(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 456 914 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
**31.10.2007 Bulletin 2007/44**

(21) Application number: **01274757.2**

(22) Date of filing: **22.11.2001**

(51) Int Cl.:
***H01R 39/00*** *(2006.01)*

(86) International application number:
**PCT/IL2001/001078**

(87) International publication number:
**WO 2003/044906 (30.05.2003 Gazette 2003/22)**

# (54) REVOLVABLE PLUG AND SOCKET

DREHBARER STECKER UND DREHBARE BUCHSE

FICHE TOURNANTE ET PRISE MURALE

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR**

(43) Date of publication of application:
**15.09.2004 Bulletin 2004/38**

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## Description

### FIELD AND BACKGROUND OF THE INVENTION

**[0001]** The present invention relates to the support of light electric appliances such as light fittings and small fans.

**[0002]** More particularly, the invention provides a plug and socket combination powering and supporting an appliance in a manner allowing the user to change its orientation. The combination is particularly useful where there is a frequent need to move light appliances from one location to another.

**[0003]** In a previous disclosure, Israel Patent no. 126246, the present inventors described a socket and plug combination for conducting electric power and for mechanically supporting a light-weight appliance by means of said plug. Such appliance can be a light, camera, small TV receiver, TV camera, a small fan or the like. The present specification is a development of and an improvement on the earlier patent, which is hereby incorporated herein by reference.

**[0004]** In our earlier patent the socket has prong-receiving receptacles similar to those found on conventional sockets. Consequently, after the appliance was plugged into the socket, which itself was rigidly attached to a wall or ceiling, the orientation of the appliance attached to the plug could no longer be changed. Where the item being installed is substantially symmetrical, for example a common incandescent filament lamp mounted in a cylindrical lamp socket, such restriction is meaningless. There are however many lighting fixtures with reflectors which need to be oriented in a certain direction, or may be expected to serve a user in two proximate but different locations. With regard to a non-oscillating fan, or a small television camera or receiver, directional orientation is most important for effective use thereof.

**[0005]** In US Patent no. 4,753,600 Williams discloses an electrical connector for use with hand tools joined to drop cords. The connector is placed in the cord and allows unlimited rotation without twisting the cable. The connector is not attachable to a building surface and can not support any load.

**[0006]** The rotatable electric connector proposed by Salzberg in US Patent no. 6,068,490 is arranged to be plugged into a wall socket but not to support any load therefrom apart for its own weight. A revolvable portion carries a cable terminated by an electric socket.

**[0007]** US-A-4 335 927 discloses a combination of a fixable socket and a plug revolvable therein for conducting electric power and for mechanically supporting in a desired orientation an appliance receiving said power, said combination comprising:

> a socket comprising a non-conductive body including at least two spaced-apart hollow arcuate conducting receptacles insulated from each other and having a common center of curvature and being connectable to an electric power supply, said socket rigidly supporting a first structural element of a mechanical connection located at said center of curvature;
> a plug also comprising a non-conductive body, rigidly attachable to, and configured to mechanically support an appliance from a first face, said plug also including a second structural element engagable to said first structural element of said mechanical connection and allowing said plug to revolve at least part of a revolution about said center of curvature.

### OBJECTS OF THE INVENTION

**[0008]** It is therefore one of the objects of the present invention to obviate the limitations of prior art electrical plugs and sockets and to provide an assembly which is configured to both support and power a revolvable load, i.e. an electric appliance.

**[0009]** It is a further object of the present invention to reduce cost by providing an embodiment for single phase supply line requiring only two slip rings in place of the three slip rings in prior-art revolvable plugs.

### SUMMARY OF THE INVENTION

**[0010]** The present invention achieves the above objects by providing a combination of a fixable socket and a plug revolvable therein for conducting electric power and for mechanically supporting in a desired orientation an appliance receiving said power, said combination comprising:

> a) a socket rigidly attachable to a wall or ceiling, said socket comprising a non-conductive body including at least two spaced-apart hollow arcuate conducting receptacles insulated from each other and having a common center of curvature and being connectable to an electric power supply, said socket rigidly supporting a first structural element of a mechanical connection located at said radius of curvature;
> b) a plug also comprising a non-conductive body, rigidly attachable to, and configured to mechanically support an appliance from a first face, said plug supporting from a second face at least two projecting conducting prongs insulated from each other and engagable with said at least two arcuate receptacles respectively and connectable to conductors for feeding electric power to said appliance, said plug also including a second structural element engagable to said first structural element of said mechanical connection and allowing said plug to revolve at least part of a revolution about said center of curvature; and
> c) releasable latching means attached to said combination, providing when engaged a retention force between said socket and said plug to prevent disengagement and to support said appliance.

**[0011]** In a preferred embodiment of the present inven-

tion there is provided a socket and plug combination wherein said first structural element comprises an aperture and said second structural element comprises a post-like male member engagable with said aperture.

**[0012]** In a most preferred embodiment of the present invention there is provided socket and plug combination wherein both parts of said mechanical connection are conductive and are arranged to be wired for use as an earth connection.

**[0013]** Yet further embodiments of the invention will be described hereinafter.

**[0014]** It will thus be realized that the novel connector of the present invention serves to allow fast installation of small electrical appliances. Unlike the industrial busbar, the present invention maintains a standard of appearance appropriate to residential areas. The ability of varying the orientation of the supported appliance is additional to the facility of fast exchange for another appliance fitted with a plug according to the present invention.

**[0015]** The present specification does not describe a locking device for retaining the plug in a desired orientation, which is a desirable addition. The prior art however describes many types of locking, braking, detent or location retention device, and an appropriate locking device can easily be added to the plug-socket combination of the present invention to retain the plug in any desired position.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0016]** The invention will now be described further with reference to the accompanying drawings, which represent by example preferred embodiments of the invention. Structural details are shown only as far as necessary for a fundamental understanding thereof. The described examples, together with the drawings, will make apparent to those skilled in the art how further forms of the invention may be realized.

**[0017]** In the drawings:

FIG. 1 is a non-detailed perspective view of a preferred embodiment of the socket and plug combination attached to a wall, according to the invention;

FIG. 2 is a sectional elevational view of the same embodiment showing the plug before engagement with socket;

FIG. 3 is a sectional elevational view of an embodiment attached to a ceiling and supporting a fan;

FIG. 4 is a plan view of the socket seen in FIGS 1 and 2;

FIG. 5 is a detail sectional elevation of a second embodiment of the release mechanism;

and

FIG. 6 is a perspective view of the plug-socket combination supporting a lighting fixture.

## DETAILED DESCRIPTION OF THE PRESENT INVENTION

**[0018]** There is seen in FIGS. 1, 2 and 4 a combination of a fixable socket 10 and a plug 12. The plug 12 is revolvable in the socket 10, and receives electric power therefrom. The combination 10 + 12 serves also for mechanically supporting in a desired orientation a light appliance 14, in the present example a miniature television receiver, receiving said power.

**[0019]** The socket 10 is shown in the present figure attached to a wall 16, seen in FIG. 2. The socket 10 has a flat base 18 and apertures 20 to allow the passage of screws 22. The socket 10 has a non-conductive body made of a plastic. Three spaced-apart hollow arcuate conducting receptacles 24, 26, 28, seen most clearly in FIG. 4, are insulated from each other and have a common center of curvature 36. All three receptacles 24, 26, 28 comprise molded recesses containing conductive inserts 30, one of which is seen in FIG. 2, which can be permanently connected by wires 32 to an electric power supply.

**[0020]** The socket 10 rigidly supports a first structural element 34, comprising a cylindrical aperture, of a mechanical connection located at the center of the radius of curvature 36 of the conducting receptacles 24, 26, 28.

**[0021]** A plug 12 also made of a plastic is configured to match the socket 10. The plug body is made of a plastic, and is somewhat larger than conventional plugs to enable the plug to rigidly support an appliance from a first face 38. The plug 10 has a second face 40 for mechanically supporting the conductive prong rings 43 a,b,c. The appliance 14 weight is about 0.5 to 5 kg, depending on the support configuration in the case of wall attachment. The shorter the distance between the wall 16 and the appliance center of gravity 42, the higher the load which can be supported.

**[0022]** Three projecting conducting prong rings insulated from each other are positioned to be engagable with the three arcuate receptacles 24, 26, 28 of the socket 10, respectively. The prong rings are connected to conductors 62 for feeding electric power to the appliance 14.

**[0023]** The plug 12 also supports a second structural element 44, engagable to the first structural element 34 of the mechanical connection and allowing the plug 12 to revolve at least part of a revolution about the center of curvature 36.

**[0024]** Preferably and as seen in the figure, the first structural element 34 comprises an aperture and the second structural element 44 comprises a post-like male member engagable with the aperture 34. The reverse order, that is where the socket 10 carries the male member, is also feasible.

**[0025]** Releasable latching means 46 retain the plug 12 in the socket 10, by providing a retention force between the socket and the plug to prevent disengagement and to support the appliance. In the present embodiment latching means 46 comprises a split expandable post end 48 with a shoulder 50. An internal shouldered push rod

52 is axially moved to expand the split end 48, enabling the shoulder 50 to abut the aperture of the first structural element 44.

**[0026]** Latching means 48 are sized to engage the first structural element 44 with sufficient retention force to support a two kg appliance 14 in a ceiling socket during an earthquake of a severity not causing structural damage to the building in which the combination is installed. Users will not expect an appliance to continue to be supported following a severe earthquake, which damages the building structure itself.

**[0027]** With reference to the rest of the figures, similar reference numerals have been used to identify similar parts.

**[0028]** FIG. 3 shows an embodiment of an interconnected socket 10 and plug 54. The socket 10 is seen attached to a ceiling 56. The plug 54 supports a fan 58, which can be directed to face any desired direction by revolving the plug 54 in its socket 10. The bowl-shaped cover 60 is added to improve appearance and to prevent users making contact with electric wires 32, 62. The inner assembly is similar to the plug 12 and socket 10 shown not yet interconnected in FIG. 2.

**[0029]** Referring now to FIG. 5, there is depicted a detail of a socket 64 and plug 66 combination wherein both parts 68, 70 of the mechanical connection are conductive and are arranged to be wired for use as an earth connection. It will be appreciated that the earth plug prong ring, 43b in FIG. 2, is eliminated from the plug, an arcuate recess 26 in FIG. 2 is eliminated from the socket, and both plug and socket can be made smaller.

**[0030]** The socket 64 rigidly supports a first structural element 68 of a mechanical connection is located at the radius of curvature 36. Element 68 is a female metal component molded into the plastic body 66. Due to the high stress on element 68, a metal construction is in any case an advantage, thus opening the option of utilizing the mechanical connection as an earth connector.

**[0031]** The retention mechanism in the present embodiment comprises a plurality of hard captive balls 72 which are shown in the figure at their outer position. The balls 72 retain the plug 66 in the socket 64, as the post 70 can not be withdrawn through the element 68 while the balls 72 project outwards. Pushing the rod 74 inwards, against the compression spring 76 allows the balls 72 to retract into a recess 78 to allow withdrawal of the plug 66.

**[0032]** FIG. 6 shows a socket 80 and plug 82 combination similar to that seen in FIG. 1. The appliance being powered and supported is an electric light fitting 84. The hollow support arm 86 carrying cables 88 is attached to the side of the plug 82. The light fitting 84 can be quickly installed, adjusted to radiate in a desired direction, and quickly removed when not needed - without the aid of tools.

**[0033]** The scope of the described invention is intended to include all embodiments coming within the meaning of the following claims. The foregoing examples illustrate useful forms of the invention, but are not to be considered as limiting its scope, as those skilled in the art will readily be aware that additional variants and modifications of the invention can be formulated without departing from the meaning of the following claims.

## Claims

1. A combination of a fixable socket (10) and a plug (12) revolvable therein for conducting electric power and for mechanically supporting in a desired orientation an appliance (14) receiving said power, said combination comprising:

   a) a socket (10) rigidly attachable to a wall or ceiling, said socket comprising a non-conductive body including at least two spaced-apart hollow arcuate conducting receptacles (24, 26) insulated from each other and having a common center of curvature and being connectable to an electric power supply, said socket rigidly supporting a first structural element (34) of a mechanical connection located at said center of curvature;

   b) a plug (12) also comprising a non-conductive body, rigidly attachable to, and configured to mechanically support an appliance (14) from a first face, said plug supporting from a second face at least two projecting conducting prong elements (43a, 43b) insulated from each other and engagable with said at least two arcuate receptacles respectively and connectable to conductors (62) for feeding electric power to said appliance, said plug also including a second structural element (44) engagable to said first structural element of said mechanical connection and allowing said plug to revolve at least part of a revolution about said center of curvature;
   and

   c) releasable latching means (46) attached to said combination, providing when engaged a retention force between said socket and said plug to prevent disengagement and to support said appliance.

2. The socket and plug combination as claimed in claim 1, wherein said first structural element comprises an aperture (34) and said second structural element comprises a post-like male member engagable with said aperture.

3. The socket and plug combination as claimed in claim 2, wherein said releasable latching means is a captive ball (72) detent.

4. The socket and plug combination as claimed in claim 2, wherein both parts of said mechanical connection are conductive and are arranged to be wired for use

as an earth connection.

5. The socket and plug combination as claimed in claim 1, wherein said latching means engages said first structural element with sufficient retention force to support a two kg appliance in a ceiling socket during an earthquake of a severity not causing structural damage to the building in which said combination is installed.

6. The socket and plug combination as claimed in claim 1, wherein said appliance is an electric light fitting.

**Patentansprüche**

1. Kombination einer fixierbaren Buchse (10) und eines darin drehbaren Steckers (12) zum Leiten von elektrischer Leistung und zum mechanischen Abstützen eines Geräts (14), das die Leistung empfängt, in einer gewünschten Orientierung, wobei die Kombination umfasst:

   a) eine Buchse (10), die starr an einer Wand oder Decke angebracht werden kann, wobei die Buchse einen nicht-leitenden Körper mit mindestens zwei beabstandeten, hohlen, bogenförmigen, leitenden Steckbuchsen (24, 26) umfasst, die voneinander isoliert sind und ein gemeinsames Krümmungszentrum aufweisen und mit einer elektrischen Leistungsversorgung verbunden werden können, wobei die Buchse ein erstes Strukturelement (34) einer mechanischen Verbindung, das sich im Krümmungszentrum befindet, starr abstützt;
   b) einen Stecker (12), der auch einen nicht-leitenden Körper umfasst, der an einem Gerät (14) starr angebracht werden kann und dazu ausgelegt ist, dieses an einer ersten Fläche mechanisch abzustützen, wobei der Stecker an einer zweiten Fläche mindestens zwei vorstehende leitende Stiftelemente (43a, 43b) abstützt, die voneinander isoliert sind und mit den mindestens zwei bogenförmigen Steckbuchsen jeweils in Eingriff gebracht werden können und mit Leitern (62) zum Zuführen von elektrischer Leistung zu dem Gerät verbunden werden können, wobei der Stecker auch ein zweites Strukturelement (44) umfasst, das mit dem ersten Strukturelement der mechanischen Verbindung in Eingriff gebracht werden kann und ermöglicht, dass sich der Stecker zumindest um einen Teil einer Umdrehung um das Krümmungszentrum dreht; und
   c) ein lösbares Verriegelungsmittel (46), das an der Kombination befestigt ist und das, wenn es in Eingriff steht, eine Haltekraft zwischen der Buchse und dem Stecker bereitstellt, um ein Ablösen zu verhindern und das Gerät abzustützen.

2. Buchsen- und Steckerkombination nach Anspruch 1, wobei das erste Strukturelement eine Öffnung (34) umfasst und das zweite Strukturelement ein pfostenartiges Steckerelement umfasst, das mit der Öffnung in Eingriff gebracht werden kann.

3. Buchsen- und Steckerkombination nach Anspruch 2, wobei das lösbare Verriegelungsmittel eine Schnappkugelarretierung (72) ist.

4. Buchsen- und Steckerkombination nach Anspruch 2, wobei beide Teile der mechanischen Verbindung leitend sind und so beschaffen sind, dass sie zur Verwendung als Erdverbindung verdrahtet sind.

5. Buchsen- und Steckerkombination nach Anspruch 1, wobei das Verriegelungsmittel mit dem ersten Strukturelement mit ausreichender Haltekraft in Eingriff steht, um ein Gerät mit zwei kg in einer Deckenbuchse während eines Erdbebens mit einer Stärke, die keine Strukturbeschädigung am Gebäude verursacht, in dem die Kombination installiert ist, abzustützen.

6. Buchsen- und Steckerkombination nach Anspruch 1, wobei das Gerät ein elektrischer Beleuchtungskörper ist.

**Revendications**

1. Combinaison d'une prise fixable (10) et d'une fiche tournante (12) pour conduire du courant électrique et maintenir mécaniquement un équipement (14) recevant ledit courant selon une orientation souhaitée, ladite combinaison comprenant :

   a) une prise (10) apte à être rigidement attachée à un mur ou un plafond, ladite prise comprenant un corps non - conducteur qui inclut au moins deux réceptacles (24, 26) conducteurs arqués, qui sont distants l'un de l'autre et isolés l'un par rapport à l'autre, qui possèdent un centre d'arc ou de courbure commun et qui sont aptes à être connectés avec une alimentation en courant électrique, ladite prise maintenant un premier élément structurel (34) d'une connexion mécanique située audit centre d'arc ;
   b) une fiche (12) comprenant également un corps non - conducteur, qui est apte à être attaché avec, et configuré pour maintenir mécaniquement, un équipement (14) depuis un premier côté, ladite fiche maintenant au moins deux éléments d'embranchement (43a, 43b) depuis un deuxième côté, qui sont isolés l'un par rapport à l'autre, peuvent être engagés avec lesdits au

moins deux réceptacles arqués respectivement et sont aptes à être connectés avec des conducteurs (62) pour alimenter ledit équipement en courant électrique, ladite prise possédant également un deuxième élément structurel (44), qui est apte à engager ledit premier élément structurel de ladite connexion mécanique et permet à ladite prise d'effectuer au moins une portion de révolution par rapport audit centre d'arc ou de courbure ; et

c) des moyens de verrouillage libérables (46), qui sont attachés à ladite combinaison et fournissent, lorsqu'ils sont engagés, une force de rétention entre ladite prise et ladite fiche afin d'empêcher un désengagement et de maintenir ledit équipement.

**2.** Combinaison de prise et de fiche selon la revendication 1, dans laquelle ledit premier élément structurel comprend une ouverture (34) et ledit deuxième élément structurel comprend un membre mâle en pilier ou poutre apte à engager ladite ouverture.

**3.** Combinaison de prise et de fiche selon la revendication 2, dans laquelle lesdits moyens de verrouillage libérables sont une détente à asservissement sphérique ou à bille captive (72).

**4.** Combinaison de prise et de fiche selon la revendication 2, dans laquelle les deux éléments de ladite connexion mécanique sont conducteurs et sont configurés avec un lien filaire pour usage en tant que connexion de terre.

**5.** Combinaison de prise et de fiche selon la revendication 1, dans laquelle lesdits moyens de verrouillage engagent ledit premier élément structurel avec suffisamment de force de rétention pour maintenir un équipement de deux kilogrammes dans une prise de plafond au cours d'un tremblement de terre, dont la sévérité ne donne pas lieu à un endommagement structurel du bâtiment dans lequel ladite combinaison est installée.

**6.** Combinaison de prise et de fiche selon la revendication 1, dans laquelle ledit équipement est un luminaire.

FIG. 1

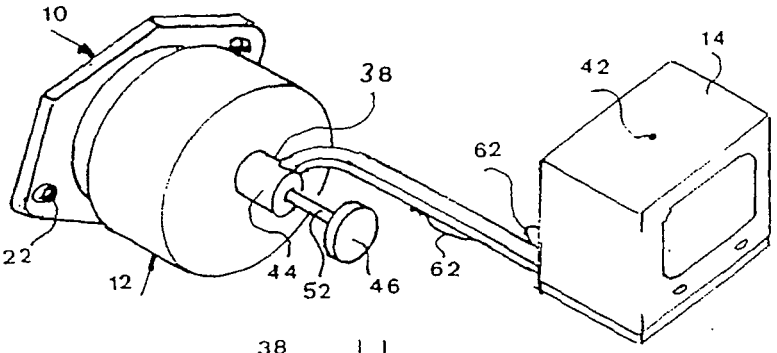
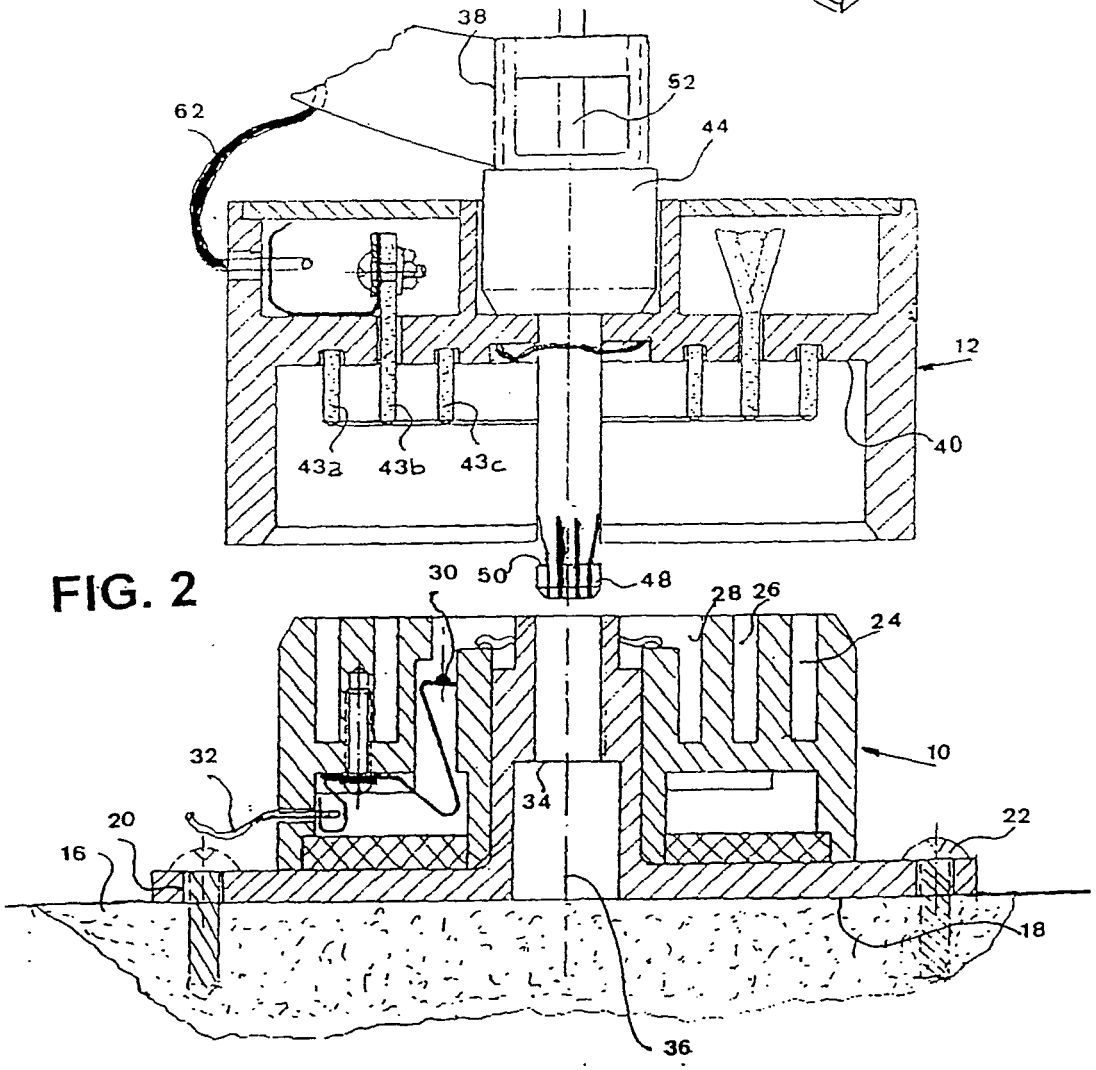

10
38
42
14
62
22
12
44
52
46
62

FIG. 2


38
52
62
44
12
40
43a
43b
43c
30
50
48
28
26
24
10
32
34
22
20
16
18
36

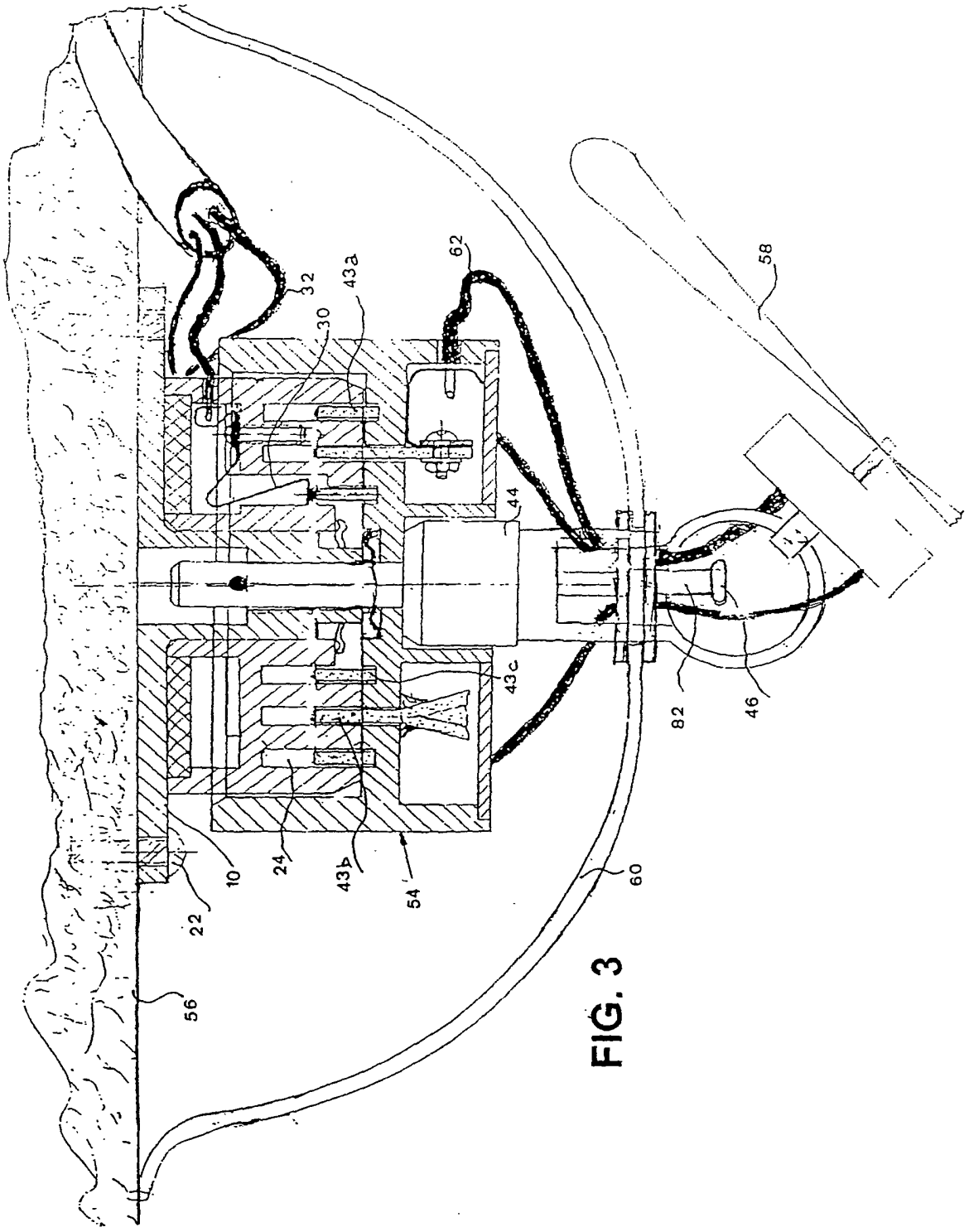



FIG. 3

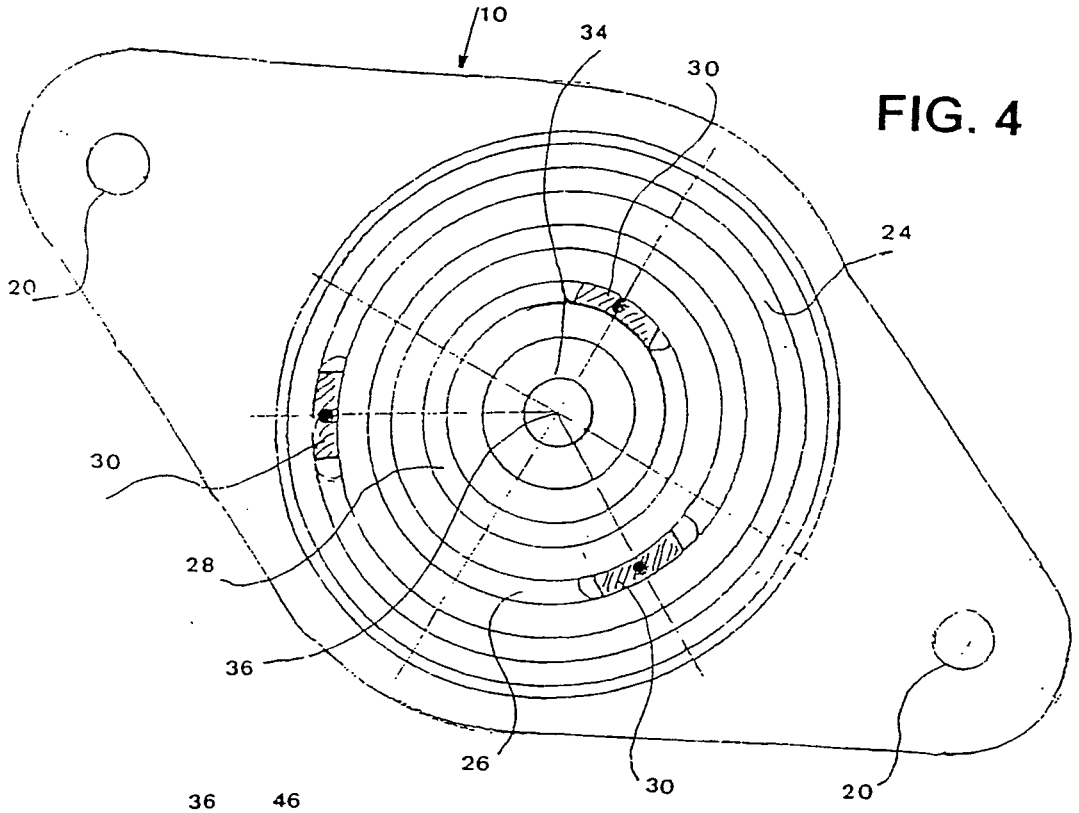



FIG. 4

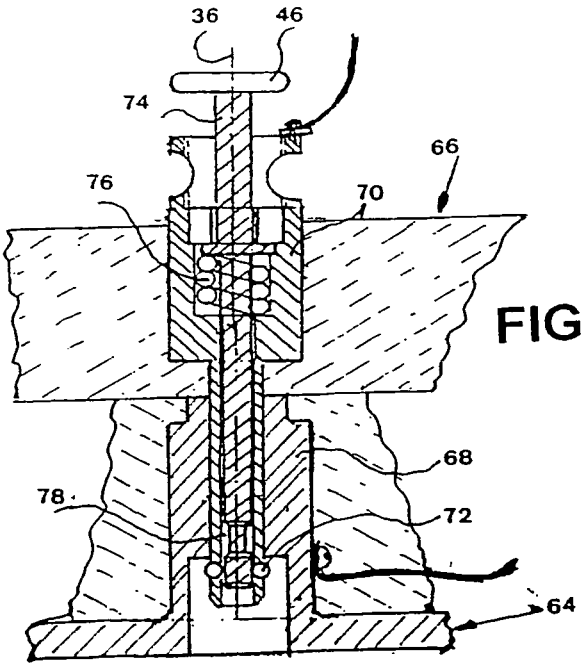
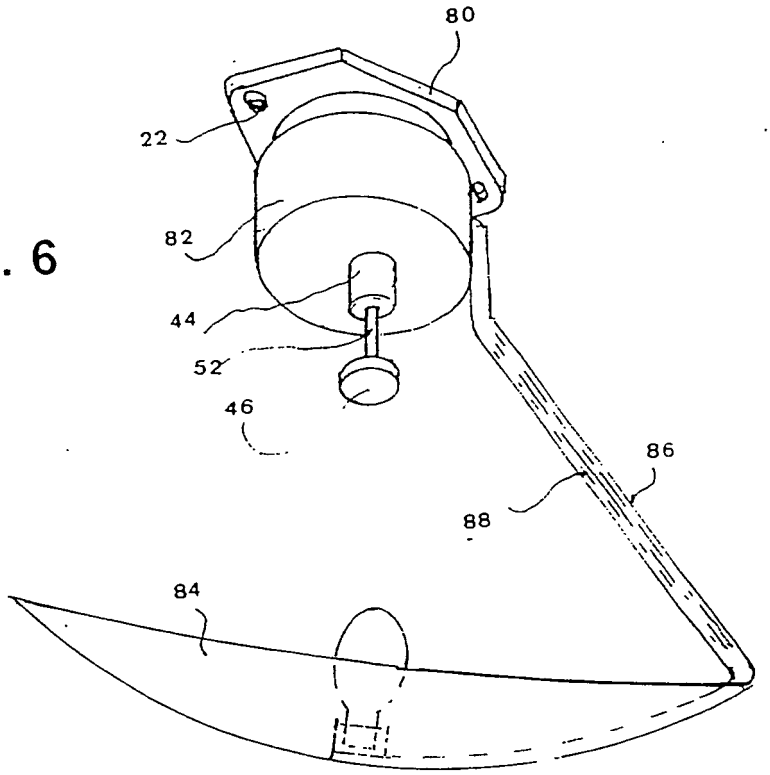



FIG. 5

FIG. 6



## REFERENCES CITED IN THE DESCRIPTION

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