

Feb. 28, 1950

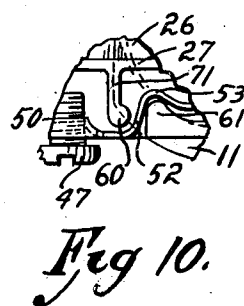
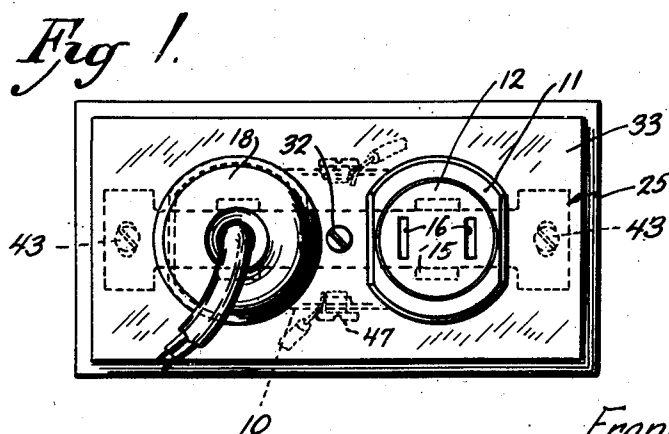
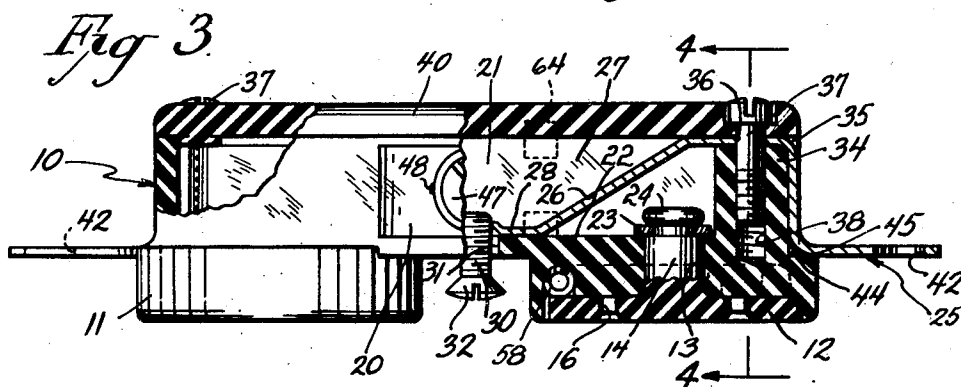
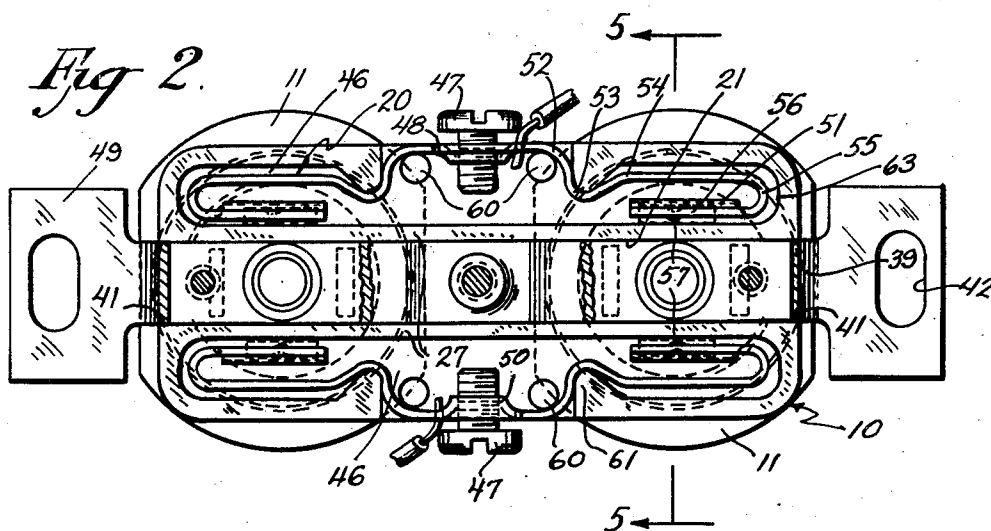
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2,498,643

ELECTRICAL RECEPTACLE

Filed March 27, 1946

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig 6.

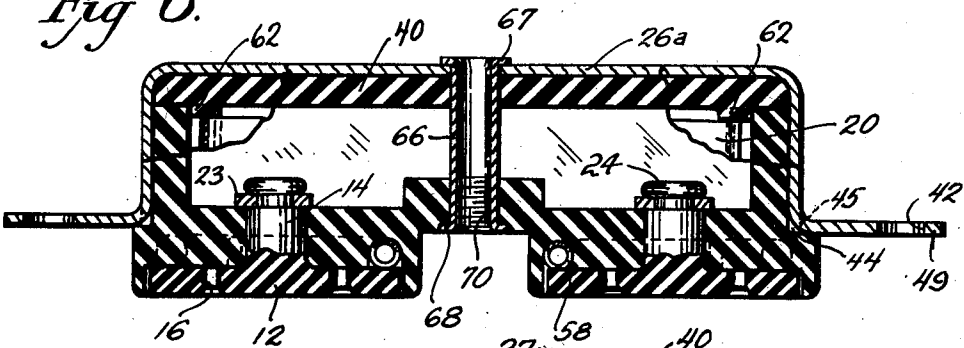


Fig 7.

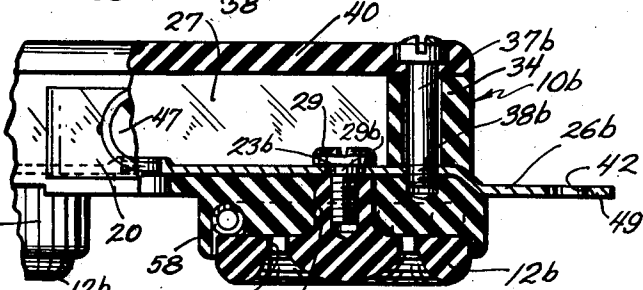


Fig 5.

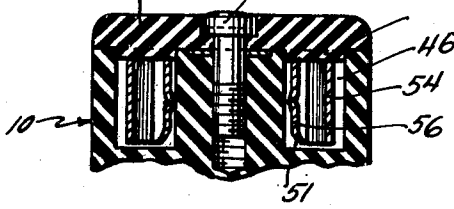
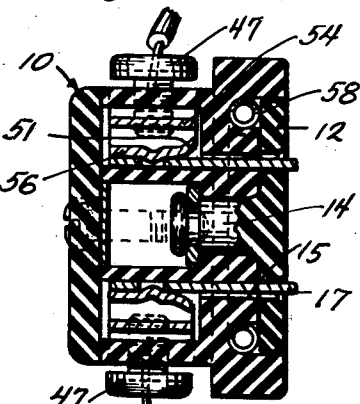


Fig 4.

Fig 8.

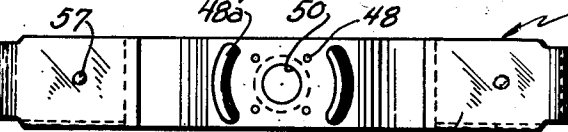
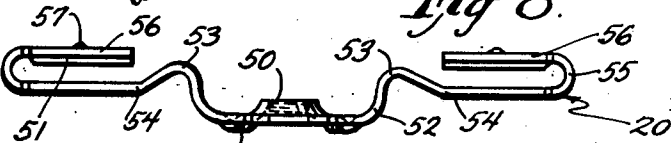


Fig 9.

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ELECTRICAL RECEPTACLE

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Application March 27, 1946, Serial No. 657,415

6 Claims. (Cl. 173—330)

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The present invention relates to electrical receptacles and to certain improvements in the construction and arrangement of parts of the invention disclosed in my application Serial No. 645,883, which application is incorporated herein by reference.

Observation has revealed the fact that the life of receptacles is very short when they are subjected to continual use as where household appliances are plugged in and detached repeatedly. It is seldom possible to determine what receptacles will be used the most in a house, or elsewhere, and for that reason it is seldom that heavy duty receptacles or extra receptacles are provided at any particular point. Consequently, the effective life of receptacles in a house would appear to be the life of the most used ones, i. e. the time of use before repair or replacements started.

Most of the failures incurred arise from broken contacts or spring contacts that are sprung beyond their elastic limit due to repeated use or twisting of the plug prongs in the receptacle sockets. This occurs primarily because, working in such close quarters, the spring contacts are formed of complicated stampings bent to complex forms without sufficient body length for the springs for them to give when depressed by a prong without exceeding their modulus of resiliency. Double springs have also been used where the displacement caused by insertion of a plug prong is divided between two opposing springs. However, due to the looseness developing between the receptacle and plug in repeated use, the prongs can easily be wiggled enough in getting them started that one or both of the two springs can be distorted or displaced sufficiently that good electrical contact is not possible without repair or replacement of the receptacles.

Some manufacturers have sought to overcome this difficulty by providing spring action prongs, but this only serves as a temporary correction which ultimately aggravates the situation due to the spring contacts weakening under the strains and the wider displacement of the spring prongs forcing the contacts even further out of effective positions.

Furthermore, where the contacts are thin enough to provide a high degree of resiliency, the metal can be melted away readily by arcing when the plug is pulled out with the appliance load still on.

It is one of the objects of this invention to correct for these difficulties and to provide a spring contact which will retain its working position and tension under all prong conditions and provide

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a receptacle which will accommodate such a spring within the conventional receptacle size.

A further object of the invention is to provide a spring element providing contacts for the two sockets of a duplex receptacle where the spring action incurred at one socket is carried throughout more than a half of the spring element.

A further object of the invention is to steady rest one face of a prong insert against the receptacle body and have a full acting spring contact displaced under controlled conditions which prevent any distortion weakening the spring.

Another object of the invention is to support the spring against displacement longitudinally of the prong with a supporting action which permits lateral movement of the spring contact at the support point when flexed by insertion of a plug prong so that resiliency in the spring element beyond the support point is effective when electrical contact is established.

The invention is further characterized by an arrangement whereby the receptacle can be connected to the house wiring in either one or both of two ways with a single clamp screw for each side of the line.

It is also an object of the invention to provide a receptacle whose parts and construction are strong and rugged, inexpensive to construct and assemble, and more efficient and enduring in operation.

These being among the objects of the invention, other and further objects will appear from the drawing, the description relating thereto and the appended claims.

In the drawing:

Fig. 1 is a plan view of a duplex receptacle embodying the invention as it appears when mounted in place ready for use, with one of the sockets in use.

Fig. 2 is a plan view of the duplex receptacle from the rear thereof with its back cover removed and a house wire connected to the contacts.

Fig. 3 is a side elevation partly in section illustrating the manner in which the metal mounting strip and back cover are assembled with the main body of the receptacle.

Fig. 4 is a section taken upon line 4—4 of Fig. 3.

Fig. 5 is a section taken upon line 5—5 of Fig. 2.

Fig. 6 is a longitudinal sectional view similar to Fig. 3 illustrating another form of the invention.

Fig. 7 is a side elevation partly in section illustrating the preferred form of the invention.

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Fig. 8 is a top view of one of the spring contacts shown in place in Fig. 2.

Fig. 9 is a side elevation of the spring contact shown in Fig. 8, and

Fig. 10 is a view similar to Fig. 2 of a part of the construction shown there illustrating a modification thereof.

The receptacle embodying the invention, as mentioned in my said application, is one whose construction is such that it can be set as a guarded or unguarded receptacle upon the front thereof depending upon whether or not children are around that might try to insert hairpins and other articles in the prong openings. In the present invention the dial guards are made of transparent material having a frosted or knurled back face that is impregnated or coated with a luminous material to assist in locating the socket in the dark. The luminous material is opaque to conceal the presence of the main prong openings from the sight of children who otherwise might discover how to operate the dial to gain access to the main prong openings. This feature along with the construction of the spring contacts and the improved body and cover construction, and their assembly, constitute the essential subject matter of the present invention.

Referring now to the drawing, the main body or base 10 is made of molded Bakelite or other suitable insulating material preferably to the form shown in which two integral front bosses 11 are recessed to receive guards 12 journaled in openings 13 on shafts 14 for quarter turn rotation from one position in which the prong receiving openings 15 are concealed, to a second position in which mating openings 16 in the guard coincide with the openings 15 to admit prongs 17 on the plug 18 into electrical contact with the spring contact members 20.

The back of the base 10 is provided with integral end wall structures 34 joining them at their ends and defining three recesses extending the length of the base. The walls serve as reinforcing ribs as well as to insulate adjacent recesses from each other.

The middle recess 21 accommodates all parts, especially metal parts which are used for holding the receptacle in assembled relationship and for mounting the receptacle in an outlet box (not shown). The journals 13 open into the recess 21 through the bottom 22 thereof where they receive retaining washers 23 which are held in place by a screw (not shown) or by upsetting the end of the shaft 14 as at 24 under heat and pressure.

In the embodiment as shown in Fig. 3, a receptacle supporting strap 25 has its intermediate portion 26 just wide enough to fit snugly between the bounding walls 27, and offset towards the front of the receptacle enough of a distance for the middle part 28 of the strap to rest against the bottom 22 of the recess 21 where a threaded opening 30 in the strap coincides with an opening 31 through the base to receive the screw 32 (Fig. 1) that holds a cover plate 33 in place. The metal to metal contact between the cover plate 33, if metal, and the strap 26 by the screw 32 and between the strap 26 and the outlet box (not shown) by a screw 43 as will now be described, thoroughly grounds all exposed parts against electrical shocks.

Where the strap 35 passes over the top of the end walls 34, it passes through a recess 35 (Fig. 3) and is apertured as at 36 to admit the screws 37 to a hole 38 threaded into the

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base to hold the back cover 40 in place. Outside of the base the strap ends turn forwardly to rest in grooves 41 provided for them at this point. These grooves prevent twisting of the base with respect to the strap. Just behind the bosses 11, the straps turn outwardly as at 39 and terminate in wing or outrigger portions having openings 42 therein by which the receptacle can be mounted on an outlet box by screws 43 (Fig. 1).

At the last turn or bend 39 in the strap ears 44 are upset to engage behind dogs 45 formed integral with the bosses 11, which dogs prevent the ends of the strap from being pulled endwise away from the base 10.

Thus a very strong and simple arrangement is provided for mounting the receptacle and supporting cover or wall plate 33 thereon. The walls 27 and recesses 35 and 41 hold the strap against turning and the strap serves as a single element for mounting all receptacle accessories.

Referring to the preferred embodiment shown in Fig. 7, the strap 25b runs substantially straight through the body 10b as integrally embedded therein when the body is cast. In this embodiment, the strap 25b eliminates the washers 23 and serves in their stead by having openings 23b in them concentric with the journal openings 13. Moreover, the straps are threaded as at 38b to provide a metal to metal engagement with the screws 37b which are merely longer screws than screws 37 for holding the back cap in place. Furthermore in this embodiment, the shaft 14 of the guard 12b is threaded to receive a journal screw 29 whose journal portion 29b engages in the opening 23b. The screw 29 removably secures the guard 12b in guarded or unguarded position as described in my above mentioned application.

Referring to the two outer recesses 46, the structure of only one side of the receptacle will be described since the receptacle is symmetrically constructed on opposite sides of its middle. The outer surface of the wall 27 coincides with the inner edges of the prong openings 15 so that the prongs slide along the wall as solidly supported thereby when inserted in place. The rest of the space in the recess 46 is devoted to housing all electricity carrying parts such as the spring contact member 20, the end of the clamp screws 47 and the ends of any house wires extending through the holes 48 beneath the head of the screw 47.

The spring contact element 20 is a substantially parallel sided strip of spring brass or copper of uniform thickness which can be cut from a roll, tapped at its center as at 50, punches as at 48, and upset as at 48a to provide a wire retaining land around the opening 50 and also upset along an edge adjacent its ends to provide inclines 51. The strip is then bent as at 52 and 53, straightened as at 54 in one operation and then folded back upon itself in a rounded bend as at 55 so that the outer ends 56 of the strip now become the spring contacts with the inclines 51 inclined away from the wall as located at the bottom of the recess adjacent to the prong openings 15 to ride up and over the end of the incoming prong and tension the spring contact to establish a good electrical contact.

When the spring contact 20 is flexed by the prong the flexure is distributed to and accommodated at the bends 55, 53, 54 and 52, particularly at bends 54 and 53, so that the spring end is kept parallel with the face of the prong over a wide area of contact.

If desired, a nipple 57 can be provided at the time the incline 51 is made. Such a nipple would engage in the hole usually provided in the prongs of conventional plugs. However, this is not necessary for the purpose usually intended for the prong holes because the binding action provided between the guard 12 and the base 10 as exerted by the guard spring 58 will tend to hold the prongs in place. The nipple would preferably serve as a locating means for the prong to position it properly in place at the effective center of the spring contact end 56.

With this construction of the spring contact, the contact cannot be strained beyond its resilient limit, yet is simple, easily and inexpensively formed, being an element that provides improved electrical contact with a plug prong.

The spring contact is supported loosely in place at the bends 52 and 53 by upright elements 60 and 61 formed integrally in the base. The flexure load on the spring ends 56 are carried by these elements, while the spring band as exteriorly exposed at its middle is supported by elements 60 on opposite sides of the screw 47 against pressure exerted by a screw driver engaging the screw.

In connecting the receptacle to the house wiring, the ends of the wires are skinned off insulation a short distance, the screw 47 loosened, the bare ends of the wire inserted a short distance through the holes 48 and the screw tightened down to bend the wire flat and hold the end thereof in the hole 48. This manner of securing is very simple, and as many wires can be connected to the spring contact as there are holes around the screw. Thus the receptacle can serve as a connector station if desired. In event, however, only one wire is to be connected to each spring contact, the usual loop can be made around the screw if desired and the screw tightened in place to hold it.

If desired the elements 60 can be connected to the adjacent walls 27 by a reinforcing rib 71. Greater strength would be provided and the screw 47 would be separated from the spring end portion of the recess 46. This would also prevent the remote possibility that enough wire would be pushed through the opening 48, or be broken off, to interfere with the operation of the spring contact ends.

The back cover 40, as shown in Fig. 3 preferably closes the recesses, and covers the strip 26. To do this, the edges of the cover follow the border of the base and are provided with locating bosses 62 which follow the curves 63 at the ends of the recesses 46. These bosses are flat on their exposed face to serve as pads supporting the spring contacts at the band 55 against displacement by prongs which have difficulty in riding the incline 51. The pad, however, permits full flexure of the spring contact laterally.

Recesses 64 may also be provided to receive the upper ends of the elements 60 to support them if desired and when the cover 40 is fastened in place by the screws 37 the receptacle is fully enclosed by insulating material and ruggedly rigid for handling and use.

In event, it is desired to locate the strip 26 outside of the cover, the cover can be held in place as shown in Fig. 6 by a tubular tie 66 which is upset as at 67 beyond the strip to rivet it in position, and upset at the other end as at 68 for securing on the base 10a. The inside of the tube is threaded as at 70 to receive the face plate screw 32 (Fig. 1).

Consequently, having thus described several

embodiments of the invention and the reasons for the preferred forms shown, it will be readily apparent to those skilled in the art of manufacturing and using electrical outlet receptacles that the objects and purposes of the invention are attained, and that a duplex receptacle is thus provided which is simple and inexpensive to make; that a minimum of parts are used, most of which are duplicating elements for manufacturing economy; and that the parts as formed can be formed by the simplest of production machinery. The spirit and substance of the invention are commensurate with the scope of the appended claims.

What is claimed is:

1. In a receptacle, a base provided with integral wall structures joined at their ends to define two recesses extending the length of the base, said base having prong receiving openings opening into the two recesses adjacent the separating walls, spring contacts mounted in said recesses extending from one end of a recess to the other end, each spring contact comprising a metal strip having a threaded opening near its middle exposed outside the recess between two wall ends, said strip being symmetrically formed on opposite ends to have upset edges forming an incline and the ends of the strip being reversely bent to dispose the inclines over said openings with the inclines between the openings and the remainder of the strip, said strip being formed adjacent its middle to rest against said wall ends to flex at these points under displacement by plug prongs received through said openings which displacement moves the overlapping portions of the reversely bent ends away from said separating walls, and means upon said body for holding said spring contacts in position against said wall ends the spring contacts being unsupported and free to flex throughout the overlapping portions.

2. In a receptacle the combination including a body having a prong receiving opening therein and a wall adjacent one side of said opening, a prong contacting member rigidly mounted with respect to said wall at a point remote from said opening, said member extending from said point to a second point on the other side of said opening and the end portion thereof being bent backwardly so as to terminate over said prong receiving opening, and an inclined edge on said end portion, said edge being inclined toward the portion extending across said prong receiving opening forming a cam surface which cooperates with a prong to cause said member to be bent away from said wall when said prong is inserted therebetween.

3. In a receptacle the combination including a body having pairs of prong receiving openings therethrough, a wall adjacent one side of each of said openings, a pair of prong contacting members rigidly mounted on said body at points remote from said openings, said members extending from a prong receiving opening of one pair to a prong receiving opening of the other pair and the end portions thereof being bent backwardly so as to terminate over said prong receiving openings, and an inclined edge on each end portion, said edges being inclined toward the portions extending across said prong receiving openings, forming cam surfaces which cooperate with prongs to cause said members to be bent away from said wall when said prongs are inserted therebetween.

4. In a receptacle, a base provided with integral wall structures joined at their ends and defining

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two recesses extending the length of the base, said base having prong receiving openings opening into the two recesses bordering the separating walls, spring contacts mounted in the two recesses and having reverse bends therein located at the ends of the recesses, and inclined cam faces on the reversely bent portions cooperating with prongs received through said openings to move the contacts away from the walls as the prongs are inserted, and means for mounting the springs in said recesses permitting flexure of both sides of the overlapping portions of the contacts in one direction only under the displacement of said prongs.

5. In an electrical outlet receptacle, a body having prong receiving openings therethrough, and a spring contact comprising a metal strip having means near its middle for attaching a conductor thereto, said strip being symmetrically formed on opposite ends of its middle in that the end portions of the strip are reversely bent parallel to the strip and the reversely bent portions having an edge upset to form an incline, the inclined edges sloping towards the intermediate portions, said strip being shaped between said bends to be received in supported relationship in said receptacle body, the strip being free to flex throughout its overlapped portions, and the inclined edges being disposed behind the prong receiving openings, and the prong contacting surfaces of said strip being located on the reversely bent portions thereof and on the side remote from the intermediate portions of the strip.

6. In a receptacle, the combination including a

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body having a prong receiving opening therein, a prong contacting member rigidly mounted on said body at a point remote from said opening, said member extending from said point to a second point on the other side of said opening and the end portion thereof being bent backwardly so as to terminate over said prong receiving opening, and an inclined edge on said end portion, said edge being inclined toward the portion extending across said prong receiving opening forming a cam surface which cooperates with a prong to cause said member to be moved away from said opening when said prong is inserted therein, the side of said end portion of the member making electrical contact with the side of said prong when the latter is fully inserted.

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