United States Patent

Robbins

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[54] **LINE PLUG WITH RETRACTABLE GROUNDING PIN**

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[52] **U.S. Cl.**.....**339/14 P,** 339/31 R
[51] **Int. Cl.**.....**H01r 3/06**
[58] **Field of Search**.....339/14, 31, 32, 33, 45, 62, 339/63, 157, 195, 196

[56] **References Cited**

UNITED STATES PATENTS

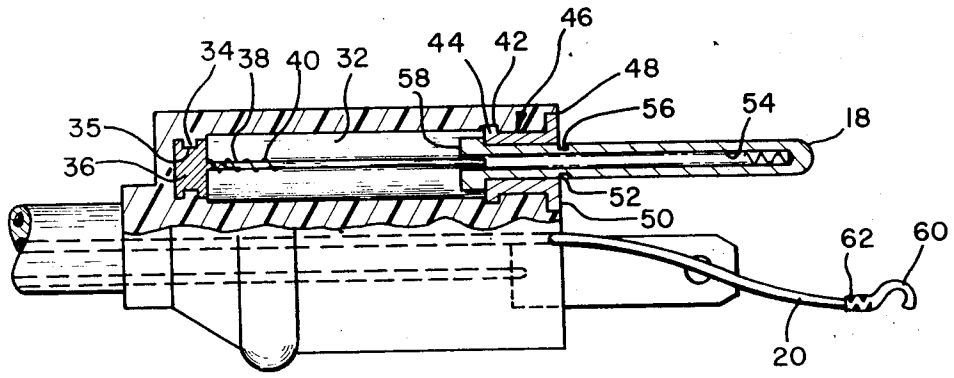
2,984,808	5/1961	Bender	339/14
3,308,415	3/1967	Cramer et al.	339/14
3,178,667	4/1965	Morse	339/14
3,079,475	2/1963	Rumble	200/51
3,495,205	2/1970	Ricci	339/14
3,061,809	10/1962	Morse	339/14
3,440,591	4/1969	Whalen	339/14
3,134,631	5/1964	Whalen	339/14

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[57] **ABSTRACT**

A plug having a pair of fixed prongs, a retractable grounding pin, and a grounding wire is provided for making an electrical connection by insertion in a female receptacle. The fixed prongs are connected to the line and load leads of a power cord and the grounding wire is connected to the ground lead of the power cord. The grounding wire is provided with a hook shaped terminal and the retractable grounding pin is formed with an annular groove adapted for locking engagement with the terminal. If the female receptacle is of the type adapted to receive a three prong male plug, the grounding wire is locked within the annular groove by means of the terminal, whereby the grounding pin is secured in the extended position. If the female receptacle is of the type adapted to receive a two prong male plug, the grounding wire is attached to a ground point on the box housing the receptacle by means of the terminal, whereby the grounding pin is retracted as the plug is inserted in the receptacle.

10 Claims, 3 Drawing Figures



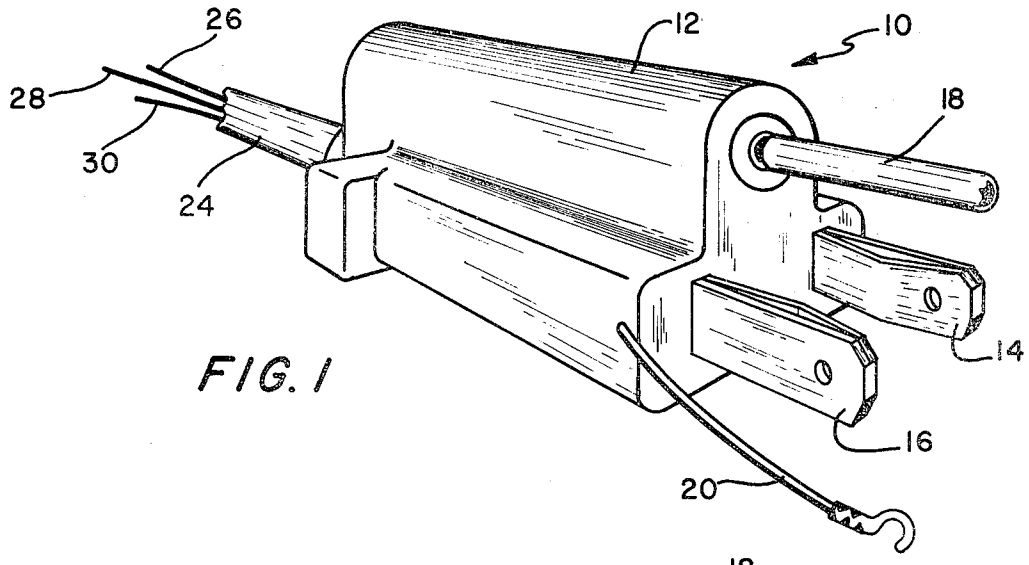


FIG. 1

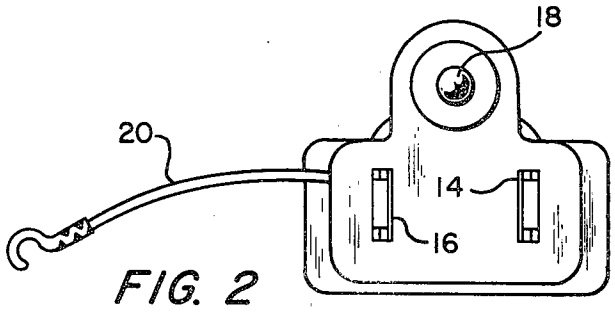


FIG. 2

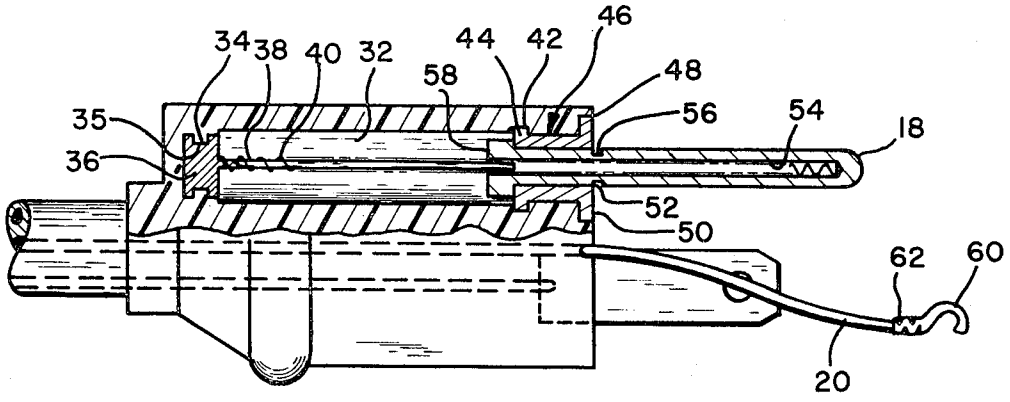


FIG. 3

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LINE PLUG WITH RETRACTABLE GROUNDING PIN

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to electrical plugs and more particularly to electrical plugs adapted for use with two and three port female receptacles.

2. Description of the Prior Art

Due to the potential hazards from electric shock, power tools are provided with three prong plugs which allow the power tools to be grounded. However, all female receptacles are not adapted to receive three prong plugs. Accordingly, a separate adaptor is provided as an interface between the three prong plug and the two port receptacle. Often times, such adaptors are misplaced and the grounding pin of the plug is removed in order to use the power tool. After the grounding pin has been removed, the power tool can no longer be grounded and the potential of electric shock is presented whenever the tool is being used.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a line plug adapted for use with two and three port female receptacles. The plug is characterized by a body portion having extending therefrom a pair of fixed prongs, a retractable grounding pin, and a grounding wire. The fixed prongs are connected to the line and load leads of a power cord and the grounding wire is connected to the ground lead of the power cord. The body portion is formed with a chamber adapted for slidable reception of the grounding pin. The grounding pin is formed with a central bore adapted to slidably receive a guide pin and spring which are axially mounted to the body within the chamber. The spring is received within the central bore, whereby the grounding pin is held normally in the extended position. The ground pin is formed also with an annular groove and the grounding wire is provided with a hook shaped terminal which is adapted for locking engagement with the groove when the grounding pin is in the extended position. If a three prong female receptacle is provided, the terminal is latched within the groove and the grounding pin is fixed against retraction. If a two port female receptacle is provided the grounding wire is attached to a ground point on the receptacle box housing by means of the terminal whereby the grounding pin is retracted as the plug is inserted in the receptacle. The combination of a pair of fixed prongs, a retractable grounding pin, and a grounding wire is such as to provide a power cord plug which is which is adapted for use with two and three port female receptacles.

The invention accordingly comprises the device possessing the construction, combination of elements and arrangement of parts that are exemplified in the following detailed description, the scope of which will be indicated in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

For a fuller understanding of the nature and objects of the present invention, reference should be had to the following de-tailed description taken in connection with the accompanying drawings, wherein:

FIG. 1 is a perspective of a line plug made according to the invention;

FIG. 2 is a front elevation of the plug; and

FIG. 3 is a side elevation, partly brokenaway, showing certain details of the plug.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, reference character **10** denotes a line plug embodying the invention and adapted for use with two and three port female receptacles. Plug **10** comprises a body portion **12**, fixed prongs **14** and **16**, a retractable grounding pin **18**, and a grounding wire **20**. A power cord **22** having power line leads **24**, **26** and ground lead **28** is operatively connected to body **12**. Leads **24** and **26** are connected to fixed prongs **14** and **16**, respectively, and lead **28** is connected to grounding wire **20**. Preferably, lead **28** and grounding wire **20** are integral. Fixed prongs **14**, **16** and grounding pin **18** are oriented in mating registration with the correlative ports of the female receptacle.

Body **12** is formed with a substantially tubular cavity **32** which is closed at one extremity and opened at the other extremity and is adapted to slidably receive grounding pin **18**. Proximate to the closed extremity of cavity **32**, there is a rib **34** which is adapted for locking engagement with a groove **35** of a hub **36**.

A bias element **38**, for example a helical compression spring, envelops a rod **40** which extends from hub **36** into cavity **32**. Proximate to the opened extremity of cavity **32**, there is a notch **42** which is adapted to lockingly engage a shoulder **44** of a bushing **46**. Body **12** is formed with an annular recess **48** which is adapted to receive a shoulder **50** of bushing **46** in such a manner that exposed face of bushing **46** is substantially flush with the face of body **12**. Bushing **42** is formed with an bore **52** which is adapted to slidably receive grounding pin **18**.

Grounding pin **18** is formed with a bore **54**, an annular groove **56**, and a stop **58**. Bore **54**, closed at the one extremity and opened at the other extremity, is adapted to receive rod **40** and spring **38**, the axis of bore **54** and rod **38** being in registration. Rod **40** is positioned within bore **54** approximate to the outermost face of stop **58** and spring **38** abuts the closed extremity of grounding pin **18**. That is, rod **40** defines a guide for grounding pin **18** which is held normally in an extended position by spring **38**. Stop **58** is slightly larger than bore **52**, whereby grounding pin is prevented from being pushed out of busiing **46** by spring **38**. The innermost side of annular groove **56** is substantially flush with the outermost face of bushing **46**.

Annular groove **56** is adapted for locking engagement with a terminal **60** which is attached to the free end of grounding wire **20** by means such as crimping or soldering, for example. In the illustrated embodiment, terminal **60** defines a hook shaped configuration having a socket portion **62** which is adapted to receive grounding wire **20**. It is to be understood that, in alternative embodiments, terminal **60** defines other than a hook shaped configuration, for example a snap-ring configuration. When terminal **60** engages annular groove **56**, grounding pin **18** is fixed against retraction into cavity **32** of body **12**.

As previously indicated, plug **10** is adapted for use with two and three port female receptacles. If the female receptacle is adapted to receive a three prong plug, terminal **60** is locked within annular groove **56**, in

consequence grounding pin is fixed against retraction. If the female receptacle is of the two port type, terminal **60** is attached to a ground point on the box housing the receptacle, for example the screw holding the box plate, in consequence grounding pin is retracted in cavity **32** of body **12** as prongs **14**, **16** are inserted into their respective ports of the female receptacle. Accordingly, whether plug **10** is used with a two or three port female receptacle, the power tool attached to the end of power cord **22** is grounded.

For ease of manufacture, it is preferred that plug **10** is formed by a molding technique such as injection molding, for example. In this case, the outer covering of power cord **22** is cut back to expose leads **24**, **26**, and **28**. Leads **24** and **26** are cut and stripped so that they are substantially equal in length and shorter than leas **28**. Leads **24** and **26** are connected to prongs **14** and **16**, respectively. Prongs **14** and **16**, lead **28**, cord **22**, and hub **36** are position in their respective locations in the molding fixture. Thereafter, body **12** is formed by injection molding. It is preferred that body **12** is composed of an elastomer such as natural or synthetic rubber, for example. Upon completion of the molding process, ground lead **28** is stripped and terminal **60** is attached thereto. Spring **38** is positioned about rod **40** and grounding pin **18** is inserted into cavity **32**, rod **40** and spring **38** being received within bore **54**. Thereafter, bushing **46** is urged into the opened extremity of cavity **32**, bore **52** slidably receiving grounding pin **18**, whereby shoulder **44** is locked into notch **42** and the fabrication of the plug is completed.

Since certain changes may be made in the foregoing disclosure without departing from the scope of the invention herein involved, it is intended that all matter contained herein be construed in an illustrative and not in a limiting sense.

What is claimed is:

1. A plug for use with two and three port female receptacles, power being applied to at least two of the ports, said plug comprising:

a. body means formed with a cavity;

b. at least two prong means operatively connected to said body and projecting therefrom, said prong means in mating registration with the ports having power applied thereto;

c. grounding pin means operatively connected to said body means and adapted for extension from said body and retraction within said cavity, said grounding pin means normally extending from said body means in mating registration with the third port of the three port female receptacle and in parallel space relationship with each said prong means, said grounding pin means slidably retractable within said cavity along a plane parallel to the longitudinal axis of each said prong means, said grounding pin means having locking means; and

d. grounding means operatively connected to said body means and extending therefrom, said grounding means adapted for engagement with said locking means, said grounding pin means being fixed against retraction when said grounding means and locking means are engaged.

2. The plug as claimed in claim **1** including power cord means operatively connected to said body means, said power cord means including at least first, second, and third lead means, said first lead means connected to one of said prong means, said second lead means connected to another of said prong means, and said third lead means being an integral part of said grounding means.

3. The plug as claimed in claim **1** wherein said cavity is tubular, one extremity of said cavity being closed and the other extremity of said cavity being opened.

4. The plug as claimed in claim **3** including:

a. hub means operatively connected to said body at the closed extremity of said cavity;

b. guide means operatively connected to said hub means;

c. bushing means operatively connected to said body means at the opened extremity of said cavity, said bushing means formed with a bore adapted to slidably receive said grounding pin means, said guide means projecting from said hub means into said grounding pin means; and

d. bias means enveloping said guide means, said grounding pin means being held in the extended position by said bias means.

5. The plug as claimed in claim **4** wherein said grounding pin means is formed with a bore, said bore being closed at one extremity of said grounding means and opened at the other extremity of said grounding pin means, said bore adapted to slidably receive said guide and bias means.

6. The plug as claimed in claim **5** including stop means operatively connected to said grounding pin means proximate to said opened extremity of said grounding pin means, said stop means being larger than said bushing bore.

7. The plug as claimed in claim **6** wherein said grounding means includes terminal means, said terminal means adapted for engagement with said locking means.

8. A plug for use with two and three port female receptacles, power being applied to at least two of the ports, said plug comprising:

a. body means formed with a cavity said cavity opened to one face of said body means and closed to an opposite face of said body means;

b. at least two prong means operatively connected to said body and projecting therefrom, said prong means in mating registration with the ports having power applied thereto;

c. grounding pin means operatively connected to said body means and adapted for extension from said body and retraction within said cavity, said grounding pin means normally extending from said body means in mating registration with the third port of the three port female receptacle and in parallel space relationship with each said prong means, said grounding pin means slidably retractable within said cavity along a plane parallel to the longitudinal axis of each said prong means, said grounding pin means having locking means;

d. grounding means operatively connected to said body means and extending therefrom, said grounding means adapted for engagement and disengagement with said locking means, said grounding pin means being fixed against retraction when said grounding means and locking means are engaged, said grounding pin means slidable in a plane paral-

lel to said prong means when said grounding means and locking means are disengaged; and

e. power cord means operatively connected to said body means, said power cord means including at least first, second, and third lead means, said first lead means connected to one of said male prong means, said second lead means connected to another of said male prong means, and said third lead means being an integral part of said grounding means.

9. The plug as claimed in claim **8** including:

a. hub means operatively connected to said body at the closed extremity of said cavity;

b. guide means operatively connected to said hub means;

c. bushing means operatively connected to said body means at the opened extremity of said cavity, said bushing means formed with a bore adapted to slidably receive said grounding pin means, said guide means projecting from said hub means into said grounding pin means;

d. bias means enveloping said guide means, said grounding pin means being held normally in the extended position by said bias means; and

e. grounding pin means formed with a longitudinally extending bore and a stop, said grounding pin means bore closed at one extremity of said grounding pin means and opened at the other extremity of said grounding pin means, said grounding pin means bore adapted to slidably receive said guide and bias means, said stop being larger than said bushing means bore, said stop engaging said bushing means when said grounding pin means is extended and operating to retain a portion of said grounding pin means within said cavity.

10. The plug as claimed in claim **8** wherein said grounding means includes terminal means operatively connected to said third lead means, said terminal means adapted for engagement and disengagement with said locking means.

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