

# INTEGRAL BUTTON DESIGN FOR SWITCHED SOCKET

## FIELD OF THE INVENTION

**[0001]** The present invention relates to a socket, in particular to a socket having a large flat panel button switch.

## THE RELATED ART

**[0002]** Currently, a socket having a button switch is widely used in the market. The socket can be turned on or off the electric power through opening or closing of the button switch, so that power supply to an electrical appliance that is electrically connected with the socket is connected or cut off without pulling out the electrical appliance from the socket. This is particularly useful for the electrical appliance which needs to be used together with the socket and not to be pulled out therefrom, for example, a wall lamp. Therefore, such a socket having a button switch provides certain convenience and safety in use.

**[0003]** However, in a conventional socket having a button switch, the button switch is generally small, and it is installed on a panel of the socket and protrudes from the panel. Therefore, nowadays, people's needs becoming more increasingly diverse, such a protruded structure of the button switch cannot be used for some electrical appliances having relatively large volume, for example, a large mobile phone charger or a large-volume wall lamp. Such a large electrical appliance will interfere with the button switch when being inserted into this conventional socket, so that the appliance may not be fully inserted into the socket. Thus, for the electrical appliance, there are risks of poorly contacting and dropping off due to unstable insertion of the electrical appliance. In addition, since the large electrical appliance usually covers (or at least partially covers) the button switch upon insertion, it is impossible to operate the button switch conveniently. Moreover, since the button switch is protruded over the panel of the socket, the overall appearance is not good and does not meet the aesthetic demands of the people.

**[0004]** Therefore, there is a need for a new type of socket, which can provide a good

overall appearance and can be applied to various kinds of electrical appliances in modern life.

## SUMMARY OF THE INVENTION

**[0005]** To solve the above technical problem, an object of the present invention is to provide a socket having a large flat panel button switch, which is simple in structure, easy to manufacture, as well as stable and safe in use. It can overcome defects of the socket in the prior art.

**[0006]** According to the present invention, a socket having a large flat panel button switch is provided. The socket having a large flat panel button switch includes a mounting carrier, a switch driving block assembly and a switched socket module, which are assembled together, characterized in that, the socket further comprises:

**[0007]** a switch member which is in a form of flat planar panel and has a receiving aperture, the switch member comprising two rotating shafts oppositely disposed and located at two ends of an edge of the switch member, respectively; and

**[0008]** a frame member having a raised pin protrusion, the pin protrusion being received in the receiving aperture of the switch member and defining a cavity for receiving a pin base provided on the mounting carrier, the frame member comprising: two rotating holes oppositely disposed and located at two ends of an edge of the frame member, respectively, the rotating shafts of the switch member being inserted and fitted into the rotating holes such that the switch member can pivot around the rotating shafts; and an opening for receiving the switch driving block assembly.

**[0009]** Whereby, when the switch member is pressed down, the switch member is rotated via the rotating shafts inserted and fitted within the rotating holes of the frame member so as to energize the switched socket module by actuating the switch driving block assembly. Meanwhile, stopper grooves of the frame member stop the rotation of the switch member by contacting stoppers of the switch member, and after the pressing is stopped, the switch member is returned to an original state where it is flush with a surface of the frame member under an elastic force of an elastic member of the switch driving block assembly.

When the switch member is pressed down again, the switch member de-energizes the switched socket module by actuating the switch driving block assembly.

**[0010]** Preferably, the rotating shafts are integrally formed with the switch member.

**[0011]** Preferably, the fit between the rotating shafts and the rotating holes is a clearance fit or a fit through bearings.

**[0012]** Preferably, the switch member further comprises two stoppers oppositely disposed and respectively located at two ends of an edge of the switch member opposite to the edge on which the rotating shafts are positioned. The frame member further comprises two stopper grooves oppositely disposed and respectively located at two ends of an edge of the frame member opposite to the edge on which the rotating holes are positioned, the stopper grooves being used for receiving the stoppers of the switch member so as to stop the rotating movement of the switch member.

**[0013]** Preferably, the receiving aperture of the switch member is in a form of circular aperture, and the pin protrusion of the frame member is in a form of a cylinder.

**[0014]** In an embodiment, the socket further comprises a display member formed of transparent material, the display member being located in a display hole of the switch member and used to indicate whether the socket is energized or not.

**[0015]** In the present invention, the socket may be one of the following types: a UK 13A square plug, a 10A three-pole flat socket, a 10A double-pole oblate socket, a 16A three-pole flat socket, a 5A three-pole round socket, a 15A three-pole round socket, a 16A three-pole round socket, an American 15A three-pole socket, and an European 16A double-pole round socket.

**[0016]** The present invention employs a large flat panel integral button switch structure, which will not stick out from the panel of the socket. Therefore, the socket has a good overall appearance and is applicable to various kinds of electrical appliances, and has advantages of simple structures, low manufacturing costs as well as safety and reliability in use.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0017]** The above and further objects and advantages of embodiments of the present invention will be further described in conjunction with specific embodiments and with reference to accompanying drawings. The present invention will become more apparent from reading the description below. In the drawings, same or corresponding technical features or components are indicated by same or corresponding reference signs, in which:

**[0018]** Figure 1 is an exploded view of a socket having a large flat panel button switch according to an embodiment of the present invention;

**[0019]** Figure 2 is an exploded view of the socket in Figure 1 with some components thereof being assembled;

**[0020]** Figures 3a and 3b are views of the structure of a switch member of the socket in Figure 1, wherein Figure 3a is a front view of the switch member, and Figure 3b is a rear view of the switch member;

**[0021]** Figures 4a and 4b are views of the structure of a frame member of the socket in Figure 1, wherein Figure 4a is a front view of the frame member, and Figure 4b is a rear view of the frame member;

**[0022]** Figures 5a and 5b are views of the structure of a mounting carrier of the socket in Figure 1, wherein Figure 5a is a front view of the mounting carrier, and Figure 5b is a rear view of the mounting carrier;

**[0023]** Figures 6a and 6b are views of the structure of a switch driving block assembly of the socket in Figure 1, wherein Figure 6a shows a front view of the switch driving block assembly, and Figure 6b shows a rear view of the switch driving block assembly;

**[0024]** Figures 7a and 7b are views of the structure of a switched socket module of the socket in Figure 1, wherein Figure 7a shows a front view of the switched socket module, and Figure 7b shows a rear view of the switched socket module;

**[0025]** Figure 8 is a view of a socket having a large flat-panel button switch of the present invention after being assembled; and

**[0026]** Figure 9 is an illustration showing the pressing operation for the socket having a large flat-panel button switch of the present invention.

## DETAILED DESCRIPTION OF THE INVENTION

**[0027]** Hereinafter, several specific embodiments of the present invention are described. These specific embodiments only serve to illustrate the present invention and should not be construed as limitations thereto.

**[0028]** Figures 1 and 2 show a socket having a large flat-panel switch button according to an embodiment of the present invention, wherein Figure 1 shows an exploded view of the various components of the socket, and Figure 2 shows a planar view of the socket with some components thereof being assembled. According to Figures 1 and 2, the socket having a large flat-panel button switch of the present invention includes a display member 1, a switch member 2, a frame member 3, a mounting carrier 4, a switch driving block assembly 5, and a switched socket module 6. As shown in Figure 2, the display element 1, the switch member 2 and the frame member 3 are assembled together, and the mounting carrier 4, the switch driving block assembly 5 and the switched socket module 6 are assembled together.

**[0029]** In Figures 3a and 3b, views of the structure of the switch member 2 of the socket of the present invention are shown, wherein Figure 3a shows a front view of the switch member 2, and Figure 3b shows a rear view of the switch member 2. The switch member 2 is in a form of a flat planar panel, and has a receiving aperture 2.3. As shown in the Figures, the receiving aperture 2.3 is preferably in a form of a circular aperture. However, it may be understood, the receiving aperture 2.3 may also be in other forms, for example, elliptic, square, etc. (not shown in Figures). As shown in the Figures, the receiving aperture 2.3 is generally provided at or near the center of the switch member 2, however, the receiving aperture 2.3 may also be provided in other positions (not shown in Figures) as required for designs or for the purpose of aesthetics. The switch member 2 includes two rotating shafts 2.4 oppositely disposed and preferably two stoppers 2.2 oppositely disposed. The rotating shafts 2.4 are respectively located at two ends of an edge of the switch member 2. The stoppers 2.2 are respectively located at two ends of an edge of the switch member 2 opposite to the edge on which the rotating shafts 2.4 are positioned. Preferably, the rotating shafts 2.4 are integrally formed with the switch member 2. Preferably, a display hole 2.1, in which the display member 1 is provided, is further provided on the switch member 2. The

display member 1 is formed of transparent material for indicating an energizing state of the socket.

**[0030]** Referring to Figures 4a and 4b, wherein Figure 4a shows a front view of the frame member 3 of the socket, and Figure 4b shows a rear view of the frame member 3. The frame member 3 has a raised pin protrusion 3.7, preferably in a form of a cylinder. Corresponding to the position of the receiving aperture 2.3 in the switch member 2, the pin protrusion 3.7 is generally disposed at or near the center of the frame member 3 (as shown in the Figures). However, the pin protrusion 3.7 may also be provided in other positions (not shown in Figures) as required for designs or for the purpose of aesthetics. After being assembled, the pin protrusion 3.7 of the frame member 3 is received in the receiving aperture 2.3 of the switch member 2, and defines a cavity for receiving a pin base 4.6 provided on the mounting carrier 4. It may be understood, although the pin protrusion 3.7 is preferably in a form of a cylinder, it may also be in other forms, such as a cylinder having a cross-section in elliptic shape, or a cylinder having a cross-section in square shape, as long as it can cooperate with the receiving aperture 2.3 of the switch member 2.

**[0031]** Further, the frame member 3 includes two rotating holes 3.5 oppositely disposed and preferably two stopper grooves 3.1 oppositely disposed. The rotating holes 3.5 are located on two ends of an edge of the frame member 3, respectively. The rotating shafts 2.4 of the switch member 2 are inserted and fitted into the rotating holes 3.5 in a way such that the switch member 2 can pivot around the rotating shafts 2.4 in the rotating holes 3.5. The stopper grooves 3.1 are respectively located on two ends of an edge of the frame member 3 opposite to the edge on which the rotating holes 3.5 are positioned. The stopper grooves 3.1 are used for receiving the stoppers 2.2 of the switch member 2 to stop the rotating movement of the switch member 2. Preferably, the fit between the rotating shafts 2.4 and the rotating holes 3.5 is a clearance fit or a fit through bearings. Further, the frame member 3 includes an opening 3.3 for receiving the switch driving block assembly 5 and an indicating window for light transmission of an indicating light.

**[0032]** In the socket of the present invention, the mounting carrier 4, the switch driving block assembly 5 and the switched socket module 6 belong to the prior art, and thus will not be described in detail. However, for a thorough understanding of the socket of the

present invention, a simple description thereof is given below.

**[0033]** Figures 5a and 5b are views of structure of the mounting carrier 4 of the socket, wherein Figure 5a shows a front view of the mounting carrier 4, and figure 5b shows a rear view of the mounting carrier 4. Figures 6a and 6b are views of structure of the switch driving block assembly of the socket, wherein Figure 6a shows a front view of the switch driving block assembly, and figure 6b shows a rear view of the switch driving block assembly. Figures 7a and 7b are views of structure of the switched socket module of the socket, wherein Figure 7a shows a front view of the switched socket module, and figure 7b shows a rear view of the switched socket module. The mounting carrier 4 includes an indicating hole 4.1 for light transmission of an indicating light, a mounting hole 4.2 for receiving the switch driving block assembly 5, and a pin base 4.6 which is received in the cavity defined by the pin protrusion 3.7 of the frame member 3. The pin base 4.6 is used for receiving a L-pole plug pin, a N-pole plug pin and an E-pole plug pin of a plug. Further, a snap portion 4.3 of the mounting carrier 4 is caught by a base snap portion 6.4 of the switched socket module 6; fixing holes 4.4 are used for receiving mounting screws; a snap portion 4.5 cooperates with a snap portion 3.4 of the frame member 3; the pin base 4.6 is matchingly received in the pin protrusion 3.7 of the frame member 3 and is located below the pin protrusion 3.7 (as described above). The switch driving block assembly 5 is comprised of a driving member 5.2, a spring member (e.g. a planar spring) 5.3 and a L-shaped pin 5.4. A hole 5.1 of the switch driving block assembly 5 is clearance fitted with a shaft 6.1 of the switched socket module 6, on which shaft 6.1 a return spring is mounted. The switch driving block assembly 5 is brought into contact with the switch member 2 by passing through the mounting hole 4.2 of the mounting carrier 4 and the opening 3.3 of the frame member 3. A horn-shaped lever 6.2 of the switched socket module 6 is pushed by the driving member 5.2 of the switch driving block assembly 5 to achieve on/off functions. The switched socket module 6 is comprised of a socket pin portion 6.6, a protection shutter 6.5, a base 6.3 and a switch portion 6.2.

**[0034]** Further referring to Figure 8, Figure 8 is a view of the socket having a large flat panel button switch of the present invention after being assembled. In the socket, the display member 1, the switch member 2, the frame member 3, the mounting carrier 4, the switch driving block assembly 5, and the switched socket module 6 are assembled together

in the order as shown in Figure 1. In the socket, the pin base 4.6 of the mounting carrier 4 is received in the cavity of the pin protrusion 3.7 of the frame member 3; the pin protrusion 3.7 of the frame member 3 is received in the receiving aperture 2.3 of the switch member 2; the display member 1 is disposed in the display hole 2.1 of the switch member 2, and the light emitted by the indicating light on the switched socket module 6 is visioned through the indicating window 3.2 of the frame member 3 and the indicating hole 4.1 of the mounting carrier 4; the switch driving block assembly 5 is brought into contact with the switch member 2 by passing through the mounting hole 4.2 of the mounting carrier 4 and the opening 3.3 of the frame member 3, which above structure can be clearly observed particularly referring to the sectional view of a corner of this Figure 8. In an original state after being assembled, surfaces of the switch member 2 and the frame member 3 are flush with each other, and are remained in this flush state under elastic force of the spring member of the switch driving block assembly 5 due to the contact of the switch member 2 with the switch driving block assembly 5.

**[0035]** According to the present invention, the socket having a large flat panel button switch may be a UK 13A square plug, a 10A three-pole flat socket, a 10A double-pole oblate socket, a 16A three-pole flat socket, a 5A three-pole round socket, a 15A three-pole round socket, a 16A three-pole round socket, an American 15A three-pole socket, or an European 16A double-pole round socket.

**[0036]** The following will describe the operation of the socket of the present invention. Referring to Figure 9, which shows an illustration of the operation of pressing down the socket having a large flat panel button switch of the present invention. When the switch member 2 is pressed down, the switch member 2 is rotated via the rotating shafts 2.4 inserted and fitted within the rotating holes 3.5 of the frame member 3 to actuate the switch driving block assembly 5 with which it is contacted, so that the switched socket module 6 is energized and thereby electrical power is supplied to the electrical appliance which is inserted in the socket. Meanwhile, as the switch member 2 rotates, the stoppers 2.2 of the switch member 2 are brought into contact with the stopper grooves 3.1 of the frame member 3 such that the rotation of the switch member 2 is stopped, as shown in Figure 9, and at this time, there is formed an angle of about  $1.4^{\circ}$  of the pressed down switch member 2 with respect to the surface of the frame member 3. After removing the pressing, the

switch member 2 is returned back to the original state where it is flush with the surface of the frame member 3 by the elastic force of the spring member of the switch driving block assembly 5 to achieve a good uniform overall appearance. If electrical power supplied to the socket is needed to be turned off, the switch member 2 is only pressed down again, so that the switch member 2 de-energizes the switched socket module 6 by actuating the switch driving block assembly 5, and thereby electrical power supplied to the electrical appliance inserted in the socket is turned off. Furthermore, after removing the pressing, the switch member 2 is returned back to the original state where it is flush with the surface of the frame member 3 by the elastic force of the spring member of the switch driving block assembly 5 to maintain integrality of appearance.

**[0037]** By employing a large flat panel, integral switch button structure by the present invention, the socket can be applied to various electrical appliances without being limited by dimensions, and as the structure of the switch button does not stick out from the panel of the socket, the socket has a relatively good overall appearance and is easy to manufacture and safe in use.

**[0038]** Although the above preferred embodiments of the present invention has been illustrated and described, an ordinary person skilled in the art should understand that various modifications, changes and combinations can be made to the present invention according to design requirements and other conditions without departing from the spirit and scope of protection of the claims of the present invention.

What is claimed is:

1. A socket having a large flat panel button switch, comprising a mounting carrier, a switch driving block assembly and a switched socket module which are assembled together, wherein the socket further comprises:

a switch member which is in a form of a flat planar panel and has a receiving aperture, the switch member comprising two rotating shafts oppositely disposed and located at two ends of an edge of the switch member, respectively; and

a frame member having a raised pin protrusion, the pin protrusion being received in the receiving aperture of the switch member and defining a cavity for receiving a pin base provided on the mounting carrier, the frame member comprising: two rotating holes oppositely disposed and located at two ends of an edge of the frame member, respectively, the rotating shafts of the switch member being inserted and fitted within the rotating holes such that the switch member can pivot around the rotating shafts; and an opening for receiving the switch driving block assembly.

2. The socket having a large flat panel button switch according to claim 1, wherein the rotating shafts is integrally formed with the switch member.

3. The socket having a large flat panel button switch according to claim 1 or 2, wherein the fit between the rotating shaft and the rotating hole is a clearance fit or a fit through bearings.

4. The socket having a large flat panel button switch according to claim 1 or 2, wherein the switch member further comprises two stoppers oppositely disposed and respectively located at two ends of an edge of the switch member opposite to the edge on which the rotating shafts are positioned, and the frame member further comprises two stopper grooves oppositely disposed and respectively located at two ends of an edge of the frame member opposite to the edge on which the rotating holes are positioned, the stopper grooves being used for receiving the stoppers of the switch member so as to stop the rotating movement of the switch member.

5. The socket having a large flat panel button switch according to claim 3, wherein the switch member further comprises two stoppers oppositely disposed and respectively located at two ends of an edge of the switch member opposite to the edge on which the rotating shafts are positioned, and the frame member further comprises two stopper grooves oppositely disposed and respectively located at two ends of an edge of the frame member opposite to the edge on which the rotating holes are positioned, the stopper grooves being used for receiving the stoppers of the switch member so as to stop the rotating movement of the switch member.
6. The socket having a large flat panel button switch according to claim 1 or 2, wherein the receiving aperture of the switch member is in a form of circular aperture, and the pin protrusion of the frame member is in a form of a cylinder.
7. The socket having a large flat panel button switch according to claim 5, wherein the receiving aperture of the switch member is in a form of circular aperture, and the pin protrusion of the frame member is in a form of a cylinder.
8. The socket having a large flat panel button switch according to claim 1 or 2, wherein the socket further comprises a display member formed of transparent material, the display member being located in a display hole of the switch member and used to indicate whether the socket is energized or not.
9. The socket having a large flat panel button switch according to claim 7, wherein the socket further comprises a display member formed of transparent material, the display member being located in a display hole of the switch member and used to indicate whether the socket is energized or not.
10. The socket having a large flat panel button switch according to claim 1 or 2, wherein the socket is one of the following types: a UK 13A square plug, a 10A three-pole flat socket, a 10A double-pole oblate socket, a 16A three-pole flat socket, a 5A three-pole

round socket, a 15A three-pole round socket, a 16A three-pole round socket, an American 15A three-pole socket, and an European 16A double-pole round socket.

11. The socket having a large flat panel button switch according to claim 9, wherein the socket is one of the following types: a UK 13A square plug, a 10A three-pole flat socket, a 10A double-pole oblate socket, a 16A three-pole flat socket, a 5A three-pole round socket, a 15A three-pole round socket, a 16A three-pole round socket, an American 15A three-pole socket, and an European 16A double-pole round socket.