April 9, 1935. F. S. McCULLOUGH 1,996,820

BASE AND SOCKET STRUCTURE FOR RADIO TUBES

Original Filed Feb. 24, 1925

Fig. 1.

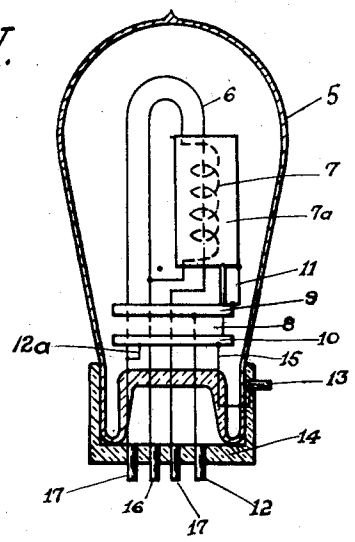


Fig. 2.

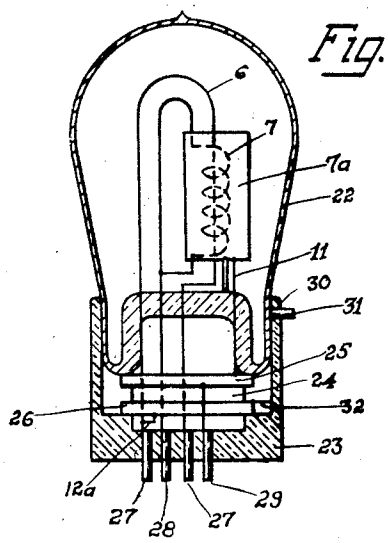


Fig. 3.

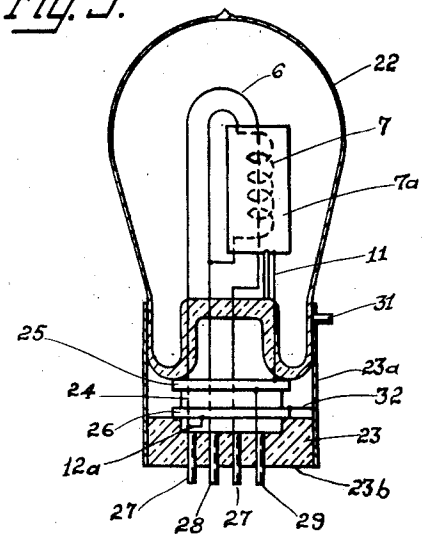


Fig. 4.

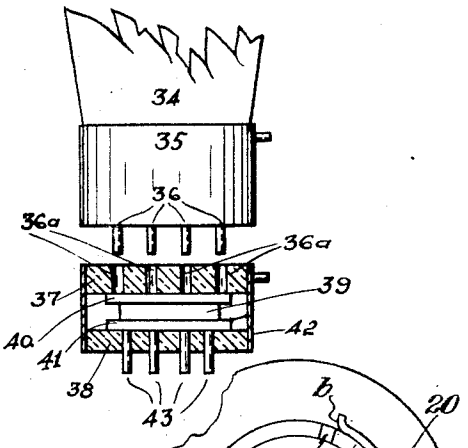


Fig. 5.

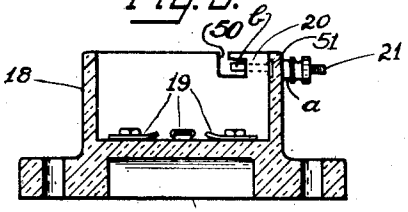
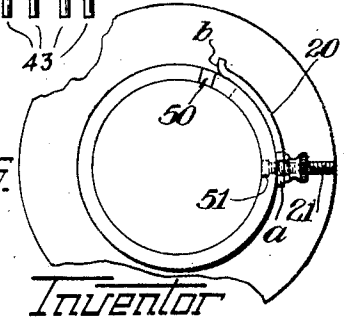


Fig. 6.



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UNITED STATES PATENT OFFICE

1,996,820

BASE AND SOCKET STRUCTURE FOR RADIO TUBES

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Original application February 24, 1925, Serial No. 11,083. Divided and this application September 11, 1929, Serial No. 391,773

3 Claims. (Cl. 173—328)

This is a divisional application of my co-pending application Serial Number 11,083, filed February 24, 1925.

This invention pertains to radio tubes, particularly receiving tubes, and to a base and socket construction therefor.

The invention relates particularly to the type of tube shown in my patent for Thermionic tube construction No. 1,528,735, issued March 3, 1925 and constitutes an improvement thereof.

The present invention proposes to work out and carry forward the general purposes of the invention disclosed in that patent in a novel and unique manner.

In my said Letters Patent it is pointed out that considerable improvement can be made in receiving apparatus by the inclusion of the radio frequency transformer coils of a receiving circuit inside the tube, to thereby reduce the length of interconnecting lead wires and reduce the capacity and impedance of the circuits.

Similar results may be obtained by placing the transformer in an integral or removable base structure for the tube where it is in immediate proximity to the electrodes of the tube.

The present invention has for a principal object to provide means at the base of the tube for coupling a tube having a transformer either inside or at its base into a circuit.

A further object of the invention is to provide a base member, either fixed or removably secured to the tube, in which the transformer may be housed.

These and other objects and advantages are attained by the invention, which may be understood by reference to the accompanying drawing, which are diagrammatic, and to the details of which the invention is not confined. In the drawing:

Fig. 1 represents a section through a tube constructed in accordance with my invention and having the transformer inside the evacuated vessel, the drawing showing one form of my present improvement;

Fig. 2 is a section through a tube having the transformer in the base of the tube;

Fig. 3 is a view similar to Fig. 2 of a modified base structure;

Fig. 4 shows the invention applied to a tube adapter;

Fig. 5 shows a socket for use with a tube or adapter embodying the invention;

Fig. 6 is a top view of a portion of my socket showing certain of the details in cross section.

Referring to Fig. 1, 5 designates the usual envelope having a filament 6, a grid 7, and plate 7a suitably mounted in the tube. Within the tube is a supporting member 8, on which is carried two windings 9 and 10, which may constitute the windings of a radio frequency transformer. The connections or circuit for the transformer may be arranged according to the requirement of the circuit in which the tube and transformer is included. Such circuits are outlined in my said patent.

In the present figure, I have shown the primary 9 in series with the plate through connection 11 and the plate contact pin 12 of the tube. The secondary 10 may have a connection 12a with the filament and have a terminal connector 13 on the outside of the base 14 of the tube through wire 15. The connector 13 may be the usual pin for locking the tube in the socket, as is well known in the art, or it may be a separate pin than the locking pin, or it may be the metal shell of the base when, as it frequently happens, the shell 14 has a metal band forming the side of its base structure. The tube has the usual grid terminal pin 16 and filament pins 17.

With this arrangement, it is not necessary to bring a lead wire out through the glass envelope, as disclosed in my prior patent and all circuit connections can be made at the socket. In Fig. 5, I have shown a suitable socket 18 which may be of the standard type with the usual contacts 19 at the bottom thereof. In addition, a contact strip 20 may be put in the socket with an exterior terminal connector 21 for contact with the pin 13 or 31 or other terminal for wire 15. The contact strip 20 has its end in contactual engagement with the terminal 21 and extends along the outer edge of the annular wall with its free end b extending into the horizontal portion of the bayonet slot 50. The contact strip 20 is under tension so as to normally hold the free end in the slot but when a terminal pin such as 13 or 31 is placed in the slot and the tube is turned, the pin 13 or 31 engages the free end b of the strip 20 and forces it outward and permits the pin to pass entirely into the slot. The head 51 of the terminal connector 21 is inset in the wall and makes an additional contact with the metal shell 42 when an adapter such as that shown in Fig. 4 is used.

In Fig. 2, I have shown a modification wherein the usual tube construction 22 is provided with the usual electrodes. Cemented to the neck of the vessel in the manner commonly practiced in the art, is a base 23. Inside the base is a transformer construction 24 of which 25 may be

the primary and 26 the secondary. This transformer is shown as having its primary in series with the plate, as in Fig. 1, though obviously the transformer might be in the grid circuit. The usual two filament connector pins 27 are carried on the base, and 28 is the usual grid pin and 29 the plate pin.

On the tube base at 30 is a contact 31 connected with one of the transformer coils through wire 32, this pin serving the same as and being arranged similar to pin 13 of Fig. 1.

A tube as thus constructed may be used with the standard socket as modified in Fig. 5 to provide a contact for the fifth pin 13 or 31.

In Fig. 3, I have shown an arrangement similar in all respects to Fig. 2 with the exception that, instead of a one-piece base of insulating material, as shown in Fig. 2, the base 23 has a metal band 23*a* and a bottom part 23*b* of insulating material. Such a base is often used in present forms of tubes. With this construction, the wire 32 may be connected to the metal shell instead of to a pin on the base, as described in Fig. 2.

In Fig. 4, I have shown a modification permitting present forms of tubes to be used without alteration, and obtain the advantages of the structures shown in Figs. 1, 2 and 3. In this view, I have shown a base member, in which the transformer is contained, adapted to receive the base of the usual form of tube.

In this figure, 35 designates the base of a standard or ordinary tube 34 and 36 are the several contact pins on the base arranged in the usual manner. For the purpose of illustration, I have shown these pins in this figure, as in the other figures, in line instead of being grouped as they ordinarily are on a tube.

These pins are adapted to be projected into suitably arranged holes 36*a* in a separable base or socket member 37. This base or socket member may be of the usual socket type or may be in the form of a special socket arranged to fit into a standard type of socket and commonly termed an adapter. I have illustrated the special or adapter form of socket. It may comprise a suitable body of insulating material 38 in which is the transformer 39 having windings 40 and 41, and may have a metal band 42. On the body are suitable terminals, such as pins 43, for engagement with contacts in the standard socket, such as shown in Fig. 5. When the usual tube is plugged into the socket or adapter, the same result is obtained as is obtained, for instance, in the tube of Fig. 3. The metal band 42 may be the fifth contact point for one of the transformer coils.

In each construction, I have provided an arrangement wherein the transformer is, in effect, a part of the tube. The length of the lead wires can be minimized and the impedance of radio frequency amplification circuits greatly reduced. This is of particular advantage in extremely short wave reception. The invention also enables receiving sets to be more easily and compactly assembled.

It will be obvious that various detail changes may be made in the construction and design of parts within the contemplation of the invention and under the scope of the appended claims.

Having described my invention, what I claim as new and desire to secure by United States Letters Patent is:

1. In a base socket for audion tubes, an annular wall of insulation forming a recess, a slot in said wall connecting with the outer free edge thereof, a contact strip carried by said annular wall and having a portion extending into said slot to engage a terminal pin on the base of an audion tube, and a terminal connector on the periphery of said annular wall electrically joined to said contact strip.

2. In a base socket for audion tubes, an annular wall of insulation forming a recess, a slot in said wall connecting with the outer free edge thereof, a contact strip adjacent to said slot and having a portion extending into said slot to engage a terminal pin on the base of an audion tube, and a terminal connector on the periphery of said annular wall electrically joined to said contact strip.

3. In a base socket for audion tubes, an annular wall of insulation forming a recess, said annular wall having a bayonet slot therein adjacent to the free edge thereof, a contact strip adjacent to said bayonet slot and having a portion extending into said slot to engage a terminal pin on the base of an audion tube, and a terminal connector on the periphery of said annular wall electrically joined to said contact strip.

FREDERICK S. McCULLOUGH.