

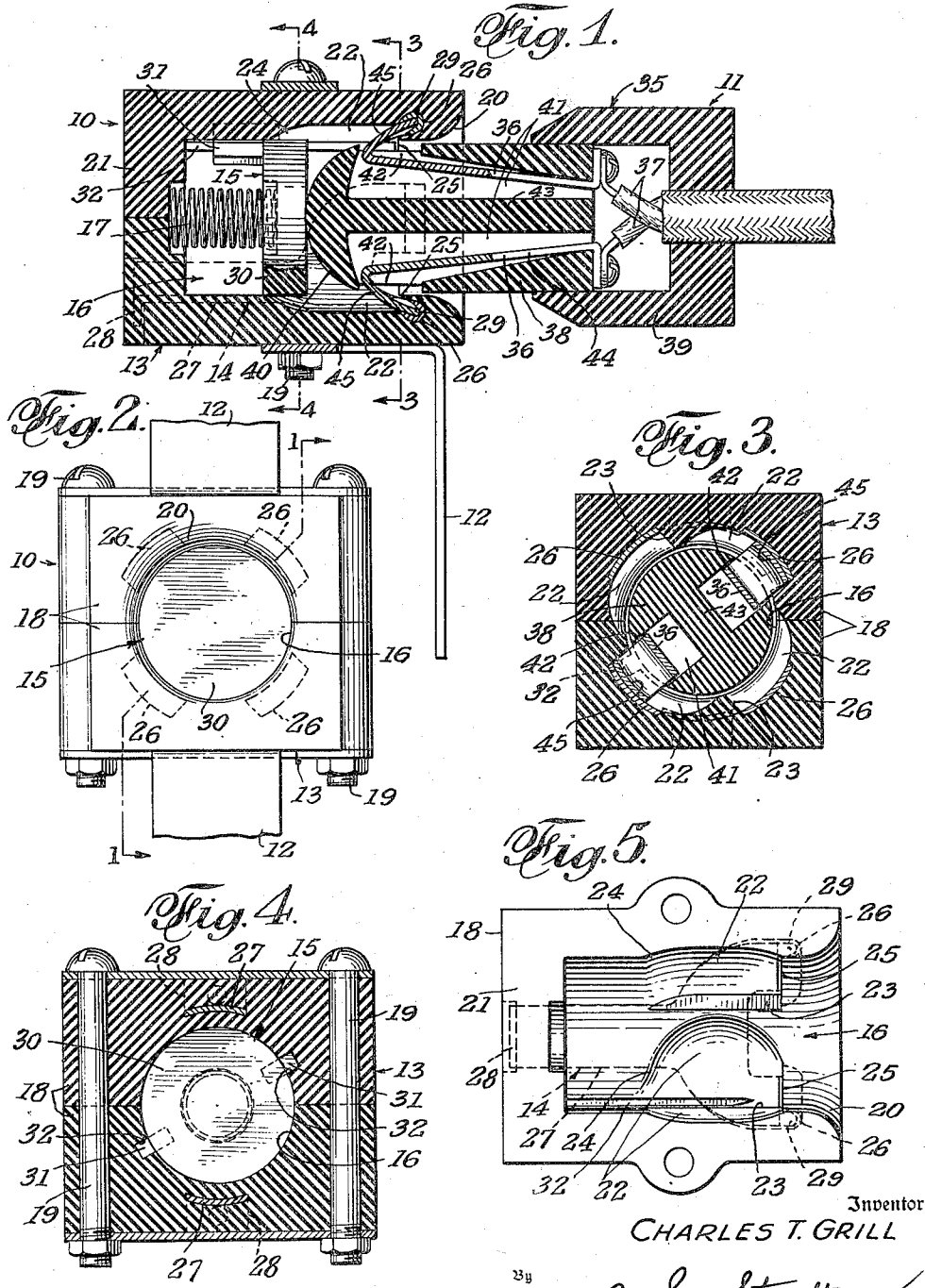
Oct. 3, 1950

C. T. GRILL

2,524,701

COMBINATION ELECTRIC PLUG AND SOCKET

Filed Aug. 3, 1949



Inventor
CHARLES T. GRILL

35
C. S. Stratton
Attorney

UNITED STATES PATENT OFFICE

2,524,701

COMBINATION ELECTRIC PLUG AND SOCKET

Charles T. Grill, Pasadena, Calif.

Application August 3, 1949, Serial No. 108,405

6 Claims. (Cl. 173—330)

1

This invention relates to a combination electric plug and socket.

An object of the present invention is to provide a combination plug and socket in which the former is readily inserted to make electrical connection with the latter without the need of seeking out an oriented entry position for the contact prongs of the plug, the structure contemplating that the prongs may have any angular position with respect to the contacts of the plug and yet at all times finding proper engagement with said contacts. Thus, even in the dark, the plug may readily be connected to the socket.

Another object of the invention is to provide a combination plug and socket that interlocks to obviate inadvertent extraction of the plug.

Another object of the invention is to provide a combination device, as indicated, that is characterized by safety in that the contacts in the socket are so concealed or recessed that bridging thereof by the fingers or by metallic objects is rendered so difficult as to be practically incapable of occurrence.

The invention also has for its objects to provide such means that are positive in operation, convenient in use, easily installed in a working position and easily disconnected therefrom, economical of manufacture, relatively simple, and of general superiority and serviceability.

The invention also comprises novel details of construction and novel combinations and arrangements of parts, which will more fully appear in the course of the following description. However, the drawings merely show and the following description merely describes one embodiment of the present invention, which is given by way of illustration or example only.

In the drawings, like reference characters designate similar parts in the several views.

Fig. 1 is a longitudinal sectional view of a combined plug and socket according to the present invention, the view being taken on the planes of line 1—1 of Fig. 2.

Fig. 2 is a front elevational view of the socket, the mounting brackets therefor being partly broken away.

Figs. 3 and 4 are cross-sectional views taken substantially on the respective lines 3—3 and 4—4 of Fig. 1.

Fig. 5 is an inner face view of one socket body part, the socket body comprising two such parts.

The device that is illustrated comprises a socket 10 and a plug 11. The former is so formed and proportioned that the same may be operatively mounted in the same manner as conventional

2

sockets, either singly or in pairs, and in conventional outlet boxes and covered by conventional face plates. Means, such as brackets 12, are employed for effecting mounting of the socket in an outlet box and said brackets, conventionally, may mount a suitable face plate.

The socket 10 comprises, generally, a dielectric body 13, a pair of electric terminals 14 within said body, a closure member 15 for an open-ended socket chamber 16 formed in the body, and resilient means such as a compression spring 17 for engaging said closure member to close the open end of socket chamber 16.

The body 13 comprises two identical body parts 15 18, as best seen in Fig. 5, that are held together as by screws 19 which also fasten brackets 12 in place. The two-part body facilitates manufacture, but for the purposes of this disclosure, the body will be treated as an integral member, i. e., as if it were not split.

The socket chamber 16, at its open end, is outwardly flared to provide a lead-in throat 20, the opposite end of said chamber being closed by a wall 21. Two pairs of opposed recesses 22 are formed in the otherwise cylindrical wall of chamber 16, said four recesses being equally spaced and all alike. Each recess, on one side, is gradually blended into said cylindrical wall and, on the opposite side, is provided with a generally radial shoulder 23, said shoulder being on the same side of each respective recess. The inner ends of said recesses are formed to gradually blend, as at 24, into the cylindrical wall of chamber 16. The outer end of each recess terminates in a transverse shoulder 25 adjacent throat 20. While four recesses 22 are disclosed, it will be evident that any suitable even number may be provided, such as two, four, six or eight.

The two terminals 14 are arranged on opposite sides of body 13 and may be embedded as inserts therein when the body parts are molded. Since there are four recesses, each terminal 14 is formed to have two similar contacts 26, said contacts branching from a main part 27 extending to the closed end of the body. The latter part terminates in a connection flange 28 for an electrical conductor. One contact 26 of one terminal 14 is arranged to be diametrically opposite a contact of the other terminal.

The end of each contact 26 is formed as a transversely curved U-shaped portion to provide a seat 29, the open side of which is directed toward the inner end of socket 13. The forward end of each recess 22 is open to communicate with each respective seat. Since the contacts 26 are

3

located between shoulders 25 and the throat 20, it will be seen that the same are not within reach of any objects that may be introduced into socket chamber 16, unless, as will be later described, such objects first fall laterally into recesses 22 and then are drawn forward to engage said contacts.

The closure member 15 comprises a dielectric disc 30 that has a sliding fit in socket chamber 16. Said disc is provided with oppositely disposed lateral projections 31 that extend in a rearward direction and are engaged in grooves or slots 32 formed in the cylindrical wall of chamber 16. The forward or outer position of disc 30 is limited by said lateral projections 31 engaging shoulders 25 to locate said disc just rearward or inward of throat 20. The rearwardmost position of said disc is limited by engagement of projections 31 and wall 21. Compression spring 17 normally projects disc 30 to its outer position, thus closing socket chamber 16.

It will be apparent that the above described socket 10 is safe against inadvertent bridging of its contacts; that dust is excluded from the interior thereof by the closure member 15; and that by endwise retraction of the latter member, the contacts 14 are adapted to be electrically engaged. To the latter end, the novel plug 11 is provided.

Plug 11 comprises, generally, a body 35, a pair of prong terminals 36, and suitable conductors 37—one for each prong.

The body 35, in this case, is shown as comprising a cylindrical plug part 38 of dielectric material and a larger end part 39 into which plug part 38 is fitted, the latter also being of dielectric material. The two parts are inter-fixed and may be separable for convenience of assembly of the plug.

Plug part 38 has a rounded end 40 for convenient insertion past throat 20 into socket chamber 16 of the socket 10 and freely slidably fits into said chamber. Two longitudinal passages 41 are formed in part 38, the same terminating short of end 40 and opening laterally, as at 42, on opposite sides of said plug part. A wall 43 separates passages 41.

Prongs 36 each comprise an elongated metal strip 44 that is connected to one of the conductors 37. Said strips extend through passages 41 which are of a cross-sectional size to permit free flexure of said strips. Each strip 44, at its end adjacent the end 40 of plug part 38, is formed with a laterally directed hook 45, said hooks extending outwardly through openings 42. When unflexed, said hooks extend beyond the peripheral face of plug part 38.

When the plug 11 is to be inserted into socket 10, the former is held to present its rounded end toward closure member 15. Such presentation need only be approximately aligned, since throat 20, together with the round of end 40, will serve to guide the plug into socket chamber 16. The angular orientation of prong hooks 45 is immaterial, said hooks merely being pressed inward by flexure of the prongs until the free ends thereof slide against the cylindrical wall of socket chamber 16.

As the plug is pushed further into the socket, displacing closure member 15 inward, if, by chance, hooks 45 are exactly aligned with two opposite contacts 26, said hooks will slip past shoulder 25 and the prongs will spring outward. Now, a pull on the plug will bring the hooks into firm engagement with seats 29 of said contacts

4

26. However, in most cases, such exact alignment of hooks and contacts will not occur. Under such initial misalignment, hooks 45 will be held retracted by the cylindrical wall of the socket chamber. It is now only necessary to rotate the plug, that amount which will bring the hooks 45 into alignment with any two opposite recesses 22 and said hooks will spring into said recesses. This rotation is limited by radial shoulders 23 of said recesses. Now, a pull on the plug will electrically engage the prong hooks and the contacts 26 that are at the ends of said recesses. It will be seen that not more than a quarter turn of the plug and, in the majority of cases, a shorter turn, is needed to effect proper connection of plug and socket and that, once connected, the plug cannot be pulled out.

Disconnection is simple. The plug is first pushed inward, as limited by projections 31, then rotated in the opposite direction (away from shoulders 23) to cam the hooks inward as they ride from their recesses back into engagement with the cylindrical wall of the socket chamber. Now, the plug can be pulled straight out. Closure member 15 follows to close off the chamber.

While the invention that has been illustrated and described is now regarded as the preferred embodiment, the construction is, of course, subject to modifications without departing from the spirit and scope of the invention. It is therefore not desired to restrict the invention to the particular form of construction illustrated and described, but to cover all modifications that may fall within the scope of the appended claims.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. In a combined plug and socket, a plug having a cylindrical body, a pair of flexible prong terminals in said body, a hook on the end of each of said terminals and normally extending laterally beyond said body, a socket having an open-ended cylindrical chamber receptive of the plug body, there being opposed recesses in the wall of said chamber, said recesses, on one side, gradually blending into the wall of the chamber and, on the other side, terminating in a radial shoulder, said plug prongs being contractable by engagement of the hooks thereof with said chamber wall, during insertion of the plug, and then expandable into said opposed recesses by rotation of the plug relative to the socket until said hooks are engaged with the mentioned radial shoulders, and a pair of terminals carried by the socket and each provided with a contact located in the mentioned recesses and having hooking engagement with the hooks of the plug terminals while said hooks are held aligned with the mentioned recesses by said radial shoulders.

2. In a combined plug and socket, a plug having a cylindrical body, a pair of flexible prong terminals in said body, a hook on the end of each of said terminals and normally extending laterally beyond said body, a socket having an open-ended cylindrical chamber receptive of the plug body, there being opposed recesses in the wall of said chamber, said recesses, on one side, gradually blending into the wall of the chamber and, on the other side, terminating in a radial shoulder, said plug prongs being contractable by engagement of the hooks thereof with said chamber wall, during insertion of the plug, and then expandable into said opposed recesses by rotation of the plug relative to the socket until said hooks are engaged with the mentioned

radial shoulders, a pair of terminals carried by the socket and each provided with a contact located in the mentioned recesses and having hooking engagement with the hooks of the plug terminals while said hooks are held aligned with the mentioned recesses by said radial shoulders, and a resiliently-urged closure member normally closing the open end of the socket chamber and inwardly displaceable by the plug during insertion of the latter.

3. In a combined plug and socket, a plug having a cylindrical body, a pair of flexible prong terminals in said body, a hook on the end of each of said terminals and normally extending laterally beyond said body, a socket having an open-ended cylindrical chamber receptive of the plug body, there being opposed recesses in the wall of said chamber, said recesses, on one side, gradually blending into the wall of the chamber and, on the other side, terminating in a radial shoulder, said recesses, on the ends thereof adjacent the open end of the socket chamber, each terminating in a transverse shoulder, said plug prongs being contractable by engagement of the hooks thereof with said chamber wall, during insertion of the plug, and then expandable into said opposed recesses by rotation of the plug relative to the socket until said hooks are engaged with the mentioned radial shoulders, and a pair of terminals carried by the socket and each provided with a contact located in the mentioned recesses and having hooking engagement with the hooks of the plug terminals while said hooks are held aligned with the mentioned recesses by said radial shoulders, the mentioned transverse shoulders overstanding said contacts and spacing the latter from the socket chamber.

4. In a combined plug and socket, a plug having a cylindrical body, a pair of flexible prong terminals in said body, a hook on the end of each of said terminals and normally extending laterally beyond said body, a socket having an open-ended cylindrical chamber receptive of the plug body, there being opposed recesses in the wall of said chamber, said recesses, on one side, gradually blending into the wall of the chamber and, on the other side, terminating in a radial shoulder, said recesses, on the ends thereof adjacent the open end of the socket chamber, each terminating in a transverse shoulder, said plug prongs being contractable by engagement of the hooks thereof with said chamber wall, during insertion of the plug, and then expandable into said opposed recesses by rotation of the plug relative to the socket until said hooks are engaged with the mentioned radial should-

ders, a pair of terminals carried by the socket and each provided with a contact located in the mentioned recesses and having hooking engagement with the hooks of the plug terminals while said hooks are held aligned with the mentioned recesses by said radial shoulders, the mentioned transverse shoulders overstanding said contacts and spacing the latter from the socket chamber, and a resiliently-urged closure member normally closing the end of the socket chamber that is forward of the mentioned transverse shoulders, said closure member having lateral projections adapted to engage said transverse shoulders to limit the outward movement of said member, said member being inwardly displaceable by the plug during insertion of the latter.

5. The combined plug and socket according to claim 4 in which each socket terminal is provided with at least two contacts and in which the contacts of one terminal are diametrically opposite to the corresponding contacts of the other terminal, and in which there is a recess for each contact provided.

6. In a combined plug and socket, the former having a pair of resilient prong terminals each having a hook on its end, and said hooks being oppositely directed; a socket comprising a housing formed of two identical body parts, each body part having an open-ended semi-cylindrical socket chamber and the wall of said chamber having at least one recess formed therein, said recess blending into said wall at one side and at that end which is opposite to the open end of the chamber, the opposite side and end of said recess being respectively defined by a radial shoulder and a transverse shoulder, and a terminal carried by said body part and having a hook-shaped contact disposed adjacent to the transverse shoulder of the recess and in spaced relation to the socket chamber, said plug being insertable into said chamber to bring the hooks on the ends of the prong terminals into hooking engagement with the hook-shaped contacts of the socket.

CHARLES T. GRILL.

REFERENCES CITED

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

UNITED STATES PATENTS

| Number | Name | Date |
|-----------|---------|----------------|
| 1,509,839 | Kuhn | Sept. 30, 1924 |
| 1,593,985 | Nielsen | July 27, 1926 |
| 1,679,067 | Wiseman | July 31, 1928 |
| 2,102,625 | Hubbell | Dec. 21, 1937 |