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(54) **FLOOR SYSTEM**

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(57) **ABSTRACT**

A utilities terminal for use in a raised floor system is disclosed. The utilities terminal includes a floor tile having an access cavity, a support pan and an upper surface. The support pan is positioned within the access cavity, and has at least one access opening. The utilities terminal further includes a utilities grommet configured to be received within the support pan, and covering at least a portion of the support pan. The utilities terminal further includes a plurality of cover blocks selectively configured and adapted to be received within the support pan, cover the remaining open area of the support pan, and positioned substantially flush to the upper surface of the floor tile.

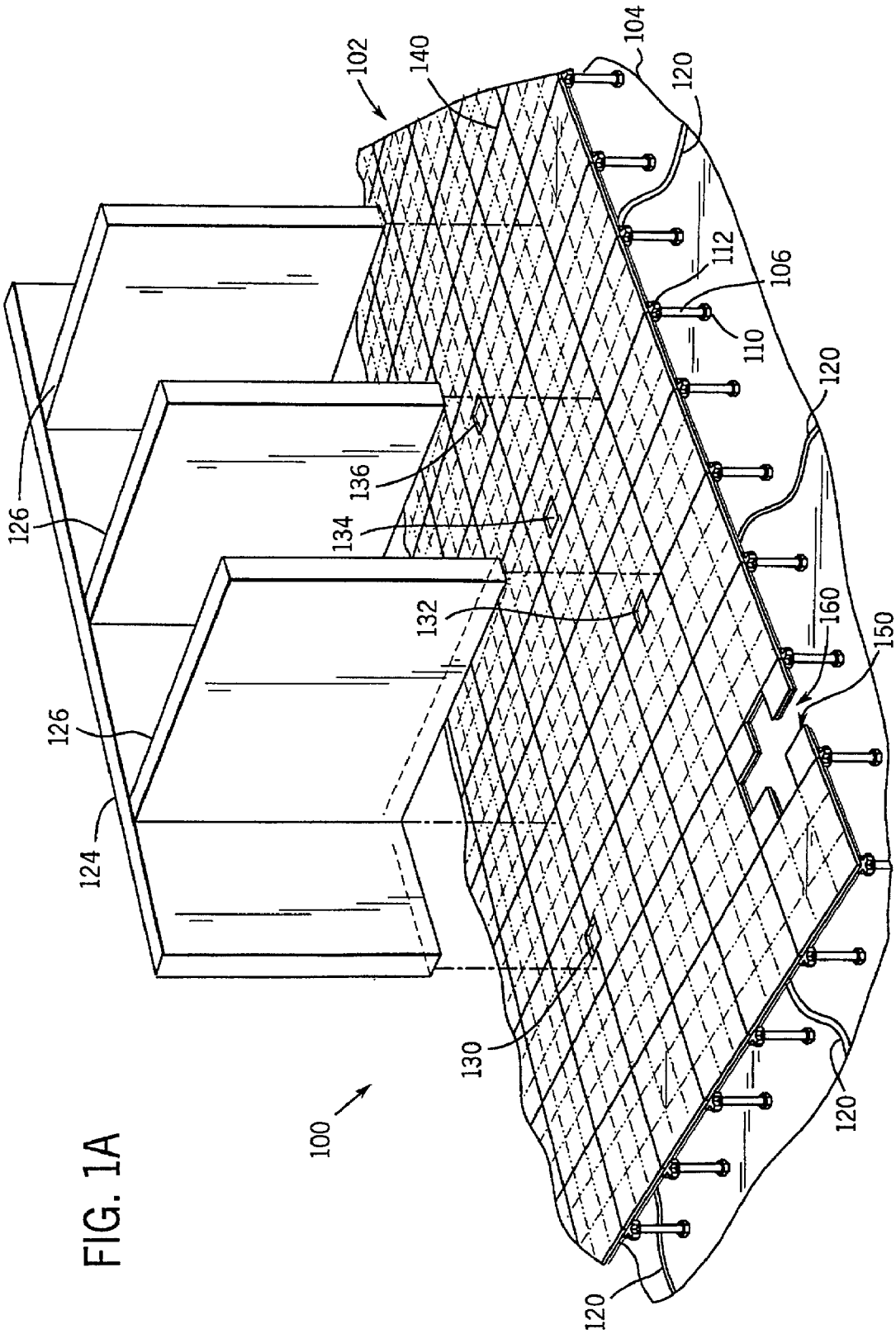
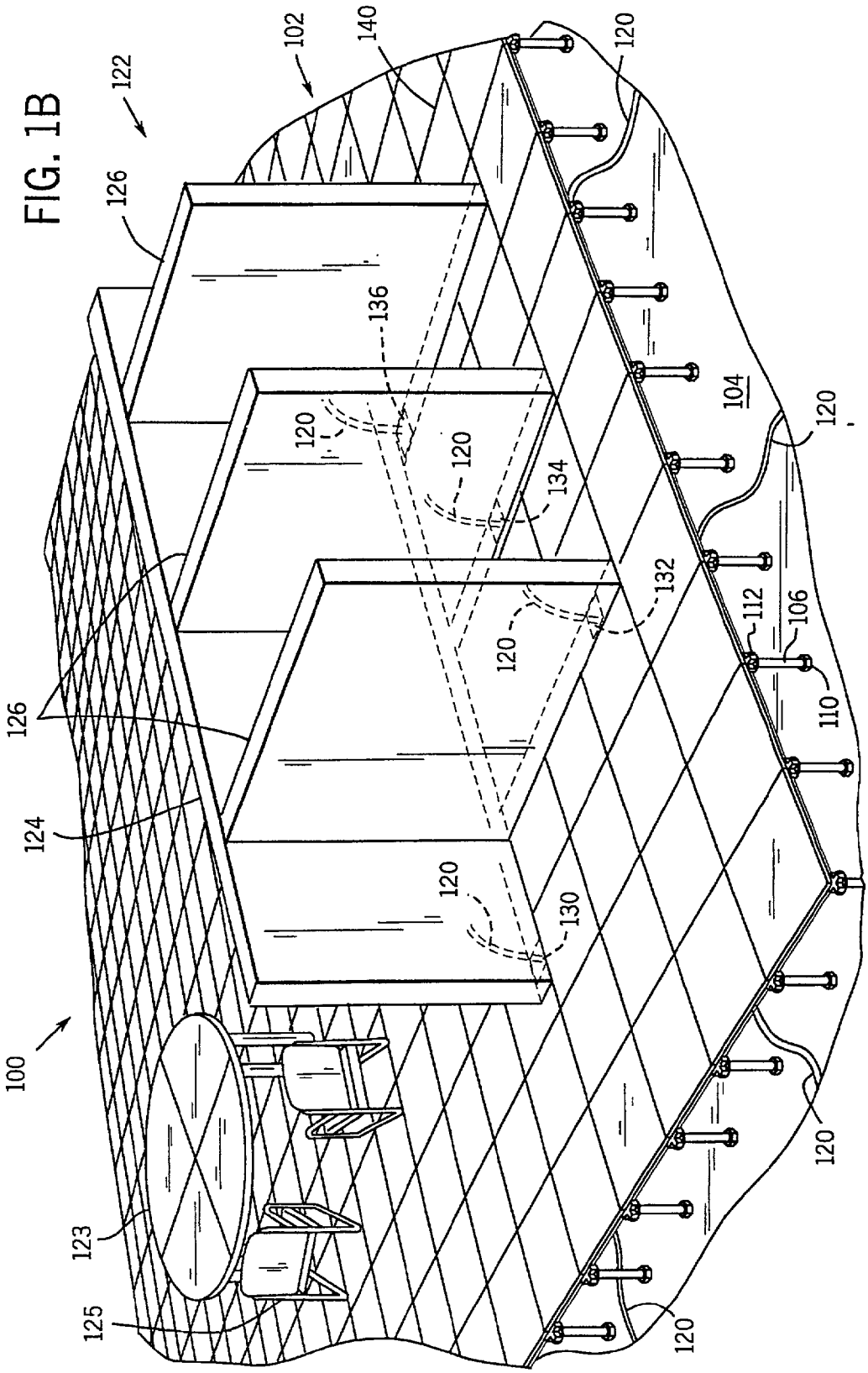

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FIG. 1A

FIG. 1B


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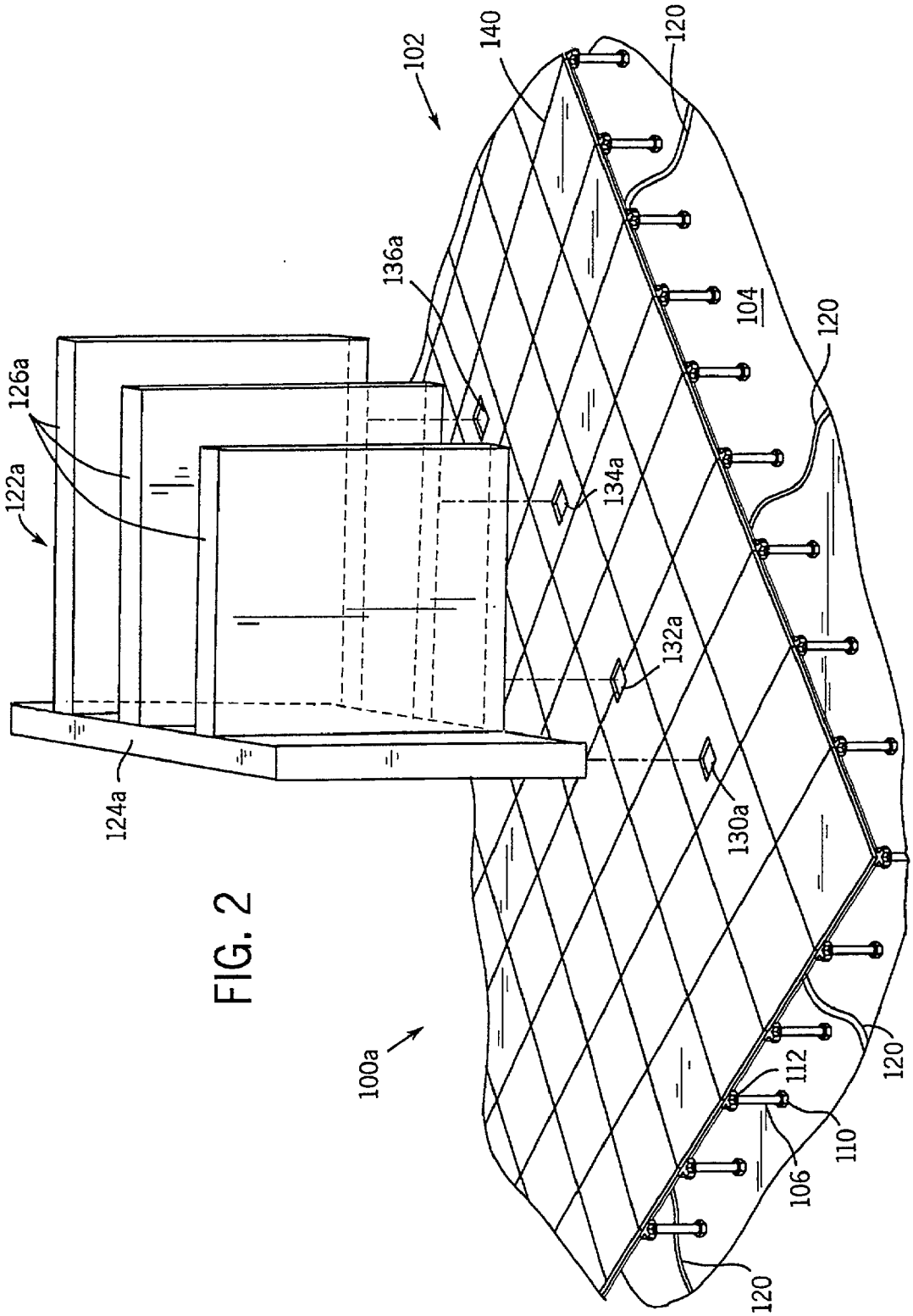

102
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120
136a
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126a
122a
134a
132a
130a
124a
100a
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120

FIG. 2

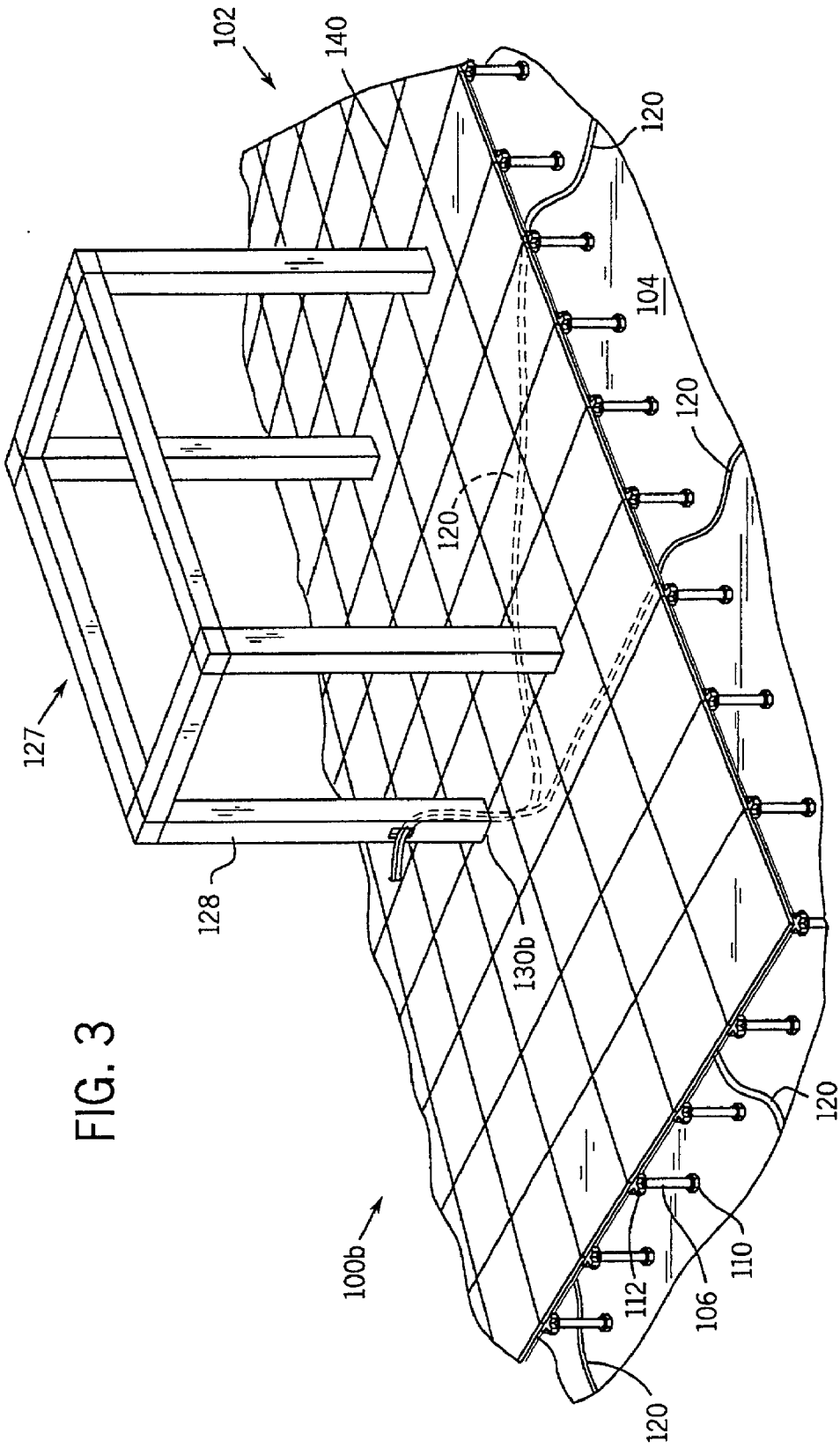


FIG. 3

FIG. 4

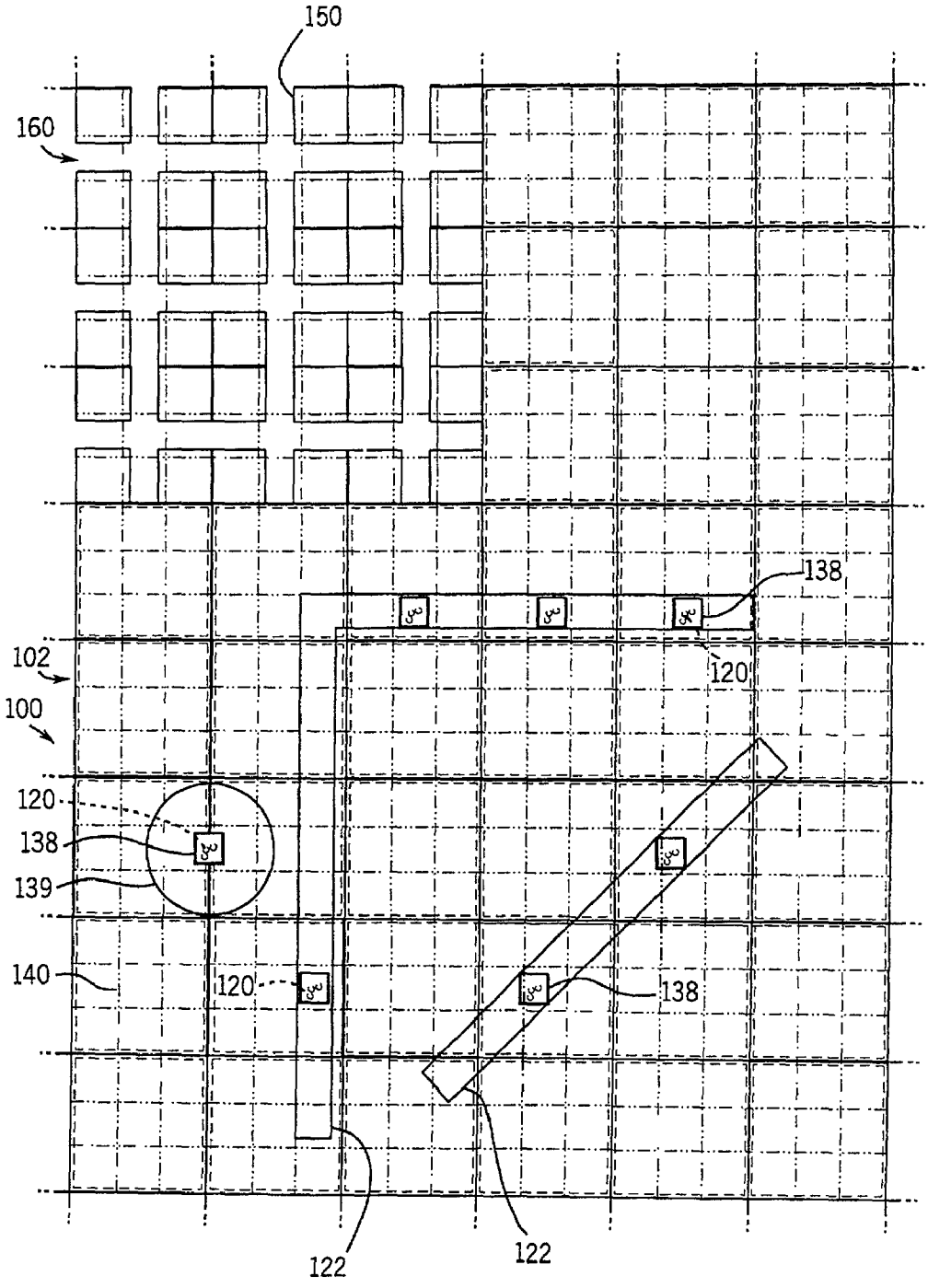


FIG. 5A

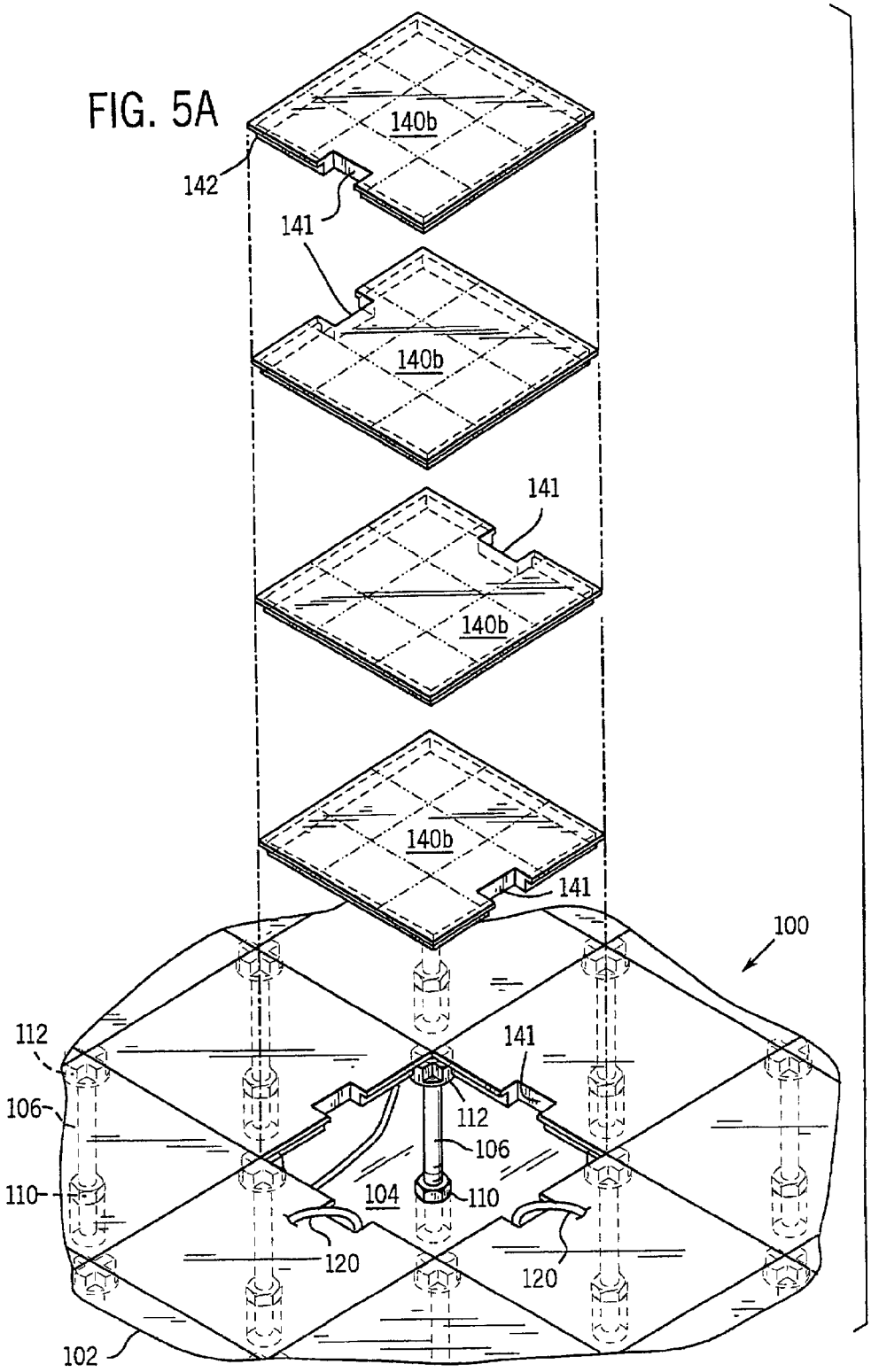

140b
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FIG. 5B

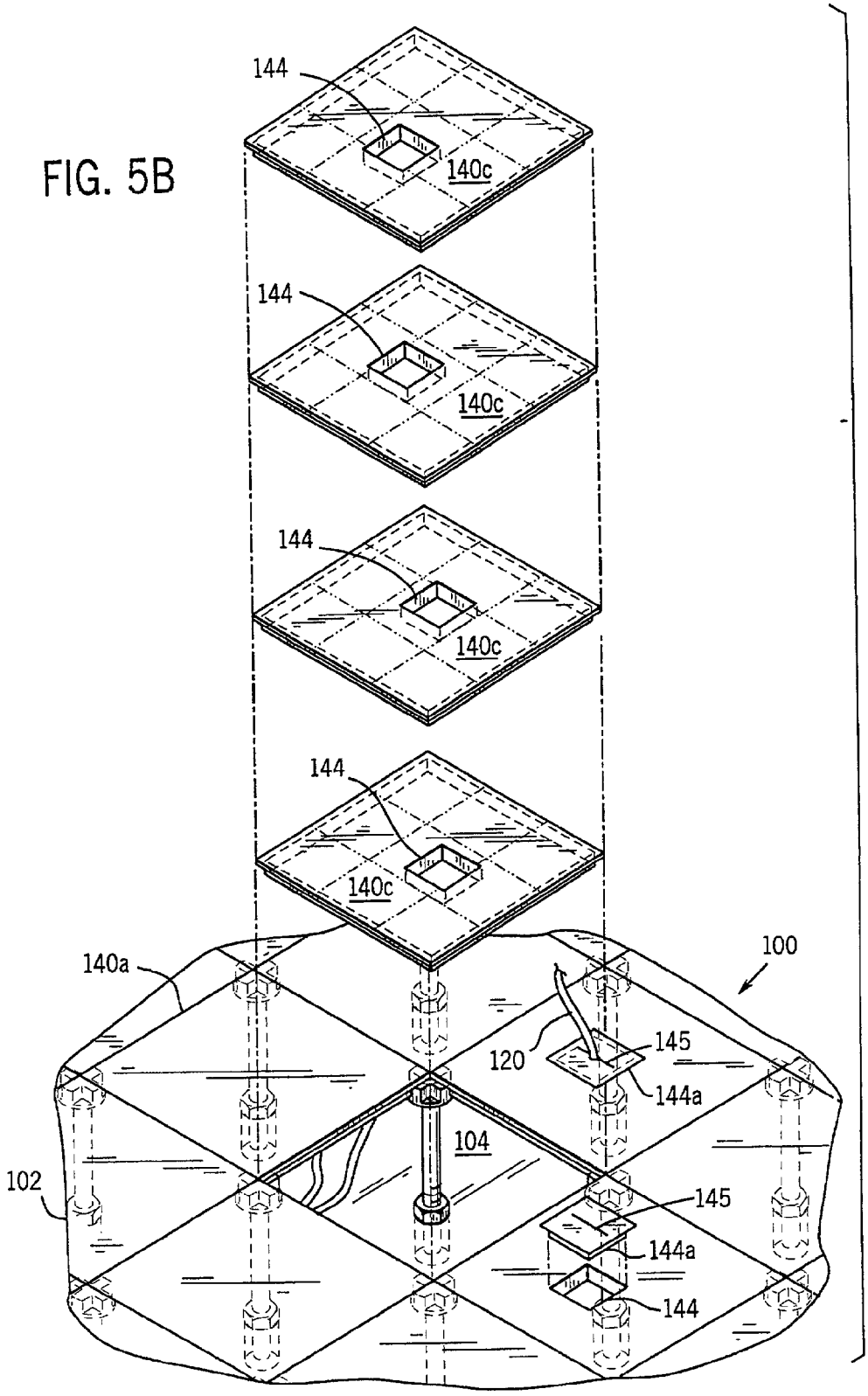

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FIG. 5C

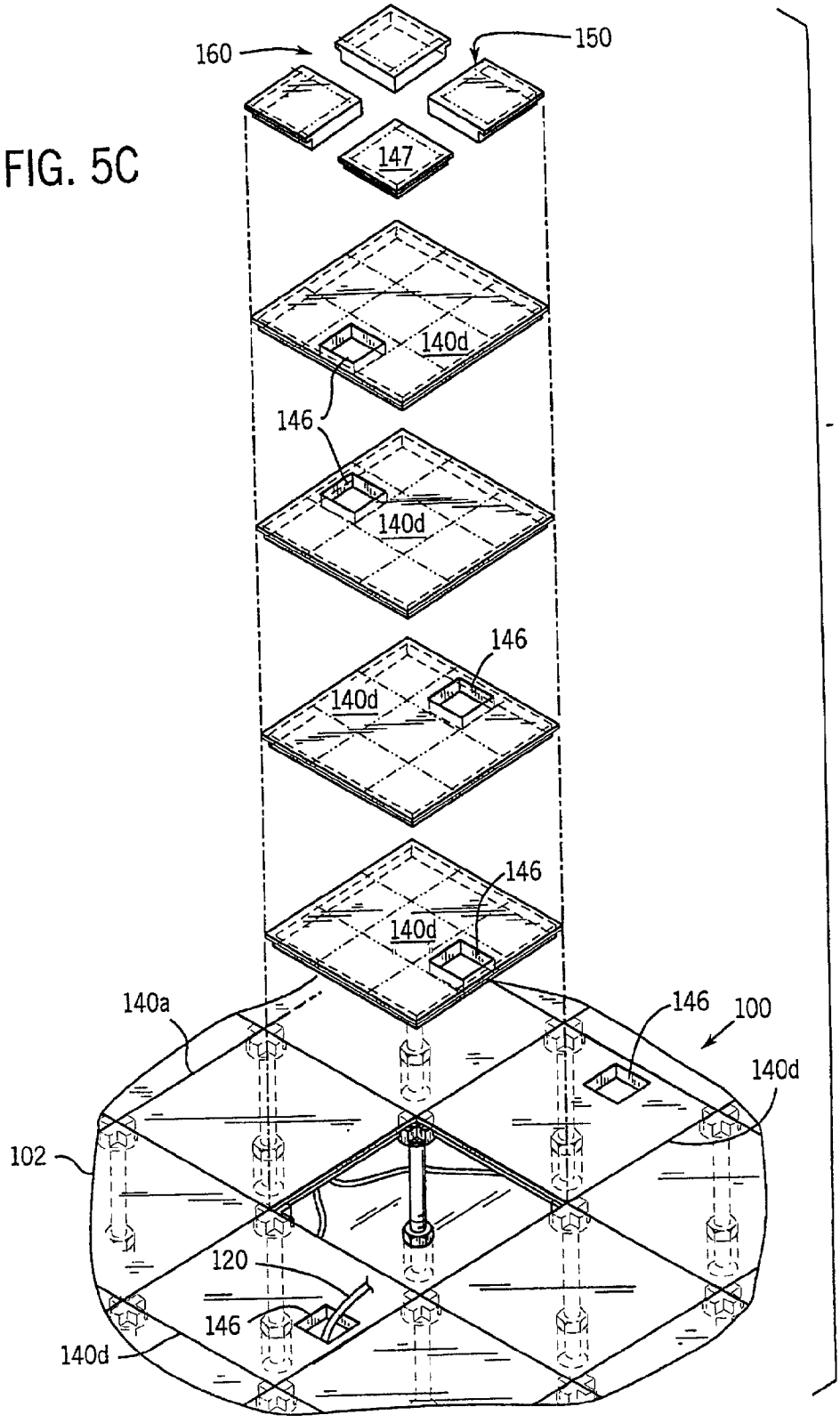

160
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140d
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140d

FIG. 6

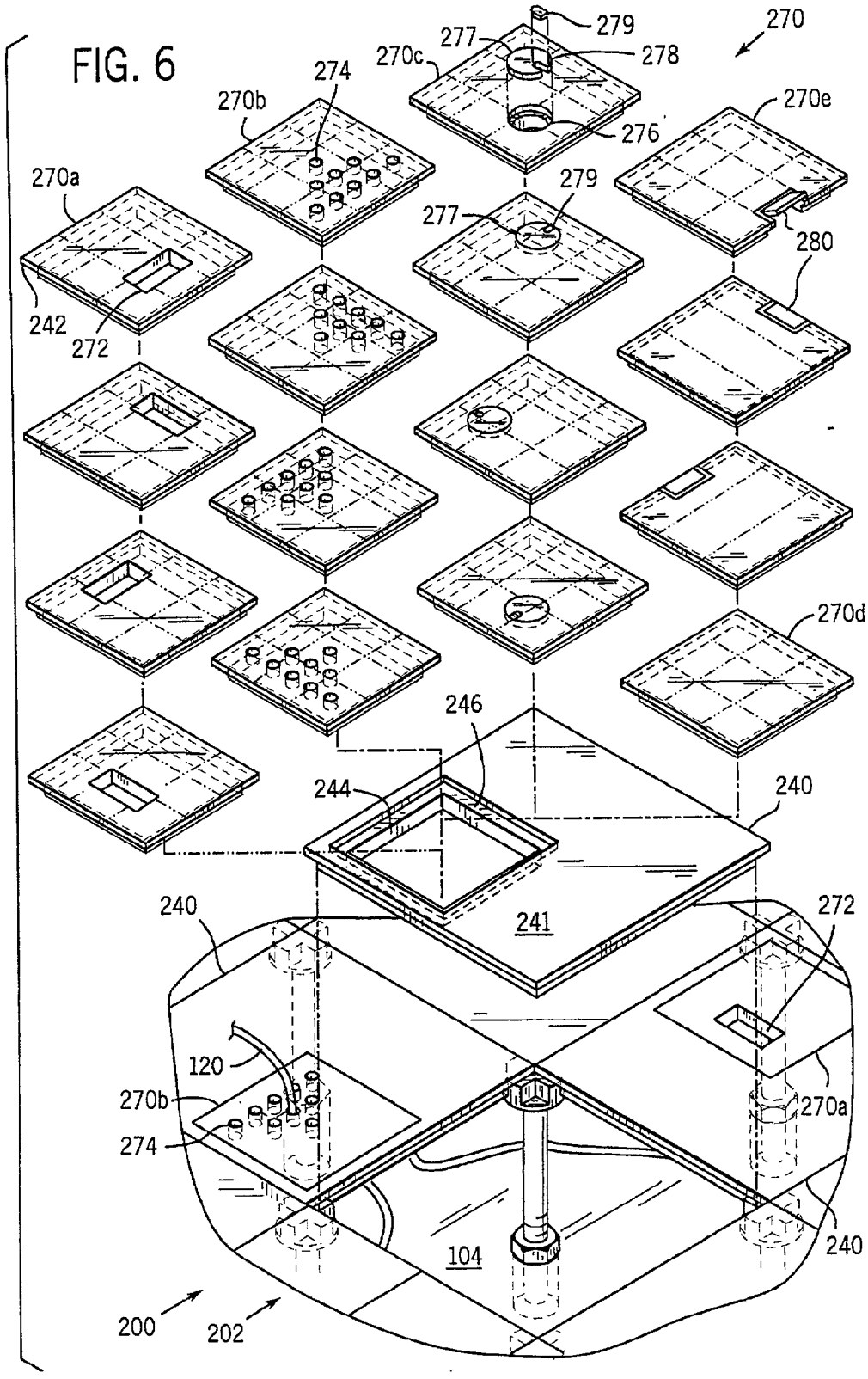

270
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270a
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FIG. 7A

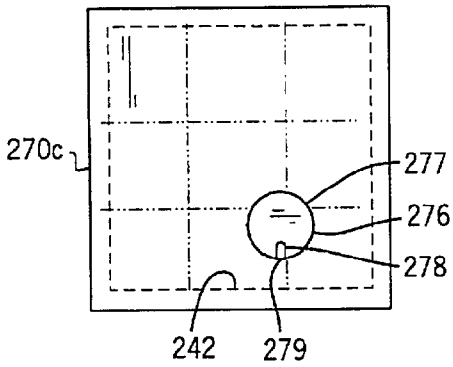


FIG. 7B

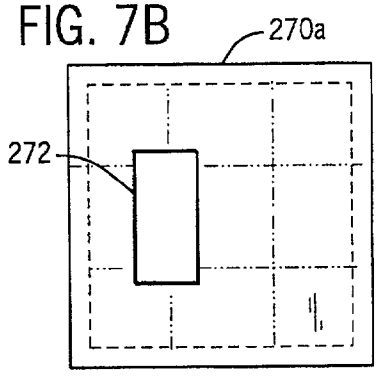


FIG. 7C

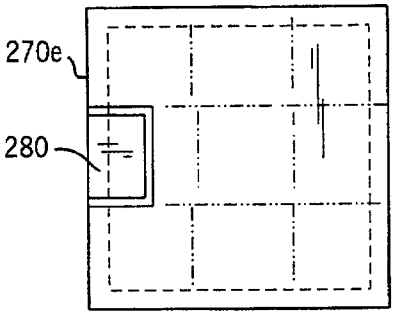


FIG. 7D

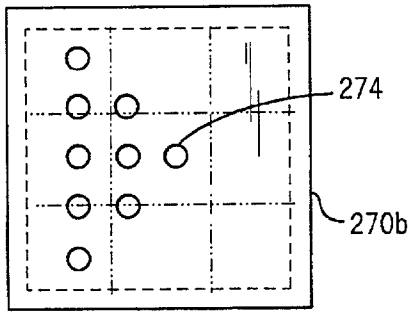
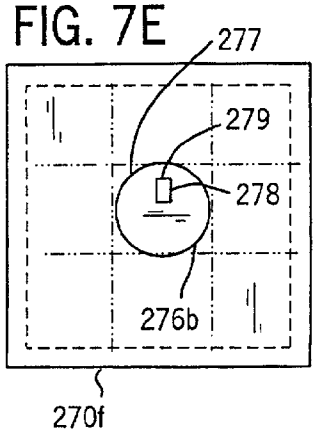


FIG. 7E



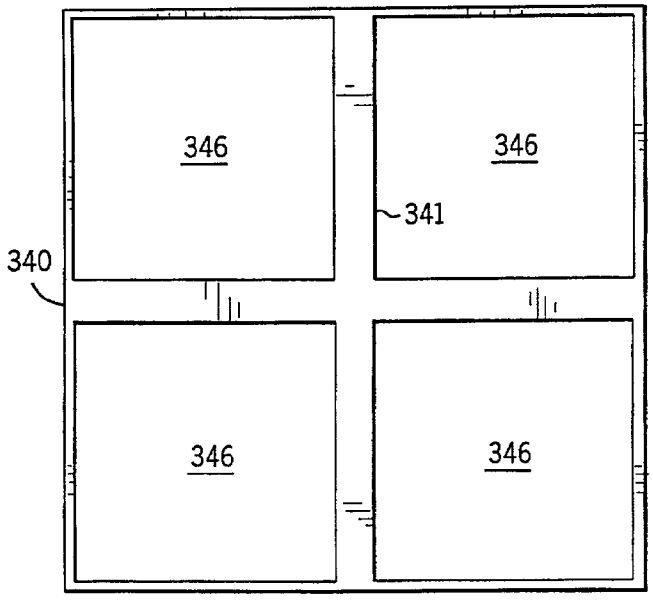


FIG. 8

FIG. 9

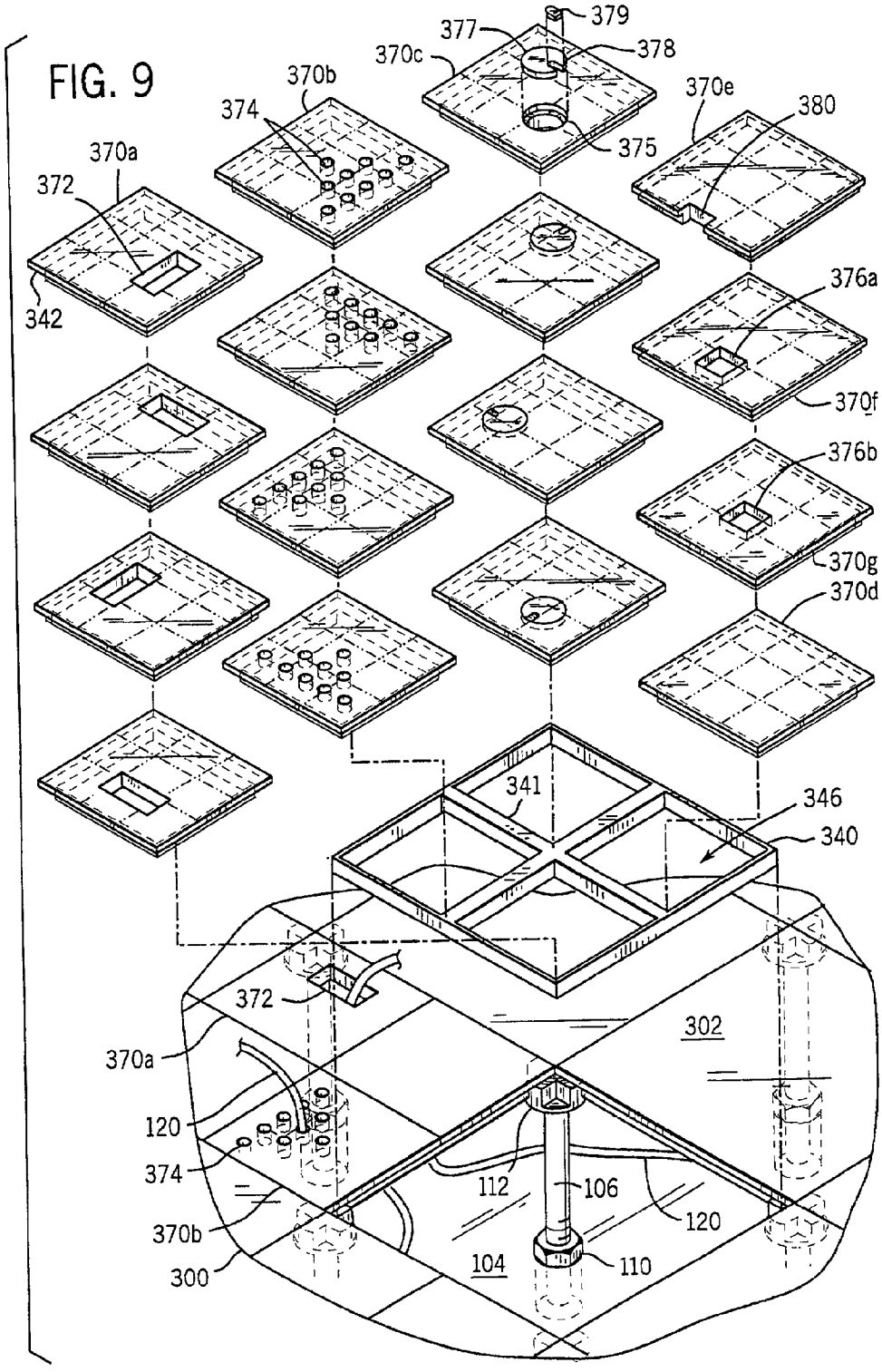

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FIG. 10A

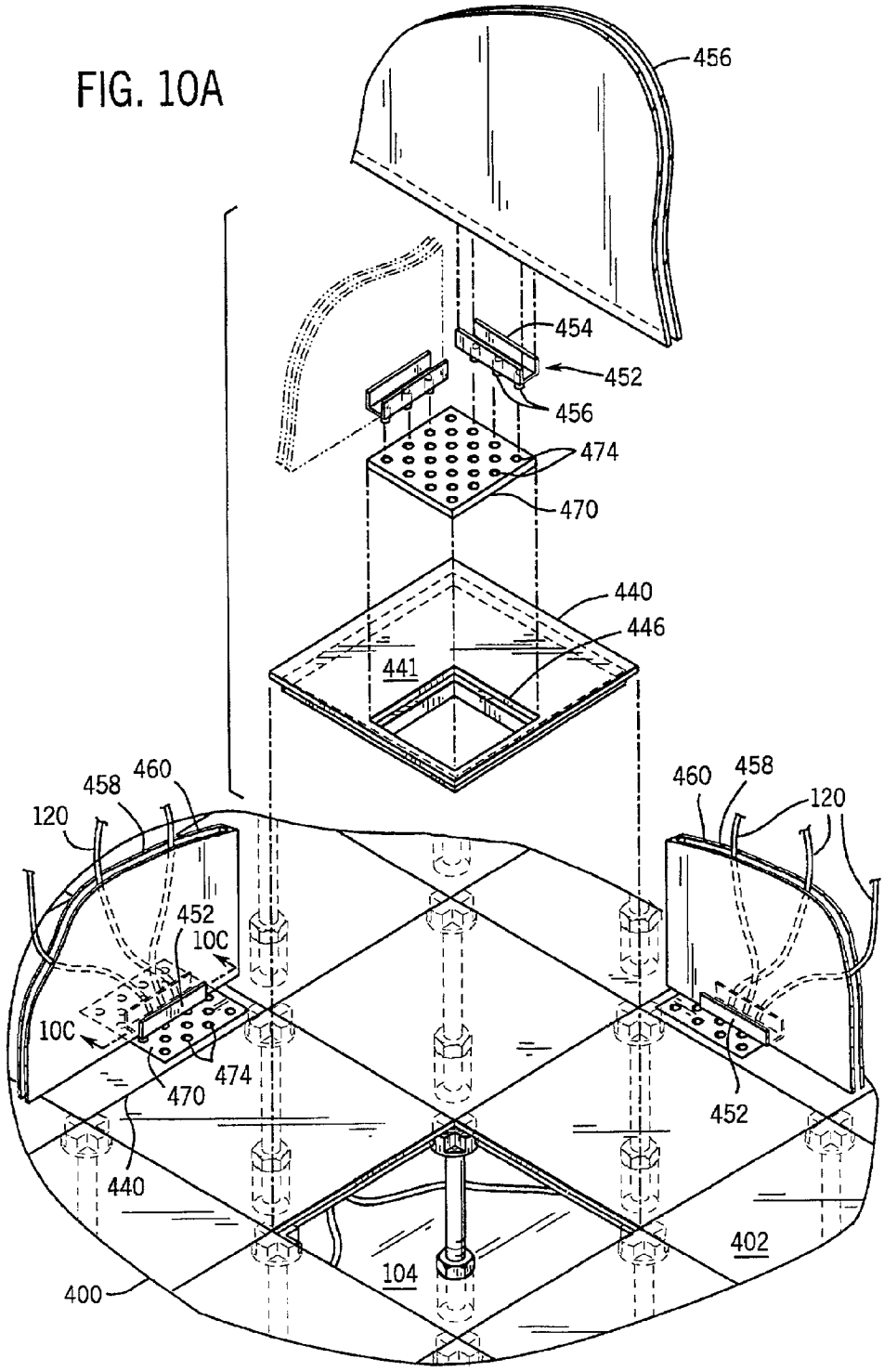

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FIG. 10B

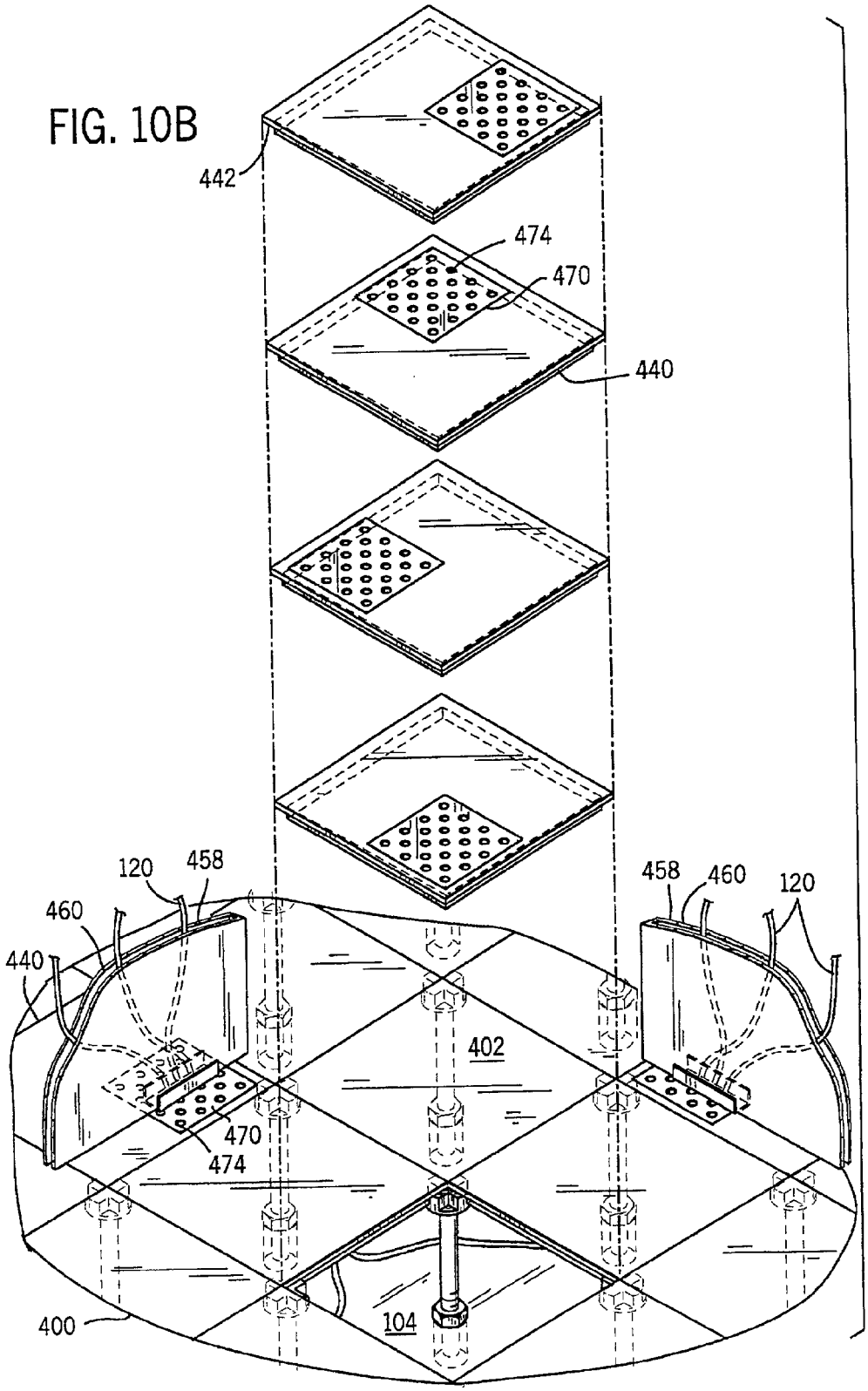


FIG. 10C

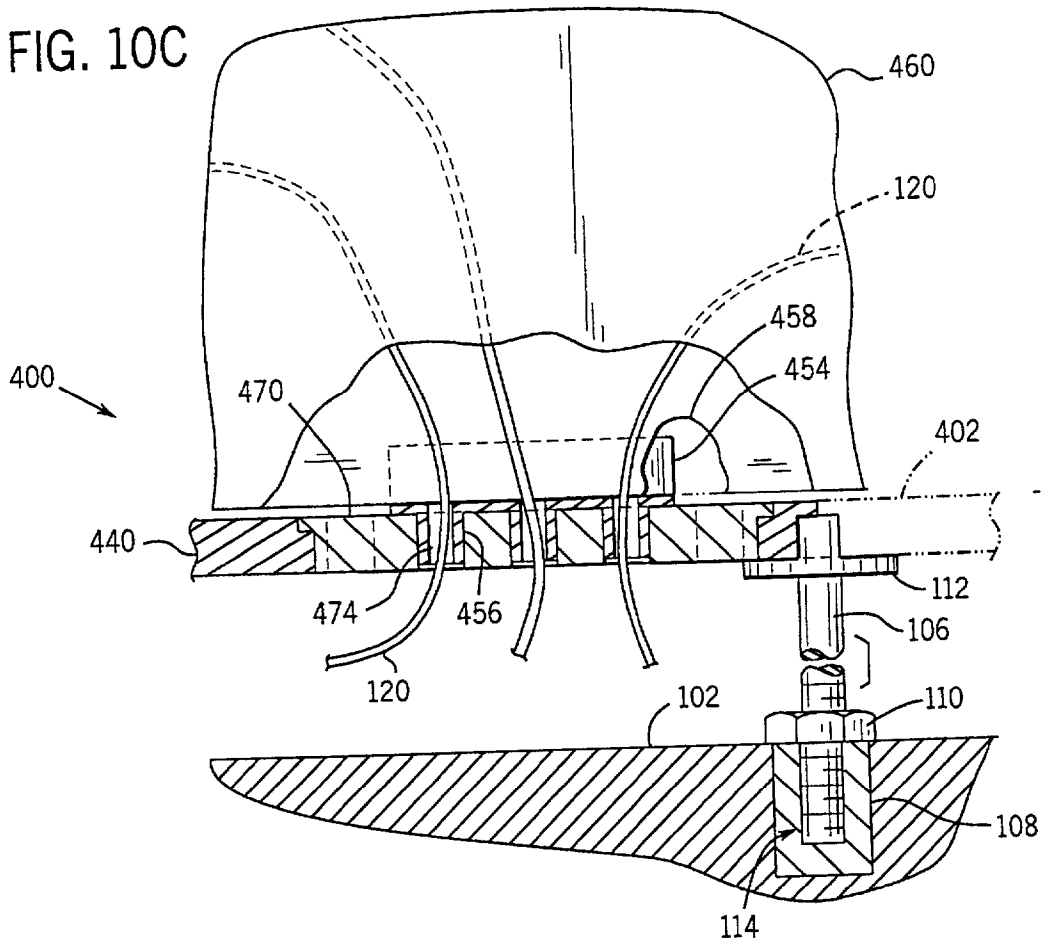


FIG. 11C

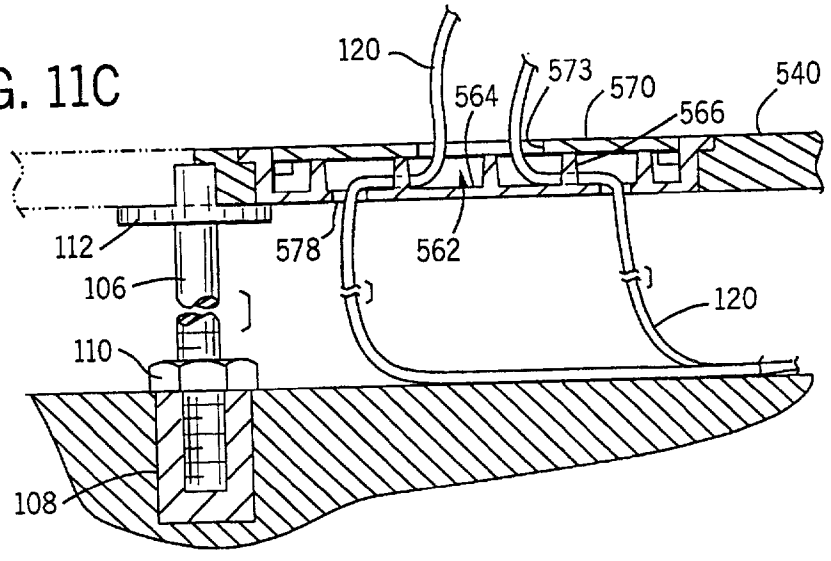


FIG. 11A

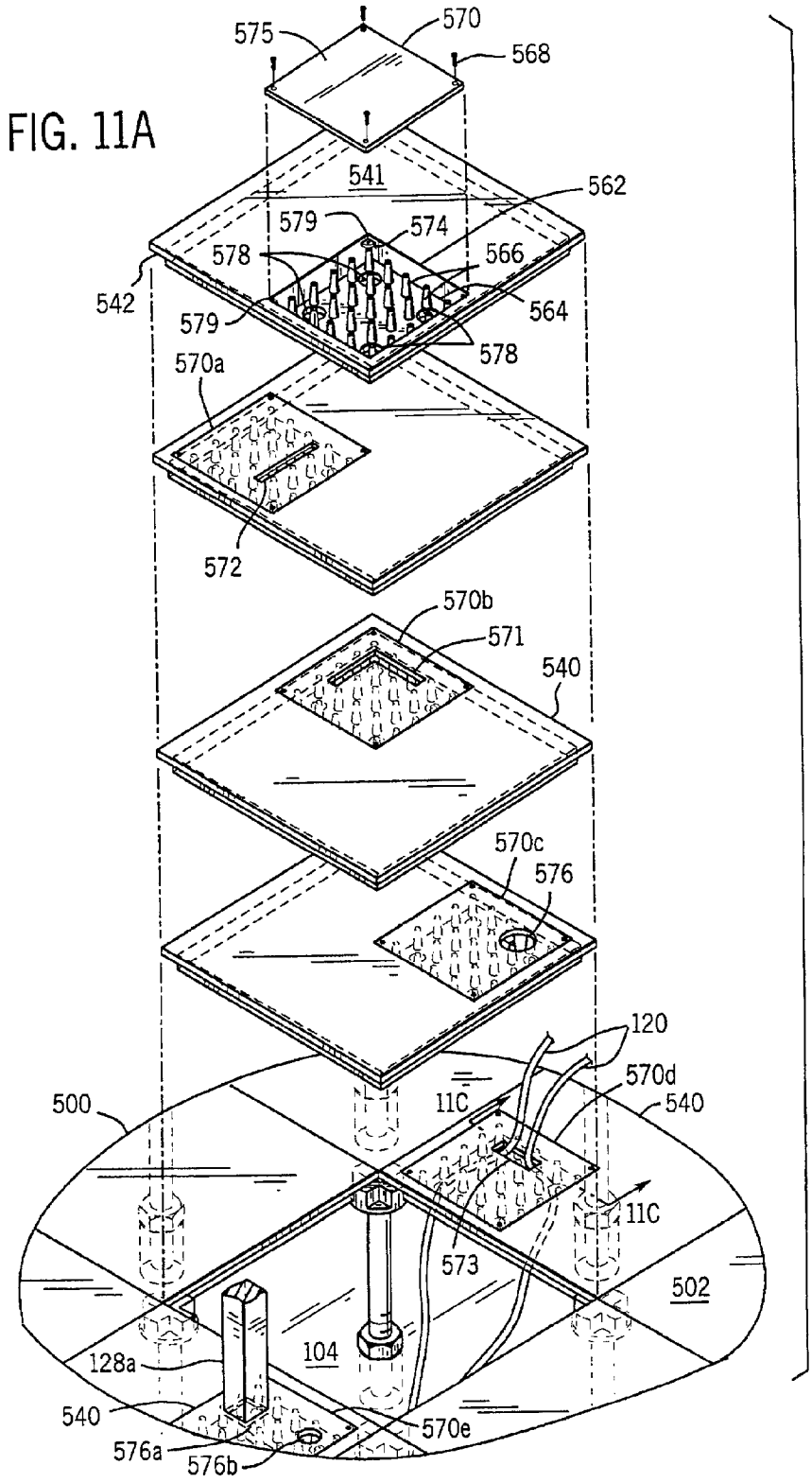

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570b
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576
120
570d
500
11C
540
11C
573
502
104
128a
540
570e
576a
576b

FIG. 11B

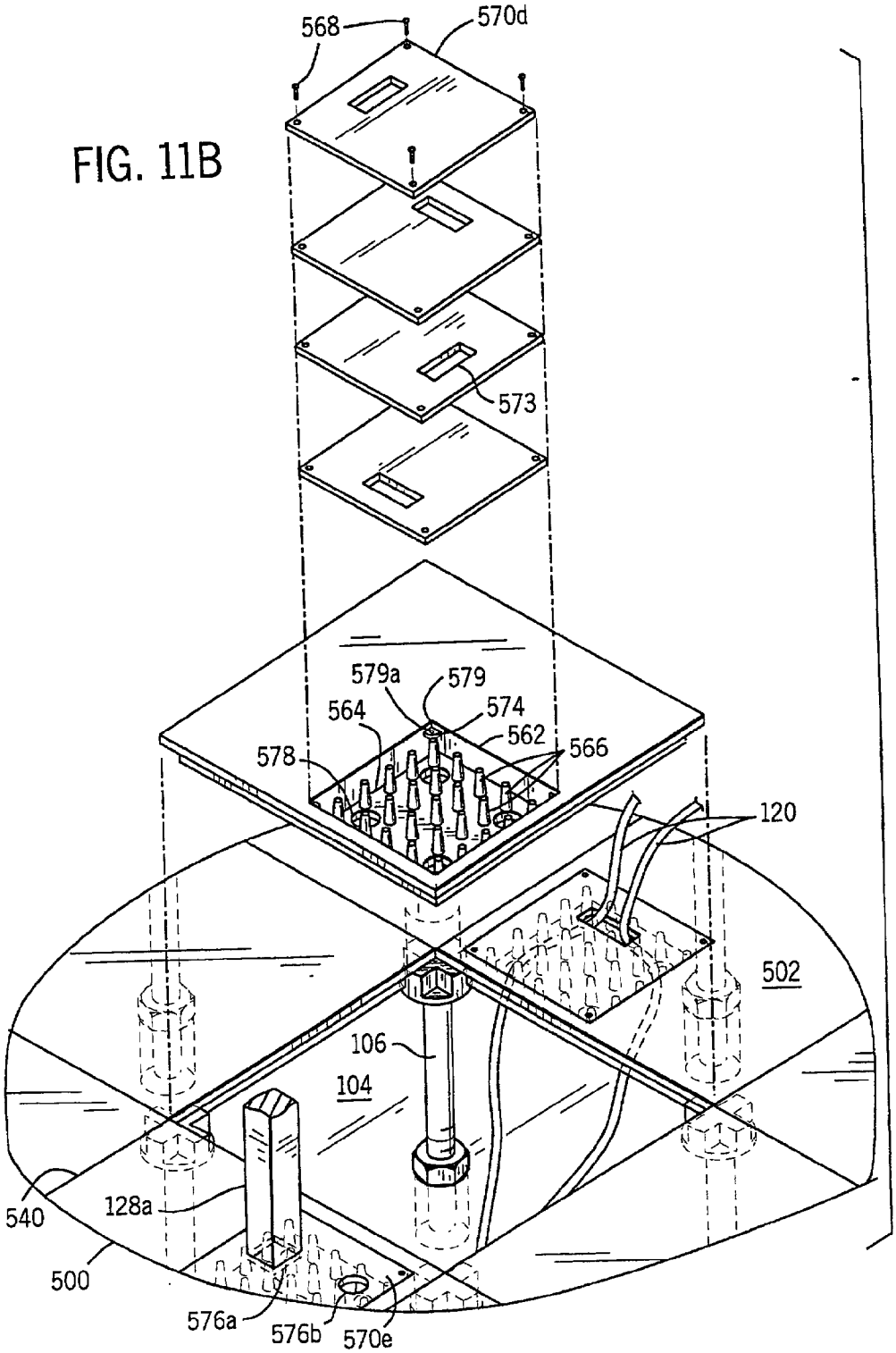

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570d
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579a
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128a
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FIG. 12A

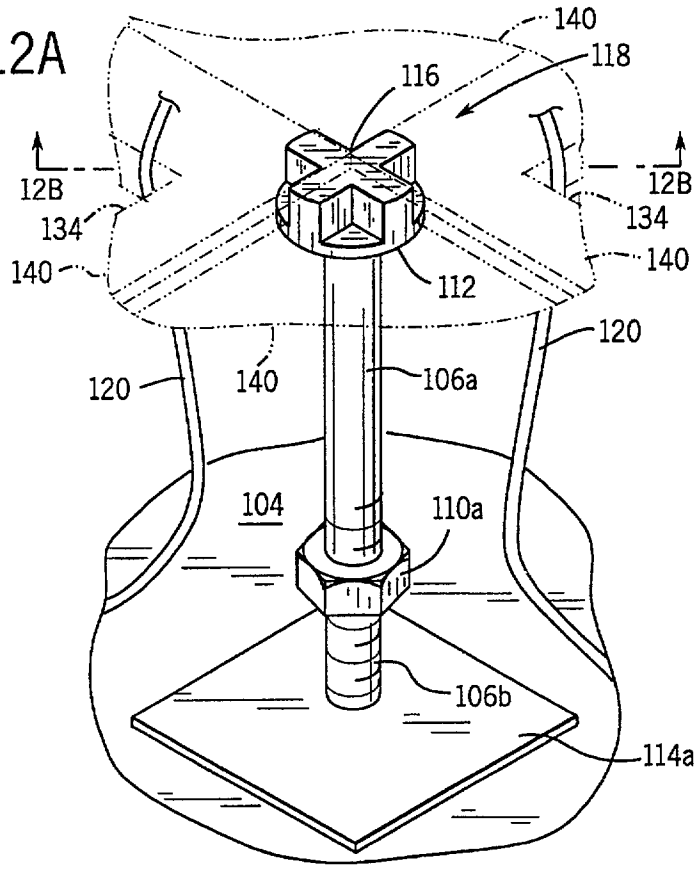
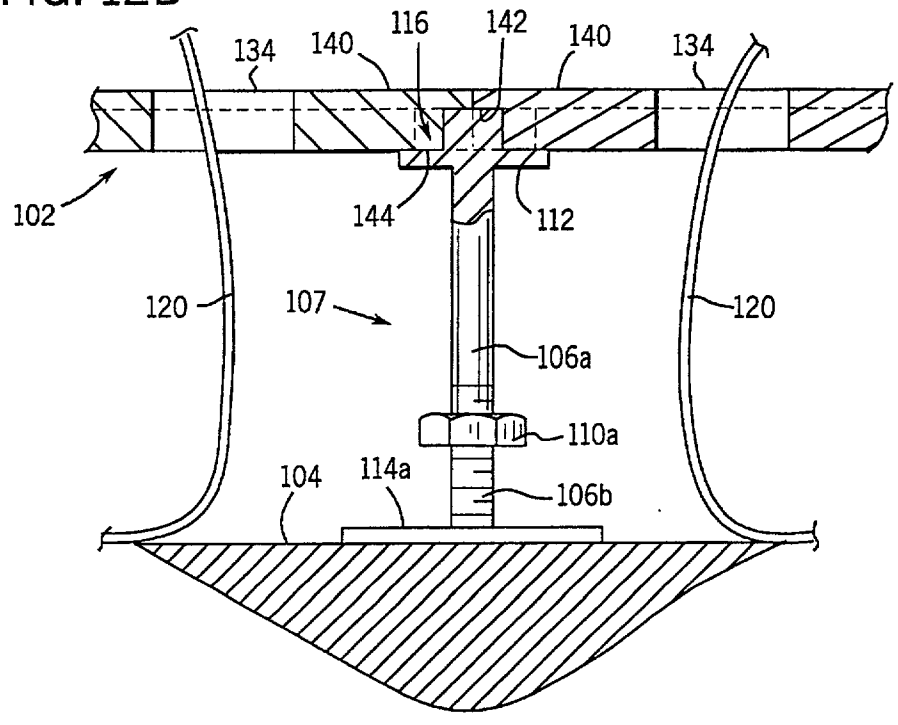


FIG. 12B



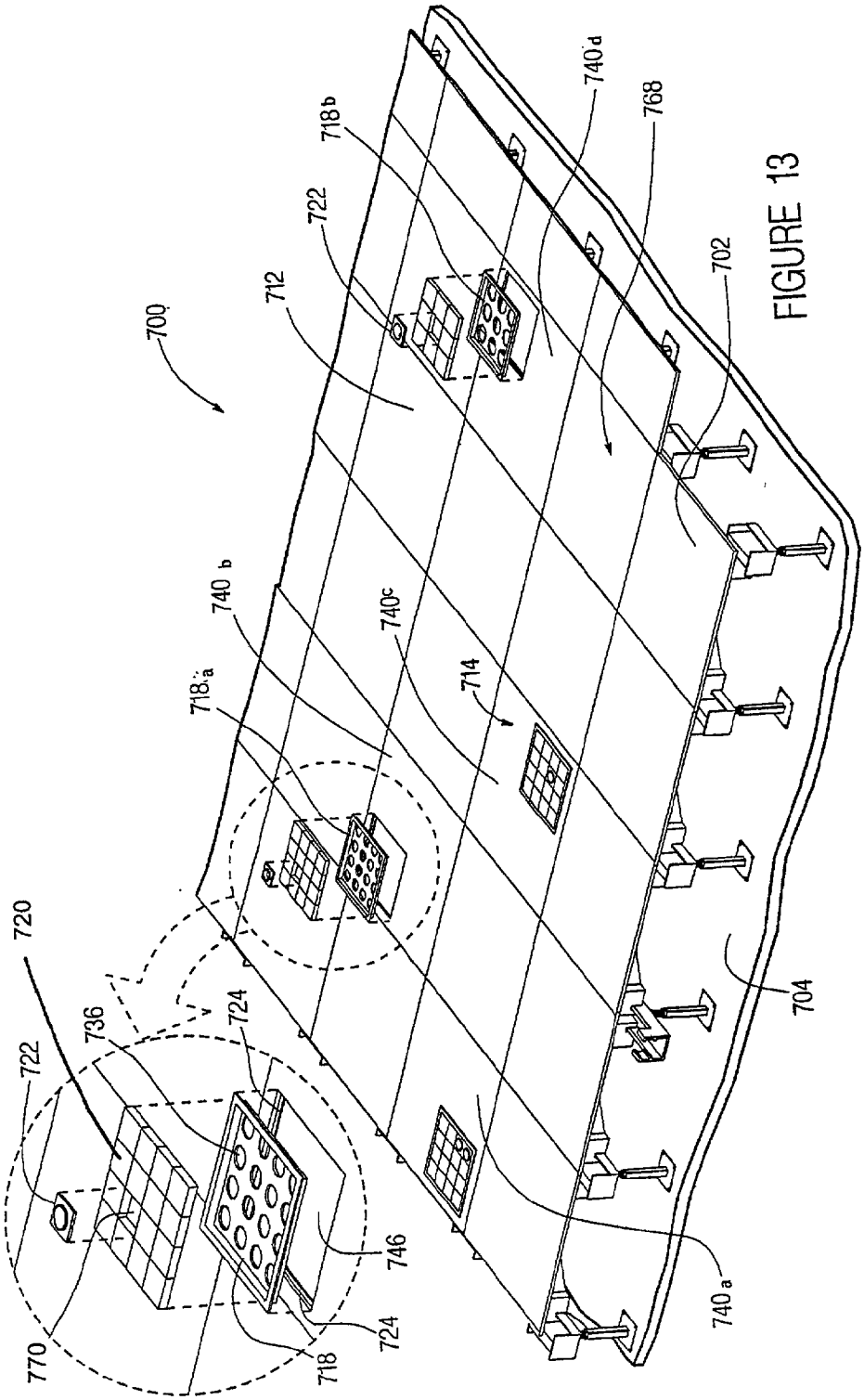

700
712
722
718b
740d
768
702
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740c
718a
714
720
736
724
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746
770
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704
740a

FIGURE 13

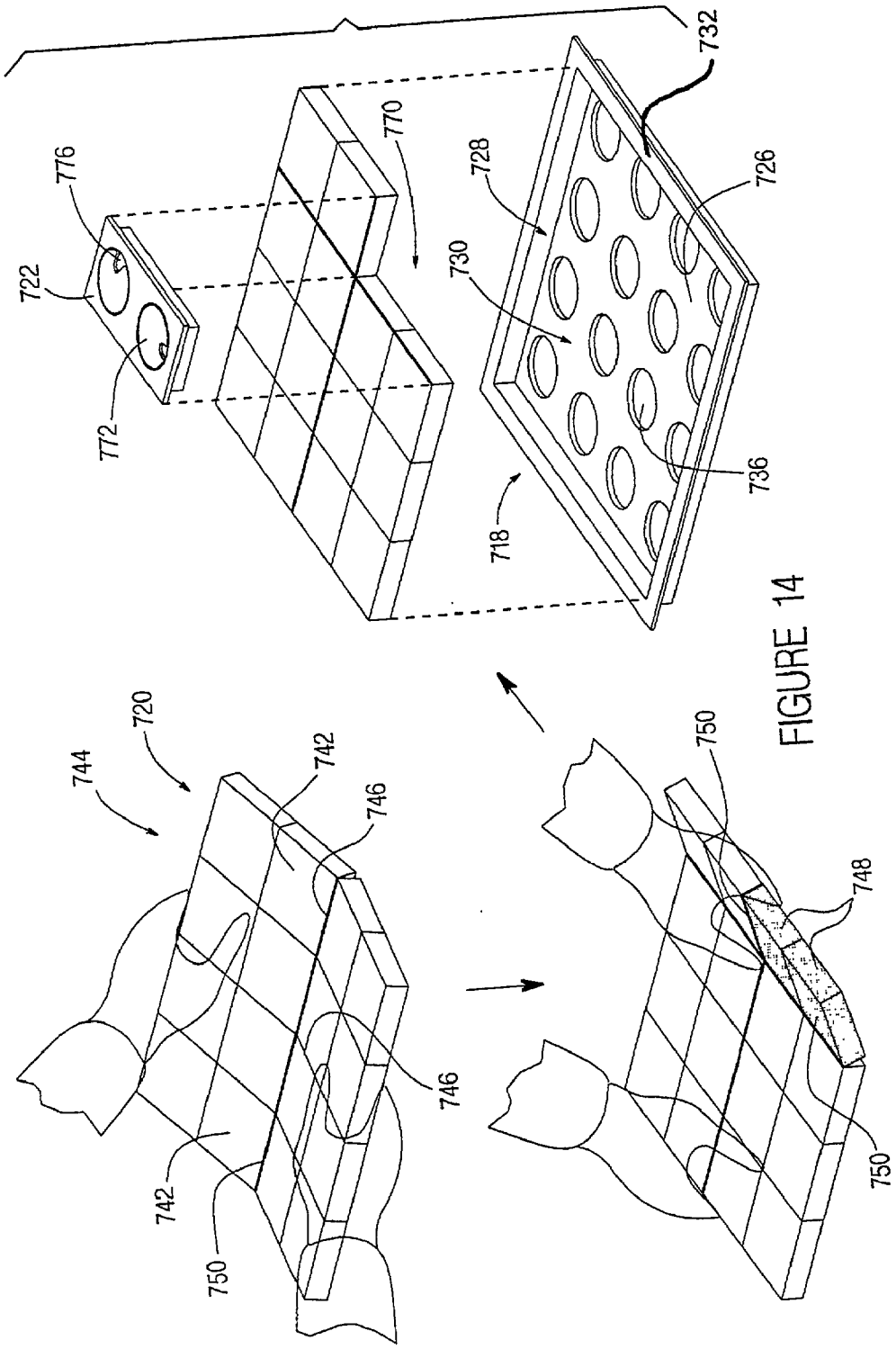


FIGURE 14

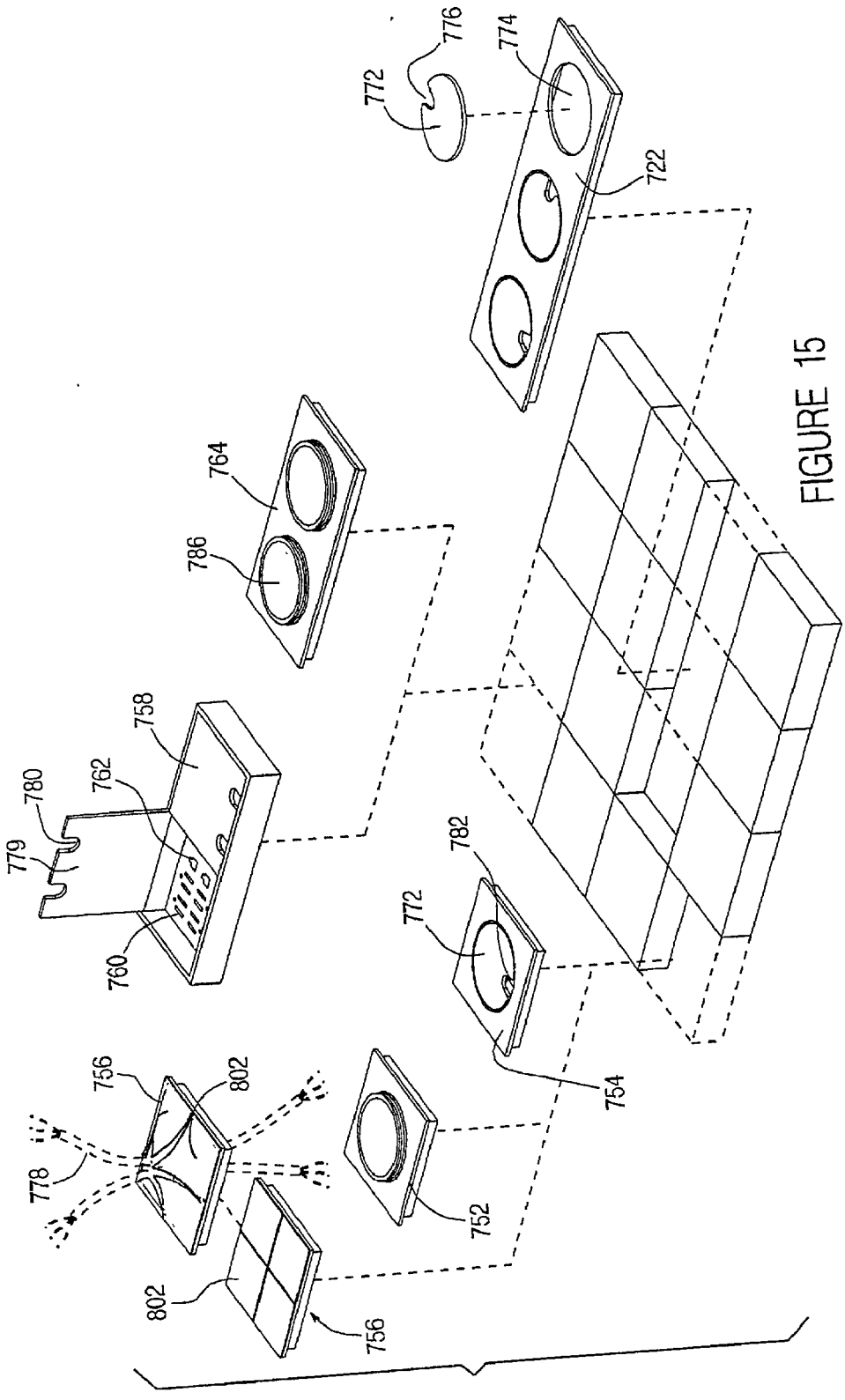

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FIGURE 15

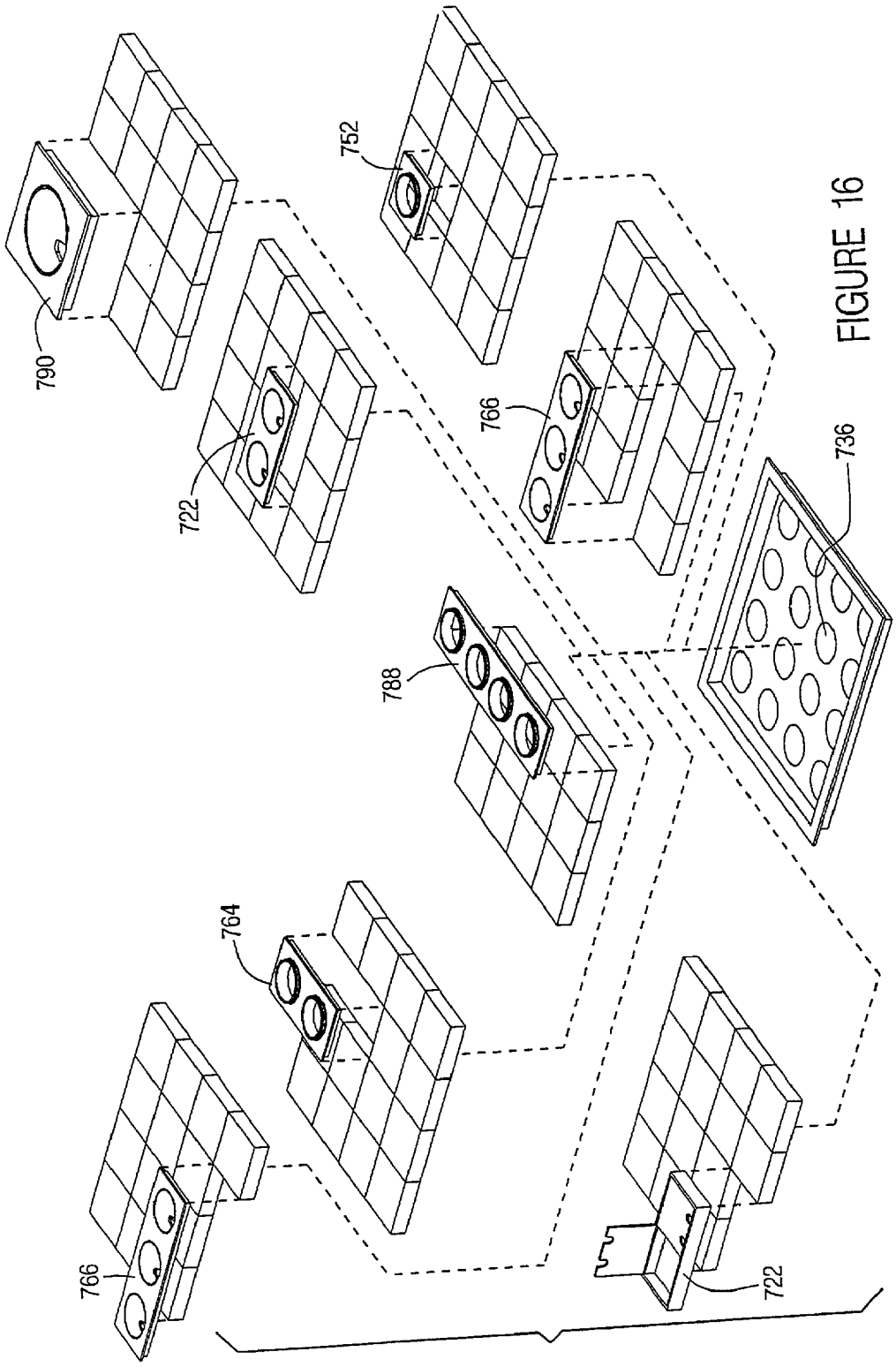


FIGURE 16

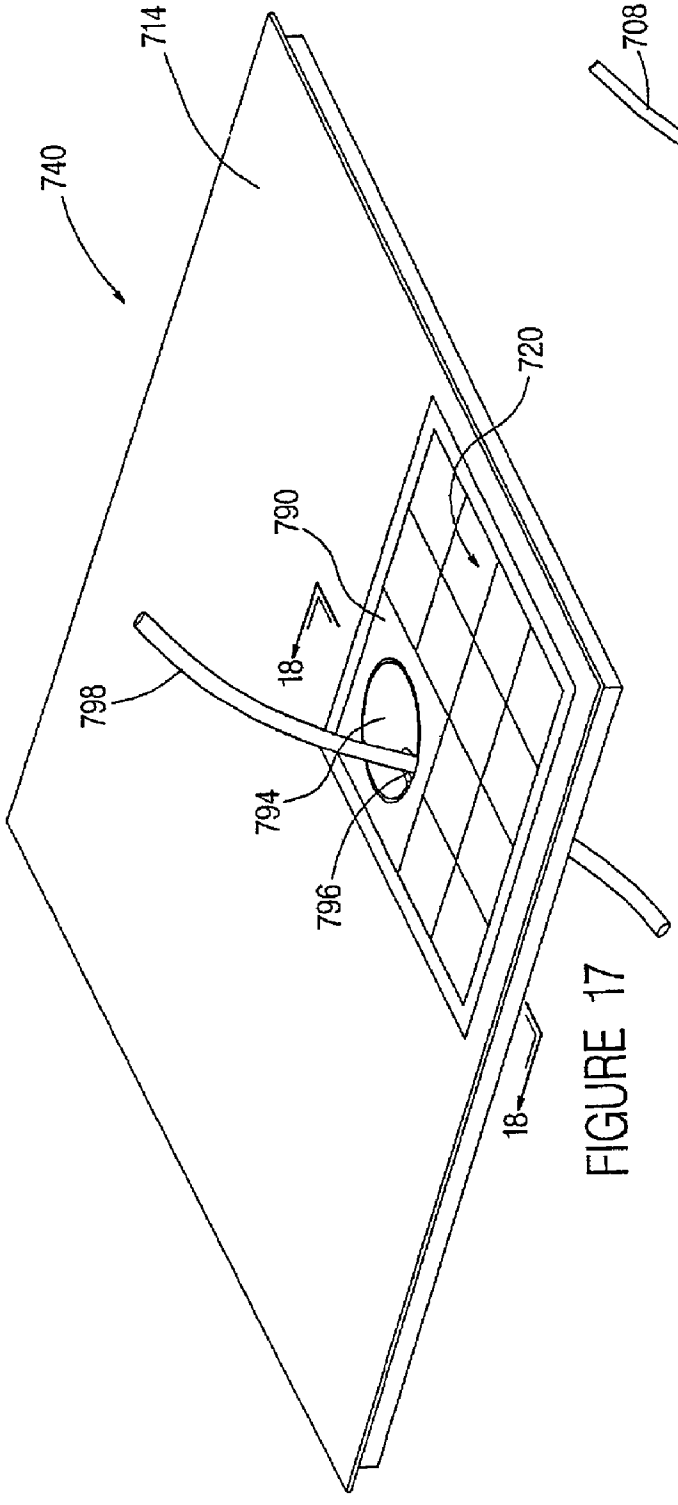


FIGURE 17

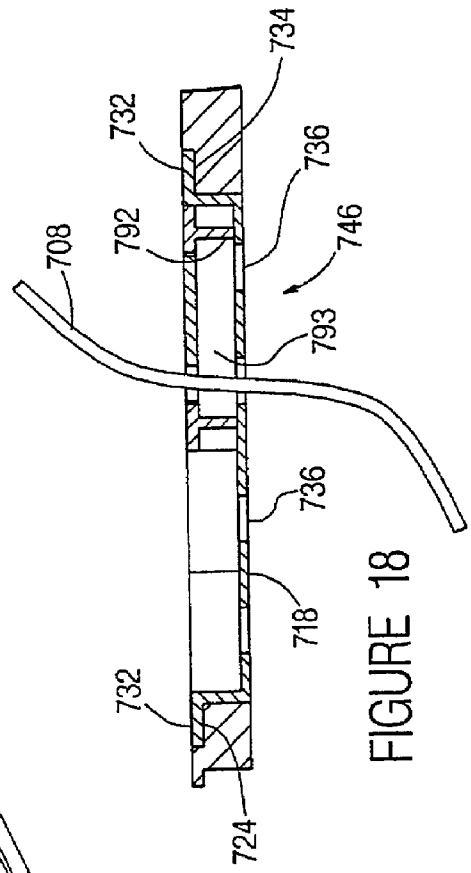


FIGURE 18

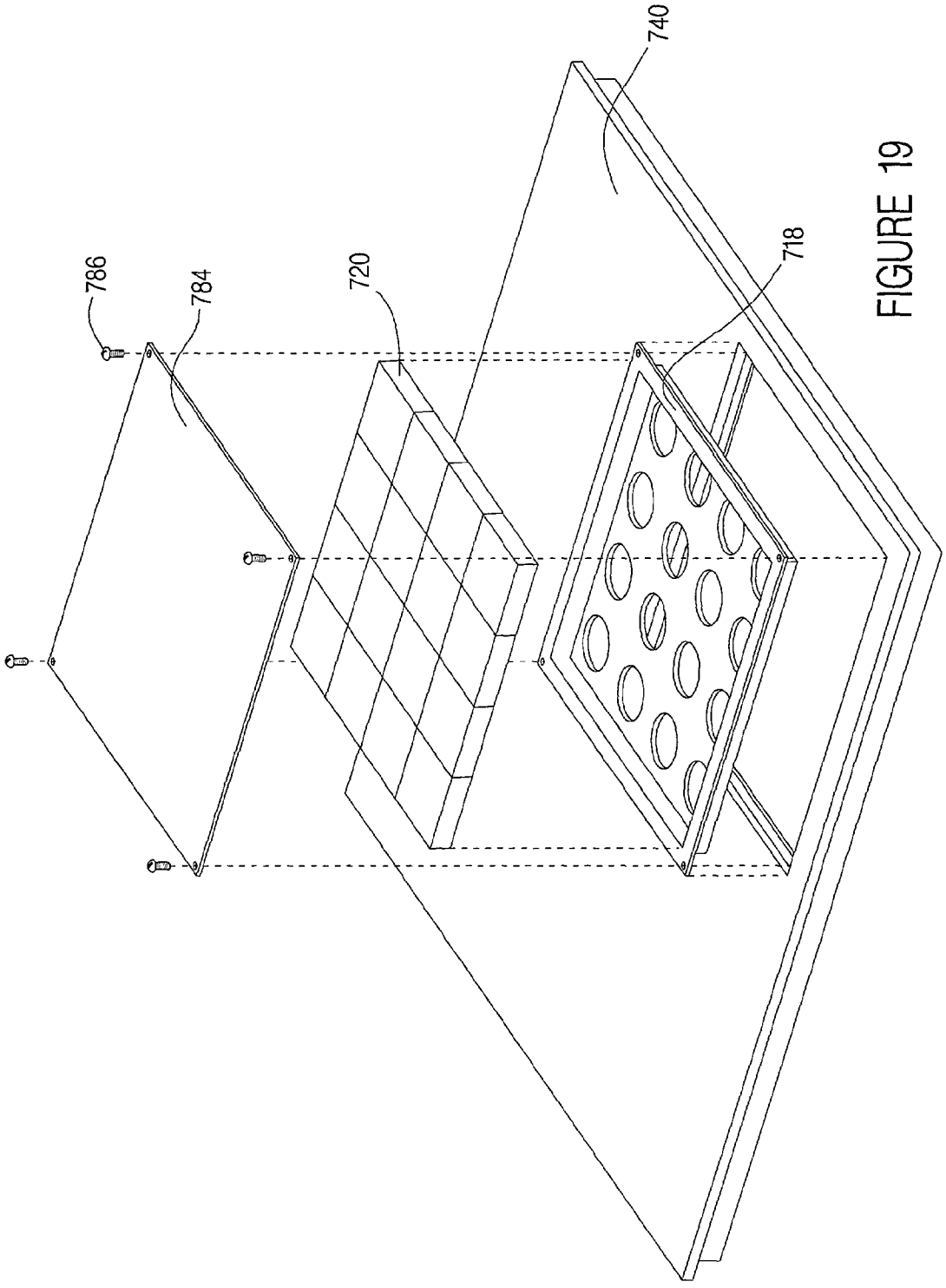


FIGURE 19

FLOOR SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application is a continuation-in-part of application Ser. No. 09/713,602 titled "FLOOR SYSTEM," filed Nov. 15, 2000, incorporated by reference, which is a continuation of application Ser. No. 09/093,996 titled "FLOOR SYSTEM," filed Jun. 9, 1998, now issued as U.S. Pat. No. 6,202,374, incorporated by reference, to which a claim of priority is made.

FIELD OF THE INVENTION

[0002] The present invention relates to a floor system. In particular, the present invention relates to a floor system including a floor with floor tiles providing an access pattern with at least one access point so that the position of at least one article such as an article of furniture on the floor and the location of the access point of the floor can be made at least partially coincident and access to utilities can be provided through the floor to the article of furniture regardless of the position of the article of furniture on the floor.

BACKGROUND OF THE INVENTION

[0003] It is well known to provide for a work environment or space that includes articles of furniture (and other articles), such as systems furniture (e.g. panel walls), cabinets, worksurfaces, desks, tables, chairs or other seating products, posts or other utility or activity products, storage products, frames or other structures, lighting products, etc. Such articles may be freestanding, mounted or secured to a floor and/or to internal walls of the work environment or space or secured together, depending upon needs and nature of the particular application or installation.

[0004] It is also known to provide in the work environment for a floor system that includes a raised floor, typically composed of floor tiles, on which the articles of furniture are supported standing above a base floor (made of concrete or the like) and wherein utilities such as telephony, data, power and HVAC may be routed in a horizontal space created between the base floor and the raised floor, typically out of sight. According to such known arrangements for floor systems, access to utilities is typically provided at specific, fixed locations within the floor system, and thus the articles must be arranged on the raised floor in locations that are at least in part dictated by the specific, fixed locations of access to utilities within the floor system. While it is desirable to maintain utilities out of sight (i.e. below the raised floor), in certain applications, it is undesirable to have the potential location of articles of furniture and/or equipment limited by the fixed, specific location of access points in the floor system for utilities.

[0005] Accordingly, it would be advantageous to provide for a floor system for a work environment or space that does not limit the potential location of articles such as articles of furniture due to the fixed, specific location of access points for utilities. It would also be advantageous to have a floor system that includes a raised floor composed of floor tiles that can readily be configured during installation and thereafter reconfigured to provide for access points for utilities at a wide variety of locations. It would further be advantageous to have a floor system that provides articles such as articles of furniture with access to utilities at such access points so as to facilitate an optimal utilization of the work environment or space. It would further be advantageous to have a readily configurable and reconfigurable floor system including a floor with floor tiles providing an access pattern with at least one access point so that the position of at least one article such as an article of furniture on the floor and the location of the access point of the floor can be made at least partially coincident and access to utilities can be provided through the floor to the article of furniture regardless of the position of the article of furniture on the floor. It would further be advantageous to have a floor system of a type that is of sufficient structural strength and functionality for the work environment.

[0006] It would be desirable to provide a floor system with any one or more of these or other advantageous features.

SUMMARY OF THE INVENTION

[0007] The present invention relates to a floor system which includes a plurality of floor tiles, with at least one of the floor tiles providing an access pattern. A floor is formed by selective arrangement of the plurality of floor tiles, with at least one access point for utilities provided by the access pattern of at least one of the plurality of floor tiles. At least one article of furniture is selectively positioned on the floor. At least one access point can be selectively located within the floor. The position of at least one article of furniture on the floor and location of the access point of the floor can be made at least partially coincident and access to utilities can be provided through the floor to the article of furniture regardless of the position of the article of furniture on the floor.

[0008] The present invention also relates to a floor system for providing for access to utilities. The floor system includes a plurality of floor tiles, with at least one of the floor tiles having at least one compartment, and at least one subtile having an access pattern configured to be installed in at least one compartment of at least one floor tile. A floor is formed by selective arrangement of the plurality of floor tiles, with at least one access point for utilities provided by the access pattern of at least one of the plurality of floor tiles. At least one article of furniture is selectively positioned on the floor. At least one access point can be selectively located within the floor. The position of the article of furniture on the floor and location of the access point of the floor are at least partially coincident and access to utilities can be provided through the floor to the article of furniture regardless of the position of the article of furniture on the floor.

[0009] The present invention further relates to a floor system for a work environment adapted for distribution of utilities associated with articles such as articles of furniture. The floor system includes a plurality of floor tiles. At least one of the floor tiles provides an access pattern. A floor is formed by selective arrangement of the plurality of floor tiles with at least one access point for utilities provided by the access pattern of at least one of the plurality of floor tiles. At least one article is selectively positioned on the floor. At least one access point can be selectively located within the floor. The position of at least one article on the floor and location of the access point of the floor are at least partially coincident and access to utilities can be provided through the floor to the article regardless of the position of the article on the floor.

[0010] The present invention further relates to a utilities terminal for use in a raised floor system. The utilities terminal includes a floor tile having an access cavity, a support pan and an upper surface. The support pan is positioned within the access cavity and has at least one access opening. The utilities terminal further includes a utilities grommet configured to be received within the support pan, covering at least a portion of said support pan. The utilities terminal further includes a plurality of cover blocks selectively configured and adapted to be received within the support pan covering the remaining open area of the support pan and positioned substantially flush to the upper surface of the floor tile.

[0011] The present invention further relates to a floor system. The floor system includes a plurality of pedestals adapted to support floor tiles, a plurality of floor tiles having an access cavity, and an upper surface where at least one of the floor tiles includes a support pan positioned within an access cavity. The support pan has at least one access opening. The floor system further includes a utilities grommet configured to be received within the support pan covering at least a portion of the support pan. The floor system further includes a plurality of cover blocks selectively configured and adapted to be received within the support pan covering the remaining open area of the support pan and positioned substantially flush to the upper surface of said floor tile.

[0012] The present invention further relates to a method for reconfiguring a utilities terminal within a raised floor system where the utilities terminal includes a floor tile having an access cavity, a support pan, a plurality of cover blocks adapted to be received in the support pan, and a utilities grommet adapted to be received in the floor pan. The method includes the steps of removing the utilities grommet, removing the plurality of cover blocks, reconfiguring the grommet within the support pan, and reconfiguring the cover blocks within the support pan.

[0013] The present invention further relates to a utilities terminal for use in a raised floor system for a work environment adapted for distribution of utilities through utility carriers associated with articles such as articles of furniture. The utilities terminal includes a floor tile having an access cavity, a frame, and an upper surface, where the frame is positioned within the access cavity and the frame has at least one access opening. The utilities terminal further includes an insert configured to be received within the frame, covering at least a portion of the frame. The utilities terminal further includes a subtile selectively positionable within the frame so that utility carriers may be passed through frame.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] **FIG. 1A** is an exploded perspective view of a floor system according to a preferred embodiment of the present invention.

[0015] **FIG. 1B** is a perspective view of the floor system.

[0016] **FIG. 2** is an exploded perspective view of the floor system according to an alternative embodiment.

[0017] **FIG. 3** is a perspective view of the floor system according to an alternative embodiment.

[0018] **FIG. 4** is a schematic top plan view of the floor system.

[0019] **FIGS. 5A through 5C** are exploded perspective views of the floor system showing the potential orientation of floor tiles.

[0020] **FIG. 6** is an exploded perspective view of the floor system according to an alternative embodiment showing the potential orientation of floor tiles.

[0021] **FIGS. 7A through 7E** are top plan views of floor tiles according to alternative embodiments.

[0022] **FIG. 8** is a top plan view of a floor tile frame according to an alternative embodiment.

[0023] **FIG. 9** is an exploded perspective view of the floor system according to an alternative embodiment showing the potential orientation of floor tiles.

[0024] **FIGS. 10A and 10B** are exploded perspective views of the floor system according to an alternative embodiment showing the potential orientation of floor tiles.

[0025] **FIG. 10C** is a cross-sectional side elevation view of the floor system of **FIGS. 10A and 10B** showing a structural support system and passage of utilities taken along line **10**C-**10**C in **FIG. 10A**.

[0026] **FIGS. 11A and 11B** are exploded perspective views of the floor system according to an alternative embodiment showing the potential orientation of floor tiles.

[0027] **FIG. 11C** is a cross-sectional side elevation view of the floor system of **FIGS. 11A and 11B** showing a structural support system and passage of utilities taken along line **11**C-**11**C in **FIG. 11A**.

[0028] **FIG. 12A** is a fragmentary perspective view of a structural support system for the floor system.

[0029] **FIG. 12B** is a cross-sectional side elevation view of the structural support system taken along line **12**B-**12**B in **FIG. 12A**.

[0030] **FIG. 13** is a perspective view of the floor system according to an alternative embodiment.

[0031] **FIG. 14** is a perspective view of a support pan, cover block sheet, and grommet of a utilities terminal for the floor system, partially animating a construction sequence of the portion of the cover block sheet, and grommet.

[0032] **FIG. 15** is an exploded perspective view of the cover block sheet and grommets according to an alternative embodiment showing the potential orientation and interchangeability of the grommets.

[0033] **FIG. 16** is an exploded perspective view of the cover block sheet and grommets according to an alternative embodiment showing the potential orientation and interchangeability of the cover block sheets and grommets.

[0034] **FIG. 17** is a perspective view of a floor tile of the floor system according to an alternative embodiment.

[0035] **FIG. 18** is a cross-sectional side elevation of the floor tile of **FIG. 17** taken along line **18-18**.

[0036] **FIG. 19** is an exploded perspective view of a floor tile of the floor system according to an alternative embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0037] Referring to **FIGS. 1 through 5**, a floor system **100** is shown according to a preferred embodiment of the present invention. Floor system **100**, which is configured for use in a work environment or the like according to any preferred embodiment (but may be used in a wide variety of other spaces according to alternative embodiments), provides a raised floor **102** installed above a base floor **104** (e.g. a "subfloor" such as a poured concrete floor). Raised floor **102** is formed of a plurality of floor tiles **140** (e.g. floor panels) which are typically arranged in a grid-like pattern to form a floor surface, typically in a horizontal plane.

[0038] As is shown in greater detail in **FIGS. 12A and 12B**, according to a particularly preferred embodiment, each of floor tiles **140** forming raised floor **102** is supported on base floor **104** by a structural support system. According to any preferred embodiment, the floor tiles and associated structural support system are designed and installed to support the load that may be imposed by persons, articles of furniture and any other occupants that stand or rest directly or indirectly upon the floor tiles (within limits dictated by the structural support system and floor tiles). According to the particularly preferred embodiment shown in **FIGS. 12A and 12B**, the structural support system includes a plurality of upright stands **107**. Each stand **107** includes a base plate **114***a* (which is shown as a square plate but may be of other shapes) secured to base floor **104** (e.g. by an adhesive) with a lower threaded rod portion **106***b* and an upper threaded barrel portion **106***a*; an adjustment or lock nut **110***a* is mounted to lower threaded rod portion **106***b*; rotation of adjustment nut **110***a* on lower threaded rod portion **106***b* (which is fixed to base plate **114***a*) raises or lowers upper threaded barrel portion **106***b* to provide height adjustment for stand **107** (and thus the raised floor).

[0039] According to an alternative embodiment shown in other FIGURES, wherein the structural support system includes a stand **106** secured within base floor **104**. Height adjustment of stand **106** is provided by rotating stand **106** (which has a lower threaded end) to a greater or lesser length of threaded engagement within a threaded sleeve **108** inserted in a cavity **114** in base floor **104**. Securing of stand **106** to base floor **104** is provided by lock nut **110**. Other types of suitable structural support or mounting systems or floor anchors and height adjustment arrangements that may be used for alternative embodiments commercially available and/or are known to those skilled in the art who may review this disclosure.

[0040] According to the preferred embodiment, stand **107** also includes a cap **112** mounted on top of barrel portion **106***a* onto which floor tiles **140** are installed. (Cap **112** is mounted directly on top of stand **106** according to alternative embodiments.) As shown in **FIGS. 12A and 12B**, cap **112** of stand **107** (or cap **112** of stand **106** in other FIGURES) is circular with a set of cutouts or notches **116** formed in association with a crossmember structure **118**. As shown, four floor panels may be supported at their intersecting corners by the cap of each stand. A lower perimeter edge **144** of floor tile **140** nests or seats (i.e. rests or is supported) within each notch **116** of cap **112**; an outer peripheral flap **142** of floor tile **140** is supported on the top of crossmember structure **118** of cap **112**. According to a particularly preferred embodiment, when the floor system is installed, the perimeter of each of the upper surface edges of each floor panel are adjacent to the perimeter of the upper surface edges of an adjacent floor panel so as to provide a secure and relatively close fit for the floor panels (see **FIG. 12B**) as well as a raised floor presenting a uniform appearance (with "seams" between floor panels that are relatively unobtrusive). According to any preferred or alternative embodiments, any of a wide variety of other types of structural support systems of suitable functionality and strength may be employed for the floor tiles (i.e. with stands of other configurations or without stands, installed at various heights with respect to the base floor, with caps of other configurations or without caps, etc.).

[0041] According to any preferred embodiment, articles such as articles of furniture will be supported by the raised floor of the floor system. For example, in **FIGS. 1A and 1B**, articles of furniture shown as "systems furniture" in the form of a panel wall system **122** is arranged on raised floor **102** (a table **125** and chairs **123** are shown schematically in **FIG. 1B**). According to alternative embodiments, the articles of furniture and other articles may be of any type used in a work environment or space, including but not limited to panel walls, cabinets, workstations, worksurfaces, desks, tables, chairs or other seating products, carts, posts or other utility or activity products, storage products, bins, shelving units, frames or other structures, lighting products, equipment, etc. (The term "article" or "article of furniture" is intended to be used in the broadest sense, and would also include any other type of mechanical or electronic or like equipment or system, HVAC system or element (such as an inlet, outlet or diffuser), device, machine, instrument, other object or system or the like that occupies of is used on the floor of a work environment). The articles may be freestanding, mounted or secured to the floor and/or to internal walls of the work environment or space or secured together, depending upon needs and nature of the particular application or installation.

[0042] According to any preferred embodiment, the articles of furniture associated with the floor system may be configured to support connectivity for utilities (e.g. through associated internal and/or external passages), for example, telephony, data, power, HVAC, piping, or any other signals or services. As shown in the FIGURES, utilities may be provided by wires or cables **120**, which typically run beneath raised floor **102** and above base floor **104** (e.g. out of sight in ordinary use). In order to allow for interconnection or passage of utilities between or through the articles of furniture, the raised floor of the floor system is configured to provide an access pattern including one or more access points (shown as apertures **130** in **FIGS. 1 and 2**). As shown in the FIGURES, utilities shown as cables **120** pass in either direction through the access points (e.g. apertures **130**) through raised floor **102** and can be routed into passages within or associated with various articles of furniture (see **FIGS. 1 through 3**).

[0043] According to a particularly preferred embodiment shown in **FIGS. 1 through 5**, floor system **100** includes four types of floor tiles **140***a*, **140***b*, **140***c* and **140***d*. Floor tile **140***a* is solid, with no aperture (i.e. access point). Floor tile **140***b*, shown in **FIG. 5**A, includes an edge aperture **141**. Floor tile **140***c*, shown in **FIG. 5**B, includes a central aperture **144** (slightly offset). Floor tile **140***d*, shown in **FIG.**

5C, includes a lateral aperture **144**. During installation of raised floor **102**, any of four floor tiles **140***a* through **140***d* may be selectively and interchangeably installed in any of four rotational positions (see **FIGS. 5A through 5C**) at a particular location. As a result of the possible combinations of rotational positions and locations, interchangeable floor tiles **140***a* through **140***d* may be represented by an "effective" floor tile (shown by reference numeral **150**) having an "effective" access pattern **160** (formed in base **147**). As is apparent from the **FIG. 4**, the size and shape of "effective" access pattern **160** of "effective" floor tile **150** is determined by the superimposition of each of apertures **141**, **144** and **146** of each of floor tiles **140***b*, **140***c* and **140***d* in each of the possible rotational positions. (As shown, for convenience of installation and configuration, but not of necessity, "effective" floor tile is of a symmetrical arrangement; it should be noted that according to alternative embodiments, where a set of floor tiles that are not rotatable, or are not wholly interchangeable, is used, the arrangement of "effective" floor tile may not be symmetrical.)

[**0044**] According to any preferred embodiment, for example as shown in **FIGS. 1 through 5**, floor system **100** is configured so that the arrangement or placement of articles of furniture on raised floor **102** is not constrained by the access pattern, i.e. the location of access points **130** for utilities (e.g. cables **120**). During installation of raised floor **102**, the selection and position of the floor tiles will dictate the location of the access points within the floor system. The location of the access points within the floor system thereby can be matched to the location of passages for utilities that are associated with the articles of furniture to be arranged or installed on the floor system.

[**0045**] As shown in **FIGS. 1A and 1B**, panel wall system **122** includes a primary wall panel **124** (e.g. "module" or "spine" panel) and secondary wall panels **126** (e.g. "off-module" panel). Primary wall panel **124**, as well as each of secondary wall panels **126**, are configured with internal passages for cables **120**. Primary wall panel **124** and secondary wall panels **126** are arranged in an orthogonal orientation with respect to floor system **100**. As a result of the selection and rotational position of the floor tiles, access points shown as apertures **130**, **132**, **134**, and **136** provide for passage of cables **120** (or other utility distribution elements) from beneath raised floor **102** directly into the passages within primary wall panel **124** and secondary wall panels **126**, respectively.

[**0046**] As shown in **FIG. 2**, panel wall system **122***a* also includes a primary wall panel **124***a* and secondary wall panels **126***a*, which are also configured with internal passages for cables **120**. However, primary wall panel **124***a* and secondary wall panels **126***a* are arranged in an angled or skewed orientation with respect to floor system **100**. Nevertheless, as a result of the selection and rotational position of the floor tiles (e.g. which are of a type shown in **FIGS. 1A and 1B**), access points shown as apertures **130***a*, **132***a*, **134***a*, and **136***a* provide for passage of cables **120** (or other utilities) from beneath raised floor **102** directly into the passages within primary wall panel **124***a* and secondary wall panels **126***a*, respectively.

[**0047**] The flexibility provided by the floor system is illustrated by the exemplary embodiments of **FIGS. 1, 2** and **3**, as well as in **FIG. 4** (which is a top plan view of the floor system showing other arrangements for access points **130** along with "effective" floor tiles **150** with "effective" access pattern **160**). The positions of apertures **130**, **132**, **134** and **135** in floor system **100** accommodate the position of panel wall system **122** (FIGS. 1A and 1B); the positions of apertures **130***a*, **132***a*, **134***a* and **136***a* in floor system **100***a* accommodate the position of panel wall system **122***a* (**FIG. 2**). According to any preferred embodiment, the floor system can readily be configured or reconfigured to accommodate any arrangement or position of articles of furniture (i.e. however selectively positioned). For example, as shown in **FIG. 3**, the floor system can also be configured with an access point **130***b* located as to provide a structure shown as frame **126** with access to cables **120** through at least one of its legs **128**. **FIG. 4** also shows a circular base **139** (or "footprint") for an article of furniture such as a table or utility post positioned over an access point shown as aperture **138**. In other applications, other articles or combinations of articles having different shapes and sizes could be positioned on the raised floor.

[**0048**] The "coverage" of the access pattern for the floor system depends upon the potential locations of the access points corresponding to the "effective" floor tile formed by the superimposition of all floor tiles within the floor system (i.e. the set of wholly or partially interchangeable floor tiles that is considered as the floor system). When being installed or reconfigured, the raised floor of the floor system provides for potential locations of access points for distribution of utilities in a predetermined access pattern; the actual locations of access points are determined by the selection and arrangement of the floor tiles as actually installed to form the raised floor. As shown in **FIG. 4**, floor system **100** (i.e. the set of four floor tiles shown in **FIGS. 5A through 5C**) provides an uninterrupted (continuous) grid of potential access points for articles of furniture across raised floor **102**. According to any preferred embodiment, the location of access points is made at least partially coincident with the position of the articles of furniture (i.e. the passages for utilities in certain articles of furniture that are so configured). In this manner, the position or arrangement of the articles of furniture is not constrained by access to utilities through the raised floor.

[**0049**] According to other exemplary embodiments, such as those shown in the remaining FIGURES, the floor system may provide for an access pattern of potential access points covering virtually the entire surface of the raised floor. (A wide variety of other floor tile configurations are possible according to other alternative embodiments that provide an access pattern with more or less coverage, to varying degrees.) According to any preferred embodiment, the floor system will provide for an access pattern of sufficient coverage (density and/or granularity) for the particular application so that articles of furniture may be "linked" to utilities regardless of their position or location on the raised floor. (The "density" of the access pattern may be controlled by the location of the access points on the floor tile; the "granularity" of the access pattern may be controlled by the size of the access points.)

[**0050**] Where necessary or useful, any of the access points can be provided either wholly or partially with a suitably-shaped plug (shown in **FIG. 5B**) (e.g. in the form of a grommet or of a "blind" plug, i.e. without or with passage or slot, perhaps formed of rubber or plastic, or the like) so

that any portion of the access point that is not intended to be visible or exposed (for example, after the articles of furniture have been arranged) will be covered and/or so that the cables are secured within the access point. (According to an exemplary embodiment shown in **FIG. 5B, a** compliant plastic plug **144***a* having a central slot **145** is provided for aperture **144** of floor tile **140**.)

[**0051**] Referring to **FIG. 6**, an alternative embodiment of floor system **200** is shown using a carrier or tray tile **240** (in the place of the standard floor tile). Tray tile **240**, which is configured to be installed within floor system **100** in any of four rotational positions, has a solid base and an offset aperture **246** into which a floor subtile **270** may be installed. Each subtile **270**, which is configured to be interchangeably installed within tray tile **240** in any of four rotational positions, is supported by a peripheral flap **242** on a ledge **244** around the perimeter of aperture **246**. Each of floor subtiles **270** also provides a distinctive set of one or more access points for utilities. (As with any exemplary embodiment, the overall or "effective" access pattern of the floor system is predetermined by the possible configuration of the available floor subtiles.)

[**0052**] By way of example but not of limitation, a variety of configurations of floor subtiles (an access points or patterns) are shown in **FIGS. 6 and 7**A through **7**E. For example, subtile **270***a* includes a slot **272**. Subtile **270***b* includes a plurality of holes **274** (in a triangular pattern). Subtile **270***c* includes an offset circular hole **276** with a cap **277** (that can be indexed in a variety of orientations); cap **277** has a cutout **278** that can be filled in whole or in part by a plug **279** (or grommet). Subtile **270***d* does not provide for any access points. Subtile **270***e* includes an edge aperture with cover or flap **280** (e.g. made of a resilient or semi-rigid plastic material or the like) that can be lifted to provide for access to utilities. Subtile **270***f* includes a central circular hole **276** with a cap **277** (seated on a rim that can be indexed in a variety of orientations); cap **277** has a cutout **278** that can be filled in whole or in part by a plug **279** (or grommet).

[**0053**] Referring to **FIGS. 8 and 9**, an alternative embodiment of floor system **300** is shown using a carrier or frame tile **340**, similar in purpose to tray tile **240** of **FIG. 6**. (As will become apparent to those of skill in the art who review this disclosure, the arrangement of the tray tile or frame tile may be modified to include one or more apertures in a wide variety of suitable shapes, internal orientations and configurations.) Frame tile **340**, which is configured to be installed within floor system **300** in any of four rotational positions, has a frame **341** with a set of four apertures **346** into each of which floor subtiles **370** may be installed. Each floor subtile **370**, which is configured to be interchangeably installed within tray tile **340** in any of four locations and any of four rotational positions, is supported by a peripheral flap **342** on frame **341** and around the perimeter of aperture **346**.

[**0054**] By way of example but not of limitation, a variety of configurations of floor subtiles are shown in **FIG. 9**, some of which are similar to the floor tiles and subtiles shown according to other exemplary embodiments. Subtile **370***a* includes a rectangular slot **372**. Subtile **370***b* includes a plurality of hole **374**. Subtile **370***c* includes an offset circular hole **375** with a cap **377** (that can be indexed in a variety of orientations); cap **377** has a cutout **378** that can be filled in whole or in part by a plug **379** (or grommet). Subtile **370***d* is solid, with no aperture (i.e. access point). Subtile **370***e* includes an edge aperture **380**. Subtile **370**f includes a lateral aperture **376***a*. Subtile **370***g* includes a central aperture **376***b* (slightly offset). (As shown by comparing **FIGS. 5A through 5C** and **FIG. 9**, the floor tiles of one embodiment may function in a similar manner to the floor subtiles of other embodiments.)

[**0055**] Referring to **FIGS. 10A through 10C**, an alternative embodiment of floor system **400** is shown using a carrier or tray tile **440** (similar to tray tile **240** shown in **FIG. 6**) with a peripheral flap **442**. (According to alternative embodiments, other arrangements, such as the frame tile **340** shown in **FIG. 9**, could be used.) As shown in **FIG. 10**B, floor subtile **470**, which is configured to be installed within an aperture **446** in a base **441** of tray tile **440** in any of four rotational positions, includes a plurality of access holes **474** (in a generally symmetrical offset grid pattern). Floor system **400** also includes a mounting guide **452** having a channel section **454** into which a panel wall **460** may be fitted with retaining plugs **456** (projecting downwardly) which may be fitted into access holes **474**. By virtue of mounting guide **452**, panel wall **460** may be secured to raised floor **402**.

[**0056**] As shown in **FIG. 10**C, retaining plugs **456** of mounting guide **452** are hollow so that utilities shown as cables **120** may pass from beneath raised floor **402** through access holes **474** of subtile **470** through mounting guide **456** and into an internal passage or space **458** within panel wall **460**. Floor system **400** provides not only for flexibility in the location of access points for utilities but also for flexibility in the positioning and securing of panel wall **460** to raised floor **402**. In any event, the location of panel wall **460** is not constrained by floor system **400** (given the range of predetermined positions). According to alternative embodiments, the plurality of holes in the subtile could be arranged in other suitable patterns for a particular application (e.g. in an asymmetrical pattern).

[**0057**] Referring to **FIGS. 11A through 11C**, an alternative embodiment of floor system **500** is shown using a carrier tile **540** (similar to tray tile **340** shown in **FIG. 6**.) Carrier tile **540**, which is supported by cap **112** of stand **106** at a peripheral flap **542**, includes a compartment **562** into which a floor subtile **570** is configured to be installed in any of four rotational positions. Compartment **562** of carrier tile **540** has a base **564** including a plurality of upward projections shown as a system of posts **566** which provide support for subtile **570**. Subtile **570**, which can be made from a sheet of any sufficiently strong and durable material (preferably a rigid plastic material of suitable thickness), is secured within compartment **562** of carrier tile **540** by a set of fasteners shown as screws **568**. Screws **568** are inserted through subtile **572** and are threaded into holes **579***a* at mounting areas shown as mounting tabs **574** in corners **579** of compartment **562**. Access to utilities is provided through apertures **578** at base **564** of compartment **562** (at least one aperture of suitable size is required). According to any preferred embodiment, as shown in **FIG. 11**C, posts **566** are of a size and shape and arranged in a pattern that provides sufficient structural support for subtile **570** but that does not impede the passage of cables **120** through raised floor **502**.

[**0058**] Subtile **570** originally has the form of a solid sheet **571** but can be provided with access points for utilities shown as cables **120** by providing a cutout arrangement of

suitable size, shape and placement as required for the particular application. The cutout arrangement can be formed in the subtile before or during installation of the floor, when articles of furniture are positioned and/or when the floor is reconfigured. By way of example but not of limitation, subtile **570***a* is provided with an offset elongated slot cutout **572**, subtile **570***b* is provided with an "L"-shaped cutout **571**, subtile **570***c* is provided with an offset circular cutout **576**, subtile **570***d* is provided with an offset rectangular cutout **573**, and subtile **570***e* is provided both with an offset circular cutout **576***b* and an offset square cutout **576***a* (over the top of which a structural member **128***a* of an article of furniture has been positioned). As is apparent, the access pattern provided by the subtiles of floor system **500** is particularly flexible, and preferably can be modified during installation of floor system and/or positioning of articles of furniture within the work environment or space (i.e. "field cut"). The position of the article of furniture is effectively unconstrained by the floor system.

[**0059**] As is apparent from the exemplary embodiments, the floor subtiles of certain embodiments fit and function in a similar manner to the floor tiles of other embodiments and are therefore conceptually interchangeable provided they are of proper size and strength for a particular application. According to any preferred embodiment, the floor tiles and subtiles fit together to provide a structurally sound and relatively seamless raised floor.

[**0060**] While the exemplary preferred and alternative embodiments of the floor system show floor tiles (e.g. including tray tile, frame tile, carrier tile, other tile, etc.) and subtiles having a square shape, other shapes could be used according to additional alternative embodiments of the present invention. According to any preferred embodiment, the floor tiles and/or subtiles, although readily reconfigurable, will fit together in any suitable arrangement to provide a structurally sound and relatively seamless raised floor while providing an access pattern or access pattern for distribution of utilities that is suitable for the application.

Additional Exemplary and Alternative Embodiments

[**0061**] Referring to FIGS. **13-18**, additional exemplary and alternative embodiments of a floor system are shown.

[**0062**] Referring to **FIG. 13, a** raised floor system **700** is shown in a work environment (such as an office space, computer room, utility room or other facility) where various utilities are used. Utilities which may include any utilities typically associated with the transmission of power, voice, and/or data, through utilities carriers such as power cables, network connections, telephone wires, optical cables, etc. or various combinations as may be used in the work environment. (The utilities may also include various other utilities used in the environment, such as heating, ventilation and air conditioning (HVAC) ducts, plumbing, pipes, conduits, etc.)

[**0063**] According to any preferred embodiment, the floor system is configured to provide a level floor surface that is relatively free of protrusions; the floor system may also be capable of being retrofit into a work environment (e.g. where a raised floor had previously been installed) to allow passage of utilities under the floor and through access points so that utilities may be passed into work spaces within the work environment.

[**0064**] As shown in **FIGS. 1A, 1B** and **13**, the floor system includes a raised floor that may be constructed using a selective combination or arrangement of floor tiles which may be installed or interchanged selectively for placement, configuration and orientation of access points for utilities (e.g. in association with articles of furniture that may be configured and positioned throughout the work environment, see **FIGS. 1A and 1B**). According to any preferred embodiment, floor system may include a variety of different floor tiles and types of floor tiles (including floor tiles of a generally conventional configuration), to provide flexibility in configuration and placement of various articles of furniture based on the particular needs, requirements, space constraints, etc. of the work environment, so that the positioning of articles of furniture is not constrained by the location of access to the various utilities.

[**0065**] Referring to **FIG. 13**, floor system **700** is shown in a work environment having a base floor **704**. Floor system **700** includes a raised floor **702** installed above base floor **704** upon a structural support system (e.g. of a conventional type see **FIGS. 10C, 12A**, and **12B**). Raised floor **702** of floor system **700** includes floor tiles **740** and **768** which are installed upon and supported by the structural support system. Floor tiles **740** are of a generally conventional type and arrangement (and can be provided in any of a wide varieties of shapes, sizes and configurations). Floor tiles **740** may be similar to floor tile **440** as discussed above, but may be other types and arrangements. Floor tiles **740***a*, **740***b*, **740***c*, and **740***d* may be configured to serve as a utilities terminal and are provided with an aperture or opening **746** (e.g. base access point) into which a frame shown as a tray tile **718** (e.g. in the form of a carrier, receptacle, compartment, or support "pan") is installed. A subtile **720** is installed into tray tile **718**. Subtile **720** may be provided with an aperture or opening (shown as a hole **770** in **FIG. 13**) into which a plug or insert **722** (or grommet) can be installed. Tray tile **718***a* or **718***b* may include one or a plurality of apertures or openings (shown as circular holes **736** in **FIG. 13**). Insert or grommet **722** has an aperture or opening **774** into which a cover or cap **772** (or grommet) may be installed (**FIGS. 14 and 15**). Cap or grommet **772** may provide a notch or access hole **776**; cap **772** may also be rotated or inserted at various orientations within aperture **774**.

[**0066**] As shown in **FIG. 13**, floor tiles **740** may be installed into floor system **700** to position an opening **746** in a floor tile for installation of a tray tile **718** in any of a variety of locations; a subtile may be installed into a tray tile to position opening **746** in any of a variety of locations; an insert **722** with cap **772** may also be installed to position an access hole **776** in any of a variety of locations. As a result, according to any preferred embodiment, utilities may be passed from beneath the raised floor **702** through a hole **776** in cap **772** installed within a subtile **720** which is installed within the tray tile **718**. According to any preferred embodiment, the tray tile **718** and subtile **720** may be provided in any of a variety of configurations having any of a wide variety of aperture or opening patterns or configurations in any of a wide variety of sizes or shapes or number. Orientation or arrangement of the opening in the floor tile for the tray tile provides one level of selective placement of the access opening for utility carriers (e.g. wires or cables or conduits, etc.); orientation or arrangement of the opening in the subtile within the tray tile provides a second level of selective placement; orientation or arrangement of the insert

within the subtile provides a third level of selective placement; orientation of a hole in cap within the insert provides an additional level of selective placement of the access opening.

[0067] According to an exemplary embodiment as shown in **FIGS. 14 through 16**, subtile **720** can be formed of a series of selectively detachable or selectively removable units or segments **748** (or cover blocks); one segment or a plurality of segments can be selectively detached from subtile **720** to provide a cutout or aperture **770** at a desired position (e.g. within the interior, at the perimeter, or in any other location) and with a desired size (e.g. one segment, two segments, or more). An insert (or plug or plugs) having a corresponding size may be installed within the aperture or opening of the subtile which then can be installed within the tray tile. As shown in **FIG. 14**, segments **748** of subtile **720** may be arranged in a grid or other pattern and connected by a web **746** or other structure. In a particularly preferred embodiment, segments **748** of subtile **720** are arranged in a four by four grid pattern.

[0068] Referring to **FIGS. 15 and 16**, the inserts may be provided in any of a wide variety of sizes and configurations. An insert **756** may include a set of flexible panels **802** (shown not flexed open) through which wires or cables **778** (shown in phantom lines) can be passed to route utilities from beneath the raised floor (e.g. along designated tracks or slots). Insert **756** is shown in a first condition with panels **802** in an unflexed state, and a second condition in a flexed state with wires or cables **778** passed through. An insert **758** may provide one or more utilities modules shown as outlet boxes **760** (two are shown as including a hinged door **779** with access notches **780**) into which power or voice or data connections or access generally may be made for utilities. An insert **754** having one cap **772** with a notch **782** (e.g. through which a wire or cable may be passed) or an insert **766** having a plurality of caps may be provided (**FIG. 16**). An insert **752** having one opening or an insert **764** having two openings **786** (or more openings as in insert **788** (**FIG. 16**)) may be provided. According to other alternative embodiments, the inserts may be provided in any of a wide variety of arrangements and combinations of arrangements so that access openings can be made available at any of a wide variety of locations within the floor system.

[0069] Referring to **FIGS. 17 and 18**, a floor tile **740** is shown according to an alternative embodiment. Floor tile **740** includes an opening or cutout **746** into which a tray tile **718** is installed (e.g. to rest upon a ledge or other support structure within opening **746**); a subtile **720** is installed into tray tile **718**; an insert **790** can be installed in (or associated with) subtile **720** (e.g. having a base **792** to rest on tray tile **718**). Insert **790** has an aperture **793** into which a cap **794** may be installed (e.g. to rest upon a ledge or other supporting structure provided within aperture **793**). Cap **794** may provide a notch or hole **796** through which a utility carrier shown as a cable **798** (shown in fragmentary view) may pass from beneath the raised floor to above the raised floor. Cap **794** may also be arranged so that hole **796** can be set at a desired position within the insert and therefore within the raised floor.

[0070] As shown in **FIGS. 13 and 18**, base floor tile **740** provides a ledge **724** which is disposed at least partially around the perimeter of access point or opening **746** to provide suitable support for frame or tray tile **718**.

[0071] Referring to **FIGS. 13 and 14**, according to an exemplary embodiment, frame or tray tile **718** may be a pan-shaped body having a base or bottom **726**, side walls **728**, and lip or edge **732**. Base **726** of tray tile **718** is shown to include apertures shown as openings **736**. As shown in **FIG. 13**, openings **736** may be circular apertures disposed on base **726** of tray tile **718**. According to alternative embodiments, the openings may be arranged in any pattern including a three by three grid pattern (as shown in tray tile **718***b*), a four by four grid pattern (as shown in tray tile **718***a*) or any other pattern or shape or size or combination, in any desired location, pattern, or arrangement. Referring to **FIG. 18**, frame or tray tile **718** is configured to fit and be supported in opening **746** of base floor tile **740** by ledge **724**. Edge **732** is configured to fit on top surface **734** of ledge **724** and to support tray tile **718** in base floor tile **740**. According to alternative embodiments, the frame or tray tile may be supported or mounted in the base floor tile by a variety of other methods including fasteners such as clips, screws, etc.

[0072] According to an exemplary embodiment shown in **FIG. 14**, segments (or blocks) are provided in a series within a subtile shown as sheet **744**. The blocks are interconnected by a portion of material shown as web **746**. The web may be a connection that is scored, pre-stressed, perforated, or provided in any other suitable arrangement to define an individual segment out of sheet **744**. As shown in **FIG. 14**, selected blocks **748** may be removed from sheet **744** by selective removal (e.g. breaking off) from sheet **744**. According to an exemplary embodiment, for removal, blocks **748** may be repeatedly deformed along the selected "break-off" line to "fatigue" the web or connection between selected blocks **748** for removal from sheet **744**. According to any preferred embodiment, once the connection between the selected blocks and remainder of the sheet has been sufficiently fatigued or severed (e.g. by cutting or scoring or the like), the selected blocks may be removed. According to an alternative embodiment, the connection between individual connected blocks may be a rigid or "brittle" connection through which the selected blocks may be separated and removed by "snapping" from block sheet **744**. The blocks may be formed with an "open" box construction or other form (e.g. solid). According to a particularly preferred embodiment, the subtile (with blocks) may be integrally formed from a moldable material such as suitably resilient plastic. According to other alternative embodiments, the subtile may be formed from other materials in other shapes and configurations.

[0073] As shown in **FIG. 14**, after selected blocks **748** are removed from subtile or sheet **744**, any suitable insert (or inserts) may be installed within tray tile **718** within the vacant or open area **770** of selected blocks **748**. Referring to **FIG. 15, a** variety of inserts are shown including a pass-through **752**, pass-through with cover plate **754**, a pliable pass-through cover **756**, a utilities module **758**, a power outlet module **760**, a phone jack module **762**, a duplex pass-through **764**, a triplex covered pass-through **722** or any other insert or suitable size and shape (e.g. to the corresponding blocks removed from the subtile).

[0074] Referring to **FIG. 19**, floor tiles **740** may alternatively be further provided with plate **784** installed over subtile **720**. Fasteners, shown as screws **786**, attach plate **784** to tray tile **718**. Plate **784** allows for flexible planning and changes in the construction of raised floor system **700**. Plate

784 may operate as a built in "dumb" tile to cover or conceal subtile **720**, and/or tray tile **718**.

[**0075**] The modularity and selective reconfigurability of the floor system and utilities terminal is shown in **FIG. 16**. A variety of exemplary configurations for use in a utilities terminal are shown. It should be noted that the few configurations shown in **FIG. 16** are meant only to be illustrative of the wide variety of configurations which may be implemented using the floor system, by choosing and arranging and selectively reconfiguring one or more of the elements as may be necessary or desirable based on space requirements of the work environment, such as the desired location of articles of furniture.

[**0076**] According to any preferred embodiment, utilities may be passed from beneath the raised floor through a cutout in a floor tile so that access is available to utilities at any of a wide variety of positions and locations upon the raised floor. According to any preferred embodiment, the floor tile may be provided in any of a variety of configurations having any of a wide variety of aperture configurations in any of a wide variety of sizes or shapes or number. According to an alternative embodiment, the subtile may be configured to be installed within a floor tile without the use of a tray tile (e.g. with or without a supporting frame or structure). It should also be noted that the mounting or installation of any of the elements of the floor system (e.g. floor tiles, frames, carriers, tray tiles, subtiles, inserts, cover blocks, plugs, caps, covers, grommets, or the like) may be provided in any of a wide variety of different arrangements, for example, through the use of supporting structures such as base-frame and/or edge-ledge arrangements (see **FIG. 18**), support brackets or trim, interference fits, mechanical fasteners, etc. According to any preferred embodiment, the elements will be configured for quick and easy removal (e.g. without fasteners) so that the floor system can be configured and reconfigured selectively and conveniently to provide access points or access openings for utilities (e.g. one or a plurality of utility carriers) at any of a wide variety of locations or positions (e.g. in association with articles of furniture).

[**0077**] Although only a few exemplary embodiments of the floor system have been described in detail above, those skilled in the art who review this disclosure will readily appreciate that many modifications are possible in the exemplary embodiments without materially departing from the novel teachings and advantages of the present invention. For example, the floor system is not limited by type or nature of the articles of furniture or the arrangement of utilities above or below the raised floor. (In alternative embodiments, utilities may include a wide variety of services, including those provided through cables, conduits, pipes or ducts, layers, levels, channels, paths, passages, raceways, etc.) Neither is the floor system limited by the specific size, scale, shape or fit of floor tiles and subtiles (which may be based on or adapted from existing floor systems such as those available from Tate Access Floors, Inc. of Jessup, Md., Interface Architectural Resources of Kennesaw, Ga., and/or by other suppliers or standards), the manner of installation of the floor system, the nature of the raised floor (whether a thick raised floor, thin raised floor or other type of floor), the height and structural support system for the raised floor, or whether the floor tiles and subtiles are uncovered or covered by vinyl, carpet, etc. Access points, apertures or access patterns of any size or shape may be provided in the floor tiles or subtiles. Any preferred embodiment of the floor system will include floor tiles and subtiles of suitable structural rigidity and strength that have been interconnected to provide a raised floor that meets the requirements for loading as well as noise, efficiency and regulatory compliance.

[**0078**] Accordingly, all such modifications are intended to be included within the scope of the invention as defined in the following claims. In the claims, any means-plus-function clause is intended to cover the structures described herein as performing the recited function and not only structural equivalents but also equivalent structures. Other substitutions, modifications, changes and omissions may be made in the design, operating conditions and arrangement of the preferred embodiments without departing from the spirit of the invention as expressed in the appended claims.

1. A utilities terminal for use in a raised floor system comprising:

a floor tile having an access cavity, a support pan and an upper surface, said support pan positioned within said access cavity and said support pan having at least one access opening;

a utilities grommet, said grommet configured to be received within said support pan covering at least a portion of said support pan; and

a plurality of cover blocks selectively configured and adapted to be received within said support pan covering the remaining open area of said support pan and positioned substantially flush to said upper surface of said floor tile.

2. The utilities terminal defined in claim 1 wherein said cover blocks are positioned within said support pan to provide access to at least a portion of said support pan.

3. The utilities terminal defined in claim 1 wherein said cover blocks are positioned within said support pan to prevent access to said support pan.

4. The utilities terminal defined in claim 1 wherein said cover blocks are interconnected prior to installing into said support pan and whereby at least one of said cover blocks can be easily detached and removed from the others.

5. The utilities terminal defined in claim 1 wherein said cover blocks can be reconfigured after installation to allow for more or less access to said support pan.

6. The utilities terminal defined in claim 1 wherein said utilities grommet includes a utilities module.

7. The utilities terminal defined in claim 1 wherein said grommet is dimensioned to be substantially the same size as any one of said cover blocks.

8. The utilities terminal defined in claim 1 wherein said grommet is dimensioned to be substantially the same size as a plurality of said cover blocks.

9. A floor system comprising:

a plurality of pedestals adapted to support floor tiles;

a plurality of floor tiles having an access cavity, and an upper surface wherein at least one of said floor tiles includes a support pan positioned within said access cavity and said support pan having at least one access opening;

a utilities grommet, said utilities grommet configured to be received within said support pan covering at least a portion of said support pan; and

a plurality of cover blocks selectively configured and adapted to be received within said support pan covering the remaining open area of said support pan and positioned substantially flush to said upper surface of said floor tile.

10. The floor system defined in claim 9 wherein said cover blocks are positioned within said support pan to provide access to at least a portion of said support pan.

11. The floor system defined in claim 9 wherein said cover blocks are positioned within said support pan to prevent access to said support pan.

12. The floor system defined in claim 9 wherein said cover blocks are interconnected prior to installing into said support pan and whereby at least one of said cover blocks can be easily detached and removed from the others.

13. The floor system defined in claim 9 wherein said cover panels can be reconfigured after installation to allow for more or less access to said support pan.

14. The floor system defined in claim 9 wherein said pedestals are vertically adjustable.

15. The floor system defined in claim 9 wherein said utilities grommet includes a utilities module.

16. The utilities terminal defined in claim 9 wherein said grommet is dimensioned to be substantially the same size as any one of said cover blocks.

17. The utilities terminal defined in claim 9 wherein said grommet is dimensioned to be substantially the same size as a plurality of said cover blocks.

18. A method for reconfiguring a utilities terminal within a raised floor system wherein the utilities terminal includes a floor tile having an access cavity, a support pan, a plurality of cover blocks adapted to be received in said support pan, and a utilities grommet adapted to be received in said floor pan, the method comprising steps of:

removing said utilities grommet;

removing said plurality of cover blocks;

reconfiguring said grommet within said support pan; and

reconfiguring said cover blocks within said support pan.

19. The method for reconfiguring a utilities terminal defined in claim 18 wherein the step of reconfiguring said grommet includes repositioning said grommet at a different location within said support pan and wherein the step of reconfiguring said cover blocks includes repositioning said cover blocks to cover the open area of said support pan not covered by said grommet.

20. The method for reconfiguring a utilities terminal defined in claim 18 wherein the step of reconfiguring said grommet includes utilizing a different dimensioned grommet and wherein the step of reconfiguring said cover blocks includes utilizing a different dimensioned configuration of said cover blocks positioned to cover the open area of said support pan not covered by said grommet.

21. A utilities terminal for use in a raised floor system for a work environment adapted for distribution of utilities through utility carriers associated with articles such as articles of furniture, the utilities terminal comprising:

a floor tile having an access cavity and an upper surface;

a frame positioned within said access cavity having at least one access opening;

an insert configured to be received within said frame covering at least a portion of said frame; and

a subtile selectively positionable within said frame so that utility carriers may be passed through said frame.

22. The utilities terminal of claim 21, wherein said subtile is selectively configured and adapted to be received within said frame covering a remaining open area of said frame and positioned substantially flush to said upper surface of said floor tile.

23. The utilities terminal of claim 22, wherein said subtile further comprises cover blocks.

24. The utilities terminal of claim 23, wherein said cover blocks further comprise detachable segments.

25. The utilities terminal of claim 21, wherein said insert further comprises a grommet.

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