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(54) **LOCKING ELECTRICAL SOCKET**

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(51) **Int. Cl.**
H01R 13/625 (2006.01)

(52) **U.S. Cl.**
USPC **439/346**

(58) **Field of Classification Search**
USPC 439/346, 102
See application file for complete search history.

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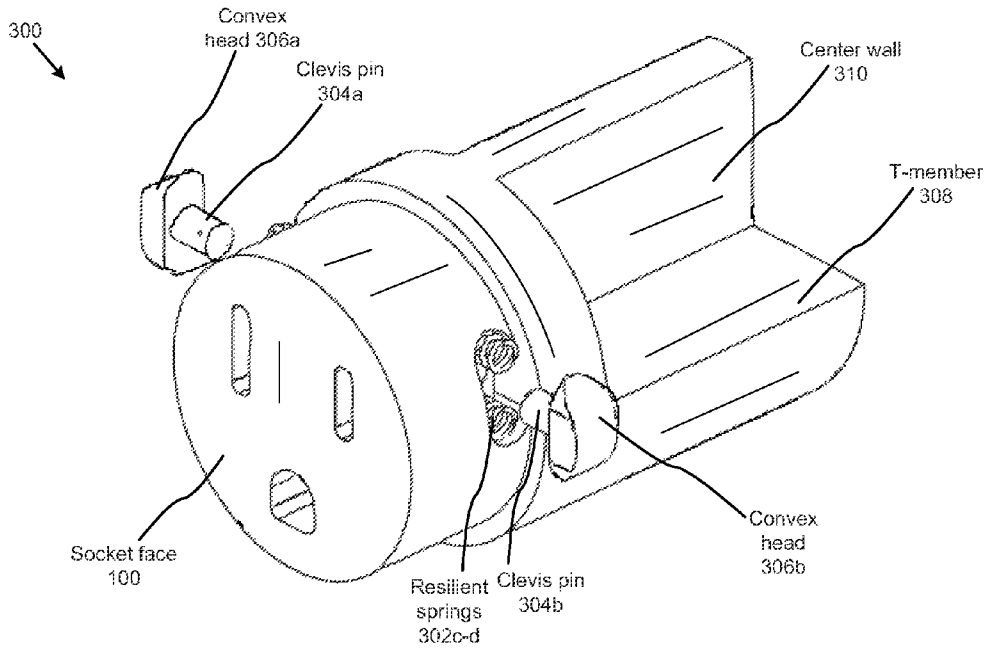
(57) **ABSTRACT**

A locking electrical plug is disclosed having a rigid tubular housing which rotates axially around a partially enclosed cylindrical socket face. As the tubular housing rotates, internally projecting cam engages clevis pins on the socket face, which pins lock through apertures of male electrical prongs detachably inserted into jacks on the socket face. The clevis pins are disengaged from the electrical prongs as the tubular body is rotated backward, the clevis pins biased back into an open position by resilient springs. Certain embodiments of the present invention recite electrical outlet embodiments comprising a plurality of socket faces. The locking electrical socket securely retains the male end of a US 120 volt electrical plug, but may be embodied to retain the male end of a US 220 volt electrical plug or electrical plugs of various international standards.

6 Claims, 10 Drawing Sheets



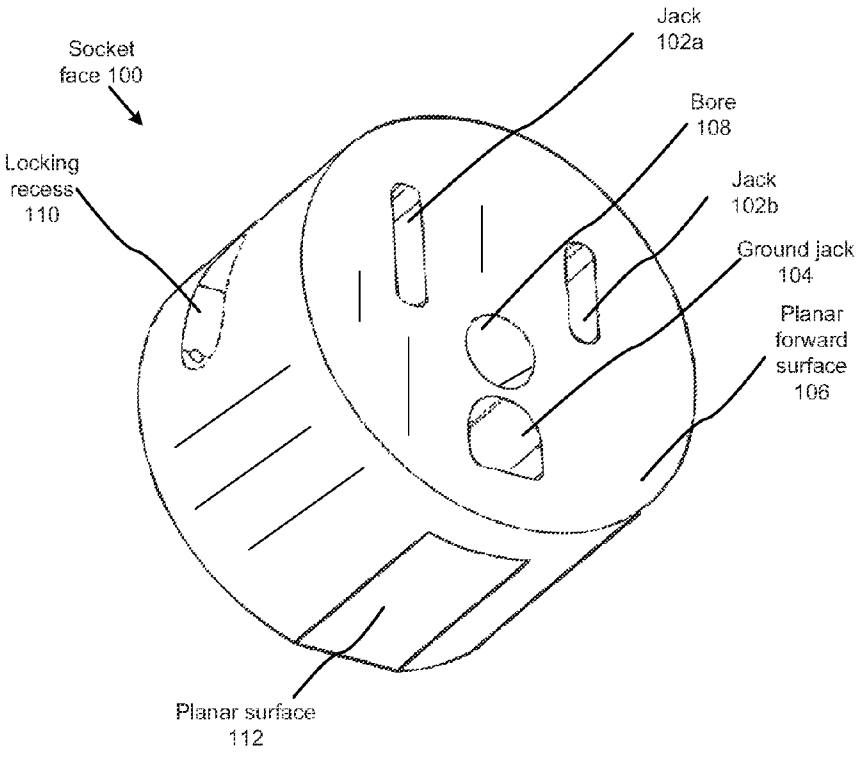

Socket face 100
Locking recess 110
Jack 102a
Bore 108
Jack 102b
Ground jack 104
Planar forward surface 106
Planar surface 112

FIG. 1

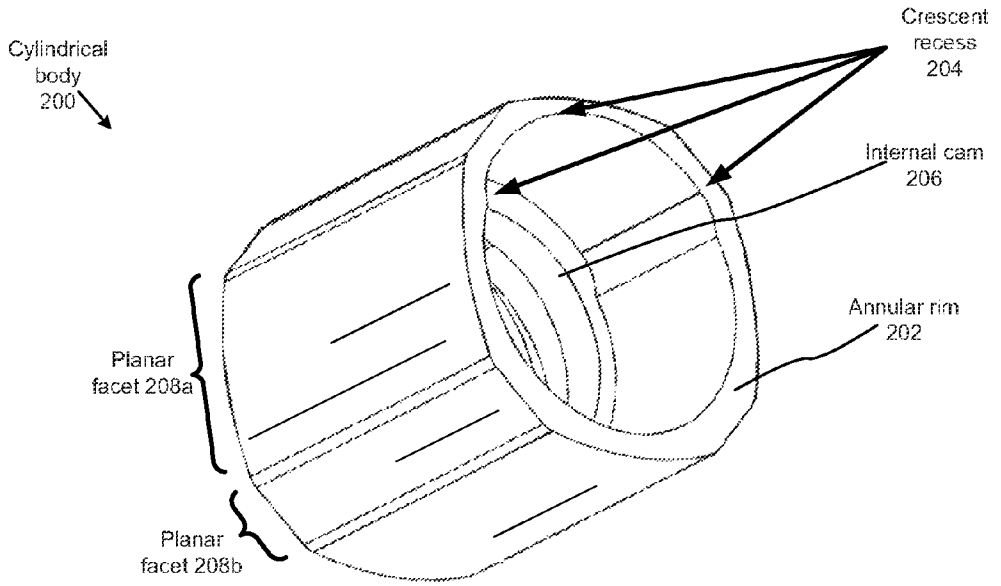

Cylindrical body 200
Crescent recess 204
Internal cam 206
Annular rim 202
Planar facet 208a
Planar facet 208b

FIG. 2

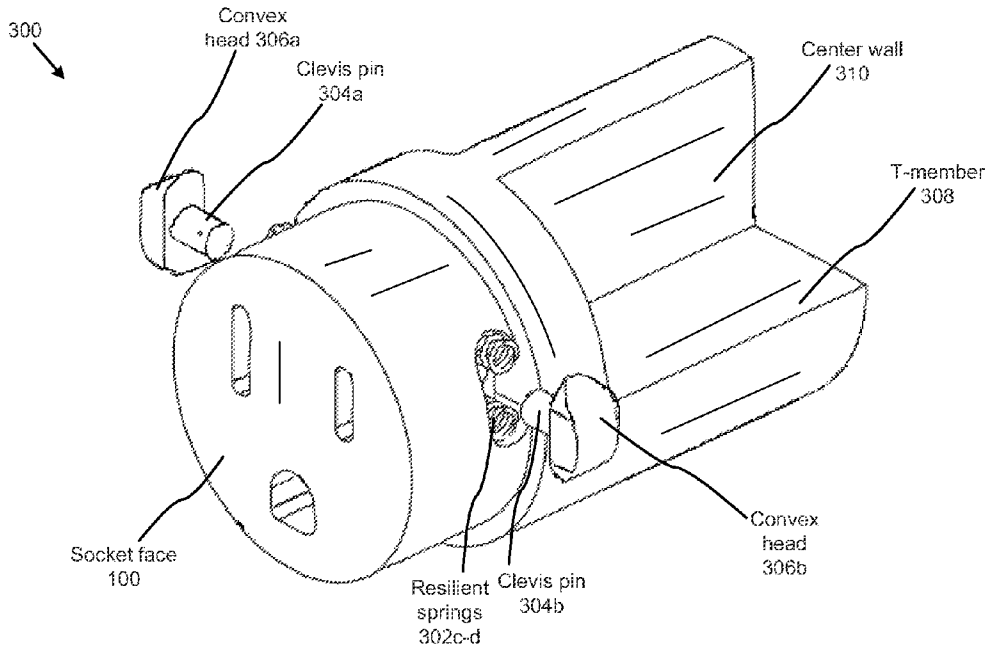

300
Convex head 306a
Clevis pin 304a
Center wall 310
T-member 308
Socket face 100
Resilient springs 302c-d
Clevis pin 304b
Convex head 306b

FIG. 3

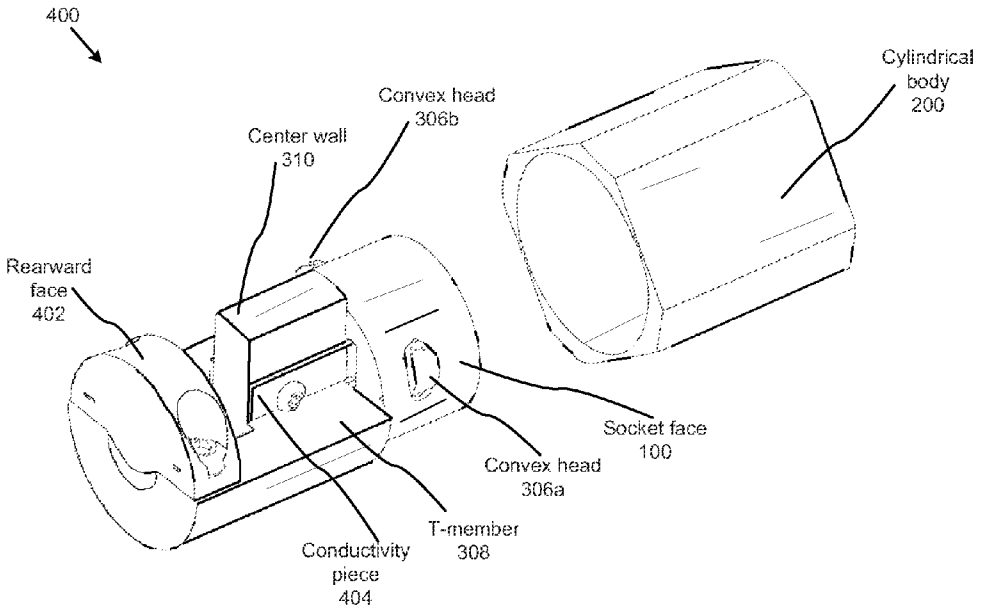

400
Cylindrical body 200
Convex head 306b
Center wall 310
Rearward face 402
Socket face 100
Convex head 306a
T-member 308
Conductivity piece 404

FIG. 4

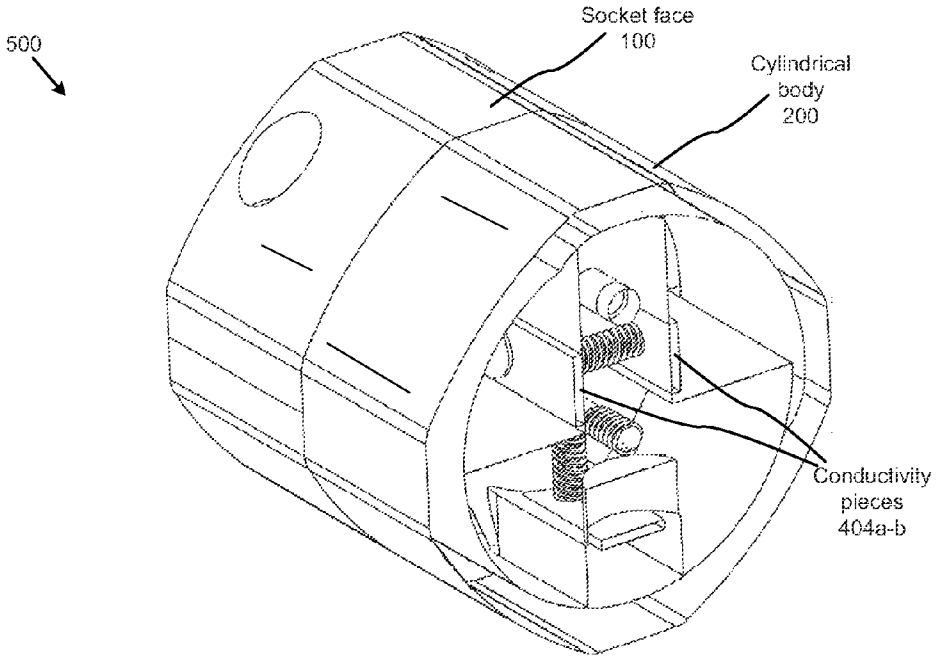

500
Socket face
100
Cylindrical
body
200
Conductivity
pieces
404a-b

FIG. 5

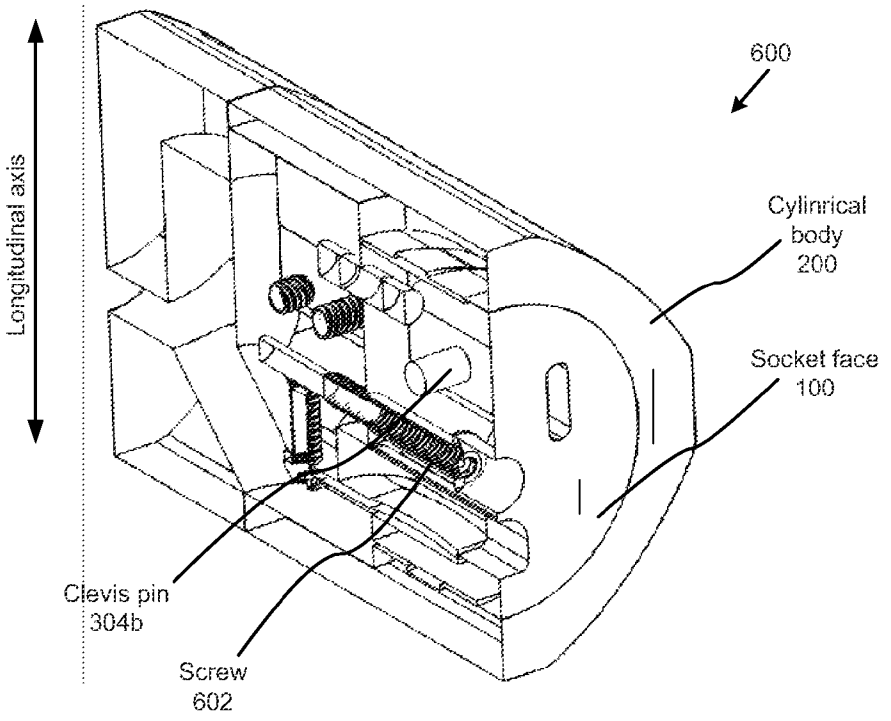

600
Longitudinal axis
Cylinrical body 200
Socket face 100
Clevis pin 304b
Screw 602

FIG. 6

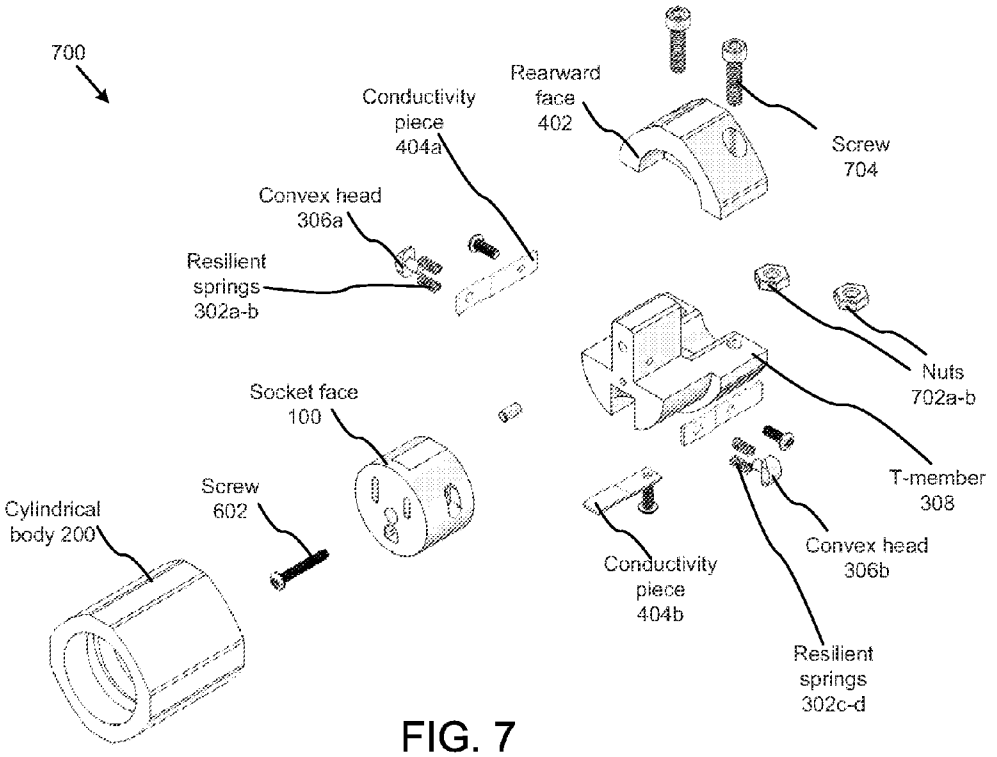

700
Conductivity piece 404a
Rearward face 402
Screw 704
Convex head 306a
Resilient springs 302a-b
Nuts 702a-b
Socket face 100
T-member 308
Screw 602
Cylindrical body 200
Conductivity piece 404b
Convex head 306b
Resilient springs 302c-d

FIG. 7

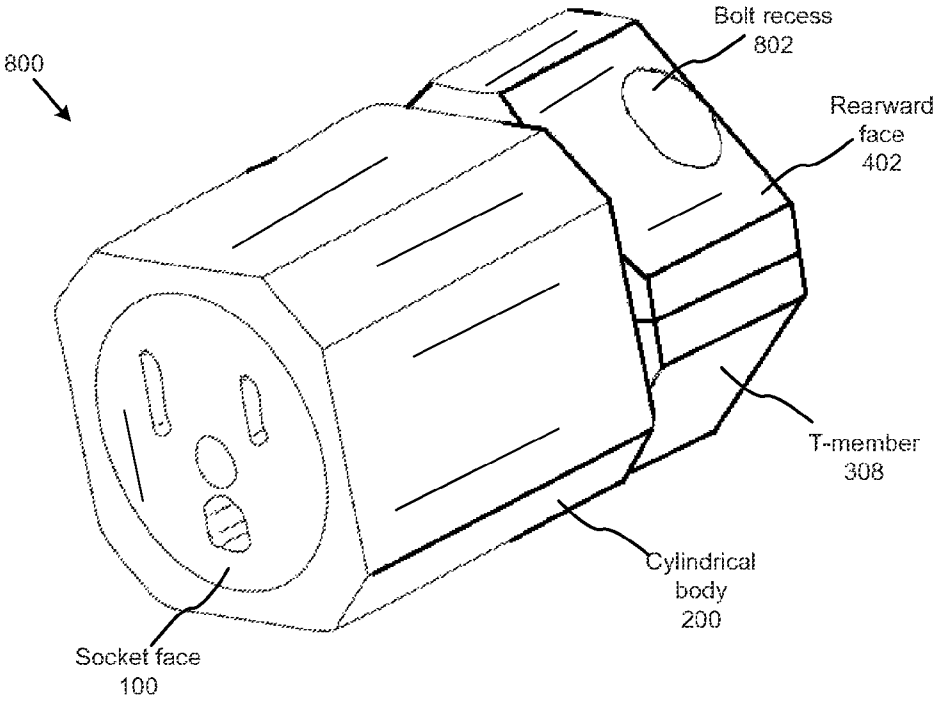

800
Bolt recess
802
Rearward
face
402
T-member
308
Cylindrical
body
200
Socket face
100

FIG. 8

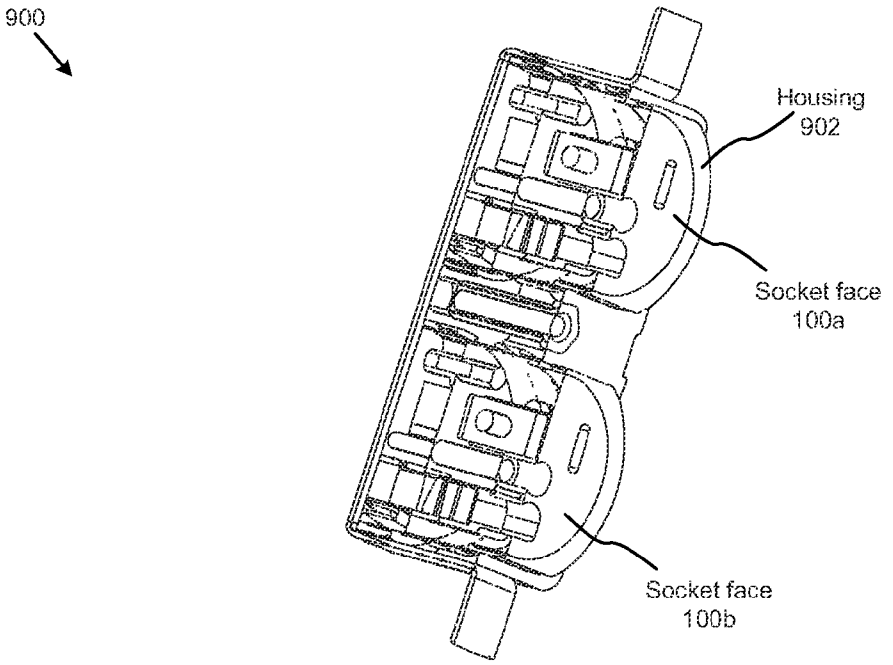


FIG. 9

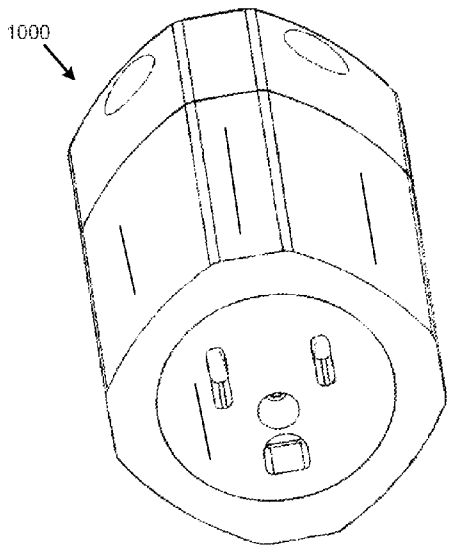


FIG. 10

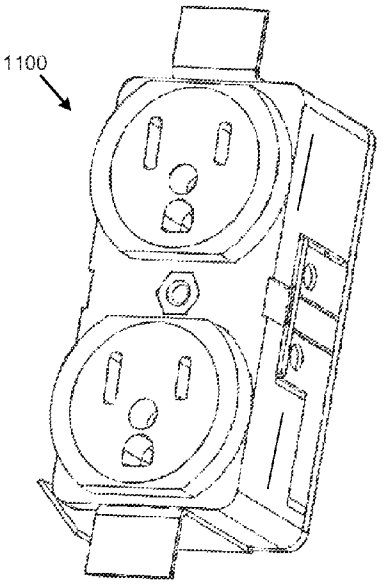


FIG. 11

LOCKING ELECTRICAL SOCKET

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to electrical plugs, and more particularly relates to electrical sockets with locking mechanisms for detachably securing male electrical plugs.

2. Description of the Related Art

Electrical sockets power appliances and tools in every home and business in the United States. Countless electronic devices, from televisions, to refrigerators, to air conditioners, are plugged into electrical sockets for indefinite periods of time by hundreds by millions of people. With periodic movement of these devices, and pressure on the male pins insertably connected to the electrical sockets, many plugs come free unexpectedly. In some instances, extension cords are pulled free by users attempting to extend their length, inadvertently disengaging the extension cords from the electrical sockets. In other cases, lights, garage door openers, and extension cords plugged into the ceiling of garages can come lose and be difficult to reconnect.

Electrical plugs are secured to sockets only by the mild compressive force of conductivity pieces with the jacks which become fatigued over time. There exists a need in the art for a simple locking electrical socket for securing electrical plugs in place which is reliable for indefinite periods of time.

SUMMARY OF THE INVENTION

From the foregoing discussion, it should be apparent that a need exists for a locking electrical socket. Beneficially, such a saw would overcome many of the difficulties with prior art by providing a more functional apparatus to consumers and professionals with a more effective locking mechanism.

The present invention has been developed in response to the present state of the art, and in particular, in response to the problems and needs in the art that have not yet been fully solved by currently available apparatii and methods. Accordingly, the present invention has been developed to provide a locking electrical socket comprising: a hollow cylindrical body defining an internal recess, the cylindrical body having two open ends for housing a cylindrical socket face and partially housing a t-member, the cylindrical body comprising an internal cam for engaging one more clevis pins, the cam partially circumscribing the inner surface of the cylindrical body; wherein the internal recess defined by the cylindrical body is of non-uniform diameter, such that the diameter of the recess across a lateral axis is smaller than the diameter of the internal recess across a longitudinal axis.

The locking electrical socket further comprises a cylindrical socket face having two or more jacks for receiving the male pins of an electrical plug, the jacks comprising one or more conductivity pieces for engaging with electrical contact the male pins, the socket face defining one or more recesses for receiving one or more clevis pins for closing and engaging apertures on the male pins; wherein the clevis pins are biased in an open position by one or more resilient springs, wherein the clevis pins are closed to engage the male pins by the cam rotating across the clevis pins when the cylindrical body is twisted axially around the socket face; and a rigid member mounted inside the cylindrical body to one of the cylindrical socket face and a component affixed to cylindrical socket face, the rigid member traversing the longitudinal axis of the inner recess, the rigid member of a length longer the diameter of inner recess across its lateral axis, the rigid member of a length less than the diameter of the inner recess across its longitudinal axis, such that cylindrical body can only rotated axially around the rigid member until a diameter of the inner recess as measured across the rigid member is reduced to the length of the rigid member.

In some embodiments, an outer surface of the cylindrical body may comprise one or more planar facets. The cylindrical socket face may further comprise a substantially planar outer face comprising a centrally located bore hole for receiving a screw, the screw affixing the cylindrical socket face to an abutting member partially enveloped by the cylindrical body. The clevis pins may further comprise convex heads, the convex heads engaged by the cam.

In some embodiments, the cylindrical body further comprises a crescent recess interiorly traversing the length of the cylindrical body, the crescent recess expanding the length of the diameter of the inner recess.

A locking electrical outlet having a plurality of electrical sockets is also recited, the electrical outlet comprising: a hollow housing defining a plurality of internal recesses, a face of the housing defining a plurality the cylindrical openings, each opening for housing a cylindrical socket face, the housing comprising internal cam for engaging one more clevis pins on the cylindrical socket faces; and a plurality of cylindrical socket faces having two or more jacks for receiving the male pins of an electrical plug, the jacks comprising one or more conductivity pieces for engaging with electrical contact the male pins, the socket face defining one or more recesses for receiving one or more clevis pins for closing and engaging apertures on the male pins when the male pins are insertably and detachably connected to an electrical socket; wherein the clevis pins are biased in an open position by one or more resilient springs affixed to a socket face, wherein the clevis pins are closed to engage the male pins by the cam rotating across the clevis pins when the socket face is twisted axially within the housing.

These features and advantages of the present invention will become more fully apparent from the following description and appended claims, or may be learned by the practice of the invention as set forth hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

In order that the advantages of the invention will be readily understood, a more particular description of the invention briefly described above will be rendered by reference to specific embodiments that are illustrated in the appended drawings. Understanding that these drawings depict only typical embodiments of the invention and are not therefore to be considered to be limiting of its scope, the invention will be described and explained with additional specificity and detail through the use of the accompanying drawings, in which:

FIG. **1** is a lower elevational perspective view of a socket face in accordance with the present invention;

FIG. **2** is a lower elevational perspective view of a cylindrical body in accordance with the present invention;

FIG. **3** is a side elevational perspective view of a socket face and T-member assembly in accordance with the present invention;

FIG. **4** is a side elevational perspective view of a partially disassembled locking electrical socket in accordance with the present invention;

FIG. **5** is a forward side elevational sectioned perspective view of a partially disassembled locking electrical socket in accordance with the present invention;

FIG. **6** is a forward side elevational cross-sectioned perspective view of a partially disassembled locking electrical socket in accordance with the present invention;

FIG. **7** is a forward side elevational perspective view of a disassembled locking electrical socket in accordance with the present invention;

FIG. **8** is a forward side elevational perspective view of a locking electrical socket in accordance with the present invention;

FIG. **9** is a forward side elevational cross-sectioned perspective view of a locking electrical outlet in accordance with the present invention;

FIG. **10** is a forward elevational perspective view of a locking electrical socket in accordance with the present invention; and

FIG. **11** is a lower elevational perspective view of a locking electrical outlet in accordance with the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Reference throughout this specification to "one embodiment," "an embodiment," or similar language means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment of the present invention. Thus, appearances of the phrases "in one embodiment," "in an embodiment," and similar language throughout this specification may, but do not necessarily, all refer to the same embodiment.

Furthermore, the described features, structures, or characteristics of the invention may be combined in any suitable manner in one or more embodiments. In the following description, numerous specific details are provided to provide a thorough understanding of embodiments of the invention. One skilled in the relevant art will recognize, however, that the invention may be practiced without one or more of the specific details, or with other methods, components, materials, and so forth. In other instances, well-known structures, materials, or operations are not shown or described in detail to avoid obscuring aspects of the invention.

FIG. **1** is a lower elevational perspective view of a socket face **100** in accordance with the present invention. The socket face **100** comprises a cylindrical component having a jack **102***a*, a jack **102***b*, a ground jack **104**, a planar forward surface **106**, a bore hole **108**, a locking recess **110**, and a planar lower surface.

The socket face **100** comprises a cylindrical member with a forward planar surface **106** with a centrally located bore hole **108** for receiving a screw, the screw used to affix the socket face **100** to an abutting member on the rearward face of the socket face **100**.

The jacks **102***a-b* comprise prong receiving bore openings for receiving the male prongs of standardized US 120 volt electrical plugs. In other embodiments, the jacks **102***a-b* are shaped so as to receive male electrical prongs of other standardized sizes commonly used in countries and regions across the globe, including 220 volt plugs.

The jacks **102***a-b* comprise contact terminals for electrically engaging male prongs inserted into the jacks **102***a-b*.

The socket face **100** comprises two locking recesses **110** for receiving clevis pins, which clevis pins are forced inward through apertures in male prongs to lock the male prongs in place.

The socket face **100** may be formed from any non-conductive polymeric material.

FIG. **2** is a lower elevational perspective view of a hollow cylindrical body **200** in accordance with the present invention. The hollow cylindrical body **200** comprises an annular rim **202**, a crescent recess **204**, an internal cam **206**, a planar facet **208***a*, and a planar facet **208***b*.

The cylindrical body **200** comprises a non-conductive elongated hollow cylindrical casing, body, or housing with an open forward end for receiving the socket face **100** and a t-member described below affixed to the socket face **100**. The cylindrical body **200** may be insulated.

The cylindrical body **200** comprises inwardly projecting helical ridging forming an internal cam **206** which engages convex heads on clevis pins as the cylindrical body **200** is rotated around the socket face **100**.

The internal cam **206** may be manufactured through means known to those of skill in the art, including additive, subtractive, taps and dies, single point threading, thrilling, grinding, molding, lapping, rolling and the like.

The cylindrical body **200** may comprise a plurality of planar facets **208** on its outer face for showing the rotational position of the cylindrical body **200** relative to the socket face **100** and other components of the locking electrical socket.

The cylindrical body **200** defines a hollow inner recess. In some embodiments, the inner recess is of non-uniform diameter across different axes of the cylindrical body **200** such that an elongated, rigid component traversing the longest diameter direction prevents axial rotation of the cylindrical body **200** as the diameter narrows during rotation of the cylindrical body **200** around the rigid component.

The cylindrical body **200** comprises two annular rims **202** with planar outward faces, a forward rim and rearward rim.

FIG. **3** is a side elevational perspective view of a socket face and T-member assembly **300** in accordance with the present invention. The assembly **300** comprises a socket face **100**, resilient springs **302***c-d*, a clevis pin **304***a*, a clevis pin **304***b*, a convex head **306***a*, a convex head **306***b*, a t-member **308**, and a center wall **310**.

The socket face **100** is affixed to a plurality of resilient springs **302**, which bias open clevis pins **304** affixed to the resilient springs **302**.

The clevis pins **304***a-d* comprises depressible shanks, clevis pins, shafts, bolts, or gyves for engaging the apertures on standardized US 120 volt male electrical prongs inserted into the socket face **100**.

The clevis pins **304***a-b* are biased by the resilient springs **302***a-d* into their open position. When the cylindrical body **200** is rotated around the socket face **100**, the cam **206** engages the convex heads **306***a-b* and presses them inward, forcing the clevis pins **304***a-b* through apertures on the male electrical plugs inserted into the jacks **102***a-b*. When the cylindrical body **200** is rotated back to its original position, the cam **206** disengages from the convex heads **306***a-b* which heads **306***a-b* are disengaged from the male electrical inserts by the resilient springs **302***a-d*.

The convex heads **306** may comprise flattened heads or tabs curving outward in convex form along their outer face.

The t-member **308** comprises a polymeric, non-conducting member affixed to the rearward face of the socket face **100**. In the shown embodiment, the t-member **308** comprises a central wall **310** extending upwardly. In the shown embodiment, the central wall **310**, measure from the bottom of the t-member **308** to the top of the central wall **310** excess the horizontal (i.e. lateral axis) diameter of the inner recess of cylindrical body **200**, but does not exceed the longitudinal axis diameter of the inner recess as measured across the inner recess and the crescent recess, such that the cylindrical body **200** cannot rotate fully around the central wall **310**.

FIG. **4** is a side elevational perspective view of a partially disassembled locking electrical socket **400** in accordance with the present invention. The electrical socket **400** com-

prises a socket face **100**, a cylindrical body **200**, a t-member **308**, a convex head **306***a*, a convex head **306***b*, a center wall **310**, a rearward face **402**, and a conductivity piece **404**.

A semi-cylindrical component, the rearward face **402**, may be affixed to the upper portion of the t-member **308**. The rearward face **402** may formed with coupling means for coupling the locking electrical socket to wire of varying gauges.

Conductivity pieces **404** are affixed to the lateral flanges of the central wall **310**. The conductivity pieces **404** are engaged in electrical contact by the male prongs of an electrical plug.

FIG. **5** is a forward side elevational sectioned perspective view of a partially disassembled locking electrical socket **500** in accordance with the present invention. The electrical socket **500** comprises a socket face **100**, a cylindrical body **200**, and conductivity pieces **404***a-b*.

As shown, the conductivity pieces **404***a-b* are affixed interiorially to the cylindrical socket face **100** using screw/bolt mechanisms, or via other means known to those of skill in the art.

FIG. **6** is a forward side elevational cross-sectioned perspective view of a partially disassembled locking electrical socket **600** in accordance with the present invention. The electrical socket **600** comprises a socket face **100**, a cylindrical body **200**, a clevis pin **304***b*, and a screw **602**.

As shown, the clevis pin **304***b* slides laterally along the lateral axis in and out of an aperture defined by a male prong inserted into a jack **102**.

FIG. **7** is a forward side elevational perspective view of a disassembled locking electrical socket **700** in accordance with the present invention. The electrical socket **700** comprises a cylindrical body **200**, a socket face **100**, a screw **602**, resilient springs **302***a-b*, resilient springs **302***c-d*, conductivity pieces **404***a-b*, convex heads **306***a-b*, a t-member **308**, a rearward face **402**, nuts **702***a-b*, and a screw **704**.

Each of these components are assembled as shown.

FIG. **8** is a forward side elevational perspective view of a locking electrical socket **800** in accordance with the present invention. The electrical socket **800** comprises a cylindrical socket face **100**, a cylindrical body **200**, a t-member **308**, and a rearward face **402** defining a bolt access recess **802**.

The assembled locking electrical socket appears as shown in a half-locked position.

FIG. **9** is a forward side elevational cross-sectioned perspective view of a locking electrical outlet **900** in accordance with the present invention. The electrical outlet **900** comprises a housing **902** and two electrical socket faces **100***a-b*.

In the shown embodiment, the electrical outlet **900** comprises a plurality of socket faces **100**. The shown embodiment is similar to locking electrical socket **400** with the primary difference being that the socket faces **100***a-b* rotate within the housing **902**, rather than the housing **902** rotating around the socket faces **100***a-b* as the cylindrical body **200** would in other embodiments.

FIG. **10** is a forward elevational perspective view of a locking electrical socket **1000** in accordance with the present invention. The electrical socket **1000** appears in its assembled, unlocked position as shown.

FIG. **11** is a lower elevational perspective view of a locking electrical outlet **1100** in accordance with the present invention. The locking electrical outlet **1100** appears as shown in its unlocked position. After the electrical plug in inserted into the electrical outlet **1100**, the plug and socket face **100** are rotated clockwise or counterclockwise within the housing **902**.

The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope.

What is claimed is:

1. A locking electrical socket comprising:

a hollow cylindrical body defining an internal recess, the cylindrical body having two open ends for housing a cylindrical socket face and partially housing a t-member, the cylindrical body comprising an internal cam for engaging one more clevis pins, the cam partially circumscribing the inner surface of the cylindrical body;

wherein the internal recess defined by the cylindrical body is of non-uniform diameter, such that the diameter of the recess across a lateral axis is smaller than the diameter of the internal recess across a longitudinal axis;

a cylindrical socket face having two or more jacks for receiving the male prongs of an electrical plug, the jacks comprising one or more conductivity pieces for engaging with electrical contact the male prongs, the socket face defining one or more recesses for receiving one or more clevis pins for closing and engaging apertures on the male prongs;

wherein the clevis pins are biased in an open position by one or more resilient springs, wherein the clevis pins are closed to engage the male prongs by the cam rotating across the clevis pins when the cylindrical body is twisted axially around the socket face; and

a rigid member mounted inside the cylindrical body to one of the cylindrical socket face and a component affixed to cylindrical socket face, the rigid member traversing the longitudinal axis of the inner recess, the rigid member of a length longer the diameter of inner recess across its lateral axis, the rigid member of a length less than the diameter of the inner recess across its longitudinal axis, such that cylindrical body can only rotated axially around the rigid member until a diameter of the inner recess as measured across the rigid member is reduced to the length of the rigid member.

2. The locking electrical socket of claim **1**, wherein an outer surface of the cylindrical body comprises one or more planar facets.

3. The locking electrical socket of claim **1**, wherein the cylindrical socket face further comprises a substantially planar outer face comprising a centrally located bore hole for receiving a screw, the screw affixing the cylindrical socket face to an abutting member partially enveloped by the cylindrical body.

4. The locking electrical socket of claim **1**, wherein the clevis pins comprise convex heads, the convex heads engaged by the cam.

5. The locking electrical socket of claim **1**, wherein the cylindrical body further comprising a crescent recess interiorly traversing the length of the cylindrical body, the crescent recess expanding the length of the diameter of the inner recess.

6. A locking electrical outlet having a plurality of electrical sockets, the electrical outlet comprising:

a hollow housing defining a plurality of internal recesses, a face of the housing defining a plurality the cylindrical openings, each opening for housing a cylindrical socket face, the housing comprising internal cam for engaging one more clevis pins on the cylindrical socket faces; and

a plurality of cylindrical socket faces having two or more jacks for receiving the male pins of an electrical plug, the jacks comprising one or more conductivity pieces for engaging with electrical contact the male pins, the

socket face defining one or more recesses for receiving one or more clevis pins for closing and engaging apertures on the male pins when the male pins are insertably and detachably connected to an electrical socket;

wherein the clevis pins are biased in an open position by one or more resilient springs affixed to a socket face, wherein the clevis pins are closed to engage the male pins by the cam rotating across the clevis pins when the socket face is twisted axially within the housing.

* * * * *