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Nuti et al.

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(54) **MODULAR COMPONENT POWER OUTLET FOR A POWER SUPPLY STRIP**

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Related U.S. Application Data

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(51) **Int. Cl.**

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H01R 13/24	(2006.01)
H01R 13/514	(2006.01)
H01R 13/518	(2006.01)
H01R 25/00	(2006.01)

(52) **U.S. Cl.**

CPC ***H01R 13/639*** (2013.01); ***H01R 13/245*** (2013.01); ***H01R 13/514*** (2013.01); ***H01R 13/518*** (2013.01); ***H01R 25/006*** (2013.01)

(58) **Field of Classification Search**

None

See application file for complete search history.

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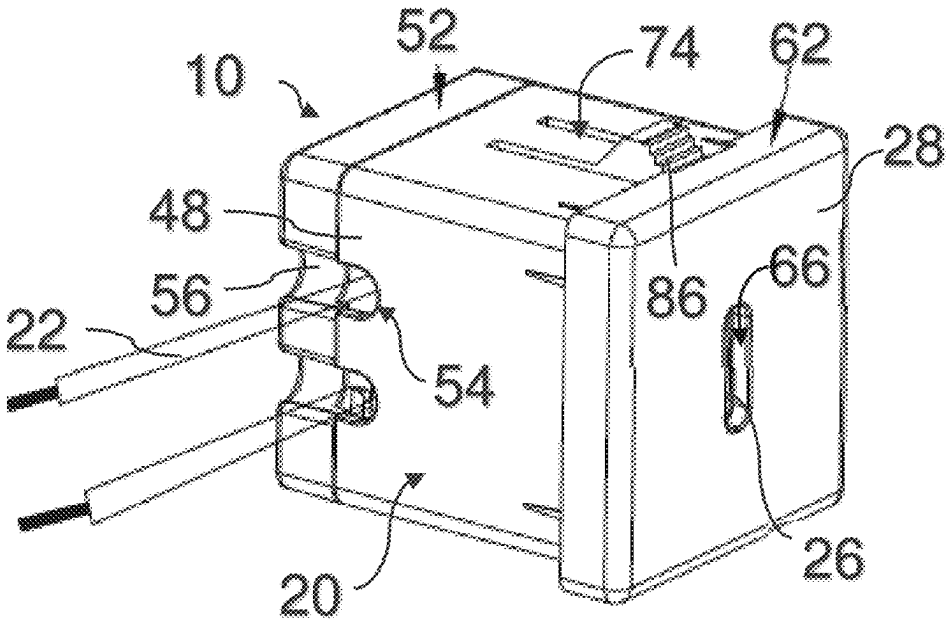
(57) **ABSTRACT**

A power outlet, and associated method, for an electrical power supply strip. The power outlet includes a housing, an electrical connection for receiving first electrical power type, electrical components to change the first electrical power type to a second electrical power type, and a connection interface to supplying the second electrical power type. The power outlet housing has a body with a shape that corresponds to a shaped aperture of a main housing of the strip. A front portion of the power outlet housing is larger than the shaped aperture. An elastically deformable arm extends from the body and deforms as the arm passes through the shaped aperture of the main housing. An engagement portion of the arm retains the power outlet housing relative to the main housing.

20 Claims, 11 Drawing Sheets



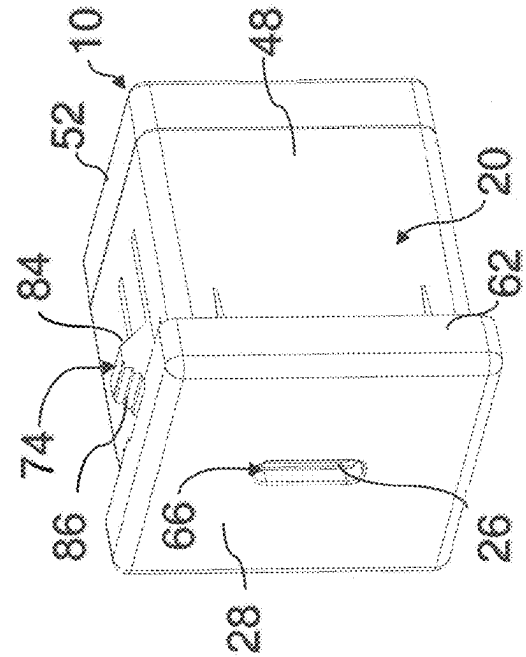


FIG. 2

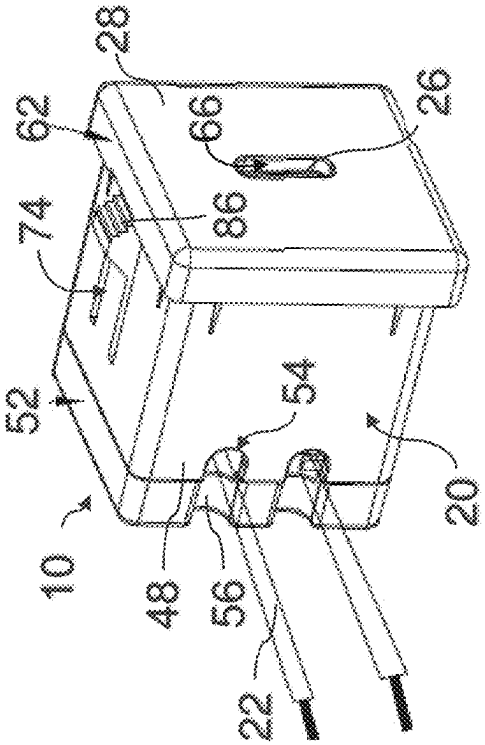


FIG. 1

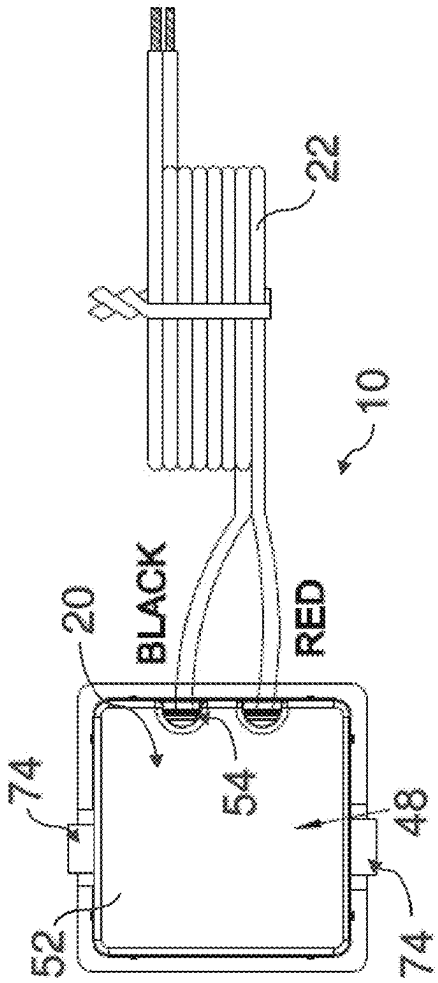


FIG. 4

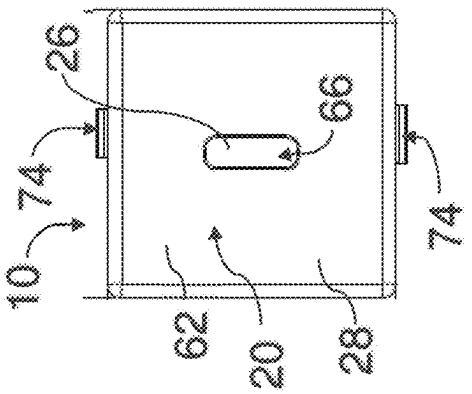


FIG. 3

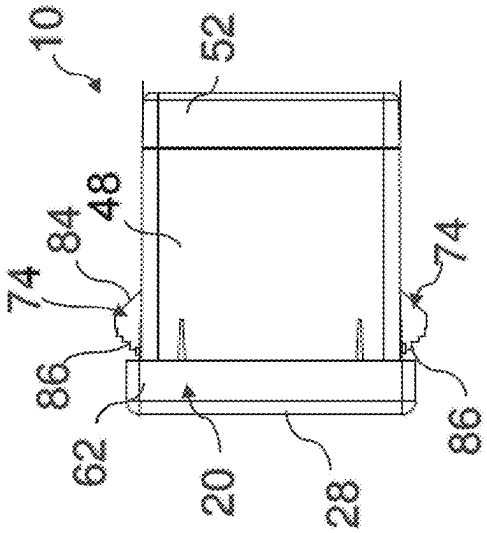


FIG. 6

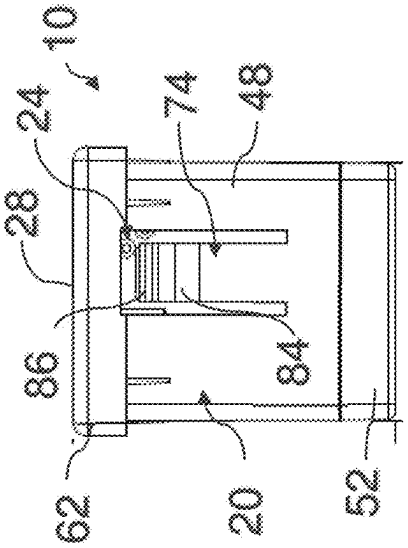


FIG. 8

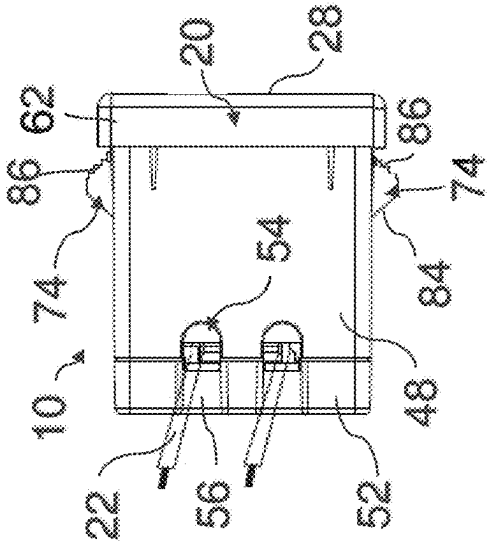


FIG. 5

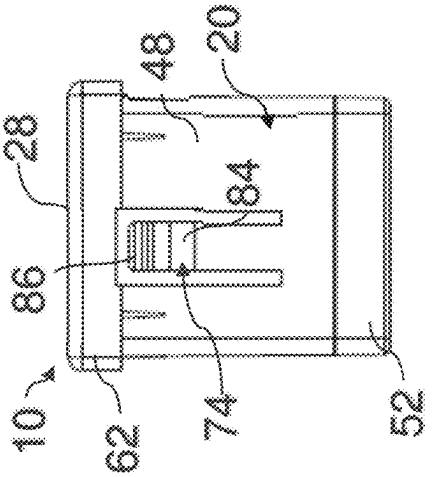


FIG. 7

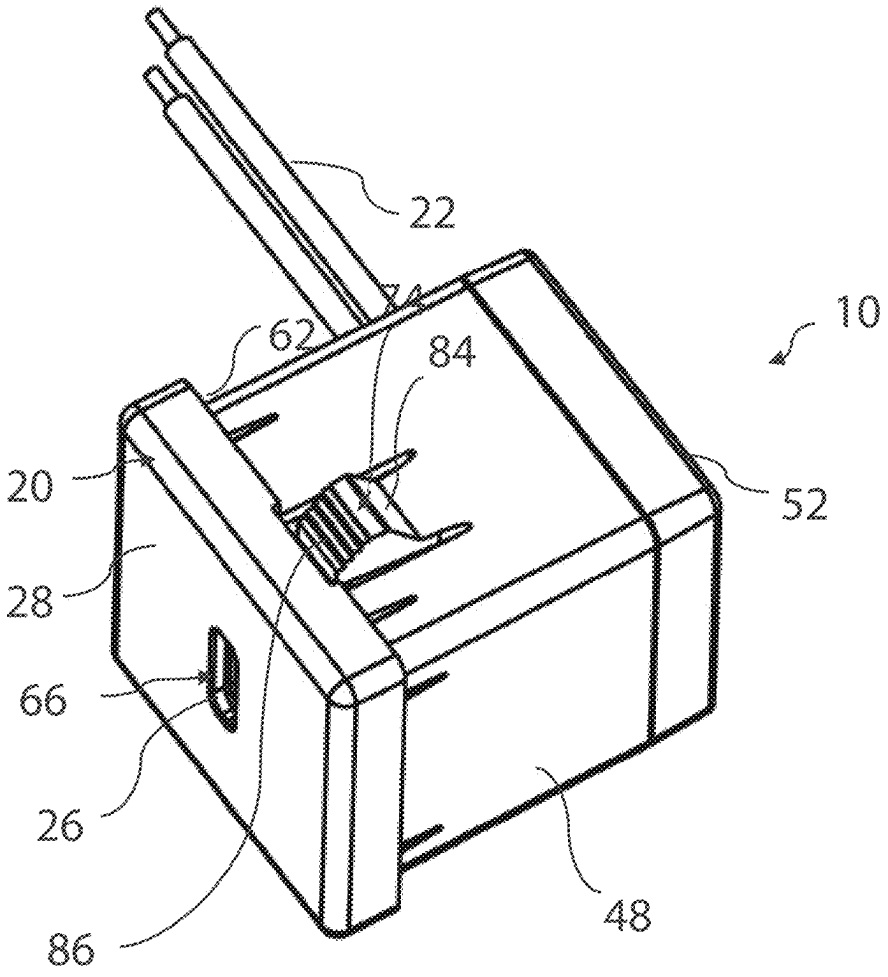


FIG. 9

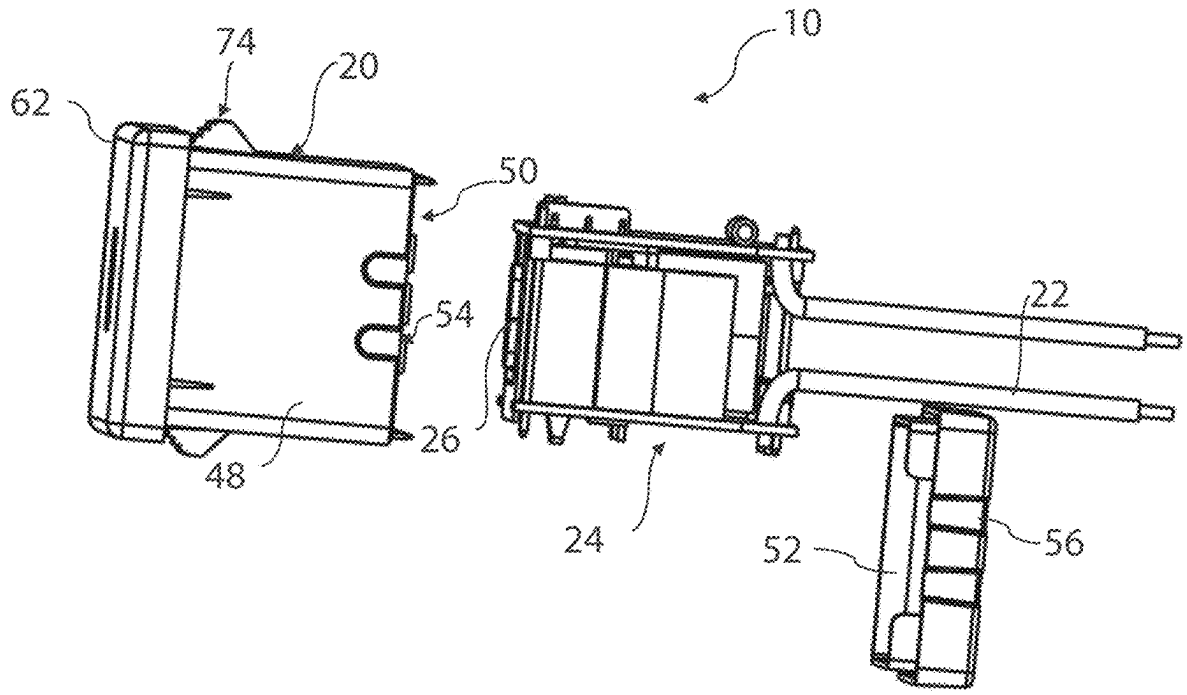


FIG. 10

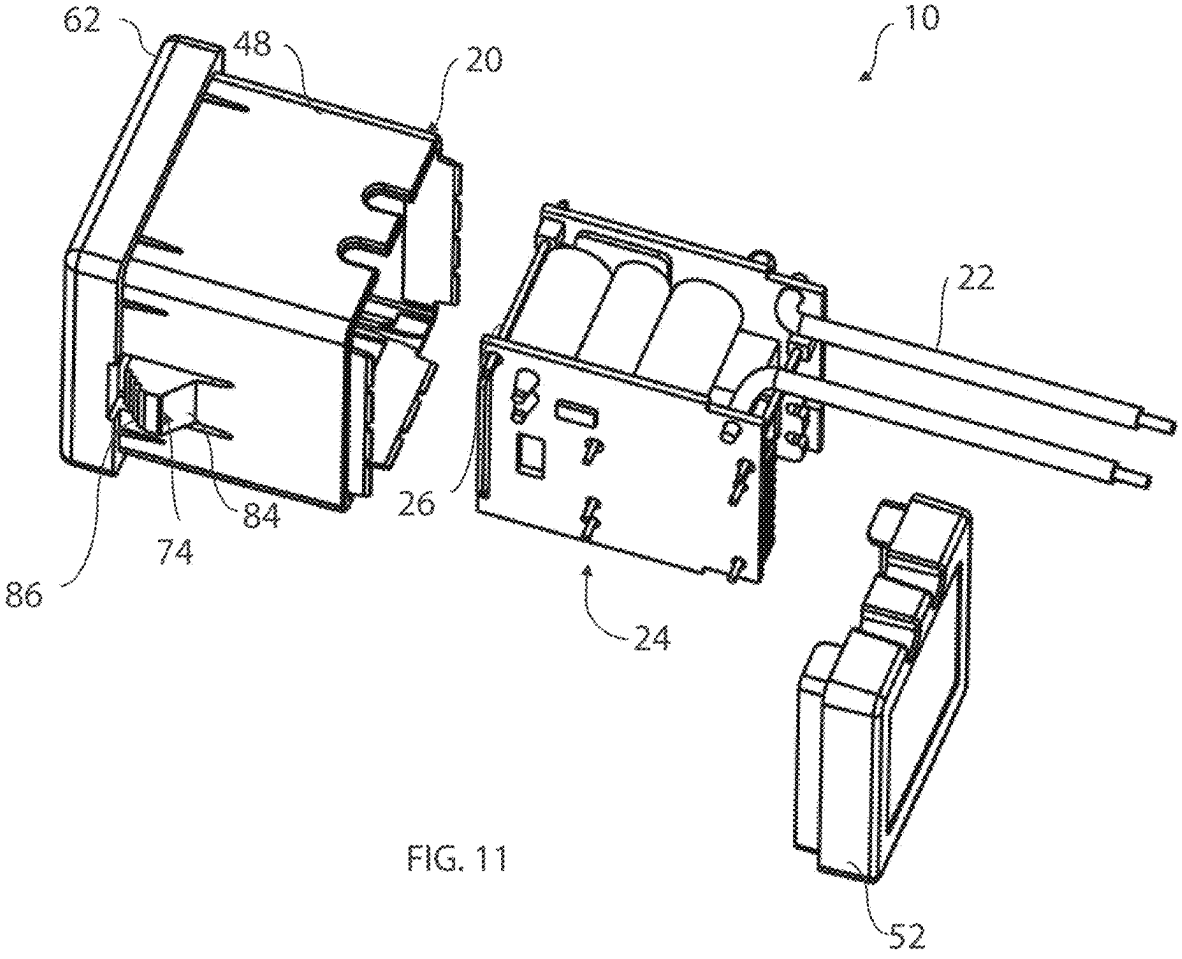


FIG. 11

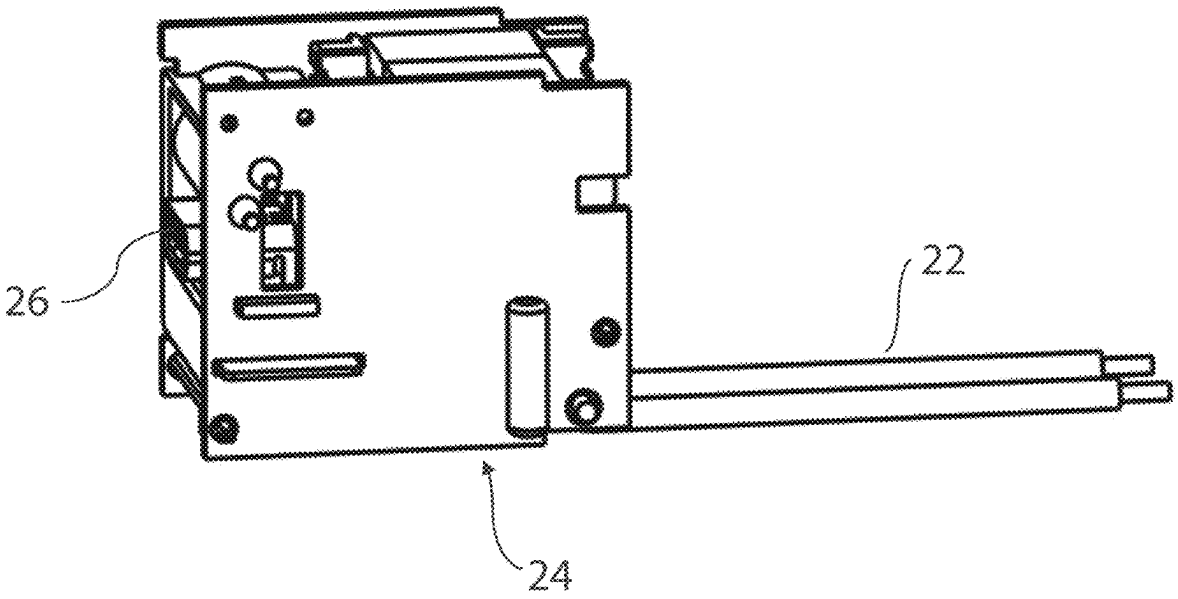


FIG. 12

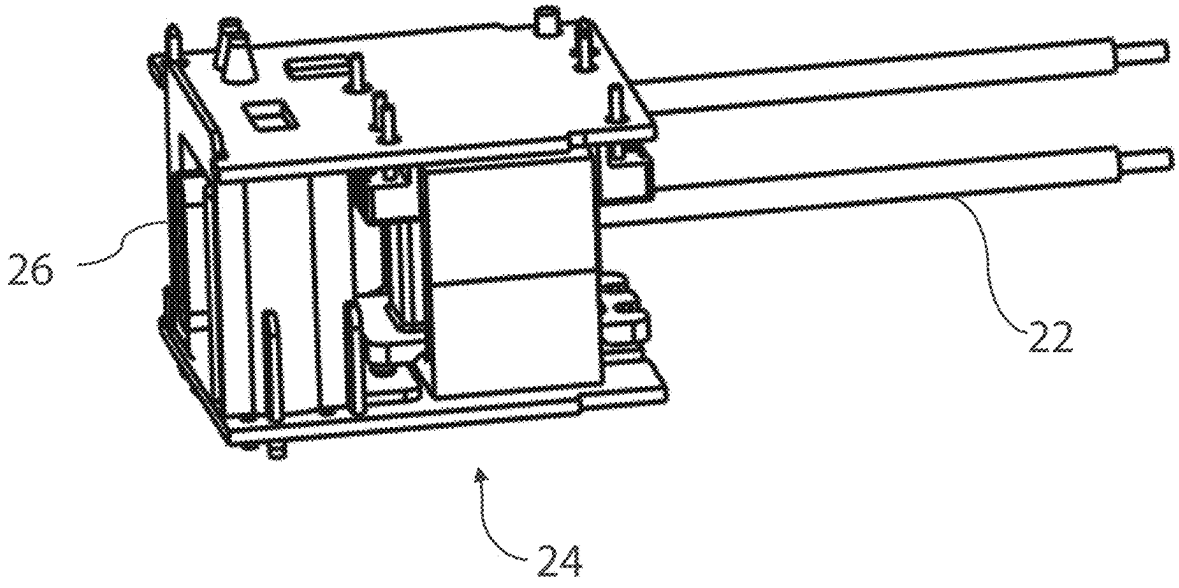


FIG. 13

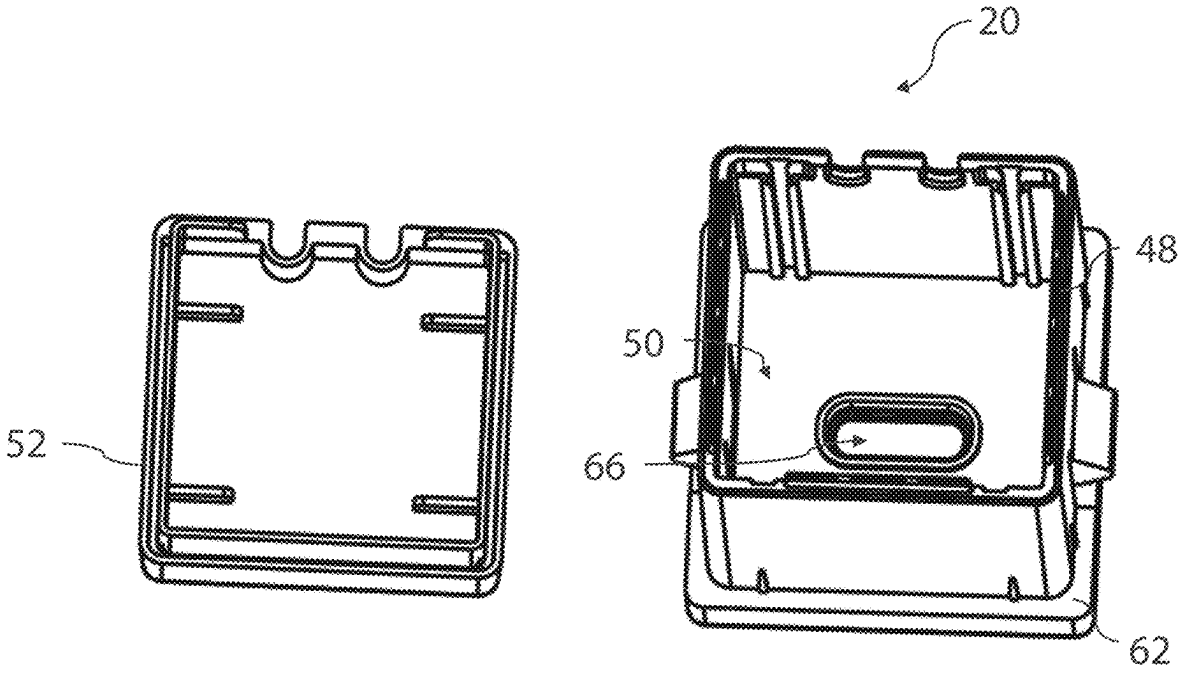


FIG. 14

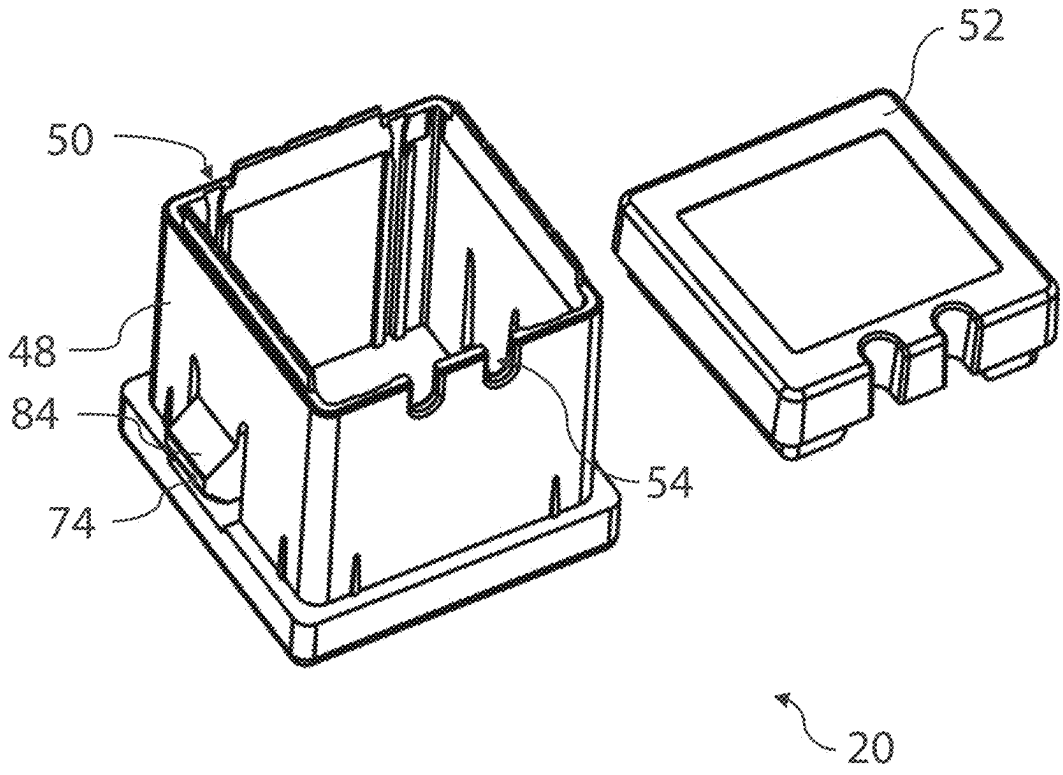


FIG. 15

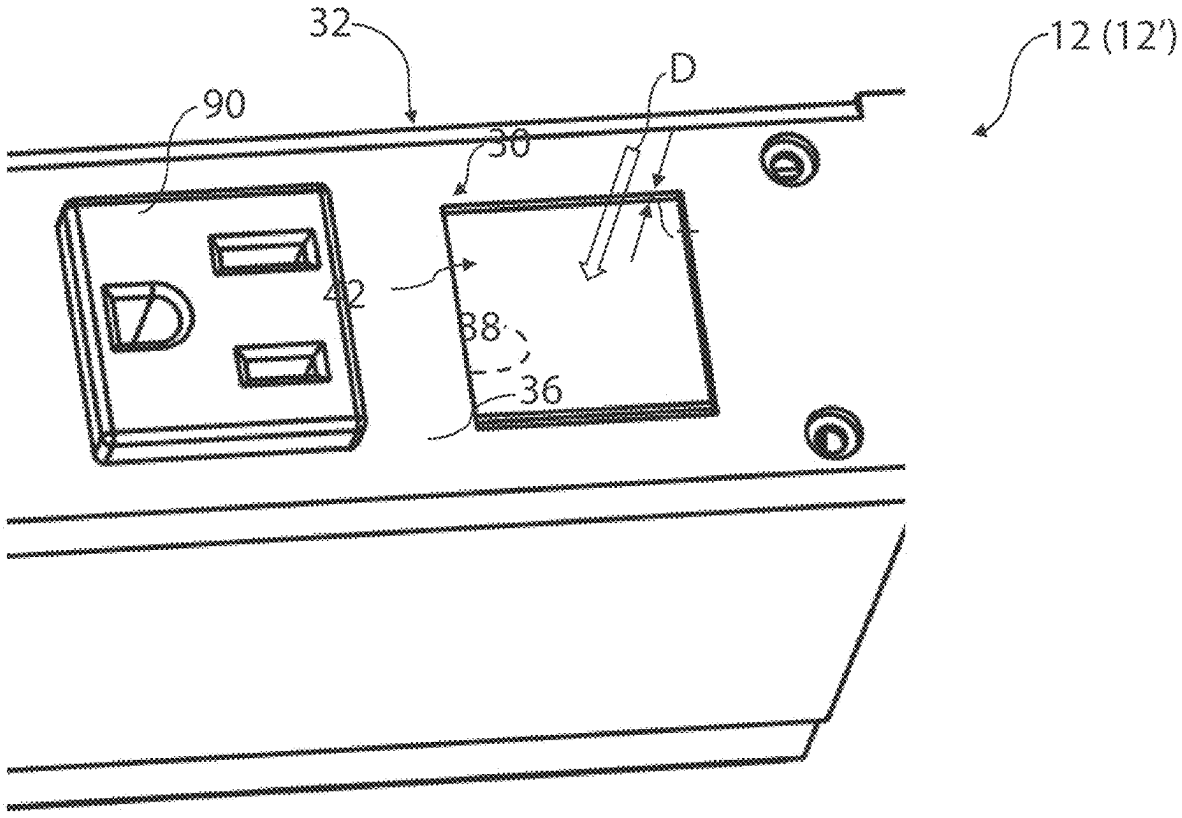


FIG. 16

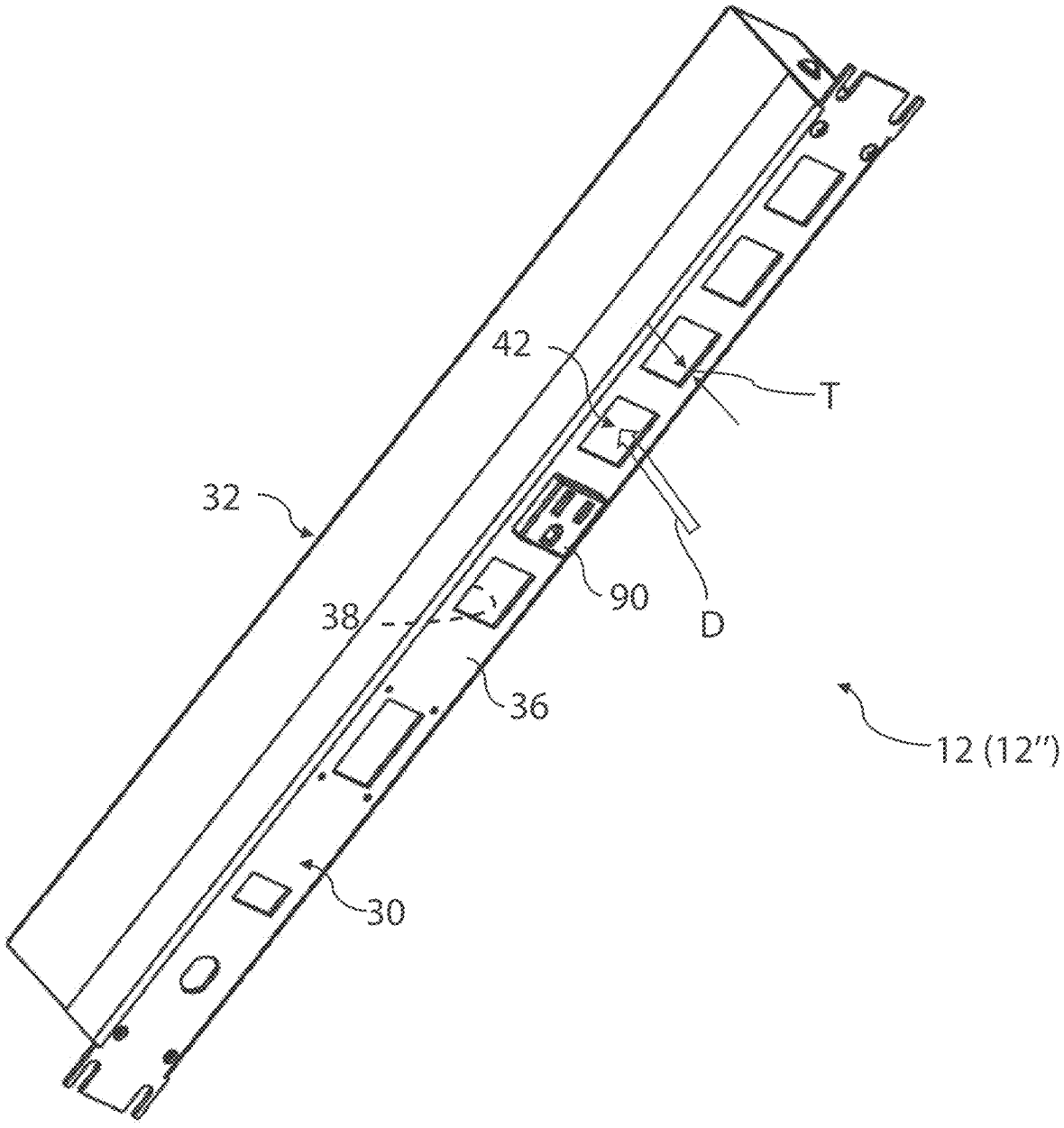


FIG. 17

MODULAR COMPONENT POWER OUTLET FOR A POWER SUPPLY STRIP

FIELD

The present disclosure relates generally to an electrical power outlet for an electrical power supply strip.

BACKGROUND

An electrical power supply strip provides electrical power. Typically, such a power supply strip is for a location, such as a desktop. Also, the power supply strip is connected (e.g., plugged-in) to a source of electrical power (e.g., approximately 110 volts AC at approximately 60 Hz, or approximately 230 volts AC at approximately 50 Hz or other AC format dependent upon local power infrastructure). Further, the power supply strip includes plural electrical power outlet, and the plural electrical power outlets may provide different electrical power formats. Such different electrical power formats may include: approximately 110 volts AC at approximately 60 Hz (or approximately 230 volts AC at approximately 50 Hz or other AC format dependent upon local power infrastructure) and 3 to 20 volts DC. Such a 3 to 20 volts DC format may be provided via a USB type outlet.

Power strips may be varied. For example, power strips have different sizes (e.g., different number of power outlets), different arrangements/configurations, etc.

Power strips have a main housing in which the power outlets are located. Different main housings may have varied constructions. For example, different main housings may be made of different materials, different main housings may have different housing material thicknesses.

As mentioned, each power strip may have plural electrical power outlets that provide different electrical power formats. If there is a power outlet that provides a power format (e.g., 3 to 20 volts DC) that is different from the supplied power format (e.g., approximately 110 volts AC at approximately 60 Hz, or approximately 230 volts AC at approximately 50 Hz or other AC format dependent upon local power infrastructure), the power strip will include a power converter/adaptor to convert/adapt from the supplied power format.

BRIEF SUMMARY

The following presents a simplified example summary in order to provide a basic understanding of some aspects of the present disclosure. This summary is not an extensive overview of the present disclosure. It is intended to neither identify key or critical elements nor delineate the scope of the present disclosure. Its sole purpose is to present some concepts of the present disclosure in a simplified form as a prelude to the more detailed description that is presented later.

In accordance with an aspect, the present disclosure provides a power outlet for an electrical power supply strip. The strip is configured to receive a first electrical power type. The strip has a main housing. The main housing has a wall. The wall has an outer face and an inner face. The wall has a thickness between the outer face and the inner face. The wall has a shaped aperture therethrough. The power outlet includes a power outlet housing. The power outlet includes an electrical connection to connect within the electrical power supply strip to receive the first electrical power type. The power outlet includes electrical components located within the power outlet housing to change the first electrical power type to a second electrical power type. The power outlet includes a connection interface located at a front of the power outlet housing and supplying the second electrical power type. The power outlet housing has a body with a shape that corresponds to the shape of the shaped aperture of the main housing. The power outlet housing has a front portion at the front of the power outlet housing that is larger than the shaped aperture of the main housing to engage the outer face of the wall of the main housing and prevent the front portion from passing through the shaped aperture of the main housing. The power outlet housing has an elastically deformable arm extending from the body. The deformable arm deforms as the arm passes through the shaped aperture of the main housing. The deformable arm has an engagement portion that engages the inner face of the wall of the main housing after the arm passes through the shaped aperture of the main housing to entrap the wall of the main housing between the arm and the front portion and retain the power outlet housing relative to the wall of the main housing, and the deformable arm being configured to accommodate a variation of the thickness of the wall of the main housing.

In accordance with an aspect, the present disclosure provides an electrical power supply strip configured to receive a first electrical power type. The power supply strip includes a main housing. The main housing has a wall. The wall has an outer face and an inner face. The wall has a thickness between the outer face and the inner face. The wall has a plurality of shaped apertures therethrough. The power supply strip includes a first power outlet that provides a supply of the first electrical power type. The first power outlet is located within one of the shaped apertures. The power supply strip includes a second power outlet.

The second power outlet includes a power outlet housing. The second power outlet includes an electrical connection to connect within the electrical power supply strip to receive the first electrical power type. The second power outlet includes electrical components located within the power outlet housing to change the first electrical power type to a second electrical power type. The second power outlet includes a connection interface located at a front of the power outlet housing and supplying the second electrical power type. The power outlet housing has a body with a shape that corresponds to the shape of the shaped aperture of the main housing. The power outlet housing has a front portion at the front of the power outlet housing that is larger than the shaped aperture of the main housing to engage the outer face of the wall of the main housing and prevent the front portion from passing through the shaped aperture of the main housing. The power outlet housing has an elastically deformable arm extending from the body. The deformable arm deforms as the arm passes through the shaped aperture of the main housing. The deformable arm has an engagement portion that engages the inner face of the wall of the main housing after the arm passes through the shaped aperture of the main housing to entrap the wall of the main housing between the arm and the front portion and retain the power outlet housing relative to the wall of the main housing, and the deformable arm being configured to accommodate a variation of the thickness of the wall of the main housing.

In accordance with an aspect, the present disclosure provides an associated method for providing the power outlet and the electrical power supply strip.

BRIEF DESCRIPTION OF THE DRAWINGS

While the techniques presented herein may be embodied in alternative forms, the particular embodiments illustrated

in the drawings are only a few examples that are supplemental of the description provided herein. These embodiments are not to be interpreted in a limiting manner, such as limiting the claims appended hereto.

FIG. **1** is a perspective view of an example power outlet in accordance with at least one aspect of the present disclosure.

FIG. **2** is another perspective view of the example power outlet of FIG. **1**.

FIG. **3** is a front view of the example power outlet of FIG. **1**.

FIG. **4** is a back or rear view of the example power outlet of FIG. **1**.

FIG. **5** is a first side view of the example power outlet of FIG. **1**.

FIG. **6** is a second side view of the example power outlet of FIG. **1**.

FIG. **7** is a third side view of the example power outlet of FIG. **1**.

FIG. **8** is a fourth side view of the example power outlet of FIG. **1**.

FIG. **9** is a perspective photograph of the example power outlet of FIG. **1**.

FIG. **10** is a perspective photograph of an explosion of the example power outlet of FIG. **1**, and shows electrical components of the power outlet that are within a housing of the power outlet.

FIG. **11** is another perspective photograph of the explosion of the example power outlet of FIG. **1**.

FIG. **12** is a perspective photograph of the electrical components, which are inverted as compared to FIGS. **10** and **11**.

FIG. **13** is a perspective photograph of electrical components, which are laid on side as compared to FIGS. **10** and **11**.

FIG. **14** is a perspective photograph of an explosion/disassembly of the housing of the power outlet of FIGS. **10** and **11**.

FIG. **15** is another perspective photograph of the explosion/disassembly of the housing of the power outlet of FIGS. **10** and **11**.

FIG. **16** is a perspective photograph of an example portion of an example main housing, having a wall thickness, of an example power strip within which a power outlet in accordance with at least one aspect of the present disclosure may be utilized.

FIG. **17** is a perspective photograph of an example portion of an example main housing, having a wall thickness, of another example power strip within which one or more power outlets in accordance with at least one aspect of the present disclosure may be utilized.

DETAILED DESCRIPTION

Subject matter will now be described more fully hereinafter with reference to the accompanying drawings, which form a part hereof, and which show, by way of illustration, specific example embodiments. This description is not intended as an extensive or detailed discussion of known concepts. Details that are known generally to those of ordinary skill in the relevant art may have been omitted, or may be handled in summary fashion.

Certain terminology is used herein for convenience only and is not to be taken as a limitation on the disclosed subject matter. Relative language used herein is best understood with reference to the drawings, in which like numerals are used to identify like or similar items. Further, in the drawings, certain features may be shown in somewhat schematic form.

The following subject matter may be embodied in a variety of different forms, such as methods, devices, components, and/or systems. Accordingly, this subject matter is not intended to be construed as limited to any illustrative embodiments set forth herein as examples. Rather, the embodiments are provided herein merely to be illustrative.

An example power outlet **10** for an electrical power supply strip is shown within FIGS. **1-11**, with some selected portions of the power outlet **10** being shown in FIGS. **12-15**. Examples of portions of an electrical power supply strips **12** (i.e., **12'** and **12"**), within which the power outlet **10** may be used, are shown in FIGS. **16** and **17**.

In general, the power outlet **10** (FIGS. **1-11**) includes: a power outlet housing **20**, an electrical connection (e.g., two wire leads) **22** to connect within the electrical power supply strip **12** to receive a first electrical power type, electrical components **24** (see FIGS. **10-13**) located within the power outlet housing **20** (see FIGS. **8**, **10** and **11**) to change the first electrical power type to a second electrical power type, and a connection interface **26** (see FIGS. **1-3** and **10-12**) located at a front **28** of the power outlet housing **20** and supplying the second electrical power type. Within an example, the connection interface **26** may be a USB type connection interface. Within an example, the second electrical power type may be approximately 3 to 20 volts direct current (DC) format.

Of course, the second electrical power type may be varied. One example variant includes other DC voltages. Within such variation, one more specific example may be approximately 40 volts DC. So, an example range may be approximately 3 to 40 volts DC. Moreover, the second electrical power type may be further varied, including being an alternating current at any voltage and any frequency.

Of course, the connection interface, and the second electrical power type supplied thereby, may be varied and such variation is within the scope of the present disclosure. Moreover, further variations are contemplated and within the scope of the present disclosure. For example, the USB type outlet may be: USB A, USB B, USB C USB mini, USB micro, etc. Still further, the provision of power may be a variety of pin configurations, pin numbers, etc. As such, a wide variation of different electrical power formats, and associated provision configuration of such, are contemplated and thus within the scope of the present disclosure. According, the different electrical power formats, and associated provision configuration, is to be broadly interpreted.

It is to be appreciated that some of the aspects of the present disclosure include the following: The power outlet **10** is provided as a modular component that may be swiftly and economically installed within the power supply strip (e.g., **12**, such as examples **12'** and **12"**, see FIGS. **16** and **17**). The installation may be a one-direction D motion of the entire power outlet **10** into a wall **30** of the power supply strip (e.g., **12**, such as examples **12'** and **12"**). The installation may automatically accommodate for variable thickness T of the wall **30** of the power supply strip **12**. The power outlet **10** may be swiftly and economically connected to electrical supply within the power supply strip **12**. The power outlet **10** contains its own electrical components **24**, located within a power outlet housing **20**, to change the first electrical power type to a second electrical power type. Thus, a need for separate electrical components, located

elsewhere within the power supply strip **12**, to change the first electrical power type to a second electrical power type is omitted.

Turning briefly to the electrical power supply strip **12** (see the examples of FIGS. **16** and **17**), the strip is configured to receive a first electrical power type. Examples of such first electrical power type are common wall outlet type power within a dwelling, office or similar. An example of such wall outlet type power is approximately 110 volts (e.g., plus or minus 10 volts variation), alternating current (AC) at approximately 60 Hz. Another example of such wall outlet type power is approximately 230 volts (e.g., plus or minus 10 volts variation), alternating current at approximately 50 Hz. Of course, example voltages may vary higher or lower (e.g., plus or minus 10 volts or more). Thus, one example general range is approximately 100 to 240 volts AC at approximately 50 to 60 Hz. It is to be appreciated that different power types (e.g., different voltages and/or different frequencies) are within the scope of the present disclosure. Moreover, the first electrical power type may be further varied, including being a direct current at any voltage.

As mentioned, the power outlet **10** includes the electrical components **24** that are located within the power outlet housing **20** to change the first electrical power type to a second electrical power type. So, the electrical power supply strip **12** does not need to include any other electrical components that change the first electrical power type to a second electrical power type. Recall that the electrical connection (e.g., two wire leads) **22** is to be connected within the electrical power supply strip **12** to receive a first electrical power type. To be clear, the electrical connection (e.g., two wire leads) **22**, and thus the electrical components **24** of the power outlet **10**, receive the first electrical power type, as is (i.e., directly, without alternation).

The power outlet **10**, with the included electrical components **24**, provides for its own needs regarding changing from the first electrical power type to the second electrical power type. Such is beneficial in that the electrical power supply strip **12** does not need to be constructed/configured with such electrical components. Moreover, it is to be appreciated that the first electrical power type may be varied and the second electrical power type may be varied. The electrical power supply strip **12** does not need to be constructed/configured to have varied electrical components to accommodate variations in the first electrical power type and/or the second electrical power type. It is to be appreciated that an aspect of the present disclosure is that multiple, different power outlets **10** may be manufactured, available, etc. so that selection may be made among the multiple, different power outlets **10** according to the first electrical power type and/or the second electrical power type.

Within an example, the electrical components **24** of the power outlet **10** are constructed/configured to change (e.g., convert or transform) approximately 110 volts (e.g., plus or minus 10 volts) AC at approximately 60 Hz, as the first electrical power type, to approximately 3 to 40 volts DC, as the second electrical power type. Of course and as mentioned, another first electrical power type and/or another second electrical power type (e.g., approximately 230 volts AC at approximately 50 Hz) may be involved and the electrical components **24** of the power outlet **10** constructed/configured accordingly. Moreover, for such first electrical power type and/or another second electrical power type, the electrical components **24** is construction/configuration to accomplish the change (e.g., convert or transform) accordingly.

It is to be appreciated that FIGS. **16** and **17** only show a portion of the electrical power supply strip **12**. Other portions of the electrical power supply strip **12** are not shown and may have a variety of constructions/configurations. Such variations, although contemplated within the scope of the present disclosure, are not limitations upon the present disclosure. The present disclosure simply includes the knowledge/understanding of the existence of other portions of the electrical power supply strip **12**.

The electrical power supply strip **12** does have a main housing **32** (partially shown in FIGS. **16** and **17**, i.e., only a portion is shown). The wall **30** is part of the main housing **32**. Focusing upon the wall **30**, the wall may have varied constructions/configurations, be made of varied materials, etc., and such variations are contemplated within the scope of the present disclosure. The wall **30** has an outer face **36** and an inner face **38** (hidden from view in FIGS. **16** and **17**, and so designated via use of dash lead lines within the figures). The thickness T of the wall **30** is a measurement between the outer face **36** and the inner face **38**.

The wall **30** has a shaped aperture **42** therethrough. It is contemplated that more than one shaped aperture **42** may be provided through the wall **30**. For example, FIG. **17** shows at least two shaped apertures **42**. It is to be appreciated that the shape (e.g., as defined within a plane of the wall **30**) and size (e.g., as defined within the plane of the wall **30**) of the aperture **42** may be varied and that such variation is within the scope of the present disclosure. Within the shown examples of FIGS. **16** and **17**, the shape of the aperture **42** is generally rectangular, and specifically generally square. It should be noted that the shape need not be perfectly rectangular/square and that such difference from being perfectly rectangular/square is within the scope of the present disclosure.

Focusing upon the power outlet **10**, the power outlet housing **20** has a body **48** that has a cross-sectional shape that corresponds to the shape of the shaped aperture **42** through the wall **30** of the main housing **32**. Within the shown example of the figures, the cross-sectional shape of the body **48** is generally square. It should be noted that the shape need not be perfectly square and that such difference from being perfectly square is within the scope of the present disclosure. A cross-sectional size (i.e., area) of the body **48** is similar, but slightly smaller than the size of the shaped apertures **42**. So, the body **48** may pass into the shaped apertures **42**.

The body **48** of the power outlet housing **20** is hollow **50** and the electrical components **24** that are located within the power outlet housing **20** are located within the hollow **50** of the body **48**. The body **48** includes a rear portion **52** that closes the hollow **50**. Once the electrical components **24** are within the hollow **50** of the power outlet housing **20**, the rear portion **52** is connected/secured to the remainder of the body **48**. Such connection/securement may be varied. For example, the rear portion **52** may be connected to the remainder of the body **48** by a hinge, that permits pivoting between an open condition and a closed position. It is to be appreciated that FIGS. **10**, **11**, **14** and **15** show a hinge that has been cut in order to provide exploded views. Further, the rear portion **52** may include a latch, tab or similar that secures the rear portion **52** in a closed position. Other examples to secures the rear portion **52** in a closed position may include various fastening structures, adhesives and the like. It is to be appreciated that the specifics regarding securing the rear portion **52** in a closed position need not be limitations upon the present disclosure and variations are within the scope of the present disclosure.

The body **48** includes at least one port or opening **54** through which the electrical connection (e.g., two wire leads) **22** extend. Within the shown example, the rear portion **52** of the body **48** includes taper(s) or recess(es) **56** to accommodate the electrical connection (e.g., two wire leads) **22**.

The power outlet housing **20** includes a front portion **62** at the front **28** of the power outlet housing. An opening **66** extends through the front portion. The opening **66** is aligned with the connection interface **26** such that the connection interface **26** is accessible through the front portion **62**.

The front portion **62** has a cross-sectional size (i.e., area) that is larger than the cross-sectional size (i.e., area) of the body **48**. The front portion **62** is also larger than the shaped aperture **42** of the main housing **32** (see FIGS. **16** and **17**). Specifically, the front portion **62** has cross-sectional size (i.e., area) that is larger than the cross-sectional size (i.e., area) of the shaped aperture **42** of the main housing **32**. Such larger size results in the front portion **62** being engageable to the outer face **36** of the wall **30** of the main housing **32**. Such engagement prevents the front portion **62** from passing through the shaped aperture **42** of the main housing **32** (i.e., cessation of further movement in the direction D).

To be clear, when the power outlet housing **20** is inserted, in the direction D, into the shaped aperture **42** of the main housing **32**, the body **48** of the power outlet housing **20** passes into and through the shaped aperture **42**, but the front portion **62** abuts and stops against the outer face **36** of the wall **30** of the main housing **32**. Thus, the front portion **62** helps to hold the power outlet housing **20** in the position with the front portion **62** against the outer face **36** of the wall **30** of the main housing **32** (i.e., no further movement of the power outlet **10** in the direction D).

The power outlet housing **20** includes an elastically deformable arm **74** extending from the body **48**. Within the shown example, the power outlet housing **20** includes two elastically deformable arms **74**. Within the shown example, the deformable arms **74** are located on opposite sides of the power outlet housing **20**. Each deformable arm **74** is attached at one end of the deformable arm **74** to a side of the body **48** and the other end of the deformable arm **74** is free to move relative to the remainder of the body **48** via elastic deformation. The deformable arm **74** is constructed/configured such that the deformation may be inward relative to the remainder of the body **48**.

Each deformable arm **74** includes a head portion **76**. The head portion **76** has an outward extent, in a width-wise direction. When the deformable arm **74** is in a non-deformed condition, the outward extent of the head portion **76** is greater than the remainder of the body **48**. As the deformable arm **74** is increasingly deformed inward, the outward extent of the head portion **76** is lessened. Upon sufficient inward deformation, the outward extent of the head portion **76** may be lessened sufficiently such that the outward extent of the head portion **76** beyond the remainder of the body **48** is zero or substantially zero. At such an inwardly deflected condition, the head portion **76** thus has no more outward extent than the remainder of the body **48**. In other words, the head portion **76** of the deformable arm **74** essentially has the same outward extend or dimension as the remainder of the body **48**. It is to be noted that because the deformation is elastic, the deformable arm **74** has a bias that urges the deformable arm **74** outward toward the non-deformed condition.

Recall that the power outlet **10** is provided as a modular component that may be installed within the power supply strip (e.g., **12**, such as examples **12'** and **12"**, see FIGS. **16** and **17**) via the one-direction D motion of the entire power outlet housing **20** into the shaped aperture **42** of the wall **30** of the main housing **32**. Also recall that upon sufficient inward deformation, the outward extent of the head portion **76** of the deformable arm **74** is essentially has the same outward extend or dimension as the remainder of the body **48**. Such a condition (i.e., inward deformation of the deformable arm **74**) allows the power outlet **10** to be installed within the power supply strip (e.g., **12**, such as examples **12'** and **12"**, see FIGS. **16** and **17**) via the one-direction D motion of the entire power outlet housing **20** into the wall **30** of the power supply strip (e.g., **12**, such as examples **12'** and **12"**). The deformable arm **74** simply deforms inwardly as needed. In other words, the deformable arm **74** deforms as the arm passes through the shaped aperture **42** in the wall **30** of the main housing **32**.

Recall that the wall **30** has a thickness T. Dependent upon the placement of the deformable arm **74**, and the head portion **76** thereon, upon the body **48**, the thickness T of the wall **30**, and possibly other factors, some or all of the head portion **76** may move past the wall **30** upon complete installation of the power outlet **10** (i.e., the front portion **62** abuts and stops against the outer face **36** of the wall **30** of the main housing **32**). As such, the bias force of the deformable arm **74** may cause at least some outward movement of the deformable arm **74**, and the head portion **76** thereon, adjacent to the inner face **38** of the wall **30**. It is to be appreciated that such outward movement may be associated with the head portion **76** of the deformable arm **74** engaging/bearing upon the wall **30** at the inner face **38**. Such engagement/bearing holds the power outlet **10** relative to the wall **30** of the power supply strip (e.g., **12**, such as examples **12'** and **12"**) from the inner face **38** side of the wall **30**. Moreover, such holding provides for resisting a removal movement (i.e., opposite direction to the direction D) of the power outlet **10** relative to the power supply strip (e.g., **12**, such as examples **12'** and **12"**).

It is to be recalled that the front portion **62** abuts and stops against the outer face **36** of the wall **30** of the main housing **32**. Thus, the front portion **62** helps to hold the power outlet housing **20** in the position with the front portion **62** against the outer face **36** of the wall **30** of the main housing **32** (i.e., no further movement of the power outlet **10** in the direction D). So, also with the head portion **76** of the deformable arm **74** engaging/bearing upon the wall **30** at the inner face **38** and holding to provide for resistance against a removal movement (i.e., opposite direction to the direction D), the power outlet **10** is held in place relative to the power supply strip (e.g., **12**, such as examples **12'** and **12"**). So, the deformable arm **74** has an engagement portion (e.g., the head portion **76**) that engages the inner face **38** of the wall **30** of the main housing **32** after the arm passes through the shaped aperture **42** of the main housing **32** to entrap the wall **30** of the main housing **32** between the arm **74** and the front portion **62** and retain the power outlet housing **20** relative to the wall **30** of the main housing **32**.

The installation of the power outlet **10** into the shaped aperture **42** may automatically accommodate for variable thickness T of the wall **30** of the power supply strip **12**. By that, it is to be appreciated that the amount that the deformable arm **74** is permitted to move back toward the non-deformed condition may be related to the thickness T of the wall **30**. A smaller wall thickness may allow a larger amount of movement of the deformable arm **74** back toward the non-deformed condition. A larger wall thickness may allow a smaller amount of movement of the deformable arm **74** back toward the non-deformed condition. However, the

resilience of the deformable arm **74** may retain a pressure (i.e., a pressing force) against the wall **30** despite such variation of wall thickness.

It is to be appreciated that the deformable arm **74**, and the head portion **76** thereon, may have a varied construction/configuration. Such variation is contemplated and within the scope of the present disclosure. An example of a variant of the head portion **76** is shown within the figures. Specifically, the shown example includes a ramped or tapered surface **84** on a segment of the head portion that would first engage against the wall **30** as the power outlet **10** is inserted (i.e., moved in the direction D) into the shaped aperture **42**. As such, the tapered surface **84** may be considered to be on a leading location as the power outlet **10** is inserted (i.e., moved in the direction D) into the shaped aperture **42**. The tapered surface **84** helps to smoothly allow the deformable arm **74** to deform (e.g., deflect) inward, via pushing against the wall **30**, as the tapered surface **84** is engaged against the against the wall **30** as the power outlet **10** is moved in the direction D. Within an example, the tapered surface **84** cams against the wall **30** of the main housing **32** to cause the deformable arm **74** to deform as the arm passes through the shaped aperture **42** of the main housing.

Further regarding the shown example of the variant of the head portion **76**, the shown example includes a stair-step segment **86**. Such stair-step segment is located somewhat opposite of the location of the tapered surface **84** upon the head portion **76**. As such, the stair-step segment **86** may be considered to be on a trailing or following location as the power outlet **10** is inserted (i.e., moved in the direction D) into the shaped aperture **42**. Each step in the stair-step segment **86** is capable of directly engaging against the wall **30** at the inner face **38**. The stair stepping may provide an additional resistance to removal (i.e., in the direction opposite to the direction D) of the power outlet **10**. As the power outlet **10** in inserted (i.e., moved in the direction D) into the shaped aperture **42**, the stair-step segment **86** may act as click-locks. Dependent in part on the thickness T of the wall **30**, a varied number of steps of the stair-step segment **86** will sequentially "click-lock" against the inner face **38** of the wall **30**. Such sequential "click-locking" may occur until the front portion **62** abuts and stops against the outer face **36** of the wall **30** of the main housing **32**. As mentioned, the power outlet **10** is accordingly retained in place relative to the wall **30** of the main housing **32** of the electrical power supply strip **12**. As such, the stair-step segment **86** provides a sequential click-lock for the power outlet **10** to secure to the main housing **32**. The wall **30** of the main housing **32** is entrapped between the front portion **62** of the power outlet housing **20** and the stair-step segment **86**.

It is to be appreciated that the modular attribute of the power outlet **10** allows the overall power supply strip **12** to configured with various/varied power outlets **10** at various/varied locations on/along the power supply strip **12**. As such, various power supply strips **12** may have various configurations. As such, various power supply strips **12** may be individualized, customized, or the like.

FIGS. **16** and **17** show an example the power supply strip **12** in which at least two types of power outlets are provided. Within the example, a first type of power outlet **90** (e.g., a first power outlet), which provides a first electrical power type (e.g., approximately 110 volts AC at 60 Hz, with understanding that variations are contemplated) is shown as already located within the main housing **32**. With the above-described power outlet **10** installed (i.e., via the motion direction D as described above) in the main housing **32**, as described above, the power outlet **10** is thus a second type of power outlet. As mentioned above, the power outlet **10** (e.g., the second type of power outlet) may provide the power format (e.g., 3 to 20 volts DC).

Of course, the power supply strip **12** includes multiple locations, with each location being able to receive power outlet (e.g., either power outlet **10** or power outlet **90**). Either power outlet **10** or power outlet **90** may be place at any location on the power supply strip **12**. Moreover, any number of power outlet(s) **10** and any complement number of power outlet(s) **90** may be placed into the power supply strip **12**. Of course, the numbers of each of power outlet(s) **10** and power outlet(s) **90** simply are limited by the total available spaces (e.g., apertures **42**).

Unless specified otherwise, "first," "second," and/or the like are not intended to imply a temporal aspect, a spatial aspect, an ordering, etc. Rather, such terms are merely used as identifiers, names, etc. for features, elements, items, etc. For example, a first object and a second object generally correspond to object A and object B or two different or two identical objects or the same object.

Moreover, "example" is used herein to mean serving as an instance, illustration, etc., and not necessarily as advantageous. As used herein, "or" is intended to mean an inclusive "or" rather than an exclusive "or." In addition, "a" and "an" as used in this application are generally be construed to mean "one or more" unless specified otherwise or clear from context to be directed to a singular form. Also, at least one of A and B and/or the like generally means A or B or both A and B. Furthermore, to the extent that "includes," "having," "has," "with," and/or variants thereof are used in either the detailed description or the claims, such terms are intended to be inclusive in a manner similar to the term "comprising."

Although the subject matter has been described in language specific to structural features and/or methodological acts, it is to be understood that the subject matter defined in the appended claims is not necessarily limited to the specific features or acts described above. Rather, the specific features and acts described above are disclosed as example forms of implementing at least some of the claims.

Various operations of embodiments are provided herein. The order in which some or all of the operations are described herein should not be construed as to imply that these operations are necessarily order dependent. Alternative ordering will be appreciated by one skilled in the art having the benefit of this description. Further, it will be understood that not all operations are necessarily present in each embodiment provided herein. Also, it will be understood that not all operations are necessary in some embodiments.

Also, although the disclosure has been shown and described with respect to one or more implementations, equivalent alterations and modifications will occur to others skilled in the art based upon a reading and understanding of this specification and the annexed drawings. The disclosure includes all such modifications and alterations and is limited only by the scope of the following claims. In particular regard to the various functions performed by the above-described components (e.g., elements, resources, etc.), the terms used to describe such components are intended to correspond, unless otherwise indicated, to any component which performs the specified function of the described component (e.g., that is functionally equivalent), even though not structurally equivalent to the disclosed structure. In addition, while a particular feature of the disclosure may have been disclosed with respect to only one of several implementations, such feature may be combined with one or

more other features of the other implementations as may be desired and advantageous for any given or particular application.

What is claimed:

1. A power outlet for an electrical power supply strip, the strip being configured to receive a first electrical power type, which is an alternating current (AC), and having a main housing, the main housing having a wall, the wall having an outer face and an inner face, the wall having a thickness between the outer face and the inner face, the wall having a shaped aperture therethrough, the power outlet comprising:
- a power outlet housing;
- an electrical connection to connect within the electrical power supply strip to receive the first electrical power type;
- electrical components located within the power outlet housing to change the first electrical power type to a second electrical power type, which is a direct current (DC); and
- a connection interface located at a front of the power outlet housing and supplying the second electrical power type;
- the power outlet housing having:
  - a body with a shape that corresponds to the shape of the shaped aperture of the main housing;
  - a front portion at the front of the power outlet housing that is larger than the shaped aperture of the main housing to engage the outer face of the wall of the main housing and prevent the front portion from passing through the shaped aperture of the main housing; and
  - an elastically deformable arm extending from the body, the deformable arm deforms as the arm passes through the shaped aperture of the main housing, the deformable arm has an engagement portion that engages the inner face of the wall of the main housing after the arm passes through the shaped aperture of the main housing to entrap the wall of the main housing between the arm and the front portion and retain the power outlet housing relative to the wall of the main housing, and the deformable arm being configured to accommodate a variation of the thickness of the wall of the main housing.

2. A power outlet as claimed in claim 1, wherein the electrical components are configured to convert approximately 100 to 240 volts AC at approximately 50 to 60 Hz as the first electrical power type to approximately 3 to 40 volts DC as the second electrical power type.

3. A power outlet as claimed in claim 1, wherein the connection interface includes a USB type outlet.

4. A power outlet as claimed in claim 1, wherein the deformable arm includes a head portion.

5. A power outlet as claimed in claim 4, wherein the head portion includes a tapered surface.

6. A power outlet as claimed in claim 5, wherein the tapered surface cams against the wall of the main housing to cause the deformable arm to deform as the arm passes through the shaped aperture of the main housing.

7. A power outlet as claimed in claim 4, wherein the head portion includes a stair-step segment.

8. A power outlet as claimed in claim 7, wherein the stair-step segment provides a sequential click-lock for the power outlet to secure to the main housing.

9. A power outlet as claimed in claim 8, wherein the front portion of the power outlet housing and the stair-step segment entrap the wall of the main housing therebetween.

10. An electrical power supply strip configured to receive a first electrical power type, which is an alternating current (AC), the power supply strip comprising:
- a main housing, the main housing having a wall, the wall having an outer face and an inner face, the wall having a thickness between the outer face and the inner face, the wall having a plurality of shaped apertures therethrough;
- a first power outlet providing a supply of the first electrical power type, the first power outlet being located within one of the shaped apertures; and
- a second power outlet comprising:
  - a power outlet housing;
  - an electrical connection to connect within the electrical power supply strip to receive the first electrical power type;
  - electrical components located within the power outlet housing to change the first electrical power type to a second electrical power type, which is a direct current (DC); and
  - a connection interface located at a front of the power outlet housing and supplying the second electrical power type;
  - the power outlet housing having:
    - a body with a shape that corresponds to the shape of the shaped aperture of the main housing;
    - a front portion at the front of the power outlet housing that is larger than the shaped aperture of the main housing to engage the outer face of the wall of the main housing and prevent the front portion from passing through the shaped aperture of the main housing; and
    - an elastically deformable arm extending from the body, the deformable arm deforms as the arm passes through the shaped aperture of the main housing, the deformable arm has an engagement portion that engages the inner face of the wall of the main housing after the arm passes through the shaped aperture of the main housing to entrap the wall of the main housing between the arm and the front portion and retain the power outlet housing relative to the wall of the main housing, and the deformable arm being configured to accommodate a variation of the thickness of the wall of the main housing.

11. A power supply strip as claimed in claim 10, wherein the electrical components are configured to convert approximately 100 to 240 volts AC at approximately 50 to 60 Hz as the first electrical power type to approximately 3 to 40 volts DC as the second electrical power type.

12. A power supply strip as claimed in claim 10, wherein the deformable arm includes a head portion.

13. A power supply strip as claimed in claim 12, wherein the head portion includes a tapered surface.

14. A power supply strip as claimed in claim 12, wherein the head portion includes a stair-step segment.

15. A power supply strip as claimed in claim 14, wherein the stair-step segment provides a sequential click-lock for the power outlet to secure to the main housing.

16. A power supply strip as claimed in claim 15, wherein the front portion of the power outlet housing and the stair-step segment entrap the wall of the main housing therebetween.

17. A method of providing an electrical power supply strip configured to receive a first electrical power type, which is an alternating current (AC), the method comprising:

providing a main housing, the main housing having a wall, the wall having an outer face and an inner face, the wall having a thickness between the outer face and the inner face, the wall having a plurality of shaped apertures therethrough;

providing a first power outlet that provides a supply of the first electrical power type, the first power outlet being located within one of the shaped apertures; and

providing a second power outlet that comprises:

a power outlet housing;

an electrical connection to connect within the electrical power supply strip to receive the first electrical power type;

electrical components located within the power outlet housing to change the first electrical power type to a second electrical power type, which is a direct current (DC); and

a connection interface located at a front of the power outlet housing and supplying the second electrical power type;

the power outlet housing having:

a body with a shape that corresponds to the shape of the shaped aperture of the main housing;

a front portion at the front of the power outlet housing that is larger than the shaped aperture of the main housing to engage the outer face of the wall of the main housing and prevent the front portion from passing through the shaped aperture of the main housing; and

an elastically deformable arm extending from the body, the deformable arm deforms as the arm passes through the shaped aperture of the main housing, the deformable arm has an engagement portion that engages the inner face of the wall of the main housing after the arm passes through the shaped aperture of the main housing to entrap the wall of the main housing between the arm and the front portion and retain the power outlet housing relative to the wall of the main housing, and the deformable arm being configured to accommodate a variation of the thickness of the wall of the main housing.

18. A method as claimed in claim **17**, wherein the electrical components are configured to convert approximately 100 to 240 volts AC at approximately 50 to 60 Hz as the first electrical power type to approximately 3 to 40 volts DC as the second electrical power type.

19. A method as claimed in claim **17**, wherein the power supply strip includes multiple locations for receiving power outlets, the step of providing a first power outlet includes placing the first power outlet at any of the multiple locations, and the step of providing a second power outlet includes placing the second power outlet at any other of the multiple locations.

20. A method as claimed in claim **17**, wherein the method includes multiple steps of at least one of providing a first power outlet and providing a second power outlet.

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