April 13, 1965 M. MORSE 3,178,667

MANUALLY RELEASABLE GROUNDING ELECTRICAL PLUG

Filed July 13, 1962 2 Sheets-Sheet 1

Fig.1

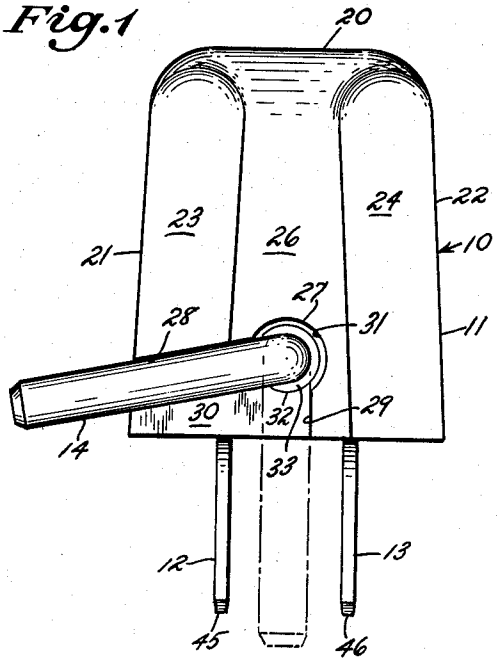


Fig.2

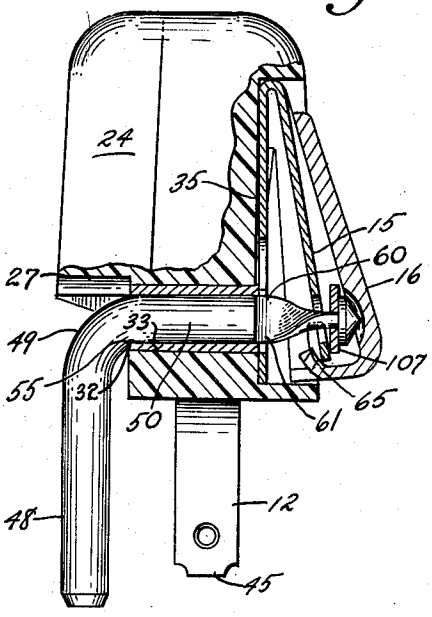


Fig.3

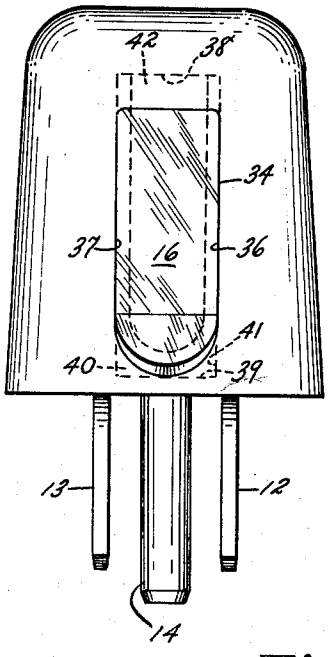
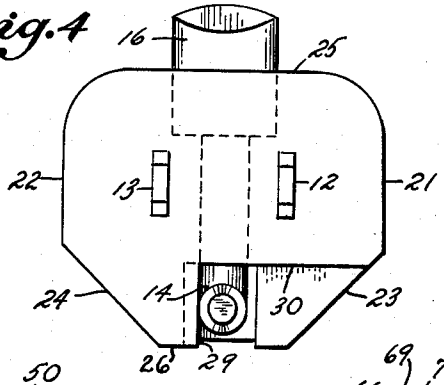


Fig.4



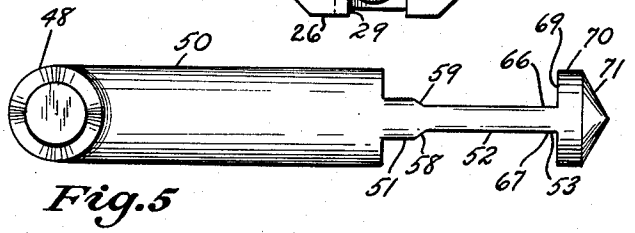


Fig.5

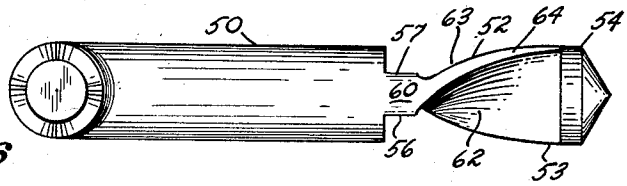


Fig.6

April 13, 1965 M. MORSE 3,178,667

MANUALLY RELEASABLE GROUNDING ELECTRICAL PLUG

Filed July 13, 1962 2 Sheets-Sheet 2

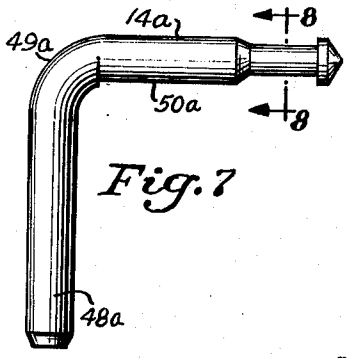


Fig. 7

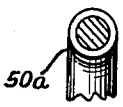


Fig. 8

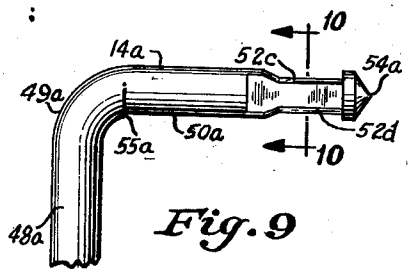


Fig. 9

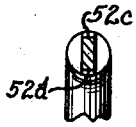


Fig. 10

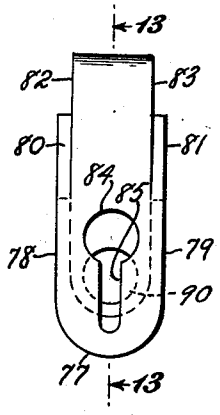


Fig. 12

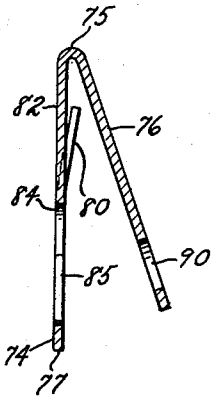


Fig. 13

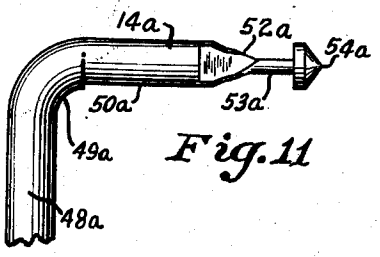


Fig. 11

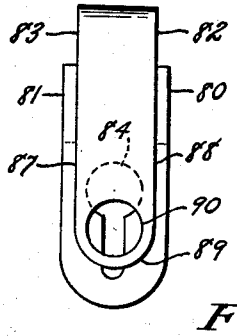


Fig. 14

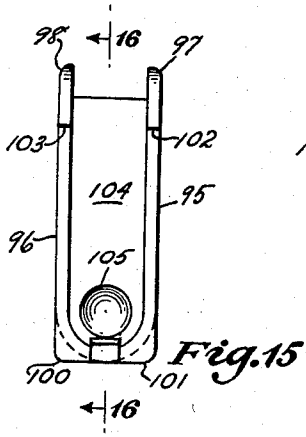


Fig. 15

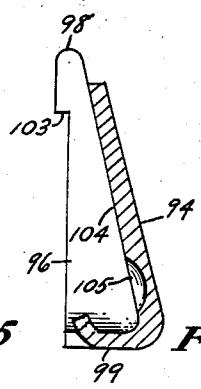


Fig. 16

United States Patent Office 3,178,667
Patented Apr. 13, 1965

3,178,667

MANUALLY RELEASABLE GROUNDING ELECTRICAL PLUG

Milton Morse, 41 Honeck St., Englewood, N.Y.

Filed July 13, 1962, Ser. No. 209,579
5 Claims. (Cl. 339—14)

This invention relates generally to the field of grounding electrical plugs of a type employing, in addition to the normally-present power prongs, a grounding prong adapted to engage a separate portion of an electric outlet receptacle. Devices of this type are generally known in the art, and the invention lies in specific constructional details, permitting greater convenience in use together with a high degree of safety, and in a means for manufacturing the improved structure at reasonable cost.

While it is known in the art to provide a grounding blade which is pivotally mounted upon a plug body in such manner as to be deflected upon the engagement of the plug with a non-grounded receptacle, so that the blade may establish a ground with respect to the cover plate of the receptacle, such devices have not been entirely satisfactory and have failed to obtain approval of certifying agencies. Where the pivotally mounted grounding prong or blade is only resiliently urged to a position in which the same lies parallel to the power prongs, accidental contact of the fingers of the user, or other object, may readily deflect the same from a parallel relation, wherein the grounding member will not enter the grounding opening of a grounded receptacle where such receptacle is not visible to the user. Further, where the grounding blade is only resiliently maintained in operative position, it can be accidentally deflected to a degree wherein the power prongs may engage the receptacle without the grounding prong first establishing an electrical ground, either with the grounding opening of the receptacle or the face plate, thereby subjecting the user to the possibility of a severe shock.

It is therefore among the principal objects of the present invention to provide an improved grounding plug of the class described in which the above-mentioned disadvantages have been substantially eliminated.

Another object of the invention lies in the provision of an improved grounding-type plug in which the grounding blade thereof may be held rigidly in the grounding position by manually-operated mechanical latching means.

Another object of the invention lies in the provision of an improved grounding-type plug of the class described in which the latching means operates automatically to lock the blade in grounding position upon being returned from a displaced position thereto by resilient means.

Another object of the invention lies in the provision of an improved self-restoring grounding blade plug construction including a finger-operated mechanical latching means in which the manual release of the means serves to deflect the grounding blade through a small arc only, thereby assuring further deflection upon contact with the face plate of a receptacle, and preventing entry of power prongs into the receptacle prior to the establishment of a ground by the grounding blade.

Still another object of the invention lies in the provision of an improved grounding plug having a latched grounding blade, in which the latching means is electrically insulated from the grounding blade as an additional safety feature.

Yet another object of the invention lies in the provision of an improved grounding-type plug in which the grounding blade is provided with means for giving a clear indication to the user if the grounding blade has not entered a grounding hole in a receptacle.

A further object of the invention lies in the provision

of an improved grounding-type plug particularly adapted for use in conjunction with hand-held electrical tools and appliances, wherein the possibility of shock to the user is greater than in the case of other appliances.

A further object of the invention lies in the provision of improved machine tool means for manufacturing a grounding electrical plug possessed of the above advantages.

A feature of the invention lies in the fact that a single resilient component may be employed to provide both grounding blade return and locking function.

Another feature of the invention lies in the fact that the disclosed embodiments may be manufactured at least partially as tool machine operations, thereby maintaining the cost of production at reasonable levels, comparable with that of existing prior art devices.

These objects and features, as well as other incidental ends and advantages, will more fully appear in the progress of the following disclosure, and be pointed out in the appended claims.

In the drawings, to which reference will be made in the specification, similar reference characters have been employed to designate corresponding parts throughout the several views.

FIGURE 1 is a side elevational view of a first embodiment of the invention.

FIGURE 2 is a central longitudinal sectional view thereof, partly in elevation.

FIGURE 3 is a side elevational view thereof, showing the side opposite that seen in FIGURE 1.

FIGURE 4 is a bottom plan view thereof.

FIGURE 5 is a view in elevation of a grounding blade element which comprises a part of the first embodiment, prior to complete forming thereof.

FIGURE 6 is a similar view in elevation of the grounding blade element in fully formed condition.

FIGURE 7 is an elevational view of a modification of the grounding blade element during one step in fabrication.

FIGURE 8 is a sectional view as seen from the plane 8—8 in FIGURE 7.

FIGURE 9 is an elevational view corresponding to FIGURE 7 but showing an ensuing step in fabrication.

FIGURE 10 is a sectional view as seen from the plane 10—10 in FIGURE 9.

FIGURE 11 is an elevational view showing the modification of FIGURE 7 in finished condition and form.

FIGURE 12 is a view in elevation showing a resilient element comprising a part of the first embodiment.

FIGURE 13 is a longitudinal central sectional view as seen from the plane 13—13 in FIGURE 12.

FIGURE 14 is a view in elevation as might be seen from the right-hand portion of FIGURE 13.

FIGURE 15 is a view in elevation of a cover element comprising a part of the first embodiment.

FIGURE 16 is a longitudinal central sectional view of the cover element as seen from the plane 16—16 in FIGURE 15.

In accordance with the first embodiment of the invention, the device, generally indicated by reference character 10, comprises broadly: a plug body element 11; first and second power prongs 12 and 13, respectively; a grounding blade element 14; a resilient cam element 15; and an insulative cover or button element 16.

The plug body element 11 is preferably of molded rubber construction, although if desired the same may be also formed from phenolic resins and similar substances. It is bounded by an upper surface 20, side surfaces 21, 22, 23, 24, 25 and 26. Extending inwardly into the body element from the surface 26 is a recess 27 bounded by first, second and third planar surfaces 28, 29 and 30, respectively, and a cylindrical surface 31 disposed

coaxially with respect to a transversely disposed bore **32** which extends completely through the body element **11**. The bore **32** is lined with a brass or other conductive bushing **33**, and is connected to a grounding conductor (not shown) in well-known manner.

Disposed opposite the recess **27** is an elongated recess **34** bounded by a bottom surface **35**, side surfaces **36** and **37**, and end surfaces **38** and **39**. Disposed at the upper periphery of the recess **34** are lip members **40, 41** and **42**, which serve to retain the cover element **16** in position, as will more fully appear.

The first and second power prongs **13** and **14**, respectively, are of conventional construction, and may be embedded within the plug body **11** at the time the latter is molded. The outer ends **45** and **46** project outwardly a distance less than the distance the grounding blade element **14** projects when in aligned position with respect to the principal axes of the power prongs **12** and **13**, so as to assure that a ground will be established before the outer ends **45** and **46** contact the corresponding contacts within the openings in an electric receptacle.

With reference to FIGURES 5 and 6, the grounding blade element **14** is formed from a readily machined electrical conductive material such as brass, and includes a receptacle-engaging member **48**, a curved member **49**, a transversely disposed cylindrical member **50**, an axially aligned member of rectangular cross section **51**, a spiral member **52**, a second member of rectangular cross section **53**, and a button or terminal **54**.

The curved member **49** is formed in such a manner as to include a small shelf **55** which serves the function of positioning the transversely disposed cylindrical member **50** within the bushing **33**.

The member **51** is, as has been mentioned, axially aligned with respect to the axis of the member **50**, and is bounded by first and second planar surfaces **56** and **57**, tapered surfaces **58** and **59**, and arcuate surfaces **60** and **61** which are continuations of the outer surface of the member **50**.

The spiral member **52** is bounded by two arcuate surfaces **62** and **63**, and spiral surfaces **64** and **65**. As best seen from a consideration of FIGURE 5, it will be observed that the thickness of the spiral member **52** is substantially less than that of the member **51** for reasons which will more clearly appear. The member **53** includes first and second planar surfaces **66** and **67**, and may be of the same thickness as the member **52**. The button or terminal **54** is bounded by a radial surface **69**, a cylindrical surface **70**, and a conical surface **71**.

With reference to FIGURES 12 to 14, inclusive, the resilient cam element **15** is preferably formed as a stamping, from brass or other resilient material, and includes a base member **74**, a connecting bend portion **75**, and a resiliently flexing member **76**. The base member **74** is bounded by a curvilinear edge **77**, outer side edges **78** and **79**, from which depend resilient tabs **80** and **81**, and inner side edges **82** and **83**. Extending through the plane of the base member **74** is a circular opening **84** with which a slotted opening **85** communicates.

The resilient flexing member **76** is bounded by side edges **87** and **88**, as well as a curvilinear edge **89**. It is provided with a circular opening **90**, the dimensions of which are similar to those of the opening **84**, being of sufficiently large diameter to permit passage of the button or terminal **54**.

With reference to FIGURES 15 and 16, the cover or button element **16** is preferably formed from synthetic resinous material so as to possess the quality of electrical insulation. It includes an outer wall **94**, side walls **95** and **96**, having first and second tabs **97** and **98** thereon, and a curved end wall **99** having third and fourth tabs **100** and **101** thereon. At the narrower end of the side walls **95** and **96** are notches **102** and **103** formed by the tabs **97** and **98**, respectively, the notches **102** and **103** being adapted to engage the ends of the tabs **80** and **81** during assembly. The undersurface **104** of the outer wall **94** is provided with a circular recess **105** adapted to engage the conical surface **71** of the button or terminal **54**.

During assembly, the grounding blade element **14** is inserted into the bushing **33** so that the terminal **54** projects outwardly into the recess **34**. The cam element **15** is then positioned within the recess **34** in such manner that the slotted opening **85** engages the spiral member **52**, the terminal **54** projecting through both the opening **84** and the opening **90**. The cam element **15** is maintained in position by slipping a small split washer **107** to engage the radial surface **69**, and prevent passage again through the circular openings. Following this, the cover element **16** is positioned in such manner that the tabs **100** and **101** are disposed beneath the lip members **40** and **41**, and the tabs **97** and **98** beneath the lip member **42**, respectively.

In engaging the device **10** within a receptacle, where a grounding prong opening is present, the resilient force of the cam member **15** will retain the grounding blade element **14** in locked condition wherein the receptacle-engaging member **48** is axially aligned parallel to the power prongs **12** and **13**. When in this locked condition, it cannot be manually moved out of aligned condition without depressing the cover element **16**. Where the outlet receptacle does not have a grounding prong opening, the user will not be able to insert the plug without first unlocking the grounding blade element **14** by pressing inwardly on the cover element **16**. Upon the exertion of pressure, the imparted motion is transmitted through the slotted opening **85** to the spiral member **52**, to result in deflecting the grounding blade element **14** through a small arc, preferably under thirty degrees. The blade will remain in deflected condition for so long as pressure is maintained upon the cover element **16**. During this slight deflection, owing to the fact that the grounding blade element **14** is of greater length than the power prongs **12** and **13**, the grounding blade element **14** will not be deflected a distance sufficient to permit the power prongs **12** and **13** to contact the outlet prior to the grounding blade element making contact with the face plate of the receptacle to establish a ground, thereby preventing all possibility of a shock being transmitted to the user. This degree of deflection is sufficient to permit continued further deflection upon striking of the face plate, to a degree sufficient to permit the power prongs to be fully seated within the receptacle.

Upon removal of the plug from the receptacle, the resilient cam element **15** returns to its unstressed condition, and in doing so transmits motion to the grounding blade element **14** to return it to aligned condition with respect to the power prongs. Following the reaching of an aligned condition, the slotted opening **85** engages the member **51** to lock the grounding blade element **14** in aligned condition until pressure again is applied to the cover element **16**.

In the modification of the grounding blade element shown in FIGS. 17–21, to avoid repetition, corresponding parts are given the same reference character with the suffix "*a*." Element **14***a* differs in that the portion which forms the spiral member **52***a* during the process of fabrication is first reduced in diameter (FIGS. 17 and 18); then the flats are milled (FIGS. 19 and 20); and are finally twisted. The reduced distance between the edges **52***c* and **52***d*, requires less stretching of said edges during twisting, resulting in a smoother superior spiral member.

I wish it to be understood that I do not consider the invention limited to the precise details of structure shown and set forth in this specification, for obvious modifications will occur to those skilled in the art to which the invention pertains.

I claim:

1. In a grounding electrical plug having a plug body, at least one power prong extending outwardly of said body, and a grounding prong pivotally mounted upon said

body and normally extending parallel to said power prong, the improvement comprising: said grounding prong having a transversely disposed portion thereof extending through said plug body having an axis perpendicular to the axis of said power prong about which pivotal movement may take place, resiliently mounted means movable in a direction generally parallel to said transversely disposed portion, cam and cam follower means interconnecting said resiliently urged means and said transversely disposed portions to transmit rectilinear motion impressed upon said resilient means to rotational movement of said transversely disposed portion wherein said grounding prong is moved to a non-parallel relation with respect to said power prong.

2. In a grounding electrical plug having a plug body, at least one power prong extending outwardly of said body, and a grounding prong pivotally mounted upon said body and normally extending parallel to said power prong, the improvement comprising: said grounding prong having a transversely disposed portion thereof extending through said plug body having an axis perpendicular to the axis of said power prong about which pivotal movement may take place, said portion having cam follower means thereon, cam means resiliently mounted upon said plug body and movable in a direction generally parallel to the axis of said transversely disposed portion and contacting said cam follower portion thereof to impart movement thereto tending to move said grounding prong to a non-parallel relation with respect to said power prong.

3. In a grounding electrical plug having a plug body, at least one power prong extending outwardly of said body, and a grounding prong pivotally mounted upon said body and normally extending parallel to said power prong, the improvement comprising: said grounding prong having a transversely disposed portion thereof extending through said plug body having an axis perpendicular to the axis of said power prong about which pivotal movement may take place, said portion having cam follower means thereon, cam means resiliently mounted upon said plug body and movable in a direction generally parallel to the axis of said transversely disposed portion and contacting said cam follower portion thereof to impart movement thereto tending to move said grounding prong to a non-parallel relation with respect to said power prong; said cam means when moving in an opposite direction under the influence of said resilient means tending to urge said grounding prong to a parallel position with respect to said power prong.

4. In a grounding electrical plug having a plug body, at least one power prong extending outwardly of said body, and a grounding prong pivotally mounted upon said

body and normally extending parallel to said power prong, the improvement comprising: said grounding prong having a transversely disposed portion thereof extending through said plug body having an axis perpendicular to the axis of said power prong about which pivotal movement may take place, said portion having cam follower means thereon, cam means resiliently mounted upon said plug body and movable in a direction generally parallel to the axis of said transversely disposed portion and contacting said cam follower portion thereof to impart movement thereto tending to move said grounding prong to a non-parallel relation with respect to said power prong; said cam means when moving in an opposite direction under the influence of said resilient means tending to urge said grounding prong to a parallel position with respect to said power prong, and locking means for maintaining said grounding prong in parallel relation with respect to said power prong.

5. In a grounding electrical plug having a plug body, at least one power prong extending outwardly of said body, and a grounding prong pivotally mounted upon said body and normally extending parallel to said power prong, the improvement comprising: said grounding prong having a transversely disposed portion thereof extending through said plug body having an axis perpendicular to the axis of said power prong about which pivotal movement may take place, said portion having cam follower means thereon, cam means resiliently mounted upon said plug body and movable in a direction generally parallel to the axis of said transversely disposed portion and contacting said cam follower portion thereof to impart movement thereto tending to move said grounding prong to a non-parallel relation with respect to said power prong; said cam means when moving in an opposite direction under the influence of said resilient means tending to urge said grounding prong to a parallel position with respect to said power prong, and locking means for maintaining said grounding prong in parallel relation with respect to said power prong, said locking means being actuated by said resilient means.

References Cited in the file of this patent

UNITED STATES PATENTS

1,856,724	Phelps	May 3, 1932
1,924,962	Rosenbaum	Aug. 29, 1933
2,217,496	Riley	Oct. 8, 1940
2,323,736	Tousley	July 6, 1943
2,876,426	Morse	Mar. 3, 1959
2,922,134	Elfenbein	Jan. 19, 1960

FOREIGN PATENTS

1,194,663	France	May 11, 1959