Dec. 26, 1950 J. W. BEATTY 2,535,031

COMBINATION PLUG, SOCKET, AND PANEL ASSEMBLY

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FIG. 1.

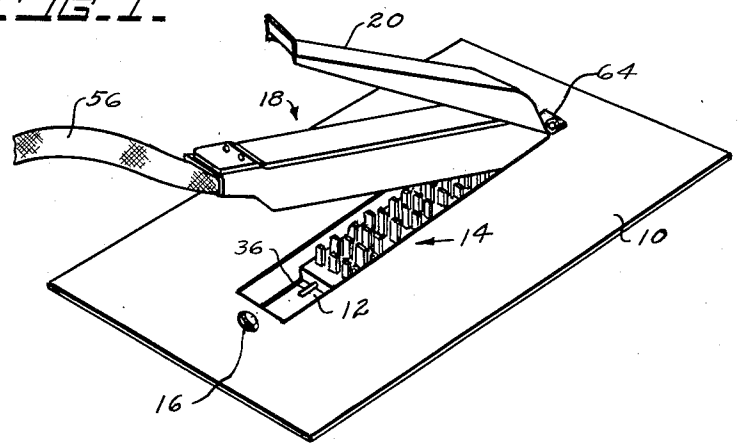


FIG. 2.

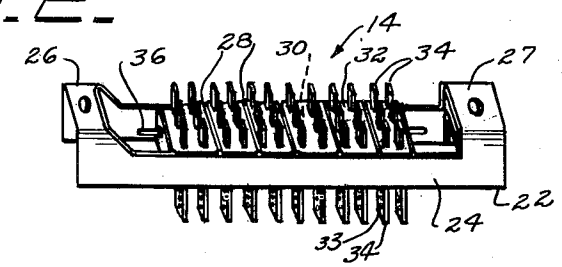
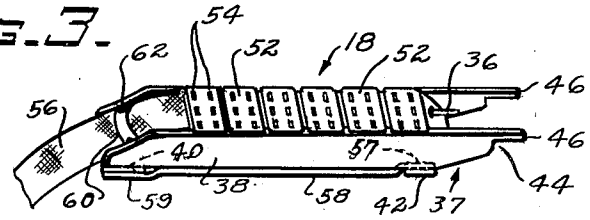


FIG. 3.



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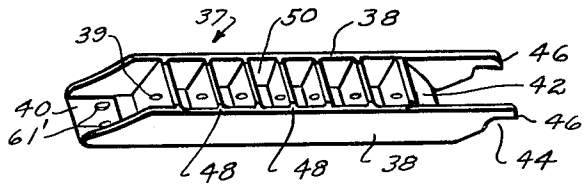


FIG. 4

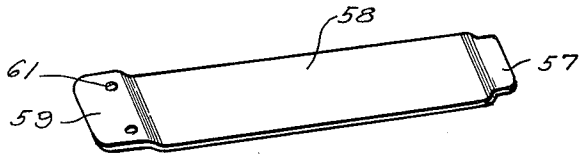


FIG. 5

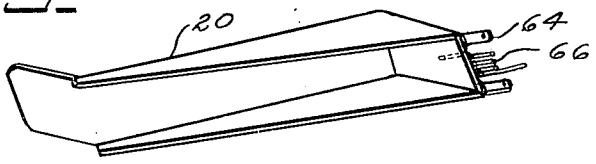


FIG. 6

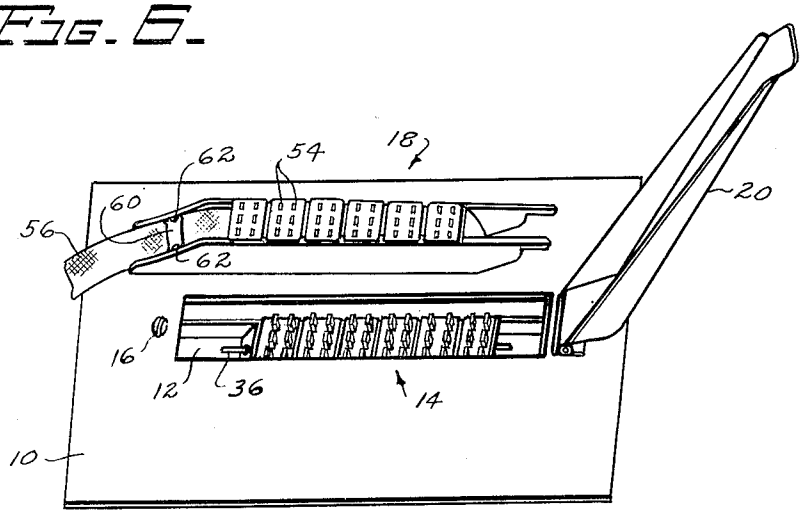


FIG. 7

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FIG. 8

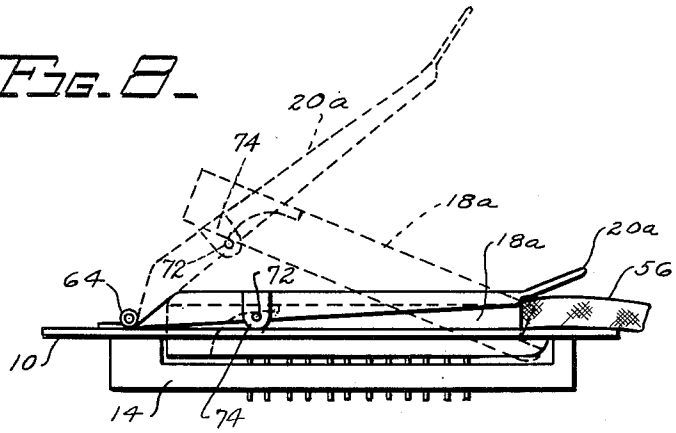


FIG. 9

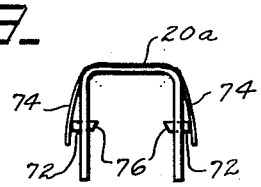
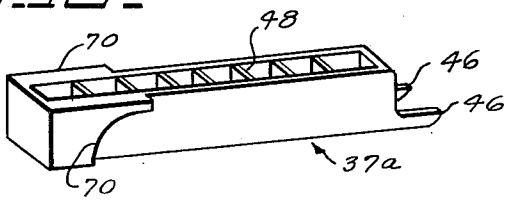


FIG. 10



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COMBINATION PLUG, SOCKET, AND PANEL ASSEMBLY

John W. Beatty, Dayton, Ohio

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5 Claims. (Cl. 173—328)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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The invention described herein may be manufactured and used by or for the Government for governmental purposes without payment to me of any royalty thereon.

This invention relates to a combination plug, socket and panel assembly and has special reference to a device of this kind arranged for simultaneously making a plurality of connections to the several wires of a multiple cable.

It is an object of this invention to provide a device of this kind which will occupy the least space required to make a predetermined number of connections.

It is another object of the invention to provide a device in which a single manual movement will disconnect all of the plugs of the device from all of the sockets coincidentally.

It is another object of the invention to provide, in a device of this kind, a multiple plug unit, a multiple socket unit, and a cover which automatically closes over the exposed contacts when the plug and socket units are separated.

It is another object of the invention to so construct the cover member that it will serve also as a lever for separating one multiple unit from the other.

Other objects and advantages will become apparent from a consideration of the following description when read with reference to the drawings, wherein:

Fig. 1 shows an assembly of the several components of a device embodying my invention.

Fig. 2 is a perspective view of a multiple plug which constitutes a unit of the device shown in Fig. 1.

Fig. 3 is a perspective view of the underside of a multiple socket which constitutes another unit of the device shown in Fig. 1.

Fig. 4 is a perspective view of the frame of the multiple socket shown in Fig. 3.

Fig. 5 is a perspective view of an enclosing plate for the underside of the frame shown in Fig. 4.

Fig. 6 is a perspective view of a cover constituting one component of the assembly shown in Fig. 1.

Fig. 7 is a perspective view of the assembly like Fig. 1 but with the cover raised and the multiple socket unit withdrawn from connection with the multiple plug unit and laid bottom side up alongside the multiple plug unit.

Fig. 8 shows a modification of the device of Fig. 1.

Figs. 9 and 10 show two of the detail parts of the modification shown in Fig. 8.

Like reference characters refer to like parts throughout the several views.

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Referring more particularly to Fig. 1, a panel 10 preferably of a suitable sheet material has a rectangular opening 12 within and adjacent which the several operative units of the device are arranged and supported.

Fig. 1 shows a relatively small panel supporting a single plug and socket assembly but it will be readily understood that a large panel having a series of openings 12 may be substituted or a sufficiently large panel may be provided with a large opening in which a selected number of plug and socket assemblies may be mounted side by side, one substantially touching the next.

In the assembly shown in Fig. 1, the plug unit 14 is fixedly mounted on the underside of the panel 10 in alignment with the opening 12 by screws 15, the socket unit 18 being of a width which is slidably received by the opening 12 and fulcrumed at one end thereof. The cover 20 is hinged to the panel 10 at the same end of the opening 12 at which the socket unit 18 is fulcrumed.

The multiple plug unit 14 is shown as a subassembly in Fig. 2 and comprises a plug frame 22 having side rails 24 with upwardly formed bridges 26 and 27 joining the two rails at the ends. The bridges 26 and 27 provide the anchorage by which the frame is connected to the underside of the panel by the screws 16. Intermediate the ends of the plug frame 22 the partitions 28 extend across from one rail 24 to the other, thereby dividing the space between the side rails 24 into a series of pockets 30 into each of which an insulation member 32 may be slidably fitted.

Each insulation member 32 is shown as being provided with six flat metal plugs 34 but obviously a greater or a less number of plugs per block and plugs of different shapes may be employed as the case may require. The plugs 34 are supported in vertical tunnels in the insulation members 32 with considerable looseness, so that they may adjust themselves for easier entry and better contact when they are entered into their respective openings in the socket unit 18.

As a means to retain the plugs in the loose tunnels, laterally projecting lugs may extend from the plugs loosely into laterally extending pockets in the vertical tunnels of the insulation members 32. Pins 36 (see Fig. 2) extending through openings 39 (see Fig. 4) in the partitions 28 is one way of holding the insulation members 32 in place.

The plugs 34 extend upwardly from the top surface of the insulation members 32 to such an

extent that when the plug unit 14 is secured to the panel 10, the top ends of the plugs will be substantially flush with the top surface of the panel 10. The bottom ends of the plugs 34 extend far enough below the bottom surface of the insulation members 32 to provide space for several transverse openings 33 one above the other in each plug for connecting conducting wires as desired.

The multiple socket unit 18 is shown as a subassembly in Fig. 3 and comprises a socket frame 37 having side rails 38 with bridges 40 and 42 at the ends of the rails joining them together (see Fig. 4). The side rails 38 are so spaced apart by the bridges 40 and 42 that the frame 37 is of proper thickness to be a sliding fit in the opening 12 of the panel 10.

At one end of the socket frame 37, the side rails 38 are cut away as at 44 thereby to provide a pair of prongs 46 which pass through the opening 12 of the panel 10 and engage the underside of the panel at one end of the opening to provide a fulcrum for the socket unit 18 which becomes a lever of the second order when it is being pressed into engagement with the plug unit 14.

Intermediate the ends of the socket frame 37 are partitions 48 which extend across from one rail 38 to the other, thereby dividing the space between the side rails into a series of pockets 50 corresponding in position and spacing to the pockets 30 of the plug unit 14. Pockets 50 are dimensioned each to slidably receive an insulation member 52 (see Fig. 3).

The insulation members 52 carry a series of conductive socket terminals 54 which correspond in position to the plug terminals. The socket terminals may be held in the insulation members in accordance with standard practice, and should be prolonged in a manner similar to that shown at 34 in the plug subassembly 14, Fig. 2 for connection to the several wires of the cable 56 but should not be so far prolonged as to touch the socket enclosing plate 58. The socket terminals, where they extend from the insulation members 52 may preferably have several transverse holes through which the conductive wires of the cable 56 may be threaded and soldered. The socket frame insulation members 52 may be retained in the pockets 50 with wires 36 as is done in the case of the plug frame insulation members 32.

The socket enclosing plate 58 is offset downward as at 57 at one end to extend under the bridge 42 and upward as at 59 at the other end to lie on the top of the bridge 40 to which it is fastened by screws 62 (see Fig. 7) extending through openings 61. The same screws 62 which extend through openings 61 in the plate 58 and through openings 61' in the bridge 40 of frame 37 threadedly engage the clamp 60 for gripping and holding the cable 56 (see Fig. 3).

The cover 20 is pivotally supported directly over the opening 12 in the panel 10 by a hinge 64 one side of which is integral with the cover and the other side of which is attached to the panel by any suitable means such as by soldering or the like. In the embodiment of the invention shown in Figs. 1 through 7 the cover 20 is hinged at the same end of the opening 12 as the socket unit 18 is fulcrumed. A small coil spring 66 is adapted to surround the pin of the hinge 64, (see Fig. 6), the ends of the coil being extended to lie one end on each hinged part. The spring 66 when in place is tensioned to urge the cover 20 to its closed position.

Figs. 1 and 7 clearly show how the device illustrated in Figs. 1 through 7 operates. By raising the cover 20 as seen in Fig. 1 and grasping the cable end of the multiple socket unit 18, turning it upside down from the position shown in Fig. 3, then inserting the prongs 46 into the end of the panel opening 12, the socket unit 18 may be pressed down into full engagement with the plug unit 14, after which the spring 66 will return the cover 20. It follows that whenever the socket unit 18 is withdrawn, the cover 20 closes over the exposed metal plugs 34.

In the modification shown in Figs. 8 through 10, the panel 10 has an opening 12 like that shown in Fig. 1, and a plug unit 14 is secured by screws 16 in the same manner as is shown in the exemplification Fig. 1. The socket unit 18*a*, however, differs from that shown in Fig. 1 in that the cable 56 is taken off the right-hand end, from which the fulcrum prongs 46 extend, instead of being taken off the left-hand end as in Fig. 1.

The socket frame 37*a* (see Fig. 10) of the modification Fig. 8 differs from the socket frame 37 of Fig. 1 in that frame 37*a* has a pair of integral or attached socket frame disengaging cams 70 one on each side of the frame 37*a*.

The cover 20*a* of the modification Fig. 8 differs from the cover 20 of Fig. 1 in that the cover 20*a* is hinged to the panel 10 at the left-hand end of the cover instead of at the right-hand end as in Fig. 1. Moreover, the cover 20*a* is provided with opposite socket raising plungers 72 actuated by springs 74 fastened to the cover by any suitable means. Plungers 72 are beveled on their inner ends as at 76 (see Fig. 9) so that, if the socket unit 18*a* is down in engagement with the plug unit 14 when the cover 20*a* is being closed, the plungers 72 will snap over the socket frame 37*a* and engage the underside of the cams 70 as seen in solid lines in Fig. 8.

If the cover 20*a* is thereafter raised to the dotted line position as seen in Fig. 8, the plungers 72 will slide along the underside of the cams 70 and thereby raise the socket unit 18*a* substantially out of engagement with the plug unit 14, as seen in dotted lines in Fig. 8, so that from there on complete disengagement may readily be made manually by lifting the socket unit from the plug unit.

The advantage of the construction shown in Fig. 8 is that it precludes the possibility of using the cable as the removal medium. It further provides a greatly increased mechanical advantage in removing the socket unit from the plug unit.

In the embodiments of my invention hereinbefore shown and described, the unit 14 which is permanently secured to the bottom of the panel 10 is designated the plug unit, while the unit 18 which is fulcrumed at one end and engageable with and removable from the plug unit 14 is designated the socket unit. It will, however, be obvious that in any case the unit 14 may carry the socket terminals and the unit 18 the plug terminals. Such other modifications and equivalents as do not depart from the spirit of the invention are sought to be embraced in the following claims.

I claim:

1. In a device of the character described, a panel having an opening therethrough, a multiple contact member secured to the underside of said panel in register with said opening, a multiple cable, a second multiple contact member

having its contacts electrically joined, one to each of the several wires of said cable and in removable engagement with the contacts of said first multiple contact member, fulcrum prongs on said second multiple contact member extending from one end downward through said opening and lying against the underside of said panel when said second multiple contact member is fully entered in said opening, a cover hinged at the end of said opening opposite to that at which the second multiple contact member is fulcrumed, adapted to close over said second multiple contact member when the contacts of said second multiple contact member are in engagement with the contacts of said first multiple contact member, and adapted to close over said opening when said second multiple contact member is withdrawn from said panel, a cam on each side of the said second multiple contact member and a cam engaging lug movable inwardly on each side of the said cover, both positioned near the end to which the lid is hinged, and a spring for each lug urging said lugs inwardly toward each other, the inner ends of said lugs being beveled from the upper edge downwardly and outwardly, whereby when said cover is closed after the said second multiple contact member is in the engaged position, the lugs will spread apart, pass over the cams and lie along the underside thereof positioned for a subsequent opening.

2. A plug, socket, and panel assembly which comprises, a panel having an elongated opening therethrough, an elongated lower frame secured to the underside of said panel in register with said elongated opening, said elongated lower frame being divided by transverse partitions into a series of pockets, lower contact assemblies each comprising a series of lower contacts set in a body of insulation, one assembly in each said pocket of said lower frame, a multiple cable, an elongated upper frame slidably fitted to said elongated opening, said elongated upper frame also being divided by transverse partitions into a series of pockets, upper contact assemblies each comprising a series of upper contacts set in a body of insulation, one assembly in each said pocket of said upper frame, and the upper contacts being electrically connected to the individual wires of said cable and in removable engagement with the lower contacts, fulcrum prongs on said elongated upper frame extending downward through said elongated opening and lying against the underside of said panel when said elongated upper frame is fully entered in said elongated opening, and a cover hinged to one end of said opening adapted to close over said elongated upper frame when the upper and lower contacts are fully engaged, and adapted to close over said elongated opening when the said upper frame is withdrawn from said panel, and spring means for holding said cover closed.

3. A plug, socket, and panel assembly which comprises, a panel having an elongated opening therethrough, an elongated lower frame secured to the underside of said panel in register with said elongated opening, said elongated lower frame being divided by transverse partitions into a series of pockets, lower contact assemblies each comprising a series of lower contacts set in a body of insulation, one assembly in each said pocket of said lower frame, a multiple cable, an elongated upper frame slidably fitted to said elongated opening, said elongated upper frame also being divided by transverse partitions into a series of pockets, upper contact assemblies each comprising a series of upper contacts set in a body of insulation, one assembly in each said pocket of said upper frame, and the upper contacts being electrically connected to the individual wires of said cable, and in removable engagement with the lower contacts, fulcrum prongs on said elongated upper frame at one end thereof adapted to extend downward through said elongated opening and lying against the underside of said panel when said elongated upper frame is fully entered in said elongated opening, and a cover adjacent said elongated opening adapted to close over said elongated upper frame when the upper and lower contacts are fully engaged and adapted to close over said elongated opening when the said upper frame is withdrawn from said panel, and means for holding said cover closed.

4. A plug, socket, and panel assembly which comprises, a panel having an elongated opening therethrough, an elongated lower frame secured to the underside of said panel in register with said elongated opening, said elongated lower frame being divided by transverse partitions into a series of pockets, lower contact assemblies each comprising a series of lower contacts set in a body of insulation, one assembly in each said pocket of said lower frame, a multiple cable, an elongated upper frame slidably fitted to said elongated opening, said elongated upper frame also being divided by transverse partitions into a series of pockets, upper contact assemblies each comprising a series of upper contacts set in a body of insulation, one assembly in each said pocket of said upper frame, and the upper contacts being electrically connected to the individual wires of said cable, and in removable engagement with the lower contacts, fulcrum prongs on said elongated upper frame extending downward through said elongated opening and lying against the underside of said panel, whereby said multiple contact member may be first engaged with said panel at one end then rotated downwardly through said opening and a cover hinged to one end of said opening adapted to close over said elongated upper frame when the upper and lower contacts are fully engaged, and adapted to close over said elongated opening when the said upper frame is withdrawn from said panel, and resilient means for holding said cover closed.

5. A plug, socket, and panel assembly which comprises, a panel having an elongated opening therethrough, an elongated lower frame secured to the underside of said panel in register with said elongated opening, said elongated lower frame being divided by transverse partitions into a series of pockets, lower contact assemblies each comprising a series of lower contacts set in a body of insulation, one assembly in each said pocket of said lower frame, a multiple cable, an elongated upper frame slidably fitted to said elongated opening, said elongated upper frame also being divided by transverse partitions into a series of pockets, upper contact assemblies each comprising a series of upper contacts set in a body of insulation, one assembly in each said pocket of said upper frame, and the upper contacts being electrically connected to the individual wires of said cable, and in removable engagement with the lower contacts, rigid extensions on said elongated upper frame extending downward through said elongated opening and lying against the underside of said panel when said elongated upper frame is fully entered in

said elongated opening and a cover hinged to one end of said opening adapted to close over said elongated upper frame when the upper and lower contacts are fully engaged, and adapted to close over said elongated opening when the said upper frame is withdrawn from said panel, and spring means for holding said cover closed.

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