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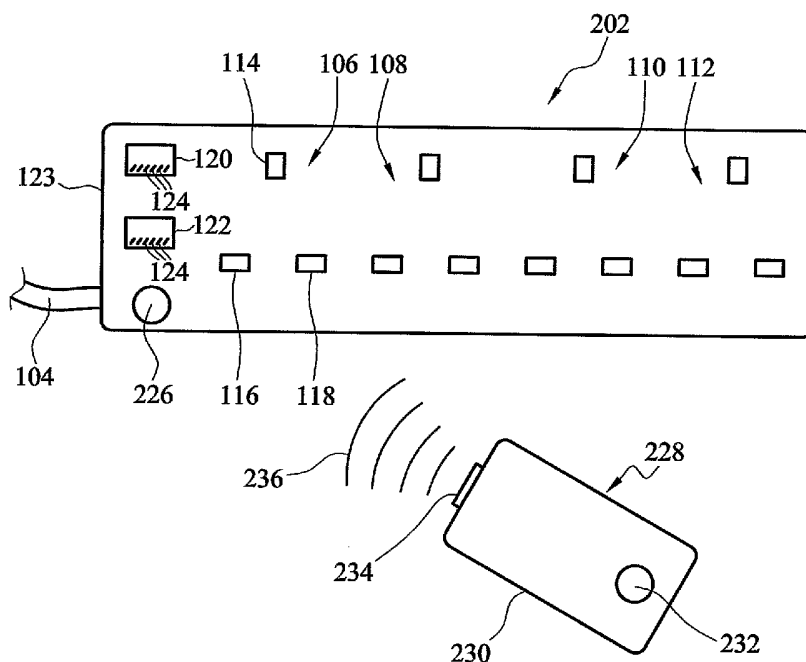
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(54) Title: POWER DISTRIBUTION DEVICE



(57) Abstract: A power distribution device (102) comprising; i) connection means (104) operable to connect the power distribution device to a source of electricity, ii) at least three electrical outlets (106, 108, 110, 112), and iii) switching means (126) adapted to switch at least two, but not all, of the at least three electrical outlets (106, 108, 110, 112) between an enabled and a disabled configuration.

Power Distribution Device

The present invention relates to power distribution devices, particularly to power distribution devices for
5 use in the home.

Many household items such as vacuum cleaners, computers, televisions etc. require an electrical input in order to function. Such items are usually supplied with a cable
10 having a plug attached to an end thereof which plug is of an appropriate shape and size to allow it to be inserted into an electrical outlet (a wall socket) and thereby allow electricity to be supplied to the item. Different countries of the world have different shaped and sized
15 plugs and sockets, but generally the manner of operation is the same.

Often, many electrical items, each requiring an individual electrical input, may be situated in close proximity to
20 each other in the home. An example of this is an entertainment area where a television is situated. Often, in such an entertainment area, it is required that a television, DVD player, VCR, cable or satellite television receiver, amplifier etc all be supplied with electricity.
25 However, it is unusual in the home to find a suitable number of electrical outlets (wall sockets) in close proximity to allow each item to have its own outlet. In such a situation, it is usual to use a power distribution board.

30

A power distribution board connects to a single electrical outlet (wall socket) but comprises a number of sockets into which the plugs of individual items may be inserted.

Many varieties of power distribution device are known, but perhaps the most common is a so called "four gang" socket which has four sockets into each of which a plug may be inserted.

5

When the items which are connected to the power distribution board are not required to be used, a user may wish to disable the power supply to the item to reduce the risk of fire, for example. The quickest and easiest way to perform such a task would be to disable the wall socket into which the power distribution board is connected, by switching it off. However, this would disable the electricity supply to all of the items connected to the power distribution board, which may be disadvantageous if, for example, one of the items were a VCR which were programmed to record at a certain time.

20

It is an object of embodiments of the present invention to address the above mentioned problems.

According to a first aspect of the present invention there is provided a power distribution device comprising;

- i) connection means operable to connect the power distribution device to a source of electricity,
- 25 ii) at least three electrical outlets, and
- iii) switching means adapted to switch at least two, but not all, of the at least three electrical outlets between an enabled and a disabled configuration.

30

Preferably, the power distribution device comprises at least four electrical outlets. The power distribution device may comprise at least five electrical outlets. The

power distribution device may comprise at least six electrical outlets. Preferably, the power distribution device comprises between 6 and 20 electrical outlets, more preferably between 8 and 16 electrical outlets and most
5 preferably 12 electrical outlets.

In one embodiment, the device may comprise between 3 and 10 sockets, preferably between 4 and 8 sockets.

10 Preferably, the connection means comprises a cable extending from the power distribution device, preferably having a plug attached at an end thereof distal to the power distribution device.

15 Preferably, each electrical outlet comprises a socket. Preferably, each electrical outlet comprises a socket adapted to accommodate and engage an electrical plug of an appliance. Preferably, each electrical outlet comprises at least two apertures which at least two apertures are
20 preferably each adapted to engage with a pin of an electrical plug. Preferably, each electrical outlet comprises at least three apertures which at least three apertures are preferably each adapted to engage with a pin of an electrical plug.

25 Preferably, each electrical outlet is adapted to engage a three pin plug.

Preferably, the power distribution device comprises surge
30 protection means operable to prevent a surge of electricity from the source of electricity being transferred to the at least three electrical outlets.

Preferably, the surge protection means comprises a varistor.

Preferably, the power distribution device further
5 comprises at least one communication input and preferably at least one communication output. Preferably, the surge protection means is further operable to prevent a surge in electricity being transferred from the at least one communication input to the at least one communication
10 output.

The at least one communication input may comprise any one or more of a CAT 5 input, a CAT 6 input, an RJ45 input, a telephone line input, a broadband internet input, an
15 ethernet input, a coaxial aerial input or the like. Similarly, the at least one communication output may comprise any one or more of a CAT 5 output, a CAT 6 output, an RJ45 output, a telephone line output, a broadband internet output, an ethernet output, a coaxial
20 aerial output or the like.

Preferably, the switching means is remotely controllable. By the term remotely controllable, we mean that the switching means may be adapted to switch at least two of,
25 but not all of, the at least three electrical outlets between an enabled and a disabled configuration by a user who is situated at a position remote to the power distribution board.

30 Preferably, the switching means is remotely controllable by virtue of an infra red or radio frequency remote. Preferably, the switching means comprises signal detection means operable to detect a signal from a remote control.

Preferably, the switching means comprises infra red or radio frequency detection means operable to detect an infra red or radio frequency signal.

- 5 Preferably, the signal detection means is programmable to recognise a signal from a user's existing remote control. For example, preferably, a user's existing remote control, such as a television remote control, may be used to operate the switching means.

10

The remote control may be a remote control from an alternative domestic appliance. For example, a user's television remote control, DVD remote control, stereo remote control etc.

15

According to another aspect of the invention there is provided a power distribution device comprising:

- i) connection means operable to connect the power distribution device to a source of electricity,
- 20 ii) at least one electrical outlet, and
- iii) a remotely controllable switching means adapted to switch at least one of the or each electrical outlet between an enabled and a disabled configuration,

- 25 characterised in that the device further comprises signal detection means programmable to recognise a signal from a remote control to thereby remotely control the switching means.

- 30 Preferably, the device comprises at least two electrical outlets, more preferably at least three electrical outlets and even more preferably at least four electrical outlets.

Preferably, the signal detection means is programmable to recognise a plurality of discrete signals, which discrete signals may, individually, switch different electrical outlets between an enabled and a disabled configuration.

5

According to a yet further aspect of the present invention, there is provided a remote control adapted to remotely control the power distribution device of the first aspect.

10

All of the features contained herein may be combined with any of the above aspects in any combination.

For a better understanding of the invention, and to show how embodiments of the same may be carried into effect, reference will now be made, by way of example, to the accompanying diagrammatic drawings in which:

Figure 1 shows a plan view of a first embodiment of a power distribution board;

20

Figure 2 shows a plan view of a second embodiment of a power distribution board;

Figure 3 shows a flow diagram for a learn routine of the power distribution board;

25

Figure 4 shows a perspective view of an upper side of a third embodiment of a power distribution board; and

30

Figure 5 shows a perspective view of a lower side of third embodiment of a power distribution board.

Referring to figure 1 there is shown a power distribution device in the form of a board 102 having a cuboidal housing 103. When viewed in plan, the cuboidal housing 103 is rectangular and has a cable 104 extending from a lower portion of a shorter side thereof. The cable 104 has a protective outer sheath and comprises three internal copper cables each also having a protective sheath such that the three copper cables are not in electrical connection with each other.

10

The board 102 comprises four electrical outlets 106, 108, 110, 112 each in the form of a standard UK 240 volt socket. Each socket comprises three rectangular apertures 114, 116, 118, into which pins of a standard UK plug engage. The apertures 114, 116, 118 are arranged such that they form the corners of an isosceles triangle. Inner walls of each of the upper apertures 114 are linked by a metal rod (not shown) within the housing 103, which is in electrical connection with one of the copper cables, such that the inner walls of each of the four upper apertures 114 are in electrical connection with each other. In a similar manner, the inner walls of each of the lower left apertures are in electrical connection with each other and the second copper cable, and the inner walls of each of the lower right apertures are in electrical connection with each other and the third copper cable.

In a traditional manner, the upper of the three apertures 114 is electrically connected to "earth" and receives an earth pin of a standard plug, the bottom left 116 of the three apertures is electrically connected to "live" and receives a live pin of a standard plug and the bottom

right aperture 118 is electrically connected to "neutral" and receives a neutral pin of a standard plug.

Between the copper cable which is connected to "live" and the apertures 116 is a varistor (also known as a voltage dependent resistor). This acts as a surge protector for board 102 and prevents a surge of electricity being passed from an electricity source, down the cable 104, to the outlets 106, 108, 110, 112.

10

The board 102 comprises a further two apertures 120, 122 toward an upper left corner thereof. The aperture 120 is rectangular and of an appropriate size to engage with a telecommunication plug, such as an RJ45 plug. The aperture 122 is also rectangular and of an appropriate size to engage with a telecommunication plug, such as an RJ45 plug. Within the apertures 120, 122 are metal contacts 124. Like metal contacts are electronically connected in the apertures 120, 122 by connecting wires (not shown) within the housing 103. Between the contacts 120, 122 are gas discharge tubes on each connecting wire which prevent a spike of electricity passing from one aperture 120, 122 to the other 120, 122. In this manner the board offers electrical spike protection to a telecommunication device.

25

A switch 126 is situated between the middle two outlets 108, 110 and is operable to break the electrical connection between the two outlets 106, 108 on the right thereof and the two outlets 110, 112 on the left thereof. Specifically, the switch mechanically breaks the link along the metal bar (not shown) within the housing 103

30

which connects the inner walls of the apertures 116 which carry the "live" electricity.

In this manner, a single switch is utilised to disable a
5 number of outlets, but leave other outlets active.

Referring now to figure 2 there is shown a power distribution board 202 which is similar in shape and function to the board 102 as described above. In this
10 manner, like parts are labelled with like numerals.

The board 202 is different to the board 102 in that instead of a mechanical switch 126, the board 202 comprises an infrared detector 226 which detects an infra
15 red signal provided by a remote control unit 228.

The infrared detector 226 is connected directly to a circuit board (not shown).

20 The remote control unit 228 comprises cuboidal housing 230 having a button 232 on an upper face thereof and an infra red emitter 234 on a side face thereof. In use, a user presses the button 232 which causes the infra red emitter 234 to emit an infrared signal 236. The infra red signal
25 236 is detected by the infra red detector 226 which causes the electricity supply to the outlets 110, 112 to become disabled. Specifically, the infra red signal 236 is detected by the infra red detector 226 which passes a signal to a microprocessor which in turn sends a signal to
30 a transistor which activates a relay to isolate the electricity supply to outlets 110, 112.

In an alternate preferred embodiment, a power distribution board as described in the second embodiment comprises a programmable infra red detector. In such an embodiment, a button is located in proximity to the infra red detector and is connected electrically to the infra red detector. When the button is pressed, the infra red detector is in "learn" mode. A user may then "set" the signal that the infra red detector is to detect by using, for example, an existing infra red emitting device such as a television remote control or remote control from another device. The button may then be released and will respond to the programmed infra red signal to switch on or off the associated outlets. Advantageously, this allows a user to use an existing remote control.

A flow diagram for a learn routine 302 for such an embodiment is shown in figure 3. The learn routine 302 operates as follows. Firstly, a button on the device (such as button 418 described below) must be pressed as indicated in box 304. If this is the case, then the learn routine does not begin until after the button is released as shown in box 306.

If the button is released, but was held for less than two seconds, then sub-routine 310 causes the power switch to toggle, thus activating/de-activating the power to the related electricity outlet. In this manner the device may be operated in a usual manner without the remote control. However, if the button has been held for more than two seconds then the "learn" routine 302 is continued by activating the learn function of the device as indicated in box 312. At this stage, the device may emit an audible

signal or illuminate a light signal to indicate that the learn mode is activated.

A button that is desired to be programmed on the user's remote control should then be pressed to emit an infra-red signal as indicated in box 314. If the button is not pressed, a sub-routine as indicated in box 316 is activated whereby the operation may time out and re-boot as indicated in box 318.

10

Assuming the button of the remote control is pressed as per box 314, the infra-red detector of the device assesses the infra-red maximum and minimum timing as indicated in box 320 and further, assuming the infra-red signal continues to be emitted by the remote control as indicated in box 322, the device decodes the infra-red signal and stores the template as indicated in box 324. The device is now programmed to recognise the infra-red signal of the remote control and if the infra-red signal is detected by the device, the power switch is toggled.

20

The learn routine 302 may also store further templates, for example to switch further outlets on/off individually. In this case, after the template is stored as displayed in box 324, a sub-routine 326 may be activated which causes the learn routine to go back to box 322. Alternatively, further templates may be stored by repeating the entire learn routine 302. The device may then, in use, detect on infra-red signal, match the signal to an existing template and turn on/off the associated outlet or group of outlets.

30

It is also envisaged that the infra red detector will have a raised profile adequate to receive infra red signals

from any angle or via a light pipe. A light pipe may be, for example, a fibre optic pipe that can relay light information from an end thereof distal to the infra-red detector of the device to the infra-red detector of the device. This will enable the infra red signal to be carried to the board, rather than directing the remote control at the board.

It will be appreciated by one skilled in the art that while the second embodiment of the invention uses infra red wireless technology, any wireless switching technology may be used, for example radio technology.

Referring now to figure 4 and 5 there is shown a third embodiment of a power distribution board 402 which is generally cuboidal in shape. The power distribution board 402 has an upper side 404, as shown in figure 4, and a lower side 406, as shown in figure 5. The upper side 404 is generally rectangular and has a central region 408 that is also generally rectangular and has two peripheral regions 410 extending from major edges of the central region 408. The peripheral regions 410 are generally rectangular in shape and angled slightly downwardly from the central region 408. The peripheral regions 410 have a plurality of vents 412 extending through to the lower side 406 of the board 402. The central region 408 may have information such as a trade mark 414 printed, stamped or embossed thereon.

Toward one of the minor edges of the central region 408 is a remote control/user interface region 416. The interface region 416 comprises a button 418 (which corresponds to the button described above in relation to figure 3) an

infra-red detector 420 and a plurality of LEDs 422 that can indicate various signals to a user (such as "learn mode activated", for example). A cover portion (not shown) may be added to the device 402 to cover the infra-
5 red detector 420 and the LEDs 422.

Extending downward from the upper side 404 are four side walls 424 that define a cavity 426 that can be seen more clearly in figure 5. Within the cavity 426 is a box 428
10 which comprises six electrical outlets 430 into which plugs may be inserted.

The side walls 424 extend to such an extent that the cavity 426 is deep enough to allow the side walls 424 to
15 sit on a surface with the cavity 426 facing downward when plugs are located in the outlets 430. One of the minor side walls 424a comprises a cut out section 432 to allow electrical cables access to the cavity 426 while allowing the board 402 to sit on a surface with the cavity 426
20 facing downward. The learn routine 302 may be used with the board 402.

Accordingly, a power distribution board made in accordance with the present invention allows a user to disable the
25 electricity supply to at least two of but not all of the electricity outlets by operating a single switch. Further, as discussed in relation to the second embodiment, the switch may be operated remotely thus alleviating the need for a person to physically contact
30 the power distribution boards.

An alternative embodiment of a power distribution device allows any or all outlets to be remotely switchable by a

user's existing remote control, thus removing the need for a user to have yet further remote control to operate their electronic equipment.

5 Attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and
10 documents are incorporated herein by reference.

All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or
15 process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

Each feature disclosed in this specification (including
20 any accompanying claims, abstract and drawings) may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series
25 of equivalent or similar features.

The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features
30 disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

CLAIMS

1. A power distribution device comprising;
 - i) connection means operable to connect the power distribution device to a source of electricity,
 - ii) at least three electrical outlets, and
 - iii) switching means adapted to switch at least two, but not all, of the at least three electrical outlets between an enabled and a disabled configuration.
2. A power distribution device according to claim 1, which comprises at least four electrical outlets.
3. A power distribution device according to either of claim 1 or claim 2, wherein the connection means comprises a cable extending from the power distribution device.
4. A power distribution device according to any preceding claim, wherein each electrical outlet comprises a socket.
5. A power distribution device according to any preceding claim, wherein each electrical outlet comprises a socket adapted to accommodate and engage an electrical plug of an appliance.
6. A power distribution device according to any preceding claim, wherein each electrical outlet comprises at least three apertures which at least three apertures are each adapted to engage with a pin of an electrical plug.

7. A power distribution device according to any preceding claim, wherein each electrical outlet is adapted to engage a three pin plug.

5 8. A power distribution device according to any preceding claim, wherein the power distribution device comprises surge protection means operable to prevent a surge of electricity from the source of electricity being transferred to the at least three electrical outlets.

10

9. A power distribution device according to any preceding claim, wherein the power distribution device further comprises at least one communication input and at least one communication output.

15

10. A power distribution device according to claim 9 when dependent on claim 8, wherein the surge protection means is further operable to prevent a surge in electricity being transferred from the at least one communication
20 input to the at least one communication output.

11. A power distribution device according to claim 9 or 10, wherein the at least one communication input comprises any one or more of a CAT 5 input, a CAT 6 input, an RJ45
25 input, a telephone line input, a broadband internet input, an ethernet input, a coaxial aerial input or the like.

12. A power distribution device according to any preceding claim, wherein the switching means is remotely
30 controllable.

13. A power distribution device according to any preceding claim, wherein the switching means is remotely

controllable by virtue of an infra red or radio frequency remote.

14. A power distribution device according to any preceding
5 claim, wherein the switching means comprises signal detection means operable to detect a signal from a remote control.

15. A power distribution device according to claim 14,
10 wherein the signal detection means is programmable to recognise a signal from a remote control.

16. A power distribution device according to claim 15,
wherein the remote control is a remote control from an
15 alternative domestic appliance.

17. A power distribution device comprising:
i) connection means operable to connect the power
distribution device to a source of electricity,
20 ii) at least one electrical outlet, and
iii) a remotely controllable switching means adapted to switch at least one of the or each electrical outlet between an enabled and a disabled configuration,
25 characterised in that the device further comprises signal detection means programmable to recognise a signal from a remote control to thereby remotely control the switching means.

30 18. A power distribution device according to claim 17, wherein the remote control is a remote control from an alternative domestic appliance.

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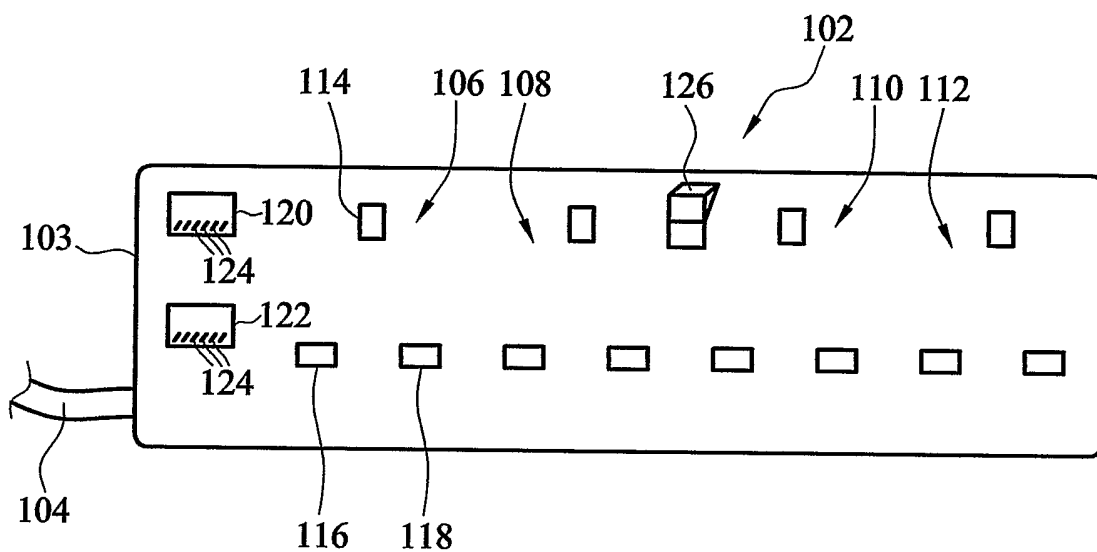


FIG. 1

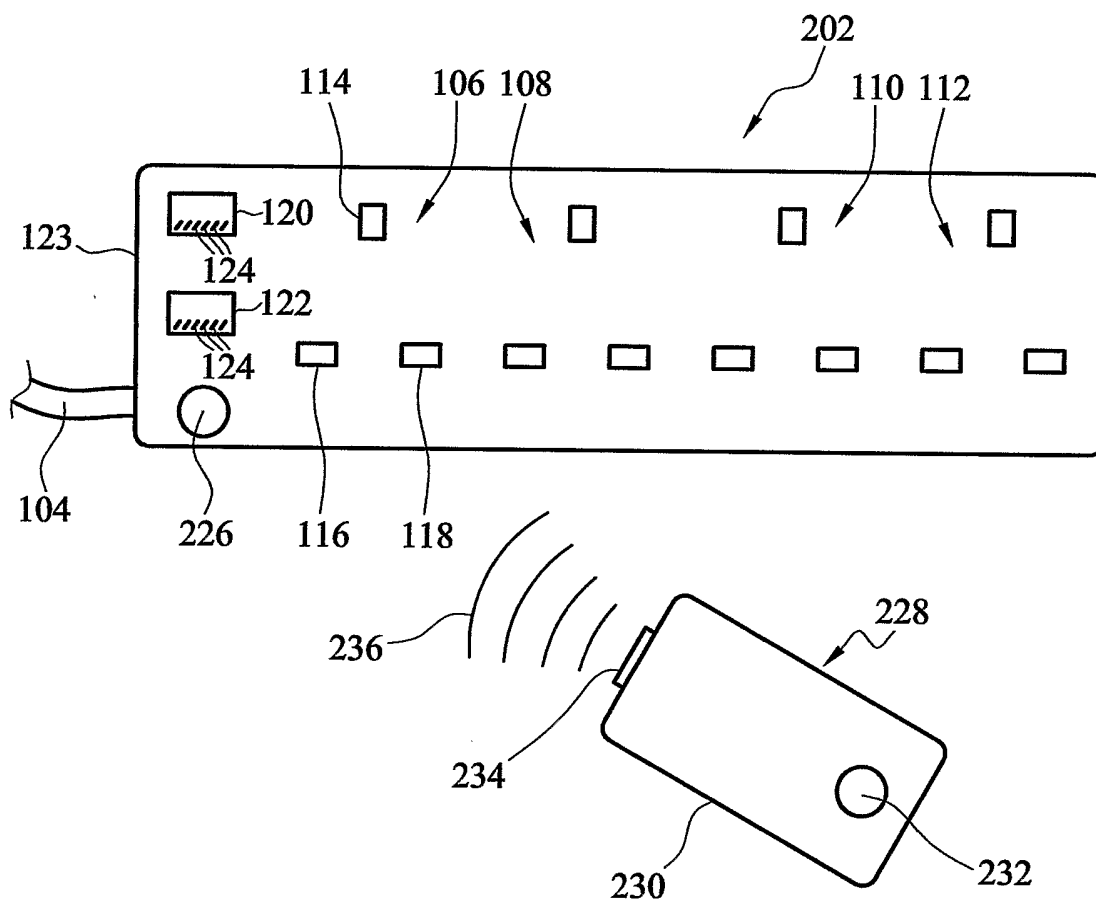


FIG. 2

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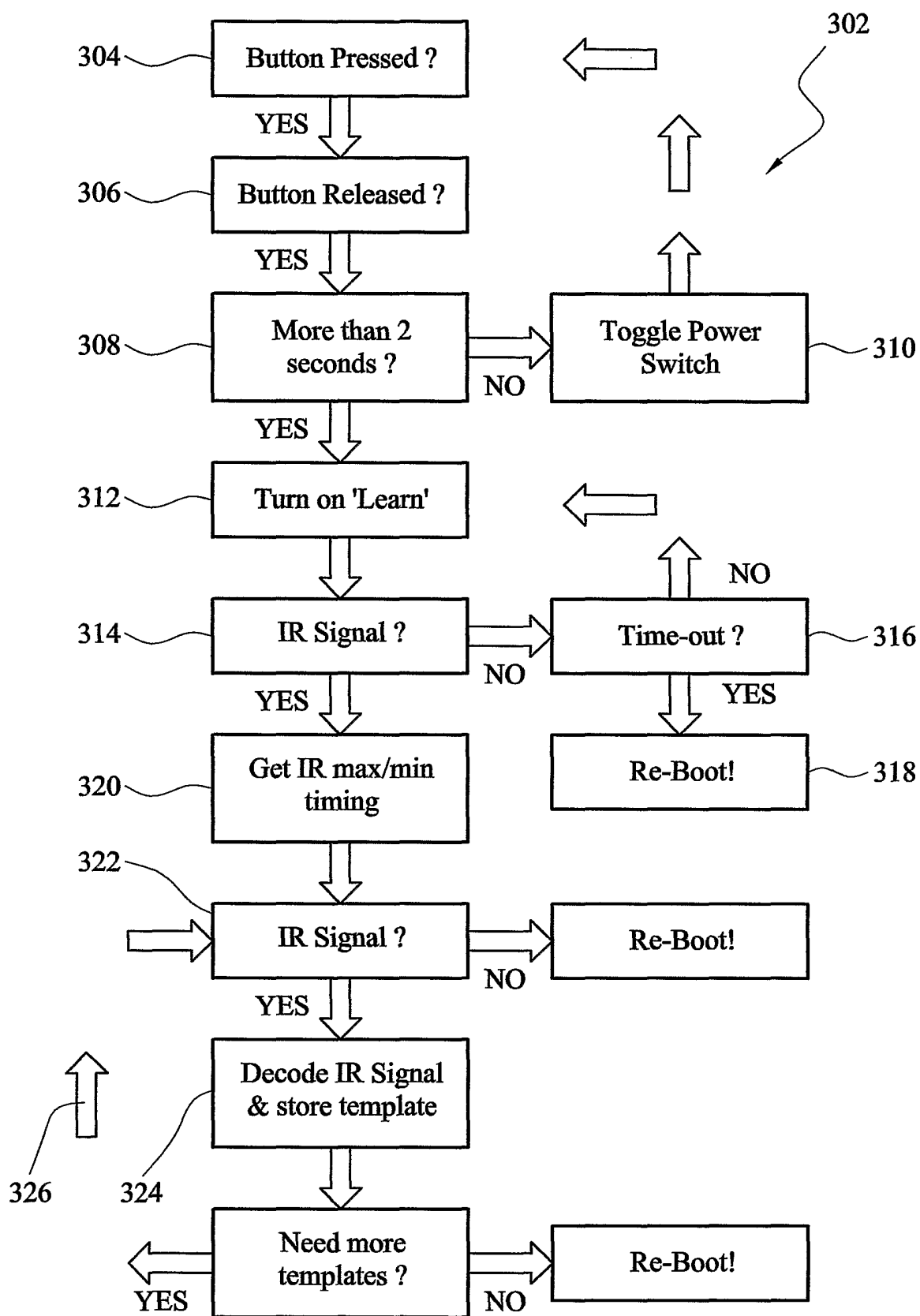
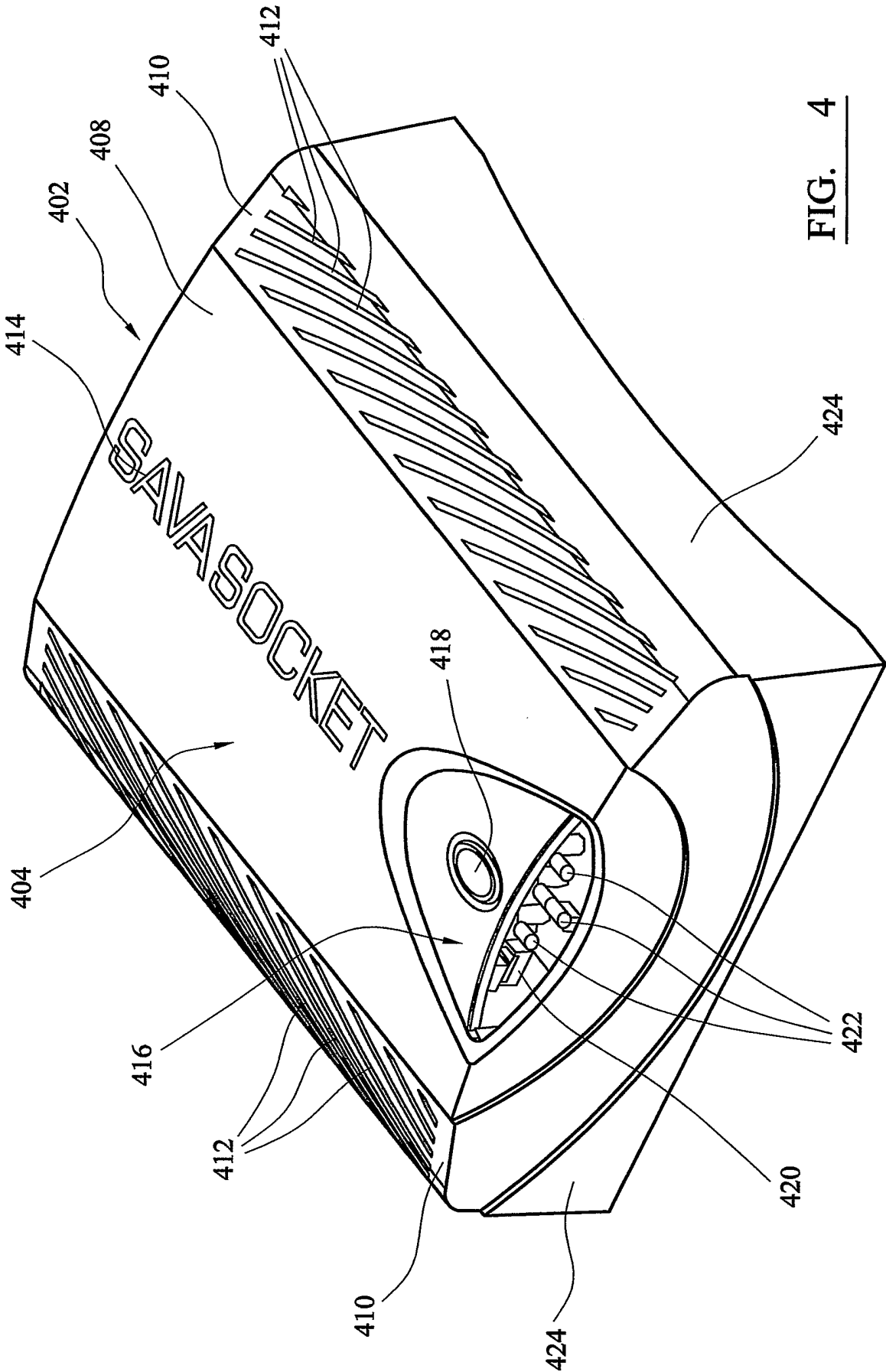


FIG. 3

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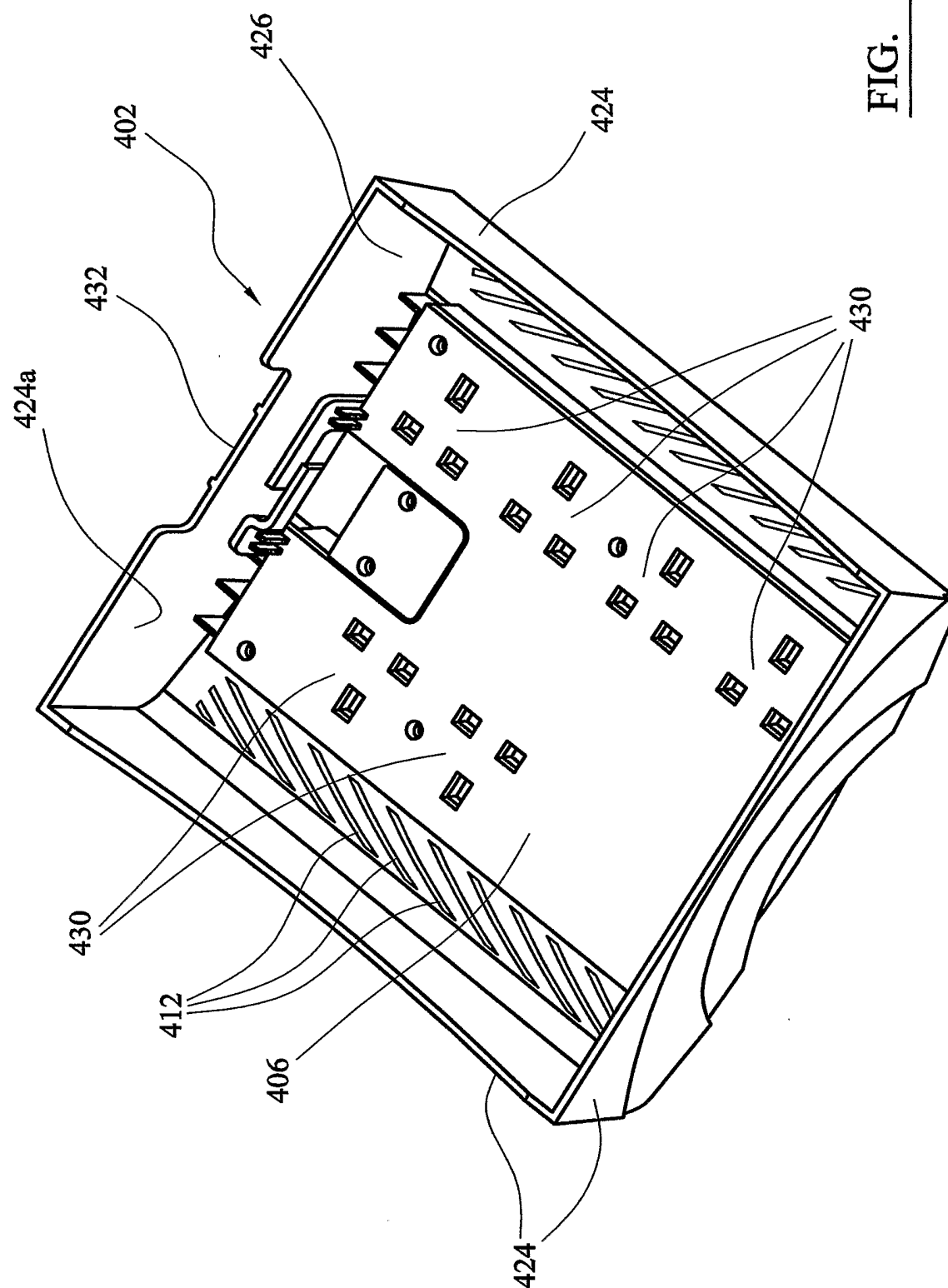


FIG. 5