

Nov. 21, 1933.

M. ALDEN

1,936,320

SOCKET FOR VACUUM TUBES

Filed June 30, 1926

Fig. 1-

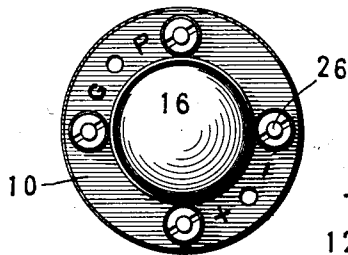


Fig. 7-

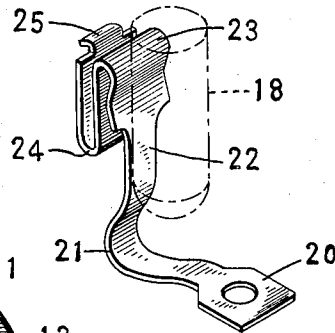


Fig. 3-

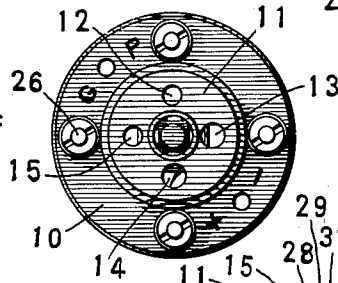


Fig. 2-

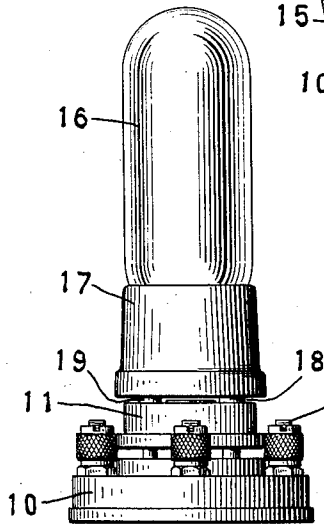


Fig. 5-

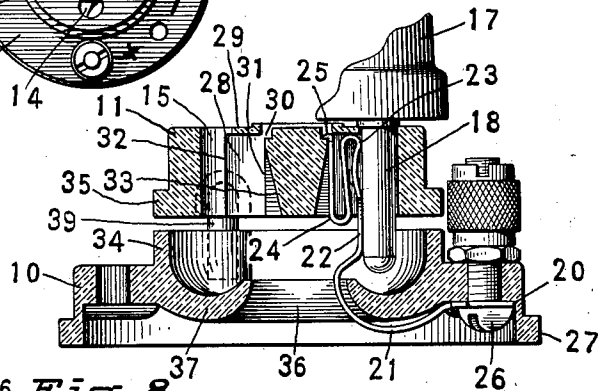


Fig. 8-

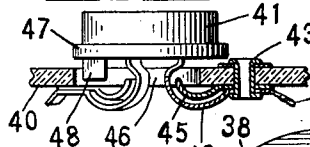


Fig. 6-

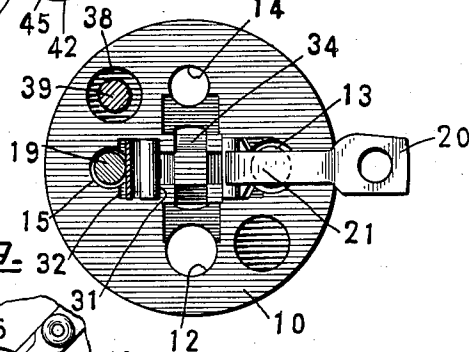


Fig. 4-

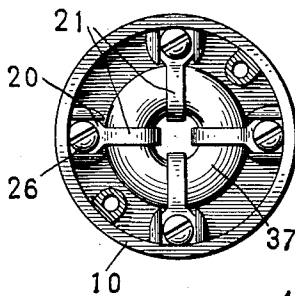
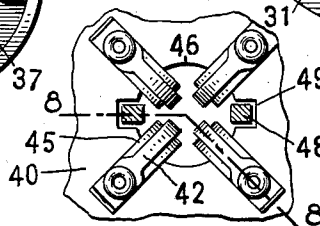


Fig. 9-



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UNITED STATES PATENT OFFICE

1,936,320

SOCKET FOR VACUUM TUBES

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Application June 30, 1926. Serial No. 119,531

23 Claims. (Cl. 173—328)

My invention relates to sockets for mounting devices such as detector tubes amplifiers and rectifiers having projecting contact terminals or prongs.

5 One object is to provide a simple and yet reliable construction for holding a device of this character so that it will not transmit or receive sufficient mechanical vibrations to interfere with other apparatus in the vicinity or to be interfered with
10 by other apparatus.

Another object is to provide a socket having contacts which will ensure excellent conduction with minimum losses.

15 Another object is to prevent injury to the conducting parts of the socket.

Another object is to provide a construction which can be readily and cheaply manufactured according to predetermined specifications.

20 In its preferred and complete form the socket includes an insulating supporting member which is in two parts namely a base and a top piece which are separately formed. A series of resilient conductor members are provided corresponding
25 in number and location with the prongs of such tubes as the socket is intended to accommodate. Each conductor member has a terminal portion to which the circuit wires or leads are connected, a contact tip portion and a resilient arm portion
30 connecting the circuit terminal and the contact tip. The base serves to support the stationary ends of the conductor members and their circuit terminal ends. The top piece is attached in such a way as to protect the movable ends of the conductor members and to coact with the contact tips
35 to form sockets for the various prongs of vacuum tubes. I have only shown two forms of the invention in the drawing but it should be understood that I contemplate that the broad invention may be embodied in many other forms within the
40 scope of the claims.

Figure 1 is a plan view of a socket with a tube in place.

Figure 2 is a side view of the same.

Figure 3 is a plan view without the tube.

45 Figure 4 is a bottom view of the socket.

Figure 5 is a cross sectional view on a larger scale showing a fragment of a tube base and one prong in place at one side and the contact member omitted from the other side.

50 Figure 6 is a bottom view of the top piece.

Figure 7 is a perspective view of one of the conductor or contact members.

Figure 8 is a side view and section showing a modification.

55 Figure 9 is a bottom plan view illustrating the same.

The base 10 and top 11 are preferably of insulating material. The top or block 11 is provided with perforations such as 12, 13, 14 and 15 sized
60 and located to receive the prongs of such tubes as

are intended to be accommodated. I have shown a tube 16 with a base 17 and projecting prongs or contact terminals such as 18 and 19 merely for the purpose of illustration.

Each conductor member consists in its preferred 65 form of an outer circuit terminal portion 20, a bowed spring arm portion 21, an inclined contact portion 22, folded or doubled compressible portions 23 and 24 and an anchorage hook or lip 25.

The outer end 20 is secured to the base for in- 70 stance by a binding post or screw 26. A supporting flange 27 in this type surrounds and protects the lower parts of the springs and terminals.

The arm 21 and end 20 serve as integral connector extensions projecting beyond the open 75 ends of the pockets 28. The top piece is provided with a pocket or recess 28 at the inner edge of each of the perforations for the prongs adapted to receive the compressible portions 23, 24 of the conductor members. This recess opens down- 80 wardly and is partially closed by the web 29 at the top or bottom depending upon which side it is viewed from. The prong or pin hole passages 15 communicate with the pockets 28 and continue along the pocket walls whereby grooves are 85 formed in said walls designed to hold the pins or prongs in contact making relation to the cam shaped portions of the spring elements. An abutment shoulder 30 at the inner edge of the recess near the upper surface serves to interlock with 90 the hook 25 on the conductor member. This shoulder 30 is preferably formed by a die (not shown) from the top which overlaps the die (not shown) which forms the adjoining recess 28. The recess has shoulders 31 and 32 at its sides to en- 95 gage the edges of the compressible parts 23, 24 of a conductor member. To facilitate assembly of the parts 23, 24 and 25 I provide an inclined wall 33 for automatically directing the hook 25 and compressing the spring. The hook 25 auto- 100 matically snaps into engagement with the shoulder 30 when the spring has been thrust in to its full extent at which point the hook or lip 25 and the folded spring portion 23 abut against the top of the recess or pocket 28. The spring or com- 105 pressible portion of the contact strip expands it against the shoulders 31 and 32 leaving the curved edge 23 to act like a cam when the prong 18 is inserted and compress the spring to provide a powerful grip.

The bowed spring arms 21 support the contacts and the top piece normally out of contact with the base. The flanges 34 and 35 serve as limiting stops for the top when the tube prongs are in- 110 serted in the sockets formed by the holes 12, 13, 14 and 15 and the respective spring contacts. Each contact surface 22 is inclined somewhat into the path of a prong so that as the tube is inserted in the socket the springs are gradually com- 115 pressed. As the springs yield inward radially 120

there is no tendency for the prongs to split the top piece when the prongs are forced in.

The base is provided with a central passage 36 through which the spring arms extend and the lower wall is arched at 37 to serve as a curved abutment for the bowed or arched arms when the tube is being withdrawn thus avoiding bending the arms or chipping the insulation. These curved abutments also come into play when the tube or the top piece is tilted or moved excessively to one side.

I also prefer to provide some means independent of the conducting parts for limiting the permissible angular twisting of the tube or top such for instance as the projections 39 and recesses 38 (see Figs. 5 and 6) so as to prevent injury to the conductors by excessive twisting of the tube.

The construction shown in Figs. 8 and 9 is particularly intended for use on a panel or strip mounting. The base or support 40 may be of a sheet of insulation and the top piece 41 molded. The conductor members 42 are riveted to the base by eyelets 43, and may have projecting soldering terminal lugs 44. In this case the arched abutment is formed by metal strips 45 (instead of the integral flange 37 as in Fig. 5). The opening 46 is smaller than the flange 47 which overlaps it. Relative rotation is limited by the projections 48 and notches or recesses 49.

The assembly is most readily affected by first inserting and interlocking the upper ends of the contact arms in the perforated top member, then bending the arms and inserting the terminal ends downwardly through the opening in the base and securing them in place on the bottom of the base. This places the arms under compression tending to lift the top member and hold it spaced apart from the base.

The flexibility of the spring arms makes it possible to vary the positions of the circuit terminal ends considerably and thus accommodate the parts to various conditions such as variations in the locations of rivet or screw holes or so as to bring the outer ends into the most convenient position for circuit connection to shorten the leads etc. The same perforated top piece and conductor members can be used either on a base such as shown in Figs. 1 to 5 or on a shelf or panel support such as shown in Figs. 8 and 9.

This invention in its complete form provides a very complete shock absorption at a minimum expense and a maximum of reliability and safety.

It should be understood that other variations may be made within the spirit and scope of my invention.

I claim:—

1. A vacuum tube socket comprising a base having a passage therethrough, conductor members having terminal ends secured beneath said base and bowed spring arms extending outwardly through said passage and terminating in contact portions above said base, said base having curved abutment means for those parts of the spring arms which lie below the base, said arms being normally out of contact with said base when a tube is in place and means for holding tube prongs against said contact portions.

2. A socket comprising a base having a passage therethrough, conductor members having terminal ends secured beneath said base and bowed spring arms extending outwardly through said passage and terminating in compressible contact portions above said base, said base having arched abutment means for these parts of the bowed spring arms which lie below the base, said arms

being normally out of contact with said base when a tube is in place and a perforated top for tube prongs supported by said conductor members.

3. A socket comprising a base, conductor members having terminal ends secured to said base and spring arms extending outwardly and terminating in contact portions above said base, said base having abutment means for those parts of the spring arms which lie below the base, said arms being normally out of contact with said base when a tube is in place, and a perforated top supported on the outer ends of said arms, said base and top having projections and recesses coacting to limit the relative rotation of the top with respect to the base independently of the conductor members.

4. A vacuum tube socket comprising a base, conductor members having terminal ends secured to said base and spring arms extending outwardly and terminating in radially compressible contact portions above said base, said base having abutment means for the spring arms, said arms being normally out of contact with said base when a tube is in place, a perforated top supported on the outer ends of said arms, said base and top having projections and recesses coacting to limit the movement of the top with respect to the base.

5. A shock absorbing socket comprising a base and a plurality of unitary conductor members each having a terminal end secured to said base, an upright yielding contact tip and, a universally yielding arm including a bowed spring portion connecting said terminal end and said contact tip and a perforated top for tube prongs having means independent of said conductor members for limiting the permissible twisting of said contact tips with respect to said base, said arm portions being entirely free from each other between the base and the contact tips.

6. A socket comprising a base, a plurality of spring conductor members secured thereto and a perforated top member, said conductor members and top member having interlocking spring catch and shoulder portions permitting said members to be automatically interlocked when assembled, said conductor members supporting said top member out of contact with the base.

7. A vacuum tube socket comprising a base, a plurality of spring conductor members secured thereto and a perforated top member, said conductor members and said top member having interlocking portions securing said members together independently of the base, said conductor members supporting said top member out of contact with the base.

8. A socket comprising a perforated top having abutment shoulders adjacent the outer ends and sides of the perforations and inclined walls leading to said end shoulders and conductor contact members having spring arms with yielding contact portions held between the side shoulders, hook like tips adapted to slide along the inclined walls and interlock with the end shoulders and anchorage portions adapted to be secured to a support.

9. A vacuum tube socket comprising a perforated top having abutment shoulders adjacent the outer ends and sides of the perforations, said end shoulders facing outwardly and exposed and conductor contact members having spring arms with yielding contact portions supported between the side shoulders and hook like tips interlocked with the end shoulders and anchorage portions adapted to be secured to a support.

10. As an article of manufacture an insulating

socket base having a passage with a lower wall arched in cross section at its edge to serve as an abutment for bowed springs and having means for circuit terminal connections and an abutment shoulder for a movable top piece.

11. As an article of manufacture an insulating socket base having a passage, arched supports around the rear edge of said passage to serve as abutments for bowed springs and having means for connecting the springs to a support and abutment means for a movable top piece.

12. In a plug socket, a block of insulation material having open ended pockets formed therein, a plurality of spring elements provided with contact parts housed in said pockets, each element being provided with an engagement shoulder and comprising an integral connector extension projecting beyond the open ends of said pockets, a resilient cam shaped contact bend bearing against the closed ends of said pockets and a hook-like tip, said block having pin holes communicating with the bottoms of the pockets and continuing in part along one of the pocket walls, whereby grooves are formed in said walls designed to hold the pins in contact making relation to the cam shaped bends of said spring elements said block of insulation material having a shoulder at one side of each pocket with which the hook-like tip of a spring element is adapted to automatically interlock when such spring element is inserted in its pocket.

13. An electric socket comprising a body of insulation material having a series of pocket recesses therein, in combination with spring members, having integral support engaging provisions, projecting beyond the socket and resilient contact parts housed within said recesses provided with return bends, and fixation means designed to hold said bends under pressure against the bottoms of their housing recesses and in a plane normal to the socket axis when the socket is secured to a rigid support, whereby one side of the return bend is held fixed and the other side is freely movable to serve as a resilient contact, within its recess said body having a shoulder at one side of each recess and each spring member having a hook-like tip automatically engaging a shoulder to hold the spring member when inserted in its recess.

14. In a socket, a member of insulation, a plurality of open ended chambers in said member, having apertured rear walls, return bend contact elements in said chambers with their bends engaging the rear walls of the chambers in a plane at right angles to the axis of the socket member, said elements provided with integral circuit connector attachments projecting beyond the open ends of the said chambers, and assembly means for said parts comprising a shoulder in one side of each chamber and a hook-like tip on each contact element interlocked with one such shoulder to hold one side of the return bend contact element fixed and to leave its other side resiliently free to engage a pin inserted through the apertured rear wall of the socket member chambers.

15. A vacuum tube socket comprising an insulating member having passages for tube prongs and anchorage abutments concealed beneath the top of the insulating member and adjacent the passages, one piece conductor strips having resilient contact portions in line to be engaged by prongs inserted in said passages, each conductor strip having a tip at one end bent at an angle to its contact portion and engaged with one of the anchorage abutments and a circuit terminal

at the opposite end of the strip projecting laterally beyond the adjacent passage in the insulating member.

16. A vacuum tube socket comprising an insulating member having passages for the prongs of a tube and having recesses adjacent the passages with shoulders parallel to the passages and abutment shoulders opposite thereto beneath the upper face of the insulating member, and spring contact strips biased in the respective recesses between the oppositely disposed shoulders thereof, each strip having an anchorage lug interlocked with a portion of the insulating member at one side of its recess, each strip having a contact portion arranged alongside a prong passage for engagement by an inserted prong and each strip having a circuit terminal portion extending outwardly from the recess in which the contact portion is located.

17. A cushion socket comprising an insulating top having perforations for the insertion of the prongs of a translating device, conducting strip members each having an anchorage portion, a contact portion, a bowed spring arm and a terminal portion, said contact portions being biased into the paths of the inserted prongs and holding the prongs securely by gripping them on their sides, said top having abutments for preventing the contact portions from being forced from the top when inserting the prongs, said anchorage portions extending transversely of the axis of the socket and resisting separation of the top from the conducting members when the prongs are withdrawn, said spring arm portions being narrow and extending radially of the socket and permitting the top to yield easily in all directions.

18. A tube socket comprising an insulating member having passages for the prongs of a tube and having oppositely facing shoulders adjacent each passage, a conducting strip for each passage, each strip having at least one laterally resilient contact portion extending longitudinally of the axis of the socket alongside of a passage to be engaged by an inserted prong along its length, each strip having a hook-like portion engaging one of the adjacent shoulders to support the strip against the inward thrust applied by a prong, each strip having a portion engaging another adjacent shoulder and opposing movement of the strip as the prong is withdrawn from its passage and each strip having a portion extending from the resilient contact portion as a circuit terminal.

19. A tube socket comprising insulating material having passages for the prongs of a tube and having oppositely facing shoulders adjacent the inner edges of each passage, a conducting strip for each passage, each strip having a laterally resilient contact portion extending longitudinally of the axis of the socket alongside of a passage to be engaged by the inner surface of an inserted prong along its length, each strip having a portion extending substantially parallel to the outer surface of the socket toward the center of the socket and engaging one of the adjacent shoulders to support the strip against the thrust of a prong as it is inserted, another adjacent shoulder opposing movement of the strip as the prong is withdrawn and each strip having a portion extending from the resilient contact portion around the end of the inserted prong and means for anchoring the outer ends of the strips.

20. A socket for vacuum tubes comprising a base section, a disk positioned above the plane

of the base and having apertures therein through which the contact pins of the tube are adapted to be inserted, and a plurality of spring conductors secured at one end to said base section and at the opposite end to said disk to resiliently support the disk in spaced relation to the base, the intermediate portion between the fixed ends of said conductors being shaped to provide a yielding inclined surface below each of the disk apertures for contacting engagement with the tube contact pins inserted through the same.

21. A socket for vacuum tubes comprising two members and a plurality of spring conductors connecting the members, one of the members being in the form of a supporting base centrally apertured and the other a disk positioned above the plane of the base and apertured to receive the terminal contact pins of the tube, the ends of said conductors beyond the point of attachment to the base projecting outwardly to provide soldering lugs for lead wires, the opposite ends of the conductors projecting through the aperture of the base for permanent attachment to the disk member, that portion of each of said conductors between its ends being curved and narrowed to resiliently support the disk member in spaced relationship above the base.

22. A socket for vacuum tubes comprising a lower supporting member of insulating material, a disk of insulating material having a plurality

of apertures therein through which the contact pins of said tube are adapted to be inserted, a spring conductor in radial alignment with each of said apertures, rigidly connected with said member and disk and serving to support said disk resiliently in spaced relationship from said member, each of said conductors having an inclined and a curved portion for engaging the contact pins of said tubes at spaced points.

23. A vacuum tube socket comprising an insulating member having perforations for the prongs of a vacuum tube, spring members each having a portion abutting the insulating body adjacent the edge of a perforation and each having a cam-like shoulder with a contact arm portion protruding into the path of movement of a prong in its perforation and extending longitudinally of the axis of the socket so as to facilitate the sliding insertion of the end of the prong and a reinforcing spring member connected to the contact arm and disposed laterally of the contact arm to afford supplemental pressure to force the contact arm against the side of the prong when the prong is fully inserted, means for anchoring said spring members to the insulating member adjacent said perforations and a circuit terminal for each contact arm extending away from the insulating member.

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