March 16, 1954 T. W. SHENTON 2,672,593

THREE-WIRE ATTACHMENT PLUG RECEPTACLE

Filed June 13, 1952

Fig. 1.

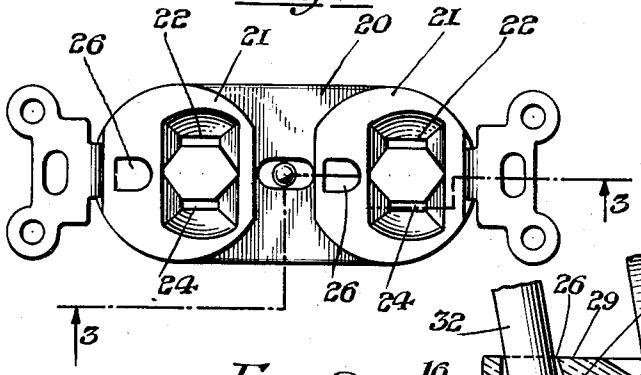
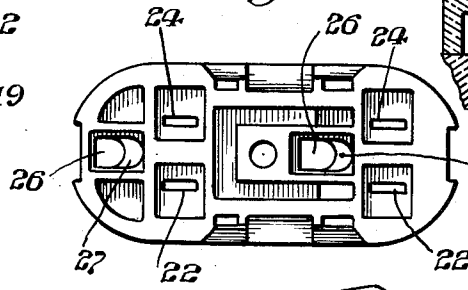


Fig. 2.



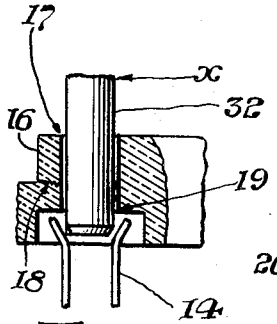


Fig. 6.

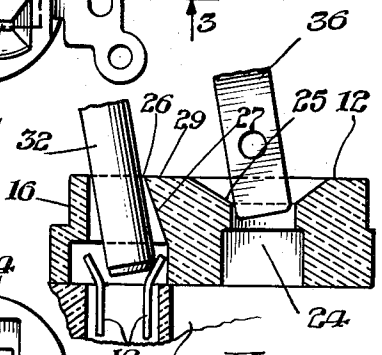


Fig. 5.

Fig. 3.

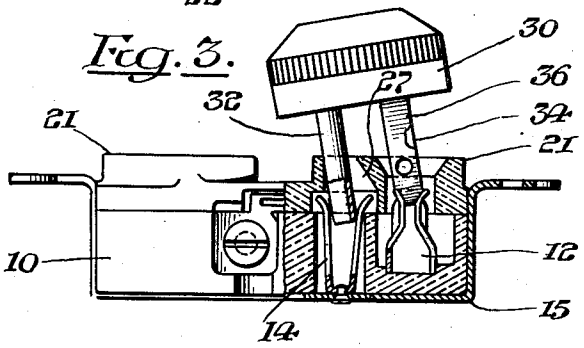
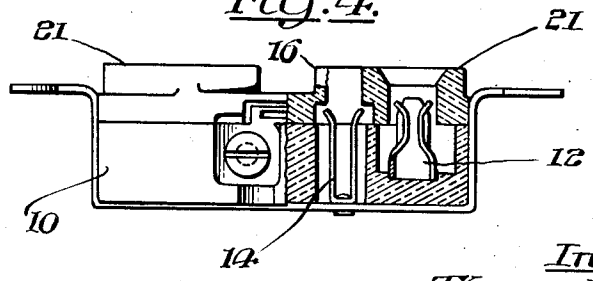


Fig. 4.



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Patented Mar. 16, 1954

2,672,593

UNITED STATES PATENT OFFICE

2,672,593

THREE-WIRE ATTACHMENT PLUG RECEPTACLE

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Application June 13, 1952, Serial No. 293,266

6 Claims. (Cl. 339—14)

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This invention relates to attachment plug receptacles and more particularly to attachment plug receptacles for use with plugs having three prongs, such, for example, as are used in three-wire circuits.

Heretofore attachment plug receptacles for use with wall plates or outlet box covers have been made mainly in the form of a single or duplex outlet. The single outlet form usually has a round front face portion adapted to fit within or extend through a round hole in the wall plate. The duplex form customarily has two face portions raised above the front surface of the receptacle body, each shaped as a circle flattened at opposite poles for known reasons.

In designing a new three-wire form of duplex receptacle, it was a practical necessity that its face portions be dimensioned and shaped to fit within the holes of a standard duplex wall plate. Otherwise, a new design and new tools would also be necessary for a special wall plate which would add to the cost and the stock of parts a jobber need keep on his shelf.

The need to place all the openings for the three prongs of the plug cap within the limited area of a face portion of the receptacle body imposes serious limitations on design. Among those limitations a few may be mentioned. Firstly, it is necessary (if the receptacle is also to be capable of receiving standard two-prong attachment plug caps) for the slots through which the line-wire prongs are to pass to be of the same size and arranged the same distance apart as in conventional two-wire receptacles. Secondly, the aperture for the grounded prong must be properly spaced from the aforesaid slots. Thirdly, it is desirable for reasons of manufacturing economy that the prong receiving contacts within the receptacle body be formed so as to accept prongs arranged either in parallel or in tandem, both of which arrangements are common. Therefore a relatively large portion of the interior of the receptacle is occupied by those contacts, leaving only a small amount of room for the grounded contact. Such limitations indicated the need to place the opening for the grounded prong close to one edge of the face of the outlet. Such placement gave rise to a new difficulty when a grounded prong of greater length and girth was used, as is desirable in certain instances. Users would jerk the plug from the outlet applying lateral pressure by pulling on the wire or would manually pull or otherwise press the plug sidewise. The

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outlet would break away or chip off at the edge adjacent the ground-prong aperture.

Therefore it is an object of this invention to provide an improved three-wire electric outlet or attachment plug receptacle usable with standard face plates which will accept three-prong plugs with a large grounded prong which will withstand strenuous usage and abuse, particularly sidewise pulling and laterally applied stresses.

Other objects and advantages will appear as the invention is described in connection with the accompanying drawings.

The invention is illustrated as applied to a duplex attachment plug receptacle adapted to receive a plug having parallel prongs connected to the line wires and a grounded prong. It will be apparent however that the invention is applicable to a single receptacle and also, in either single or multiple form, to plugs in which the wire-connected prongs are arranged in tandem or otherwise.

In the drawings:

Figure 1 is a plan view of a duplex receptacle in which the invention is applied;

Figure 2 is a bottom view of the cover portion of the receptacle illustrated in Fig. 1;

Figure 3 is a side elevation view partly in section along line 3—3 of Fig. 1 showing the plug being removed;

Figure 4 is a view similar to Fig. 3 showing for comparison a receptacle without the invention applied thereto and illustrating the likelihood of breakage in the three-wire type of receptacle;

Figure 5 is an enlarged detail view in sectional elevation similar to Fig. 3;

Figure 6 is an enlarged detail view showing in sectional elevation a portion of the structure of Fig. 4.

Referring to the drawings, a molded, plastic, insulating body of generally conventional exterior shape has a base portion 10 which is hollowed out and recessed to receive and hold combined contact and terminal members. A cover member 20 also molded of insulating material forms the top of the insulating body and fits on the base portion 10 to enclose the contact and terminal members. The cover has two raised faces 21 of size and shape to fit within the openings of a standard wall plate for attachment plug receptacles.

The contact and terminal members 12 are stamped from sheet stock in usual form and may, if desired, be formed to accept either parallel or tandem plug blades. The grounded contacts 14

are also stamped from sheet stock into usual substantially U-shape and riveted through the receptacle bottom to the mounting strap 15.

The cover 20 is provided with pairs of parallel spaced rectangular slots 22, 24 to receive the parallel blades or prongs of a conventional two-wire attachment plug cap or the similar parallel blades or prongs of a three-wire attachment plug cap 30. To receive the third or grounded prong 32 of the three-wire attachment plug cap, a U-shaped aperture 26 is formed in the cover and located preferably in the longitudinal axis thereof adjacent to but spaced from the parallel slots. Each set of slots and their ground-prong aperture lie within the area of one outlet face 21.

The above-mentioned three-prong plug 30 is a standard form. Two of the prongs 34, 36 are the blade-type and are similar to standard two-wire plug prongs. The third or ground prong 32 may be in the form of a solid or hollow pin, but preferably is a strip of metal folded lengthwise by stamping, into U-shaped cross-section. Those forms of grounded prongs prevent entirely insertion or forcing of the prongs into the wrong receptacle slots. The desire to employ such form of plug further handicaps freedom of design within the already limited space.

Because of the space limitations, it is necessary to place the aperture for the grounded prong 32 of the attachment plug cap close to the edge of the protruding face 21 of the receptacle. I have found as a result of meeting this requirement that there is a danger of the relatively, and necessarily, thin wall 16 of the projecting portion breaking away as at 18 when the sidewise or lateral thrust is applied to the plug as, for example, when the plug is pulled out by a sidewise jerk on the electric cord which is always attached to it. This is due (see Fig. 6) to the leverage applied at the upper edge or point 17 of the prong aperture where the prong 32 presses as force is applied in direction of the arrow X. The prong, acting as a lever, has a fulcrum point 19 at the inner lower corner or edge on the opposite side of the prong aperture where it is offset and widened to provide space for movement of the fingers of the grounded receptacle contacts 14. Obviously as the prong is withdrawn, the lever arm, between the fulcrum point and the point where the pressure is applied, increases because of the plug movement farther and farther from the receptacle. But, the shorter force arm, between points 17 and 19 remains constant. Hence with the same lateral pull applied to the plug, the force acting to break the wall 16 increases as the prong 32 is withdrawn. Whether the plug is fully inserted or partly withdrawn, a destructive force is applied. That force is multiplied greatly when the plug is jerked, but it is nevertheless present when a steady, strong, oblique pull is exerted.

To avoid the exertion of such destructive pressure on the wall 16, I bevel the inner arcuate wall 27 of ground-prong aperture 26 inwardly of the cover away from the outer margin 29 of the aperture. In that way, the fulcrum point 19 is removed. Removal of the fulcrum point allows tilting of the plug prongs. Hence force applied obliquely will have less lateral component and minimal tendency to break wall 16. When the plug is fully inserted, most of the stress is taken up by the receptacle contacts; and whatever small proportion of the lateral force is transmitted to the thin receptacle wall 16 is insufficient to break that wall. When the plug prongs are partly withdrawn, the absence of the fulcrum point allows even greater tilting, further reducing the lateral component. At this stage, such reduction is important because less of the stress on the prongs is taken up by the receptacle contacts.

From the foregoing, it will be clear that inability to strengthen the thin receptacle wall 16 by thickening or otherwise, demands that the stress be relieved, removed or transferred. Hence the prong must be able to tilt. By reforming the interior of the ground plug aperture to provide an inclined inner wall opposite the thin wall, removal of the fulcrum point is accomplished together with ability to tilt the prong and thus minimize the lateral component of force.

Variations within the scope of my invention will occur to those skilled in the art. Therefore the invention is not limited to the precise details of the illustrated form.

What I claim is:

1. In an attachment plug receptacle, an insulating body having a front face raised above its front surface and shaped to fit within an aperture of a standard receptacle face plate, said face having within its area a pair of openings to receive a pair of prongs of a conventional attachment plug cap and a third opening to receive a grounded prong of a three-wire attachment plug cap, said third opening being near one margin of said area and having a relatively thin frangible wall between it and said margin, the wall of said third opening opposite said thin wall being inwardly offset and widened to provide space for movement of the finger of a receptacle contact, and said wall also being undercut inwardly between said offset and said front face of the receptacle thus to enlarge inwardly from the face of the receptacle, and thereby to permit tilting movement of the grounded prong when in partly withdrawn position.

2. A receptacle as claimed in claim 1 wherein the third opening is U-shaped peripherally with the straight side adjacent the thin wall, and the wall opposite the thin wall is bevelled inwardly progressively to said offset portion.

3. The construction of an attachment plug receptacle body of the three-wire type in which the slots for the prongs of a three-prong plug must lie within the face area of the portion of the receptacle which fits within the opening of a standard receptacle wall plate, comprising a receptacle body having two slots located and dimensioned to receive the prongs of a standard two-prong plug and a third slot receiving the grounded prong of a three-wire plug, said third slot being located within an area which includes said first two slots and which is of a size less than the opening in a standard receptacle wall plate, a thin frangible wall between said third slot and the margin of said area, the interior of said third slot increasing in area inwardly by the wall opposite said thin wall being bevelled inwardly to enlarge said third slot from front toward the rear of the receptacle whereby tilting of said grounded prong is made possible to avoid breaking said thin wall when lateral pressure is applied to said plug.

4. A construction as claimed in claim 3 wherein the third slot is U-shaped peripherally and the straight side of the slot is adjacent the thin wall.

5. The construction as claimed in claim 3 wherein the receptacle is of molded insulation having a base portion and a cover portion fitting

thereon, said two slots and said recessed portion of the third slot being in said cover portion, thereby facilitating the molding of said cover with said undercut portion.

6. The construction as claimed in claim 1 wherein the receptacle is of molded insulation having a base portion and a cover portion fitting thereon, said pair of openings and said undercut of the third opening being in said cover portion, thereby facilitating the molding of said cover with said undercut portion.

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