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Ludwig

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[54] **TERMINAL CONNECTOR FOR ELECTRIC EXTENSION CORD**


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[52] **U.S. Cl.** ..... **339/36**, 174/67, 339/61 R, 339/154 R

[51] **Int. Cl.** ..... **H01r 13/54**

[58] **Field of Search** ..... 339/36–40, 339/42, 28, 29, 154–166, 59, 60; 61; 174/66, 67; 220/3.2, 3.4



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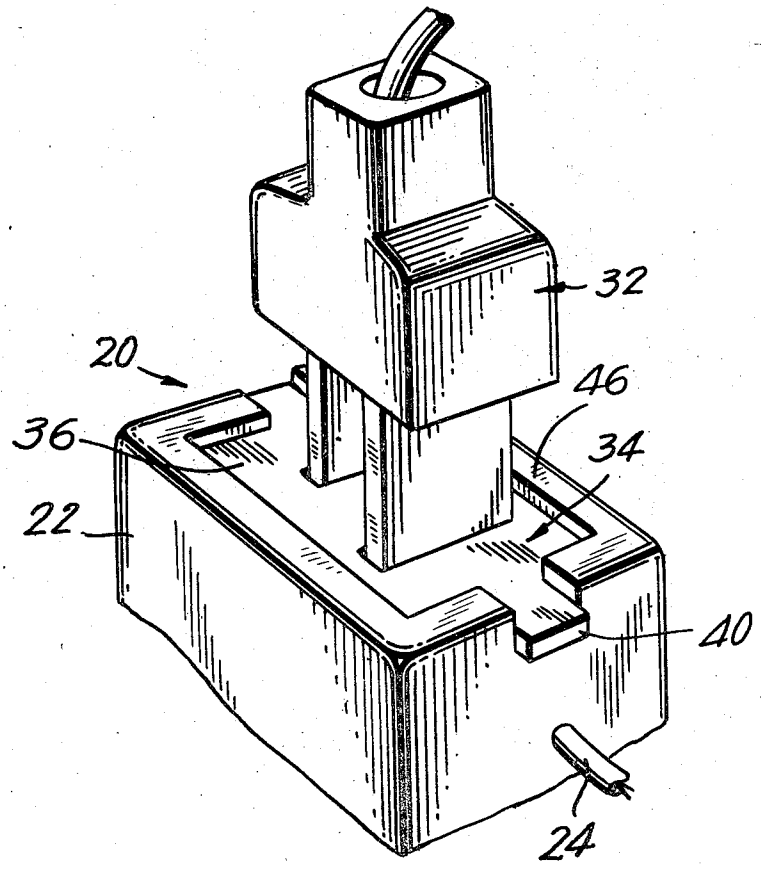
[57] **ABSTRACT**

A connector having a body of elastomeric material is molded around one end of an extension cord the other end of which terminates in a twin-prong plug. An electrically non-conductive rigid safety guard is slidably captive over an exterior surface of the body and has a pair of prong-passing passageways the dimensions and relative positioning of which conform to those of underlying prong-admitting passageways of the connector that lead to a pair of internal electrical female contacts. The prong-admitting passageways of the guard normally are disaligned with the prong-admitting passageways of the connector. However, the guard can be forced into a position in which its prong-admitting passageways are aligned with the prong-admitting passageways of the connector so as to permit entry of the twin-prongs of a plug into the connector. Forcing the guard to such position resiliently deforms a portion of the elastomeric body, thereby building up a stress which, when the plug is withdrawn, restores the guard to its idle position in which it covers the prong-admitting passageways of the connector and thus prevents a child from being subjected to an electrical shock or burn either through accidental or deliberate insertion of an electrically conductive element into a prong-admitting passageway of the connector or by having the child place the connector in his mouth.


**11 Claims, 11 Drawing Figures**



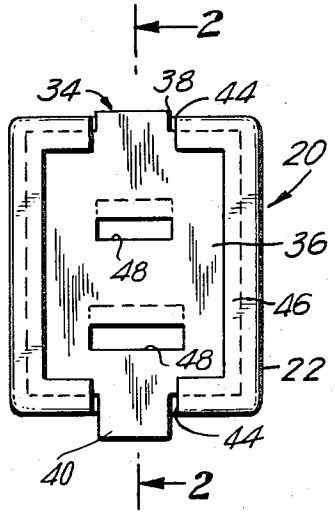



FIG. 1

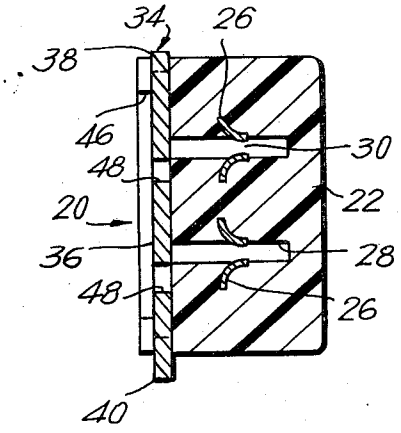



FIG. 2

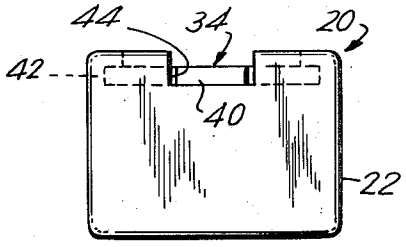



FIG. 3

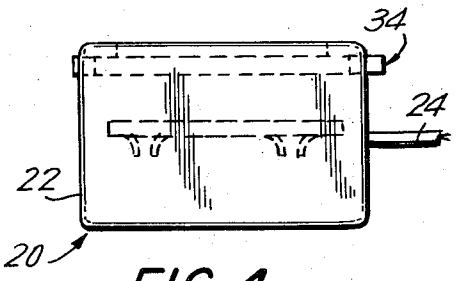



FIG. 4

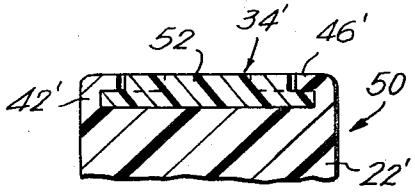



FIG. 5

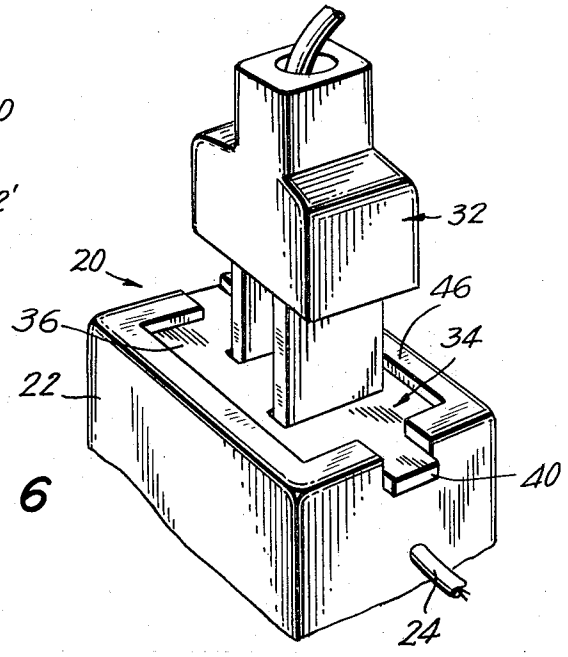



FIG. 6

FIG. 7

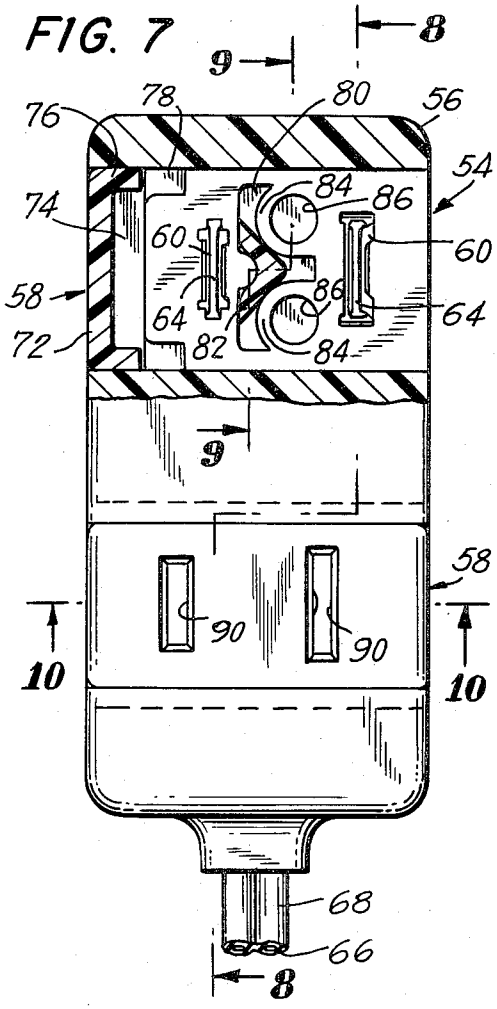



FIG. 8

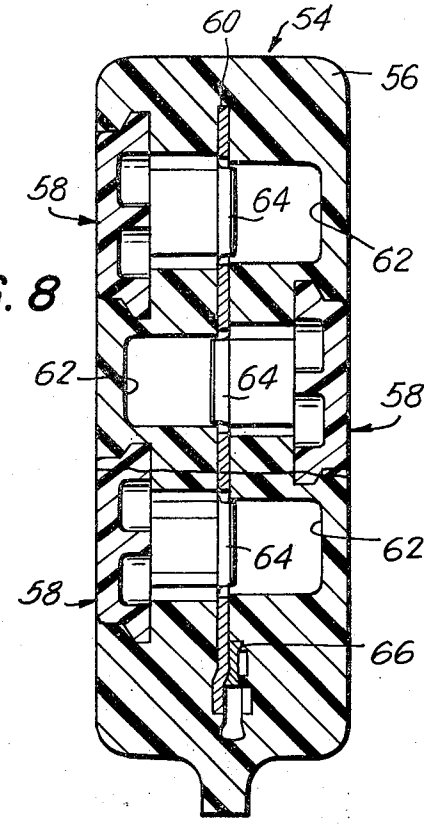



FIG. 9

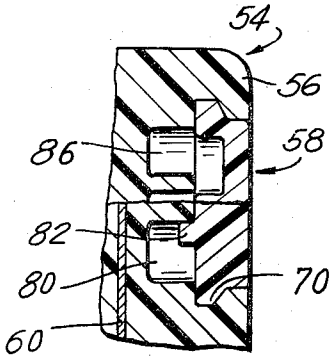



FIG. 10

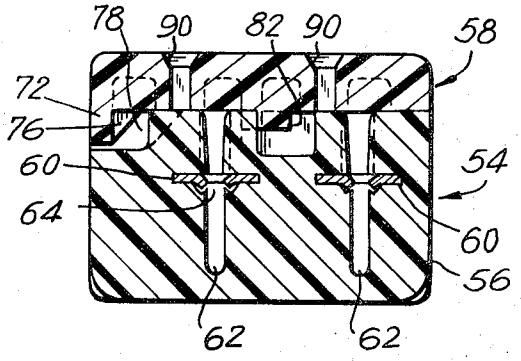
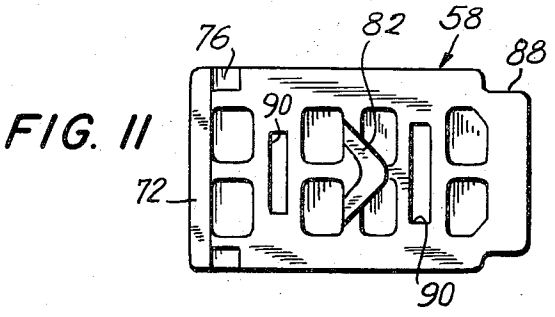



FIG. 11



# TERMINAL CONNECTOR FOR ELECTRIC EXTENSION CORD

## BACKGROUND OF THE INVENTION

1. Field of the Invention

For an electric extension cord, a molded-on terminal connector having a guard against electrical shock and burn.

2. Description of the Prior Art

It has long been recognized that electrical outlets present a substantial hazard to children. A child's curiosity leads him to insert metallic objects into the prong-admitting passageways that lead to the female contacts housed in the connector. Children automatically pattern their actions upon their parents'. They see their parents inserting objects into an electrical wall outlet and, not knowing the dangers involved, insert what to them seem similar objects. As a result, they are shocked or burned, sometimes seriously and, upon occasion, fatally.

Various approaches have been suggested for the purpose of overcoming this problem. One favorite approach has been to provide a pseudo-twin-prong plug for an electrical wall outlet, such prong, however, constituting a plug totally composed of electrically nonconductive material such as a synthetic plastic, the bases of the prongs being connected by a bridge molded in one piece with the prongs. These, although widely used, do not fully remove the danger associated with wall outlets since children, as a rule, are highly inquisitive and very ingenious. With their tiny fingers they manage to pry out the bridge and prongs when even an adult has difficulty performing the operation with tools.

A more successful approach, although one which has not been as widely accepted commercially, involves the use of a special wall outlet which replaces a standard wall outlet. The special wall outlet includes a disc rotatably mounted over a wall outlet casing and including a pair of passageways that normally are out of alignment with the passageways of the wall outlet casing but which can, by revolving the disc, be brought into alignment with the casing passageways. The disc is spring-biased into its out-of-alignment position so that to successfully couple a twin-prong plug to the wall outlet, the tip of the prongs are inserted into the passageways of the disc, the disc rotated through an arc, usually 90°, with the aid of the plug, and the prongs then thrust home into the passageways of the casing until they engage the female contacts. This second approach requires more coordination and dexterity than is possessed by most children and, therefore, is quite effective. However, the structure of the special wall outlet is rather expensive so that the same has not proven to be highly salable.

There also is on the market — and this is not an item which has any connection with safeguarding a child against the danger of electrical shock or burns — a molded-on terminal for an electric extension cord. The molded-on terminal has largely replaced the now-antiquated hollow cube tap which had comprised a pair of mating shells containing within them female contacts that were secured to the twin leads of the extension cord. In the molded-on connectors access to the female contacts is provided by prong-admitting openings. The previous terminals employed rigid shells, for example,



shells molded of a phenol-formaldehyde condensation resin, e.g., Bakelite. However, the molded-on terminals are made of an elastomeric plastic, e.g., a polyvinylchloride, which is a semi-soft, semi-rigid material typically having a Shaw durometer in the vicinity of **40**, the same being exemplificative. No one has realized that such a terminal is capable of modification to act as an excellent electrical shock and burn guard for a child.

Another safety hazard — and this is not solely restricted to children — is that in most extension cord terminals the construction is such that it is possible to insert but one prong of a twin-prong plug into one of the passageways of the terminal, leaving the other prong free. This creates the possibility of an electric shock if a person should accidentally touch the uncoupled prong. It has been proposed heretofore that this problem be overcome by making a terminal somewhat oversized so that it is not possible to insert only a single prong. However, such approach requires the terminal to be made unduly large and bulky and to significantly increase the cost thereof.

## SUMMARY OF THE INVENTION

1. Purposes of the Invention

It is an object of the invention to provide an improved terminal connector for an electric extension cord which terminal is not subject to the foregoing drawbacks.

It is another object of the invention to provide a terminal connector of the character described which utilizes the elastomeric properties of a molded-on terminal to make an effective, quick operating, reliable, simple and inexpensive safety guard.

It is another object of the invention to provide a terminal connector of the character described which constitutes relatively few and simple parts and readily lends itself to mass production and easy, rapid assembly.

It is another object of the invention to provide a terminal connector of the character described which has an attractive appearance and which has a safety guard that despite its ease of manipulation still presents a sufficiently difficult problem to provide an effective safety device for children.

It is another object of the invention to provide a terminal connector of the character described which has a safety guard of such nature that the safety guard itself, rather than the terminal connector, will function to prevent coupling of one prong only of a twin-prong plug with the terminal.

It is another object of the invention to provide a terminal connector of the character described which utilizes a safety guard that, although easily assemblable to the terminal, is, when once installed, only removable with difficulty so that, in effect, it becomes a permanent part of the terminal.

It is another object of the invention to provide a terminal connector of the character described which incorporates a suitable arrangment for cooperating with polarized, i.e., different, width prongs.

Other objects of the invention in part will be obvious and in part will be pointed out hereinafter.

2. Brief Description of the Invention

A terminal connector is molded on to an end of a twin-wire extension cord. The opposite end of the cord terminates in a twin-prong plug. The end of the cord on which the connector is molded has female contacts attached thereto. These contacts are embedded during

molding into a connector body of synthetic plastic in the shape of the terminal. Also, during molding, passageways are formed for admitting twin prongs into the connector body so as to engage the contacts. The material of the body is an elastomer, that is to say, it is a material which is yieldable and resilient. It has the characteristics commonly associated with a rubber having a Shaw durometer in the order of 40. It will yield only under a reasonable degree of pressure such as can be exerted without an unacceptable strain by a person's finger, e.g., a thumb, providing that the material is not of too thick a cross-section. A preferred material for this purpose is a polyvinylchloride although other synthetic plastic elastomers of an electrically non-conductive nature also are suitable such, for example, as polyethylene or a synthetic rubber.

Preferably, in accordance with current practices in the electrical art, the passageways molded into the connector body for admitting the prongs of a twin-prong plug are polarized, the type of polarization used being a standard one, to wit, one in which one prong-admitting passageway is wider than the other. Thus, such passageways will readily couple with the twin prongs of an appliance plug which currently are of two different widths in order to prevent any but the proper insertion, this being one in which the prong that through failure of insulation in an electrical appliance will be connected to the casing of such appliance is the prong which will engage the grounded female contact of the connector. Such connector polarization is not reliable because the resilient material of the connector body permits reverse coupling of a plug and connector, i.e., insertion of a wide prong in a too narrow passageway.

An electrically non-conductive stiff rectangular safety guard is associated with the connector body, the body being provided with a recess on a face thereof for admitting the guard and the recess being so configured that the guard is captively retained in the connector body. The guard is so confined that movement thereof in any direction is inhibited by adjacent, indeed abutting, portions of the connector body. However, the guard and body are so relatively shaped that the guard can experience linear translatory motion, i.e., sliding motion, with respect to said body in one predetermined direction upon application of a mild manual pressure, e.g., a few pounds, in such direction. Motion in any other direction requires a substantially greater pressure and, therefore, is discouraged. This desired motion is opposed by the connector body; that is to say, when such translatory motion is experienced by the guard it is accompanied by a distortion of the elastomeric connector body. Hence, when the guard is moved in the manner prescribed above and the connector body distorted, a biasing stress is developed by the body. This stress will, when the guard is released from a position to which it has been shifted by manual pressure, restore the guard to its idle position, this being one in which the body is unstressed or all stresses are balanced.

The guard is provided with twin prong-admitting polarized passageways in the connector body that provide access to the embedded female contacts. However, in the idle position of the guard the passageways therein are out of registry (misaligned) with the associated passageways in the connector body so that solid portions of the guard block admission of prongs to the passageways in the connector body. However, when the guard is shifted manually, either by direct manual manipulation thereof or by manually moving a plug the tips of the twin prongs of which are in the guard pasageways, the movement being such that the guard passageways become aligned with the connector body passageways, the prongs may be inserted into the passageways of the body and thrust all the way into the body to a depth sufficient to engage the female contacts. The use of polarized passageways in the stiff guard prevents reverse coupling.

As will be appreciated from the foregoing description, this movement of the guard is permitted by virtue of the elastomeric nature of the connector body, thus eliminating the necessity for a separate spring, the cost and assembly of which unduly add to the price of the connector.

Desirably the guard is so proportioned that the distance from either prong-admitting passageway to an edge of the guard exceeds the space between two prongs, thus preventing the insertion of only one prong into a passageway in the guard and into the corresponding passageway of the connector body which could, as mentioned previously, lead to a mishap.

The invention accordingly consists in the features of construction, combinations of elements and arrangements of parts which will be exemplified in the devices hereinafter described and of which the scope of application will be indicated in the appended claims.

## BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings in which are shown various possible embodiments of the invention:

FIG. **1** is a plan view of a connector constructed in accordance with the present invention and molded around one end of an extension cord, said view showing the safety guard in its idle position in which the prong-admitting passageways thereof are out of alignment with the prong-admitting passageways of the connector body;

FIG. **2** is a cross-sectional view taken substantially along the line **2—2** of FIG. **1**;

FIG. **3** is an end view of the connector;

FIG. **4** is a side view of the connector;

FIG. **5** is a fragmentary transverse cross-sectional view of a connector embodying a modified form of the invention;

FIG. **6** is a perspective view of a connector in association with a twin-prong plug;

FIG. **7** is a plan view similar to FIG. **1** of another modified form of the invention, a portion of the connector and safety guard being broken away to illustrate certain internal details;

FIGS. **8, 9** and **10** are sectional views taken substantially along the lines **8—8, 9—9** and **10—10** of FIG. **7**, FIG. **9** being fragmentary; and

FIG. **11** is a bottom view of the safety guard used in the connector of FIG. **7**.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now in detail to the drawings, and more particularly to FIGS. **1–4** and **6**, the reference numeral **20** denotes an electrical connector embodying the present invention. Said connector includes a connector body **22** which, for convenience, may have a simple overall rectangular parallelepipedal configuration. Such configuration is merely shown and mentioned by

way of example, it being understood that the specific configuration for any given connector body will be one suitable for manufacturing purposes and trade demands. For instance, one end of the connector may be of tapered shape leading to a twin-wire lead, this being a form of connector body that currently is rather widely used. The connector body is generally solid and is fabricated, as by molding, of a synthetic elastomer, a typical example being polyvinylchloride. Alternate materials are polyethylene and synthetic rubber. For a reason which has been mentioned previously, the connector body has mildly rubbery characteristics, that is to say, it is yielding and resilient, being deformable under a stress which can be applied by a person's finger or hands without an unacceptable strain thereon, e.g., of the order of a few pounds. Such connector bodies are well known in the art of electrical extension cords, although previous such bodies never have had safety guards associated therewith.

The connector body is molded around one end of a twin-wire electrical cord **24,** th other end of which is provided with a conventional twin-prong plug (not shown) for insertion in an electrical outlet such as a wall outlet. The end of the cord **24** around which the connector body **22** is molded has attached to the electrically conductive wires thereof electrically conductive female contacts **26.** These contacts thus are embedded within the connector body. Moreover, during the process of molding, suitable pins are used to provide in the molded body prong-admitting passageways **28** which extend from a surface of the body to and beyond prong-engaging slots **30** formed in the female contacts. The molding of connector bodies around female contacts in the manner just described is well known and is currently standardly employed in connection with elastomeric connector bodies, the same, as just indicated, not having been provided with safety guards.

Any suitable molding procedure may be practiced which permits the female contacts and associated end of the cord **24** to be inset into the connector body and suitable pins to be employed to form the passageways **28** during the molding process. A suitable molding procedure is injection molding, although transfer molding, compression molding and, indeed, any other type of conventional molding are not excluded, the selected procedure usually depending upon the particular characteristics of the elastomeric synthetic plastic employed and upon costs, time and availability of equipment.

Although the same is not critical to the present invention, the prong-admitting passageways **28** are polarized, that is to say, they are different from one another in some respect. The purpose of polarization is to ensure that the prong of an appliance which is or may be connected by failure of insulation to the casing of the appliance engages that female contact which is grounded, that is to say, is so connected in the house circuit that this contact is at ground potential. This prevents the appliance casing from accidentally having a high potential applied thereto as, for example, by failure of insulation within the appliance. Various types of polarizing arrangements can be employed, although only one is shown in the connector **20.** One type of polarizing arrangement which is not presently favored is to have the passageways **28,** which are of oblong transverse cross-section, arranged so that the longitudinal axis of one such cross-section is perpendicular to the longitudinal axis of the other. The prongs designed to be admitted into such passageways have a corresponding angular orientation and, therefore, can only be inserted in one manner, thus ensuring the proper type of engagement as mentioned above. However, it is now accepted practice in the United States household electrical field to have appliances provided with twin-prong plugs, the prongs of which, likewise of oblong cross-section, have the longitudinal axes of the cross-sections parallel to one another. Hence the prong-admitting passageways of connectors designed to be engaged by such plugs likewise have the prong-admitting passageways (of oblong cross-section) arranged with their longitudinal axes parallel. Thereby, it is possible to insert the prongs incorrectly. To prevent this and still retain the parallelism of the passageways, present-day plugs are polarized by having one plug wider than the other, and, to cooperate with such plugs, prong-admitting passageways of electrical outlets, e.g., electrical outlets in connectors of extension cords, likewise have the prong-admitting passageways of different widths, thus ensuring proper connection with the household power supply.

In the illustrated embodiment of the invention, the prong-admitting passageways are of different widths, as best shown in FIG. **1,** to cooperate with a similarly polarized twin-prong plug **32** exemplificatively shown in FIG. **6.**

Pursuant to the present invention, a safety guard **34** is provided which will prevent a person, and particularly a child, from deliberately or accidentally inserting an electrically conductive object into a connector body passageway **28** and thereby subjecting himself to an electric shock or burn, and also will prevent a child from being burned if the child inserts the connector body in his mouth.

The safety guard is electrically non-conductive and stiff, being both stiff relative to th connector body and being independently rigid enough not to noticeably distort when pressure is applied thereto, so that upon such application of pressure it will not tend to appreciably flex or bend but rather will move as a body in the direction of application of the pressure. Suitable materials for the safety guard are Nylon (a polyamide resin), Bakelite (phenolformaldehyde condensation resin) and fiberboard.

The safety guard is preferably of a generally planar configuration, that is to say, generally flat, one form of safety guard being illustrated in FIGS. **1–4** and **5.**

This safety guard has a central portion **36** of oblong configuration with aligned tabs **38, 40** extending in the plane of the central portion from the middles of both short edges thereof. The tab **38** is the shorter of the two tabs being just long enough to extend through the associated gap **44** so that thereto act as a guide. The tab **40** projects beyond the connector body a distance equal to the displacement between the guard and body openings when the guard is idle. The safety guard is arranged to cover an external face of the connector body and to be captively retained by the body. For this purpose the upper portion of said body is provided with a squat peripheral flange **42** interrupted at gaps **44** at the centers of both short ends of the connector body. The positions of these gaps correspond to the positions of the tabs **38, 40** when the safety guard **34** overlies the upper portion of the connector body, thus permitting the tabs to ex-

tend through said gaps and project beyond the boundaries of the connector body.

At the upper end of the flange **42** an integral inwardly extending ledge **46** is formed. Like the flange **42**, the ledge defines a rectangular frame interrupted only by the gaps **44**. The ledge overlays the peripheral zone of the upper surface of the safety guard **34**, except at the gaps **44**. The height of the flange **42** is substantially equal to the thickness of the safety guard **34**, and the area defined by the frame of the flange **42** is identical to the area defined by the periphery of the safety guard, except for the tabs, or is barely larger, so that when the safety guard is emplaced within the flange **42**, any movement thereof in the plane of the upper portion of the connector body is inhibited by the flange. Thus, the safety guard will not move of its own volition, either parallel or perpendicular to the length of the aforesaid upper portion of the connector body. Moreover, the ledge **46** is juxtaposed or adjacent to the upper surface of the peripheral zone of the safety guard whereby the safety guard is, as aforesaid, captively held in place against the external upper portion of the connector body. However, because the connector body is flexible and because the flange **42** is thin enough, for example, approximately one-sixteenth inch thick, the safety guard can be displaced against the confining action of the flange by manually pressing on the longer tab **40**.

The pressure required to shift the safety guard across the exterior face of the connector body when thus captively retained by the flange and ledge is relatively mild. It is a pressure which can be exerted by a person's finger without unduly straining himself, typically being in the order of a few pounds. In this manner the safety guard is so confined that it can experience linear translatory motion, i.e., sliding motion, with respect to the connector body, the shape and dimensions of the confining means and the shape and dimensions of the safety guard being such that the aforesaid linear motion preferably is in a predetermined direction and sense.

This channeling to one predetermined direction and sense of the possible motion of the safety guard relative to the connector body can be accomplished in various manners. Thus, in the connector **20** being described, such motion is encouraged by the provision of the tabs **38, 40** which tend to convey to a user that the motion should be in a direction indicated by a line between the tabs. Moreover, because of the gaps **44**, the portions of the flange **42** at the short edges of the connector body are of lesser length than the portions of the flanges at the long side of the connector body and, hence, offer less resistance to motion of the safety guard. In addition, motion of the safety guard across the exterior face of the connector body in a direction perpendicular to the line between the tabs is difficult because it requires lengthwise compression of the short portions of the flange extending across the short ends of the connector body. The selection of a predetermined direction of motion can be further encouraged by having the portions of the flange at the short ends of the connector body somewhat thinner than the portions of the flange at the long edges of the connector body. A primary fact is having tab **40**, which is opposite the predetermined direction, longer than the tab **38**, this encouraging motion is the desired sense as well as in the predetermined direction. It also will be observed that the ledge **46**, in addition to captively retaining the safety guard against an external face of the connector body over mouths of the underlying prong-admitting passageways **28**, tends to discourage movement of the safety guard away from the connector body. Furthermore, the long portions of the flange and ledge conjoin to define tracks in which the long parallel side edges of the safety guard ride, there being a greater tendency with such an arrangement for the body, which can be slid along two tracks, one pair long and one pair short, to slide in the direction of the longer pair of tracks. Hence, all elements of the design cooperate to encourage movement in a single predetermined direction, this direction being, as can be observed, parallel to the long dimension of the connector body, perpendicular to the longitudinal axes of the transverse cross-section prong-admitting passageways **28** and in a sense to align the passageways of the guard and connector body.

The safety guard is provided with prong-admitting passageways **48**, the transverse cross-sectional shape and relative spacing of which essentially match those of the prong-admitting passageways **28**, the mouths of which underlie the safety guard. Thus, the passageways **48**, like the passageways **28**, are polarized to match the polarized configuration of the blades of the plug **32**.

In the idle position of the safety guard, as shown best in FIGS. **1** and **2**, the position of said guard is such that the passageways **48** are misaligned with the mouths of the underlying passageways **28**, so that solid portions of the safety guard block the mouths of the passageways **28** and thereby prevent access thereto and, also, prevent communication between the passageways and ambient surroundings. Accordingly, in such idle position of the safety guard it is not possible to insert an electrically conductive element into the passageways **28** where it could engage the female contacts and, hence, shock or burn a person, particularly a child, and most particularly an inquisitive or ingenious child who tries to emulate his elders. Moreover, because of the additional condition just mentioned, if a child should place a connector in his mouth, a liquid conductive path would not readily be formed between a female contact **26** and the child's mouth, such path being blocked by the safety guard, hopefully for a period long enough for the child to remove it from his mouth before saliva enters the interstice between the safety guard and the upper portion of the connector body so that the saliva will not run down to the female contacts through the passageways **28**.

If it is desired deliberately to insert the prongs of an appliance plug, such as the plug **32**, into the connector so as to electrically engage the female contacts **26**, the safety guard is shifted in the aforesaid predetermined direction and sense sufficiently to align the passageways **28** and **48** thereby permitting the prongs to be thrust home into the connector body and complete electrical coupling.

When the safety guard is thus shifted against the aforesaid predetermined direction and sense against the inhibiting action of the short end portions of the flange **42**, the portion of the flange in the direction of the shift will be substantially distorted to permit the motion required to align the passageways **28, 48**. This distortion creates a stress within the connector body which is maintained as a restoring (biasing) force so long as the safety guard is held in a position such that the passageways are aligned. Immediately the manual pressure required to align the passageways is released,

the restoring force will bias the guard to its idle position, this being one in which the body is unstressed or all stresses are unbalanced so that the safety guard, once again, is in the stabilized position shown in FIG. **1** with its passageways **48** misaligned with the passageways **28** and with solid portions of the safety guard blocking the mouths of the underlying passageways **28.** Desirably, the tip of the tab **40** extends beyond the connector body a distance substantially equal to the misalignment of any associated pair of passageways **28,48** whereby when the tip of the tab is pressed to approximately the level of the end surface of the connector body the passageways automatically will be aligned.

Although the better way of manipulating the safety guard so as to align the passageways **28, 48** is the mode just described, the safety guard also can be manipulated by inserting the tips of the prongs of an appliance plug **32** into the passageways **48** and then, with the plug, shifting the safety guard in the predetermined direction and sense far enough to align the passageways, whereupon the prongs of the appliance can be thrust fully into the connector body.

In FIG. **5** there is shown a connector **50** embodying a modified form of the invention. The connector **50** is essentially the same as the connector **20.** The variance relates only to the configuration of the safety guard; hence, the same numerals as those applied to the parts of the connector **20** have been applied to the connector **50,** being distinguished therefrom by the addition of a prime symbol. Thus, the connector **50** includes a connector body **22'** having female contacts embedded therein to which admittance is gained from an exterior surface of the body by passageways. The safety guard **34'** of the connector **50** is captively secured in the connector body **22'** in a manner the same as that previously described in the first embodiment of the invention and said safety guard has the same prong-admitting passageways. The difference between the connector **50** and the connector **20** resides solely in the provision in the safety guard **50** of a low plateau **52** on the upper surface thereof, the plateau being disposed within the frame defined by the ledge **46'** at the upper ends of the flange **42'**. This plateau imparts to the connector **50** an appearance which is more finished than that of the connector **20** inasmuch as the upper surface of the safety guard thereby is made substantially flush with the upper surface of the ledge **46'**.

Attention is directed to the fact that, in both embodiments of the invention heretofore detailed and, indeed, in the embodiment about to be described with respect to FIGS. **7 – 11,** there is a feature characteristic of the present invention and which, indeed, renders the same operable, to wit, the provision in the stiff safety guard and the elastomeric connector body of adjacent or abutting surfaces, i.e., at least one surface on the connector body abutting at least one surface on the safety guard, these surfaces abutting in the predetermined direction and sense of movement so that when such movement is imparted to the safety guard its abutting portion will distort the abutting portion of the connector body to create, without a separate spring, the restoring, i.e., biasing, force which is a major feature of the instant invention.

Referring now to FIGS. **7 – 11,** the reference numeral **54** denotes a connector embodying a second modified form of the present invention. Said connector includes an elongated connector body **56,** made of elastomeric material, and three stiff safety guards **58.** Two of the safety guards are on one broad face of the connector body where they are spaced apart in the direction of the length of the body, and the third safety guard is on the opposite broad face of the body midway between the first two safety guards. This type of connector on an extension cord provides three duplex outlets instead of the single duplex outlet supplied by the connector **20.** The connector body has female contacts **60** embedded therein during molding. Likewise during molding, prong-admitting passageways **62** are formed as with the use of pins which are withdrawn after molding. These passageways extend through slots **64** formed in the female contacts. The passageways **62** extend from mouths at one face of the connector body to blind ends within the connector body on the side of the female contacts opposite from the mouths of the passageways. Each female contact is connected to a different electrical conductor **66** of a twin-wire line electric cord **68.**

Each female contact is formed with three slots **64,** the slots in the female contacts being transversely registered with one another so that there effectively are provided three pairs of female contacts spaced apart from one another along the length of the elongated connector body **56.** Each pair of such contacts is designed to be engaged by the twin prongs of an electric plug. As is well known in the art, the slots in the female contacts are so shaped that two pairs of endmost slots are designed to receive the prongs of plugs thrust into the connector body from one face thereof, and the third pair of slots, which are intermediate slots, is designed to receive a plug inserted into the connector body from the opposite face. All of the slots and their associated passageways **62** are identically constructed and function in the same manner.

A typical pair of slots is the pair of slots furthest from the end of the connector body into which the cord **68** extends, this being the uppermost pair of slots in FIGS. **7** and **8.** The external surface of the connector body into which prongs are designed to be inserted into the slots is formed with a cross narrow elongated depression **70** (one for each pair of slots **64**) extending between openings at the sides of the connector body. Each depresson **70** has its central axis bisecting the associated pair of slots.

In order to assist in maintaining an associated safety guard **58** in each depression **70,** the bases of the depression are wider than the mouths thereof (dovetailed) and the transverse cross-section of the safety guard is matchingly shaped. The outer surfaces of the safety guard are flush with the outer surfaces of the connector body. The sundry safety guards are thereby captively retained within the connector body against outward movement in a direction perpendicular to the bases of the depressions **70.**

One end of each safety guard is formed with a flange **72** that extends inwardly toward the connector body in a direction perpendicular to the length and breadth of the safety guards. The outer surfaces of these flanges, when the safety guards are in idle position, are flush with the adjacent surfaces of the connector body. Said flanges are located on that end of each safety guard which is the end designed to be pushed by a user when the safety guard is to be shifted to a position permitting full entry of the prongs of a plug (guard passageways aligned with body passageways). In order to accommo-

date the flanges **72**, each depression for each safety guard is formed with a recess **74** at the end thereof at which the flange **72** is located. This recess allows the flange to sweep inwardly of the connector body when the affiliated end of the safety guard is pressed inwardly. In addition, each end of each flange has an inwardly turned triangular lip **76** and the associated portion of each recess **74** has a mating indentation **78** to receive and guide the lip. Inward movement of each safety guard is limited and defined by abutment of the inner surface of the flange **72** with the edge of the recess **74** and the undersurface of each lip **76** with the bottom of each indentation **78.**

As thus far described, the only captive retentions of a stiff safety guard in the elastomeric connector body are one which prevents movement of the safety guard upwardly perpendicularly to the base of its affiliated depression **70,** and another which prevents the slide from moving perpendicularly to its length and parallel to the base of the depression **70.** The first detention means constitutes the matching dovetail shapes of the safety guard and depression, and the second constitutes the side walls of the depression **70** and the mass of the connector body backing up such side walls.

The aforesaid detention means captively holding each safety guard in the connector body while permitting translatory movement of the safety guard relative to the connector body in a direction lengthwise of the safety guard. However, pursuant to the present invention, additional means must be provided which, while permitting movement of the safety guard in a direction parallel to its length, still holds the safety guard in the connector body captively so that it cannot escape the depression **70** by such movement and, moreover, so that such movement in a predetermined direction will be accompanied by elastic distortion of a portion of the connector body so as to store up a biasing force that will restore the safety guard to its idle (stabilized) position when manual shifting pressure on the safety guard is released. Such latter additional means constitutes a cavity **80** in the base of each depression **70** in which cavity there is fitted a dependent post **82** extending from the undersurface of each safety guard and in one piece with such guard.

The particular configurations of the cavity and post are not critical. However, their shapes must be such that surfaces thereof abut in the predetermined direction of movement of the safety guard in both senses so that the safety guard has no tendency to shift of its own accord in the predetermined direction of movement but must be deliberately shifted by manual pressure on an end of the guard, the end of the guard which is to be pressed for proper functional operation of the connector **54** being the end that is provided with the flange **72.**

As illustrated, the post has a triangular surface facing in the predetermined direction and sense of movement and a concave surface facing in the opposite sense. The cavity presents nodes **84** against which opposite sides of the triangular surface aubt when the safety guard is in idle position. The cavity also has surfaces which snugly fit against the opposite side of the cavity. When the safety guard is shifted by pressure on the end thereof carrying the flange **72,** the post will be shifted within the cavity and will distort the cavity to permit such shifting. This distortion builds up a restoring force that when the pressure is released causes the safety guard automatically to be biased back to idle position. To ease such distortion of these walls of the cavity, e.e., the node walls, the connector body is formed with wells **86** spaced a short distance inwardly of the surfaces of the nodes that are abutted by the post. Hence, the portions of the connector body between the wells and the post abutting surfaces of the nodes are comparatively thin and can flexibly distort with relative ease so as not to require undue manual pressure to shift the safety guard in the predetermined direction. Movement of the guard in this opposite sense is more strongly opposed due to the greater distortion of the body required whereby to encourage shifting of the guard in a sense that will obtain alignment of the guard and body passageways.

The end of the safety guard opposite the end that carries the flange **72** is necked-in as at **88** (see FIG. **11**) to fit a frame provided by overhanging ledges at the corresponding end of the associated depression **70.**

Each safety guard is provided with prong-admitting passageways **90** that match the passageways **62** in transverse configuration and relative relationship, but which passageways **90** are, when the safety guard is in idle position, non-aligned with the passageways **62,** as best seen in FIG. **10.** The passageways **90** are so located in the safety guard **58** that when the safety guard is pushed to the extreme of its movement in the predetermined direction as determined by abutment of the flange **72** and lip **76** in the manner aforesaid, the passageways **90** will be lined up with the passageways **62** in the body to permit full entry of the prongs of a conventional appliance plug into the body.

As in the case of the connector **20,** the safety guard can be manipulated manually, as described above, or with the assistance of an appliance plug, the tips of the prongs of which are inserted into the passageways **90.**

It thus will be seen that there are provided devices which achieve the various objects of the invention and which are well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiments above set forth, it is to be understood that all matter herein described or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described the invention there is claimed as new and desired to be secured by Letters Patent:

**1.** A terminal connector for an electric extension cord, said connector comprising a connector body of electrically non-conductive elastomeric material, female contacts in said connector body, means providing pairs of prong-admitting passageways from an exterior surface of said elastomeric body to said female contacts said connector further including a safety guard of electrically non-conductive stiff material, means providing pairs of prong-admitting passageways through the safety guard the cross-sectional configuration and spacing of which match those of the passageways of the elastomeric connector body, means captively retaining said safety guard over said exterior surface of the elastomeric connector body at which the mouths of the passageways of said body open, said last-named means constraining said guard for slidable motion of the guard relative to the elastomeric body in a predetermined direction and sense, said safety guard and elastomeric

connector body having adjacent facing surfaces which oppose movement of the safety guard in said predetermined direction and sense whereby when said safety guard is, by the application of force, shifted in such direction and sense, the said facing surface of said safety guard will distort the elastomeric connector body at said facing surface of said body so as to store up energy and cause the safety guard to be restored to an idle position when the force is removed, the passageways of said body in idle position of said guard being disaligned with the passageways of the safety guard and being blocked by portions of the safety guard, said passageways of the safety guard being alignable with the passageways of said connector body upon the application of force in said predetermined direction and sense, the connector body having on the said exterior surface thereof an upstanding flange with an in-turned ledge defining a cavity, said cavity having at least one gap therein through said flange and ledge and the safety guard being snugly receivable in said cavity and having a portion projecting through said gap beyond the adjacent surface of the connector body for application of a shifting force, a portion of the ledge opposite the gap being distorted upon the application of said force.

2. A terminal connector as set forth in claim 1 wherein the safety guard has a plateau which substantially fills the frame defined by the free edges of the ledge.

3. A terminal connector for an electric extension cord, said connector comprising a connector body of electrically non-conductive elastomeric material, female contacts in said connector body, means providing pairs of prong-admitting passageways from an exterior surface of said elastomeric body to said female contacts, said connector further including a safety guard of electrically non-conductive stiff material, means providing pairs of prong-admitting passageways through the safety guard the cross-sectional configuration and spacing of which match those of the passageways of the elastomeric connector body, means captively retaining said guard over said exterior surface of the elastomeric connector body at which the mouths of the passageways of said body open, said last-named means constraining said guard for slidable motion of the guard relative to the elastomeric body in a predetermined direction and sense, said safety guard and elastomeric connector body having adjacent facing surfaces which oppose movement of the safety guard in said predetermined direction and sense whereby when said safety guard is, by the application of force, shifted in such direction and sense, the said facing surface of said safety guard will distort the elastomeric connector body at said facing surface of said body so as to store up energy and cause the safety guard to be restored to an idle position when the force is removed, the passageways of said body in idle position of said guard being disaligned with the passageways of the safety guard and being blocked by portions of the safety guard, said passageways of the safety guard being alignable with the passageways of said connector body upon the application of force in said predetermined direction and sense.

4. A terminal connector as set forth in claim 1 wherein the safety guard is planar.

5. A terminal connector as set forth in claim 1 wherein the retaining means constitutes a recess in the exterior surface of the connector body in which recess the safety guard is disposed.

6. A terminal connector as set forth in claim 1 wherein the retaining means permits slidable motion of the guard in a predetermined linear direction.

7. A terminal connector as set forth in claim 1 wherein the retaining means constitutes a rectangular recess in the said exterior surface of the connector body and wherein the safety guard is disposed in said recess and has a matching configuration.

8. A terminal connector as set forth in claim 7 wherein the recess has at least one gap in a side wall thereof and wherein the safety guard has a protuberance that extends through said recess and projects beyond the adjacent surface of the connector body so that the same may be pressed to apply a shifting force to the safety guard in said predetermined direction and sense to align the passageways of the connector body and safety guard.

9. A terminal connector as set forth in claim 1 wherein the captive retaining means includes a linearly elongated depression extending transversely across said exterior surface of said connector body, the safety guard being rectangular and slidable in said depression, said depression and guard having matching dovetailed configurations, and wherein post means and cavity forming means are provided, one of said means being associated with said connector body and the other of said means being associated with the safety guard, said post means and cavity means having surfaces which abut when the safety guard is in idle position.

10. A terminal connector as set forth in claim 9 wherein the post means is a part of the safety guard and the cavity means is a part of the connector body.

11. A terminal connector as set forth in claim 1 wherein means is included to limit the motion of the guard in said predetermined direction and sense in a position in which the passageways of the guard are aligned with the passageways of the connector body.

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