Jan. 6, 1948. D. W. WALTERS 2,434,026

ELECTRICAL PLUG AND SOCKET

Filed Sept. 1, 1944

Fig. 1.

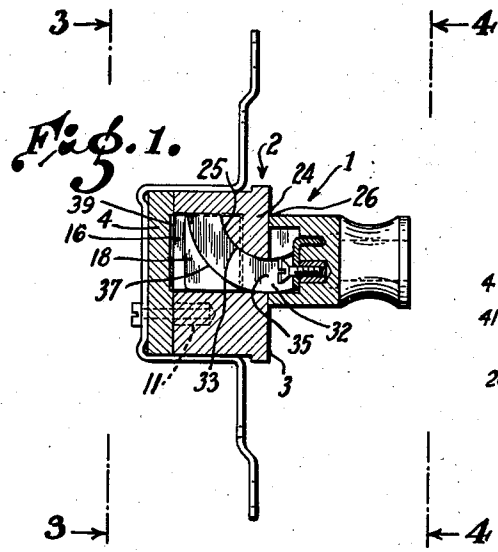


Fig. 2.

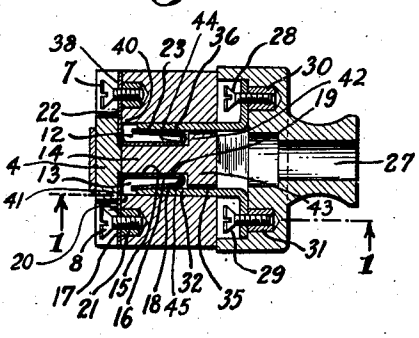


Fig. 3.

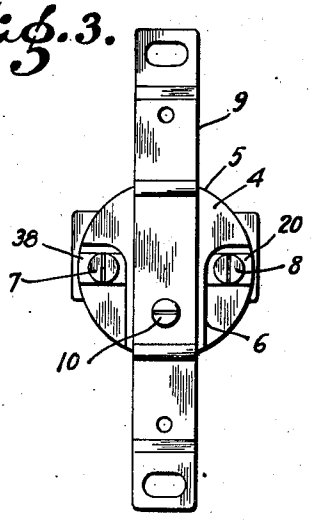
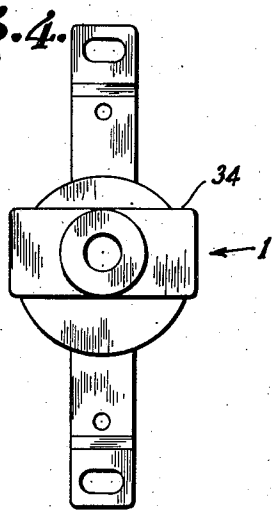


Fig. 4.



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Patented Jan. 6, 1948

2,434,026

UNITED STATES PATENT OFFICE

2,434,026

ELECTRICAL PLUG AND SOCKET

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Application September 1, 1944, Serial No. 552,267

1 Claim. (Cl. 173—330)

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The invention relates to an electrical plug and socket.

With the usual type of connector, the plug is inserted into and removed from the socket by moving the plug straight in or out, that is, by moving the plug along the longitudinal axis of the socket. This has the disadvantage that the plug may be accidentally or unintentionally removed from its socket when tension is applied to the electrical conductors connected to the plug, for example, in the course of using or moving about the electrical apparatus connected to those cords.

An object of the invention is to provide a cooperating plug and socket having arrangements whereby it is impossible to pull the plug straight out from the socket.

Another object of the invention is to provide an improved and simplified form of socket which may be employed either with a special plug which cannot be inserted or removed in a straight line, or with the conventional plug which can be inserted or pulled out straight from the socket. To this end, the invention provides a two-piece socket of insulating material, namely a body member and a cap member, wherein the body member is provided with an integral midrib and with spring terminal recesses at each side of the midrib, the recesses extending through the body from front to rear, the front end of the recesses serving as openings for the electrical prongs or terminals of a plug, the rear ends of the recesses being closed by a cap member which serves also to overlie and support the rear ends of the spring terminals.

Another object of the invention is to guard the bend in the spring terminal from being contacted or damaged by the plug terminals. This is accomplished by arranging the spring terminals in recesses in the opposite sides of the midrib, the front of the midrib being wider than its rear portion and overlying the bends in the spring terminals, the wide front end of the midrib serving as inner walls of recesses to receive the plug terminals. The spring terminals extend in a straight line behind such recesses as well as there-above and behind a cam lug, whereby either the ordinary plug having straight terminals or a special plug with curved terminals for the cam may be used.

For further details of the invention, reference may be made to the drawings wherein Fig. 1 is a vertical sectional view of a plug and socket according to the present invention, the section

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having been taken on the broken line 1—1 of Fig. 2, looking in the direction of the arrows.

Fig. 2 is a cross-sectional view of the plug and socket of Fig. 1.

Fig. 3 is a rear view in elevation of the plug and socket of Fig. 1, looking in the direction of the arrows on the line 3—3.

Fig. 4 is a front view in elevation of the plug and socket of Fig. 1, looking in the direction of the arrows on line 4—4.

Referring in detail to the drawings, the connector comprises a plug 1 and a cooperating socket 2, both of which have electrical connections not shown. The socket 2 comprises a body member 3 having at its rear end a somewhat T-shaped end piece or cap 4, the upper portion 5 of which is curved to conform to the curved top of the body member 3. An intermediate portion of the cap 4 is of reduced width as shown at 6, to provide recesses through which the terminal screws 7 and 8 project. The socket 2 is provided with a suitable bracket 9 in order to hold the socket 2 in an outlet, as is well known. The bracket 9 and cap 4 are held in position at the rear end of the socket 2 by a bolt 10 having a screw threaded connection with a nut 11 imbedded in the body of the socket 2.

The body member 3 is provided with a pair of terminal recesses 12 and 13, which lie at opposite sides of a midrib 14, the recesses 12 and 13 extending the full length of the body member 3. At the rear end of the recesses 12 and 13, the midrib 14 is cut away or of reduced width as indicated at 15 and in the enlarged recess thus formed, extends the intermediate portion 16 of a leaf spring 17 which forms one of the socket terminals. The front end 18 of the leaf spring 17 is reversely bent to extend along and adjacent the outer wall 19 of the recess 13. The rear end of the leaf spring is bent at right angles and overlies the end of the body member 3, as indicated at 20 and through the end portion 20 the connecting screw 8 passes and is secured in position by a nut 21 imbedded in the rear end of the body member 3. The leaf spring terminal 22 similarly has its reversely bent free end 23 arranged in the recess 12 and its rear end 38 is provided with the terminal screw 7.

In assembling the various parts of the socket 2 together, the leaf springs 17 and 22 are inserted through the rear end of the recesses 12 and 13 and cap 4 is placed over the oppositely extending rear ends 20 and 38 of the socket terminals, cap 4 fitting on the rear end of body 3 and being held in position by screw 10. The rear end of

body member 3 lies substantially in a plane and the rear ends 20 and 38 of the socket terminals extend in opposite directions flatwise in a plane to lie against the rear end of body member 3. The underside of cap 4 is likewise substantially flat to fit the flat rear end of body member 3. Cap 4 has a shallow recess 39 on its underside to receive the rear ends 20 and 38 of the socket terminals. As shown in Fig. 2, the underside of cap 4 fits against the outwardly extending ends 20 and 38 of the socket terminals, also cap 4 covers the rear ends of the recesses 12 and 13 and as the reduced width portion 6 of cap 4 is wider than the over-all width of both recesses 12 and 13, the rear terminal ends 20 and 38 are clamped between cap 4 and the rear end of the socket body as indicated at 40 and 41. Also cap portion 6 serves as an abutment to support and resist rearward movement of spring terminals 17 and 22 when the plug is pushed in the socket. The front end of the midrib 14 is wider than its rear portion whereby the front walls 42 and 43 of the recesses 12 and 13 serve to extend in front of the bends 44 and 45 at the front of the spring terminals 17 and 22 to guard such bends against damage by the front ends of the plug terminals 32 and 36.

As shown in Fig. 1, the intermediate portion 16 and the free end portion 18 of the leaf spring 17 are rather wide in a vertical direction, and much wider than usual because the plug terminals described later move not only along the longitudinal axis of the socket, but also across that axis and thereby provide an extended contact surface.

The inside of the upper portion of the front wall 24 of the recess 13 is provided with an arcuate or guiding and cam surface 25 which is concentric with a center 26 on the front of the socket 2, above and crosswise of the longitudinal axis of the socket. The front wall of the recess 12 has a parallel and similar curved surface not shown.

The plug 1 has an axial bore 27 through which electrical wires may pass for connection with the terminal screws 28 and 29 having nuts 30 and 31 imbedded in the plug 1. Associated with the screw 29 is a plug terminal 32 which is a flat strip curved in its own plane so that the upper curved edge 33 thereof fits the curved surface 25 and hence the curved edge 33 of the plug terminal 32 is concentric with the upper horizontal edge 34 (Fig. 4), of the plug 1 when the plug is in the socket. The lower edge 37 of the terminal 32 is concentric with its upper edge 33. The entrance 35 to the socket terminal recess 13 has a width and breadth which are substantially the same or only slightly larger than the radial cross-sectional area of the curved plug terminal 32.

The other plug terminal 36 is parallel to and similar in construction to the terminal 32, the arrangement being such that it is impossible to either insert or withdraw the plug 1 by bodily movement thereof along the longitudinal axis of the socket 2, because the curved portion 25, and a similar curved wall not shown for the plug terminal 36, extend respectively in front of the plug terminals 32 and 36. However, the plug 1 can be inserted into the socket 2 by moving the plug 1 from an upwardly tilted position to the position shown in Fig. 1, by tilting or pivoting the plug 1 about its front edge 34 with the latter resting on the face of the socket 2, and this tilting movement is assisted because the curved or cam surfaces like 25 serve to guide or cam the terminals 32 and 36 from a tilted to the aligned position shown in Figs. 1 and 2. The plug is, of course, removed by tilting or pivoting it in the reverse direction.

A standard plug having straight terminals or prongs can be used with socket 2 as the socket apertures like 35 have a size and spacing to fit a standard plug, the free ends 18 and 23 of the socket terminals extending in alignment with the socket apertures 35, as well as extending above the socket apertures 35 and behind the cam surface 25. The standard plug can, of course, be inserted and removed by the usual straight movement of the plug.

The plug 1 and socket 2 may be fitted together somewhat in the manner of a lock and key, the plug terminals 32 and 36 comprising the key, the entrances such as 35 to the socket terminal recesses 12 and 13 comprising key ways, and the walls such as 24 comprising a mask or obstruction which prevents the plug 1 from being axially withdrawn, requiring a special manipulation of the plug 1 by tilting movement thereof as above described.

A very effective contact is obtained between the plug and socket, because the plug terminal 32 fits and is wedged between the outer wall 19 of the recess 13, and the free or spring end 18 of the socket terminal 17, while plug terminal 36 is wedged between the outer wall of recess 12 and the spring terminal 22. A large contact surface is also provided due to the slant position of the curved plug terminal 32 which overlies the socket terminal portion 18 which has an extended width and height as shown in Fig. 1.

The cap 4, body portion 3 of the socket 2, and the body of the plug 1 may all be made of suitable insulating material and, for example, may be cast or molded of suitable plastic material. Also the number of plug terminals and corresponding socket terminals may be more or less than two, as illustrated.

It will be apparent that various other modifications may be made in the above invention without departing from the spirit of the following claim. For example, if the plug is to resist a pull in an upward direction, then the socket 2 shown in Fig. 1 may be mounted upside down, whereby the plug 1 would be tilted upwardly to insert it in the socket.

I claim:

A socket comprising a body member having a midrib and a spring terminal recess extending through the body member from front to rear at each side of said midrib, the front ends of said recesses serving as openings to receive the prongs of a plug, a terminal having a free spring end in each of said recesses, the rear end of said body member being substantially flat, said terminals having rear ends oppositely extending substantially in a plane on the rear end of said body member, a cap member fitting on the rear end of said body member and having an intermediate portion narrower than said body member covering the rear ends of said recesses and supporting the rear ends of said spring terminals, the rear ends of said spring terminals having extensions beyond said intermediate cap portion and a terminal connector for each of said extensions, said body member being of one piece of insulating material having an integral arcuate surface at the top and front inner side of each of said recesses, each of said arcuate surfaces being concentric with a point below the top of the front end of said body member, each of said spring terminals extending behind and below its arcuate surface, and the height of the rear end of each of said

recesses being greater than the height of said spring terminals, whereby said spring terminals may be inserted into said recesses from the rear of said body member.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,361,426	White	Dec. 7, 1920
1,364,335	White	Jan. 4, 1921
1,364,419	White	Jan. 4, 1921
1,742,907	Gaynor	Jan. 7, 1930
1,994,880	Wallbillich	Mar. 19, 1935
2,060,990	Hines	Nov. 17, 1936
2,088,845	De Mask	Aug. 3, 1937

FOREIGN PATENTS

Number	Country	Date
538,822	Germany	Nov. 19, 1931