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H. HEISS

2,510,339

ELECTRICAL TERMINAL DEVICE

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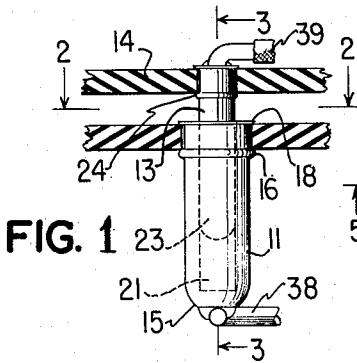


FIG. 1

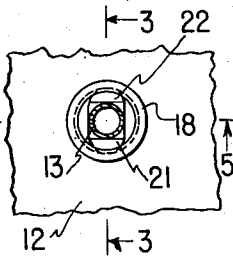


FIG. 2

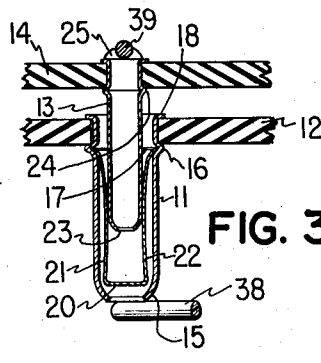


FIG. 3

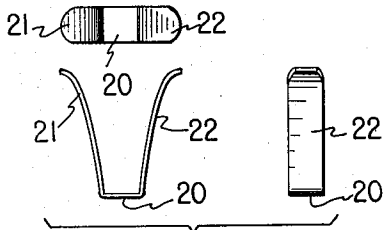


FIG. 4

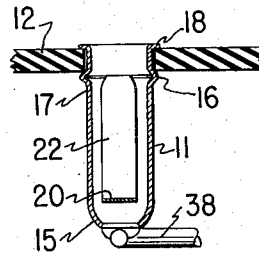


FIG. 5

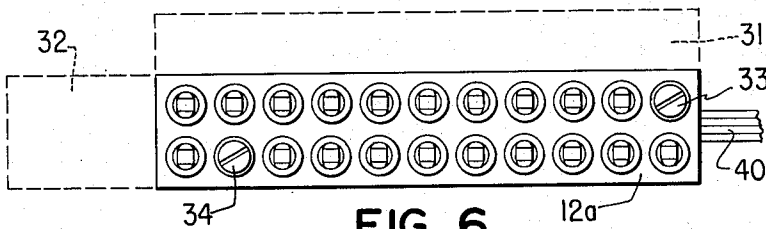


FIG. 6

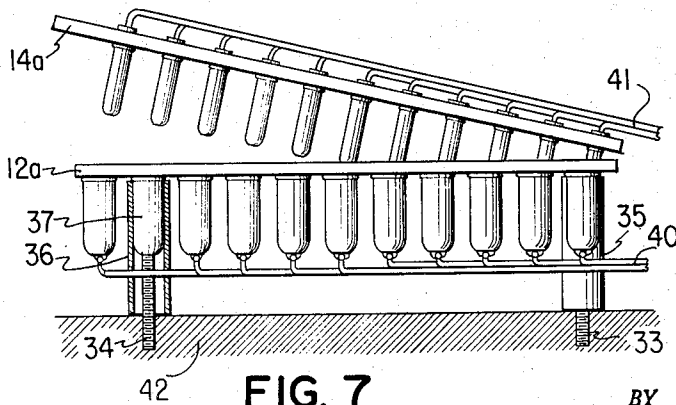


FIG. 7

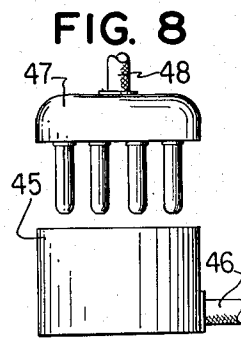


FIG. 8

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## UNITED STATES PATENT OFFICE

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## ELECTRICAL TERMINAL DEVICE

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4 Claims. (Cl. 173—328)

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This invention is concerned with a new female jack or socket element and with plug and socket terminal contact strips for removably connecting a plurality of conductors with associated stationary terminal contact points.

Terminal strips of this type are commonly used in electrical apparatus, including radios and miscellaneous signalling and electronic equipment. The socket strip carries female contact elements and forms the stationary terminal device, and the plug strip carries coacting male contact members and forms the removable terminal device.

Known socket structures employ female jack elements made of suitable conductive sheet material each formed generally in U shape or suitable angular shape, or in longitudinally slotted generally tubular shape, and each provided with or associated with an extension forming a soldering tab. A desired plurality of such female elements may be secured side by side on a strip of insulating material, and the strip is provided with legs or posts for attachment to a suitable support.

A stationary terminal device of this type, having a number of female socket elements arranged in a row on an insulating strip may be conveniently referred to as a "one-in-line" jack, or similar language. Two such strips, each carrying a number of identical female socket elements in a row, may be mounted back to back, one on each side of an intermediate insulating strip provided with suitable mounting posts or legs for attachment to a support. An assembly of the latter kind is analogously referred to as a "two-in-line" jack.

The removable terminal device for coaction with the "one-in-line" jack may be a strip of insulating material carrying a row of plugs or male members, one for each female socket element in the stationary jack strip. Each plug member may be associated with a soldering tab. The removable terminal device for coaction with the "two-in-line" jack may be similar except that two rows of plugs or male members are provided, one for each row or line of female elements in the corresponding "two-in-line" jack strip.

In order to prevent wrong alignment, that is, wrong plugging-in of the male plug members into the stationary female socket elements, there is usually provided in either structure suitable indexing or key means comprising, for example, a projecting index member associated with the leg or mounting post at one end of the jack strip, and an index extension projecting from one end of the plug strip. When the two strips are prop-

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erly aligned, the end of the plug strip provided with the index extension will be positioned above the jack strip perpendicular thereto and its opposite end will be able to pass the index member projecting from the jack strip. If the removable plug strip is inadvertently reversed from its proper position relative to the jack strip, plugging-in is prevented by engagement of the index extension on the plug strip with the index member projecting from the jack strip. In other words, the plug strip cannot pass into plugging-in position at the end of the structure where the projecting index extensions meet.

The known jack and plug strips, as briefly described above, exhibit in common with other prior art structures provided for the same purpose certain inherent drawbacks and shortcomings.

The structures are assembled of numerous parts requiring special jigs and the like, and relatively expensive operations including the placing or positioning of the female socket elements on the corresponding jack strips, the fastening thereof, the joining of the jack strips back to back on an intermediate insulating strip (as in the "two-in-line" structure), and finally the joining together of the jack strips with their mounting posts or legs, all of which calls for relatively expensive equipment and for expensive operations which increase manufacturing costs reflected in the cost of the final products.

There are also certain drawbacks and shortcomings in the use of such structures. The plug members must always be inserted into and removed from the stationary female jack elements in proper axial alignment therewith so as to avoid angular forces which may spread and may bend the female elements out of line and consequently destroy the good contact which is desired. Such requirement for relatively delicate handling poses difficulties for experts, particularly in plug and jack strips having a large number—twenty or more—of coacting pairs of plug and socket elements. The care and dexterity required are often absent, particularly in the case of unskilled or green labor, and bad electrical contacts, due to loose, spread or bent female socket elements, are consequently frequently found when checking equipment using the prior art structures.

The object of the invention is to provide a new female socket element which is easily manufactured and assembled for coaction with a plug member, showing a number of advantages which include (1) reduction in cost of manufacture; (2) possibility of standardizing plug and jack de-

vices by the use of male and female elements of identical structure but differing in size; (3) possibility of providing any practically desired number of rows of plug and coacting socket elements, thus eliminating the limitation of prior art structures which permit at the most production of "two-in-line" jack and plug strip devices; (4) employing selected female socket elements in any given jack strip structure in the nature of mounting means and thus eliminating special aligning or indexing key provisions; and (5) eliminating the necessity of relatively delicate handling incident to the plugging-in or removal of the plug strip, by arranging the coaction between the plug and socket elements so that the tilting or angular positioning of the male members with respect to the female elements cannot detrimentally affect either element. Manipulation is thus facilitated and good contact is preserved and assured at all times.

The various objects and features of the invention, including those intimated in the foregoing paragraph, will be brought out in the course of the detailed description of certain embodiments, which is presented below with reference to the accompanying drawings. In these drawings,

Fig. 1 illustrates parts of jack and plug strips in section, and in diagrammatic elevational representation an embodiment of the new female socket element and associated male plug member;

Fig. 2 is a top view of the female socket element as seen when looking in the direction of the arrows along lines 2—2 in Fig. 1, the male plug member being shown in section;

Fig. 3 represents a sectional view taken approximately along lines 3—3 in Figs. 1 and 2;

Fig. 4 illustrates three views of a contact spring associated with the female socket element;

Fig. 5 is a section through the female socket element taken approximately along lines 5—5 in Fig. 2;

Fig. 6 shows a top elevational view of a "two-in-line" jack strip;

Fig. 7 illustrates the jack strip of Fig. 6 in elevational side view and also shows its coaction with an associated plug strip; and

Fig. 8 indicates a modification.

Like parts are marked by like reference numerals throughout the various figures. Known details, operations or functions will be discussed only to the extent required for an understanding of what is believed to be new.

Referring now to Figs. 1-5, numeral 11 indicates, on a somewhat enlarged scale, an embodiment of the new female socket element mounted on an insulating carrier member 12, and numeral 13 indicates the shank of the plug carried on the insulating member or support 14. The plug 13 is shown partly inserted in the female socket element 11.

The insulating members 12 and 14 may be made of any shape and size desired or required in practice, e. g., in true strip form or in the shape of plates, and any desired or required number of male and female elements, respectively, may be provided in each. The physical arrangement of the male and female elements on their associated insulating supporting and carrier members may be as desired; for example, these elements may be arranged in annular rows or in parallel rows (see Fig. 6), or in any other symmetrical or asymmetrical arrangement that may be desired or required for any given purpose. The insulating members may be made of

any suitable insulating material, e. g., a phenol condensation product, Bakelite, or a suitable plastic or laminated insulating material.

The new female element 11 is formed from a suitable length of tubing, e. g., brass deformable tubing. One end of the tubing is turned in or peened over, as indicated at 15. Near the opposite end is provided a crimp forming exteriorly a shoulder 16 and interiorly a fold or shallow annular groove or depression 17 in the inside wall of the element. The operations for accomplishing the peening-over at 15 and the crimping at 16 are well known and are easily applied in mass production. The resulting tubular shell forms the female socket element.

The insulating carrier member 12, assuming a jack strip structure, is provided with a number of holes properly spaced and arranged as desired, for receiving a corresponding number of tubular shells each forming a female socket element such as shown at 11. Each shell is inserted in its hole in the insulating member with its crimp 16 forming the shoulder resting against it at one side thereof. The free end of the tubular shell, which at this point of the assembly operation projects from the insulating member 12, is now swaged or peened over as indicated at 18. The operation is well known and is easily accomplished. It fixes the tubular shell 11 in its position and completes the mounting thereof on the insulating member.

Associated with the female socket element is an elastic contact formed by a simple leaf spring blanked out of suitable material, e. g., in thin bronze sheet, and pressed into V- or generally U-shape, shown in Fig. 4, forming a base 20 and two outwardly flaring curved legs 21 and 22. The free end of each leg is rounded as shown.

One such V- or U-shaped spring is dropped into each tubular shell 11 that is intended to serve as a female socket element, and is pushed therein by means of a suitable pin-like tool until the free rounded ends of the outwardly flaring legs 21 and 22 snap into place in engagement with the shallow fold or groove 17 formed by the crimp 16. Only gentle force is needed to accomplish the insertion. The outwardly flaring legs 21 and 22 are resiliently drawn together into the position approximately shown in Fig. 3, forming two opposed elastic or resilient slightly inwardly curving contact surfaces. The contact spring thus depends from the fold 17 downwardly into the tubular shell 11. The inside diameter of the shell is larger than the width of the spring across its legs 21 and 22, when in inserted position as shown in Fig. 3, and the spring therefore can move sideways, the rounded ends of the legs 21 and 22 acting in the manner of pivot points.

It is important that the groove or fold 17 formed by the crimp 16 be shallow and interiorly rounded or generally V-shaped, as shown in the drawings, so as to make it possible to remove without difficulty the contact spring, if such removal should be required. It will be understood that, if the groove 17 were relatively deep and angular, removal of the spring would be quite difficult without distorting its shape. In structures made in accordance with the invention, no force is needed either for the insertion of the spring or for its removal which requires only a gentle tapping at the base 20 by a tool which is entered through the hole in the peened over end 15 of the shell.

The contact springs are inserted into their associated tubular jack shells, preferably by the

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use of a suitable jig. They are positioned so that the two legs 21 and 22 of each spring extend perpendicular to the line of insertion of the associated plug members. This means, in the case of an elongated jack strip such as 12a shown in Fig. 6, that the contact springs are positioned transversely or in a direction which is substantially perpendicular to the longitudinal extent of the strip.

The male plug members for coaction with the female socket elements are generally similarly formed but of smaller diameter. For example, the plug 13, just as the socket element 11, may be formed of a length of tubing peened over or turned in at one end as indicated at 23 and crimped near its other end to provide a shoulder 24 for engagement with the insulating member 14 at one side, while the free end is peened over at 25 to fix the plug member in its proper position on the insulating member 14.

The diameter of the shank of the plug member 13 is appreciably smaller than the inside diameter of the socket shell 11, but large enough so that the legs 21 and 22 of the contact spring engage it with relatively considerable contact pressure. The plug shank attempts to spread the spring legs apart, thus pressing the free ends thereof in point contact firmly against the inner wall of the jacket shell by engagement with the shallow fold or groove 17. Such point contact, it will be appreciated, constitutes the best electrical contact that can be made. The two legs of the spring form inwardly curving resilient contact surfaces for wiping contact engagement with the plug, thus likewise furnishing very good contact.

The shank of the plug 13 rides between the two contact surfaces formed by the legs 21 and 22 of the contact spring and is thus free to tilt angularly, that is, in a direction perpendicular to the plane of the drawing, Fig. 3, without any hindrance except, of course, the limitations imposed by the relative dimensions of the parts. Angular displacement of the plug shank 13 within the shell 11, that is, at an angle to the vertical center line, will likewise be of no effect and will not be detrimental to any of the parts. The legs 21 and 22 of the contact spring will merely be forced to the right or left within the shell 11 to a point when one or the other leg is pressed against the inside wall of the shell, where further deflection will be stopped. Distortion or damage of the spring, by such operation, is thus avoided even in the presence of considerable twisting forces and lateral pressure.

The condition is also apparent from Fig. 5 which shows the parts as viewed along the sectional lines 5-5 of Fig. 2. There is no necessity for inserting the plug exactly in axial alignment with the socket. It may be moved in partly tilted position throughout its travel into fully inserted position. Likewise tilting of the plug during insertion or withdrawal from the socket in a direction perpendicular to the plane of drawing, Fig. 5, is possible without any detriment to the parts involved except, of course, when unusual and prohibitive force is applied, which should not occur in the normal use of the structure.

It will be seen, when considering the coaction of the individual plug shank 13 with the contact spring in its associated socket shell 11, that the plug floats within its socket, permitting displacement laterally in every direction. The arrangement facilitates insertion as well as removal of the plug and prevents spreading of the socket

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shell in contrast with prior structures which depend for contact on the lateral pressure of the plug against the inside wall of the socket element. The contact spring is contained within the socket element and is thus removed from tampering or physical damage. The contact spring is freely and easily inserted into the socket shell without requiring any special mounting or fastening means.

Displacement of the contact springs from their proper positions in their associated socket shells, transversely of the jack structure, as shown in Figs. 2 and 6, does not occur as a result of inserting the plugs in angularly tilted position, apparently due to the fact that the angular component of such tilted insertion (or removal), which affects the legs of the contact spring, is very small and that progressive insertion exerts increasing outward pressure on the legs of the spring, tending to keep it in place by contact of the free ends of the legs in the fold or groove 17 of the socket shell.

Fig. 6 shows a "two-in-line" jack strip or carrier member 12a, as seen from the top. This jack strip is an insulating member corresponding to the insulating member 12 of the previously described figures. Two rows, each comprising eleven female socket elements, are provided in the strip 12a. As indicated in dotted lines at 31, the strip may be made wider—in fact, as wide as desired—and, as indicated in dotted lines at 32, it may be made as long as desired, for mounting thereon in either coordinate direction as many rows of socket elements as may be necessary for any particular purpose. It will thus be seen that there is no inherent limitation as to the number of rows of socket elements, as in the prior art structures. Nor is there any necessity for an intermediate insulating member or for any complicated and relatively expensive manufacturing or assembling steps. The female socket elements are simply dropped in place, in a suitable jig, into the corresponding holes in the strip 12a, and their free ends are peened over, as described, which completes the assembly of the basic jack strip. Contact springs such as shown in Fig. 4 are then dropped into the tubular socket shells which are intended to serve as sockets in coaction with corresponding plugs.

It is assumed in Fig. 6 that in each row there are ten socket elements for coaction with ten plugs. In one row, the last socket element is shown associated with a screw 33, and in the other row the second socket element is shown associated with a screw 34. The corresponding socket shells are provided with tubular spacers which are simply slipped over these shells, as shown in Fig. 7. Thus the tubular spacer 35 is slipped over the socket shell associated with the screw 33 in Fig. 6, and the tubular spacer 36 is slipped over the socket shell 37 (see Fig. 7) through which extends the screw 34. These two socket shells in coaction with their tubular spacers 35 and 36, respectively, operate in the manner of mounting posts spacing the strip 30 from the support or mounting member diagrammatically indicated at 42. The jack strip with its two rows of similar socket members is thus fixed in position on the mounting member 42.

Referring back to Figs. 1, 3 and 5, the turned in free end of the female socket element 11 furnishes a contact surface for the end of a conductor such as 38 which is simply placed thereon and soldered in place. A soldering tab may be provided, if desired, or a hole may be drilled into the socket

shell near its free end for anchoring the wire. The turning-in of the free end of the socket shell may thus be omitted. A conductor such as 39 is associated with the plug 13. The end of the conductor 39 may be placed into the hole in the plug member 13 and may be soldered in place. A soldering tab may be associated with the plug 13, if desired.

The socket and plug elements of the structure shown in Figs. 6 and 7 are shown associated with conductors, in the manner described above. The conductors associated with the ends of the female socket elements are gathered into the cable indicated at 40 and the conductors associated with the male plug members are gathered to form the cable 41.

The tilted position of the plug supporting strip 14a, with respect to the jack or socket carrier strip 12a, as shown in Fig. 7, indicates that the insertion of the plug members into their associated socket elements does not depend on axial alignment therewith. The plug strip 14a is for convenience shown in a straight line which extends at an angle to the plane of the insulating member 12a of the jack strip. In actual manipulation in practice, the plug strip 14a may be flexed and will flex incident to insertion of the plugs into the socket elements. The extent of flexing of the plug strip will, of course, depend on numerous factors including the relative stiffness of the insulating member 14a and the number of rows of plugs it carries, as well as the manner in which these plugs are arranged. In a relatively short structure flexing will be less than in a relatively long structure.

Rough handling of devices made in accordance with the invention, including purposeful tilting, flexing and deflecting in any desired angular direction, incident to inserting and removing of the plug strip with respect to the jack strip, and applying considerable force, including angular grinding force, during such manipulation, proved no detriment whatsoever to the structures. These manipulations included forceful removal of the jack strip in a ripping-off action at one end. The plugs disengaged in a "peeling-off" motion from end to end of the strip with no detriment to the parts. The contact springs were neither pushed out of line, nor were they bent, loosened or damaged in any way in any one of the tests applied. As a matter of fact, forces were applied to the point of bending or loosening one or the other plug member, and yet no damage was done to the coacting female socket element or to its associated contact spring, and the spring remained in its assigned position.

It will be noted that the left end of the plug strip 14a is extended beyond the corresponding end of the jack strip 12a to facilitate its manipulation.

Wrong insertion of the plugs on the plug strip 14a into the socket elements on the jack strip 12a is prevented by the screws 33 and 34 by means of which the jack strip is mounted on the support 42. These screws have the dual purpose of mounting the jack strip and of acting as indexing or key means. Should the plug strip 14a be inadvertently reversed from its intended position, plugging-in would be prevented by plugs in the plug strip which would encounter the screws 33 and 34, respectively, instead of their associated female socket elements. Any selected socket elements may thus be used as key or index means.

Fig. 8 indicates a modification. Numeral 45

may be a casing containing a suitable number of female socket elements, as described, which are suitably wired, the conductors leaving casing 45 in the form of the cable 46. 47 is a plug housing or handle containing plug members extending therefrom, as shown, for engagement with associated female socket members in the housing 45, the plugs being suitably wired and the conductors leaving the casing 47 in the form of the cable 48.

The last example is only one of many applications of the invention that will occur to those skilled in the art. It shows that the disclosure is not limited to use in connection with plug and jack or socket structures as commonly understood.

The contact spring has been shown as a U-shaped leaf spring anchored with its free ends in the shallow groove or fold formed by the crimp in the female jack shell. Modifications are, of course, possible.

For example, depressions may be formed in the inside wall of the socket shell, one for each free end of the legs of the spring (which may be slightly reduced to form a shoulder, if desired), or two holes may be drilled in the socket shell forming the depressions, in which the free ends of the springs are to be anchored. Such modifications will automatically locate the contact spring in its desired angular position within the socket shell.

The contact spring may also be provided with extensions projecting laterally from its base; e. g., suitable ears may be punched out and formed of the spring material at the base thereof. Such extensions or ears may then be anchored in a shallow groove near the free end of the socket shell in a similar manner in which the free ends of the spring legs are anchored in the structure illustrated in the drawings, or they may be anchored in depressions such as holes drilled into the wall of the socket shell near its free end. In the latter case, the ears punched out from the base may be slightly reduced to form lateral projections for engagement with the holes in the socket shell. The legs of the spring will in either case be free for flexing motion against the shell wall.

The base of the contact spring may also be rigidly attached to the socket shell by extensions or by forming a suitable closure, e. g., by turning in the material of the shell sufficiently to form a support at its free end for the attachment of the base of the spring, e. g., by spot welding, riveting or the like.

The body of the two legs of the spring may be pre-formed in cross-sectionally curved shape to present generally longitudinally extending convex contact surfaces for engagement with the plug element.

The free end 15 of the socket shell need not be turned in as much as illustrated, or the turning-in may be omitted, leaving in either case an opening through which the contact spring is inserted instead of inserting it from the other end as described.

Several, e. g., three, contact springs may be provided, each made in the form of a longitudinally curved cross-sectionally flat or cross-sectionally curved leaf spring having, if desired, curved or rounded free ends. A pin-like member may be suitably attached to each spring to project from its concave side perpendicularly thereof. Three radial holes may be formed in the socket shell in angular positions of 120°, for re-

ceiving the pin-like members of the three springs. These springs may curve inwardly of the socket shell so that they are in engagement centrally thereof, thus forming a resilient wall for contact-making engagement with the associated plug element. When the plug is inserted, it will spread the three springs outwardly, the pin-like members in their holes in the shell wall moving radially, piston-like, and the free ends of the springs flexing in engagement with the inside shell wall. If desired, the free ends of the pin-like members extending from the springs may be peened over to fix each spring in its assigned normal position, and in such case it will not be necessary to have the springs meet inside of the shell.

The last described embodiment is particularly suitable for relatively large structures.

Relative small or medium-sized structures may be analogously made by using substantially flat leaf springs and anchoring their free ends in longitudinally spaced depressions, forming in the inside wall of the socket shell inwardly extending projections. Suitable longitudinally spaced holes or grooves, for example, annular grooves formed by crimping, may be provided to take the place of such projections. The springs are in this case inserted with their free ends in engagement with these anchor points, projections, grooves or holes and, being longer than the distance between the anchor points, the springs will flex inwardly in radial direction, forming a floatingly disposed, inwardly curving, longitudinally extending contact surfaces for wiping contact-making engagement with the male plug member. The curved or rounded free ends of the springs act in the nature of pivot points, permitting slightly angular tilting.

The contact springs in either of the last described embodiments are again removed from injury and tampering and furnish the longitudinally extending floating contact surfaces spaced from the inside wall of the socket shell.

It may be noted in conclusion that I use an alloy known in the trade as "aluminum bronze" for the contact spring material, particularly for the embodiment of the contact spring as shown in the drawings. The aluminum bronze alloy does not take solder readily and has a highly polished surface which also impedes soldering thereto by commonly known methods. It follows therefore that no particular care need be taken when soldering a conductor such as 38 to the curved open end 15 of the socket shell. Any solder that may creep into the jack shell and touch the base of the spring will not attach to it and therefore no difficulties will be experienced in removing the spring in case it should be necessary for replacement or other purposes. When using for the contact spring a material that takes solder, care should be taken that the solder does not creep in, in contact with it, or provide a block for the insertion of the spring. If it is desired to solder the base of the spring in engagement with the shell, then either a special soldering method should be used in connection with aluminum bronze, or a different type of contact material should be employed.

Structures made in accordance with the invention have no inherent limitations as to size of the parts and/or size and general shape of the assemblies.

Changes may be made within the scope and spirit of the appended claims which define what is believed to be new and desired to have pro-

ted by Letters Patent of the United States.

I claim:

1. An electrical socket terminal device comprising a plate-like carrier member, a plurality of identical tubular members each secured at one end to said carrier member and extending therefrom perpendicular to the plane thereof, contact spring means disposed in some of said tubular members for coaction with suitable plug terminal means, and fastening means extending axially through others of said tubular members for securing the socket device on a suitable support.

2. In an electrical terminal device of the class described, a carrier member, a plurality of identical elements mounted on said carrier member and extending therefrom, each element consisting of a relatively thin-walled continuous and uninterrupted cross-sectionally circular open-ended tubular shell-like member of desired length and substantially uniform diameter throughout its length, the tubular shell-like member of each element being axially deformed near one end thereof to provide a crimp which forms exteriorly an annular shoulder for engagement with said carrier member from which it extends and interiorly a shallow generally V-shaped annular groove, generally U-shaped contact spring means disposed in each one of some of said tubular elements with the free ends of the legs thereof removably disposed in the V-shaped groove of the corresponding element to form sockets for coaction with suitable plugs carried on a support, and means disposed in at least one of said tubular elements and substantially plugging the axially extending aperture thereof to form an index key member for determining the plug-in position of the plugs carried by said support relative to the sockets formed by the tubular elements containing said U-shaped contact spring means.

3. An electrical socket terminal device comprising a platelike carrier member, a plurality of identical relatively thin-walled continuous and uninterrupted cross-sectionally circular open-ended tubular shell-like members of desired length and substantially uniform diameter throughout the length thereof, each shell-like member being axially deformed near one end thereof to provide a crimp which forms an exterior annular shoulder for mounting engagement with one side of said platelike carrier member from which said tubular shell-like members project perpendicular to the plane thereof, said crimp also forming in the wall of the corresponding tubular shell-like member an interior relatively shallow generally V-shaped annular groove, a generally U-shaped contact spring removably disposed in each one of a selected plurality of said tubular shell-like members with the free ends of the legs of such spring removably disposed in the interior V-shaped groove formed by the crimp of the respective tubular shell-like member, each shell-like member containing such U-shaped spring forming a socket element for coaction with a suitable plug carried on a support, a tubular sleeve for each one of a pair of selected tubular shell-like members, such sleeve being disposed exteriorly around its respective shell-like member with one end in engagement with the annular shoulder formed by the crimp thereof and the other end axially extending therefrom for engagement with a suitable mounting which extends generally in parallel with said platelike carrier member but spaced

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therefrom, and fastening means disposed within and extending axially through each tubular shell-like member carrying such sleeve for securing the device in engagement with said mounting, each tubular shell-like member carrying such sleeve and containing such fastening means forming a mounting member and also forming an index member to determine the plug-in position of the plugs carried on the support of a plug terminal device coacting with said socket terminal device.

4. In an electrical terminal device of the class described, a plate like carrier member, a plurality of identical tubular elements mounted on said carrier member and extending therefrom perpendicular to the plane thereof, a mounting member extending substantially in parallel with said platelike carrier member in spaced relation to the free ends of said tubular elements, contact spring means disposed within each one of some of said tubular elements to form sockets for coaction with suitable plugs carried by and extending from a suitable support, fastening means disposed in at least one of said tubular elements and substantially plugging the axially extending aperture thereof to form an index key member for determining the plug-in position of

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said plugs carried by said support relative to the sockets formed by the tubular elements containing said contact spring means, and a tubular sleeve exteriorly surrounding said tubular element which contains the fastening means forming said index key member for securing said device on said mounting member.

HARVEY HEISS.

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