

(54) Title of the Invention: Dual combined socket and wireless charging apparatus

(51) INT CL: *H02J 50/10* (2016.01) *H01R 13/66* (2006.01) *H02J 7/00* (2006.01) *H02J 7/02* (2016.01)

(21) Application No: 1509798.3

(22) Date of Filing: 05.06.2015

(30) Priority Data:
(31) 1410068 (32) 06.06.2014 (33) GB

(43) Date of A Publication 02.03.2016

(72) Inventor(s):
Timothy Hobbs

(73) Proprietor(s):
OE Electrics Limited
OE House, Thomas Maddison Lane, Calder Park,
Wakefield, Yorkshire, WF4 3GH, United Kingdom

(74) Agent and/or Address for Service:
Bailey Walsh & Co LLP
1 York Place, Leeds, LS1 2DR, United Kingdom

(56) Documents Cited:

GB 2525712 A	CN 203243084 U
CN 201829996 U	CN 201805095 U
CN 103683849 A	US 20130335020 A1
US 20130285601 A1	US 20130207472 A1
US 20110018360 A1	US 20100001685 A1

(58) Field of Search:

As for published application 2529743 A viz:

INT CL **H01R, H02J**

Other: **WPI, EPODOC**

updated as appropriate

Additional Fields

Other: **None**

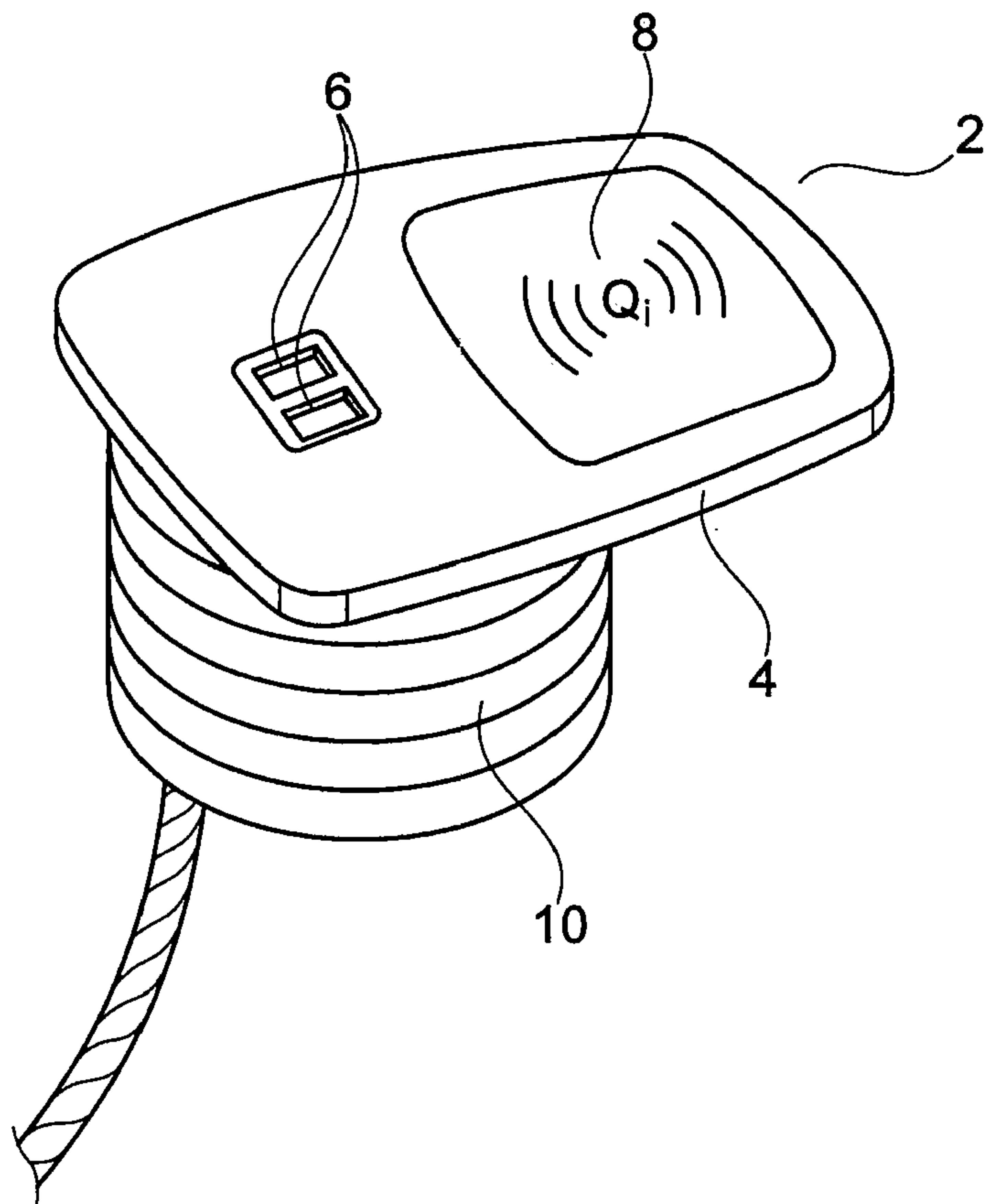
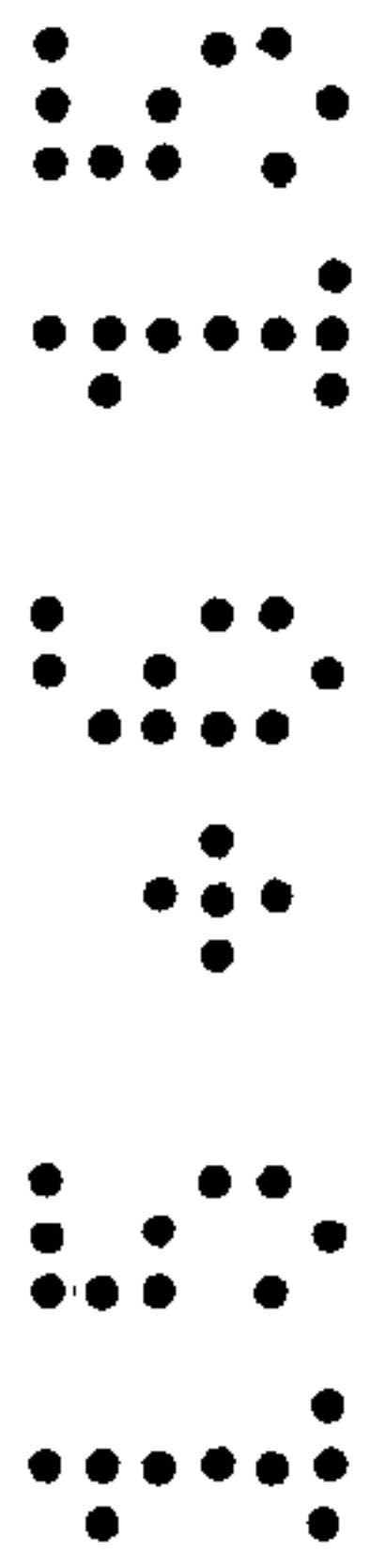


Fig. 1



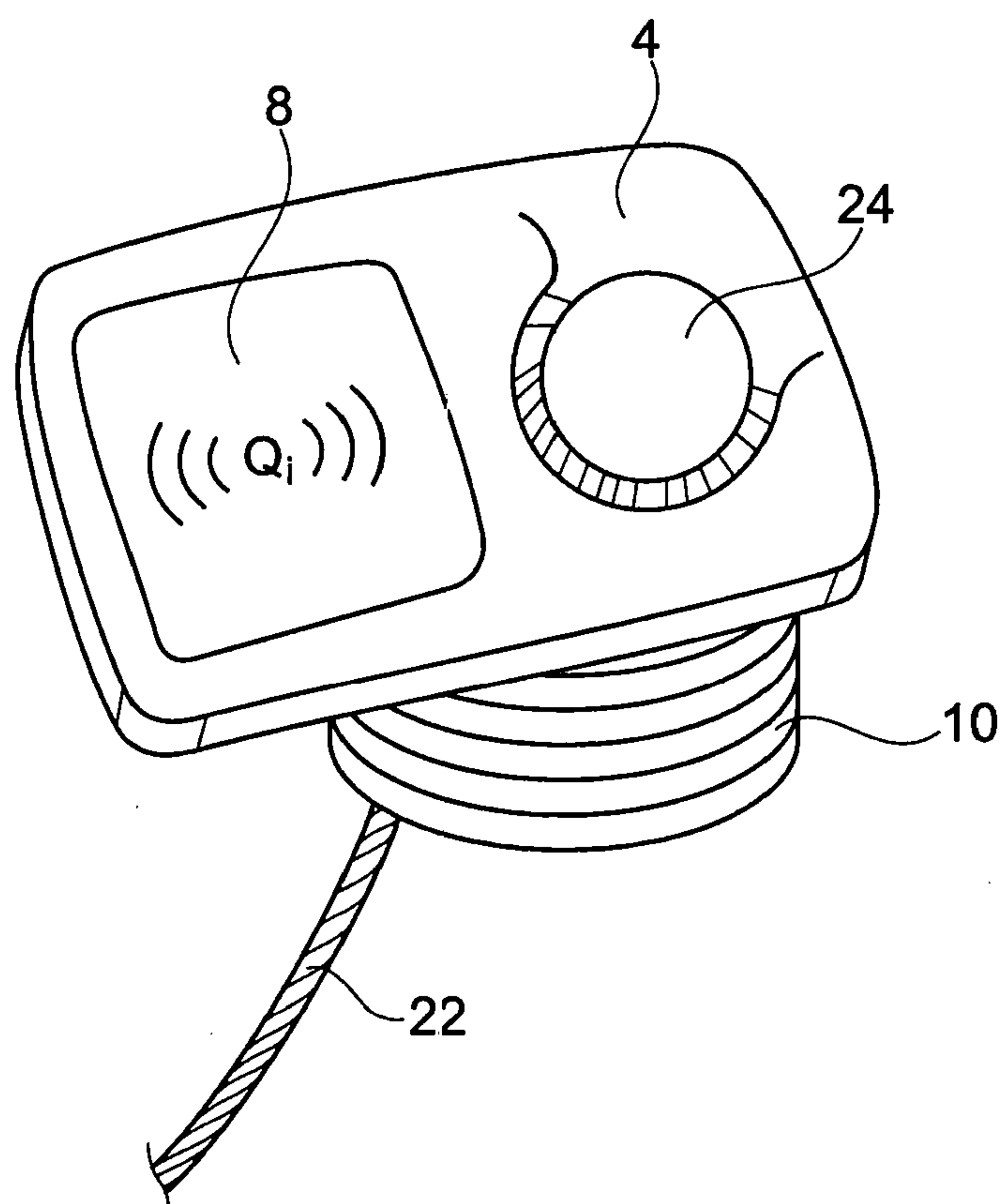
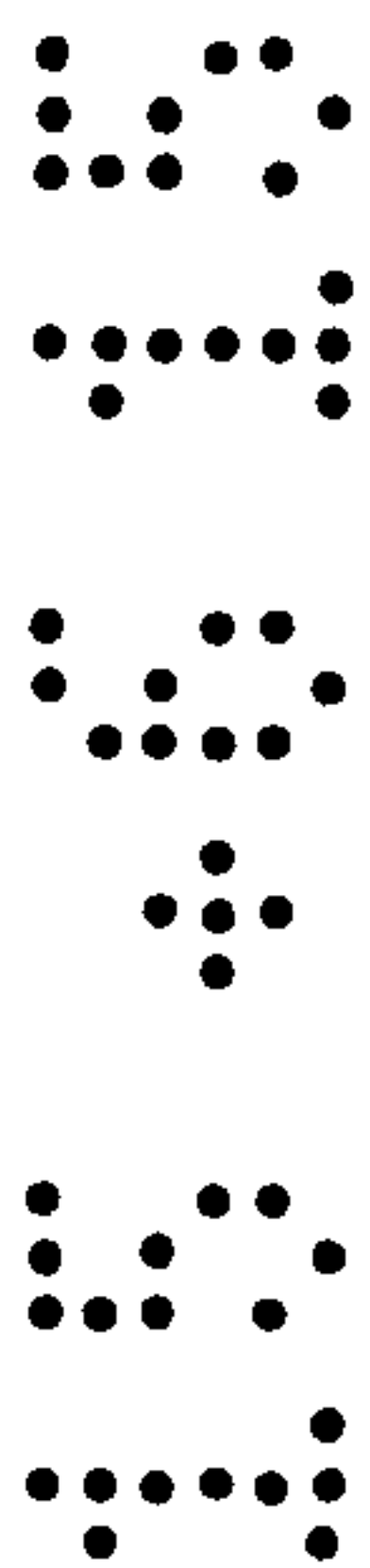


Fig. 2



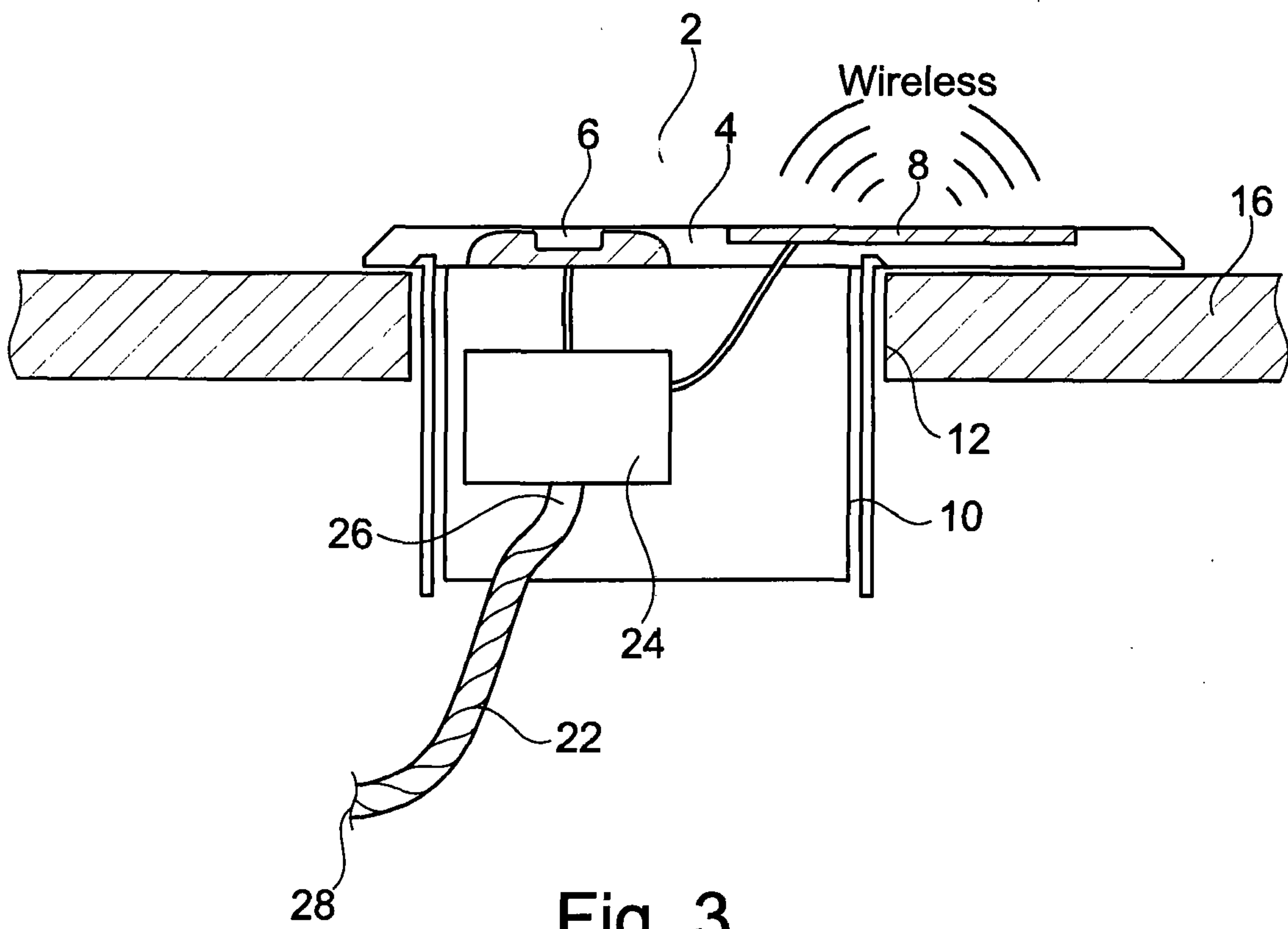


Fig. 3

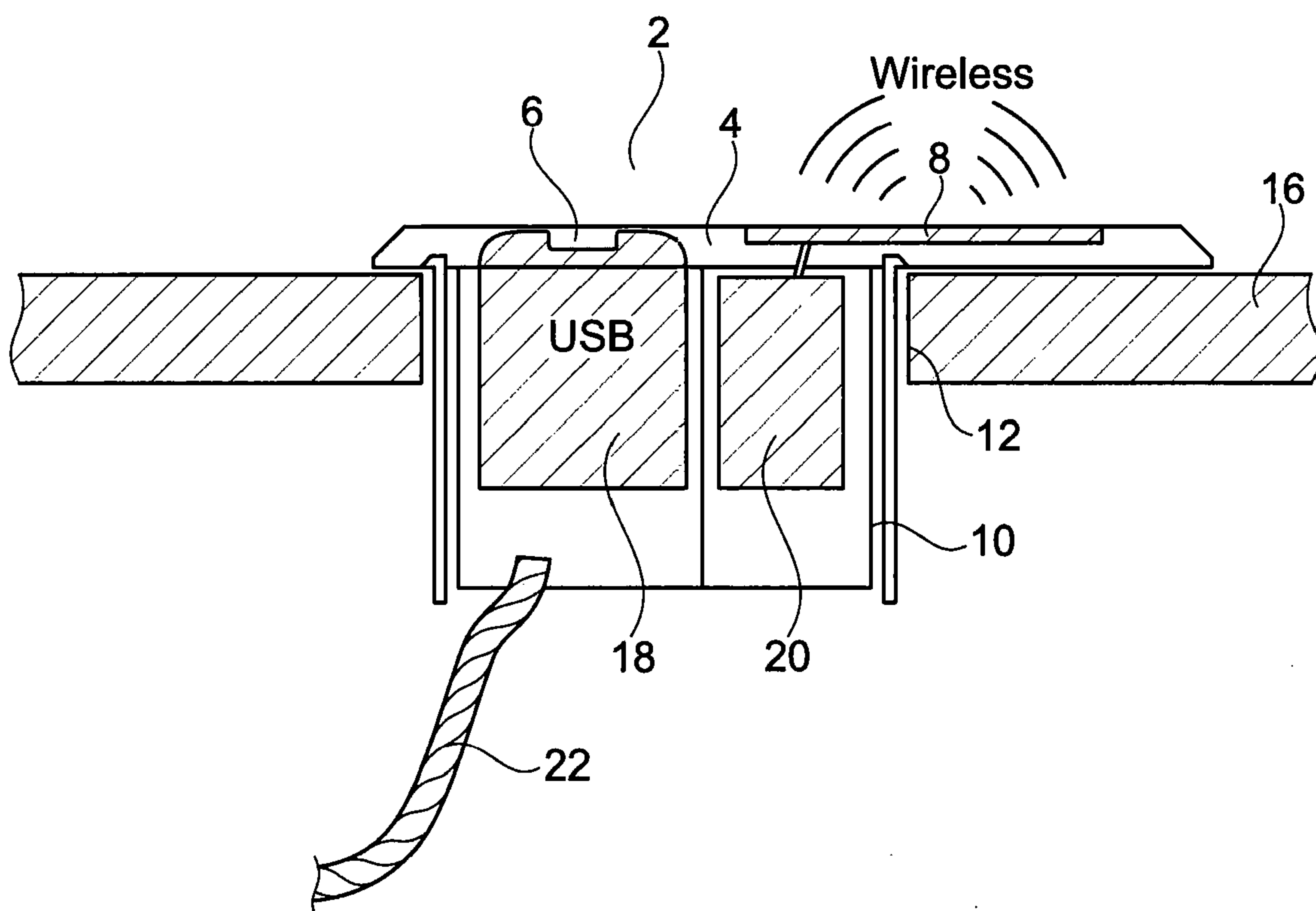


Fig. 4

Dual Combined Socket and Wireless Charging apparatus

The invention to which this application relates is a power assembly of a type which has a portion on which is provided at least one form of socket which allows a power supply to be provided to a device attached to the socket via a plug.

The applicant's co-pending application no. GB1402677.7, the details of which are incorporated herein, describes an assembly which is provided to be located in an aperture formed in an item of apparatus and most typically an aperture formed in a worktop of the item of furniture. Most typically, although not necessarily exclusively, the aperture is provided in the form of a circular aperture and more typically an 80mm diameter aperture. The assembly includes a fitting frame which fits into the aperture and is secured thereto. This frame, in turn, receives and locates a housing with an external portion in which are provided connection means for a power supply. The power supply is connected to a socket of a first type which is located on an external portion of the assembly and the same or a further power supply is connected to at least one further socket of a second type which is also located on the same external portion of the assembly.

Typically the sockets can receive suitably configured plugs to allow a power charge to be provided from the socket to the plug and, in turn, the device connected to the plug, typically via a suitable cable connection.

It is also known to provide charging means which can be mounted on an item of furniture and which allow the wireless charging of a device without the need for a cable connection between the device and the charging source. This form of charging is typically known as magnetic resonance or inductance charging and allows a suitably configured device to be charged when it is within range of the charging apparatus. Conventionally these wireless charging transmitters are supplied as single function devices and not combined with power sockets or USB charging ports and are supplied with a separate power supply unit with AC plug

for connection to an AC supply in order to supply DC power to the wireless charging transmitter unit via a supplied lead.

Therefore conventionally if it is required to provide charging capability mounted on an item of furniture by both wireless charging and mains AC and USB charging sockets then two separate assemblies would need to be fitted requiring multiple connections to the building AC power supply and more than one separate mounting locations on the furniture. This is unsatisfactory as this represents an inefficient provision of cable and wireless charging functions.

Such power assemblies are typically required to be fitted through an aperture which is relatively confined in size such as the 3 inch or 80mm diameter aperture commonly formed in an external portion of the item of furniture. This can include the requirement for the passage of power and data cables and the majority of the assembly so that all typically have to be accommodated in a relatively confined cavity formed within the item of furniture.

In a first aspect of the invention there is provided apparatus for fitment with respect to an aperture in an item of furniture, for providing electrical power to charge and/or operate at least one device said apparatus includes at least one AC mains power supply socket and at least one DC USB configuration socket, each of said sockets adapted to receive a plug to allow power to be provided from the socket to a device, at least one wireless charging transmitter to provide power to a device by magnetic resonance or induction and at least one AC to DC power supply unit connected to the AC mains power supply and to which the at least one DC USB socket and at least one wireless charging transmitter are connected to supply DC power thereto said apparatus including an external portion in which said sockets are located, said external portion located above the surface of the item of furniture so that the sockets and wireless charging transmitter are accessible,

said external portion located with a housing portion in which said AC to DC power supply unit and control means therefore are located and connected to the AC mains power supply and the cross sectional area of the external portion is greater than the cross sectional area of the housing which is located in the aperture in the item of furniture wherein the external portion includes means to identify the location of the device required to be charged by means of wireless charging, and/or to locate said device.

In one embodiment the said at least one mains AC power socket has a pin configuration to suit particular geographical requirements. In addition or alternatively at least one low voltage DC socket is provided which allows the reception of a USB plug. The USB socket may be of the type A or C configuration or a combination of USB plug configurations could be provided.

Typically the apparatus housing of the apparatus accommodates power supply control means for the AC power supply to the socket and at least one power supply control means for providing low voltage DC power to the USB ports and/or wireless charging transmitter, so that a separate external AC to DC power supply is not required.

Typically the apparatus the apparatus is a complete assembly with a prewired mains AC power supply cable which is connected to a suitable plug type for connection to the mains AC electricity power supply of the building in which the apparatus is to be used is provided as a single unit which can be safely fitted into the aperture formed in an external portion of the item of furniture, typically a circular aperture, in the region of 3 inches or 80mm diameter.

In one embodiment the apparatus is located in an aperture formed on the item of furniture such that the external portion of the assembly in which the sockets are provided can be located in a vertical, horizontal plane or at any angle in between when the item of furniture is in use.

Typically the apparatus housing accommodates power supply control means for the AC power supply to the socket and power supply control means for the DC power supply to the USB ports and/or wireless charging transmitter so that a separate external AC to DC power supply is not required.

Typically the apparatus is a complete assembly with a prewired mains AC power cable which is connected to a suitable plug type for connection to the mains AC electricity power supply of the building in which the apparatus is to be used and then provides power to all of said AC power sockets, USB charging outlets and wireless charging transmitter or control means thereof.

Typically the apparatus can be fitted in position in an item of furniture as a single unit and connected to the mains AC supply by a single power supply cable. Typically the assembly is fitted to an external portion of the item of furniture and the portion with the sockets formed thereon in line with or protrudes to the front of the external portion with the remainder of the assembly located to the rear of the external portion of the item of furniture.

In one embodiment the external portion has a substantially rectangular cross section and a circular cross section for the part of the housing fitting through the aperture in the item of furniture.

In one embodiment the power supply unit is provided as part of a housing which depends from a face of the said portion which opposes the face of the portion which is accessible by the user.

In one embodiment the apparatus is located in an aperture formed on the item of furniture such that the external portion of the assembly in which the sockets are provided can be located in a vertical or horizontal plane or at any angle in between when the item of furniture is in use.

In one embodiment the provision of DC voltage to both wireless charging transmitter and USB charging sockets is provided by a single AC to DC power supply. The aim being to achieve significant improvements in electrical efficiency and standby power consumption over having separate power supplies and allow the apparatus to be of a size to allow the same to be fitted as an integral unit and still fit within an aperture in furniture constrained in size as described earlier

In one embodiment the said single AC to DC power supply unit may have dual output voltages to allow the use of wireless power control circuitry which requires a different DC input voltage than the USB power control circuitry, thereby achieving maximum charging performance from both charging means without the need for separate AC to DC power supplies.

In one embodiment, the housing includes at least two compartments. In one embodiment there is a first compartment in which the power supply and control means therefore, for an AC power socket are provided and a second compartment in which the power supply and control means therefore, for USB charging ports and/or a wireless charging transmitter unit are located.

In one embodiment, the housing includes a first compartment in which the control means for the power supply to an AC power socket are provided and a second compartment in which the control means for at least one USB charging socket and/or wireless charging transmitter unit are located and a third compartment for the location of an AC to DC power supply for providing low voltage DC power to the USB charging or wireless charging control means in order to provide both electrical and heat separation between the power supply and control circuitry.

In one embodiment, the housing includes a first compartment in which both the control means and AC to DC power supply for USB charging ports, a second compartment in which the control means for a wireless charging transmitter unit

are located and a third compartment for the location of an AC to DC power supply for providing low voltage DC power to the wireless charging control means thereby providing electrical and heat separation between power supply and wireless charging control circuitry.

In one embodiment, the housing includes a first compartment in which the control means for both the USB charging ports and a wireless charging transmitter unit are located and a second compartment for the location of a single AC to DC power supply for providing low voltage DC power to the both the USB charging and wireless charging control means whilst providing electrical and heat separation between the power supply and control circuitry.

In one embodiment, the housing includes a first compartment in which both the control means for USB charging ports and the single shared AC to DC power supply are provided, and a second compartment in which the control means for a wireless charging transmitter unit are located thereby providing electrical and heat separation between the power supply and wireless charging control circuitry.

In one embodiment, the housing includes a first compartment in which the control means for USB charging ports are provided, a second compartment in which the control means for a wireless charging transmitter unit are located and a third compartment for the location of a single AC to DC power supply for providing low voltage DC power to the both the USB charging and wireless charging control means whilst providing electrical and heat separation between the power supply and control circuitry.

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

In one 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 portion.

In one 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 one 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 one 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 first or second compartment.

In one embodiment, the control means for the power supply to the wireless charging transmitter unit are provided on a printed circuit board and the printed circuit board is located within said first or second compartment.

In one embodiment, one or both said printed circuit boards are mounted to lie on a plane which is substantially perpendicular to the portion of the power assembly. Typically the said plane is substantially parallel with the longitudinal axis of the housing.

In one embodiment, one or both said printed circuit boards are mounted to lie on a plane which is substantially parallel with the external portion of the power assembly and/or with the horizontal axis of the housing.

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

In one 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.

Typically the centre of the AC plug socket and /or the USB charging sockets is offset to one side of the centre of the said external portion of the assembly

portion. Typically the portion is formed so as to protrude above the external portion of the item of furniture to which the same is fitted and the external portion 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.

In one embodiment the portion of the assembly may incorporate a spring loaded shutter mechanism to hide and protect the USB sockets when not in use.

Typically the assembly can 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 one 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 BS6396.

Typically the assembly is provided as an integral fire resistant and electrically safe unit.

When one considers such a power assembly is required to be fitted through an aperture which is relatively confined in size such as the 3 inch or 80mm diameter aperture commonly formed in an external portion of the item of furniture to allow the passage of power and data cables 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, especially as the desire is to provide a complete electrically insulated enclosure with a prewired power cord to suitable plug. It will therefore be appreciated that the provision of the various socket, ports, power unit and control components as part of an assembly to be fitted in available space has

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.

In one embodiment the portion of the assembly may incorporate a spring loaded shutter mechanism to hide and protect the USB sockets when not in use.

Typically the assembly can 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 one 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 BS6396.

Typically the assembly is provided as an integral fire resistant and electrically safe unit.

When one considers such a power assembly is required to be fitted through an aperture which is relatively confined in size such as the 3 inch or 80mm diameter aperture commonly formed in an external portion of the item of furniture to allow the passage of power and data cables 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, especially as the desire is to provide a complete electrically insulated enclosure with a prewired power cord to suitable plug. It will therefore be appreciated that the provision of the various socket, ports, power unit and control components as part of an assembly to be fitted in available space has

not previously been successfully achieved until the apparatus as herein described which provides a safe, electrically insulated enclosure with a prewired power cord to a suitable mains plug connection.

Specific embodiments of the invention are now described wherein;

Figure 1 illustrates a first embodiment of the apparatus in accordance with the invention ;

Figure 2 illustrates a further embodiment of the invention;

Figure 3 illustrates a cross section elevation showing the interior of the apparatus of Figure 1; and

Figure 4 illustrates a cross section elevation showing the interior of the apparatus of Figure 1 in a second embodiment.

Referring first to Figure 1 there is illustrated apparatus 2 in accordance with one embodiment of the apparatus. The apparatus includes an external portion 4 which is provided to be located so as to be externally accessible when the apparatus is in use and inserted in an aperture 12 formed in the worktop 16 of the item of furniture. The external portion, in this embodiment, includes two USB sockets 6 for the selective receipt of USB plugs therein to provide a power charging effect to a device connected by cable to the USB plug.

In addition, the external portion includes a wireless charging location area 8 with a wireless charging transmitter (typically including a coil) and which may be provided as an inductance or resonance charging transmitter which is located on the underside of the portion and which allows the provision of an electrical charge wirelessly to a device within a predetermined range of the same.

Figure 1 illustrates the manner in which the base portion of the housing 10 is circular in cross section.

Figure 2 illustrates a further embodiment of the invention in which the USB ports are not provided and are substituted with a mains power plug socket 24 with a suitable pin configuration.

In each embodiment it will be seen that the size of the external portion 4 is greater than the cross sectional size of the housing 10 so as to be able to accommodate the socket and wireless charging functionality in combination so as to allow both of the same to be externally available for the user to select to use one or both charging functions simultaneously.

In Figure 3 it is illustrated how the housing 10 is provided with a power supply unit 24 which is connected to one end 26 of a mains power supply cable 22 which, at the opposing end 28, is connected to a mains power supply of the building in which the apparatus is to be used. (not shown)

Turning now to Figure 4 it is shown how the apparatus has compartments formed therein to respectively receive therein control circuitry 18 for the USB ports 6 and control circuitry 20 connected to the wireless charging transmitter 8. A power cable 22 is provided to provide power to a common power supply unit in the housing or a power supply unit may be provided for each of the charging options and located in the respective compartments. The power supply units are connected to provide a power supply to the wireless charging transmitter and the at least one socket via the appropriate control circuitry.

Typically, the power supply unit 24 is common to provide power to both the charging socket 6 and the wireless charging transmitter 8. The power supply from

the power supply unit to each of the charging options can be controlled to be the same, or alternatively the power supply unit can be controlled such that the power supply provided to the charging options can be AC or DC or a combination of both.

Furthermore, the voltage of the power supply provided to each of the charging options may be selected to provide the appropriate charge such that, for example, voltage level to the sockets may be different to the voltage level provided to the wireless charging transmitter. In one embodiment the power supply to the socket and wireless charging transmitter can be up to 100W and in the range of 5-20 Volts. In one embodiment when a device is connected to be charged by the socket, or is in the range of the wireless charging transmitter, the device and/ or a connecting cable, when provided, will send a signal which indicates the particular charging parameters which are required to be provided and the power supply unit of the apparatus will be controlled by control means provided as part of the apparatus to supply the required charging parameters via the socket or wireless charging transmitter, as appropriate. The ability to provide the power in the range indicated is achieved by the ability to provide improved efficiency in the power supply unit and control means therefore and thereby prevent or reduce the build up of heat in operation of the apparatus and, in turn, allow the size of the apparatus to be provided within the required parameters.

In one embodiment the power supply unit and control means design comprises, and AC/DC power conversion printed circuit board connected to a DC power supply control board which includes an integrated circuit to recognise the device connected to be charged at that time and the device parameters and, in one embodiment, a data communication hub option.

The data communication hub option allows, in addition to the charging capacity via the socket and wireless charging, the ability for data communication between

devices which are connected to the apparatus via a plurality of sockets provided as part of the apparatus.

Typically the apparatus is modular in as much that the portion for the provision of the charging means includes one or more apertures into which modular socket units and/or wireless charging transmitter units can be selectively placed in order to provide the apparatus with the required charging/ socket configuration for a particular use.

There is therefore provided charging apparatus which allows multiple charging options to be selectively used by a user to charge one or more devices therefrom, with the apparatus being provided with a single cable connection to at least one power supply unit provided as part of the apparatus. The single charging cable may be provided to one power supply unit which is connected to provide power to both charging options or may be connected to two power supply units, one unit being provided for each of the charging options.

Claims- clean copy

1.Apparatus for fitment with respect to an aperture in an item of furniture, for providing electrical power to charge and/or operate at least one device said apparatus includes at least one AC mains power supply socket and at least one DC USB configuration socket, each of said sockets adapted to receive a plug to allow power to be provided from the socket to a device, at least one wireless charging transmitter to provide power to a device by magnetic resonance or induction and at least one AC to DC power supply unit connected to the AC mains power supply and to which the at least one DC USB socket and at least one wireless charging transmitter are connected to supply DC power thereto said apparatus including an external portion in which said sockets are located, said external portion located above the surface of the item of furniture so that the sockets and wireless charging transmitter are accessible, said external portion located with a housing portion in which said AC to DC power supply unit and control means therefore are located and connected to the AC mains power supply and the cross sectional area of the external portion is greater than the cross sectional area of the housing which is located in the aperture in the item of furniture wherein the external portion includes means to identify the location of the device required to be charged by means of wireless charging, and/or to locate said device.

2. Apparatus according to claim 1 wherein the socket is connected to a power supply unit or directly to the mains power supply and the wireless charging transmitter is connected to a further power supply unit.

3 Apparatus according to any of the preceding claims wherein the apparatus includes a housing which accommodates power supply control means for the AC power supply to the at least one socket and/or power supply control means for providing low voltage DC power to the at least one socket and/or wireless charging transmitter.

23 02 21

4. Apparatus according to claim 1 wherein the apparatus includes a prewired mains AC power supply cable which is provided to be connected to the mains AC electricity power supply of the building in which the apparatus is to be used.

5 Apparatus according to claim 1 wherein the aperture is a circular aperture with a diameter of substantially 80mm.

6 Apparatus according to claim 1 wherein the external portion has a substantially rectangular cross section and the housing has a substantially circular cross section.

7 Apparatus according to any of the preceding claims wherein a single AC to DC power supply unit is provided which has dual output voltages to allow a different DC input voltage level to be provided to the wireless charging transmitter than is provided to the control means for the USB power socket.

8. Apparatus according to claim 3 wherein the housing includes at least two compartments.

9 Apparatus according to claim 8 wherein a first compartment includes a power supply unit and control means therefore for an AC power socket and a second compartment in which a power supply unit and control means therefore for a USB charging socket and/or a wireless charging transmitter are located.

10 Apparatus according to claim 8 wherein a first compartment includes control means for the power supply to an AC power socket and a second compartment includes control means for at least one USB charging socket and/or wireless charging transmitter unit are located and a third compartment including an AC to

DC power supply unit to provide low voltage DC power to the USB charging socket and/or wireless charging transmitter control means.

11. Apparatus according to claim 8 wherein the housing includes a first compartment in which both the control means and AC to DC power supply unit for a USB charging socket are provided, a second compartment in which the control means for a wireless charging transmitter are located and a third compartment including an AC to DC power supply unit to provide low voltage DC power to the wireless charging transmitter control means.

12 Apparatus according to claim 8 wherein a first compartment includes control means for both the USB charging socket and a wireless charging transmitter and a second compartment including a AC to DC power supply unit to provide low voltage DC power to both the USB charging socket and wireless charging transmitter control means.

13 Apparatus according to claim 8 wherein a first compartment includes control means for the USB charging socket and a AC to DC power supply unit and a second compartment includes control means for a wireless charging transmitter.

14 Apparatus according to claim 8 wherein a first compartment includes control means for a USB charging socket, a second compartment in which the control means for a wireless charging transmitter unit are located and a third compartment for the location of an AC to DC power supply unit to provide low voltage DC power to the USB charging socket and wireless charging transmitter.

15 Apparatus according to claim 8 wherein a first compartment includes a power supply unit and control means therefore, for a USB charging socket and a second

compartment includes a power supply unit and control means for a wireless charging transmitter.

16 Apparatus according to any of claims 8-15 wherein at least one part of the housing is formed by a component which is separable from the remainder of the housing.

17 Apparatus according to claim 16 wherein one of the compartments is formed by a part 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.

18 Apparatus according to any of the preceding claims wherein the control means for the power supply to the USB charging socket and wireless charging transmitter are provided on one or respective printed circuit boards which are located within the housing.