

March 4, 1958

S. M. DEL CAMP

2,825,881

VACUUM TUBE SOCKET

Filed May 27, 1955

2 Sheets-Sheet 1

Fig. 1

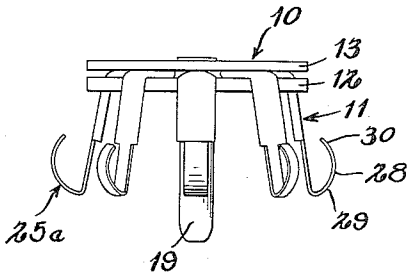


Fig. 2

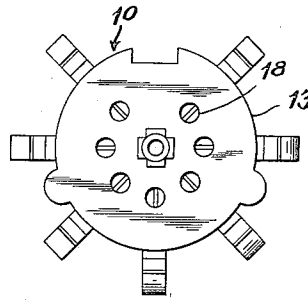


Fig. 3

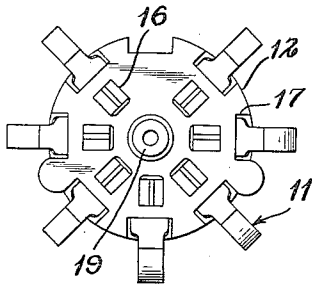


Fig. 4

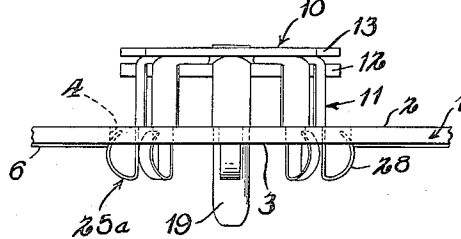


Fig. 5

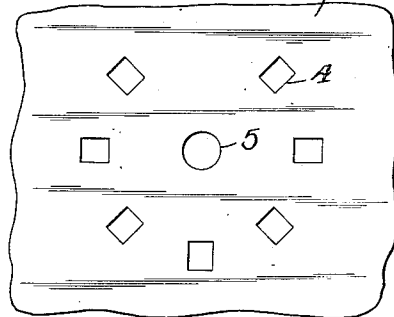
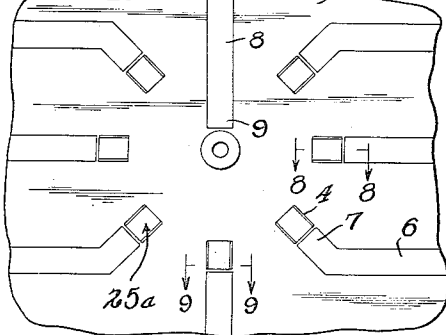


Fig. 6



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2 Sheets-Sheet 2

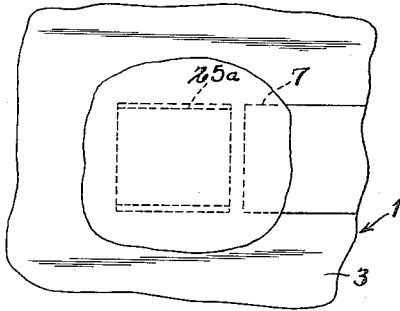


Fig. 7

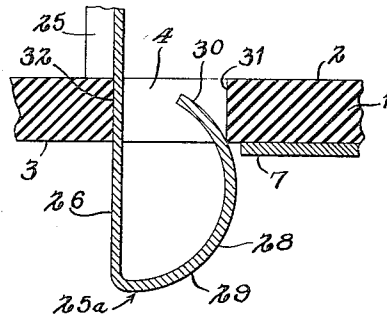


Fig. 8

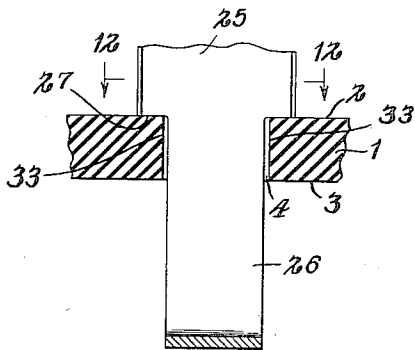


Fig. 9



Fig. 10

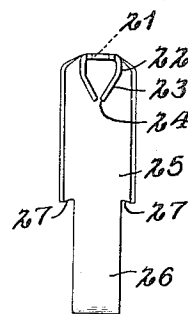
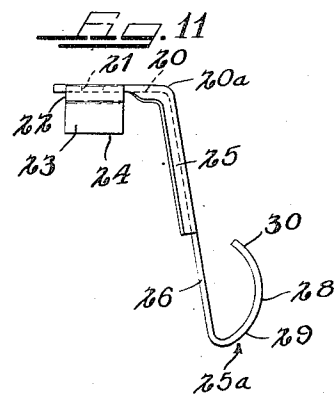


Fig. 11



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Application May 27, 1955, Serial No. 511,449

1 Claim. (Cl. 339—128)

This invention relates to an improved vacuum tube socket adapted for electrical connection with printed circuitry.

One object of my invention is the provision of a socket constructed in a way enabling it to be manually attached quickly and efficiently to a supporting panel carrying printed circuitry.

Another object of my invention relates to the construction of the contact members carried by the socket in which the terminal elements have integral attaching portions at their ends which serve to close substantially the panel openings through which they extend thereby limiting passage of flux through the panel openings when applied to the socket unit in preparation for a dip soldering operation.

Other objects of my invention will be apparent from inspection of the drawings and specification hereinbelow set forth.

Referring to the drawings in which I have illustrated a preferred embodiment of my invention:

Fig. 1 is a side elevation of my preferred socket unit, Fig. 2 is a top plan view of the socket unit shown in Fig. 1,

Fig. 3 is a bottom plan view of the socket shown in Figs. 1 and 2,

Fig. 4 is a side elevation of a preferred assembly including a supporting panel carrying printed circuits and a socket device carried by the panel having contact terminals positioned with relation to the printed circuits for permanent electrical connection with the circuits,

Fig. 5 is a top view of a fragment of the supporting panel showing the openings in the panel through which the attaching elements of the contact members and the center shield extend,

Fig. 6 is a bottom view of my preferred assembly illustrated in Fig. 4,

Fig. 7 is an enlarged view showing the attaching portion of a contact member in soldered electrical connection with a printed circuit,

Fig. 8 is an enlarged section taken along the line 8—8 of Fig. 6,

Fig. 9 is an enlarged section taken along the line 9—9 of Fig. 6,

Fig. 10 is a front elevation of the contact member carried by the socket device,

Fig. 11 is a side elevation of the contact member shown in Fig. 10, and

Fig. 12 is a partial section taken along the line 12—12 of Fig. 7 illustrating the bowed shape of the terminal portion of the contact member.

Referring to the drawings, I have illustrated in Figs. 4 and 6, my improved socket assembly which includes a supporting panel 1 of insulating material having an upper surface 2 and a lower surface 3. The panel 1 has a circular series of openings 4 each of which is preferably of rectangular shape and an opening 5 disposed in the center of the series of openings 4. The panel 1 may carry printed circuitry on both upper and lower surfaces,

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but in my preferred form, printed circuits 6 are disposed on the lower surface 3 only of the panel 1. Each of the printed circuits 6 has an end portion 7 which terminates adjacent an opening 4. In my preferred assembly, a grounding printed circuit 8 is also provided which has an end portion 9 terminating adjacent the opening 5. A socket unit 10 carrying contact members 11 is secured in pre-soldering assembly with the panel 1. Each of the contact members 11 has a terminal element carrying an attaching element at its free end which extends through an opening 4 of the panel 1 and in final assembly of the parts is soldered into electrical connection with a printed circuit 6.

Referring in detail to the construction of the socket unit 10, the socket includes a lower insulating plate 12 and an upper insulating plate 13. The lower plate 12 has a plurality of contact-receiving openings 16 which are arranged substantially in a circle. Notches 17 (Fig. 3) are preferably formed in the outer marginal edge of the plate 12 spaced radially of the openings 16 for receiving terminal elements 11 of the contact members. The upper plate 12 has a circular series of openings 18 conforming to the spacing and arrangement of the openings 16 of the plate 12. The plates 11 and 12 carrying the contact members 11 are secured in assembly by a center shield or rivet-like member 19 which extends through aligned openings (not shown) in the centers of the superposed plates in the manner well known in the art.

Referring to Figs. 10 and 11 which illustrate a preferred embodiment of the contact member 11, the contact is formed from a single piece of spring metal and provides a substantially flat base element 20 having an opening 21. Wing elements 22 in opposed relation one to another extend downwardly from opposed sides of the base element and form a generally rectangular body (viewing the broad surface of a wing 22) adapted to be snugly received within the openings 16 of the plate 12. The wing elements 22 are formed of stiff yet flexible material and have converging portions 23 at their outermost ends.

The space between the outermost edges 24 of each pair of converging portions 23 is normally less than the diameter of the prong terminals (not shown) to be engaged by the outer edges and flexing of the portions 23 is limited by the walls of the openings 16 of the plate 12 in the manner disclosed in my U. S. Patent No. 2,519,121 issued August 15, 1950. Each of the contact members 11 has a relatively stiff terminal portion 25 integrally joined to the base element 20 adjacent an end 26 thereof, and normally extending away from the base 20 at an angle slightly greater than a right angle. Each of the terminal portions 25 is of generally bowed cross-sectional shape, as illustrated in Fig. 12, thereby increasing the stiffness and rigidity of this part of the contact member.

It will be noticed that the base 20 is of bowed cross-sectional shape adjacent its junction 20a with the terminal portion 25 (Fig. 11) so that flexing of the terminal portion 25 relative to the base 20 is restricted to a degree. An attaching portion 25a is joined to the outer end of each terminal portion 25 and includes a leg portion 26 which is integrally joined to the central end portion of the terminal portion 25. The leg portion 26 is of reduced width over the terminal portion 25 with the result that shoulders 27 are formed at the outermost end of the terminal portion 25 adjacent its junction with the terminal portion. A spring portion 28 is integrally joined to the outermost end of the leg portion 26. The spring portion 28 is in the form of a reverse-bend portion and provides a curved lead portion 29 on its lowermost side and a shoulder element 30 adjacent its outermost end substantially facing the plates 12 and 13 of the socket device.

In assembly of the contact members 11 with the in-

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insulating plates 12 and 13, the base elements 20 of the contact members are disposed between the plates and supported by the plate 12. Opposed wing elements 22 of each contact member are seated within an opening 16 of the plate 12 and the terminal elements 25 are disposed within the notches 17 of the plate 12. As a result of the fact that each of the terminal elements 25 is joined to its respective base element 20 at an angle greater than a right angle, the terminals 25, in final assembly of the parts of the socket, will diverge slightly from the vertical axis of the socket as represented by the center shield 19.

In assembling the socket unit 10 to the supporting panel 1, the lower end portions of the attaching portions 25a are moved into their respective apertures 4 to engage the lead portions 29 with the outer walls 31 of the apertures 4. As a result of the fact that the greatest distance between the leg 26 and the reverse-bend portion 28 is greater than the distance between opposed walls 31 and 32 of the opening 4, the spring portions 28 will be contracted during passage through the apertures 4 after which they will expand to engage the shoulders 30 behind the lower surface 3 of the panel 1 as most clearly shown in Fig. 8. It will be noted that during the action in which the attaching portions 25a are forced through the apertures 4, the terminal portions 25 will move inwardly slightly by flexure at the points of junction 20a to move the leg portions 26 into engagement with the walls 32 of the apertures 4. When the reverse-bend portions 28 are in final fastened assembly with the panel 1, the shoulders 27 of the terminal portions 25 abut the upper surface 2 of the panel 1 and serve to relieve the strains on the soldered connections during insertion of a vacuum tube. It will be noted that the width of the reverse-bend portion 28 is substantially equal to the distance between opposed walls 33—33 (Fig. 7) of the aperture 4. As a result, when flux is applied to the reverse-bend portions 28 from a position opposite the lower surface 3 of the panel 1, the portions 28 serve to block substantially the apertures 4 thereby preventing passage of the flux through the apertures 4 so as not to become deposited on the edges 24 of the prong-engaging portions. Without this means of sealing substantially the apertures 4, it would be necessary to remove the flux from the prong-engaging elements of the contact members after the spraying operation.

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Permanent assembly of the socket unit 10 with the panel 1 is accomplished by dipping the assembly into a solder bath thereby soldering the reverse-bend portions 28 and the center shield 19 (which passes through the aperture 5 at the same time that the attaching portions pass through the apertures 4) to the appropriate ends 7 and 9 of the respective circuits 6 and 8. As a result of this action, the metal conducting members of the socket unit are secured in fixed electrical connection with the printed circuits carried by the supporting panel and the socket unit is permanently attached to the panel.

Although I have illustrated a preferred embodiment of my invention I do not wish to be limited thereby as the scope of my invention is best defined by the following claim.

I claim:

An electrical socket assembly comprising an insulating panel having a series of apertures, electrical circuits carried by said panel terminating adjacent said apertures, an electrical socket having a body of insulating material, said body carrying a plurality of prong-engaging contacts, each of said contacts having a terminal portion extending beyond said body, each of said contacts having an attaching portion at its outer end, said attaching portion including an abutment of greater width than said apertures engaging the upper surface of said panel, a leg portion integrally joined to said abutment element and of reduced width therefrom so as to extend into one of said apertures, and a resilient reverse-bend portion at the outer end of each of said leg portions, said reverse-bend portion having an upwardly facing shoulder element, said leg portion and said shoulder element cooperating to resiliently engage walls of said aperture, and said reverse-bend portion having a width sufficient to substantially block the passage of soldering flux from passing through said apertures.

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