BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other objects and features of the present invention will become apparent from the following description of the preferred embodiments of the invention with reference to the accompanying drawings, in which:

Figs.1A~1C are perspective illustrations of the prior art showing the installation and connections of the wiring devices of the prior art disclosed by the referenced US patents and the actual use of such wiring devices as experienced in the field.

Figs.2A~2D are perspective illustrations of the intelligent supporting boxes for the electrical power outlets and the SPDT switch-relay combinations or the hybrid switches of the preferred embodiment of the present invention;

Figs.3A~3E are perspective illustrations showing the rear or back views of the boxes, the power outlets and the hybrid switch or the switch-relay combinations of Figs.2A~2D including the wiring terminals;

Figs.4A~4C are perspective illustrations showing the expanded intelligent boxes of the present invention shown in Figs.2A~2D for accommodating n number of electrical power outlets and hybrid switches, or switch-relay combinations of the present invention;

Figs.5A~5C are perspective illustrations for showing the versatility of the intelligent boxes of the preferred embodiment that can be mounted vertically for supporting modified power outlets shown in Fig. 2B, 2D, 3A, 3C, 3E and 4C structured for mounting into vertical column boxes;

Figs.6A~6E are perspective illustrations showing the non-limiting versatility of the intelligent boxes of the present invention for supporting a whole range of AC outlets as used in the different countries or regions of the world;

for self-locking action by a simple insertion into the intelligent box of the present invention.

The hybrid switch H is shown in Fig.3A to include live line pin 1L, load pin 1LD, coil pin CO and key indicator access K1 for multi colors LED light. The AC or power outlet of Fig.3A is shown to include live AC pin 1L, neutral AC line pin 1N, receptacle entry 2G for the ground or earth pin 1G and an opening 10R for an intelligent sensor or rotary selector for identifying the load or the appliance being connected or plugged into the AC outlet.

By the above it is clear that the structural differences between the prior art wiring devices supporting frames, switches and outlets and the intelligent supporting boxes with the plugged-in hybrid switches and power outlets demonstrate a clear fundamental structural difference, while the assembled wiring devices may be perceived from the "outer visible side" that the switches and outlet are similar.

Each of the mechanical switches and outlets of the prior art is individually connected to the power wires accessed through the wall box and therefore require extensive work for connecting the many wires to the plurality of outlets and switches confined to within the wall box. In contrast the intelligent box connects to few wires and the hybrid switches including the power outlets of the present invention are plugged-in through the front or the frame 20F and into the receptacles 2L, 2LD and 2N and to GND pin 1G into the receptacle 2G of the power outlet.

The substantially reduced number of power and ground wires are connected through self-locking terminals surrounding the back cover of the intelligent box shown in Figs. 3B~3E and 5C. This arrangement reduces the number of wire connections, the time it takes to mount each

The third group is the random plugged loads or appliances such as food processors, Juicer or cookers, steam irons or other hand tools, personal care appliances such as air dryers or shavers, chargers and/or PCs.

It is clear that some of the appliances in the third category or group may be plugged into a given power outlet "permanently" or for long periods of time, for example a PC printer, or a "humidifier".

The setting or sensing by the intelligent support boxes of the present invention provide a range of solutions that were not available in the prior art, such as the ability to introduce "fixed" solution for the long term or permanently "plugged" appliances of the second group, such as refrigerator or washing machine by loading their particulars via the hand loader 160 via the loading connector 149 or Fig.9A.

The other solution for loading can be the loading via optical loader disclosed in the recited US patents of the prior art or via RFID loader, or direct loading by the electrical installer during the installation of the boxes, or by setting such particulars via the setting selectors 7-1~7n provided in the rear cover of the intelligent boxes shown in Figs. 3B~3E.

The identifying of the randomly plugged appliances are best served by the used of optically introduced identifier of the power plugs. Optically communicated signals are immune to noises; they are reliable and can be provided at low cost. The other practical, low cost identifiers are the RFID tags recited above and shown in Figs.7A~7D. The third is the use of the rotary selector RS40-L that is accessed through the front of the AC outlet that can be easily reached by the dweller.

Figs.10B and 10C show the variation of the snap-in or the self-locking wire terminals provided for the different intelligent support boxes of the present invention.

Each terminal provides for in-out or cascading connections to another box, be it adjacent or a distant box, yet the cascaded boxes are commonly installed in the same zone or room. This is due to the electrical wiring codes and rules that are mandating individual power lines for given load in each individual room or zone.

What is obvious with the 4H box of Fig.10C is that only a single neutral N and a single live L wires are needed to power four loads, such as four lights. Each hybrid switch or a mechanical on-off switch such as shown in Fig.14D or an SPST relay (not shown) is connected to a single load LD terminal and each load power consumption is reported individually. It is also possible to power two load or more loads via a single hybrid switch and its two snap-in terminals, each shown as LD1~LD4. Ground terminal is a must for power outlets.

Figs.10A~10C also clearly illustrate that when an AC outlet is used the load terminal is not needed and is not used. Yet a ground terminal is absolutely required for AC outlet, for this purpose and other wiring devices considerations at least one wire terminal can be an assignable terminal. In the example of AC outlet, the terminal that occupied the load position becomes assignable terminal for ground connection. Yet it may be assigned to other wire connection such as separate live AC or neutral AC when the circumstances such as local codes mandate so.

The many other configurations illustrate the simplicity of the box structure that can be manufactured by eliminating or adding receptacles, pins, self-lock or snap-in terminals and structured current sensors made of low ohmic metal allow shown in Figs. 11A~11C.

10. The method according to claim 7, wherein said two way communication commands and responses are selected from a group comprising control for operating a load, command for switching said load on-off, request for said load status, request for said load particulars, request for said outlet particulars, request for current drain data, request for power consumed data, installing particulars into said memory, removing particulars from said memory, confirmation of received command, status reporting, particulars reporting, reporting current drain, reporting power consumed, reporting power consumed with particulars of a load, confirmation of one of installing and removing said particulars and combinations thereof.

11. An electrical support box wherein at least one attachable wiring device selected from a group comprising a power outlet, a relay, a switch, an hybrid relay-switch, an hybrid switch and combinations thereof for attachment into said support box, each said wiring device comprising at least one locking structure and device joints selected from a group comprising a live AC joint, a neutral AC joint, at least one load joint, at least two traveler joints, at least one relay joint, a ground joint and combinations thereof with each joint is one of a receptacle and a pin;

said support box comprising selective box joints complementing said receptacles and pins of said device joints, selective power wire terminals selected from a group comprising live AC terminal for connecting said support box to live AC, neutral AC terminal for connecting said support box to neutral AC, a ground terminal for connecting ground wire to said power outlet, at least one load terminal for connecting a switched live AC to a load, at least two traveler terminals for connection to one of an SPDT and DPDT switch, at least one assignable terminal selectively assigned for connection to at least one of said live AC, neutral AC, ground, load or traveler; and