

[54] **PROTECTED CONNECTOR PLUG**
[75] Inventor: Attila A. Lenkey, Millburn, N.J.
[73] Assignee: Lenmark Enterprises, Inc. East Orange, N.J.
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Primary Examiner—Marvin A. Champion
Assistant Examiner—Terrell P. Lewis
Attorney—Donald P. Gillette

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 23,217, March 27, 1970.

[52] U.S. Cl. 339/42, 339/154
[51] Int. Cl. H01r 13/44
[58] Field of Search 339/36, 40, 42, 154

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[57] **ABSTRACT**

A protected connector plug provided with a hollow, open-end housing; the open end is closed by a single, spring-loaded, slidable sheath surrounding both contact blades and having detents on it to engage a stop in the housing to retain the sheath in the housing. In one embodiment the detents are deflectable to allow the sheath to be inserted after the housing is otherwise complete. In another embodiment the sheath is properly placed within one half of the housing before the other half is joined thereto.

10 Claims, 10 Drawing Figures

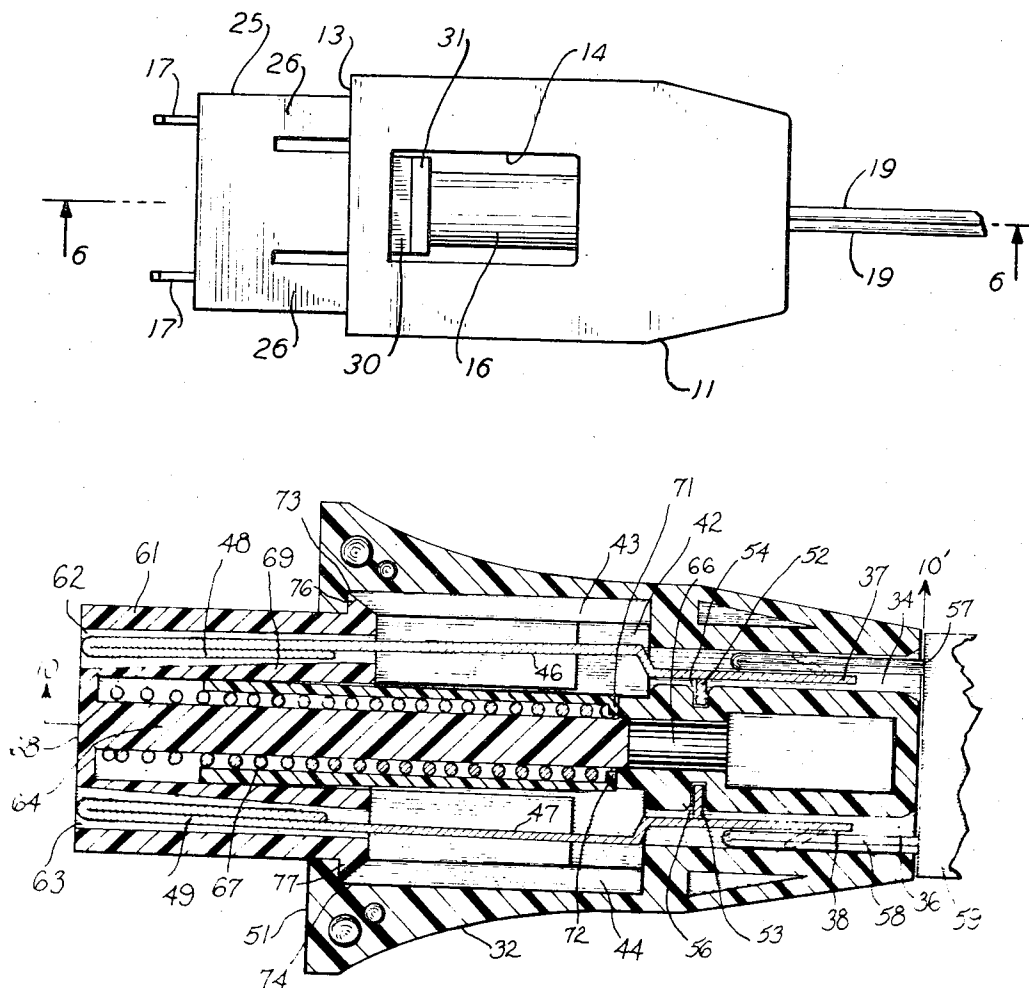


FIG. 1

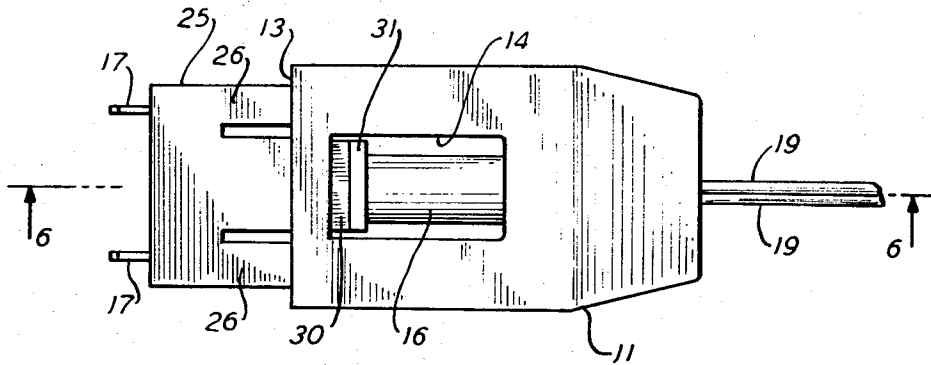


FIG. 2

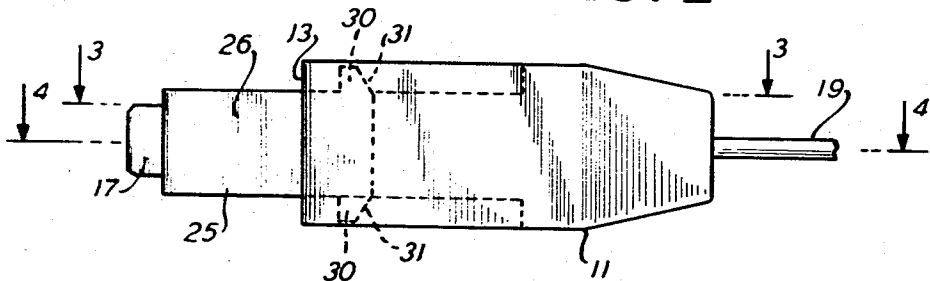
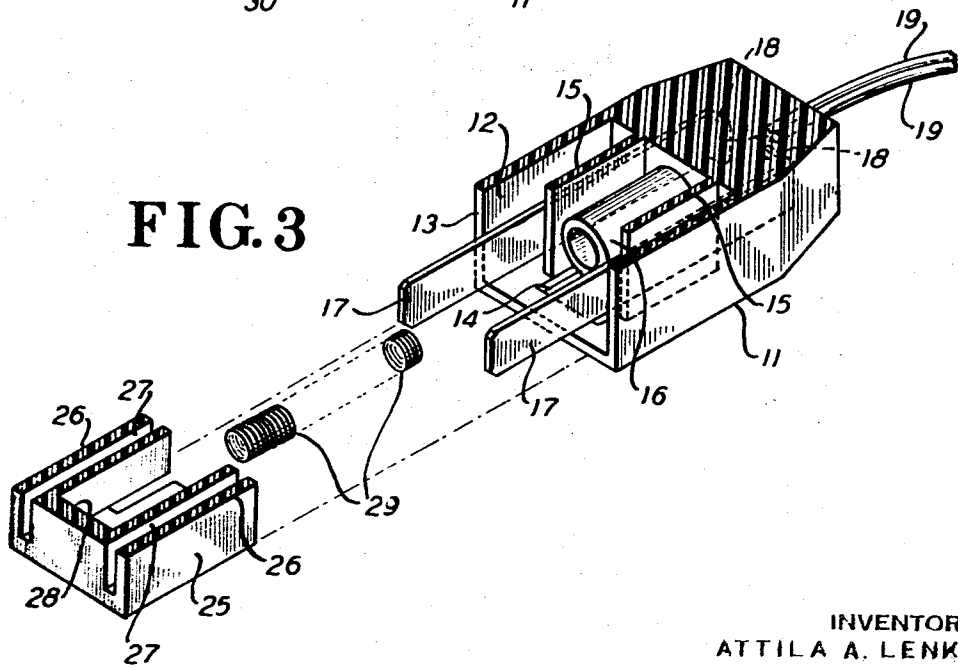


FIG. 3



INVENTOR
ATTILA A. LENKEY

BY
Popper, Barn, Bobis + Jelfellman
ATTORNEYS

FIG. 4

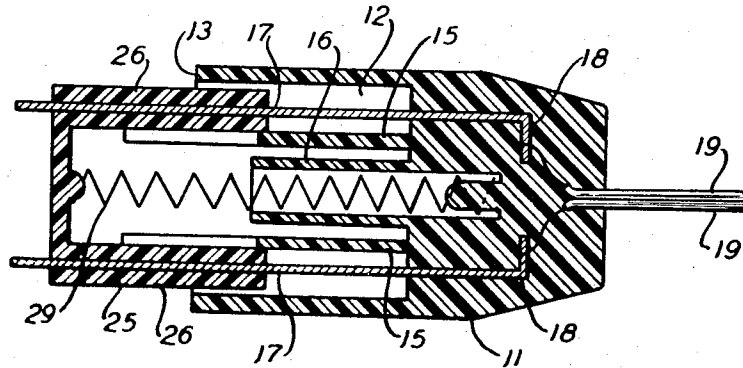


FIG. 5

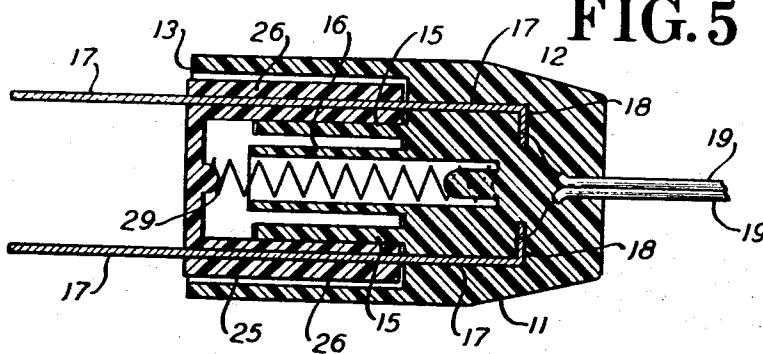


FIG. 6

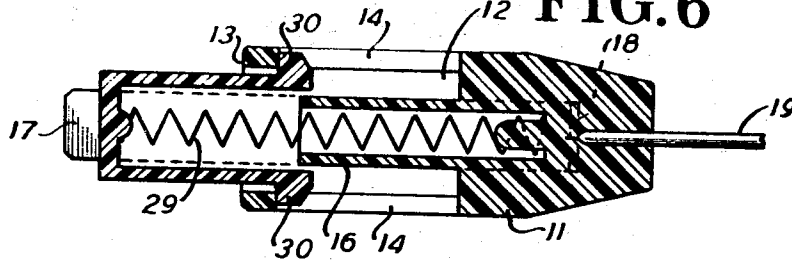
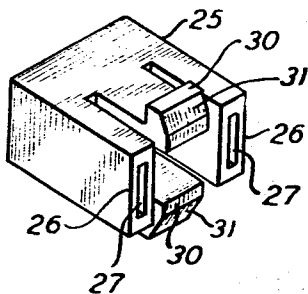
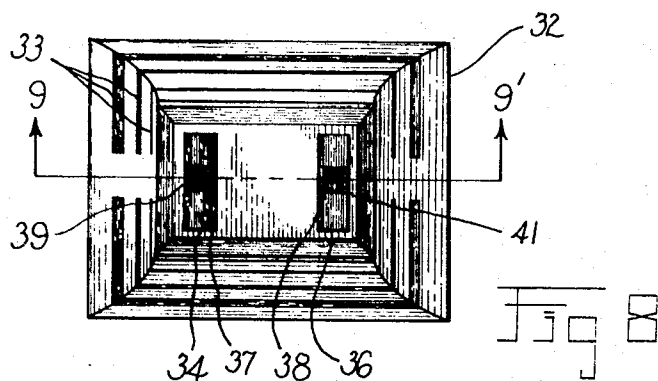
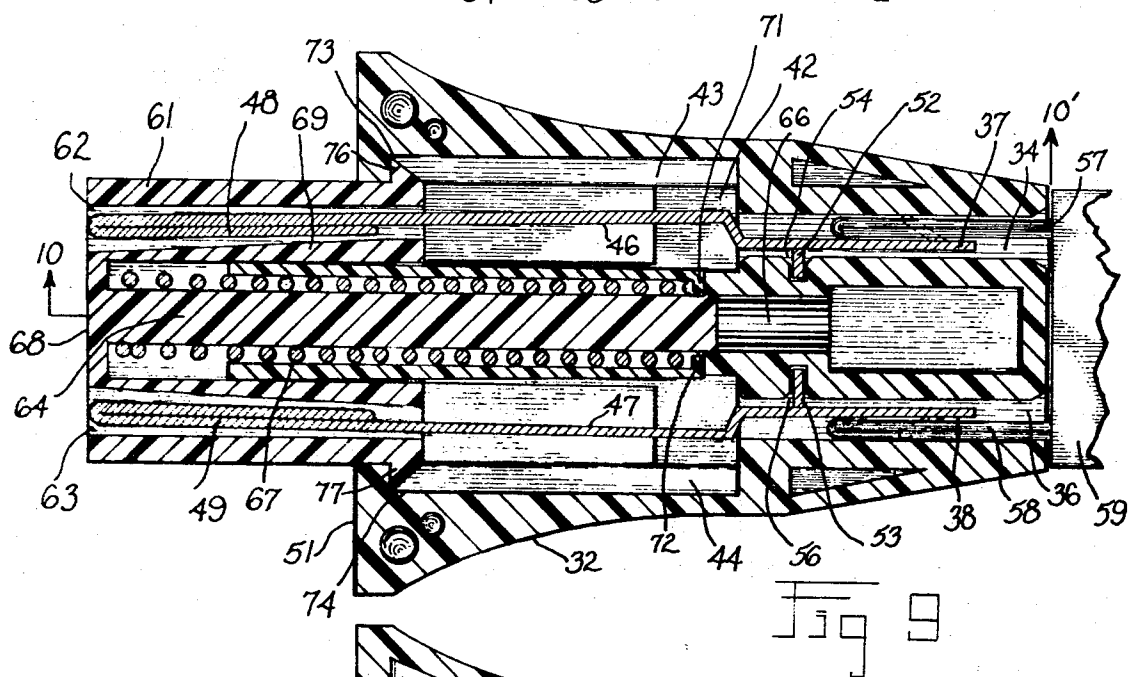
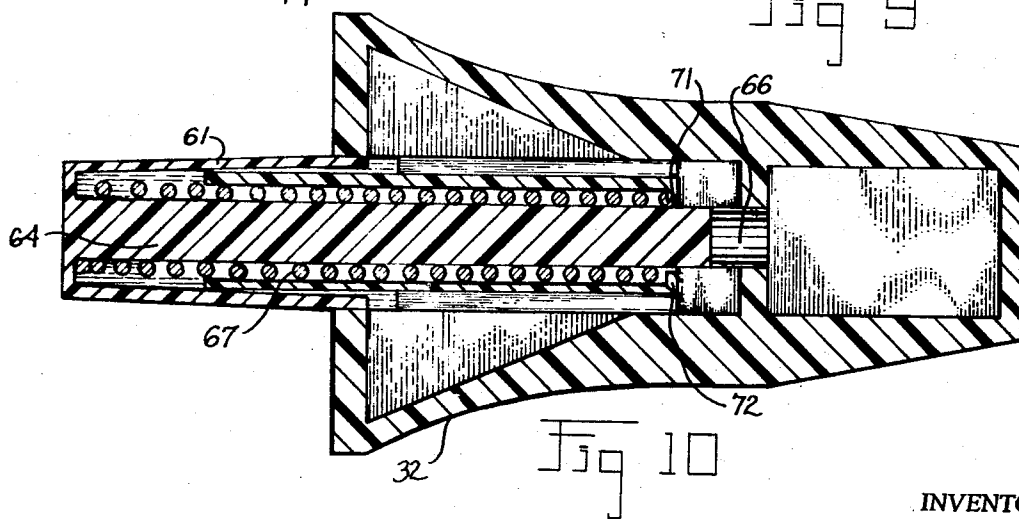


FIG. 7



INVENTOR
ATTILA A. LENKEY

BY
Potter, Barn, Boris & Jellman
ATTORNEYS



INVENTOR.
Attila A. Lenkey
BY

PROTECTED CONNECTOR PLUG

This application is a continuation-in-part of my co-pending application, Ser. No. 23,217 filed Mar. 27, 1970.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to connector plugs with means for shielding against inadvertent contact with the two blades when the plug is partially inserted into a socket. In particular, it relates to a plug having a sheet that surrounds both of the blades and extends transversely between the blades and is resiliently biased away from the main body of the plug to cover all or most of the blades but is retractable into the body as the blades are inserted into a socket.

2. Description of the Prior Art

The prior art has provided several means of protecting at least part of the length of the prongs of a male plug with insulation so that it is difficult or impossible to make conductive connection with both prongs when the plug has been inserted far enough into a socket to receive current. In some cases, the insulating means surrounds and is rigidly attached to each prong. This rigid insulation extends only part way along the length of the prongs and the outermost ends of the prongs are reserved as contact areas and are not covered by the insulation. Such plugs are dependent on the fact that most sockets have their contact portions sufficiently far back from the outer face of the socket to engage only the ends of the prongs. However, the contact portions of the socket are not always so far back. It is possible for the prongs to extend far enough into the socket for the contact portion of the socket to make physical connection only with the insulated part of the prongs of such a plug and thereby conduct no current into the plug itself.

Other prior art structures include telescoping or retractable insulating means separately surrounding each of the blades of a plug and vacant spaces in the body of the plug into which the retractable insulating means can be compressed when the plug is inserted into a socket. Such protective devices, if molded as part of the plug body, may lack the resilience necessary to extend over the length of the plug blade once they have been compressed for a long time or they may become brittle and wear out easily. If they are entirely separate members, there is a possibility that they will become dislodged separately and leave one of the blades open. If this blade happens to be the one that makes contact with the "hot" line in a socket, it is almost as dangerous as if both of the blades were unprotected. Furthermore, such separate protecting sheaths are inherently more complex and have more parts to break than the unitary structure of the present invention. In addition, the separate protective sheaths may become wedged into the contact portions of the socket and prevent the plug from working. On the other hand, the single sheath of the present invention cannot fit into the holes intended to take the prongs of the socket and, therefore, cannot get wedged so as to prevent the socket from working.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of a safety connector plug according to the present invention;

FIG. 2 is a side elevational view of the plug in FIG. 1;

FIG. 3 is an exploded sectional view thereof taken along the line 3—3 in FIG. 2;

FIG. 4 is a cross-sectional view taken along the line 4—4 in FIG. 2;

FIG. 5 is a cross-sectional view corresponding to FIG. 4 but with the sheath retracted;

FIG. 6 is a cross-sectional view perpendicular to the view in FIGS. 4 and 5;

FIG. 7 is a perspective view of the sheath in the previous figures;

FIG. 8 is a rear view of a modified embodiment of a plug constructed according to the invention;

FIG. 9 is a cross-sectional view along the line 9—9' in FIG. 8; and

FIG. 10 is a cross-sectional view of the plug in FIG. 9 along the line 10—10'.

DETAILED DESCRIPTION OF THE INVENTION

The safety plug shown in FIGS. 1-6 has a housing 11 which has an internal, generally rectangular cavity 12. The cavity is open at one end 13 of the housing 11, and it also communicates with top and bottom slots or openings 14 in the housing 11. The top and bottom openings are partially closed by a pair of longitudinal walls 15, extending therebetween. These walls define tracks between themselves and the outer wall of the housing. The tracks slidably receive a bifurcated cover. A tubular integral spring socket 16 is formed on the housing 11 in the cavity 12 between the walls 15. A pair of contact blades, or prongs, 17 of electrically conductive material are attached to the housing 11, which is made of dielectric material. The contact prongs 17 may be attached to the housing 11 in any suitable manner. By way of illustration, they are shown with offset ends 18, with electrical conductive wires 19 attached thereto; the ends 18 are molded into the housing 11.

The open end 13 of the housing 11 receives a bifurcated sheath or cover 25. The cover 25 has a pair of legs 26 which have internal slots 27 which receive the prongs 17 and slide thereon and are joined together at the outer end by a flat, transverse plate that extends from one of the slots 27 to the other. The cover 25 has a wall 28 connecting the legs 26. A single spring 29 in the socket 16 between the walls 15 engages the wall 28 and normally urges the cover 25 out of the housing 11. A pair of resilient, deflectable detents 30 are formed on the cover 25. The detents have cam surfaces 31 so that they may easily be deflected to enter the housing 11, and then will snap to hold the cover 25 engaged against discharge from the housing 11. The detents 36 are spaced sufficiently from the legs 26 to permit the entry of the walls 15 between them. The cover 25 is preferably dimensioned so as to at least partially sheath the prongs 17, as shown in FIGS. 1, 2, 4 and 6, and to yield to pressure sufficient to overcome the spring 29, to un-sheath the prongs 17 as shown in FIG. 5. In this manner, the tips of the prongs 17 being exposed, the plug may easily be inserted in the socket and the cover 25 will yield to pressure as the prong enters the socket.

The top and bottom openings 14 in the housing 11 make it possible to get a good grasp on the plug in order to remove it from a socket. Sometimes sockets become worn so that their conductive parts bind the prongs, or blades, 17 and make it difficult to pull the plug out of the socket, especially if the plug is made of slick, hard plastic material with no transverse ridges on it. Even with transverse ridges and even if the plug is made of

a yieldable material it is still sometimes difficult to remove a plug from the socket in which it has gotten wedged. Such difficulties are almost completely obviated by the slotted plug of the present invention.

On the other hand, it may be considered undesirable to have a slot that extends through the main body of the housing 11, and if this is the case, the housing may be molded in two mirror image sections with flat plate portions that cover the slots 14. If necessary, the height of the detents 30 may be reduced slightly so as not to rub against the inner surfaces of these plates.

The embodiment shown in FIGS. 1-7 is connected directly to one end of a line cord. The safety features of the invention also make it useful as an attachment to an existing plug. Such an attachment is shown in FIGS. 8-10.

FIG. 8 is a rear view of a plug constructed according to the invention and intended for use as an adjunct to a normal line plug. It has a main body portion 32 with grooves 33 therein to make it easier to grasp in order to pull it out of a socket. At the back end of the plug are two slotted openings 34 and 36 to receive the prongs of a regular line plug. Within the slots are two contact members 37 and 38, each of which has a conductive tongue 39 and 41, respectively, to engage a regular line plug inserted therein. The body 32 may be made of any of the usual materials for making line plugs, including either rigid or slightly deformable insulating material. Usually the body is molded in two mirror image sections divided along the horizontal center line of the plug as shown in FIG. 8. The two sections may be joined by ultrasonic welding to form a unitary final structure.

The plug of FIG. 8 is shown in cross-sectional views in FIGS. 9 and 10. The body 32 of the plug has a central cavity 42 with two shelves 43 and 44 along the sides thereof. The prongs 46 and 47 each have one end 48 and 49, respectively, extending beyond the front surface 51 of the body of the plug by the same distance as is customary in normal line plugs. The prongs are held against longitudinal movement by a pair of flanges 52 and 53 extending laterally from the prongs 46 and 47, respectively, and fitting into a pair of recesses 54 and 56 in the body 32 of the plug.

While the plug of FIGS. 1-7 was arranged for connection directly to a line cord, the present plug is arranged to have an ordinary line plug inserted in it. For this purpose, the ends 37 and 38 of the prongs 46 and 47 extend into the channels 34 and 36, respectively, to make connection with a pair of prongs 57 and 58 of a line plug 59. In order to grip the prongs 57 and 58 firmly, the contact portions 37 and 38 have short tongues of the contact material pressed outwardly to engage the prongs 57 and 58.

The male contact ends 48 and 49 of the prongs 46 and 47 are enclosed within a sheath 61. This sheath has two channels 62 and 63 to fit loosely around the ends 48 and 49, respectively, and it also has a central rod 64 molded integrally with the rest of the sheath. The rod 64 slides in a channel 66 formed in the body 32 of the plug. Surrounding the central rod 64 is a spring 67, one end of which presses against the inner surface at the closed outer end 68 of the sheath 61 and the other end of which fits between the rod 64 and a sleeve 69. The sleeve has an inwardly projecting flange 71 at the end remote from the closed end 68 of the sheath 61 and the spring is captured between the closed end 68 and the

flange 71 and presses the latter against a shoulder 72 that forms part of the body 32. This spring pressure resiliently forces the sheath 61 to the extended position shown in FIG. 9 in which it completely or substantially completely covers both of the blade contact ends 48 and 49. In order to limit the outward movement of the sheath 61, it is provided with two ears 73 and 74 that slide along the shelves 43 and 44 and engage inwardly projecting stops 76 and 77.

When the plug of FIGS. 8-10 is used as a protective device for an ordinary plug, the latter, illustrated by plug 59, is inserted into it and is held more firmly than plugs are usually held in ordinary sockets. This permits the safety plug to be used as the principle device for making connection with the socket. When the safety plug is inserted into a socket, the outer end 68 of the sheath first strikes the surface of the socket. If the contact ends 48 and 49 of the prongs 46 and 47 are properly aligned with the usual receptacle portions of the socket, the safety plug can be pressed forward causing the contact portions 48 and 49 to enter the receptacle slots of the socket. As this occurs, the sheath 61 is pushed into the cavity 42, compressing the spring 67. The resilient force developed by the spring is not enough to cause the plug to push itself out of the socket but is enough to force the sheath 61 out of the cavity 42 when the plug is removed from the socket. As a result, the contact portions 48 and 49 of the prongs 46 and 47 are never exposed and anyone either inserting or removing the safety plug of this invention cannot come into contact with the prongs.

What is claimed is:

1. A safety plug comprising:

A. an insulating housing;

B. a pair of contact members, each secured internally within said housing and having one end extending from said housing;

C. an insulating sheath slidably held within said housing and enclosing said ends of said contact members;

D. a spring; and

E. an insulating wall enclosing said spring within said housing, said spring having one end bearing against said sheath and the other end against said housing to press said sheath out of said housing and into surrounding relationship with respect to said ends of said contact members, said sheath comprising a wall portion extending substantially between said ends of said contact members near the outer tips thereof.

2. The plug of claim 1 in which said sheath comprises detents within said housing and said housing comprises stops to hold said detents, and thereby hold said sheath from becoming disengaged from said housing.

3. The plug of claim 2 in which said housing has slots to receive said detents, and one end of said slots forms said stops.

4. The plug of claim 1 in which said sheath is bifurcated and has two free ends extending into said housing.

5. The plug of claim 2 in which said detents hold said sheath in only partial sheathing position on said contact members.

6. The plug of claim 1 in which the inner ends of said contact members are offset and have electric leads attached thereto and are molded within said housing.

7. The plug of claim 1 in which

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- A. said contact members have flanges extending transversely therefrom intermediate their ends; and
- B. said housing comprises recesses to receive said flanges whereby both ends of said contact members are free to engage other contact devices.
- 8. The plug of claim 7 in which
 - A. the ends of said contact members extending from said housing are in the form of blades spaced apart by the proper distance to engage electric outlets; and
 - B. the inner ends of said contact members are offset from said first-named ends by a distance to make

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contact with a plug inserted into said housing from the end opposite said sheath.

9. The plug of claim 1 comprising, in addition, longitudinal interior walls defining a central space between said contact members to enclose said spring.

10. The plug of claim 1 in which said sheath comprises, in addition, a central rod extending through said spring and attached to the inner surface of said wall portion, and said housing comprises a channel aligned with said central rod to guide the free end thereof.

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