

Jan. 5, 1932.

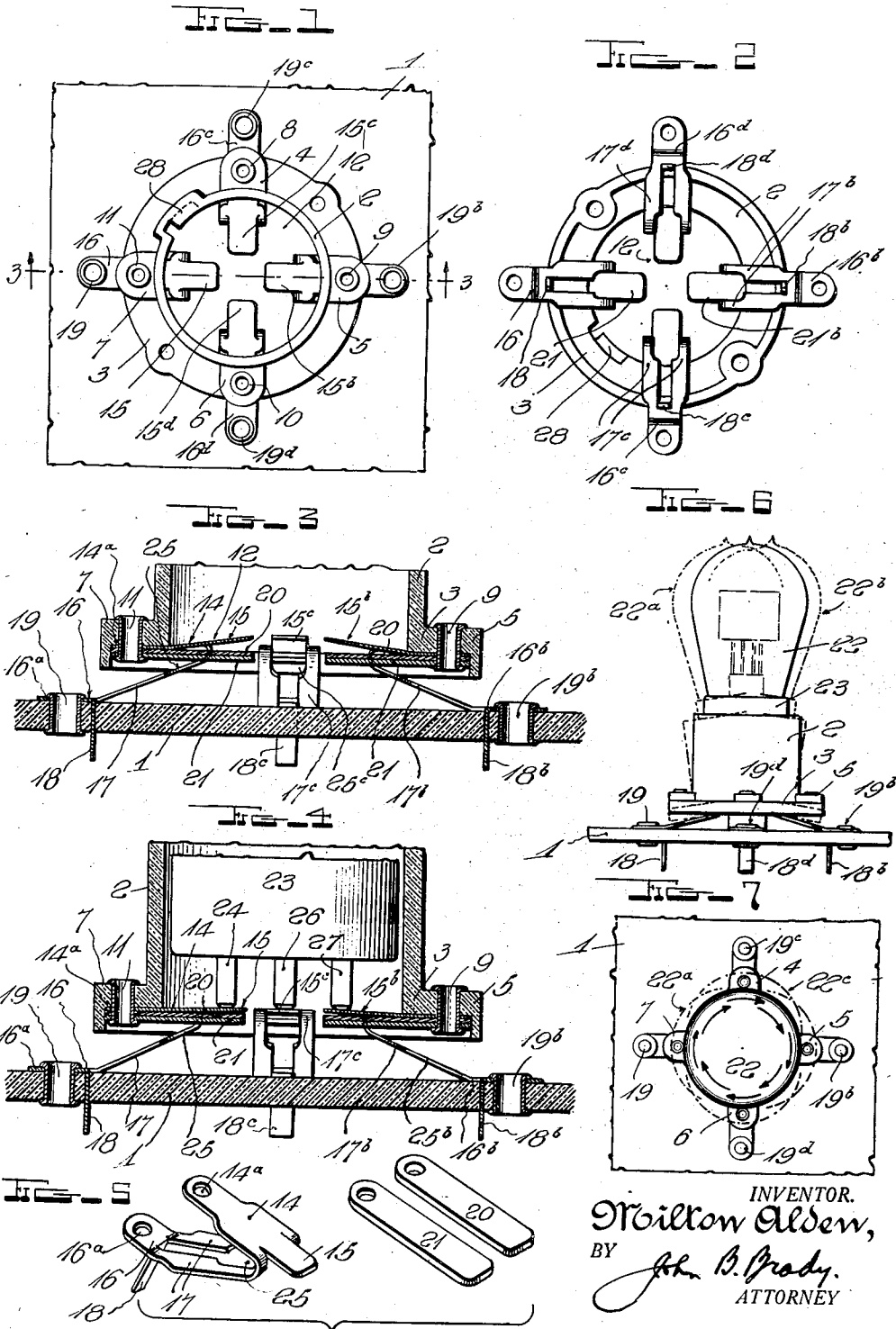
M. ALDEN

1,839,633

ELECTRON TUBE SOCKET

Filed Dec. 2, 1925

2 Sheets-Sheet 1



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Fig. 8

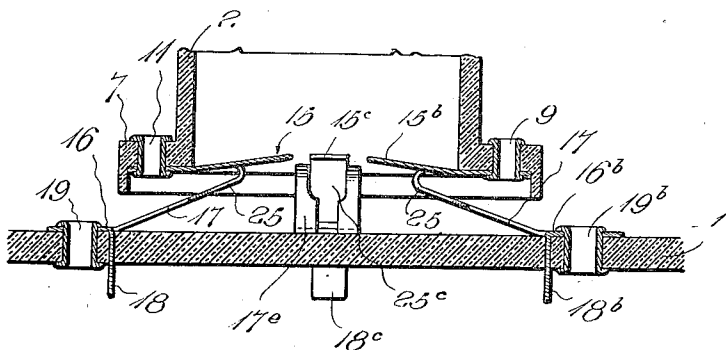


Fig. 9

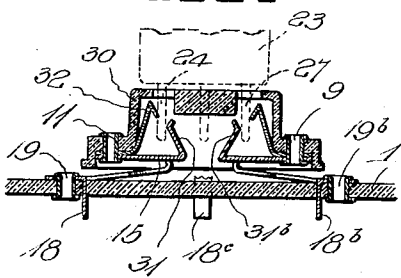


Fig. 11

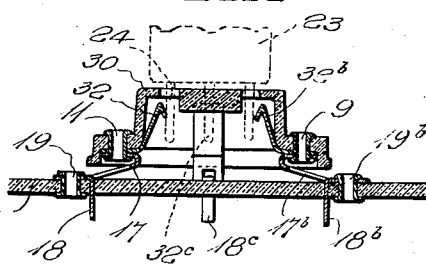


Fig. 10

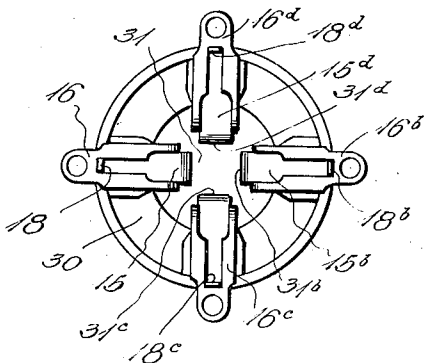
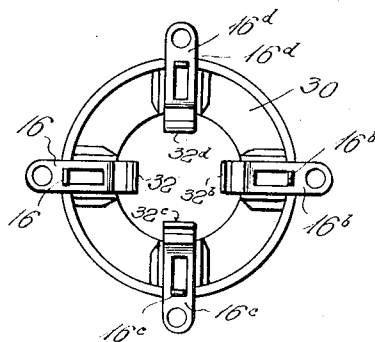


Fig. 12



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UNITED STATES PATENT OFFICE

MILTON ALDEN, OF SPRINGFIELD, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO RADIO INVENTIONS, INC., A CORPORATION OF NEW YORK

ELECTRON TUBE SOCKET

Application filed December 2, 1925. Serial No. 72,794.

My invention relates broadly to electron tube sockets and more particularly to a construction of resilient mounting for electron tube sockets for preventing mechanical vibrations, shocks and jars from damaging the relatively delicate electrode construction of the electron tube.

One of the objects of my invention is to provide a mounting for an electron tube socket which is simple in mechanical construction and yet effective for preventing external mechanical vibrations, shocks and jars from being transferred to the electron tube structure.

Another object of my invention is to provide a construction of contact for a resilient electron tube socket mounting where a plurality of sheets of spring metal are arranged to be readily die-stamped for forming a resilient electrical contact for the socket mounting.

Still another object of my invention is to provide a construction of contact for an electron tube socket in which the contact members are placed under tension upon the insertion of an electron tube in the mounting whereby the electron tube is suspended resiliently and thus protected against undesirable mechanical vibration.

Still another object of my invention is to provide a resilient electron tube socket mounting in which electron tubes of long or short pin terminals may be readily utilized and proper electrical connection made with the tube.

A further object of my invention is to provide a construction of contact for a resilient electron tube socket mounting in which a pair of parallel supporting faces are provided in different planes interconnected by an angularly disposed connecting member forming both an electrical connection and terminal for the contact and insuring a flexible suspension for the contact.

A still further object of my invention is

the provision of an electron tube socket mounting for electron tubes where a substantially oscillatory movement is imparted to the electron tube under conditions of mechanical vibration as distinguished from straight line motion of the tube for further decreasing the effects of mechanical shocks upon the tube electrodes.

Other and further objects of my invention will be understood from the specification hereinafter following by reference to the accompanying drawings, wherein:

Figure 1 is a plan view of the electron tube socket mounting showing the arrangement of contacts therein; Fig. 2 is a plan view looking beneath the electron tube socket mounting; Fig. 3 is a partial cross-sectional view through the socket mounting taken on line 3—3 of Fig. 1; Fig. 4 is a partial cross-sectional view through the electron tube socket mounting showing a tube inserted in the socket; Fig. 5 is a view showing the elements which make up the contact construction for the socket mounting; Figs. 6 and 7 show a side elevation and a plan view of the electron tube mounting with an electron tube carried therein and illustrating the oscillatory movement which is imparted to an electron tube carried by the socket under conditions of mechanical vibrations; Fig. 8 is a cross-sectional view of a modified construction of resilient socket mounting; and Figs. 9 and 10, and 11 and 12 are cross-sectional and plan views of modified constructions of electron tube sockets embodying the principles of my invention.

Referring to the drawings in more detail, reference character 1 designates a base on which the electron tube socket or group of sockets within a radio receiver or repeater system may be mounted. Reference character 2 designates the shell of the electron tube socket which may be molded from insulating material with a flange 3 at the base thereof. At diametrically opposite points

around the periphery of the shell 2 and molded integrally with the flange 3 I may provide projections 4, 5, 6, and 7 forming supports for the resilient contacts. The contacts are secured to the projections by means of rivets 8, 9, 10 and 11 flattened against the upper and lower surfaces of the projections. The contacts indicated generally at 12 comprise a longitudinally extending sheet metal strip which is die-stamped and cut to a shape in which two substantially parallel strip portions 14 and 16 are formed inter-connected by an angularly disposed resilient portion 17. The portion 14 has its end narrowed and apertured at 14a and secured in position by the rivet 11. The outer extremity 15 of the portion 14 forms the contact for engagement with the pin terminals of an electron tube inserted in the socket. The portion 14 has a width which is sufficient to permit the contact strip 15 to be cut therefrom and the side portions bent at an acute angle with respect to the portion 14 as represented at 17. The parallel strip portion 16 has an extended tongue 18 which is punched from the material of the angularly disposed portion 17. The tongue 18 forms both a soldering terminal for the contact and extends through the panel 1. The portion 16 is apertured at 16a enabling the contact to be secured in position by a tubular rivet 19 on base 1 providing an electrical connection between the contacts and other parts of the associated apparatus. The contacts 12 may be reinforced by laminated resilient strip members 20 and 21 which are secured by the rivets 11 adjacent the contact portion 14 and which pass through the aperture 25 formed by the removal of the strip 15 from the angularly disposed portion 17 of the contacts 12. The resilient laminated strips 20 and 21 form surfaces against which the contacts 15 abut, increasing the resilient properties of the contacts. It is thus possible to use thin and highly resilient strips for the supports 17 and the contacts 14 and to reinforce the contacts by the heavier spring strips 20 and 21. I have indicated four contacts projecting radially inwardly in the electron tube socket and having parts similarly numbered. That is to say, contact 15b has parts numbered similarly to those illustrated for contact 15 with the subscript "b" added, and contacts 15c and 15d have parts similarly numbered with the subscripts "c" and "d" respectively.

In Figs. 4, 6 and 7 I have indicated an electron tube 22 having a base portion 23 mounted in the electron tube socket. The electron tube has four pin terminals projecting therefrom, three of which have been illustrated in Fig. 4 at 24, 26, and 27 in engagement with the contacts 15, 15b and 15c respectively. It will be observed that the socket may be effectively employed for mounting electron tubes independently of the

length of the pin terminals of the tubes. It will also be observed in Figs. 3 and 4 that upon insertion of an electron tube in the socket, where the tube is locked in the bayonet 28, the shell 2 actually rises with respect to the main base 1 by reason of the downward movement of the contacts 15, 15b, 15c and 15d, which movement imparts a corresponding downward movement to the angularly disposed portions 17, 17b, 17c and 17d, which rock about fulcrums 16, 16b, 16c and 16d displacing the shell 2 to a greater distance above the base 1 and placing the contacts under tension in a condition whereby mechanical vibrations are prevented from causing injury to the electrodes of the electron tube. By reason of the resilient spring suspension secured in my electron tube socket mounting, mechanical vibrations tend to impart an oscillatory movement to the electron tube as represented in Figs. 6 and 7 where the tube may move to dotted line positions 22a, 22b and 22c and finally come to rest without injury to the electrodes of the electron tube. The soldering tabs 18, 18b, 18c and 18d pass through the panel and permit connections to be made below the panel. In socket constructions heretofore available it has been the practice to make connections through bolts or rivets which may become loose and develop a noisy circuit. The soldering taps in the socket construction of my invention are a part of the metal which forms the contact and hence perfect electrical connection can be made with the socket contacts.

In Figure 8 I have shown a modified socket construction where it is unnecessary to provide laminated contacts. In this construction the contact 15 is not supplemented with laminated resilient strip members. This construction is extremely practical and inexpensive in manufacture and assembly.

In Figs. 9 and 10, I have shown a socket construction in which an insulated mounting 30 is provided with apertures or openings 30' in the top face thereof through which the pin terminals 24 and 27 of an electron tube represented at 23 may be passed. The contacts are mounted beneath the insulated body portion 30 and comprise the spring contact construction 15 heretofore described, but with the extremity of the contact 15 bent upwardly upon itself as shown at 31 to make wiping contact with the side of the pin terminals. An additional side wiping contact is provided as represented at 32 for establishing connection with the opposite side of the pin terminals. The contacts 31 and 32 are so arranged that any length of pin terminal may be readily fitted within the tube socket.

In Figs. 11 and 12, I have illustrated a contact construction in which only the contact 32 is arranged to wipe the side of each pin terminal. In this construction the resilient contact 15 is omitted and the resilient support-

ing devices are secured under the heads of the rivets 8, 9, 10 and 11 and are immediately bent upon themselves at 17 as represented in the drawings and soldering tabs 18 extended therefrom as heretofore explained.

It will be understood that similar contacts are provided for each of the pin terminals of the tube socket.

My socket construction includes a cushion mounting which is economical in its manufacture and which lends itself to concealed wiring with below-panel wires soldered directly to the same metal which contacts with the pin terminals of the tube. By the arrangement of the spring members which are bent back upon themselves, a flexibility is produced where the socket is not restricted in its movement by a trussing or limiting action of the spring members. The cushion mounting is such that the related effects of the spring members under jar or vibration prevents such jar or vibration being transmitted to the elements in the tubes and disturbing their spaced relationship. The spring members are calculated to have a period of vibration not readily effected by normal shocks or vibrations. The action of one spring member against the other is such as to produce a varying period of vibration with a dampening effect. While I have shown the bent back portions of the contacts of flat spring metal, it will be understood that spring wire may be used for securing the desired resilient mounting.

I have illustrated my invention in three of its preferred embodiments, but I desire that it be understood that modifications may be made in the construction of the electron tube mounting and that no limitations upon the invention are intended other than those imposed by the scope of the appended claims.

The forms of construction shown in Figs. 9, 10, 11 and 12 are more specifically covered in my application #565,298, filed September 26, 1931.

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

1. A mounting for an electron tube socket comprising in combination means for receiving the base of an electron tube, a plurality of contact members disposed in the base of said means, said contact members each comprising a multiplicity of spring metal strips, one of said strips having a pair of substantially parallel extending portions with an interconnecting portion forming opposite acute angles with said parallel portions and providing resilient supporting members for said means.

2. A mounting for an electron tube socket comprising in combination means for receiving the base of an electron tube, a plurality of contact members disposed in the base of said means, said contact members each com-

prising a multiplicity of spring metal strips, one of said strips having a pair of substantially parallel extending portions with an interconnecting portion forming opposite acute angles with said parallel portions and providing resilient supporting members for said means, said interconnecting portion being centrally apertured for forming at least a part of one of the first mentioned parallel extending portions from the metal thereof.

3. A mounting for an electron tube socket comprising in combination a shell, a plurality of resilient contacts carried by the base of said shell, each of said resilient contacts comprising a flat strip of flexible metal having one end secured to the periphery of the base of said shell and the opposite end being bent with reference to said first mentioned end to form a point of support for said electron tube socket, said strips being centrally apertured for providing a plurality of tongues and serving as electrical terminal members for said electron tube socket.

4. A resilient contact for an electron tube socket comprising in combination a flexible strip of metal having an enlarged central portion and narrower end portions, a pair of tongues of differing widths struck from said enlarged central portion forming contact terminals, said enlarged central portion being bent at substantially acute angles with respect to said end portions and a metallic strip passing through said enlarged central portion adjacent the underside of the tongue of larger width for reinforcing said tongue and providing a substantial electrical terminal for said electron tube socket.

5. A shock absorbing radio socket construction comprising a tube receiving receptacle member carrying a plurality of contacts for engaging the filament, grid and plate terminals, a flat base extending across the rear face of said receptacle member and having an area extending laterally and outwardly beyond the periphery of the receptacle member, wiring terminals for the tube connections on said area freely accessible for wiring from the front of the receptacle member and means for yieldingly supporting the receptacle member on the base and providing circuit connections for said contacts, respectively comprising a plurality of cantilever springs of conducting material lying substantially in a plane perpendicular to the axes of the receptacle member and spaced circumferentially about the receptacle member.

6. A shock absorbing socket construction for radio tubes having filament, plate and grid elements, the construction comprising a tube receptacle, a base, and four similar shock absorbing spring members symmetrically arranged substantially in a single plane for yieldingly supporting said receptacle on said base and for providing circuit connections to each of said elements.

7. As an article of manufacture a one-piece combined wiring terminal, socket support and prong contact for a vacuum tube socket comprising a strip of metal having a supporting foot portion, a spring contact portion and a resilient socket anchorage portion, two of said portions being formed at opposite ends of the strip of metal and the third portion being partially cut from an intermediate portion of the strip and with the cut end projecting out of the plane of said intermediate portion.

In testimony whereof I affix my signature.
MILTON ALDEN.

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