

Extendable Panel

Technical Field

The present disclosure relates to an extendable panel, and more particularly to an extendable panel with an external functional module interface.

Background of the Invention

Panel is a common device used for a power socket or switch in daily life or production sites. The power socket is a common device for power distribution and is normally installed on the wall. When the power socket on the wall cannot satisfy the needs for user equipment, users usually utilize an external power socket, commonly known as a power strip. The power strip is a moveable power distributor for converting one power input into a plurality of power outputs. The prior art CN203813113U proposes an extendable combined module power socket for the defect that the traditional power strip is not extendable. However, the extendable combined module power socket is a moveable power strip, which is not applicable to the extension of the wall power socket. The prior art CN203787659U further proposes a module socket that can be used for wall power socket extension and power strip. However, it is inconvenient for the module socket to extend the socket that has already been installed on the wall because when extended the hole-digging construction on the wall is required or its product will protrude out of the wall much, causing inconvenience for the use of the power strip.

Furthermore, for the daily life increasingly getting electronic now; in the household it is always need to use all kinds of small electronic products, such as mobile phones, alarm clocks and wireless routers etc. However, the current power socket can not provide convenience service for the electricity demands of those small electronic products.

Summary of the invention

To this end, the present disclosure proposes an extendable panel with an external functional module interface, which can be used for the wall-mounted power socket and/or switch. With the extendable panel of the present disclosure, the user can easily extend a further external functional module on the already-installed wall power socket and/or switch, which can maintain the panel appearance neat and elegant.

In a first aspect of the disclosure, an extendable panel is provided, the panel comprises a main panel and a side panel, wherein the side panel includes a first interface having a first connecting structure which is suitable to form a detachable connection with an external functional module.

According to one embodiment of the first aspect of the disclosure, the panel further comprises a shielding cover for shielding the first interface.

According to one embodiment of the first aspect of the disclosure, the first interface is one or more.

According to one embodiment of the first aspect of the disclosure, the first connecting structure comprises one or more butt holes which are suitable for receiving a butt protrusion of the external functional module to form a locking connection.

According to one embodiment of the first aspect of the disclosure, the first connecting structure comprises at least one butt protrusion which is suitable for inserting into a butt hole of the external functional module to form a locking connection.

According to one embodiment of the first aspect of the disclosure, the side panel further comprises a guide groove in which the first interface is located, the guide groove being suitable for matching with a guide protrusion of the external functional module.

According to one embodiment of the first aspect of the disclosure, the shielding cover is connected with the main panel or the side panel through a bendable joint.

According to one embodiment of the first aspect of the disclosure, the shielding cover is a removable component and comprises a second connecting structure which is suitable for matching with the first connecting structure to form a detachable connection.

According to one embodiment of the first aspect of the disclosure, the first interface comprises a first electrically conductive contact chip for forming an electrical connection with the external functional module.

According to one embodiment of the first aspect of the disclosure, the main panel comprises a power jack and/or switch.

According to a second aspect of the disclosure, an extendable panel assembly is provided, the assembly comprises a panel and an external functional module, wherein the panel includes a main panel and a side panel, the side panel including a first interface having a first connecting structure, and the external functional module includes a second interface having a second connecting structure, the first connecting structure and the second connecting structure being suitable for forming a detachable connection.

According to one embodiment of the second aspect of the disclosure, the assembly further comprises a shielding cover for shielding the first interface.

According to one embodiment of the second aspect of the disclosure, the first interface is one or more and the second interface is one or more.

According to one embodiment of the second aspect of the disclosure, the first connecting structure comprises one or more butt holes and the second connecting structure comprises a butt protrusion, the butt holes being suitable for receiving the

butt protrusion to form a locking connection.

According to one embodiment of the second aspect of the disclosure, the first connecting structure comprises at least one butt protrusion and the second connecting structure comprises a butt hole, the butt protrusion being suitable for inserting into the butt hole to form a locking connection.

According to one embodiment of the second aspect of the disclosure, the side panel further comprises a guide groove in which the first interface is located, and the external functional module comprises a guide protrusion, the guide groove matching with the guide protrusion.

According to one embodiment of the second aspect of the disclosure, the shielding cover is connected to the main panel or the side panel through a bendable joint.

According to one embodiment of the second aspect of the disclosure, the shielding cover is a removable component and comprises a second connecting structure.

According to one embodiment of the second aspect of the disclosure, the first interface comprises a first electrically conductive contact chip and the second interface comprises a second electrically conductive contact chip, the first electrically conductive contact chip forming an electrical connection with the second electrically conductive contact chip.

According to one embodiment of the second aspect of the disclosure, the main panel comprises a power jack and/or switch.

The extendable panel and the extendable panel assembly of the disclosure allows the user to easily and conveniently extend or replace various external functional modules by the extension interface at the side of the panel. The appearance can be

linked or extended at will to satisfy the diverse needs of the user. In terms of daily life, some small objects, such as alarm clocks, pen containers, small calendars and stick notes, can act as a part of the external functional module to be detachably attached on the wall socket and/or switch for convenience use of the user anytime anywhere.

Brief Description of the Accompanying Drawings

The embodiments of the disclosure are described only by way of examples with reference to the drawings, wherein:

Fig. 1A and Fig. 1B respectively schematically illustrate the appearance perspective view and the exploded perspective view of an extendable panel according to an embodiment of the disclosure;

Fig. 2A and Fig. 2B respectively schematically illustrate the appearance perspective view and the exploded perspective view of an extendable panel assembly according to an embodiment of the disclosure;

Fig. 3 schematically illustrates a local diagram of the extendable panel according to the embodiment of the disclosure during installing an external functional module;

Fig. 4A schematically illustrates a local diagram of the extendable panel according to the embodiment of the disclosure during installing an external functional module and Fig. 4B is a perspective mirror image diagram of Fig. 4A;

Fig. 5A schematically illustrates a local diagram of the extendable panel according to the embodiment of the disclosure during installing an external functional module and Fig. 5B is a perspective mirror image schematic diagram of Fig. 5A;

Figs. 6A and 6B schematically illustrate a diagram of the installation process of an extendable panel assembly according to another embodiment of the disclosure; Fig. 6C is a perspective mirror image diagram of Fig. 6B; and Fig. 6D schematically

illustrates a local diagram of the extendable panel assembly according to the embodiment of the disclosure;

Figs. 7A, 7B and 7C respectively schematically illustrate a diagram of the extendable panel according to the embodiment of the disclosure before, during and after the removal of the shielding cover.

Figs. 8A, 8B, 8C and 8D respectively schematically illustrate a diagram of the installation process of the extendable panel assembly according to the embodiment of the disclosure;

Figs. 9A and 9B schematically illustrate a diagram of the installation process of an extendable panel assembly according to another embodiment of the disclosure;

Fig. 10 schematically illustrates a diagram of the installation process of the extendable panel assembly according to another embodiment of the disclosure; and

Figs. 11A and 11B respectively schematically illustrate a section view of the extendable panel assembly according to another embodiment of the disclosure in case of a part thereof being removed.

Detailed Description of The Embodiments

The embodiments of the disclosure will be described in details herein with reference to the drawings. It should note that similar components or function assemblies in the drawings may be indicated with the same reference numerals. The appended drawings are only for the purpose of explaining the embodiments of the disclosure. Those skilled in the art can obtain an alternative technical solution from the following description based on the protection scope without departing from the spirit and scope of the disclosure.

Fig. 1A schematically illustrates an appearance perspective view of an

extendable panel 10 according to an embodiment of the disclosure. It should note that the panel 10 illustrated in all the drawings is a panel used for a wall socket 100. Those skilled in the art can understand that the extendable panel 10 of the disclosure can also be other small panels such as the wall switch etc. The panel 10 shown in Fig. 1A comprises a main panel 1 and a side panel 2 positioned between the main panel 1 and the wall 5, the main panel 1 including a power jack. Fig. 1 shows a three-hole power jack having a live wire, a null wire and a ground wire, or a two-hole power jack only having a live wire and a null wire, and a three-hole power jack or two-hole power jack with an appearance in conformity with other standards. Furthermore, the main panel 1 can also comprise various switches.

Fig. 1B is a exploded perspective view of the extendable panel 10. Fig. 1B shows a panel 10, a plurality of first interfaces 23, and a plurality of shielding covers 4. The side panel 2 shows two side portions at the top portion and right portion, each side portion including two first interfaces 23 thereon. The first interface 23 comprises a first connecting structure 13, and each shielding cover 4 includes a second connecting structure 43. A detachable connection is formed by the first connecting structure 13 on the side panel 2 and the second connecting structure 43. The shielding cover 4 shields the first interface 23 to facilitate the protection of the wall socket and/or switch and to make the wall socket and/or switch having a neat appearance.

Fig. 2A schematically illustrates the appearance perspective view of the extendable panel assembly 20 according to an embodiment of the disclosure, wherein the extendable panel assembly 20 comprises a panel 10 and an external functional module 3. Fig. 2B schematically illustrates an exploded perspective view of the extendable panel assembly 20 according to an embodiment of the disclosure, wherein it shows that a panel 10 comprises a side panel 2, an external functional module 3 and a plurality of shielding covers 4, the side panel 2 includes a first connecting structure 13 and the external functional module 3 includes a second interface (not shown) having a second connecting structure (not shown). A detachable connection can be

formed between the first connecting structure 13 and the second connecting structure. The external functional module 3 comprises a second connecting structure 43 on a side adjacent to the panel 10 and a first connecting structure 13 on a side adjacent to the shielding cover 4, the first connecting structure 13 forming a detachable connection with the second connecting structure 43 on the shielding cover 4. Therefore, extending an external functional module on the panel 10 is achieved. Besides, as the external functional module 3 has a first connecting structure 13 on a side thereof away from the panel 10, it can further extend another external function module having a second connecting structure on a side away from the panel 10. The shielding cover 4 helps protecting the panel, i.e., protecting the wall socket and/or switch to cause the wall socket and/or switch having a neat appearance. There are two or three first interfaces and first connecting structures shown on each side of the panel. The exact number varies depending on the specific situations.

Fig. 3 schematically illustrates a local diagram of the extendable panel 10 according to an embodiment of the disclosure during installing an external functional module 3, wherein it shows how the first connecting structure of the panel 10 with the second connecting structure 43 of the external functional module 3 to engage in order to realize a detachable connection between the panel 10 and the external functional module 3. Specifically, the first connecting structure 13 comprises a butt hole 15 and the second connecting structure 43 comprises a butt protrusion 35.

Fig. 4A illustrates the cooperating between the butt hole 15 and the butt protrusion 35 shown in Fig. 3 and Fig. 4B illustrates a perspective mirror image diagram of Fig. 4A. The butt protrusion 35 (correspondingly the external functional module 3) is moved in an arrow direction in Fig. 3 towards the butt hole 15 (correspondingly towards the panel 10). The butt hole 15 shown in Fig. 3 is a two-communication-hole slot, which comprises a large cylindrical hole with a larger cross-sectional diameter and a small cylindrical hole with a smaller cross-sectional diameter. The butt protrusion 35 is a cylinder comprising two parts, wherein one part

is called a large cylinder head with a larger cross-sectional area and the other part is called a small cylinder head with a smaller cross-sectional area. The large cylinder head extends into the butt hole 15 from the large cylindrical hole and slides downwards to the bottom in the arrow direction shown in Fig. 4B; hereafter, the small cylindrical hole of the butt hole 15 with a smaller diameter interacts with the small cylinder head of the butt protrusion 35 to lock the large cylinder head in the small cylindrical hole, as shown in Figs. 5A and 5B. Therefore, a locking connection between the panel 10 and the external functional module 3 is achieved, wherein the large cylinder head interacts with the large cylindrical hole and the small cylinder head interacts with the small cylindrical hole, such that the butt protrusion 35 can easily slide in the butt hole 15 and achieve a reliable locking. Those skilled in the art can easily adapting and adjusting the size of the butt hole and the butt protrusion to realize the same connection and locking according to embodiments. Alternatively, the shapes of the butt hole and the butt protrusion can also vary, e.g., the cross section can be round, elliptical and square with round corners etc. to facilitate the appearance of the wall socket and/or switch, while avoiding the sharp corners scratching the user to ensure safety in use.

Contrary to the installation process, when separating the panel 10 from the external functional module 3 is required, sliding the butt protrusion 35 upwards such that the large cylinder head of the butt protrusion 35 is aligned with the large cylindrical hole of the butt hole 15, thereby the butt protrusion 35 can be detached from the butt hole 15, i.e., realizing the separation of the panel 10 from the external functional module 3.

Alternatively, the first connecting structure 13 also may be set as the butt protrusion and the second connecting structure 43 may be set as the butt hole. The principle of the interaction of both is the same as the above and shall not be repeated again.

Figs. 6A and 6B schematically illustrate a diagram of the installation process of

an extendable panel assembly 20, wherein it shows a to-be-installed panel 10 and an external functional module 3. Fig. 6C is a perspective mirror image diagram of Fig. 6B, which shows the backs of the external functional module 3 and the butt protrusion 35. Fig. 6D is a local diagram of the first connecting structure 13.

The shielding cover 4 shown in Fig. 2B is a long-strip shaped shielding cover having a length and a width that match with the side panel 2 of the panel 10. Alternatively, as shown in Fig. 6A, the shielding cover 4 can also be a plurality of smaller shielding covers shapes of which match with the first lining structure 13. The shielding cover 4 can be a separate part, which can be separated from the panel and can also be connected to the panel at the bendable joint. For example, the shielding cover can be made of polypropylene, which can be bent when pushed by an external force to reveal a first interface and a first connecting structure 13. When the user needs to externally connect an external functional module 3 on the panel 10, he can push away the shielding cover 4 for connection without worrying about the missing of the detached shielding cover. When the user takes the external functional module 3 off, the shielding cover 4 will automatically restore to an initial position for shielding the first interface.

As shown in the drawings, the shape and size of the butt protrusion 35 should match with those of the butt hole 15. Aligning the butt protrusion 35 with the butt hole 15, and then applying a force to the external functional module 3 towards the wall direction, such that the first connecting structure and the second connecting structure form a locking connection. Similarly, the process of detaching the external functional module 3 is contrary to the installation process. Therefore, it will not be repeated again.

The external functional module 3 as shown is an alarm clock, which can also be various small devices, such as mobile phone bases, pen containers, wireless routers and small calendars etc. With the wide use of the portable small electronic devices, it is expected that there is a device disposed adjacent to the wall socket for placing the

electronic device during charging thereof, to easy to use. The external functional module can be a base device on which the portable small electronic devices, such as mobile phones, can be placed for providing the convenience to the user.

Figs. 7A-7C respectively schematically illustrate a diagram of the extendable panel 10 according to an embodiment of the disclosure before, during and after the removal of the shielding cover 4. Figs. 8A-8D respectively schematically illustrate a diagram of the installation process of the extendable panel being externally connected with an external functional module 3 to form an extendable panel assembly 20. As shown, the user can remove the shielding cover 4 from the panel 10 in the direction indicated by arrows in Figs. 7B and 7C to reveal the first connecting structure 13 and externally connect with the external functional module 3. The external functional module 3 is installed on the panel 10 in the direction indicated by arrows in Figs. 8B and 8C; and then the shielding cover 4 is installed on a side of the external functional module away from the panel 10 to ensure the neat appearance of the panel assembly 20 and user safety.

Figs. 9A and 9B schematically illustrate a diagram of the installation process of the extendable panel assembly 20, wherein the extendable panel 10 only comprises one external functional module 3 at one side and the side of the external functional module 3 away from the panel is shown as not comprising a second connecting structure. Optionally, Fig. 10 schematically illustrates the installation process of the extendable panel assembly 20, wherein the extendable panel 10 has an external functional module 3 on each of its four sides. Although the external functional modules 3 shown are the same, it can be understood that the external functional module can be different to adapt to the different demands of the user. Furthermore, the side of the external functional module 3 away from the socket can further comprise a first connecting structure to for further extending other external functional modules or shielding covers.

Further, the side panel of the panel 10 shown in Fig. 10 further comprises a guide

groove 17 and the side of the external functional module 3 is also provided with a guide protrusion 18 to cooperate with the guide groove 17. The guide groove 17 can be arranged at the four sides of the panel 10. The first interface 23 is disposed in the guide groove 17 between two side walls of the guide groove 17. The guide groove 17 also plays a role of hiding the first interface 23 at the same time. In such case, the panel 10 may not include a shielding cover 4. Optionally, all of the four sides of the external functional module 3 can comprise a guide protrusion or a guide groove to flexibly meet the user's demands.

Figs. 11A and 11B schematically illustrate a section view of the extendable panel assembly 20 in case of a part thereof being removed and a diagram of the installation process of the extendable panel assembly 20. As shown, the panel 10 of the socket 100 has been partially removed, revealing the installation hole 50, the first interface 23 and the first electrically conductive contact chip 19 therein. The external functional module 3 comprises a second interface 33 that includes a second electrically conductive contact chip (not shown). The first electrically conductive contact chip 19 and the second electrically conductive contact chip form an electrical connection to realize the electrical connection between the socket 100 and the external functional module 3. The shape and size of the first electrically conductive contact chip match with those of the second electrically conductive contact chip to ensure a reliable electrical connection. The figures only show one kind of shape and those skilled in the art can easily designing the first and second electrically conductive contact chips in other shapes and sizes. According to the embodiment, the external functional module 3 can extract electricity from the socket 100 to supply power to the small electronic devices, such as smart alarm clocks, wireless routers and electronic calendars etc.

In accordance with the above detailed description and each figure, the extendable panel and the extendable panel assembly of the disclosure can flexibly connect various external functional modules onto the panel by the extension interface at the side of the panel so as to satisfy the user's changing needs. The extendable panel and

the extendable panel assembly of the disclosure can be conveniently used for the products, such as power socket and/or switch. The extension of the panel will achieve convenient functions in various aspects for the user, such as extracting electricity, placing small objects and decoratings etc. Due to the universality of the interface of the extendable panel, the user can randomly install and disassemble it, for example taking off the small object from the socket and/or switch panel in this room and installing it to a further socket and/or switch panel in another room, which is a great convenience for the user.

Claims

1. An extendable panel assembly (20), comprising:
 - a panel (10) comprising a main panel (1) and a side panel (2) that includes a first interface (23) having a first connecting structure (13), the panel (10) configured to be installed on a wall; and
 - an external functional module (3) comprising a second interface having a second connecting structure (43) and a third interface having the first connecting structure (13) opposite the second interface, the first connecting structure (13) and the second connecting structure (43) being suitable for forming a detachable connection.
2. The extendable panel assembly according to claim 1, wherein the assembly further comprises a shielding cover (4) for shielding the third interface.
3. The extendable panel assembly according to claim 1 or 2, wherein the first interface (23) is one or more and the second interface (33) is one or more.
4. The extendable panel assembly according to claim 1 or 2, wherein the first connecting structure (13) comprises one or more butt holes (15) and the second connecting structure (43) comprises a butt protrusion (35), the butt hole (15) being suitable for receiving the butt protrusion (35) to form a locking connection.
5. The extendable panel assembly according to claim 1 or 2, wherein the first connecting structure (13) comprises at least one butt protrusion (35) and the second connecting structure (43) comprises a butt hole (15), the butt protrusion (35) being suitable for inserting into the butt hole (15) to form a locking connection.
6. The extendable panel assembly according to claim 1 or 2, wherein the side panel further comprises a guide groove (17) in which the first interface is located, and the external functional module comprises a guide protrusion (18), the guide groove (17) cooperating with the guide protrusion (18).
7. The extendable panel assembly according to claim 2, wherein the shielding cover is

connected with the main panel (1) or the side panel (2) via a bendable joint.

8. The extendable panel assembly according to claim 2, wherein the shielding cover is a removable component and comprises the second connecting structure (43).

9. The extendable panel assembly according to claim 1 or 2, wherein the first interface comprises a first electrically conductive contact chip (19) and the second interface comprises a second electrically conductive contact chip, the first electrically conductive contact chip and the second electrically conductive contact chip forming an electrical connection.

10. The extendable panel assembly according to claim 1 or 2, wherein the main panel (1) comprises a power jack and/or switch.