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De Villemeur

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[54] **SAFETY OUTLET AND PLUG DEVICE**

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[52] **U.S. Cl.** ..... **339/21 R,** 339/62, 339/74 R

[51] **Int. Cl.** **H01r 9/00**

[58] **Field of Search** 339/20, 21, 22, 23, 339/24, 74, 75, 62, 63, 120, 59–61

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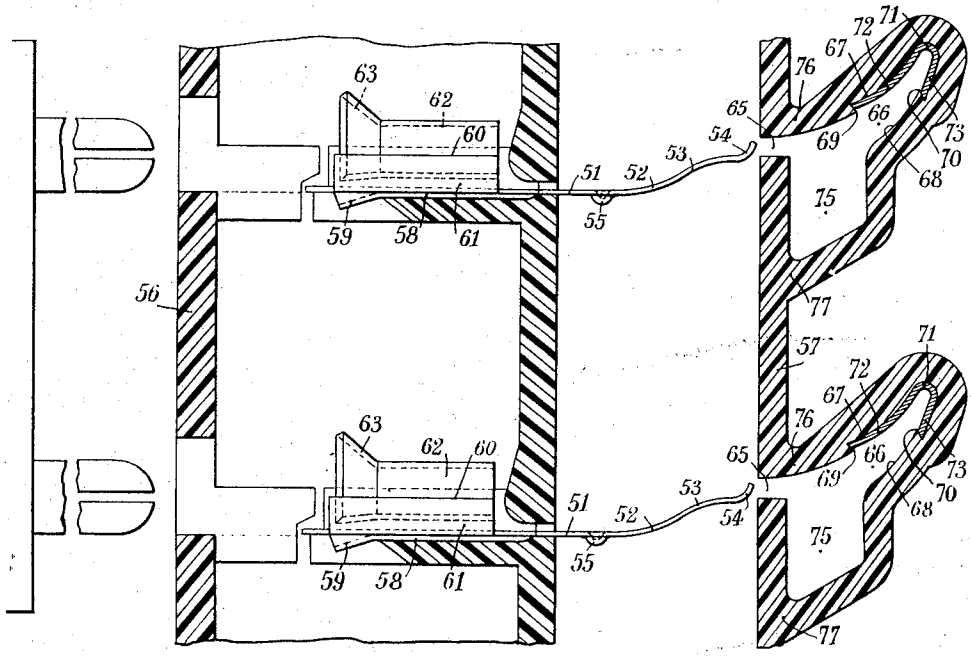
Assistant Examiner—Robert A. Hafer
Attorney—Amster & Rothstein

[57] **ABSTRACT**

This safety current outlet and plug device is preferably of the continuous type, i.e. constituting a kind of skirting-board along a wall or the like. The electric contact between the prongs of the cap, plug or connector and the electric conductors of the current outlet is obtained by causing the elastic deformation of the prongs consisting to this end of a very flexible conducting and elastic metal blade of very reduced thickness, for instance of the order of 0.1 to 0.3 millimeter, of which the front portion is adapted to engage a rigid surface of the female member which produces a substantial deformation of said blade which is sufficient for ensuring a satisfactory and reliable electric contact between said blade and an electric conductor inserted in said current outlet.

Thus, a current outlet may be obtained wherein any direct access to anyone of its conductors is positively prevented when using a rigid member, so that a safety current outlet is obtained.

4 Claims, 10 Drawing Figures



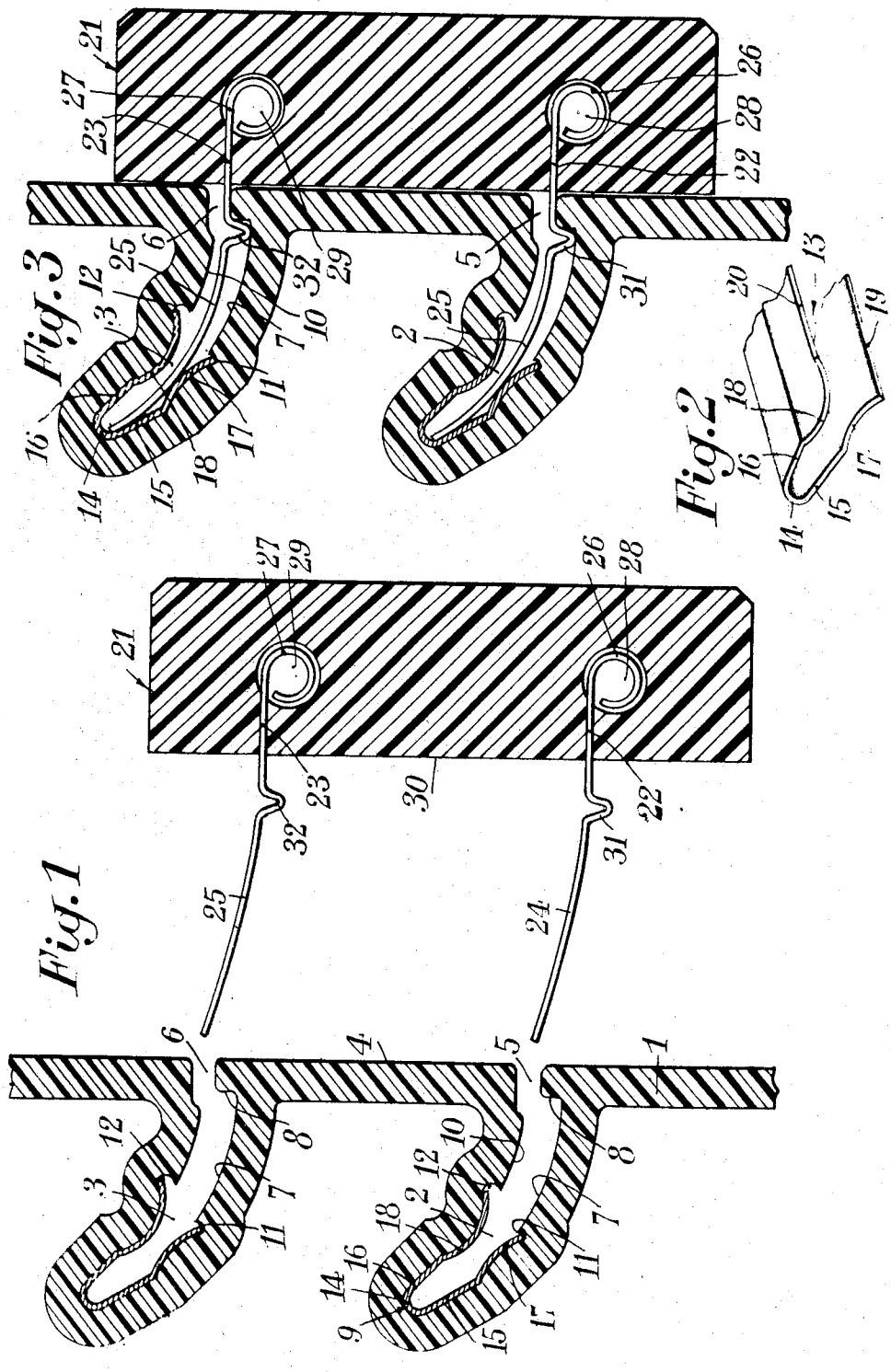


Fig. 3
Fig. 2
Fig. 1

Fig. 5

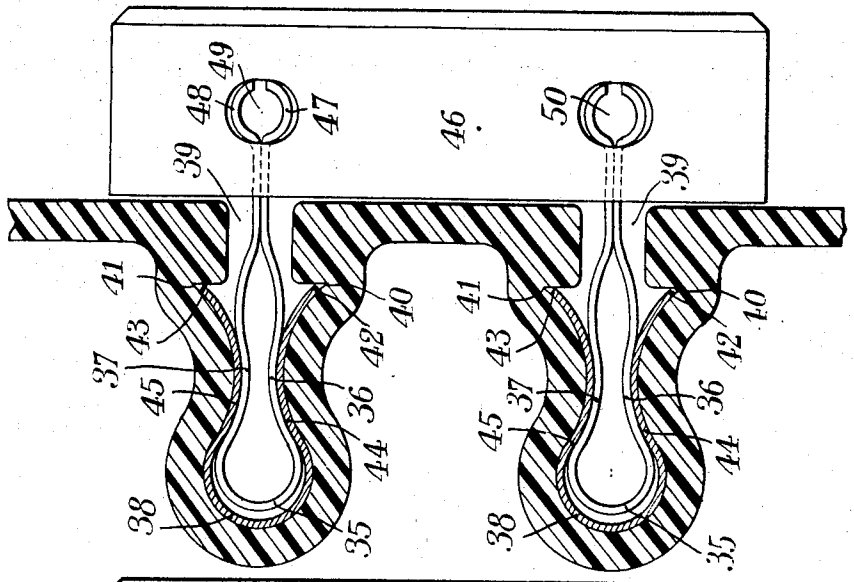

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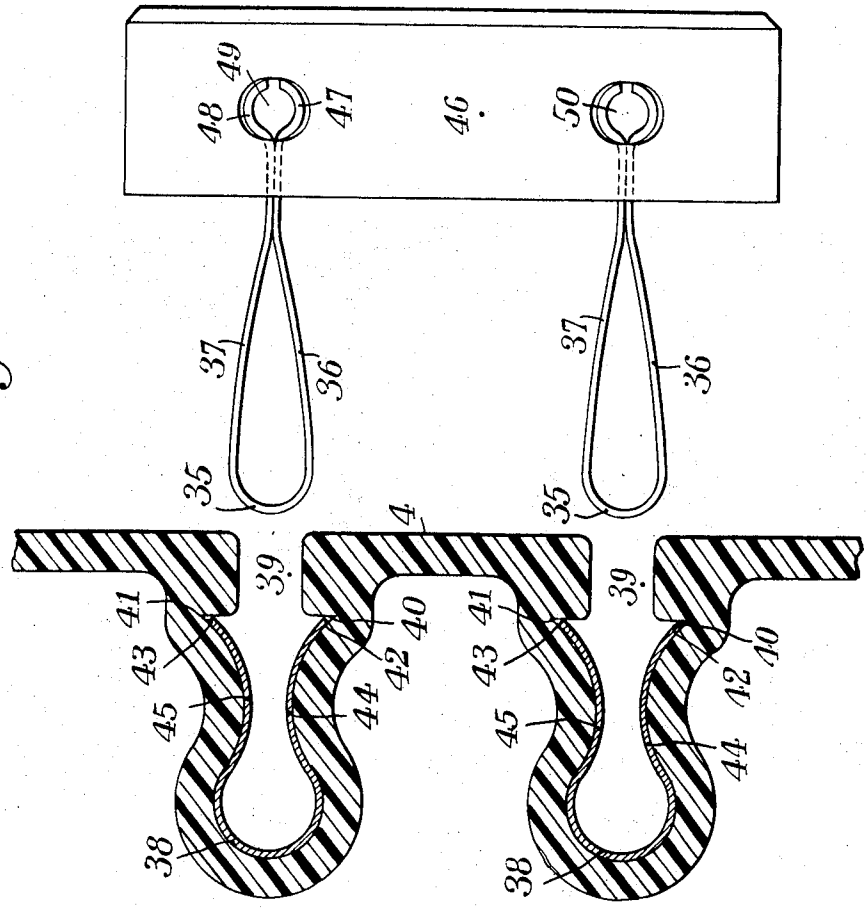
Fig. 4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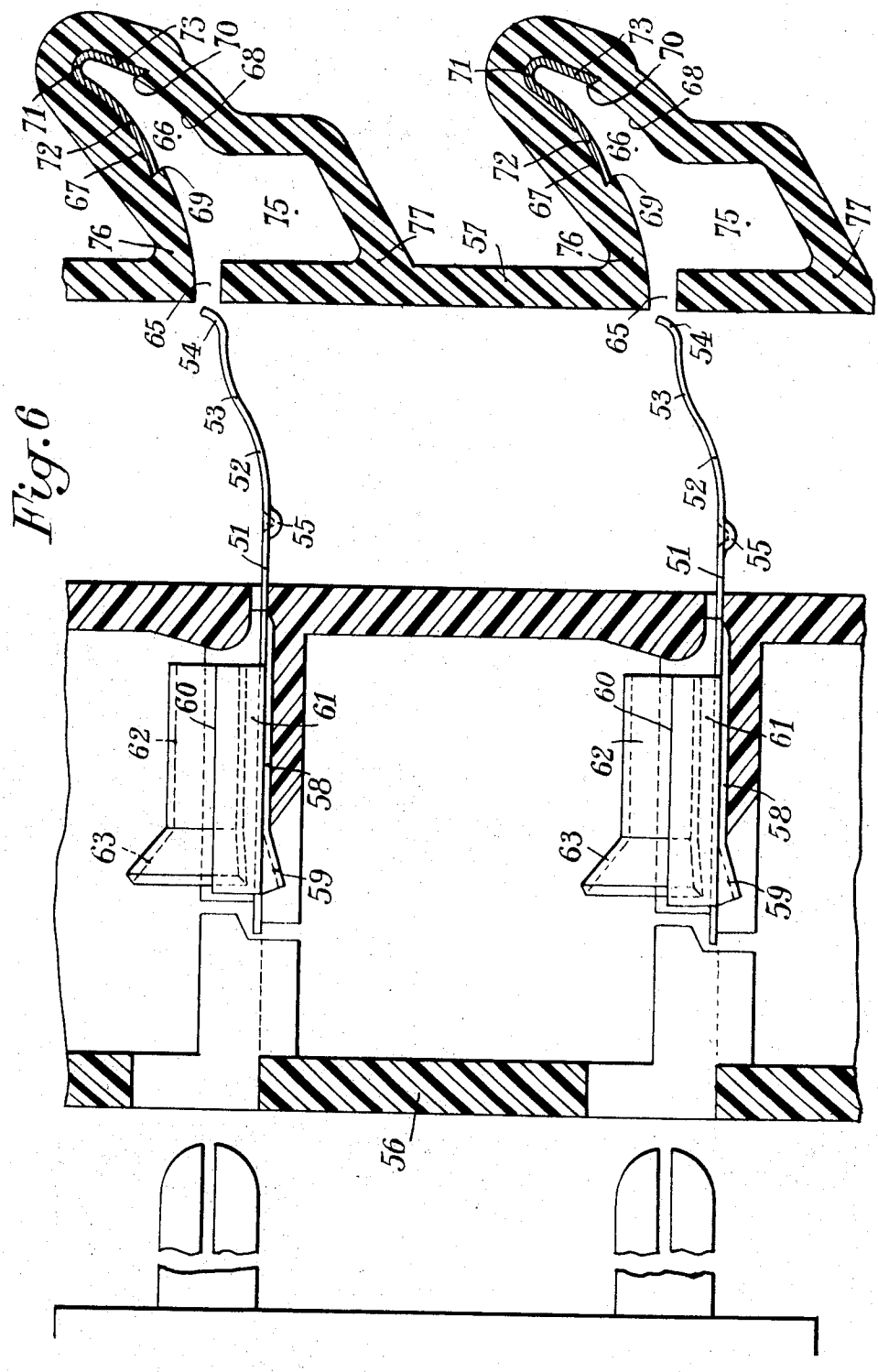
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Fig. 6

Fig. 7

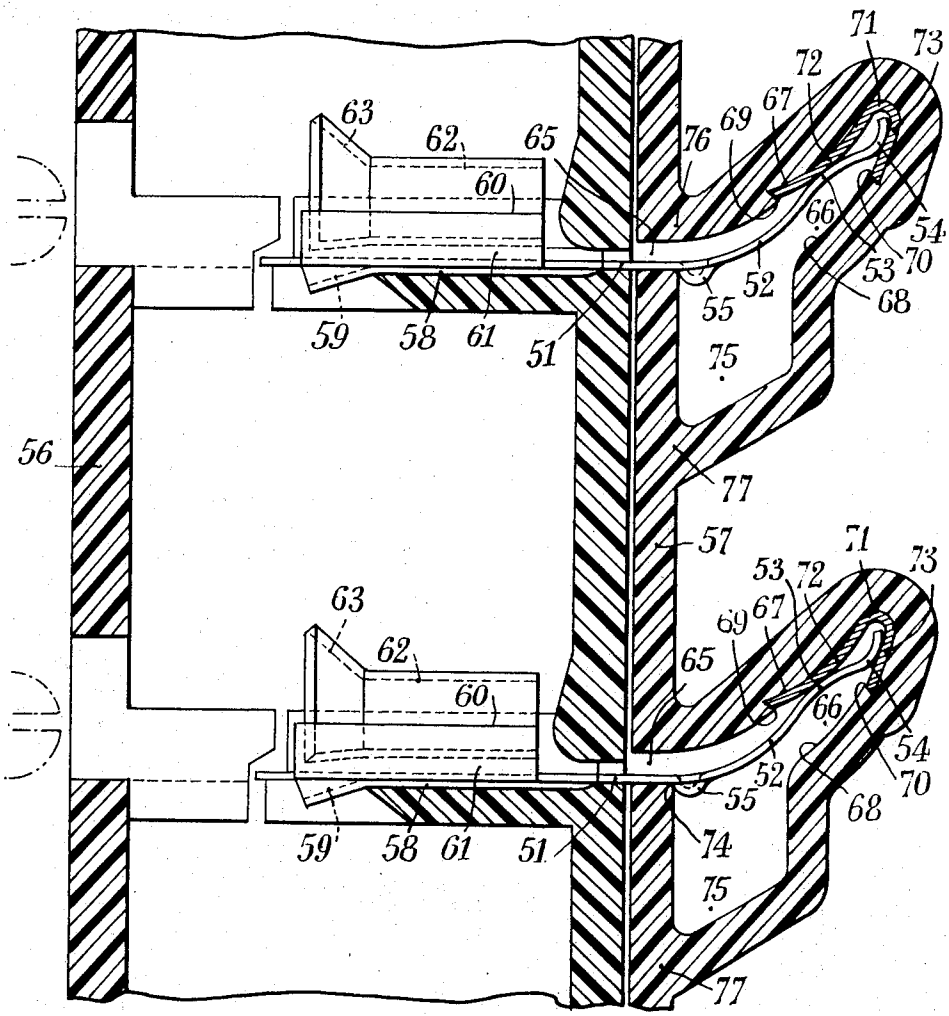

Fig. 8

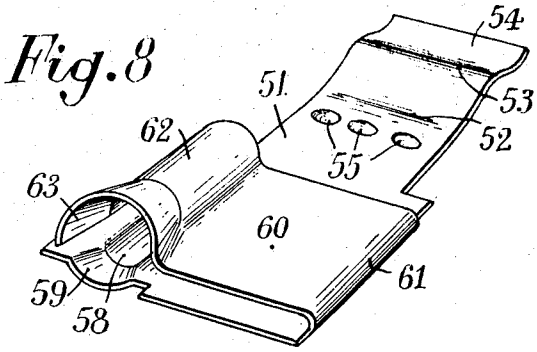

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Fig. 9

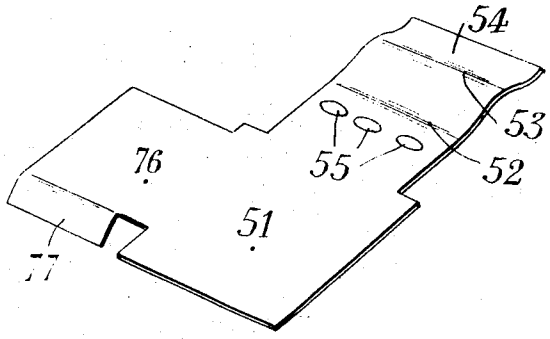
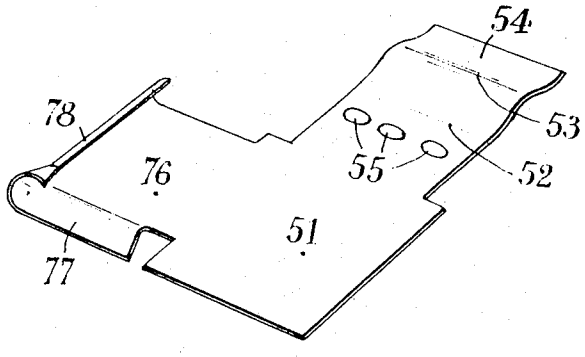


Fig. 10



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SAFETY OUTLET AND PLUG DEVICE

BACKGROUND OF THE INVENTION

The present invention relates in general to connectors and like wiring devices and has specific reference to an outlet and plug device of the type comprising in general a female member or outlet and a male member (cap or plug), wherein the quality of the electric contact obtained is due to the resilient pressure exerted by one of these members against the other; in these devices the resilient action is provided either by a resilient female member, so that when the male member is introduced into it it moves the lips of the female member slightly away from each other whereby the female member bears resiliently against the male member, or to the provision of a slightly resilient male member, so that, during its penetration into the female member, the latter exerts a lateral pressure causing a slight elastic deformation of the male member; alternatively, both members may have a certain resiliency in order to conjugate their elastic deformations.

In most of these known devices it is necessary that the male member can penetrate directly into the female member, and this is obviously attended by a certain danger, notably when the current supply is of the continuous type, for example in a skirting-board.

SUMMARY OF THE INVENTION

It is the essential object of the present invention to provide an electric outlet and plug device of the type broadly set forth hereinabove wherein the electric contact between the plug cap blades and the electric conductors of the current outlet is obtained by elastic deformation of said blades each consisting to this end of a relatively thin strip of conducting and resilient metal, about 0.1 to 0.3-millimeter thick, for example, which is extremely flexible and adapted to engage with its front or free end a rigid surface of the female member so as to cause a substantial deformation of said blade which is sufficient to ensure a satisfactory and reliable electric contact between said blade and an electric conductor of said current outlet; now, copper while having a sufficient conductivity has a poor elasticity, so that it is ill suited for making such plug blades; therefore, these blades may be made of beryllium bronze.

The current outlet may be so designed that no direct access can be had to anyone of its electric conductors, so that a safety current outlet is obtained, the considerable permissible deformation of said blades enabling them to reach these conductors otherwise inaccessible to conventional plug blades and also to any other object unless it is extremely flexible; besides, the moderate thickness of these blades permits of reducing to less than one millimeter the width of the access slots to the conductors incorporated in the outlet, so that the safety is increased correspondingly.

Each plug blade may be so designed that its deformation resulting from its introduction into the female member is also attended by the locking of the blade within the outlet; alternatively, this blade may be designed to constitute the female member of another current outlet adapted to cooperate with the blade of another cap or plug.

Of course, on the basis of the general arrangement set forth hereinabove, many other forms of embodiment may be contemplated.

Thus, notably, in case the elastic deformation of this thin blade, as a consequence of the specific shape of the female member into which it is engaged, were not sufficient for efficiently pressing this blade against the conductor disposed in the bottom of said female member, a double blade may be used which consists of a loop having a relatively short radius of curvature and two arms of which the portions extending on this side of the loop engage with a sufficient pressure the walls of a constriction formed in said female member and adapted to produce a relatively pronounced deformation of said arm portions.

The current conductor may consist of a thin copper section, for example less than 1 millimeter thick, having a cross-sectional configuration matching that of the cavity provided beyond the access slot of the current outlet, so as to bear against, and closely accommodate the contour of, said bottom, after this conductor has been introduced through said access slot.

Thus, it is possible to manufacture under extremely economical conditions current outlets in the form of skirting-boards having a continuous access slot and consisting of an extruded plastic strip, associated with electric conductors of the type set forth hereinabove and inserted into the cavity of said plastic strip as described in the foregoing.

The amount of plastic material and metal necessary for manufacturing this skirting-board and the corresponding plugs or connectors is extremely reduced, and the assembling step can be performed instantaneously without using any tool.

BRIEF DESCRIPTION OF THE DRAWING

The attached drawings illustrate diagrammatically by way of example two typical forms of embodiment of the present invention. In the drawings:

FIG. **1** is a cross-sectional view showing on a relatively large scale a first form of embodiment with the blades of the plug or cap about to be inserted into the current outlet;

FIG. **2** is a fragmentary perspective view showing a short section of the current supply conductor before the insertion thereof into the current outlet;

FIG. **3** is a view similar to FIG. **1** but showing the cap blades fully engaged into the current outlet;

FIGS. **4** and **5** illustrate a modified form of embodiment wherein the blades of the cap or connector are double or looped, before and after their engagement into the current outlet, respectively;

FIG. **6** is a sectional view showing a current outlet and cap assembly, the two component elements of the device being separated from each other;

FIG. **7** is a view similar to FIG. **6** but showing the two component elements in their assembled or contact position;

FIG. **8** is a perspective view showing a blade utilized in the male member;

FIGS. **9** and **10** are similar views of modified forms of embodiment of this blade.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The current outlet illustrated in FIG. **1** is of the skirting-board type providing a continuous inlet; it comprises a relatively thin strip **1** of plastic material, obtained by extrusion, in which a pair of channels **2,3** are formed; these channels **2,3** having a substantially

curved configuration are inclined at a considerable angle in relation to the front face 4 of the strip or outlet, and the width of their access slots 5, 6 is less than 1 millimeter; just beyond these slots 5, 6 the concave wall 7 of channels 2, 3 comprises an inner shoulder 8; at a point intermediate this shoulder 8 and the bottom 9 the convex and concave walls 10, 7 of each channel comprise other shoulders 11 and 12, as shown; electric conductors 13 for example of the type illustrated in FIG. 2 are fitted in the bottom of these channels; these conductors comprise to this end thin conducting metal blades forming at one end a loop 14 of same radius as said channel bottom 9 and having two arms 15, 16 each formed with an outflaring concave portion 17, 18 corresponding in shape to the curved intermediate portion of said channels 2, 3; at their opposite ends these blades comprise longitudinal edges 19,20. It is clear that this thin section can easily be introduced through the access slots 5, 6 of the current outlet illustrated in FIG. 1, and the elasticity of their arms 15, 16 is sufficient for causing them to resiliently engage the wall of the rear portions of said channels, so that the longitudinal edges 19, 20 fit closely against the shoulders 11,12 acting as convenient means for safely locking the conductors in their operative position.

The plug cap or connector illustrated in FIGS. 1 and 2 comprises a small plate 21 of plastic material in which the rear portions 22,23 of a pair of very thin blades 24,25 of conducting and elastic metal are embedded; to this end, these rear ends are looped as shown at 26, 27 and engage a pair of bores 28, 29 provided to this end in said plate 21 and opening laterally; at a short distance from the front face 30 of plate 21 these blades 24,25 are bent to constitute a pair of resilient locking projections 31,32.

In the case of a connector, the device is complete in the form described hereinabove, provided that the distance between the bores 28 and 29 corresponds to that prescribed for the blades or prongs of a conventional and standard cap, which can be introduced into these bores for engaging the loops 26, 27 of blades 24,25 and thus provide the desired electrical connections.

Whether in the case of a plug cap or a connector, the device operates as follows: When the cap or connector is approached to the front face 4 of the skirting-board, and the two blades 24,25 are firstly inserted into the access slots 5 and 6 of the pair of channels 2 and 3 of said striking-board, then pushed home until the front face 30 of the plug cap engages the registering front face 4 of said striking-board, the blades 24,25 are subjected to a strong elastic deformation as a consequence of their engagement with the concave face 7 of said channels, and the outer ends of these blades subsequently ensures an efficient elastic contact with the electric conductor 13, and notably by resiliently engaging its conducting arm 15; simultaneously, the projections or loops 31 and 32 having undergone a deformation as a consequence of their passage through the access slots 5 and 6, and immediately after this passage the blades 24,25 expand again and are thus locked behind the shoulders 8.

To remove the cap or connector and cut or switch out the current, it is only necessary to release the projections 31, 32 by slightly lifting the cap or connector, so that the blades 24 and 25 can easily be extracted from the outlet.

The modified form of embodiment illustrated in FIGS. 4 and 5 differs from the preceding one in that there is a direct access to the electric conductors so that the elastic deformation to be exerted on the blades for reaching the conductors in the first form of embodiment is suppressed; thus, in order to exert a similar elastic pressure against these conductors, the blades consist of a loop 35 and two arms 36, 37, the blade thickness being thus reduced and being even inferior to 0.2 millimeter; the electric conductors may consist, as in the preceding case, of a conducting metal section 38 having a cross-sectional shape corresponding substantially to that of the section element of the preceding form of embodiment, except for the fact that section 38 is symmetrical. Furthermore, the access slot 39 is also symmetrical with two shoulders 40, 41 adapted to retain and lock the ends 42,43 of the two arms 44, 45 of metal sections 38; the double blade may also comprise within the plastic base plate 46 a pair of half-loops 47 and 48 which are fitted in bores 49 and 50 and adapted to constitute, in the case of a connector, the female members engageable by the plugs or prongs of a conventional cap.

In the alternate form of embodiment illustrated in FIGS. 6 to 8 the skirting-board is very much similar to that shown in FIGS. 1 and 2, but in this case the caps or connectors and notably their metal blades are somewhat modified. In fact, the front portion of these blades 51 comprise three successive curved portions 52,53 and 54 having opposite directions as in a corrugation, the last curved portion 54 being however somewhat more pronounced than the other two. Moreover, on this side of the curved portions each blade comprises a pressed portion 55 which, as clearly shown in FIG. 7, constitutes a locking element adapted to retain the connector or cap 56 in its electric contact position with respect to the conductor of cap 57; the rear portion of each blade 51 shown more particularly in FIG. 8 is adapted to constitute on one side a partly cylindrical half-shell 58 having an outflaring opening 59; on the other side, it comprises an extension 60 having substantially the same width, which is bent on itself transversely through 180° about a fold line 61, the edge of this extension being adapted to constitute another partly cylindrical half-shell 62 complementary to and registering with the first half-shell 58, and also formed with an outflared inlet opening 63.

In the alternate form of embodiment illustrated in FIG. 9, the lateral portion 76 of blade 51 comprises only one outflared rear edge 77 adapted to facilitate the contact with the prong when the latter is introduced into the connector; in addition, a lateral portion 78 of part-cylindrical configuration may be provided for constituting a complementary contact line with the prong.

It is clear that when blades thus shaped are fitted in any connector such as the one illustrated at 56 they can constitute the female member of an outlet, adapted to receive the prongs 64 of a cap (not shown), even if these prongs differ considerably from one another.

The current outlets 57 may consist of skirting boards formed with longitudinal slots 65 of a width preferably inferior to 1 millimeter so as to allow just the corrugated portions 52,53, 54 of blades 51 therethrough and permit their ingress into channels 66 having a considerable upward and inward inclination, and limited on one side by a surface 67 having its concavity directed outwards and on the other side by a surface 68 having its concavity directed inwards; these surfaces 67 and 68 are provided with shoulders 69 and 70 respectively per-

mitting the locking of U-shaped electric conductors **71** of which the arm **72** having an outwardly directed concavity is considerably longer than the arm **73.**

Thus, when it is desired to plug in this connector by inserting the blades **51** through the slots **65** of the current outlet, these blades **51** engage firstly the rigid surface **68,** with an inner concavity, of channel **66,** so that the blades are deflected towards the bottom of the channel until, having slipped on this surface, their curved portion **54** engage the arm **73** of the electric conductor and their curved portion **53** engage the other arm **72** of the same conductor; thus, a very efficient and reliable contact is established; in contrast thereto, if it is attempted to insert a rigid member through the thin slot **65** of the current outlet, this member is positively prevented from contacting the electric conductor.

As shown in FIG. **7,** when the connector is fitted in position its pressed projections **55** resiliently engage the inner lower edge **74** of slot **65,** thus locking the connector in position.

To facilitate the manufacture of these skirting-boards **57** each channel **66** thereof may comprise on the side opposite to its surface **67** a small chamber **75;** if desired, the slots **65,** instead of being formed by extrusion, may be obtained subsequently by a simple sawing operation.

Thus, these skirting-boards may conveniently be manufactured as a continuous strip, by extrusion, by utilizing a conventional extruder.

FIGS. **6** and **7** also show that for each electric conductor of the current outlet the connector comprises a single metal member acting jointly as a male member and as a female member; this single metal member is secured and retained within the connector without resorting to any metal fastening member, in contrast to the conventional design of hitherto known connectors; if the connector casing consists of a two-piece structure and if these pieces are assembled by mutual snap-fitting engagement, their arrangement is such that this snap-fitting action ensures at the same time the locking in position of these single metal members corresponding each to one of the current outlet lines.

Of course, the forms of embodiment described hereinabove with reference to the accompanying drawings should not be construed as limiting the scope of the invention since many modifications and variations may be brought thereto without departing from the basic principles of the invention as set forth in the appended claims; thus, notably, locking means for retaining the blades of the cap or connector in the current outlet, similar to the means illustrated at **8, 31, 32** of the first form of embodiment could be provided as well in the second form of embodiment; likewise, although the above description refers mainly to current outlet conductors consisting of a thin copper section, it is clear that a thin, suitably treated aluminium section could be substituted therefor.

What is claimed is:

1. Safety outlet and plug device of the continuous access type wherein the current outlet means is made of a thin plastic section having a front face, such as a skirting board, at least two curved channels of generally arcuate configuration, formed with a closed bottom, which communicate each on the side opposite said closed bottom with the exterior through a thin slot of a width of the order of one millimeter and preferably less, formed through the front face of said section, a conductor comprising a thin strip of resilient metal lining the bottom of each channel, said strip having the shape of a narrow U with the ends of the outer lips slightly outflared, shoulders formed in each one of the opposite faces of said bottom of said channel to limit a widened portion of said bottom for receiving said conductor, said shoulders acting in turn as stop means to the ends of the U-sectioned conductor so as to retain same in their recess when said conductor has been inserted into the relevant channel through said slot, the plug means comprising each a thin strip of elastic metal about less than 1 millimeter thick, shaped to a generally arcuate configuration having a greater radius of curvature than that of said channel, the front end(**54**) of said strip having a curvature more pronounced than that of the remaining portion of the strip.

2. Safety outled and plug device of the continuous access type wherein the current outlet means is made of a thin plastic section having a front face, such as a skirting board, at least two curved channels of generally arcuate configuration, formed with a closed bottom, which communicate each on the side opposite said closed bottom with the exterior through a thin slot of a width of the order of one millimeter and preferably less, formed through the front face of said section, a conductor comprising a thin strip of resilient metal lining the bottom of each channel, said strip having the shape of a narrow U with the ends of the outer lips slightly outflared, shoulders formed in each one of the opposite faces of said bottom of said channel to limit a widened portion of said bottom for receiving said conductor, said shoulders acting in turn as stop means to the ends of the U-sectioned conductor so as to retain same in their recess when said conductor has been inserted into the relevant channel through said slot, the plug means comprising each a thin strip of elastic metal about less than one millimeter thick, shaped to a generally arcuate configuration having a greater radius of curvature than that of said channel, wherein the strip of said plug means comprises a front end portion(**54**) having a more pronounced curvature than the remaining portion of the strip, said front end portion being followed in the direction away from its tip by another, intermediate portion (**53**) having a curvature of relatively great radius but in the reverse direction with respect to the curvature of said front end portion, in order to provide two points of inflexion and thus permit, when the plug strips are pushed home into the channels of thecurrent outlet means, through the slots (**65**) thereof, the resilient contact between said end portion(**54**) with one arm(**73**) of said conductor (**71**), the other portion(**53**) of opposite curvature of said front end portion engaging the other arm (**72**) of said conductor (**71**).

3. Safety outled and plug device as set forth in claim **2,** wherein the arm (**73**) of said conductor(**71**) engaging the concave face(**68**) of said current outlet channel (**66**) is shorter than the opposite arm (**7 2**) engaging the convex face (**67**) of said channel.

4. Safety outlet and plug device as set forth in claim **2** wherein each plug strip comprises at least one pressed portion (**32,55**) and the front face(e) of said current outlet comprises a shoulder(**8**) beyond its slot(**6, 65,**) said pressed portion and shoulder being such that when said plug strips are inserted home into the channels of the current outlet through said slot said plug means are releasably locked in position in said current outled.

* * * * *