EXTENSION POWER SOCKET WITH MASTER AND SLAVE CONFIGURATION

1. TECHNICAL FIELD OF THE INVENTION

The present invention relates generally to extension power socket, and more particularly to an extension power socket assembly that is provided with means that allows electrical power to be delivered or terminated automatically to or from equipment or peripherals connected thereto.

2. BACKGROUND OF THE INVENTION

Extension power sockets are well known in the art. In general, there are many known configurations and they are called by many different terms such as gang outlet, multiple power outlet and extension socket outlet, among others. Generally, they are used for allowing electrical power to be delivered to the attached plug-connected appliance, peripheral or the like. Often, the attached appliances must be turned on or off individually through the separate switching mechanism disposed on the extension power socket. It is somewhat inconvenient to turn on/off all switches individually especially if it used with respect to a computer, where it is expected that such computer would also be connected to the commonly-related peripherals such as printer, modem, scanner, digital camera and the likes. Power socket assembly that has the ability to automatically deliver power to the related attached equipment is preferred in the art. Such automatic switching may be realized by sensing the turning on or off primary outlet where the primary equipment such as computer CPU is generally connected, and delivering or terminating power to the secondary or slave socket.

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There are known in the field a power strip configuration capable of delivering electrical power to the attaching plug-connected appliances in a time sequence manner. For example, US-A-5 430 598 discloses a programmable time interval power strip comprising power input mechanism for receiving external alternating electrical power, a power supply including a power switch and a plurality of adjustable timers including relays for the outlets. In effects, such disclosed power strip provides automatic switching together with provision of time sequence adjusting. The disclosed power strip in US-A-5 430 598 utilizes mechanical timers and relays, where such use of components add to the cost of production which ultimately will be passed on to the consumers. Additionally, with multiplicity of components used, the probability of any of the components became defective is greater, thus subjecting the device to reliability concern.

The present invention seeks to provide alternative configuration to the automatic power socket known in the art. The proposed extension power socket is made capable of sensing the drawing of current or absence of it in the primary outlet and sends appropriate signal to its related secondary outlets, thus drawing or terminating, in respect, current from the respective socket. With such master and slave configuration, the life of the connected peripherals or devices may be extended as it will not be turned on unless necessary. Risk of lightning strike could also be minimized. The socket assembly is envisaged to be suitable for any computer or any devices having USB-type or similar port as it is intended primarily to cater for such devices.

3. SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide an extension power socket assembly that is capable of delivering electrical power supply to the connected equipment in an automatic manner.

Similarly, it is another object of the present invention to provide an extension power socket assembly that is capable of terminating electrical power supply to the connected equipment in an automatic manner.

Yet, it is another object of the present invention to provide an extension power socket assembly that is configured having master and slave configuration.

These and other objects of the present invention are accomplished by providing,

An extension power socket assembly comprising:-

a primary outlet means (1) and a secondary outlet means (2), said primary outlet means (1) and said secondary outlet means (2) are disposed on a housing (3);

a controller means (4) adapted to control the operation of said secondary outlet means such that said primary and secondary outlet means (1,2) operates as master and slave, respectively;

said secondary outlet means delivers electrical power supply to device connected thereto if a device connected to said primary outlet means (1) is turned on and, accordingly terminates electrical power supply if said device is turned off;

characterized in that;

said controller means having a connection to the device that is connected to the primary outlet means (1); and

said connection provides actuation signal that causes said controller means to deliver power supply to said secondary outlet means or terminates said power supply, accordingly.

Preferably, the extension power socket includes such primary outlet means and a plurality of secondary outlet means.

Also preferable, the connection to device that is connected to the primary socket outlet means is by way of USB or other similar type of mechanical contact mechanism.

Yet, it is also preferable that the connection is through wireless connection.

Yet, it is also preferable that the controller includes used of an optoisolator and triac.

4. BRIEF DESCRIPTION OF THE DRAWINGS

The embodiments of the invention will now be described, by way of example only, with reference to the accompanying figures in which :

Figure 1 shows perspective view of extension sockets of the present invention shown in various configurations.

Figure 2 shows perspective view of another various configurations of the invention.

Figure 3a and 3b show electrical schematic diagram of the present invention; and

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Figure 4a and 4b show another electrical schematic configuration of the present invention.

5. DETAILED DESCRIPTION OF THE DRAWINGS

Referring now to the figures, especially to Figure 1 (1a-1e), there are shown perspective views of the extension power socket assembly configured according to the present invention. Generally, the power strip assembly is shown comprises of a housing (3) and connection to a plug (not shown) through wire (5). On the outer surface of the housing, there are disposed electrical outlet means, which are divided into a primary outlet means (1) and a secondary outlet means (2, Figure 1a). In Figures 1b – 1e, there are shown available variations where the extension socket may have plurality of such secondary outlet means (2). For convenient of identification, the primary outlet means is generally separated from the secondary outlet as depicted in the figure. Label may even be used for such purpose. The primary outlet means (1) is designated master and the rests are designated as slaves. The housing may be made from two cooperating body, i.e., the cover (6) and the cooperating base (7). The two components may be made from polycarbonate thermoplastic material, such as polyvinyl chloride or plastics or any other insulative materials known in the art. Preferably, the two components are secured together using screws (not shown) or any other means including the snap fit attachment.

Each of the socket outlet means (1,2) is generally formed to include three separate electrical receptacles, for live (10), neutral (11) and earth (12) connection, as known in the art. It may also include the common two-pin receptacle, especially for the lower current consuming peripherals. Although it is technically possible to include a switch, such provision is generally not necessary since the power is automatically deliver or stop. The number of such secondary outlet means is generally unlimited, however it is preferred that such secondary outlet means should be limited to only three, four or five, for safety

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and practicality. Generally, the extension socket is to be made available in two options: 1. 1500W/8Amp and, 2. 7000W/40Amp. Main electrical device such as the CPU of a computer is to be plug-connected to the primary outlet means (1), and other supporting peripherals such as printer, modem, scanner and audio device are to be plug-connected to the secondary outlet means (2), whereby the switches on the attached devices are adapted to be normally turned-on prior to connection to the power strip. The extension socket outlet is to be electrically connected via the commonly known 3-wire power cord with a plug (not shown), to a wall's outlet (also not shown) or other generally known electrical outlet. The extension socket is also provided with a receptacle (13) for receiving USB type and other similar or different contact mechanism. In application, the primary outlet means (1) is for connection with a computer or such device where an output of low DC supply is available if the computer is turned on. The other devices such as printer, scanner or other peripherals are to be connected to the secondary sockets (2). Another connection is arranged between the USB port (not shown) of the computer to the receptacle (13). Such connection may be made through wire connector as generally known in the art. With the use of such extension socket, automatic switching (on or off) that is based on the drawing of current in the primary outlet is made available. The slave outlet will be energized only if the primary outlet is energized. The drawing of current in the primary outlet to the slave outlet is available when there is a presence of low DC voltage at the USB port of the connected computer. Normally, a 5 Volts DC voltage is available at the USB port. The presence of DC voltage is used to trigger circuitry enclosed within the housing to either supplying current or terminating it.

Alternatively, the connection between the receptacle (13) and the computer USB port may also be made through wireless means (Figure 2). Such option may be made available by arranging the transmitter module (not shown) to be connected to the computer side, preferably to the USB port, and receiver module (also not shown) to be connected to the receptacle (13) on the extension

sockets. Such alternative option may be preferred if the computer and the extension socket are located quite a distant away from each other. This could be due to space constraint or other limitations.

Referring back to Figure 1 (Figures 1f-1j) and to Figures 2f-2j , there are shown another variations of the preferred embodiment where a toggle switch (14) is arranged on the extension socket housing. In this embodiment, the extension socket outlet is provided with such toggle switch to allow normal operation of the extension socket without automatic switching. For such configuration, separate switch (not shown) may be used for turning on off each of the secondary outlet means separately.

Referring now to Figure 3a, there is shown an example of circuit that provides such automatic switching. The figure shows electrical schematic diagram where the circuit includes an optoisolator (20), a triac (21), resistors (22,23) along with other typical components such as terminal, wire and such likes. The mentioned components formed part of a controller means (4) of the extension socket. Preferably, the controller means is to be enclosed within the housing (3). It may be arranged within a box (16) as illustrated in Figure 4. Terminal (15) is for connection to live terminal of the extension socket whereby the live output is connected to the live terminals of each of the secondary socket outlets (slave socket). Other terminals are connected in normal manner. Terminal (24) of the optoisolator is to be connected to the USB port of the computer via a resistor (22). Terminal (25) of the optoisolator is connected to the live input for which it is further connected T2 of the triac (21). Terminal (27) of the optoisolator is connected to the gate of the triac and terminal (26) is connected to earth. The optoisolator is generally used for isolating the DC part of the controller means from the AC part. In operation, the circuit works as the followings. When there is no +5 Volts DC at the USB port (13) which means that the computer is not turned on, the triac is not turned on as well. As a result, no AC current is supplied to the live terminal of the secondary outlets. When

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the computer is turned on, there will be +5 Volts DC available at the terminal (13, Figure 1). With this, a diode within the optoisolator is turned on. As a result, the optoisolator is also turned on and current will be supplied to terminal (T2) of the triac. Triac acts as a switch that, depending on the availability voltage at T2, allowing or stopping current to flow through. If the triac gate is closed (turn on), AC current flows in from the live terminal thus making available AC current to all connected live terminals of the secondary outlet means. In effect, the live of the secondary outlet (2, or slave) will only receive AC current when there is DC current at the USB port. On the other hand, if no DC current is available at the USB port of the connected computer, i.e. when the CPU is switched-off, correspondingly the controlling means will stop activating the gate of the triac. In effect, AC current flow to the secondary outlet means (2) will also be terminated. Therefore, automatic switching that depends on the switching on of the main device is advantageously made available.

Figure 3b shows another schematic diagram of the present invention. In this figure, a filter combination of resistor (29) and capacitor (28) is connected to the live terminals. The filter acts to filter noise, ripple and other undesired fluctuation of the supply. This circuit is primarily adapted for high current application where the total drawn current of the connected device is set to be not more that 40 Ampere with total power of 7000 W.

Figure 4a and 4b show the circuit implementation of the present invention that is arranged within a box (16). The controller means (4) may be incorporated into an extension socket assembly or sold separately as an electronic kit to be used with existing power socket. For such second option, knowledge of electronic circuitry is necessary to avoid mistake and shorting risk.

It is envisaged that other features may be incorporated to extension power socket of the present invention. It may include provision of a surge suppressor

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using non-linear resistive element, such as varistor. The non-linear resistive element is preferably formed across each pair of the intake lines, i.e., between live and earth, between live and neutral and between earth and neutral. A fast blown protective fuse may also be connected on the live intake line. Indicating mechanism to identify faulty component may also be incorporated. Such indicating mechanism may be configured using LED, neon bulb, and others.

While the preferred embodiments of the present invention have been described, it should be understood that various changes, adaptations and modifications may be made thereto. It should be understood, therefore, that the invention is not limited to details of the illustrated invention shown in the figures and thatvariations in such minor details will be apparent to one skilled in the art.

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WHAT IS CLAIMED IS:

1. An extension power socket assembly comprising:-

a primary outlet means (1) and a secondary outlet means (2), said primary outlet means (1) and said secondary outlet means (2) are disposed on a housing (3);

a controller means (4) adapted to control the operation of said secondary outlet means such that said primary and secondary outlet means (1,2) operates as master and slave, respectively;

said secondary outlet means delivers electrical power supply to device connected thereto if a device connected to said primary outlet means (1) is turned on and, accordingly terminates electrical power supply if said device is turned off;

characterized in that;
said controller means having a connection to the device that is connected to the primary outlet means (1); and

said connection provides actuation signal that causes said controller means to deliver power supply to said secondary outlet means or terminates said power supply, accordingly.

2. An extension power socket assembly as claimed in claim 1, further characterized in that said device that is connected to the primary outlet means (5) is a computer or the likes, said device having a USB type connection port. 20050973 9/3/05

3. An extension power socket assembly as claimed in claim 2, further characterized in that said USB type connection port provides direct current supply signal or cease to supply said direct signal.

4. An extension power socket assembly as claimed in claim 3, further characterized in that said presence or absence of said direct current on said USB type connection port is used to trigger said controller means to either deliver power to said secondary outlet means, or terminates said power supply, respectively.

5. An extension power socket assembly as claimed in any of the preceding claims, further characterized in that controller means includes used of an optoisolator (20).

6. An extension power socket assembly as claimed in claim 5, further characterized in that said controller means also includes use of a triac (21).

7. An extension power socket assembly as claimed in any of the preceding claims, further characterized in that a toggle switch (14) is provided for bypassing said automatic switching of said power socket assembly such that when actuated, said power socket assembly operates as a normal extension power socket.

8. An extension power socket assembly as claimed in claim 7, further characterized in that said extension socket assembly having a plurality of said secondary outlet means.

9. An extension power socket as claimed in claim 7, further characterized in that a filter of capacitor (28) and resistor (29) are arranged between the live terminal of said controller means (4).

10. An extension power socket as claimed in claim 1, further characterized in that said connection is made through wireless means.

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