Feb. 17, 1925. 1,526,353

S. D. LIVINGSTON

MOUNTING FOR RADIO VACUUM TUBES

Filed Sept. 26, 1923

FIG 1

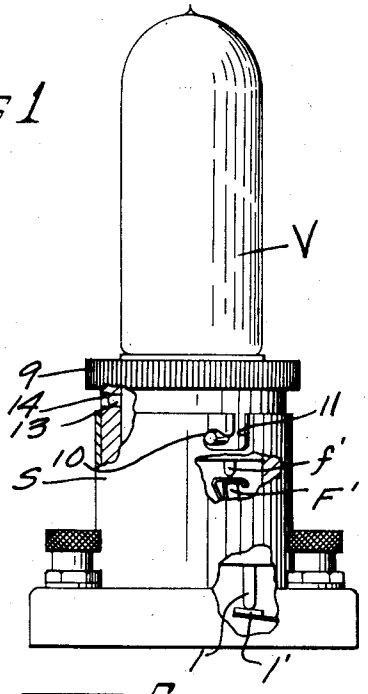


FIG 2

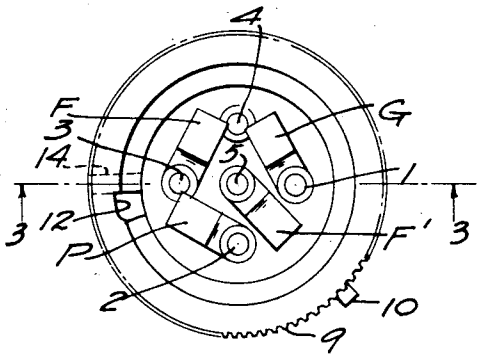


FIG 3

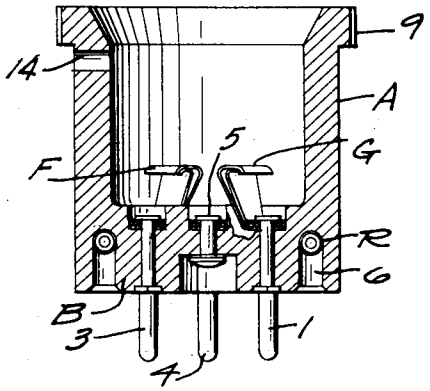


FIG 5

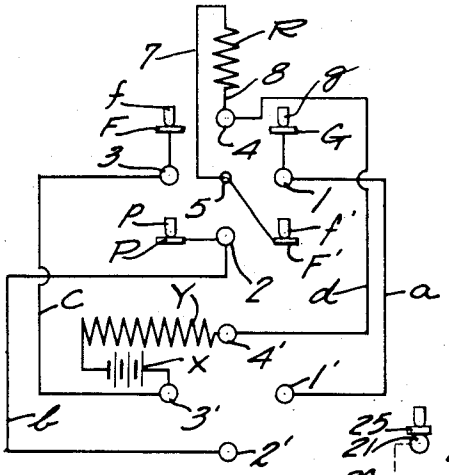


FIG 4

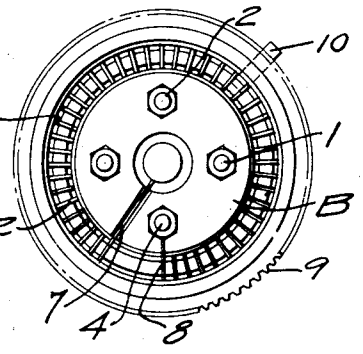
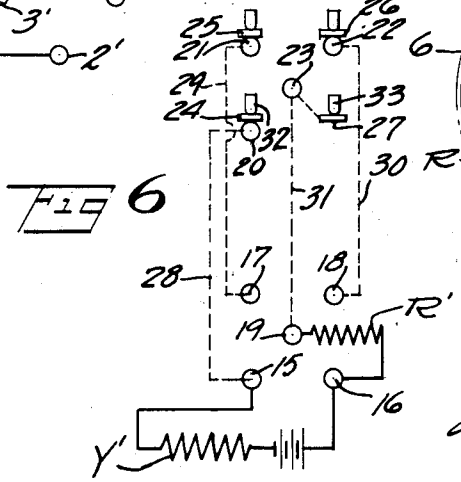


FIG 6



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UNITED STATES PATENT OFFICE.

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MOUNTING FOR RADIO VACUUM TUBES.

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To all whom it may concern:

Be it known that I, STANLEY D. LIVINGSTON, a citizen of the United States, and a resident of Freeport, Long Island, county of Nassau, and State of New York, have invented certain new and useful Improvements in Mountings for Radio Vacuum Tubes, of which the following is a specification.

My invention relates to vacuum-tube mountings, particularly as applied in the radio art, and its object is to provide a mounting for special types of lamps which do not fit into previously constructed sockets of standardized form.

Broadly considered, my invention comprises a combined tube and resistance mounting as a unitary structure, which is adapted to fit on or into a mounting designed for another type of tube.

It is generally known that vacuum tubes for radio sets (commonly called tubes or lamps) have for years been made with a base adapted to fit into a certain form of socket, which has become more or less standardized. Those lamps operate on a certain voltage and require a certain resistance to control the filament current.

In addition to lamps with a standard base, there have come into the market several types of smaller lamps with a base that will not fit into a standard socket. These small lamps operate on a considerably lower amperage than the standard lamps, and therefore require a greater resistance in the filament circuit to cut down the battery current. So it was necessary for the radio amateur, in using a small lamp, to provide an extra rheostat; otherwise, he would run the risk of damaging his lamp filament. But even when such an extra resistance was provided, there was always the danger of forgetting to cut it into the circuit, especially when experimenting with a standard lamp and a small lamp at the same time.

I overcome the foregoing difficulties and objections by providing a mounting for small lamps of such construction that, when inserted in a standard lamp mounting, the required resistance for the small lamp is automatically included in the filament circuit. In the embodiment that I prefer at the present time, my new and improved mounting consists of a socket constructed to receive the base of a special type of lamp and adapted to fit into a standard socket. This adapter socket, as I may call it, carries a resistance element as a part thereof. This resistance is so connected that when the auxiliary or adapter socket is inserted in a standard socket or similar lamp mounting, and when a lamp is in the adapter socket, the resistance is automatically included in the filament circuit, without any thought or act of the operator. This absolutely removes all danger of injuring the small lamps.

In a modification of my invention, the extra resistance for the small lamps may be embodied in the standard socket in such a way that, when a standard lamp is inserted, the resistance is out of circuit, but when the auxiliary or adapter socket with its small lamp is inserted in the main or standard socket, the extra resistance is automatically cut into the filament circuit.

In the accompanying drawings, which form part of this specification—

Fig. 1 is an elevational view showing my new lamp socket mounted in a prior lamp socket of standardized design, certain parts being broken away for clearness.

Fig. 2 is a top plan view of my new socket;

Fig. 3 is a cross-section on line 3—3 of Fig. 2;

Fig. 4 is a bottom plan view of the socket, showing the resistance element mounted in the base;

Fig. 5 is a diagrammatic view of electrical connections indicating how the resistance element mounted in my new socket is included in the filament circuit of the lamp; and

Fig. 6 is a diagrammatic view of a modification in which the extra resistance is mounted in the main socket instead of the adapter socket.

In the broader aspect of my invention, my new and improved lamp mounting may be embodied in any practical form, but at the present time I prefer to construct it in the shape of a socket adapted to fit into a larger socket, such as has heretofore been used for certain types of vacuum tubes with a standard base. As shown in the drawings, my new socket comprises a cylindrical shell A having a base B. The shell and base may conveniently be molded as a single piece from suitable material, such as bakelite, or

any other composition adapted for that purpose. The shell A fits into a socket S, which represents any socket for mounting vacuum tubes provided with what is commonly known as a standard base. So I may conveniently call the socket S a standard socket, without intending to designate any particular type or structure of socket.

The base B of the adapter socket carries four contact pins 1, 2, 3 and 4. These pins project from the underside of the base and are arranged to engage contacts 1′, 2′, 3′ and 4′, respectively, of socket S, when the adapter socket is properly inserted in the main socket. This engagement of the contact pins of the adapter socket with the terminals of the main socket is partly shown in Fig. 1 and is diagrammatically indicated in Fig. 5, where the lines *a*, *b*, *c* and *d* indicate the electrical contacts between the pins of the adapter socket and the terminals of the main socket.

Inside the shell of the adapter socket are four terminals marked F, F′, G and P. These terminals are of any suitable construction, but are preferably resilient or spring-pressed, so as to remain in firm contact with the pins of the vacuum tube inserted in the socket. Such a tube is shown at V in Fig. 1. The terminals F, F′, G and P, are so arranged that when the tube V is inserted in the socket, the terminals F and F′ connect with the filament contacts of the lamp, the terminal G with the grid contact, and terminal P with the plate contact. Terminal F is electrically connected with contact pin 3 in any suitable way. In the drawings, I have shown the lower end of the spring terminal riveted to the inner head of pin 3. In the same way, terminal G is connected with contact pin 1, and terminal P with contact pin 2. In the center of base B is a contact or binding post 5, to which one end of terminal F′ is connected. So it is clear that, although the terminal F′ engages the filament contact *f′* of the vacuum tube, it is not connected electrically to any one of the four contact pins of the adapter socket. It will also be seen that contact pin 4 is not connected to any of the four terminals F, F′, G and P.

The base B of the adapter socket is provided with a circular groove or recess 6, in which is mounted a resistance element R. The groove 6 is preferably left open after the insertion of the resistance, whereby the latter is open to the free air for cooling. In Figs. 3 and 4, I have shown the resistance R in the form of a coil of fine wire, but it is obvious that it may be of any practical construction. As shown in Fig. 4, one end of resistance R is connected to the central pin or binding post 5, and the other end is connected to the contact pin 4. These two electrical connections are indicated in Figs. 4 and 5 by wires 7 and 8, respectively. So it is clear that the resistance R is connected between the contact pin 4 and the filament terminal F′.

The upper end of shell A of the adapter socket may be provided with a knurled flange 9, whereby the socket may be easily grasped and manipulated. A pin 10, projecting from shell A, is adapted to engage in a bayonet slot 11 of the main socket S. The shell A is also provided with a recess 12 on the inside for receiving a pin 13 projecting laterally from the base of tube V. With the recess 12 communicates a hole 14 for receiving the pin 13 when the lamp is properly inserted in the adapter socket.

The diagrammatic connections shown in Fig. 5 clearly indicate how the extra resistance R is automatically included in the filament circuit of lamp V when the adapter socket is properly mounted on a standard socket. The reference characters used in Fig. 5 refer to the same parts as corresponding characters in the other figures, except that those parts are indicated merely in a diagrammatic way in order to show the electric circuit connections. In this figure, the filament battery X and main resistance Y are connected to the terminals 3′ and 4′ of the main socket. When the adapter socket with its lamp V is mounted on the main socket, the main resistance Y and the extra resistance R are automatically included in the filament circuit of the lamp, as will be readily seen. It will be understood, of course, that the pins *f* and *f′* are connected through the filament of the lamp.

In Fig. 6, I have diagrammatically indicated a modified construction, in which the extra resistance R′ required for the special type of lamp V is mounted in the main socket instead of the adapter socket. In this figure, the main socket is diagrammatically represented by the terminals 15, 16, 17 and 18. There is a fifth terminal 19 at the center of the socket, but this terminal does not engage the usual contact pins of a lamp. The terminals 15 and 16 are the filament terminals. Between the filament terminal 16 and the extra terminal 19 is connected the resistance element R′.

The adapter socket is represented in Fig. 6 by four contact pins 20, 21, 22 and 23, which are supposed to project from the underside of the base, similar to the contact pins 1, 2, 3 and 4. On the inside of the adapter socket in this construction are four terminals 24, 25, 26 and 27, which may be considered as constructed and arranged similarly to the terminals F, F′, G and P. Terminal 24 is connected to contact pin 20, terminal 25 is connected to contact pin 21, terminal 26 is connected to contact pin 22, and terminal 27 is connected to the central contact pin 23. When the adapter socket is in-

serted in the main socket, contact pin 20 engages terminal 15, as diagrammatically indicated by line 28; contact pin 21 engages terminal 17, as indicated by line 29; contact pin 22 engages terminal 18, as indicated by line 30; and the central contact pin 23 engages the central contact 19, as indicated by line 31.

When a vacuum tube is inserted in the adapter socket of Fig. 6, the filament contact pins 32 and 33 of the lamp engage the terminals 24 and 27, respectively. Consequently, the extra resistance R′ is automatically included in series with the main resistance Y′, when the proper connections are made.

It is thus clear that the arrangement of Fig. 6 operates in substantially the same way as that of Fig. 5. When the main socket in Fig. 6 is used without the adapter socket, the resistance R′ is not included in the lamp circuit, because the central terminal 19 is not engaged by any of the contact pins projecting from the base of the lamp.

It will be seen from the foregoing that I have provided an exceedingly simple device for mounting special types of vacuum tubes, and at the same time insuring the inclusion of the required extra resistance in the filament circuit. The mere mounting of a lamp in the adapter socket automatically takes care of the extra resistance, so that any injury to the lamp on account of insufficient resistance is impossible.

I claim as my invention:

1. The combination with a main socket having the usual contacts for a radio vacuum tube, of an auxiliary socket consisting of an insulating shell or cup constructed to fit into said main socket and having contact pins arranged to engage the contacts of the main socket, said shell being adapted to receive a vacuum tube, and a resistance mounted in said shell as a part thereof, said resistance being automatically connected in the filament circuit of the tube in said auxiliary socket.

2. As a new article of manufacture, an auxiliary vacuum-tube socket comprising a shell constructed to fit into a main socket and adapted to receive a vacuum tube, said auxiliary socket carrying a plurality of contacts, and a resistance element mounted in said shell and so connected to said contacts as to be included in the filament circuit of the tube.

3. As a new article of manufacture, a vacuum-tube socket comprising a cylindrical shell adapted to receive a vacuum tube and having a plurality of contacts, the bottom of said shell being provided with an open circular recess, and a resistance element mounted in said recess and so connected to said contacts as to be included in the filament circuit of the tube.

4. As a new article of manufacture, an auxiliary vacuum-tube socket consisting of an insulating shell constructed to fit into a main or standard vacuum-tube socket, and a resistance mounted in a recess in said shell for the filament circuit of the tube.

5. An auxiliary vacuum-tube mounting comprising a base, four contact pins projecting from the underside of said base and arranged to engage the usual terminals of a standard lamp mounting, four terminals mounted on the upper side of said base and arranged to engage the contact pins of a vacuum tube in said auxiliary mounting, three of said terminals being electrically connected to three of said contact pins, a resistance element carried by said mounting and having its ends electrically connected to the fourth contact pin and the fourth terminal, and means for holding a vacuum tube in operative position on said base.

6. An auxiliary vacuum-tube socket comprising a shell having a base provided with a groove or recess, four contact pins projecting from the underside of said base and arranged to engage the usual terminals of a standard lamp socket, four terminals mounted on the upper side of said base and arranged to engage the contact pins of a vacuum-tube inserted in said shell, three of said terminals being electrically connected to three of said contact pins, a resistance element mounted in said recess in the base, and means for electrically connecting the ends of said resistance element respectively to the fourth contact pin and the fourth terminal.

STANLEY D. LIVINGSTON.