. In a device adapted to be interposed between the terminals of a vacuum tube having a grid and the terminals of a vacuum tube socket, the combination of contact means for engaging said tube terminals, contact prongs for engaging said tube socket terminals, a pair of terminals each connected to a different circuit, and means carried by said device arranged to connect selectively either one of said circuit terminals with said contact means engaging the grid terminal of said vacuum tube.

3. A unitary device adapted to be interposed between the terminals of a vacuum tube and the terminals of a vacuum tube socket, comprising contact means for engaging said tube terminals, contact prongs for engaging said vacuum tube socket terminals, a pair of terminals each connected to a different circuit, a third terminal connected to one of said contact means and serving as a common return for said different circuits, and switching means carried by said device for selectively connecting one of said contact means to either one of said circuit terminals.

4. An adapter device including a base having contact means adapted to receive the terminals of a vacuum tube, and contact means adapted to engage the terminals of a vacuum tube socket, input terminals for an external circuit, and switching means carried by the base for selectively connecting one of said first named contact means either with one of said input terminals or with one of said second named contact means.

5. An adapter device including a base provided with terminals for receiving a vacuum tube and with terminals for engaging a vacuum tube socket, external circuit connections, and switching means carried by the base for selectively connecting one of said first named terminals either with one of said second named terminals or with one of said external circuit connections, said switching

means including a pair of pin jacks and a removable pin adapted to be inserted in either of said jacks to close the same.

6. The combination with an electrical apparatus including a vacuum tube and a socket for said tube, of an adapter device for applying externally produced signals to said tube, said device including contact members for receiving the tube terminals, and contact prongs for engaging said socket, external circuit connections, and switching means carried by the device for selectively connecting a contact member of said adapter device either with one of said external circuit connections or with one of said contact prongs.

7. The combination with an electrical apparatus

including a vacuum tube and a socket for said tube, of an adapter device for applying externally produced signals to said tube, said device including a flanged cylindrical base provided with socket terminals for receiving the tube terminals and terminal prongs for engaging said socket, external circuit connections, and switching means for selectively connecting a socket terminal of said adapter device either with one of said external circuit connections or with one of said terminal prongs, said last named means including a pair of pin jacks mounted in the flange of said base, and a removable contact pin for engaging either of said jacks.

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