Feb. 10, 1970 G. J. RICCI 3,495,205

CONVERTIBLE PLUG

Filed Nov. 1, 1967

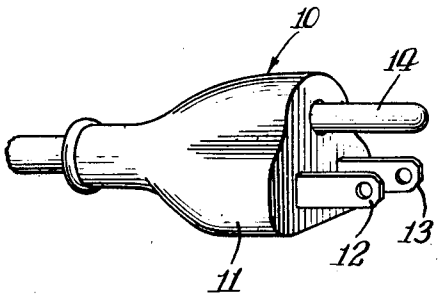


FIG. 1.

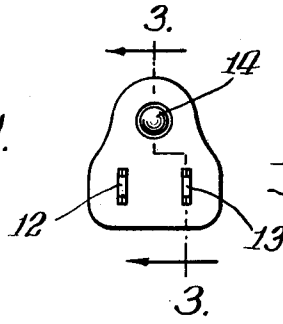


FIG. 2.

FIG. 3.

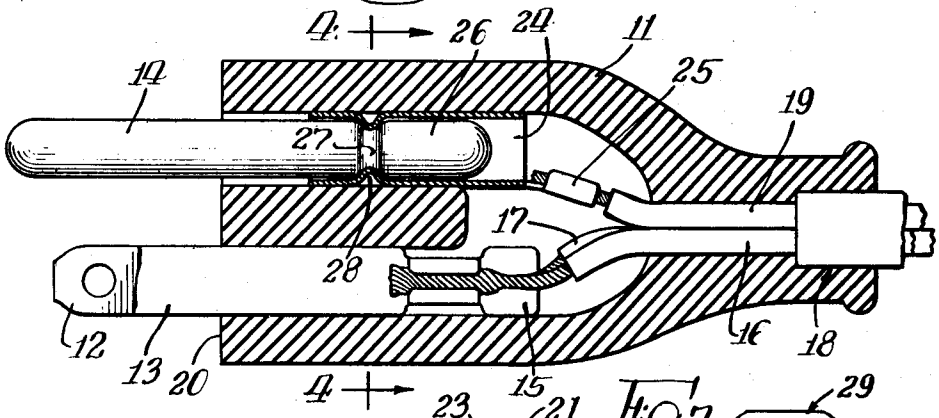


FIG. 4.

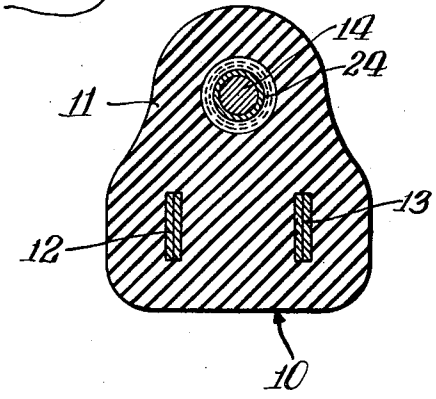


FIG. 6.

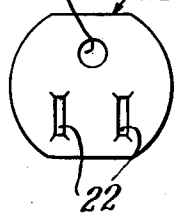
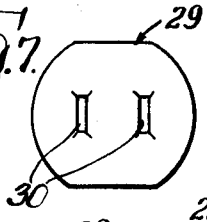


FIG. 7.



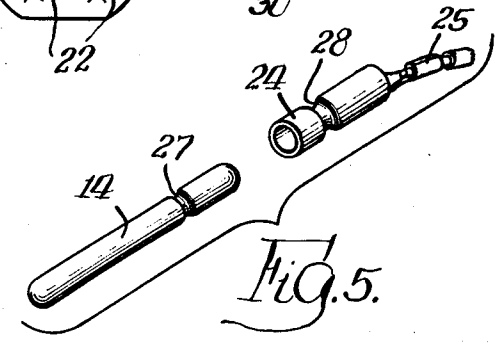


FIG. 5.

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CONVERTIBLE PLUG

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ABSTRACT OF THE DISCLOSURE

A plug for connecting a three conductor electric wire cord selectively to a three-wire grounded receptacle or a two-wire receptacle. The plug includes a ground male element which is selectively removable from the plug to permit the use of the plug with conventional two-wire receptacles. The removable ground male element may be reinstalled as desired. The removal and installation of the third male element may be effected by conventional hand tools, such as a pliers.

This invention relates to electrical plugs and in particular to plugs for connecting a cord to conventional electrical receptacles.

To provide increased reliability in the utilization of electrical equipment arranged to be energized by means of an electric wire cord selectively connectable to a conventional electric power supply receptacle, a three-wire, grounded system is utilized in many new receptacle installations. In such a system, the receptacle includes a third female element which is connected to ground. The plug on the electric cord provided for connection to such a three element receptacle includes a third male element adapted to be electrically engaged with the third female element when the plug is connected to the receptacle. The third male element in turn is connected to a ground wire in the cord which conventionally is suitably connected to the exposed portion of the apparatus to which the cord is connected, e.g. a metal housing portion thereof. Thus, should the "hot," elevated potential, wire of the cord be inadvertently grounded to the housing, a short circuit to ground will be provided.

Thus, a large number of modern electrical appliances are being provided by the manufacturer with such three element male connectors for use in connection with such three-wire receptacles. A problem arises, however, when the three-element male plug must be connected to a conventional two-wire receptacle as is commonly found in older installations. To solve this problem, a number of different adapter connectors have been developed which connect to the two-wire receptacle and which are adapted to receive the three-element male plug. The use of such adapters often gives the user false security in that he may believe that by connecting the three-element male plug to the adapter that a connection to ground is somehow effected. Such false security is highly undesirable.

One form of such adapter includes a wire connected to the third female element of the adapter and having a suitable connection means at the distal end for attachment to the cover plate mounting screw of the conventional two-wire receptacle. This structure again may provide false security to the user if the mounting screw is not properly grounded as may often occur in older installations.

To avoid such false indications, it is desirable to provide some means for effecting the selective utilization of such a cord plug in connection with the conventional two and three-wire receptacles which clearly indicates the lack of a grounded connection when the plug is used with the conventional two-wire receptacle. The present

invention comprehends an improved plug structure providing such desirable functioning.

Thus, a principal feature of the present invention is the provision of a new and improved convertible electric cord plug.

Another feature of the invention is the provision of such a plug having new and improved means for selective connection thereof to a three-wire grounded electrical receptacle or a two-wire ungrounded electrical receptacle.

A further feature of the invention is the provision of such a plug having new and improved means for clearly indicating to the user the lack of a grounded connection when the plug is connected to a two-wire ungrounded receptacle.

Still another feature of the invention is the provision of such a plug wherein the third, ground male element is removably connected to the plug.

A further feature of the invention is the provision of such a plug wherein the removable third male element is adapted to be removed by conventional means such as pliers.

A still further feature of the invention is the provision of such a plug having new and improved means for removably connecting the third male element to the ground wire of the cord.

A further feature of the invention is the provision of such a convertible plug which is adapted for use with either two-wire or three-wire receptacles and having a ground male element which may selectively be completely removed from the plug to permit the plug to be used with a two-wire receptacle or installed on the plug to provide electrical connection to the ground female element of a three-wire receptacle when desired.

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein:

FIGURE 1 is a perspective view of a plug embodying the invention;

FIGURE 2 is an end elevation thereof;

FIGURE 3 is a diametric longitudinal section thereof taken substantially along the line 3—3 of FIGURE 2;

FIGURE 4 is a transverse section taken substantially along the line 4—4 of FIGURE 3.

FIGURE 5 is a perspective view of the male and female ground elements of the plug;

FIGURE 6 is a front view of a three-wire grounded receptacle; and

FIGURE 7 is a front view of a conventional two-wire ungrounded receptacle.

In the exemplary embodiment of the invention as disclosed in the drawing, an electrical connector plug generally designated **10** is shown to include a body **11**, a pair of male electrical connector elements **12** and **13**, and a third grounding electrical element **14**. Elements **12** and **13** may comprise conventional blade-like elements having crimp-type solderless connectors **15** at their inner ends for connection to electrical conducting wires **16** and **17** of a multi-conductor cord generally designated **18**. As shown in FIGURE 3, the cord **18** further includes a ground wire **19**.

The plug body may be formed of a suitable material such as rubber. The elements **12**, **13** and **14** are arranged to project outwardly from the front face **20** thereof. Thus, with the plug **10** arranged with the male element **14** mounted thereon, the plug is adapted to be received in a three-wire receptacle **21** (see FIGURE 6) having a pair of conductor female elements **22** and a ground female element **23** receiving the elements **12**, **13** and **14**, respectively.

As best seen in FIGURES 3, 4 and 5, the ground male element **14** is removably secured to the plug body **11** by

means of a socket **24** which is fixedly retained in the plug body and recessed inwardly from the front face **20**. The socket **24** is provided at its rear end with a solderless type crimped connector **25** for connecting the ground wire **19** thereto as shown in FIGURE 3. The socket **24** is fixedly received within the plug body **11** for removable reception thereof of the inner end **26** of the third male element **14**. As shown, the male element **14** comprises a cylindrical male element having an annularly indented portion **27** in the rear portion **26** thereof adapted to have interlocking engagement with an annular detent **28** in the rear portion **26** of the socket. Thus, the male element **14** may be installed and removed as with a conventional hand tool, such as a pair of pliers. The male element may comprise a solid cylinder of suitable electrically conductive material, such as copper, or may comprise a hollow cylinder thereof as desired. The socket **24** may have a longitudinal slit to permit expansion thereof when male element **14** is inserted.

The use of the plug **10** is extremely simple. Where the plug is to be connected to a three-wire receptacle **21**, the male element **14** is retained in the socket **24**, as shown in FIGURE 3. The plug is then electrically connected to the receptacle **21** by concurrent insertion of the male element **14** into the female element **23** and the male elements **12** and **13** into the female elements **22**.

If only a two-wire receptacle, such as receptacle **29** of FIGURE 7, is available, the user may remove the ground male element **14** by withdrawal thereof from the socket **24** whereby only the two male elements **12** and **13** project forwardly from the front face **20** of the plug. Having thusly completely removed the male element **14**, the user is not misled into beliving that any grounded connection of the plug is effected when the plug is connected to the receptacle **29** by insertion of the male elements **12** and **13** into the female elements **30** thereof.

When the plug is subsequently to be connected to a three-wire receptacle **21**, the user merely reinserts the male element **14** into the socket wherein it is effectively retained by the interlocked association of the detent **28** of the socket and the recess **27** of the male element.

Plug **10** has the highly desirable feature of complete removal of the male element **14** when the plug is to be used with a two-wire receptacle as the plug then appears to be a conventional plug, and there is no suggestion to the user that the plug will function to provide a ground connection. Further, the simple socket of the male element **14** to the plug provides an extremely economical construction as compared with known devices wherein the grounding element is mounted on the plug by a movable connection means. Further, by removal of the male element **14** from the plug, inadvertent damage thereto is effectively precluded such as may occur in the known plugs having movably mounted ground elements wherein the ground elements may inadvertently move into a projecting position as by accidental engagement by the user with the moving mechanism during an attempted connection of the plug to a two-wire receptacle.

While I have shown and described one embodiment of my invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention.

The embodiment of the invention in which an exclusive property or privilege is claimed is defined as follows:

1. In a plug and cord structure defining means for connecting a three conductor electric wire cord selectively to a three-wire receptacle having two conductor female elements and a grounded female element or to a two-wire receptacle having only two conductor female elements similar to said conductor female elements of said three-wire receptacle, a plug comprising: a plug body carried on one end of said cord; a pair of first and second flat male elements carried by said plug body and each having an outer portion projecting therefrom for electrical connective reception in complementary conductor female elements of either of said three-wire and two-wire receptacles, said male elements having inner portions electrically connected respectively to two of said three conductors of said cord; a tubular connector carried by said plug body and recessed therein, said connector being electrically connected to the third of said three conductors of said cord, said tubular connector defining a continuous periphery socket provided with an internal, inwardly projecting rib; a third male element; and groove means on said third male element removably receiving said rib for mechanically and electrically removably interlocking said third male element to said connector, said third male element having an outer portion having a configuration different from that of said first and second male elements and arranged to project from said body for electrical connective reception in said third female element of said three-wire receptacle.

2. The structure of claim **1** wherein said outer portion of said third male element is cylindrical and said plug is provided with a cylindrical recess in which said inner portion of said third male element is received, the diameter of said recess being greater than the diameter of said outer portion.

3. The structure of claim **1** wherein said outer portion of said third male element has a length greater than the length of said outer portion of said first and second male elements.

4. The structure of claim **1** wherein said tubular connector is connected to said third conductor at a point spaced substantially from the longitudinal axis of said connector.

References Cited

UNITED STATES PATENTS

1,753,317	4/1930	Rothen	339—46
2,499,297	2/1950	Buchanan	339—205

FOREIGN PATENTS

1,228,931	3/1960	France.
117,771	12/1946	Sweden.

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U.S. Cl. X.R.

339—31, 217, 256