

Sept. 29, 1931.

A. MAVROGENIS

1,825,534

TUBE BASE ADAPTER

Filed Aug. 17, 1927

Fig. 1

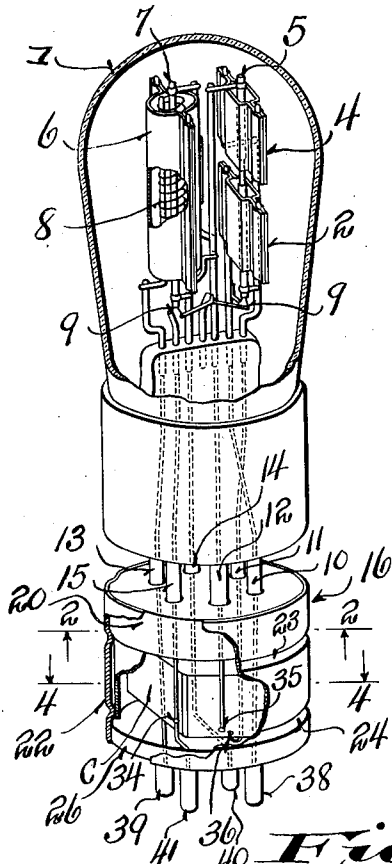


Fig. 6

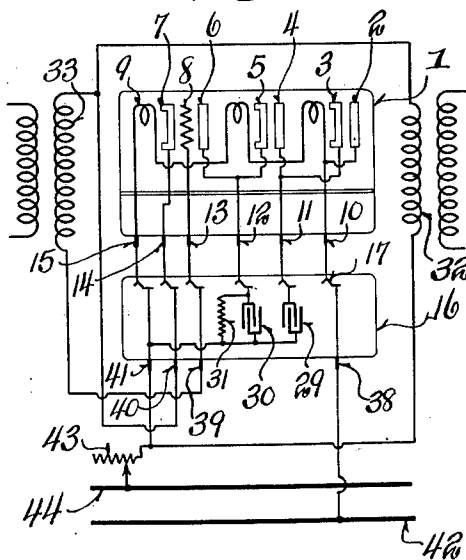


Fig. 4

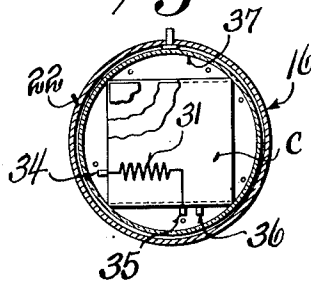


Fig. 5

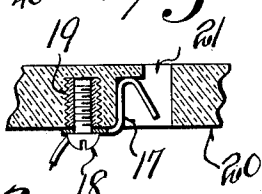


Fig. 3

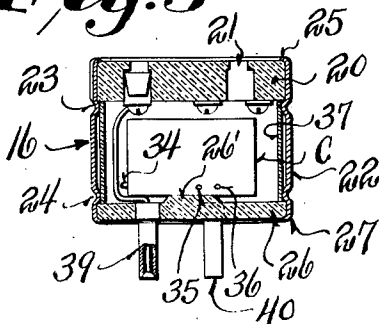
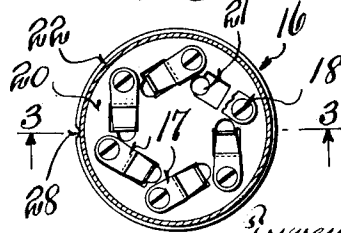


Fig. 2



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UNITED STATES PATENT OFFICE

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TUBE BASE ADAPTER

Application filed August 17, 1927. Serial No. 213,581.

This invention relates to a radio tube base adapter. Objects of this invention are to provide an adapter for vacuum tubes used in radio work which co-operates as a unitary structure with the electron discharge devices, which will receive devices of different types, such for example as those energized directly from either alternating current or from direct current supplied from city mains, such for example as devices of the general type disclosed in the following of my patents: No. 1,570,444, January 19, 1927, for wireless apparatus, No. 1,616,914, February 8, 1927, for electron discharge devices, No. 1,629,171, May 17, 1927, for electron discharge devices, No. 1,700,373, January 29, 1929, for electron discharge devices, No. 1,684,104, September 11, 1928, for electron discharge devices and No. 1,638,499, August 9, 1927, for electron discharge devices, or which may co-operate with devices of the general type disclosed in my Patent No. 1,789,186, granted January 13, 1931, for electron discharge devices.

Further objects are to provide a base adapter which is so constructed that it will cooperate with a base having any number of terminals and which will cooperate with an electrical device having a different number of terminals.

Further objects are to provide a tube base adapter which can be fitted to the standard 4-terminal radio tube socket and to the base of any electron discharge device irrespective of the number of prongs or lead-in conductors carried by the discharge devices and which may be readily made to accommodate any desired number of prongs from the electron discharge devices.

Further objects are to provide a novel form of tube base adapter which may carry electric units not necessarily operating in vacuo, such for example as resistances, condensers, or the like, which co-operates with the electron discharge devices, such as those disclosed in my above noted patents and applications, and which forms with the electron discharge devices a unitary structure, so that the device and the adapter may be handled as a single unit.

Further objects are to provide a tube base

adapter which is so constructed that it may have an unequal number of input and output terminals, so that although the tubes may have a number of prongs different from the standard base nevertheless the adapter when applied to the tube will produce a unitary structure, having the requisite number of prongs for direct co-operation with a standard base.

Further objects are to provide a tube base adapter, which is so constructed that the enclosed electric units can be easily renewed to thereby avoid the disadvantages which result from having the units inaccessible and which permits the ready renewal of a unit by a simple opening up of the adapter in the event that the unit fails.

Further objects are to provide a tube base adapter which may carry any desired unit used in conjunction with the electron discharge devices, or vacuum tube, which protects the unit from the heat developed by the tube, and which is of very simple and compact formation, and which may be readily produced.

An embodiment of the invention is shown in the accompanying drawings, in which:

Figure 1 shows the tube and adapter with parts of each broken away.

Figure 2 is a sectional view on the line 2—2 of Figure 1.

Figure 3 is a vertical sectional view through the device corresponding to a section on the line 3—3 of Figure 2.

Figure 4 is a transverse sectional view on the line 4—4 of Figure 1.

Figure 5 is an enlarged fragmentary sectional view showing one of the output terminals.

Figure 6 is a wiring diagrammatically showing the circuits, and both the tube and adapter.

In my prior patents and co-pending application noted above, I have shown and described certain forms of anodes, cathodes, and grids, and other elements of the tubes, and have shown the tubes formed with rectifiers, current limiting devices, and audions. I employ for the purpose of illustration the same general type of device as may be seen from

Figure 6. The tube is provided with a rectifier provided with an anode 2 and a cathode 3. The current limiting device is provided with an anode 4 and a cathode 5. The audion is provided with an anode 6 and a cathode 7 between which is a grid 8. A single continuous filament 9 is employed to heat each of the several cathodes, so that the cathodes are equipotential cathodes. The tube is provided with prongs 10 to 15 included, which are connected in the following manner, as is apparent from Figure 6. The prong 10 is connected to the anode 2 of the rectifier and one side of the filament 9. The prong 11 is connected to the cathode 3 of the rectifier and the anode 4 of the current limiting device. The prong 12 is connected to the cathode 5 of the current limiting device and the anode 6 of the audion or plate of the audion. The prong 13 leads to the grid 8. The prong 14 is connected to the cathode 7 of the audion. The prong 15 is connected to the other side of the heater, or filament 9. In reality the filament passes through small porcelain or silica twin-bore tubes, or other types of insulating and refractory tubes. The tubes are provided with cathodes formed of metal having a coat of low electron affinity oxides, or other compounds. It is to be seen that the tube is provided with 6 prongs in the form chosen for illustration. In the practice of this invention it is not necessary to place the condensers, resistances, or other devices of this type within the tube itself, but these devices may be placed in a separate member, or tube base adapter, indicated generally by the reference character 16. This tube base adapter is provided with a plurality of output terminals, which may take the form of spring fingers 17. These spring fingers, as indicated diagrammatically at Figure 6, co-operate with the prongs 10 to 15 of the tube to form a positive electrical connection therewith. Their actual mechanical structure is illustrated in Figure 5, and it will be seen that they are held in place by means of screws 18, which are threaded to embedded reinforced sleeves 19. These reinforced sleeves are carried within the bakelite, or other insulating top washer 20, of the adapter. The spring fingers 17 are each positioned adjacent a hole 21 into which one of the prongs of the tube is adapted to be inserted.

This insulating top 20 is carried within a metal sleeve or envelope 22 of preferably cylindrical contour. The metal sleeve is provided with an upper groove 23 and a lower groove 24, and the upper edge 25 of the sleeve is bent over, as shown in Figure 3, to retain the top 20 in position. A bottom 26 is subsequently positioned in contact with the bottom bead 24, and the bottom edge 27 of the sleeve 22 is beaded or spun inwardly to hold the bottom washer or disc 26 in place. This disc, however, is not positioned until after the

parts have been placed within the tube base adapter, as will hereinafter be described. It is, also, preferable to form small lateral depressions 28 (see Figure 2) on the metal sleeve 22 to engage the discs 20 and 26 and prevent their turning.

From Figure 6, it will be seen that a storage condenser 29 is connected to the cathode 3 of the rectifier and also to one side of the filament, or heater, it being noted that the other side of the filament or heater is connected to the anode 2 of the rectifier. Also, from Figure 6, it will be seen that a by-pass condenser 30 and a by-pass resistance 31 are bridged along the audion. That is to say, are connected between the filament terminal and anode of the audion. It is to be noted that the cathode circuit extends through the primary 32 of the output transformer and is connected to the end of the filament through this primary.

The secondary 33 of the input transformer is connected at one end to the audion cathode 7 and at its other end to the grid 8.

Preferably the condensers 29 and 30 are built up as a single block and three terminals lead therefrom, one of the terminals being a common terminal. These terminals are indicated in Figures 3 and 4 by the reference characters 34, 35, and 36. The by-pass resistance 31 may be positioned in any suitable place within the adapter, as has been diagrammatically shown in Figure 4.

The adapter is provided with an insulating inner sleeve 37, which is slipped into place, as shown in Figures 3 and 4. Further it is to be noted that each of the spring fingers 17 has its conductor secured thereto and extending downwardly prior to positioning within the metal sleeve 22. Thereafter the insulating sleeve 37 is slipped into place and the condensers and resistances assembled, as shown in Figures 1, 3, and 4, with their terminals projecting downwardly. These downwardly projecting terminals are therefore readily accessible and may be joined as required by soldering or other suitable process to form the connections indicated diagrammatically in Figure 6.

The tube base adapter is provided with four input terminals 38, 39, 40, and 41, which are connected, as shown in Figure 6. The terminal, or prong, 38 is connected directly to one of the spring fingers 17. The prong 39 is connected to the spring fingers adapted to receive the grid prong 13. The prong 40 is connected to the spring fingers adapted to receive the cathode prong 14. The prong 41 is connected to the spring fingers adapted to receive the prong 15 from the filament of the tube. In addition to this, the condensers and resistances are connected as are shown in Figure 6 and as previously described. It will be seen, therefore, that the upper side of the adapter has six output terminals and the

lower side has four input terminals. These input terminals are adapted for reception in the usual base socket, or tube holder, of standard construction and thus, although the tube has a different number of prongs, nevertheless by using this adapter would be suitable for use in a standard tube base socket.

In order to complete the description, it is to be noted that one form of wiring that may be employed with this tube is shown in Figure 6, from which it will be seen that the prong 38 is connected to one of the mains 42, and a prong 41 is connected to one side of the primary 32 of the output transformer and is also connected through a rheostat 43 to the other main 44. These mains may be either alternating or direct current mains of the usual voltage for supplying domestic lights, or power.

It will be seen that a novel form of device has been disclosed by this invention whereby the entire device forms a unitary structure provided for the rectification of alternating current, or the use of direct current, the smoothing out of any pulsations from the rectifier, and the subsequent use of the perfectly smooth and uniform current by the audion. Further it will be seen that only those portions of the device which require vacuum are placed within the evacuated envelope, or tube proper, and that the other devices such as the condensers and resistances are placed in the tube base adapter.

It is to be noted further that the utmost ease of connecting the terminals or prongs 38 to 41 with their appropriate conductors may be had by providing hollow prongs through which the conductors are placed and subsequently soldering the lower ends of the conductors to the prongs, as shown in Figure 3 for instance. Further if desired the bottom washer 26 may be provided with an integral projection 26' upon which the condensers may rest. The block of condensers is indicated generally by the reference character C in Figures 1, 3, and 4.

It is to be understood clearly that, although condensers and resistances have been described as the electrical devices carried within the adapter that, nevertheless other electrical devices, such for example as grid leaks, coupling condensers, coupling resistances, coupling transformers, or other apparatus, may be carried within the adapter if required.

It is to be seen, therefore, that this invention very much simplifies radio receiving circuits and in addition to this markedly simplifies the construction of tube, as it eliminates the various parts that would have to be provided if the devices were carried within the tube itself. However, the unitary characteristic of the tube is not lost by this invention for the reason that the adapter forms with the tube a unitary structure.

It is obvious that the adapter can be made for use with battery tubes, or other types of tubes, and may enclose grid leaks, grid condensers, coupling resistances, or other electrical devices used in the radio receiving set. Also any other type of terminals may be used on the adapter to fit any type of prongs or terminals used on the tubes or bases with which the adapter co-operates.

Although the invention has been described in considerable detail, such description is intended as illustrative rather than limiting as the invention may be variously embodied and as the scope of such invention is to be determined as claimed.

Although the adapter has been shown as designed to cooperate with one form of electrical device, it is obvious that it may be so made that it will cooperate with any desired type of electrical device without departing from the spirit of the invention.

I claim:—

1. A base adapter for cooperation with a radio receiving device having a certain number of terminals and for cooperating with a base having a different number of terminals, said base adapter having means on opposite sides cooperating with the terminals of the said device and base and having intermediate means for electrically grouping the means on one side of the base adapter to conform to the number of means on the other side of the base adapter.

2. A base adapter adapted to cooperate with a vacuum tube having a certain number of terminals and with a base having a different number of terminals, said adapter having a plurality of contacts adapted to engage the terminals of the tube and base and having smoothing means connected to certain of the contacts.

3. A radio tube base adapter comprising an envelope having a number of input terminals on one side and having a different number of output terminals on the other side, and an electrical instrumentality carried by said envelope for electrically converting the number of input terminals on one side to a different number of output terminals on the other side.

4. A radio tube base adapter comprising a hollow body portion having an unequal number of terminals on different sides for engaging the terminals of an alternating current tube and the terminals of a base, said adapter having smoothing means including a condenser carried within its hollow interior and connected to an output and an input terminal, certain of said input and output terminals being connected within said body portion.

5. A radio tube base adapter comprising a body portion having an unequal number of cooperating input and output terminals, smoothing means carried within said body

portion and connected to an input and an output terminal, certain of said input and output terminals being connected within said body portion.

- 5 6. An adapter for cooperation with an electron discharge device adapted to serve as a rectifier and as a signal responsive device and having a number of terminals, and for cooperation with a base provided with a cer-
10 tain number of terminals, said adapter having a group of input terminals adapted for engagement with the terminals of said base and having a plurality of output terminals adapted for contact with the terminals of
15 said device, said adapter having terminal connecting means and having an electrical instrumentality forming with said adapter a unitary structure, said instrumentality having only two terminals and being automati-
20 cally connected to said rectifier when said adapter receives said electron discharge device, one terminal of said instrumentality being connected to an output terminal only, and the other terminal of said instrumentality being connected to an output and an in-
25 put terminal.

7. An adapter for cooperation with an electron discharge device adapted to serve as a rectifier and as a signal responsive device,
30 and for cooperation with a base provided with a plurality of terminals, said adapter having a certain number of output terminals and a plurality of input terminals, said adapter having terminal connecting means,
35 and having a condenser forming with said adapter a unitary structure, said condenser having one terminal connected to an output terminal and having its other terminal connected to an input and an output terminal.
40 In testimony that I claim the foregoing I have hereunto set my hand at Milwaukee, in the county of Milwaukee and State of Wisconsin.

ARISTOTE MAVROGENIS.

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