(12) CERTIFIED INNOVATION PATENT (11) Application No. **AU 2015100149 B4**
(19) AUSTRALIAN PATENT OFFICE

(54) Title
Power Assembly

(51) International Patent Classification(s)
H01R 27/02 (2006.01)

(21) Application No: **2015100149** (22) Date of Filing: **2015.02.12**

(30) Priority Data

(31) Number	(32) Date	(33) Country
1402677.7	**2014.02.14**	**GB**

(45) Publication Date: **2015.03.19**
(45) Publication Journal Date: **2015.03.19**
(45) Granted Journal Date: **2015.03.19**
(45) Certified Journal Date: **2016.03.03**

(71) Applicant(s)
OE Electrics Limited

(72) Inventor(s)
Hobbs, Timothy Richard

(74) Agent / Attorney
Sandercock & Cowie, 18B Sladen Street, Cranbourne, VIC, 3977

(56) Related Art
US 2005/079769
US 2005/0088834
EP 1942567
US 2009/0315509
US 6024599
US 2014/326497
US 2013/0280956

2015100149 12 Feb 2015

ABSTRACT

The invention relates to a power assembly including a portion having a face which is accessible externally of the item of furniture to allow the selected placement of plugs in a plurality of sockets or ports provided on the said face, including at least one socket for the receipt of a plug having a plurality of pins in a predetermined configuration and at least one USB port, said at least one USB port provided to allow the charging of electrical items to be achieved via the port and a USB plug and cable connected thereto, said power assembly including a housing depending from the said portion and said housing accommodating power supply control means for the power supply to the socket and the at least one USB port. In one embodiment the housing includes first and second compartments in which the control means are located for the respective power supplies. The assembly can also accommodate at least one data cable passing along a channel formed therein to allow a plug connected to the cable to be available at the face to a user to use the same to connect to an item of apparatus to allow data connection therewith.

2015100149 24 Dec 2015

TITLE OF INVENTION

Power Assembly

TECHNICAL FIELD

The invention to which this application relates is a power assembly of a type which has a face on which may be provided with a single mains AC plug socket with a pin configuration to suit specific geographical usage requirements and additionally a plurality of ports for the reception of USB plug connectors to allow a charge to be provided from the port to an item of apparatus, such as a mobile phone or tablet computer connected thereto, for example via a cable connection.

BACKGROUND

Within a known assembly for supplying both mains power and USB charging power, there is provided a power supply unit connected to, or provided with, the said USB ports and control means are also required to be provided, typically in the form of a printed circuit board with the appropriate control components mounted thereon, to allow control of the power supply to the USB charging ports. Due to safety requirements, there may typically also required to be a sufficient spacing between the respective socket and ports to allow heat dissipation, safe separation of high and low voltage circuits and also to ensure that the insertion or presence of plugs in one or more of the socket or ports does not unduly affect the access to the other of the socket or ports.

Such known assemblies containing an AC power socket and one or more USB charging sockets are of rectangular shape and are designed to be mounted vertically into a wall or panel and to be suitably connected to the mains electrical supply by a qualified person with or without the additional provision of a suitable electrical back box so that considerable installation work has to be undertaken on site, and has to be done by qualified personnel. Furthermore this type of product is not suitable for mounting directly into a horizontal surface such as a desk or table top due to the lack of provision for preventing the ingress of liquids split on or in the region of the

2015100149 24 Dec 2015

assembly for instance, to comply fully with liquid spillage safety standards such as BS6396.

However, there is a demand for an assembly which can be safely fitted into an aperture formed in an external face of an item of furniture, for example a circular aperture, in the region of 80mm diameter, with, for example the external face of the assembly to be located in a vertical, horizontal plane or at any angle in between when the item of furniture is in use and to be supplied as complete, electrically safe, assemblies with a prewired mains AC power cord to a suitable plug type so that the assembly can be fitted as a single unit to the item of furniture.

When one considers that such a power assembly is required to pass through an aperture which is relatively confined in size such as the 80mm diameter aperture formed in an external face of the item of furniture, and the majority of the assembly typically also has to be accommodated in a relatively confined cavity formed within the item of furniture, it will be appreciated that the provision of the various socket, ports, power unit and control components, is difficult to achieve, and achieve safely, within the space which is available. This is especially the case when there is a desire to provide these components as a complete electrically insulated enclosure with a prewired power cord and a suitable plug.

As a result of these problems, it is found that, conventionally, the control means and/or power supply for at least the USB ports, is provided separately and remotely from the main power assembly housing. The control means and/or power supply are thus provided in a wired connection with the housing such that, for example, the control means and/or power supply can be mounted in a holder which is suspended from the power assembly housing. In whichever of these forms, while the provision of power and control of the same to the socket and ports may be achieved, the physical dimensions of these known products means that the apparatus cannot be used for all potential uses due to the depth required to be provided in the cavity in the which the power assembly is to be fitted in order to accommodate all of the components.

A further problem which is encountered due to the space constraint is there can be a need for other functionality and/or components to be removed in order to make the

2015100149 24 Dec 2015

space available for the one or more USB charging ports. This means that while the new functions can then be accommodated, previous functions are removed which can lead to certain potential users no longer wishing to purchase the product.

It is an object of the invention to ameliorate one or more of the disadvantages of the prior art described above or to at least provide a useful alternative thereto.

The references herein to and descriptions of prior proposals or products are not intended to be, and are not to be construed as, statements or admissions of common general knowledge in the art. In particular, the prior art discussion herein does not relate to what is commonly or well known by the person skilled in the art

SUMMARY OF INVENTION

According to the present invention, there is provided a power assembly formed to be fitted in an item of furniture, said power assembly including a portion having a face accessible to allow the selected placement of plugs in a plurality of sockets or ports provided on the said face, including at least one socket for the receipt of a plug having a plurality of pins in a predetermined configuration and at least one USB port, said USB port provided to allow the charging of an electrical item to be achieved via the port and a USB plug connection inserted therein, said power assembly including a housing depending from the said portion and said housing accommodating a socket power supply control means for the power supply to the socket and a separate USB power supply control means for the power supply to the at least one USB port and wherein the USB power supply control means are in the form of a printed circuit board (PCB) mounted to lie on a plane substantially parallel with an axis which extends from the said portion face towards the opposing end of the housing.

The assembly may be fitted to an item of furniture via a grommet with which the assembly locates and the grommet in turn locates with the periphery of a substantially circular aperture in the item of furniture.

The housing may include two compartments, a first compartment in which the plug socket power supply and control means are provided and a second compartment in

2015100149 24 Dec 2015

which the at least one USB charging port power supply and control means therefore are provided.

The assembly may be provided with at least one data cable passing through a channel formed in the assembly and connected to a plug which is available for the user to use to connect the cable to an item of electrical apparatus.

BRIEF DESCRIPTION OF DRAWINGS

In order that the present invention might be more fully understood, embodiments of the present invention will be described, by way of example only, with reference to the accompanying drawings. Possible and preferred features of the present features of the present invention will be described as examples only, however, it is to be understood that the features illustrated in and described with reference to the drawings are not to be construed as limiting on the scope of the invention. In the drawings:

Figure 1 illustrates a perspective view of a power assembly formed in accordance with an embodiment of the invention;

Figure 2 illustrates the power assembly engaged with an item of furniture in accordance with an embodiment of the invention;

Figure 3 illustrates an exploded view of the components of the power assembly of Figure 1;

Figures 4 and 5 illustrate views of a further embodiment of a power assembly.

DESCRIPTION OF EMBODIMENTS

An aim of the present embodiment is to provide a power assembly which allows the functions described before, to be provided in a safe manner and to allow the power assembly to be provided in a form which allows the assembly to be more easily accommodated in the item in which the same is to be provided. A further aim is to be

2015100149 24 Dec 2015

able to incorporate a data connection cable and plug as part of the assembly and which can be available for use from the assembly.

At least two USB ports may be provided.

The power assembly housing may include all of the power supply control means therein which, for the plug socket can comprise a base having wiring ports and connections therefore, and for the USB ports is provided in the form of a PCB, and can be fitted in position in an item of furniture as a single unit and connected to one or more power supply cables. The assembly may be fitted to an external surface of the item of furniture via a grommet or support frame with which the assembly locates and the grommet in turn locates with the item of furniture. The face of the assembly with the sockets formed thereon may be provided in line with or protrudes to the front of the external surface with the remainder of the assembly located to the rear of the external surface of the item of furniture.

In an embodiment the assembly housing passes through an aperture in the external surface which is circular in shape and in an embodiment has a diameter of 80mm.

In an embodiment the assembly housing has a circular cross section.

In an embodiment, the power assembly is connected to a power supply via a single prewired cable which provides power to all of said sockets.

In an embodiment, the housing includes two compartments, a first compartment in which the power supply and control means therefore, for the plug socket are provided and a second compartment in which the power supply and control means therefore, for the USB charging ports are located.

In an embodiment the compartments are defined within the housing which, in itself is of a dimension which is at least equal to but preferably less than the periphery of the external face.

2015100149 24 Dec 2015

In an embodiment at least one part of the housing is formed by a component which is separable from the remainder of the power assembly housing.

In an embodiment, the second compartment is formed by part of the housing which is common to the first compartment and a sliding component which can be slid into position to enclose the second compartment and complete the housing.

In an embodiment, the control means for the power supply to the USB charging ports are provided on a printed circuit board and the printed circuit board is located within said second compartment.

In an embodiment, the said printed circuit board is mounted to lie on a plane which is substantially perpendicular to the face of the power assembly. The said plane may be substantially parallel with the longitudinal axis of the housing.

In an embodiment, the PCB is mounted on the component which can be moved into engagement with the remainder of the housing and thereby forms the second compartment of the housing.

In an embodiment the walls of the compartments can be selected to be of a thickness and/or formed so as to allow improved cooling.

In an embodiment the housing includes a plurality of engagement means which are provided to allow the power assembly to be engaged in position with the item of furniture.

The centre of the plug socket may be offset to one side of the centre of the said face of the assembly portion. The face may be formed so as to protrude above the external surface of the item of furniture to which the same is fitted and the external face is provided at one or more angles when fitted which are other than horizontal so as to comply with the liquid spillage requirements of BS6396 or equivalent National or International safety standards.

2015100149 24 Dec 2015

The assembly may be fitted without the need for tools and/or skilled personnel as the assembly is provided for installation as a complete unit and once installed the plug connection provided with the assembly needs only to be connected to a mains power supply socket.

In an embodiment the assembly can be installed in the item of furniture at any desired angle from horizontal to vertical and is spill resistant when installed horizontally to meet the requirement of safety standards such as BS6396.

The assembly may be provided as an integral fire resistant and electrically safe unit.

In an embodiment the assembly includes a data communication cable to be provided for use by the user. In this arrangement the socket or plug of the cable is exposed to be available for use at or adjacent to the face of the portion in which the other connection means are provided.

In an, preferred embodiment the said socket or plug and/or exposed cable can be gripped by the user so as to unwind and extend the cable outwardly from the housing and therefore increase the range over which the data connection cable is available to be used. In an embodiment the cable is provided in combination with a rewind mechanism so as to allow the cable to be wound back automatically in to the assembly or at least within the item of furniture in which the assembly is mounted.

In an embodiment the cable is located in and passes through a channel which is formed between the housing and the mounting located on the item of furniture. This allows the cable to be located separately and in isolation from the power supply components.

In an embodiment the provision of the cable connection is an option and the same can be made available by the selective removal of a part of the housing face to make an aperture available for the passage of the cable therethrough.

In a further embodiment of another aspect of the invention there is provided an item of furniture including a power assembly, said power assembly including a portion

2015100149 24 Dec 2015

having a face which is accessible externally of the item of furniture to allow the selected placement of plugs in a plurality of sockets or ports provided on the said face, said ports or sockets including at least one USB port, said at least one USB port provided to allow the charging of electrical items to be achieved via the port and a USB plug connected thereto, said power assembly including a housing accommodating power supply control means for the power supply to the socket and the at least one USB port and which is located within a cavity formed in the item of furniture.

In an embodiment the assembly includes a data communication cable to be provided for use by the user. In this arrangement the socket or plug of the cable is exposed to be available for use at or adjacent to the face of the portion in which the other connection means are provided.

Referring firstly to Figure 2 there is illustrated a cross sectional view of the top 2 of a desk (not shown) and in which there is provided a circular aperture 4 which depends inwardly from the external face 6 of the desktop. In the aperture there is fitted a power assembly 8 in accordance with an embodiment of the invention which includes a support grommet 11, shown in cross section, which engages with the desk at the periphery of the aperture 4 and hence locates the assembly in position. The grommet has a screw thread moulded into its outer face so that it can be secured to the desk top using a fixing nut 15." The assembly further includes portion 10 having an external face 12 and a housing 14 to which a mains power supply 16 is connected. The housing 14 and/or portion 10 engage with the grommet 11 via clips 13 and/or other means so as to retain the same in position in the grommet and hence in the desk. The grommet may be sized, as shown such that the housing and portion of the assembly, with the exception of the external face 12, are located within the grommet volume and are therefore protected from impact and preferably no part of the housing is exposed below the grommet apart from the power connection cable 16. On the external face 12 there is provided a power plug socket 18 of a conventional configuration for the geographical area in which the power assembly is to be used and USB ports 20,20' to which items of apparatus can be connected via USB plug and cable, and charged. The external face 12 is therefore required to be accessible externally of the desk to allow the appropriate plugs to be inserted into and removed from the sockets and ports and

2015100149 24 Dec 2015

the external face 12 is also angled as shown to prevent the risk of spilled liquid collecting on the external face 12.

The power assembly 8 , without the grommet 11, is shown in more detail in Figures 1 and 3 in which Figure 1 shows the power assembly housing 14 and portion 10 as an integral unit and in the form in which the same is ready to be installed in the aperture 4 in the item of furniture via the grommet. The unit is provided wholly assembled and no connection of power means is required. This therefore allows the assembly to be fitted into position in the item of furniture as an integral unit by passing the assembly through the aperture formed in the item of furniture until the underside of the external face of the grommet locates on the periphery of the external surface around the aperture of the item of furniture and then securing means can be provided which could be the fixing nut 15 in Figure 2, screws and/or clips which pass into the external surface or pass through to a securing member provided on the underside of the external surface of the item of furniture. At this stage the assembly is wholly installed and no electrical fitting work is required and no skilled electrician is required to be present to install the assembly.

It will be seen that the outer dimensions of the side walls of the housing 14 are within the envelope formed by the periphery of the portion 10 and can pass through the aperture 4. Also shown is the manner in which the plug socket 18 and USB ports 20, 20' are available to be used by the insertion of the appropriate plug therein. It is also shown that the power assembly in accordance with the embodiment is provided as a single unit is not required to be connected to or support any other separate power or control components, other than connection to the power supply cable. This is achieved in the current embodiment by forming the housing with at least two compartments, a first compartment 22 and a second compartment 24 as shown in Figure 3. The first compartment 22 is provided to receive the power control unit 26 which includes the plug socket 18 and below the same control means 28 and connections for the power supply to be provided to the socket. In turn, when the unit 26 is inserted into the compartment in the direction of arrow 30 the unit is locked in position and can be connected to the mains power supply cable which leads to the main housing.

2015100149 24 Dec 2015

In this embodiment the second compartments is formed from walls 32, 34 and 36, base 38 and top wall 40 which receive a movable component 42 which can be slid into position in the direction of arrow 44 to form the second compartment 24 as shown in Figure 1 which shows the component 42 having been slid into position. The control means for the USB ports 20,20' is provided in the form of a PCB 46 with appropriate control components mounted thereon along with the USB ports 20,20'. With the PCB 46 connected to the ports, the USB ports and PCB are moved into position with the component 42 by sliding the USB ports into the respective channels 50,52 in the top face 54 of the component 42 in the direction of arrow 56. With the USB ports and hence PCB located with the component 42, the component 42 is moved into position in the direction of arrow 44 to form the compartment 24 with the PCB mounted in a plane which is substantially parallel with the longitudinal axis 48 of the housing. The openings of the ports 20, 20' are then substantially in line with the apertures provided in the external face 12 as shown in Figure 1 so that the ports can be accessed from the external face to receive USB plugs therein. The component may also include a guide member (not shown) which protrudes so as to be positioned in front of the component 42 as it is moved in position and which carries wiring connecting the PCB. The power supply and control means therefore for the USB ports 20, 20' are located in the second compartment 24 and a self contained integral housing and power assembly is formed.

Figures 4 and 5 illustrate a further embodiment of the invention. In this case the embodiment includes the components described with reference to Figures 1-3. As before there is provided the housing 14 with the face 10 in which the sockets are located and as shown in Figure 4, the housing 14 is additionally provided with a recess 60 which leads to a channel 62 which depends along a side wall of the housing away from the face 10. In Figure 5 the housing 14 of Figure 4 is shown in location with the grommet 11 which allows the power assembly to be fitted to the item of furniture in the manner already described. It will be seen that the recess 60, in conjunction with the inner wall 64 of the grommet 11, forms an aperture which leads towards the channel 62. The channel receives therealong a cable 66 which is connected to a plug 68 to allow the cable, which may be a data connection cable, to be connected to an item of electrical apparatus such as a PC, audio visual apparatus or the like. Furthermore, as the cable passes along the channel 62 formed between the

2015100149 24 Dec 2015

outer surface of the housing wall and the inner surface of the grommet, so the cable is electrically isolated from the power supply located within the housing and so there are no safety concerns.

The cable can be provided in communication with a conventional feed assembly which allows the cable to be pulled in the direction indicated by arrow 70 to allow the range at which the plug 68 can be connected to the item of electrical apparatus to be selected. In an embodiment the cable can be biased such that when the plug is released from the item, the cable is automatically retracted towards the face 10 of the housing for storage purposes.

This embodiment therefore allows the power assembly to have the advantages of the provision of the USB ports as an integral part of the assembly whilst allowing the data connectivity to be provided.

Throughout the specification and claims the word "comprise" and its derivatives are intended to have an inclusive rather than exclusive meaning unless the contrary is expressly stated or the context requires otherwise. That is, the word "comprise" and its derivatives will be taken to indicate the inclusion of not only the listed components, steps or features that it directly references, but also other components, steps or features not specifically listed, unless the contrary is expressly stated or the context requires otherwise.

In the present specification, terms such as "component", "apparatus", "means", "device" and "member" may refer to singular or plural items and are terms intended to refer to a set of properties, functions or characteristics performed by one or more items having one or more parts. It is envisaged that where a "component", "apparatus", "means", "device" or "member" or similar term is described as being a unitary object, then a functionally equivalent object having multiple components is considered to fall within the scope of the term, and similarly, where a "component", "apparatus", "assembly", "means", "device" or "member" is described as having multiple items, a functionally equivalent but unitary object is also considered to fall

2015100149 24 Dec 2015

within the scope of the term, unless the contrary is expressly stated or the context requires otherwise.

It will be appreciated by those skilled in the art that many modifications and variations may be made to the embodiments described herein without departing from the spirit and scope of the invention as defined by the appended claims.

Orientational terms used in the specification and claims such as vertical, horizontal, top, bottom, upper and lower are to be interpreted as relational and are based on the premise that the component, item, article, apparatus, device or instrument will usually be considered in a particular orientation.

2015100149 24 Dec 2015

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A power assembly formed to be fitted in an item of furniture, said power assembly including a portion having a face accessible to allow the selected placement of plugs in a plurality of sockets or ports provided on the said face, including at least one socket for the receipt of a plug having a plurality of pins in a predetermined configuration and at least one USB port, said USB port provided to allow the charging of an electrical item to be achieved via the port and a USB plug connection inserted therein, said power assembly including a housing depending from the said portion and said housing accommodating a socket power supply control means for the power supply to the socket and a separate USB power supply control means for the power supply to the at least one USB port and wherein the USB power supply control means are in the form of a printed circuit board (PCB) mounted to lie on a plane substantially parallel with an axis which extends from the said portion face towards the opposing end of the housing.

2. An assembly according to claim 1 wherein the assembly is fitted to an item of furniture via a grommet with which the assembly locates and the grommet in turn locates with the periphery of a substantially circular aperture in the item of furniture.

3. An assembly according to claim 1 wherein the housing includes two compartments, a first compartment in which the plug socket power supply and control means are provided and a second compartment in which the at least one USB charging port power supply and control means therefore are provided.

4. An assembly according to claim 1 wherein there is provided at least one data cable passing through a channel formed in the assembly and connected to a plug which is available for the user to use to connect the cable to an item of electrical apparatus.

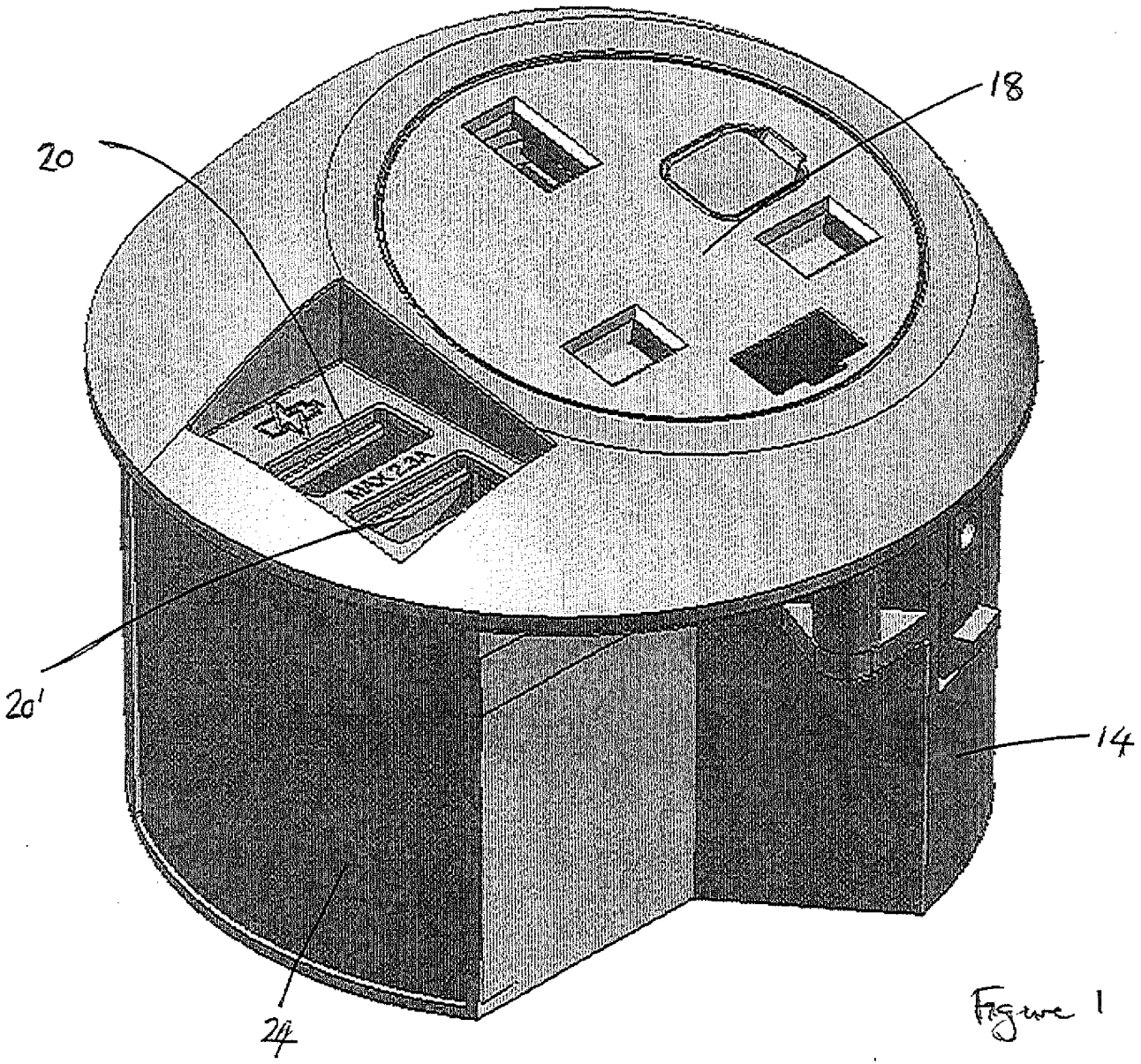


Figure 1

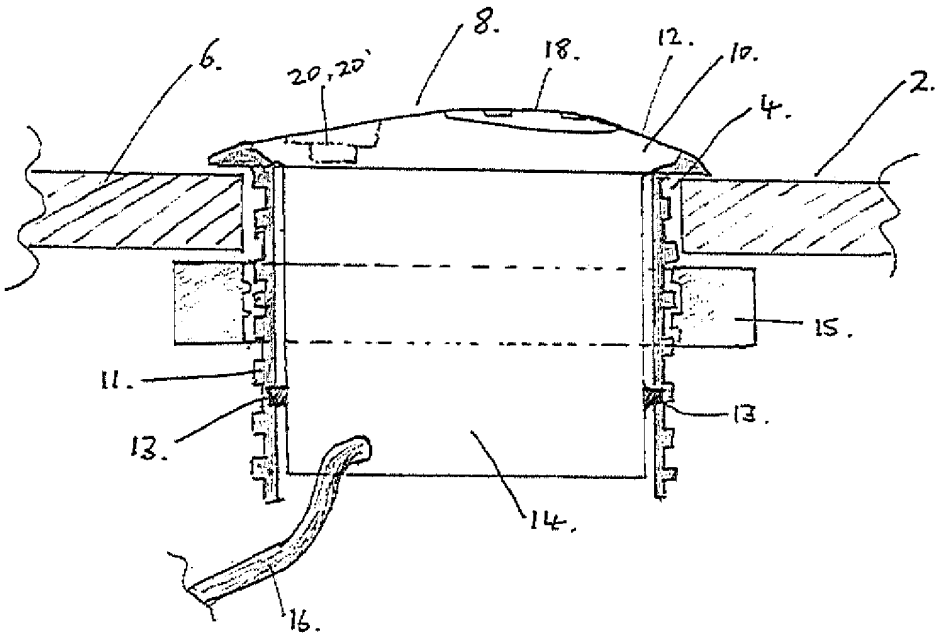
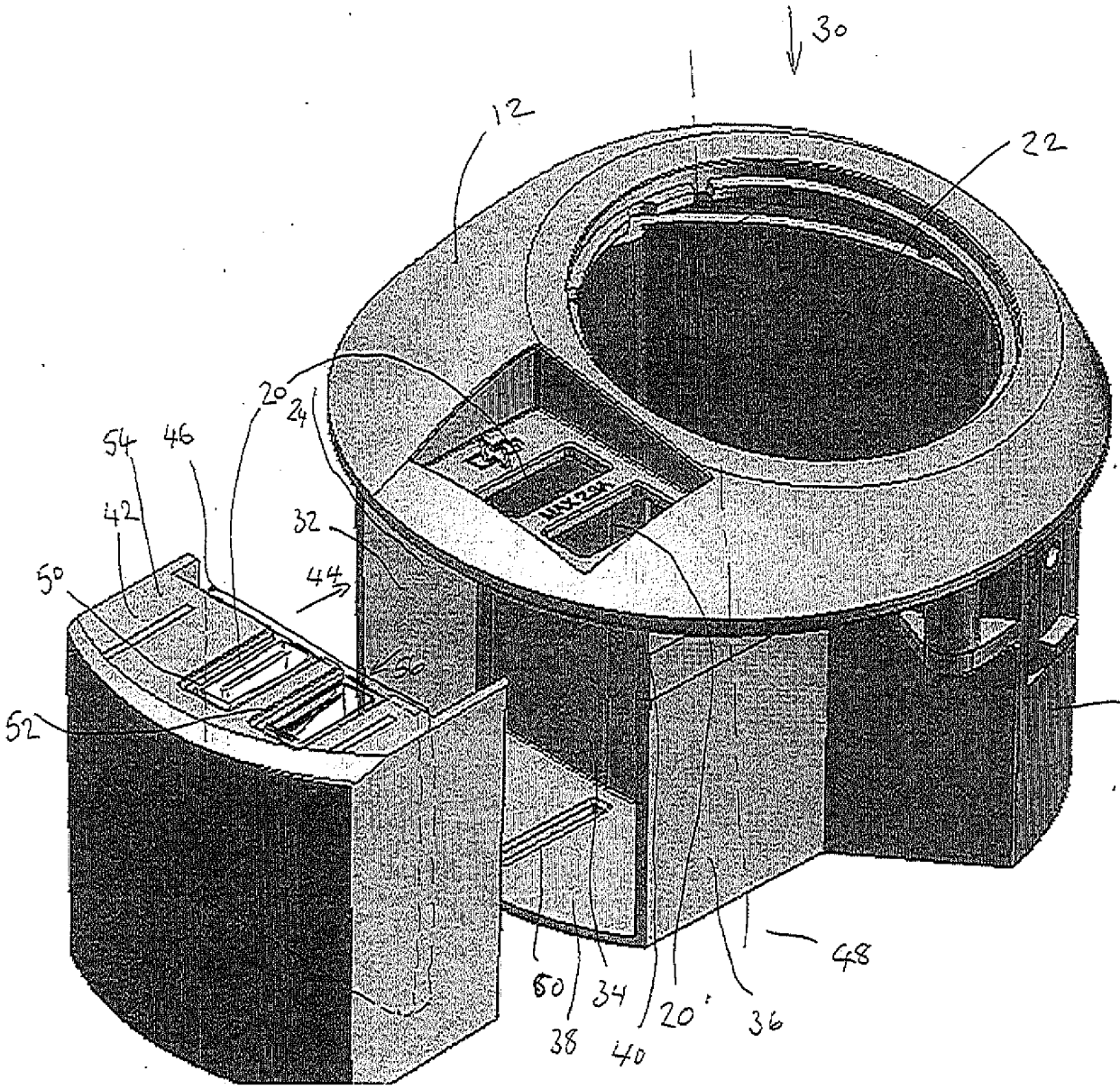


Figure 2.



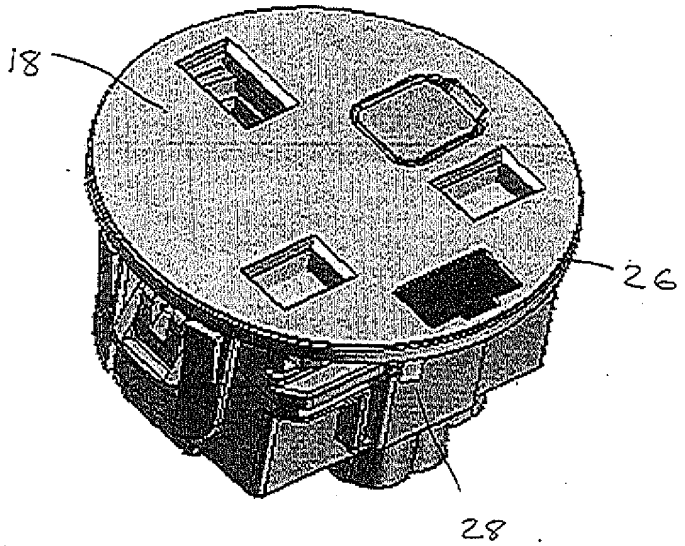


Figure 3

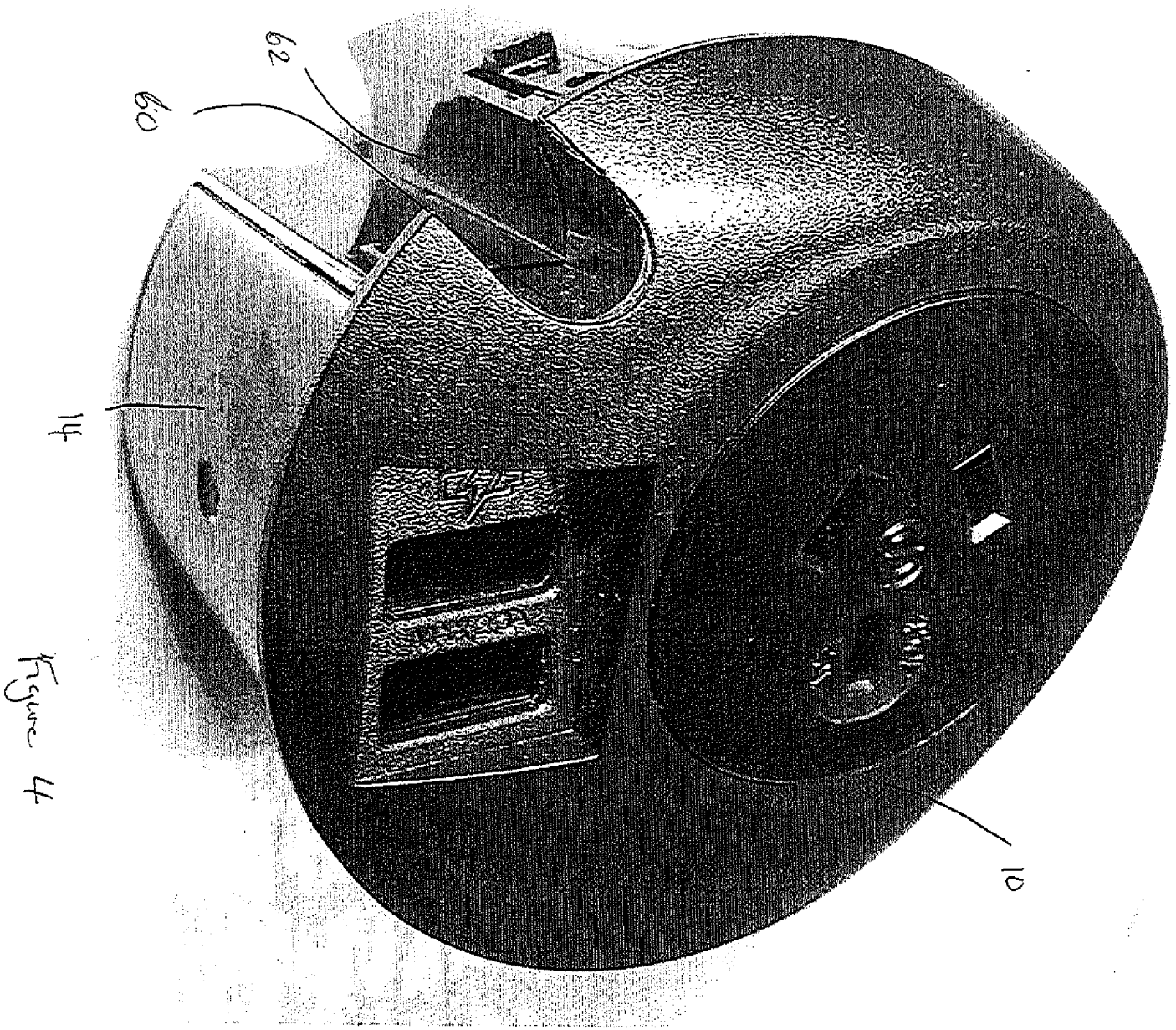


Figure 4

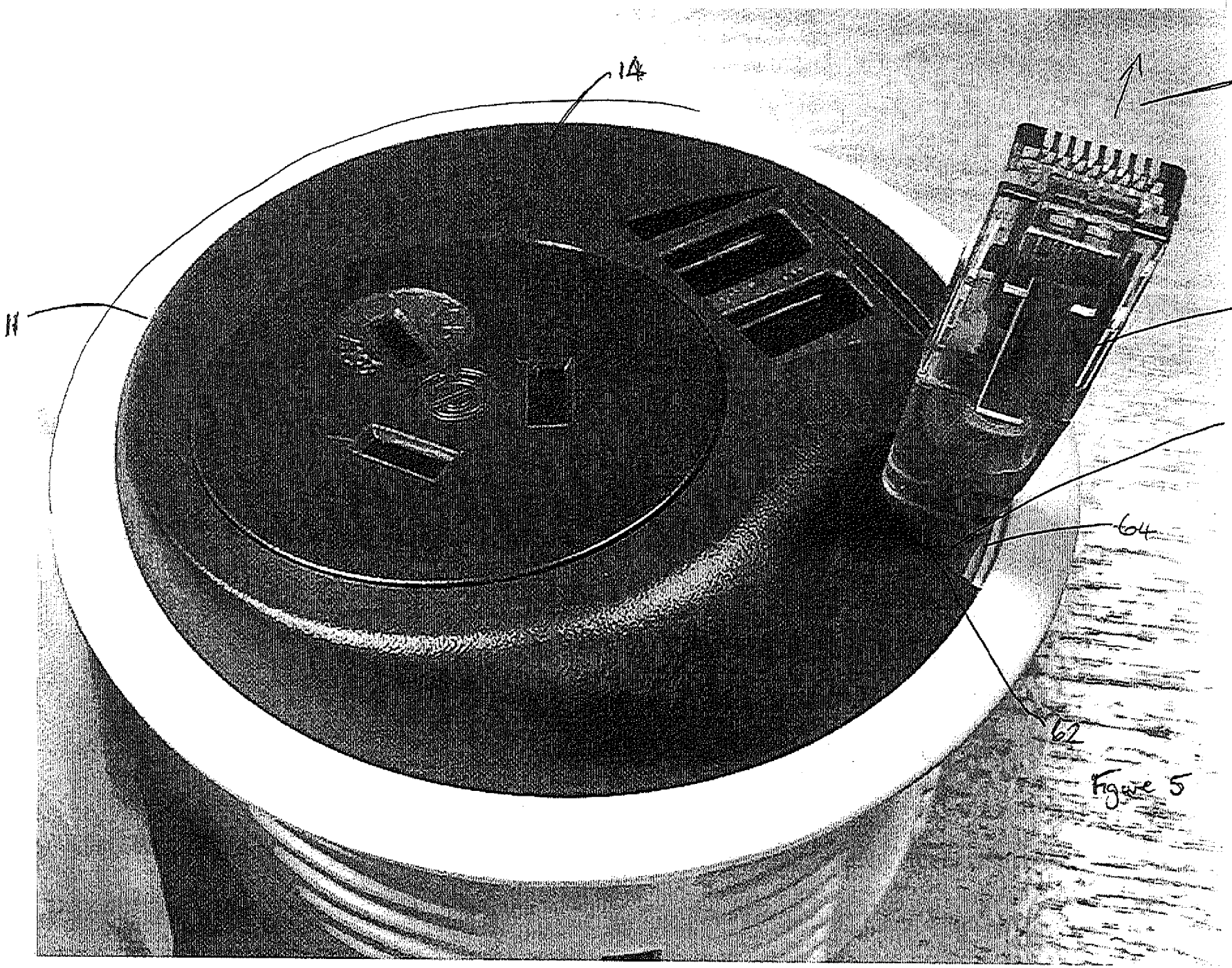


Figure 5