Aug. 23, 1938. H. H. EBY 2,127,556

SOCKET

Filed June 7, 1935

Fig. 1.

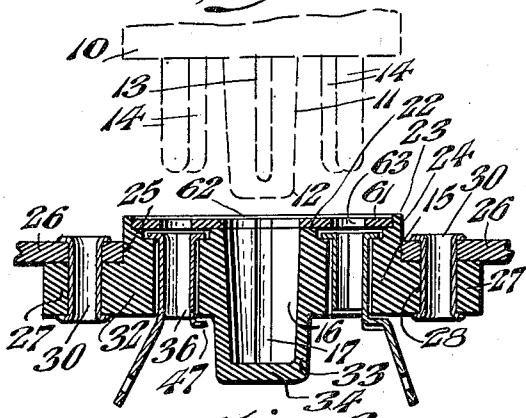


Fig. 2.

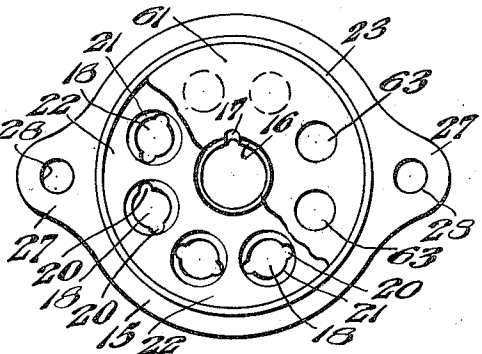


Fig. 3.

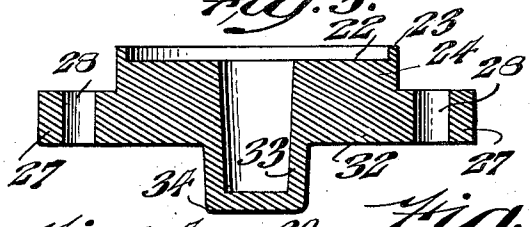


Fig. 5.



Fig. 4.

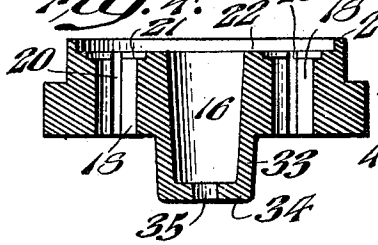
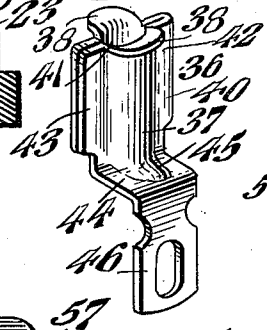


Fig. 11.



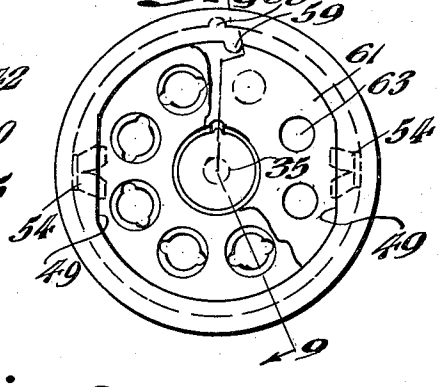


Fig. 6.

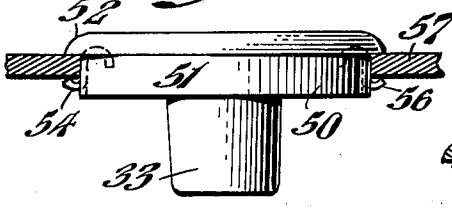


Fig. 9.

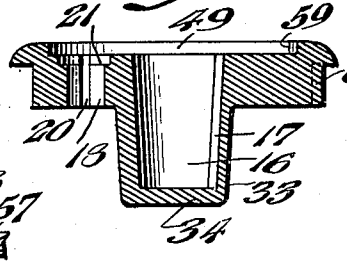


Fig. 10

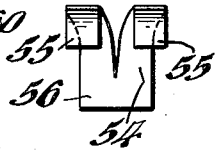
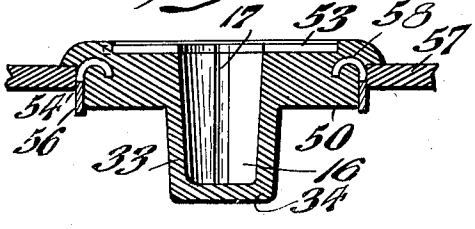


Fig. 8.



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2,127,556

SOCKET

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Application June 7, 1935, Serial No. 25,369

3 Claims. (Cl. 173—328)

This invention relates to sockets, and particularly to sockets having molded bases, especially adapted to receive the prongs of plug-in devices such as vacuum tubes or the like, as a mount for such devices.

In the prior art developments of plug-in devices and sockets, where the particular problems focused upon cheap cost of production of the sockets, whereby low prices could be attained, the trend was toward thin laminated sheets of insulating materials, such having insulating binders such as those of the phenolic resins and the like, as the supporting base for the contacts of the sockets. Usually these thin sheets required reinforcement by supplemental sheets, and due to their thinness could only be secured in position by suitable anchoring devices passing through eyelets or the like, disposed in lateral extensions of the plates or sheets. The sockets were therefore of appreciably greater size or area than was required for the mere mounting of the plug-in devices or tubes, and although of high utility in the connection and of very cheap cost of production had frequently undesirable resilience and certain other minor disadvantages which this invention is intended to overcome.

It is among the objects of this invention; to provide a molded socket for tubes, which is cheap and economical to produce and is highly efficient in use; to improve contact elements for socket receptacles; to provide a single integral element as the foundation of a socket device; to provide a socket device with means preventing undesired or accidental "shorting" of a plurality of contacts through the placing of a connector in a plane parallel to the base surface across the ends of the contacts; to provide a single hole mounting for socket receptacles; to provide a socket receptacle with a guard rail to protect the ends of the contact elements; to provide a single integral element having a molded-in portion arranged to anchor the socket in an aperture in a panel or the like; to provide in a molded socket means to prevent undesired rotative movement of the contact elements; to provide a molded socket receptacle with a plurality of contacts and an insulating or guard plate arranged to protect the ends of the contacts; to provide a molded base for sockets with a plurality of contact apertures and contacts in certain of the apertures, with an insulating guard plate having a smaller number of apertures arranged to register with a selected number of the molded apertures in accordance with the required contacts in the particular use of the socket; to provide a molded socket with a contact aperture and with a contact element arranged of itself to prevent undue axial movement in the aperture and also arranged to secure frictional engagement on opposite sides of an associated prong contact; to provide a molded socket and a contact secured therein without additional independent connecting or anchoring means; to provide a molded socket with contacts that are floating and self-aligning; to provide a molded socket with contacts and means to impart a predetermined superficial visual effect in accordance with the number of contacts available to a plug-in device, and many other objects and advantages as will become more apparent as the description proceeds.

In the accompanying drawing:

Fig. 1 represents a vertical section through a molded form of base or support according to a preferred embodiment thereof, with a fragment of the tube to be operatively associated therewith shown in dotted lines in detached relation, and with a showing in section of two different sorts of contacts mounted in the base,

Fig. 2 represents a plan of the socket according to Fig. 1 prior to mounting of the contacts and with the insulating guard plate broken away,

Fig. 3 represents a vertical section through the socket of Fig. 1 with the guard plate removed,

Fig. 4 represents a transverse vertical section through the socket of Fig. 1, with the guard plate removed,

Fig. 5 represents a vertical section through a modified form of molded base,

Fig. 6 represents a side elevation of a modified form of socket comprising a single hole mounting device, with the panel with which it is associated shown in section and broken away.

Fig. 7 represents a plan of the device of Fig. 6,

Fig. 8 represents a vertical section through the single hole mounting device of Fig. 6, without a guard plate, as taken on line 8—8 of Fig. 7,

Fig. 9 represents a transverse vertical section through the device of Figs. 6 and 7, as taken on line 9—9 of Fig. 7, but with the guard plate removed,

Fig. 10 represents an elevation of an attaching element to be molded into the base disclosed in Fig. 6,

Fig. 11 represents a perspective of a form of contact available in the contact apertures of all of the forms of socket disclosed.

It is to be observed that the sockets of this invention are capable of receiving and supporting any type of tube, and that special arrangements have been made to enable the socket to receive

and support the more or less non-conventional tubes that have recently made their appearance, characterized by the provision of an axial extension for guiding the tube toward the socket, with a rib on the extension having predetermined angular relation to the respective contacts of the tube. The special arrangement noted refers to overcoming that undesirable attribute that normally would attach to the socket for such tubes when the extension extends below the socket to engage parts below the surface thereof with possibly undesirable results, and more particularly the undesirable effect when working on the set, of providing a series of rather large openings through the sockets through which undesired metallic parts might be accidently thrust or dropped with definitely undesirable results.

Referring to Fig. 1, the tube with which the socket is preferably associated has a base 10, prolonged axial extension 11, usually slightly tapered and having the end 12, and upon which the somewhat shorter guide rib 13 is formed, while the contact prongs 14, of still shorter length extend from the base in a series concentric with the axis of the axial extension 11. The number of prongs 14 has been reduced in the interests of simplification. The tube forms no part of the invention herein, and is therefore only indicated in dotted lines, as an aid in the understanding of the invention.

The molded base 15 of Figs. 1 and 2, is provided with the central slightly tapered axial aperture 16 having the longitudinal slot 17 to respectively receive the axial extension guide element 11 and guide rib 13 of the tube. The molded base 15 has a series of apertures 18 extending perpendicularly through the base in a ring concentric with the axis of the guide aperture 16, and each in the preferred form has diametrically disposed longitudinal grooves 20—20 to receive the lateral edges of the contact to be described, which grooves preferably lie in pairs in planes substantially tangential to the axis of the contact apertures. They could be disposed otherwise in accordance with the capacity requirements of the socket, but the disposition shown is preferred. Each contact aperture 18 merges at its upper end into a recess 21, formed in the base 22 of the socket, preferably, and the face 22 is surrounded by the fence or ridge 23 disposed in a ring preferably concentric with the ring of contact apertures 18. The base preferably has a substantially cylindrical portion 24 axially prolonged from one surface of the ridge or flange 23, in such a manner as to be received in an annular opening 25 in a panel 26, to expose merely the tube receiving face of the socket. The base has ears 27 extending laterally of the main body and being provided with apertures or anchor holes 28, by which hollow rivets or the like 30 can secure the socket in place in the panel 26.

It will be clear that the description of the base as just recited will fit both the socket of Fig. 1 and its associated figures, as well as the socket of Fig. 5. The principal difference between these disclosures being that in Fig. 5 the tapering axial aperture 16 and slot 17 terminate in the lower face of the plate or base, as at 31, while in Figs. 1, 3, 4, 6, etc., the lower face of the socket base 32 has the downward projection or housing 33 extending out of the plane of the base of such thickness as may be necessary for strength and to permit a continuation downwardly of the axial tapering guiding aperture 16 and slot 17, until terminated by a transverse bottom 34. The integral base 15 and extension 33 form a guard housing for the aperture to receive the axial guide extensions of the associated tubes, which serve both to prevent movement of undesired objects through the socket by means of aperture 16, and also serve to prevent anything from touching the guide extension of the tube after it is in place in the socket. Obviously with an aperture in the bottom wall 34 of the extension, means are afforded for fastening the base as a unit in place on a suitable support by means of a screw or the like passing through the aperture in the bottom of the cup or housing described. Such aperture is indicated at 35.

There are many materials which are available for the socket base or foundation, as the principal requirements aside from strength for the purpose, center about its insulating qualities, and the maintenance of such qualities. The molding material is preferably one that can be cheaply and quickly obtained and easily worked, which is impervious to distortion or shrinkage under conditions of varying humidity or normal operating temperatures. All of these preferable characteristics are found in some of the newer phenolic condensation products and their use is preferred.

Given the base 15 as just described, it will be clear that there are many sorts of contacts that may be used for operative engagement by the prongs of the tube.

Preferably a contact 36 such as is shown in Fig. 11, is used, as it is inexpensive to make, utilizes a minimum of material, has such resilience as to enable it to frictionally engage opposite sides of a prong contact, can be anchored against rotation in an easy manner, and conduces toward its easy installation in the molded bases of this invention. The contact as shown, is preferably formed from a single sheet of metal which in its initial form is roughly that of an inverted L. The horizontal leg or foot of the sheet is preformed to provide a pair of spaced vertical groove-ribs 37, the upper ends of which extend above the adjacent material in lips 38, and which are brought face to face when the leg is bent about a line evenly dividing the leg, as at 40, to provide the contact portion composed of the oppositely curving ribs forming the quasi-cylinder 41 merging into the laterally extending flattened wings 42 and 43, one of which 43 is formed of the opposite edge portions of the leg, while the wing 42 is formed of the contiguous edge portions merging into each other on the line 40. The vertical leg of the L of sheet metal forming the contact, and which after the upper portion has been bent to contacting relation as just described becomes in elevation more like the letter I, has the laterally off-set abutting portion 44 having the tapering continuation 45 of the rib 37 serving as a sort of fillet to strengthen the off-set, in line with the rib 37, has the depending terminal soldering connection 46 as is usual on most contacts.

It will be observed in Fig. 1, that the contact 36, just described can be upwardly inserted from the bottom of the base into its appropriate contact hole 18, with the folded wing 42 and the separable wing 43 sliding in their respective grooves 20—20, until the off-set portion 44, or its rib 45, will almost or substantially abut the lower face 32 of the base, depending upon the degree of axial play it is desired to impart to the contacts, when with a simple swaging or other operation the respective lips 38 of the contact, which will by then be above the level of the bottom of the recess 21, will be bent over to overlie

the bottom of the recess to prevent undesired inward movement of the contact in the hole. This mode of mounting the contacts will obviously be so simple and easy as to commend itself to those skilled in the art. Clearly the contacts may be mounted and swaged or flanged in gangs with expedition and economy of labor.

In the contact at the left hand of Fig. 1, a supplemental tongue 47 is struck from the contact to engage the lower face 32 of the base to relieve the terminal lug 46 of its off-set and of any strain in connection with keeping the contact in position.

It will be obvious that there need only be a single wing on the contact, as 42, and that there need only be a single radial groove 20 in the apertures 18, although the form disclosed and described is preferred.

Referring now to the single hole mounting shown in Figs. 6, 7, 8 and 9, there is preferably no essential difference in any of the guiding, guarding or housing portions of the contacts from that disclosed in the earlier described form, and the same reference characters will be applied to those parts.

The base 50 preferably has a lower annular portion 51, of smaller diameter than the front flanged enlargement 52 having the peripheral portion surrounding the recessed front opening 53, having the contact apertures as already explained in connection with the other figures, and which peripheral portion serves the same guarding function as the fence or ridge 23 of the earlier described forms as will be explained. The fence or flange however, instead of being circular may be provided with one or more flattened sides 49, and a locating stud or recess 59. The molded base 50 is preferably characterized by the anchored attachment of one or more bendable anchoring elements or devices 54, having embedded wings 55, by which the anchors are secured in the base during its molding. These anchors are preferably disposed on opposite sides of the bases with their outer faces in, or not extending laterally beyond the periphery of the base, with exposed terminals 56 preferably extending below the lower surface of the base, in position to be engaged manually or by a suitable tool to be bent outwardly to engage the lower surface of a panel or board 57. It will be clear that insertion of a base in the suitable aperture 58 of the panel, with the small stud 60 on the outer surface of the base in a cooperating recess in the panel communicating with the aperture 58 therein, anchors the base against rotation, and the frictional engagement of the bent up wings 54 prevents axial movement, and thereby a quick, easy and cheap mounting is secured.

In the several forms of the device already disclosed it will be understood that it is preferred to provide the annular or other ridge or fence surrounding the main face plate or tube engaging portion of the socket receptacle, such as is shown, and in many cases this will be the only guard which will be furnished. It will be clear that even with the various contact elements having portions lying in the face enclosed by the guard ridges, it will be practically impossible to accidentally cause a short-circuiting of a plurality of contacts by any overlying of a connector across several contacts, as by disposing it in a plane parallel to the face of the base, as it would be held in spaced relation thereto by the annular guard rail. With the contact ends received in the recesses surrounding the ends of the contact apertures it would be even more difficult to accidently or even predeterminedly to short-circuit several of the contacts. It is contemplated however, in extreme cases where desired, that an additional safeguard be provided which would serve several purposes as will now be discussed.

A thin preferably resilient sheet of insulating material 61 is provided of an outer contour such as to fit the inner contour of the guard rails of the devices of Fig. 1, or that of Fig. 7, and of such area as to be capable of being "snapped" into frictional engagement with the inner surface of the guard rail. Each guard plate or sheet is arranged to overlie the contact face of the socket in substantial parallelism therewith and to remain in place against accidental dislodgement. Obviously if desired any additional means may be utilized to hold the plates in guarding position, although generally frictional engagement will suffice.

It is a feature of the invention that the plates which are merely insulating guards and serve no contact holding function, will have proper axial holes at 62 to register with the guiding surface 16, and will have only such number of prong contact apertures as will actually be used in the particular kind of receptacle desired. In this connection it may be pointed out that although a maximum number of contacts is provided for in laying out the sub-division of the annular series of contacts, only in the most complex of tubes will there be all of the contact prongs provided. Obviously if a smaller number of prongs than the maximum is used in a given tube, it would possibly involve some waste to provide the maximum number of contacts in the sockets, depending upon the manufacturing processes. Clearly also there would be no differentiation in the superficial aspect of any given socket receptacle that had less than the maximum number of contacts, except by close attention, so that it is difficult for operatives to install the proper sockets in their appropriate places in the set. It is contemplated therefore that the plates 61 will have only such contact apertures 63 as either register with contact apertures 18 containing live contacts, or with such apertures as are necessary to provide the number of contacts called for by the installation. In other words it is contemplated that the sheets 61 may have numerous blind holes, or rather that the sheet will be solid over certain contact holes, and will only have the proper number for the appropriate tube. Thus the socket receptacle may have eight or more contact apertures. It may be designed for use with a tube of but six contacts. In this case the plate 61 may have but six holes.

Again, as an aid in quick and easy differentiation between sockets, it is contemplated that the signal effect achieved by the reduced number of apertures in the cover plate over the number in the socket itself, may be marked or amplified by color signals or the like whereby a plate of a given number of apertures, and thus designed for a given tube use, may be partially or wholly colored in a pattern or visual effect instantly distinguishable from the visual effect of another plate arranged for use with a different number of prong contacts on a tube. The many combinations of these modes of differentiating will appeal to those skilled in the art.

It will be observed that the contacts are arranged for and are capable of axial and lateral movement, flexing or distortion to accord with variations in the dispositions of the prongs on the tubes. The many advantages of the invention,

and the manifest modifications to which it may be subject will appeal to those skilled in the art, and all such are to be construed as within the scope of this invention unless the claims herein are otherwise specifically limited.

I claim:

1. A female contact for molded socket receptacles formed from a unitary metallic strip of generally L shape comprised of a foot and a leg with two integral tabs extending from the lower edge of the foot in spaced relation to each other and to the side edges of the foot and leg respectively, the foot and leg each having a rib formed in alignment with a respective tab, the foot portion bent upon itself on a line substantially midway between the tabs to bring the rib portions into confronting juxtaposition to form a substantially cylindrical member having a wing formed of confronting planar portions of the foot joined by a hinge extending the height of the foot and a second wing diametrical of the first comprised of the planar portion of the outer edge of the leg and the outer planar edge portion of the foot, the tabs extending beyond the ends of the wings forming bendable lips to secure the contact in a desired mounting support against axial movement in one direction and to guide a prong entering the contact, said lips being of a width not greater than a rib.

2. A female contact for molded socket receptacles formed from a unitary metallic strip of generally L shape comprised of a foot and a leg, with two integral tabs extending from the lower edge of the foot in spaced relation to each other and to the side edges of the foot and leg respectively, the foot and leg each having a rib formed in alignment with a respective tab, the foot portion bent upon itself on a line substantially midway between the tabs to bring the rib portions into confronting juxtaposition to form a substantially cylindrical member having a wing formed of confronting planar portions of the foot joined by a hinge extending the height of the foot and a second wing diametrical of the first comprised of the planar portion of the outer edge of the leg and the outer planar edge portion of the foot, the tabs extending beyond the ends of the wings forming bendable lips to secure the contact in a desired mounting support against axial movement in one direction and to guide a prong entering the contact, said lips being of a width not greater than a rib, and said leg bent to form a stop and comprising a soldering terminal.

3. A socket receptacle comprising in combination a molded base having diametrically grooved contact apertures and countersunk recesses at the ends of the apertures, a contact disposed in a contact aperture and formed from a unitary metallic strip of generally L shape comprised of a foot and a leg with two integral tabs extending from the lower edge of the foot in spaced relation to each other and to the side edges of the foot and leg respectively, the foot and leg each having a rib formed in alignment with a respective tab, the foot portion bent upon itself on a line substantially mid-way between the tabs to bring the rib portions into confronting juxtaposition to form a substantially cylindrical member having a wing formed of confronting planar portions of the foot joined by a hinge extending the height of the foot and a second wing diametrical of the first comprised of the planar portion of the outer edge of the leg and the outer planar edge portion of the foot, the tabs extending beyond the ends of the wings forming bendable lips engaging in the countersink to secure the contact in the socket against axial movement in one direction and to guide a prong entering the contact, said lips being of a width not greater than a rib, said wings being disposed in said diametrically extending grooves, said leg extending beyond the molded base forming a soldering terminal and having a portion off-set to engage the base as a stop to limit axial movement of the contact in the other direction from that secured by the tabs.

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