(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
30 January 2014 (30.01.2014)

WIPO | PCT

(10) International Publication Number
WO 2014/015374 A2

(51) International Patent Classification:
E04H 1/04 (2006.01)

(21) International Application Number:
PCT/AU2013/000819

(22) International Filing Date:
23 July 2013 (23.07.2013)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2012903175 24 July 2012 (24.07.2012) AU

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

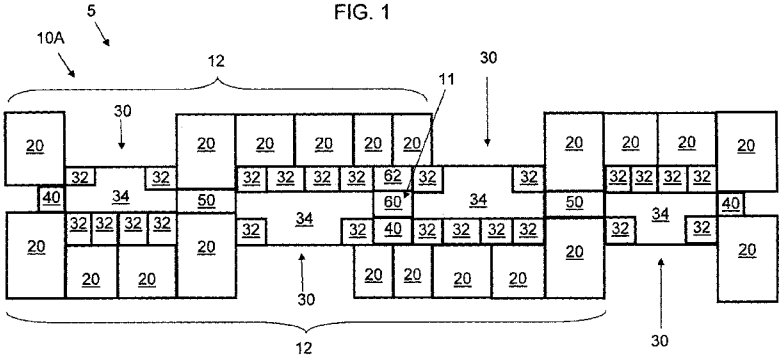
Published:

— *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*

WO 2014/015374 A2

(54) Title: MULTI-STOREY BUILDINGS

FIG. 1



(57) Abstract: Multi-storey buildings are described, embodiments of which include two or more arms extending away from a centre with each arm comprising two or more apartments located at least in part on a first storey of each arm. At least one elevated first courtyard extends between adjacent arms and the first courtyard is two or more storeys high. One side of the first courtyard is open to the atmosphere and the two or more apartments are accessible from the first courtyard. Multiple elevated courtyards can be provided on multiple storeys with access between courtyards on the same storey.

TITLE

MULTI-STOREY BUILDINGS

FIELD OF THE INVENTION

This invention relates generally to multi-storey buildings and in particular multi-storey buildings which integrate open spaces.

BACKGROUND TO THE INVENTION

Multi-storey residential buildings were originally designed to alleviate the problem of overcrowding in cities, as well as for providing low cost accommodation. However, there are many problems associated with living in multi-storey buildings.

Firstly, there is the problem of the lack of a sense of community. In high rise multi-storey housing, people live in a densely populated condition where the feelings of anonymity and lack of a sense of community commonly endured in city life are exacerbated. On one hand, living amongst a multitude of strangers is inevitable, yet it is necessary for co-operation in the maintenance and upkeep of not only the common facilities, but also the standard of civility and social conduct. This makes necessary the institution of rules and regulations that govern the residents: the developers or the government have to supervise the setting up of a management body to manage the apartment. However, this body cannot be a satisfactory substitute for the spontaneous sense of community found in small towns and villages.

The second problem is that of security. Unlike houses, much of the public spaces in multi-storey residential buildings is not overlooked by other residents and neighbours, and as a result may be more prone to burglaries. Furthermore, these spaces can be subject to other forms of crime such as vandalism, graffiti and muggings. Once a building gets a bad reputation, it is hard to get rid of it. Furthermore, due to the numbers of people living in a multi-storey building there is a large amount of

anonymity, thus the presence of strangers is even more difficult to question.

Thirdly, the quality of life for children, in terms of the opportunity for outdoor play, unsupervised by adults, can be said to be even worse compared to that enjoyed by children growing up in suburbs and the countryside. Multi-storey residential buildings are not family friendly due to the lack of space just outside the home. A park or play area may be provided on the ground floor, but such play areas can only be supervised by parents if they come down with their children. Only older children would be able to use them independently. Although balconies may provide some outside space, they can be dangerous for small children. Furthermore, they are not social spaces where they can meet and play with other children like them.

The fourth issue is that of providing natural landscaping in high rise housing. It is undeniable that the majority of high rise blocks lack any greenery on the upper floors. Only more recently, many architects and developers have now seen the advantages of landscaping tower blocks, not only by providing open spaces on the ground, but also by providing elevated green roofs, landscaped open floors or decks, and "skycourts". The problem with the current approach is that the provision of open decks and skycourts, not only add cost, but also reduces the amount of sellable apartment space to make way for the skycourts or open decks. In addition, these green spaces on intermediate floors or on the roof tops require additional space for circulation access.

Many of the social drawbacks of tall residential buildings mentioned above can be overcome by the rich living in exclusive residential high rise condominiums or luxury apartments. However this causes another problem concerning the high cost of building tall apartment buildings. Prior art multi-storey buildings do not make the best utilization of the available space. In some multi-storey buildings, circulation spaces, such as corridors and services occupy a significant amount of space. This reduces the space available for accommodation and therefore the amount of

sellable space on each floor of the multi-storey building. In this way high quality, high rise apartments become less affordable for most people.

Hence, there is a need for an improved design of multi-storey residential building.

OBJECT OF THE INVENTION

It is a preferred object of embodiments of the present invention to provide consumers with improvements and/or advantages over the above described prior art, and/or overcome or at least alleviate one or more of the above described disadvantages of the prior art, and/or provide a useful commercial choice.

SUMMARY OF THE INVENTION

In one form, although not necessarily the only or broadest form, the invention resides in a multi-storey building including:

two or more separate apartments located, at least partly, on a first storey; and

a first courtyard located on the first storey and covered, at least in part, by an upper storey; wherein:

each of the two or more separate apartments are arranged around the first courtyard;

a side of the first courtyard is open to atmosphere;

the first courtyard includes a communal courtyard;

the first courtyard includes one or more private courtyards associated with a respective separate apartment; and

wherein each separate apartment is accessible from a private courtyard and/or the communal courtyard.

In another form the invention resides in a multi-storey building including:

two or more arms extending away from a centre;

two or more apartments located at least in part on a first storey of each arm; and

an elevated first courtyard extending between adjacent arms; wherein

the first courtyard is two or more storeys high;

the two or more apartments are accessible from the first courtyard; and

one side of the first courtyard is open to the atmosphere.

Preferably, a second courtyard is located above or adjacent the first courtyard and the second courtyard is linked to the first courtyard.

Preferably, the second courtyard is linked to the first courtyard by a corridor.

Preferably, the second courtyard is linked to the first courtyard by a lobby.

Optionally, the second courtyard is linked to the first courtyard by a lift.

Preferably, one or more of the two or more separate apartments is arranged over two or more storeys.

Optionally, the first courtyard and/or the second courtyard is/are two or more storeys high.

Preferably, the second courtyard is located above, and covers at least in part, the second courtyard.

In one embodiment, a first courtyard is located on a same storey as a second courtyard. The first courtyard may be located on a different side of the multi storey building to the second courtyard. The second courtyard may be a plurality of storeys higher than the first courtyard.

Suitably, a third courtyard is located a plurality of storeys above the second courtyard, and the third courtyard is located directly above the first courtyard.

Preferably, the first and second courtyards are located side by side between a pair of adjacent arms wherein the second courtyard is on a higher storey than the first courtyard.

Preferably, a second courtyard on a same storey as the first courtyard is accessible from the first courtyard. For example, the second courtyard may be accessed from the first courtyard via a corridor.

The apartments may be arranged in one of the following shapes: an S shape, an X shape, a zigzag shape, a cross shape, a double cross shape, a star shape where each arm represents a "point" of the star, such as, but not limited to a three pointed star shape, a five pointed star shape, or a six pointed star shape.

Preferably, sellable apartment space, inclusive of the respective private courtyards, is at least about 89% of the available space.

Preferably, circulation spaces, including corridors, lift lobbies and staircases, occupy less than about 3.2% of the available space

Preferably, non sellable areas, including circulation spaces, services and communal courtyard areas, occupy less than about 11% of the available space.

Preferably, a first apartment is accessed from a first courtyard on a first storey and includes at least part of a second storey immediately above the first storey. A second apartment is also accessed from the first courtyard on the first storey and includes at least part of a lower storey immediately below the first storey.

In another form the invention resides in a multi-storey building including:

two or more separate apartments located, at least partly, on a first storey; and

a first courtyard located on the first storey and covered, at least in part, by a second courtyard; wherein:

the first courtyard is two or more storeys high;

each of the two or more separate apartments are arranged around the first courtyard;

a side of the first courtyard is open to atmosphere;

one or more of each separate apartment is accessible from the first courtyard; and

the first courtyard is serviced by stairs and/or lifts located on the first storey.

In a further form the invention resides in a method of division of a multi-storey building, the method including:

forming a layout comprising two or more separate apartments at least partly on a first storey arranged around a first courtyard, the first courtyard including a communal courtyard, one or more private courtyards associated with a respective separate apartment and a side of the first courtyard being open to the atmosphere;

providing on the layout access to each separate apartment from the respective private courtyard and/or the communal courtyard; and

covering the first storey on the layout, at least in part, by an upper storey.

In a yet further form the invention resides in a method of division of a multi-storey building, the method including:

forming a layout comprising two or more separate apartments at least partly on a first storey arranged around a first courtyard two or more storeys high, wherein a side of the first courtyard is open to the atmosphere and the separate apartments are accessible from the first courtyard;

covering the first courtyard on the layout, at least in part, by a second courtyard; and

providing on the layout access to the first courtyard by stairs and/or lifts located on the first storey.

In another form the invention resides in a method of division of a multi-storey building, the method including:

forming a layout comprising two or more arms extending away from a centre;

forming two or more apartments located at least in part on a first storey of an arm; and

forming an elevated first courtyard extending between adjacent arms; wherein

the first courtyard is two or more storeys high;

the two or more apartments are accessible from the first courtyard; and

one side of the first courtyard is open to the atmosphere.

Suitably, the methods can be performed by a processor coupled to a memory comprising computer implemented program code components which are selectively executed by the processor to perform the steps of the method.

Further features and/or aspects of the present invention will become apparent from the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

To assist in understanding the invention and to enable a person skilled in the art to put the invention into practical effect, preferred embodiments of the invention are described below by way of example only with reference to the accompanying drawings, in which:

FIG 1 illustrates a plan view of a first storey of a multi-storey building according to an embodiment of the present invention;

FIG 2 illustrates a perspective side view of the multi-storey building including the first storey of FIG 1;

FIG 3 illustrates a plan side view of a pair of apartments of FIG 2 according to a preferred embodiment of the present invention;

FIG 4 illustrates a cut away plan view of a multi-storey building in the form of a cross shape according to another embodiment of the present invention;

FIG 5 illustrates a perspective view of the multi-storey building of FIG. 4;

FIG 6 illustrates a cut away side view of a multi-storey building according to another embodiment of the present invention;

FIG. 7 illustrates a cut away plan view of a multi storey building in the form of a zigzag shape according to an embodiment of the present invention;

FIG. 8 illustrates a perspective view of the multi-storey building of FIG.7;

FIG. 9 illustrates a cut away plan view of a multi storey building in the form of a double cross shape according to an embodiment of the present invention;

FIG. 10 illustrates a perspective view of the multi-storey building of FIG. 9;

FIG. 11 illustrates a cut away plan view of a multi storey building in the form of a six pointed star according to an embodiment of the present invention;

FIG. 12 illustrates a perspective view of the multi-storey building of FIG. 11;

FIG. 13 illustrates a cut away plan view of a multi storey building in the form of a three pointed star according to an embodiment of the present invention;

FIG. 14 illustrates a perspective view of the multi-storey building of FIG. 13;

FIG. 15 illustrates a cut away plan view of a multi storey building in the form of a five pointed star according to an embodiment of the present invention;

FIG. 16 illustrates a perspective view of the multi storey building of FIG. 15;

FIG 17 illustrates a cut away plan view of a multi-storey building in the form of an 'L' shape according to another embodiment of the present invention;

FIG. 18 illustrates a cut away side view of a multi storey building with apartments built over one and a half storeys according to an embodiment of the present invention;

FIG. 19 illustrates a cut away side view of a multi storey building 170 of courtyards 30A, 30A', 30A" spanning two storeys according to an embodiment of the present invention;

FIG. 20 illustrates a cut away side view of a multi storey building of courtyards spanning three storeys according to an embodiment of the present invention;

FIG. 21 illustrates a cut away side view of a multi storey building showing an embodiment of courtyards spanning four storeys;

FIG. 22 illustrates a cut away side view of a multi storey building showing an embodiment of courtyards spanning five storeys;

FIG. 23 illustrates a cut away perspective view of the apartments of FIG. 22.

FIG. 24 illustrates a plan view of a multi storey building according to yet another embodiment of the present invention; and

FIG. 25 illustrates a perspective view of the multi storey building of FIG. 24.

Elements of the invention are illustrated in concise outline form in the drawings, showing only those specific details that are necessary to understanding the embodiments of the present invention, but so as not to clutter the disclosure with excessive detail that will be obvious to those of ordinary skill in the art in light of the present description.

DETAILED DESCRIPTION OF THE INVENTION

In this patent specification, adjectives such as first and second, left and right, front and back, top and bottom, etc., are used solely to define one element from another element without necessarily requiring a specific relative position or sequence that is described by the adjectives.

Words such as "comprises" or "includes" are not used to define an exclusive set of elements or method steps. Rather, such words merely define a minimum set of elements or method steps included in a particular embodiment of the present invention. It will be appreciated that the

invention may be implemented in a variety of ways, and that this description is given by way of example only.

FIG 1 illustrates a plan view of a first storey 10A of a multi-storey building 5 according to an embodiment of the present invention. It should be appreciated that reference herein to a first storey 10A refers to a storey located above ground level, but is not necessarily limited to the storey immediately above ground level.

The first storey 10A includes a number of separate apartments 20, a number of courtyards 30, a number of fire escape stairs or stairs 40, a number of linking corridors 50, a lift lobby or lobby 60 and a lift 62. Although FIG. 1 shows that each of the courtyards 30 or skycourts are elevated, it should be appreciated that the multi storey building 5 can additionally include a garden or courtyard on a ground level. A resident of an apartment 20 has access via a respective courtyard 30 to their apartment 20. In addition, the resident can access courtyards on other storeys via the linking corridors 50, the lift lobby 60, the lifts 62 and/or the stairs 40.

The multi storey building 5 includes a centre 11 and a plurality of arms 12 extending away from the centre 11. The centre 11 can include lobby 60 adjacent the lift 62 and stairs 40.

An advantage of this arrangement is that each apartment 20 is accessed via the courtyard 30. Thus security is increased as there is better visibility of neighbours' property. Furthermore, residents of an apartment 20 feel more connected with the outside whilst providing higher density housing and promoting social interaction between neighbours. Each courtyard 30 includes a number of private courtyards 32 and a communal courtyard 34. It should be appreciated that each private courtyard 32 may be fenced off to provide extra privacy to the resident of the apartment 20, or access to private courtyards 32 can be unrestricted.

In one embodiment, each apartment 20 is accessed via the private courtyard 32 through the communal courtyard 34. However in some embodiments it should be appreciated that the apartment 20 may be

accessed solely via the private courtyard 32 or solely via the communal courtyard 34.

Access between courtyards 30 is provided via a linking corridor 50 to an adjacent courtyard 30. In addition, courtyards 30 may be accessed via the lift lobby 60, so that residents may access different communal courtyards 34 on other storeys 10.In such embodiments, the need for corridors is reduced compared with the prior art because the apartments 20 are accessed via the courtyard 30.

In one embodiment, the apartments 20 form a 'U' shape around a courtyard 30, such that one side of the courtyard 30 is open to the atmosphere. Each end of the series of apartments 20 and courtyards 30 can include a set of stairs 40, such as a set of fire stairs.

FIG 2 shows a partial side perspective view of a multi-storey building 70 including the first storey 10A of FIG 1. The multi-storey building 70 also includes a number of upper storeys, including a second storey 10B, a third storey 10C, a fourth storey 10D, and a fifth storey 10E and a lower storey 10I. It should be appreciated however that the multi-storey building 70 can include any number of storeys 10.

As shown in FIG 2, the multi-storey building 70 includes a first courtyard 30A on the first storey 10A and a second courtyard 30B on the fourth storey 10D. The second courtyard 30B is directly over the first courtyard such that the first courtyard 30A is covered by the second courtyard 30B. In one embodiment, the courtyards 30 are three storeys high and access to an apartment 20 is via a courtyard 30.

It should be appreciated that a courtyard 30 on a higher storey 10 may not completely cover a courtyard 30 on a lower storey 10. In addition, the courtyard 30 on an upper storey 10 may overhang the courtyard 30 on a lower storey 10. Further, a courtyard 30 on a top of the multi-storey building 70 may be open to atmosphere (not shown) or covered by an additional structure (not shown). It should also be appreciated that one courtyard 30 does not necessarily need to be directly above another. For example, the side open to the atmosphere may vary or alternate between

opposing or adjacent sides of the multi-storey building 70. In addition, instead of being covered by another courtyard 30, a courtyard 30 may be covered by, at least in part, another part of an upper storey 10 such as one or more or parts of apartments 20.

In one embodiment, each apartment 20 is arranged over two or more storeys 10. In a preferred embodiment, two apartments 20 are arranged in pairs. FIG 3 shows a side view of two apartments arranged in a pair. Referring to FIGS 2 and 3, a first apartment 21 is accessed from the first courtyard 30A on the first storey 10A and includes at least part of the second storey 10B immediately above the first storey 10A. A second apartment 22 is also accessed from the first courtyard 30A on the first storey 10A and includes at least part of the lower storey 10l immediately below the first storey 10A. Internal stairs, 21A, 22A can be incorporated into the design to enable access between storeys 10A, 10B, 10F of each apartment 21, 22 respectively. It should be appreciated that pairs of apartments may be repeated on other levels. It should also be appreciated that many alternatives of this arrangement will be apparent to the person skilled in the art. For example, each apartment may occupy three levels or various combinations allowing the apartments to be accessed from every third level.

By constructing the apartments in pairs as detailed above, lifts need only stop at every three floors because each courtyard accesses two double storey apartments formed in a stack. The provision of communal courtyards means many more apartments can be acceptably located on each courtyard level or lift stop. For any given number of apartments, the cost of providing lifts becomes cheaper and lift waiting times may be reduced. Furthermore, each lift services many more apartments.

The present invention may be adapted for various combinations of number of storeys of apartment 20 and heights of courtyard 30. In the embodiment of FIG 2, a height of the first and second courtyards 30A, 30B is three storeys. However it should be appreciated that each courtyard 30 may be one storey high and each apartment 20 may also be one storey

high. In another example, each courtyard 30 may be one storey high and each apartment 20 may be two storeys high, such that residents of each apartment 20 have access to two courtyards 30. Furthermore, the multi-storey building 70 may include first and second courtyards 30A, 30B of differing heights. For example a first courtyard 30A may be three storeys in height and a second storey 30B may be two storeys in height.

By having multi-storey apartments 20, combined with courtyards 30 on every third storey, means that communal courtyard 34 and circulation spaces, including any corridors and services, occupy less than about 11% of the available space. Thus sellable apartment space inclusive of the respective private courtyards 32 is at least about 89% of the available space. This is comparable or better than current designs that have less outdoor space. Furthermore, the present invention provides the outdoor space next to each apartment 20.

FIG 4 illustrates a cut away plan view of a multi-storey building 80, and FIG. 5 illustrates a perspective view of the multi storey building 80 of FIG. 4 according to another embodiment of the present invention. The multi storey building 80 includes arms 82 extending outwardly from a centre 81 of the multi storey building 80 with arms 82 substantially at right angles to adjacent arms. In this embodiment, apartments 20 are arranged in a cross (+) formation, and in one embodiment, a lift lobby 60 forms the centre 81 of the multi storey building 80. The lift lobby 60 includes a lift 62 and stairs 40 for accessing other storeys.

As shown in FIG. 4, courtyards 30A, 30B, 30C, 30D extend between adjacent arms 82. In addition the courtyards 30A, 30B, 30C, 30D are arranged in pairs on opposite sides of the multi storey building 80. A first courtyard 30A is on a same storey as a second courtyard 30B of the multi storey building 80. However the first courtyard 30A is on an opposite side of the multi storey building 80 to the second courtyard 30B. Similarly, a third courtyard 30C is on a same storey as a fourth courtyard 30D, and the third courtyard 30C is on an opposite side of the multi storey building

80 to the fourth courtyard 30D. The third and fourth courtyards 30C and 30D are on a higher storey to the first and second courtyards 30A, 30B.

FIG. 5 illustrates a side perspective view of the multi storey building 80 of FIG. 4. As shown in FIG. 5 the courtyards 30A, 30D are repeated on upper storeys. The same applies to courtyards 30B, 30C on an opposite side of the multi storey building 80. In one embodiment, courtyard 30A' is formed five storeys directly above courtyard 30A. Courtyard 30D' is formed five storeys directly above courtyard 30D. Courtyard 30A" is formed five storeys directly above courtyard 30A', and courtyard 30 D" is formed five storeys directly above courtyard D'.

FIG. 6 illustrates a cut away side view of a multi storey building 90 according to an embodiment of the present invention. The arrangement of apartments shown in FIG. 6 may be applied to the embodiment shown in FIG. 4 and 5, and also to the embodiments shown in FIGS. 7-17.

As shown in FIG. 6, the apartments are arranged in pairs similar to the embodiment shown in FIG. 3. A first apartment 21 is arranged over a first storey 10A and a second storey 10B, and a second apartment 22 is arranged over the first storey 10A and a lower storey 10I. Access to the first and second apartments 21, 22 is via courtyard 30A on the first storey 10A. However it should be appreciated the first and second apartments 21, 22 may also be accessed via courtyard 30B shown in FIG.4, which is on the same storey as courtyard 30A.

Similarly, a third apartment 23 is arranged over a fourth storey 10D and a third storey 10C, and a fourth apartment 24 is arranged over the fourth storey and a fifth storey 10E. Access to the third and fourth apartments 23, 24 is via courtyard 30D on the fourth storey 10D. However it should be appreciated the third and fourth apartments 23, 24 may also be accessed via courtyard 30C shown in FIG.4 which is on the same storey as courtyard 30D.

In the same vein, a fifth apartment 25 is arranged over a sixth storey 10F and a seventh storey 10G, and a sixth apartment 26 is arranged over the seventh storey 10G and an eighth storey 10H. Access

to the fifth and sixth apartments 25, 26 is via courtyard 30A' on the seventh storey 10G. Courtyards 30A and 30A' are on a same side 90A of the multi storey building 90, and courtyard 30D is on an opposite side 90B of the multi storey building 90 to courtyards 30A, 30A'.

As outlined above, by alternating the courtyards 30A, 30D, 30A' between opposite sides 90A, 90B of the multi storey building 90, courtyards of twice the height between the first and second courtyards 30A, 30B and second and third courtyards 30C, 30D can be achieved. In FIG. 6, three stories separate courtyard 30A from courtyard 30D. Similarly three stories separates courtyard 30C from courtyard 30A'. Thus the number of stories separating courtyard 30A and 30A' is six storeys.

It should be appreciated that the height of each courtyard 30A, 30D, 30A' may also be varied by varying a number of storeys of an apartment 20. In addition it should be appreciated that the number of storeys occupied by an apartment may be different, or the same in order to achieve a desired height of the courtyard 30A, 30D, 30A'. Furthermore, it should be appreciated that the multi storey buildings of FIGS 4, 5 and 6 (and FIGS 7-17) may include private courtyards, and/or communal courtyards.

Although a cross shaped multi storey building 80 is shown in FIGS. 4 and 5, it should be appreciated that the multi storey building may be any suitable shape. FIGS. 7-16 show other shapes of multi storey building according to further embodiments of the present invention.

FIG. 7 illustrates a cut away plan view of a multi storey building 100 according to an embodiment of the present invention. Arms 102 extend away from a centre 101 of the multi storey building 100. Arms 102 can be in the shape of a zigzag, or W shape, as shown in FIG 7. Each arm 102 is formed from or comprises a plurality of apartments 20, and may include stairs 40 at an end of each arm 102. Similar to previous embodiments, a lift lobby 60 is formed at the centre 101 which also includes stairs 40, and a lift 62.

A first courtyard 30A on a first storey is formed on a first side 100A of the multi storey building 100, and a second courtyard 30B is formed on an opposite side 100B of the multi storey building 100 a number of storeys higher than the first courtyard 30A. In this embodiment, each courtyard 30A, 30B extends along a length of the multi storey building 100.

FIG. 8 illustrates a side perspective view of the multi storey building 100 of FIG. 7. As shown in FIG. 8 the courtyards 30A, 30B are repeated on upper storeys. In one embodiment, courtyard 30A' is formed five storeys directly above courtyard 30A. Courtyard 30B' is formed five storeys directly above courtyard 30B. Courtyard 30A" is formed five storeys directly above courtyard 30A', and courtyard 30B" is formed five storeys directly above courtyard 30B'.

FIG. 9 illustrates a cut away plan view of multi storey building 110 in the form of a double cross according to an embodiment of the present invention. The embodiment is similar to that of FIGS. 4 and 5, except that two crosses 110A, 110B are positioned side by side. Similar to FIG. 4, apartments 20 form arms 112A, 112B of a respective cross 110A, 110B. A lift lobby 60 forms a centre 111A, 111B of a respective cross 110A, 110B, and includes stairs 40 and a lift 62. The arms 112A, 112B extend away from a respective centre 111A, 111B.

Courtyards 30A, 30B extend between adjacent arms 112A, 112B. Courtyards 30A are on a same storey and courtyards 30B are on a number of storeys higher than the courtyards 30A. In one embodiment, a courtyard 30A is on an opposite side of the multi storey building to a respective courtyard 30B. In this arrangement, different sized courtyards may be achieved to provide a variety of outdoor spaces.

FIG. 10 illustrates a side perspective view of the multi storey building 110 of FIG. 9. As shown in FIG. 10 the courtyards 30A, 30B are repeated on upper storeys. In one embodiment, courtyard 30A' is formed five storeys directly above courtyard 30A, and courtyard 30B' is formed five storeys directly above courtyard 30B.

FIG. 11 illustrates a cut away plan view of a multi storey building 120 in the form of a six pointed star according to an embodiment of the present invention. A plurality of arms 122 is formed from or comprises apartments 20. Each of the six arms 122 extends away from a centre 121 of the multi storey building 120 such that the arms are at 60 degrees to each other. However, the angles between adjacent arms need not be equal. In one embodiment, the centre 121 of the multi storey building 120 includes a lift lobby 60 with stairs 40 and a lift 62 for accessing other levels. Further sets of stairs 40 may be positioned at ends of each arm 122.

Courtyards 30A, 30B extend between adjacent arms 122. Courtyards 30A are positioned between every other pair of adjacent arms, and courtyards 30B are positioned opposite to a respective courtyard 30A. The courtyards 30A are positioned on a same storey, and the courtyards 30B are positioned on a same storey, but on a higher storey to the courtyards 30A.

FIG. 12 illustrates a side perspective view of the multi storey building 120 of FIG. 11. As shown in FIG. 12 the courtyards 30A, 30B are repeated on upper storeys. In one embodiment, courtyard 30A' is formed five storeys directly above courtyard 30A, and courtyard 30B' is formed five storeys directly above courtyard 30B.

The embodiments shown in FIGS 4, 5, 11 and 12 include courtyards positioned adjacent an even number of arms. However it should be appreciated that the courtyards may be positioned adjacent arms where there is an odd number of arms. In this case, the courtyards cannot be evenly distributed between the arms. Thus two courtyards on different storeys are formed between a pair of adjacent arms. However it should be appreciated that the same principle may be applied to any of the courtyards in previous embodiments.

FIGS 13 to 16 illustrate further embodiments with two courtyards on different storeys formed between the same pair of adjacent arms.

FIG. 13 illustrates a cut away plan view of a multi storey building 130 in the form of a three pointed star according to an embodiment of the present invention. As shown in FIG. 13, arms 132 of the multi storey building 130 include apartments 20, and each arm 132 extends away from a centre 131 of the multi storey building 130. In one embodiment, the centre 131 includes a lift lobby 60, which includes stairs 40 and a lift 62. Stairs 40 are also formed in each arm 132.

Similar to previous embodiments, first and second courtyards 30A, 30B are formed between adjacent arms 132. However in this embodiment, a third courtyard 30C and a fourth courtyard 30D are located between the same pair of adjacent arms 132. The third courtyard 30C is on a same storey as the first courtyard 30A, and the fourth courtyard 30D is on a same storey as the second courtyard 30B, a number of storeys higher than the first and third courtyards 30A, 30C.

FIG. 14 illustrates a side perspective view of the multi storey building 130 of FIG. 13. As shown in FIG. 14 the courtyards 30C, 30D are repeated on upper storeys. However it should be appreciated that the same may be applied to courtyards 30A and 30B. In one embodiment, courtyard 30C' is formed five storeys directly above courtyard 30C. Courtyard 30D' is formed five storeys directly above courtyard 30D. Courtyard 30C" is formed five storeys directly above courtyard 30C', and courtyard 30 D" is formed five storeys directly above courtyard D'.

FIG. 15 illustrates a cut away plan view of a multi storey building 140 in the form of a five pointed star according to an embodiment of the present invention. As shown in FIG. 15 arms 142 of the multi storey building 140 include apartments 20, and each arm 142 extends away from a centre 141 of the multi storey building 140. In one embodiment, the centre 141 includes a lift lobby 60, which includes stairs 40 and a lift 62. Stairs 40 are also formed in each arm 142. Similar to previous embodiments, courtyards 30A, 30B, are formed between adjacent arms 142.

In this embodiment, a third courtyard 30C and a fourth courtyard 30D are located side by side between a pair of adjacent arms 142. The third courtyard 30C is on a same storey as courtyards 30A, and the fourth courtyard 30D is on a same storey as courtyards 30B and a number of storeys higher than courtyards 30A and 30C.

FIG. 16 illustrates a side perspective view of the multi storey building 140 of FIG. 15. As shown in FIG. 16 the courtyards 30A, 30C, 30D are repeated on upper storeys. However it should be appreciated that the same applies to courtyards 30B. In one embodiment, courtyard 30A' is five stories directly above courtyard 30A. Courtyard 30C' is formed five storeys directly above courtyard 30C. Courtyard 30D' is formed five storeys directly above courtyard 30D. Courtyard 30A" is formed five stories directly above courtyard 30A'. Courtyard 30C" is formed five storeys directly above courtyard 30C', and courtyard 30 D" is formed five storeys directly above courtyard D'.

Although FIGS 12 to 16 show that courtyards have been split between a single pair of adjacent arms, it should be appreciated that the courtyards may be split between any number of adjacent pairs of arms.

FIG. 17 illustrates a cut away plan view of a multi storey building 150 in an 'L' or a 'C' shape according to an embodiment of the present invention. As shown in FIG. 17, arms 152 of the multi storey building 150 include apartments 20, and each arm 152 extends away from a centre 131. In one embodiment, the centre 131 includes a lift lobby 60, which includes stairs 40 and a lift 62. Stairs 40 are also formed in each arm 152.

The embodiments shown in FIGS 4, 5, and 7-16 allow courtyards to be five storeys high by alternating the courtyards between different storeys and different sides of the multi storey building. Although embodiments have been described that allow courtyards to be five storeys high, it should be appreciated that the multi storey building may be designed to have courtyards of any suitable height. This may be achieved by varying the number of storeys over which each apartment is built.

In this embodiment, courtyard 30A extends between adjacent arms 152. Similar to the embodiment shown in FIG. 5 relating to the cross (plus) shaped multi storey building 80, the courtyard 30A is repeated on higher storeys. Similar to the embodiment shown in FIG. 5, courtyard 30A' is formed five storeys directly above courtyard 30A, and courtyard 30A" is formed five storeys directly above courtyard 30A'.

FIG. 6 demonstrated an embodiment of an apartment 20 built over two storeys. For comparison, FIG. 18 illustrates a cut away side view of a multi storey building 160 built over one and a half storeys according to another embodiment of the present invention. As shown in FIG, 18, apartments 21, 22, 23, 24 and 25 span one and a half storeys resulting in courtyards 30A, 30B, 30A' and 30B' that are three storeys high. As shown in FIG. 18, access to apartment 21 is via courtyard 30A, access to apartment 22 is via courtyard 30B, access to apartment 23 is via courtyard 30A', access to apartment 24 is via courtyard 30B', and access to apartment 25 is via apartment 30A".

In addition, as shown in FIG. 18, an arm 162 includes a first column 162A and a second column 162B. In one embodiment, the first column is vertically offset from the second column 162B by half a storey, in order to form apartments over one and a half storeys.

By offsetting the first and second columns 162A, 162B, and alternating access to an apartment 21, 22, 23, 24, 25 between different sides of the multi storey building 160 results in sky courts that are three storeys high. This arrangement has the advantage in that it is possible to design a smaller apartment such that a pair of apartments share one and a half floors instead of three floors as in FIG. 3. Another useful feature of this arrangement is that a height of a front portion adjacent the courtyard 30A, 30B, 30A' and 30B' of the pair of apartments, can be taller than a height of each floor of a rear portion.

FIGS. 19 to 22 illustrate further configurations of apartments in order to achieve a different height of a courtyard.

FIG. 19 illustrates a cut away side view of a multi storey building 170 of courtyards 30A, 30A', 30A" spanning two storeys according to an embodiment of the present invention. As shown in FIG. 19, apartments 21, 22 and 23 span two storeys resulting in courtyards 30A, 30A' and 30A" that are also two storeys high. Access to apartment 21 is via courtyard 30A, access to apartment 22 is via courtyard 30A', two storeys above courtyard 30A, and access to apartment 23 is via courtyard 30A", two storeys above courtyard 30A'. In addition, in one embodiment, a lower level 21L, 22L, 23L of each apartment 21, 22, 23 is occupied by a living and dining area, and an upper level 21U, 22U, 23U of each apartment 21, 22, 23 is occupied by bedrooms.

FIG. 20 illustrates a cut away side view of a multi storey building 180 of courtyards 30A, 30A', 30A" spanning three storeys according to an embodiment of the present invention. As shown in FIG. 20, apartments 21, 22 and 23 span three storeys resulting in courtyards 30A, 30A' and 30A" that are also three storeys high, and each of the courtyards 30A, 30A' and 30A" is on a same side of the multi storey building 180. Access to apartment 21 is via courtyard 30A, access to apartment 22 is via courtyard 30A', three storeys above courtyard 30A, and access to apartment 23 is via courtyard 30A", three storeys above courtyard 30A'. In addition, in one embodiment, each apartment 21, 22, 23 occupies some of a storey below a courtyard level and two storeys above the courtyard level.

FIG. 21 illustrates a cut away side view of a multi storey building 190 showing an embodiment with courtyards 30A, 30A', 30B spanning four storeys. As shown in FIG. 21, apartments 21, 22 and 23 each span two storeys. In addition, access to each apartment 21, 22 and 23 via a respective courtyard 30A, 30A', 30B, is alternated between sides 190A, 190B of the multi storey building 190. Access to apartment 21 is via courtyard 30A, access to apartment 22 is via courtyard 30B, two storeys above courtyard 30A, and access to apartment 23 is via courtyard 30A', two storeys above courtyard 30B, and four storeys directly above

courtyard 30A. In addition, in one embodiment, each apartment 21, 22, 23 occupies two storeys above a respective courtyard 30A, 30A', 30B.

FIG. 22 illustrates a cut away side view of a multi storey building 200 showing an embodiment of courtyards 30A, 30A', 30B spanning five storeys. As shown in FIG. 22, arm 202 of the multi storey building 200 includes a first column 202A, and a second column 202B. The columns 202A, 202B are offset by half a storey in order to achieve apartments 21, 22, 23, 24, 25, 26 that are arranged over one and a half storeys.

Access to a pair of apartments is via a same courtyard, by alternating courtyards between different sides of the multi storey building 200. In particular, access to apartments 21, 22 is via courtyard 30A, access to apartments 23, 24 is via courtyard 30B, and access to apartments 25, 26 is via courtyard 30A'. In addition and similar to the embodiment shown in FIG. 3, the courtyards are alternated between different sides of the multi storey building 200.

The layout of each apartment 21, 22, 23, 24, 25, 26 is also shown in FIG. 23. FIG. 23 illustrates a cut away perspective view of the apartments 21, 22 of FIG. 22. As shown in FIG. 23, access to each apartment 21, 22 is via a same courtyard 30A, and occupies one and a half storeys, on storeys above and below the courtyard 30A.

FIG. 24 illustrates a plan view of a multi storey building 210, and FIG. 25 illustrates a perspective view of the multi storey building 210 of FIG. 24 according to yet another embodiment of the present invention. In this embodiment, further apartments may be added to an existing multi storey building in order to create new courtyards.

The existing building is shown in the dotted line and includes apartments 20, a lobby 60 including lifts 62 and stairs 40 and other stairs 40. The existing building 210 also includes a corridor 41 allowing access to each apartment 20.

New apartments 21 may be added adjacent the corridor 41. In addition courtyards 30 may be formed which extend between the new apartments 21. Courtyards 30 can also extend to the existing apartments

20 by dispensing with some of the walls of the corridor 41 opposite the courtyards 30.

According to other forms, embodiments of the present invention reside in a method of division of a multi-storey building. The method includes forming a layout comprising two or more separate apartments at least partly on a first storey arranged around the courtyard, where the courtyard includes a communal courtyard, one or more private courtyards associated with a respective separate apartment and a side of the courtyard being open to the atmosphere.

The method includes providing on the layout access to each separate apartment from the respective private courtyard and/or the communal courtyard.

The method includes covering the first storey on the layout, at least in part, by an upper storey.

Other embodiments of the method of division of a multi-storey building include forming a layout comprising two or more separate apartments at least partly on a first storey arranged around a courtyard two or more storeys high. A side of the courtyard is open to the atmosphere and the separate apartments are accessible from the courtyard.

The method includes covering the courtyard on the layout, at least in part, by a second courtyard and providing access on the layout to the courtyard by stairs and/or lifts located on the first storey.

It will be appreciated that in some embodiments, the methods can be performed by a processor coupled to be in communication with a memory comprising computer implemented program code components which are selectively executed by the processor to perform the steps of the methods.

It will be appreciated that the aforementioned method of division will be varied according to the particular embodiment of the multi-storey building.

In summary, some advantages of at least some embodiments of the present invention include:

1) High density housing may be realised, whilst providing large outdoor courtyards and in some embodiments a private outdoor courtyard for residents of each apartment;

2) An entrance to each apartment is visible from several adjoining apartments, thus the multi-storey building is less prone to criminal activities;

3) The present invention provides areas for children to play above ground level and thus is more suitable for families;

4) In addition, the lift needs to stop at fewer floors, for example at every third floor in some embodiments, thus reducing lift waiting times and associated costs;

5) In some embodiments, the communal courtyard and circulation spaces, including any corridors and services, occupy less than about 11% of the available space. Thus sellable apartment space inclusive of the respective private courtyards is at least about 89% of the available space; and

6) The present invention improves on prior art multi storey buildings as corridors are virtually eliminated by positioning the apartments around the courtyard, linking the lifts and stairs to the courtyard, and providing access to the apartments via the courtyard rather than a corridor.

The reference to any prior art in this specification is not, and should not be taken as an acknowledgement or any form of suggestion that the prior art forms part of the common general knowledge.

The above description of various embodiments of the present invention is provided for purposes of description to one of ordinary skill in the related art. It is not intended to be exhaustive or to limit the invention to a single disclosed embodiment. As mentioned above, numerous alternatives and variations to the present invention will be apparent to those skilled in the art of the above teaching. Accordingly, while some alternative embodiments have been discussed specifically, other

embodiments will be apparent or relatively easily developed by those of ordinary skill in the art. Accordingly, this patent specification is intended to embrace all alternatives, modifications and variations of the present invention that have been discussed herein, and other embodiments that fall within the scope of the above described invention.

CLAIMS

1. A multi-storey building including:

two or more arms extending away from a centre;

two or more apartments located at least in part on a first storey of each arm; and

an elevated first courtyard extending between adjacent arms; wherein

the first courtyard is two or more storeys high;

the two or more apartments are accessible from the first courtyard; and

one side of the first courtyard is open to the atmosphere.

2. The multi storey building of claim 1 wherein the two or more arms are connected together.

3. The multi storey building of claim 1 wherein a lobby is located at a centre of the two or more arms.

4. The multi storey building of claim 1 wherein an arm of the two or more arms include a lobby.

5. The multi storey building of any preceding claim wherein the first courtyard includes a communal courtyard.

6. The multi storey building of any one of claims 1-5 wherein the first courtyard includes one or more private courtyards associated with a respective apartment of the two or more apartments.

7. The multi storey building of any preceding claim wherein the apartments are arranged over two or more storeys.

8. The multi storey building of any preceding claim wherein the two or more apartments are arranged in pairs.

9. The multi storey building of claim 8 wherein

a first apartment is accessed from a first courtyard on a first storey and includes at least part of a second storey immediately above the first storey; and

wherein a second apartment is also accessed from the first courtyard on the first storey and includes at least part of a lower storey immediately below the first storey.

10. The multi storey building of any preceding claim wherein the first courtyard is accessible from a lobby.

11. The multi storey building of any preceding claim wherein a second courtyard is located above the first courtyard.

12. The multi storey building of claim 11 wherein the first and second courtyards are connected by at least one lift.

13. The multi storey building of claim 11 wherein the first and second courtyards are connected by stairs.

14. The multi storey building of claim 1 wherein the first courtyard is located on a same storey as a second courtyard.

15. The multi storey building of claim 1 wherein the first courtyard is on a different side of the multi storey building to a second courtyard.

16. The multi storey building of claim 15 wherein the second courtyard is a plurality of storeys higher than the first courtyard.

17. The multi storey building of claim 16 wherein a third courtyard is a plurality of storeys above the second courtyard, and the third courtyard is directly above the first courtyard.

18. The multi storey building of claim 1 wherein the first courtyard and a second courtyard are located side by side between a pair of adjacent arms wherein the second courtyard is on a higher storey than the first courtyard.

19. The multi storey building of claim 1 wherein a second courtyard on a same storey as the first courtyard is accessible from the first courtyard.

20. A method of division of a multi-storey building, the method including:

forming a layout comprising two or more arms extending away from a centre of the multi storey building;

forming two or more apartments located at least in part on a first storey of each arm; and

forming an elevated first courtyard extending between adjacent arms; wherein

the first courtyard is two or more storeys high;

two or more apartments are accessible from the first courtyard; and

one side of the first courtyard is open to the atmosphere.

21. The method of claim 20, wherein the method is performed by a processor coupled to a memory comprising computer implemented program code components which are selectively executed by the processor to perform the steps of the method.

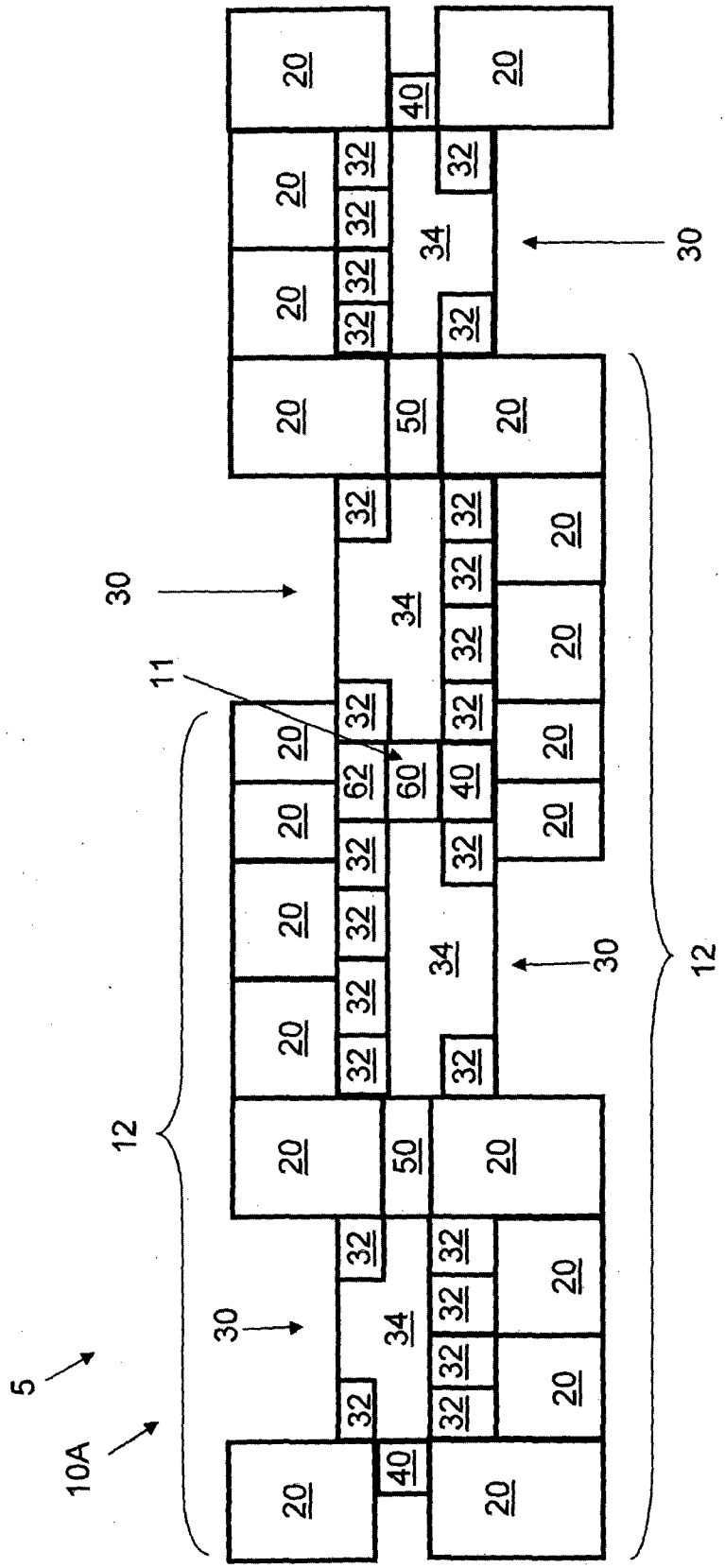


FIG. 1

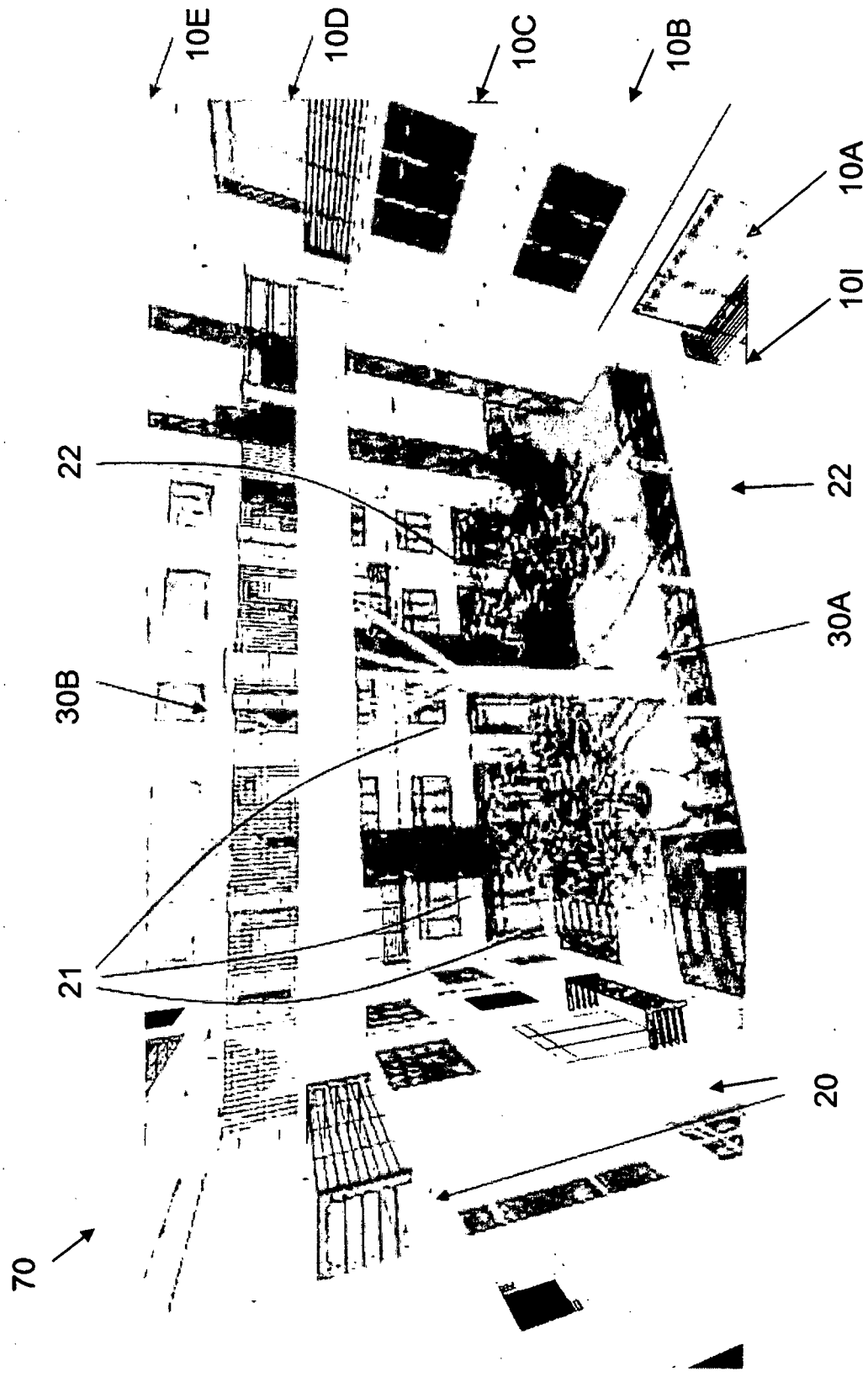


FIG. 2

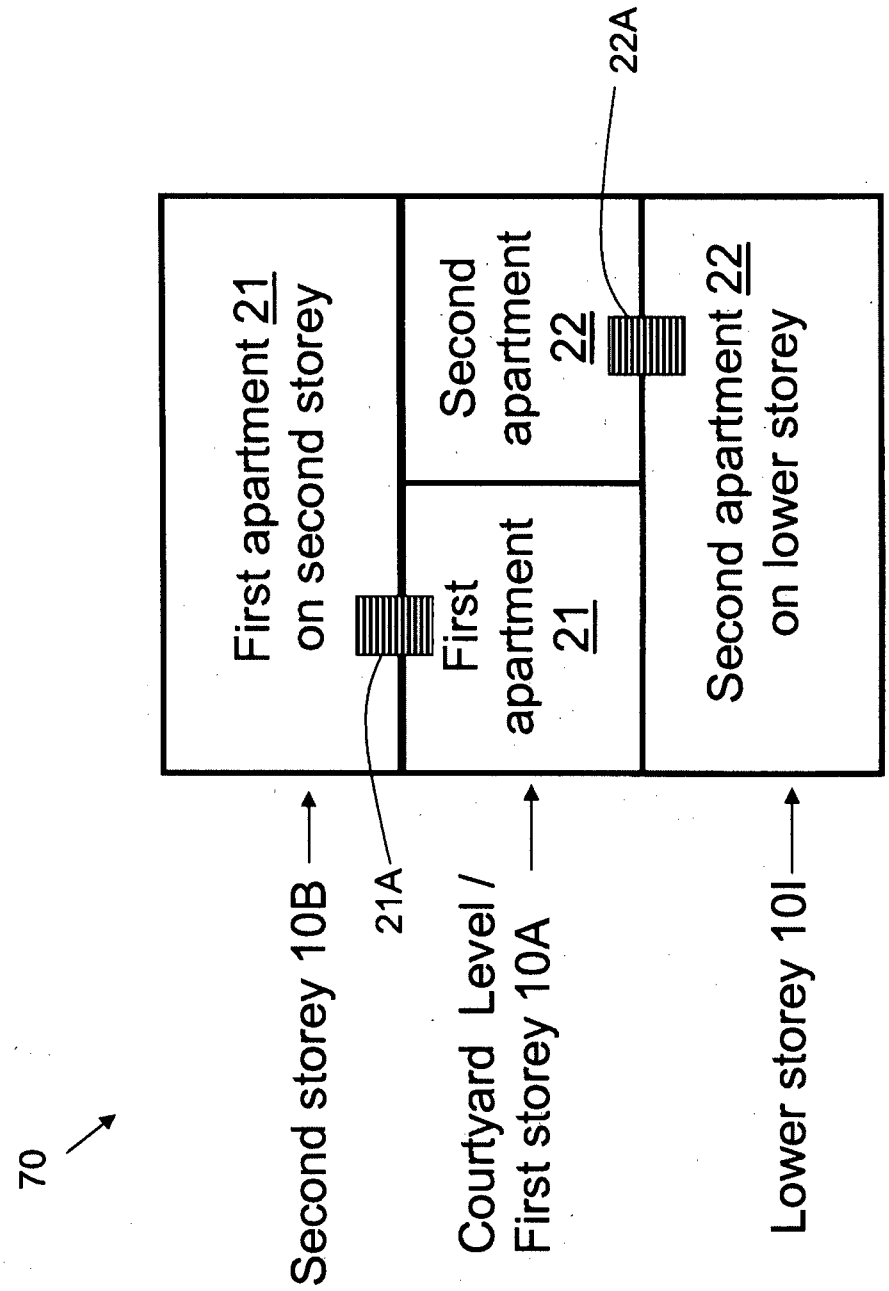

70
First apartment 21 on second storey
Second apartment 22
First apartment 21
Second apartment 22 on lower storey
22A
21A
Second storey 10B
Courtyard Level / First storey 10A
Lower storey 10I

FIG. 3

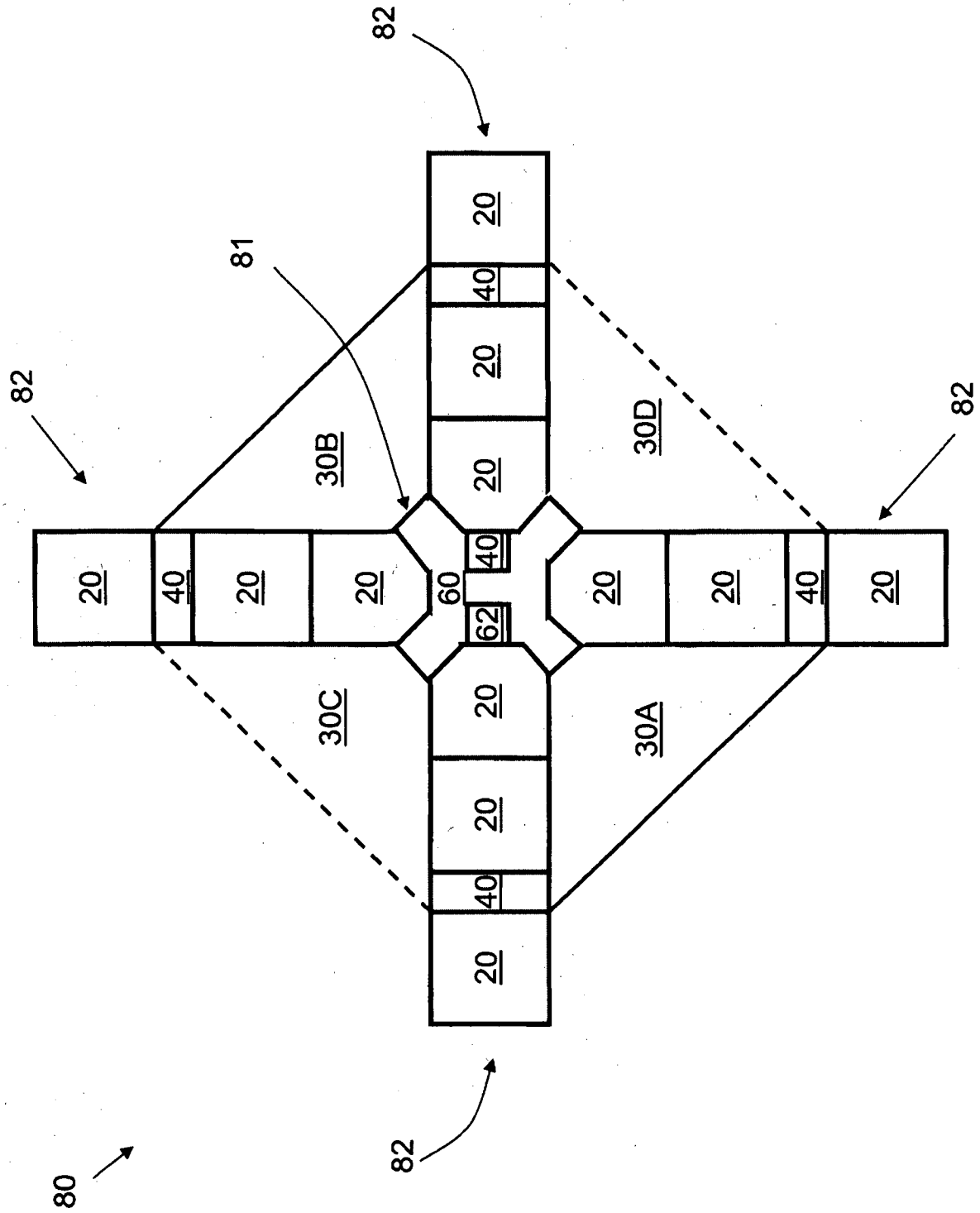


FIG. 4

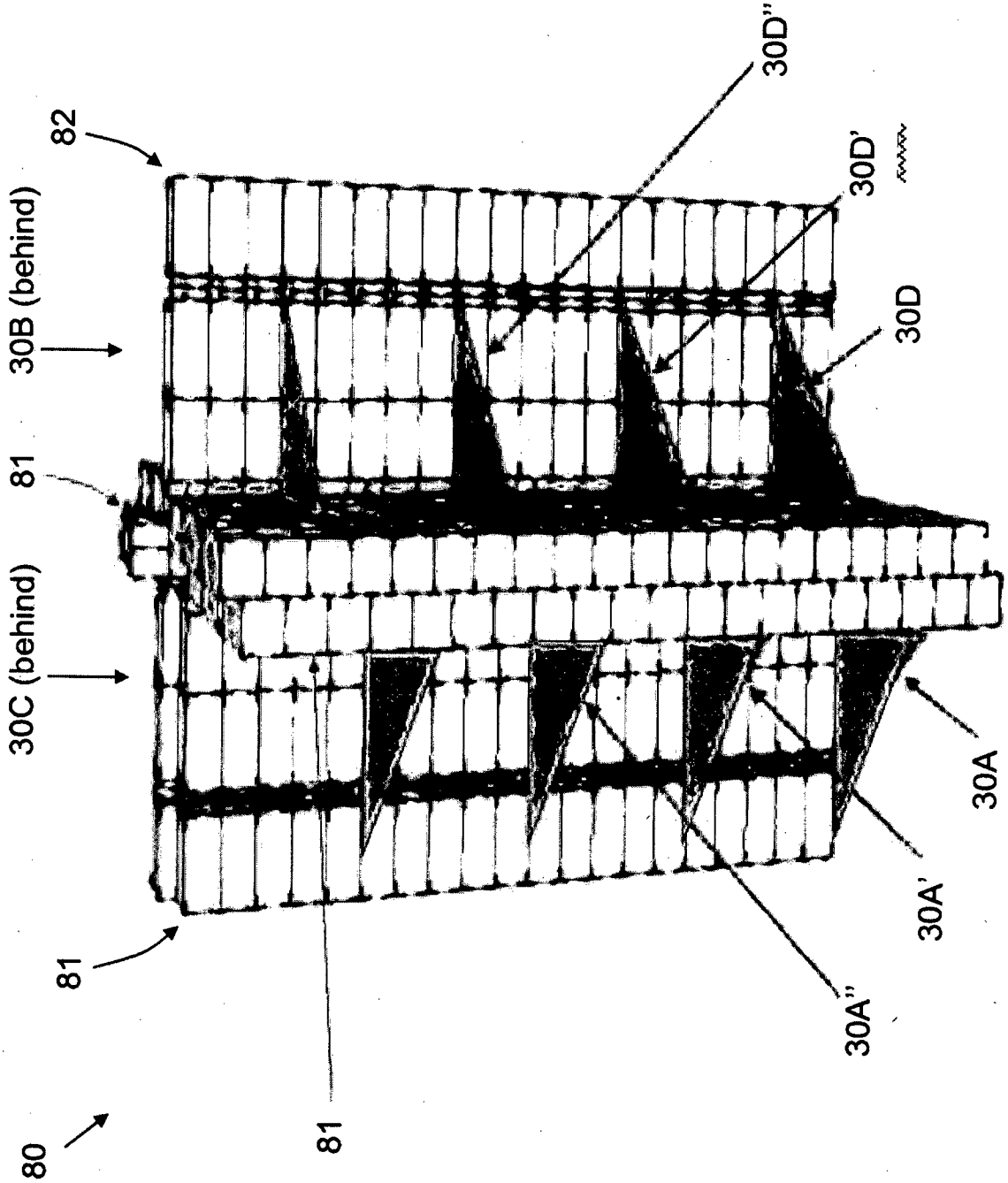


FIG. 5

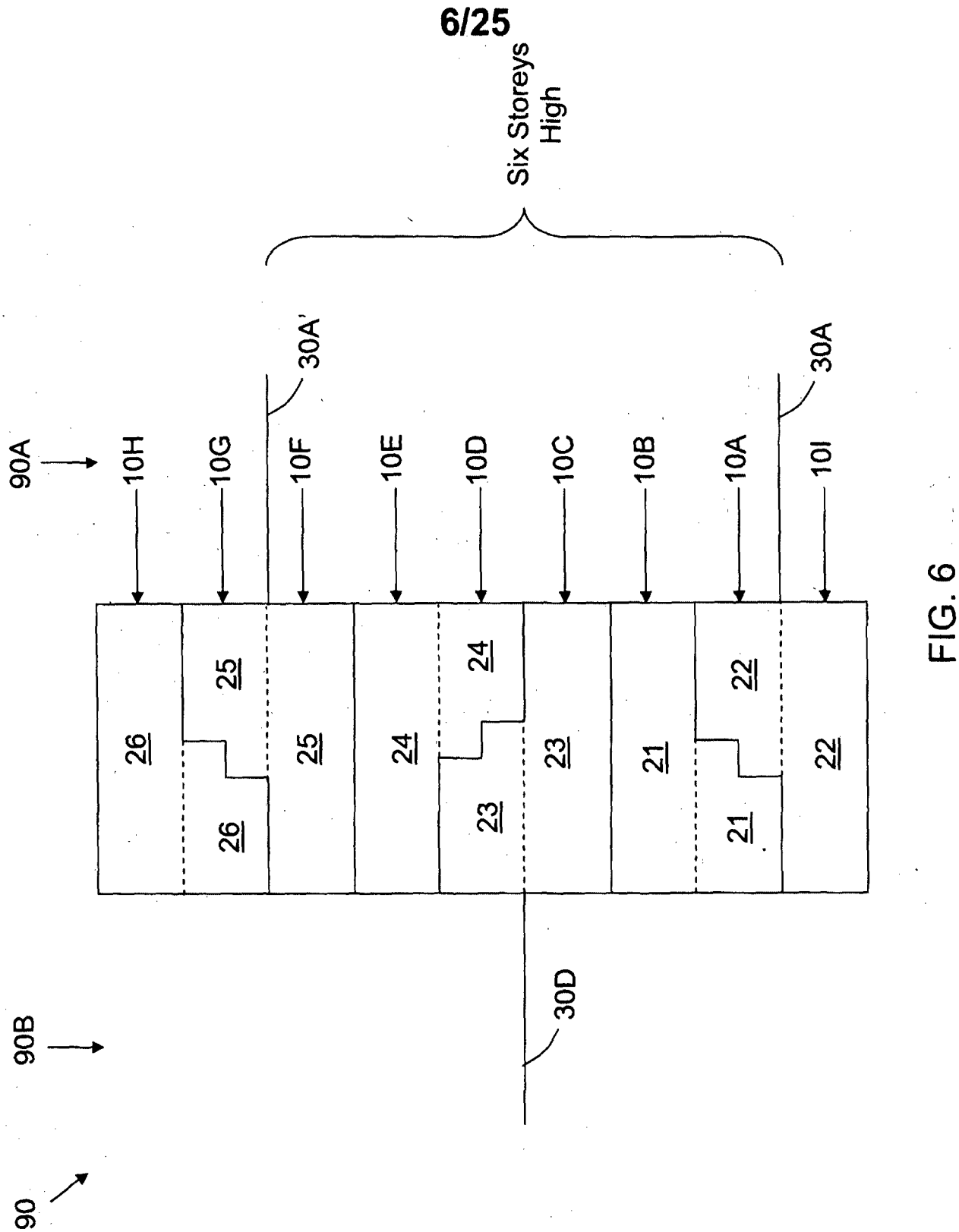

Six Storeys High
90A
90B
90
10H
10G
10F
10E
10D
10C
10B
10A
10I
30A'
30A
30D
26
25
24
23
21
22

FIG. 6

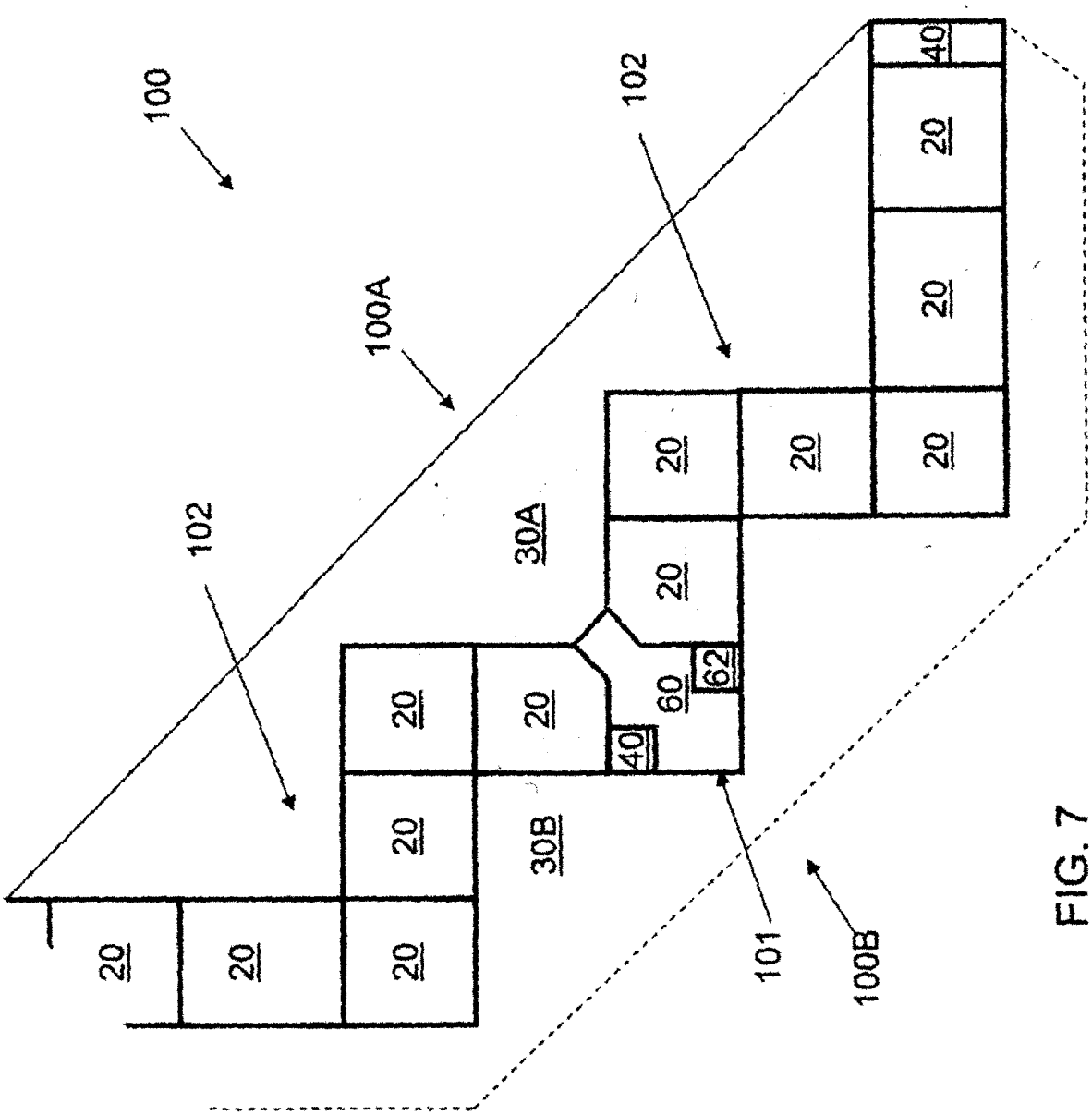


FIG. 7

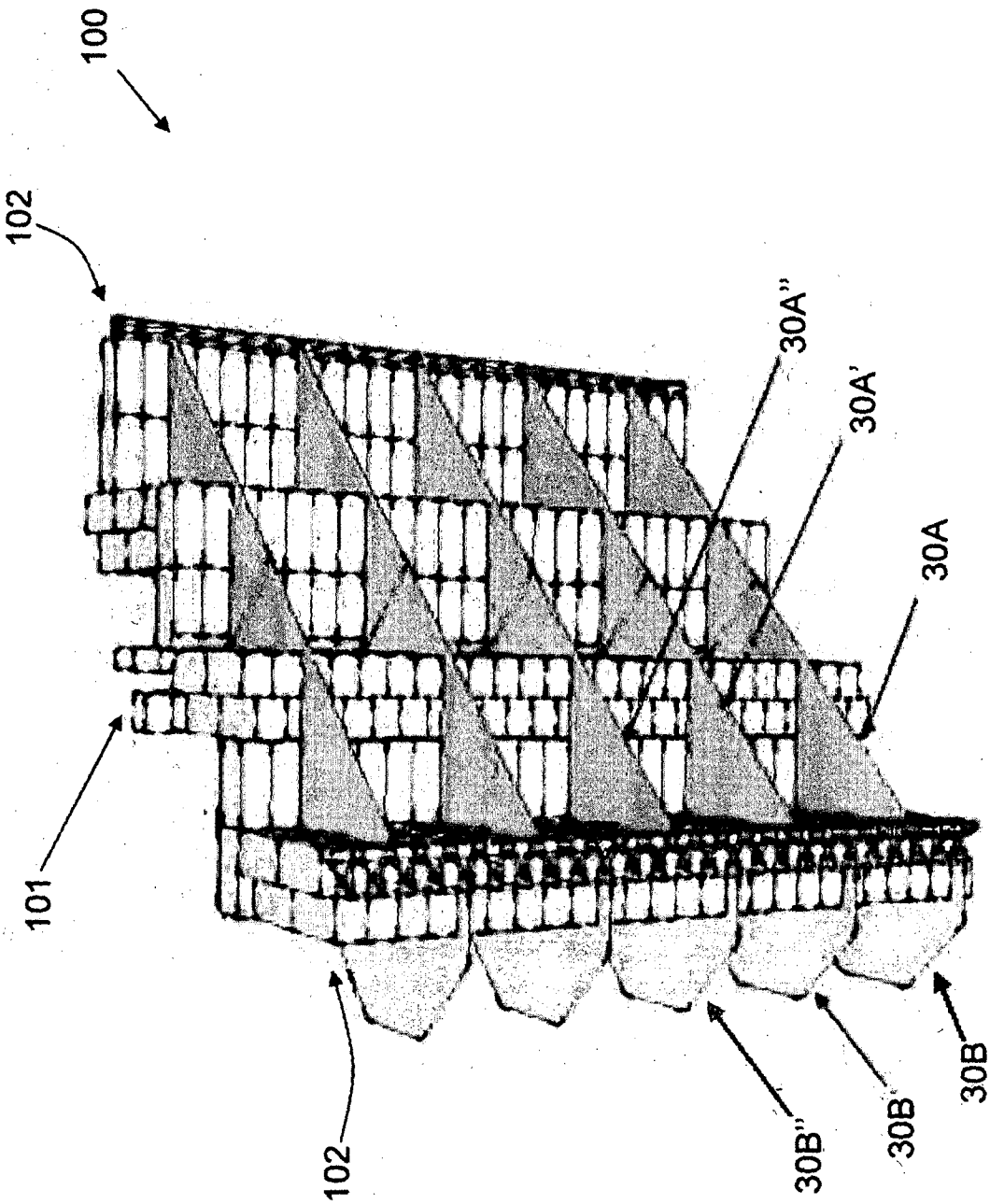


FIG. 8

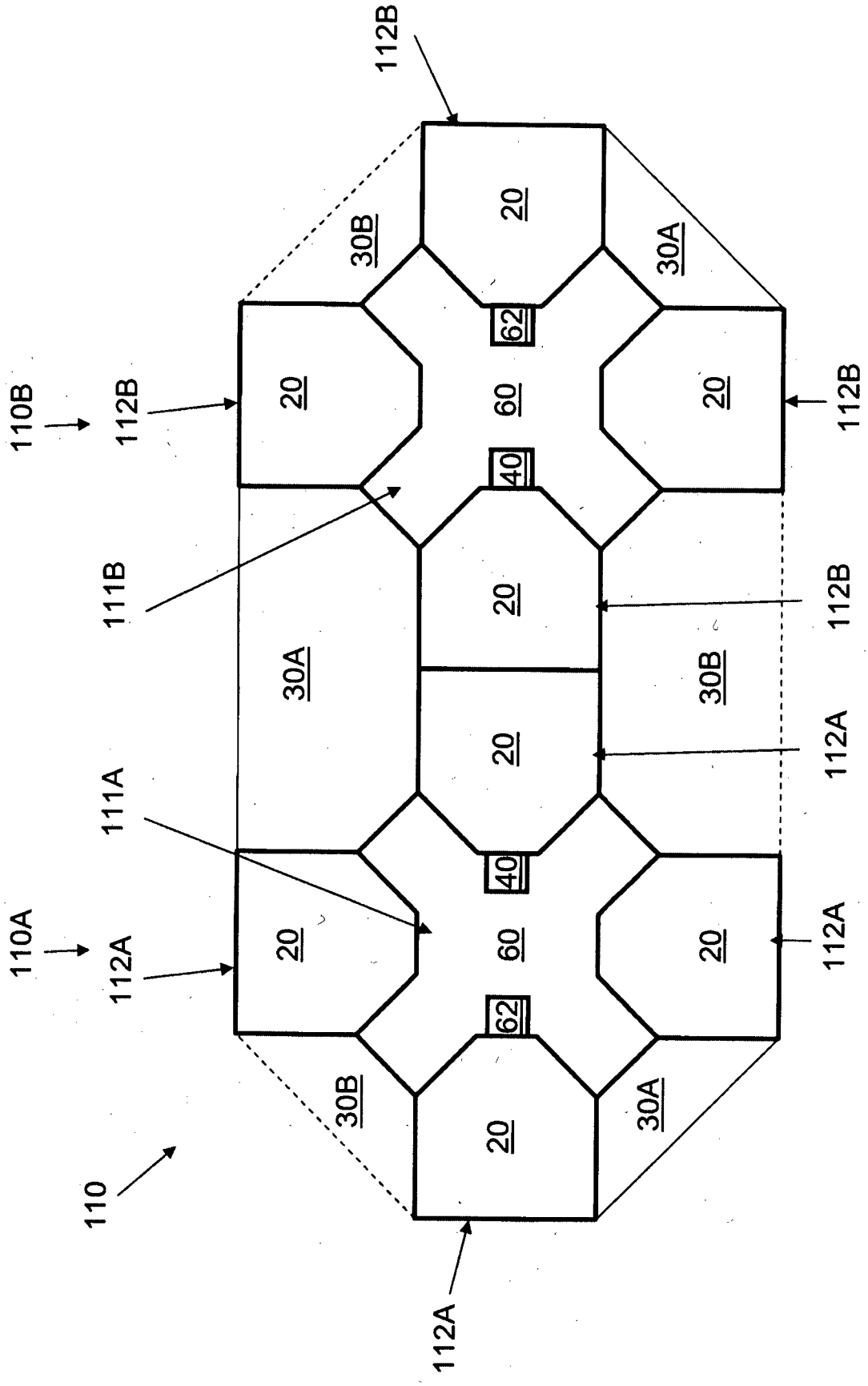

112B
20
30B
30A
62
110B
112B
20
60
20
112B
40
111B
20
112B
30A
30B
20
112A
111A
40
110A
112A
20
60
20
112A
62
30B
30A
20
110
112A

FIG. 9

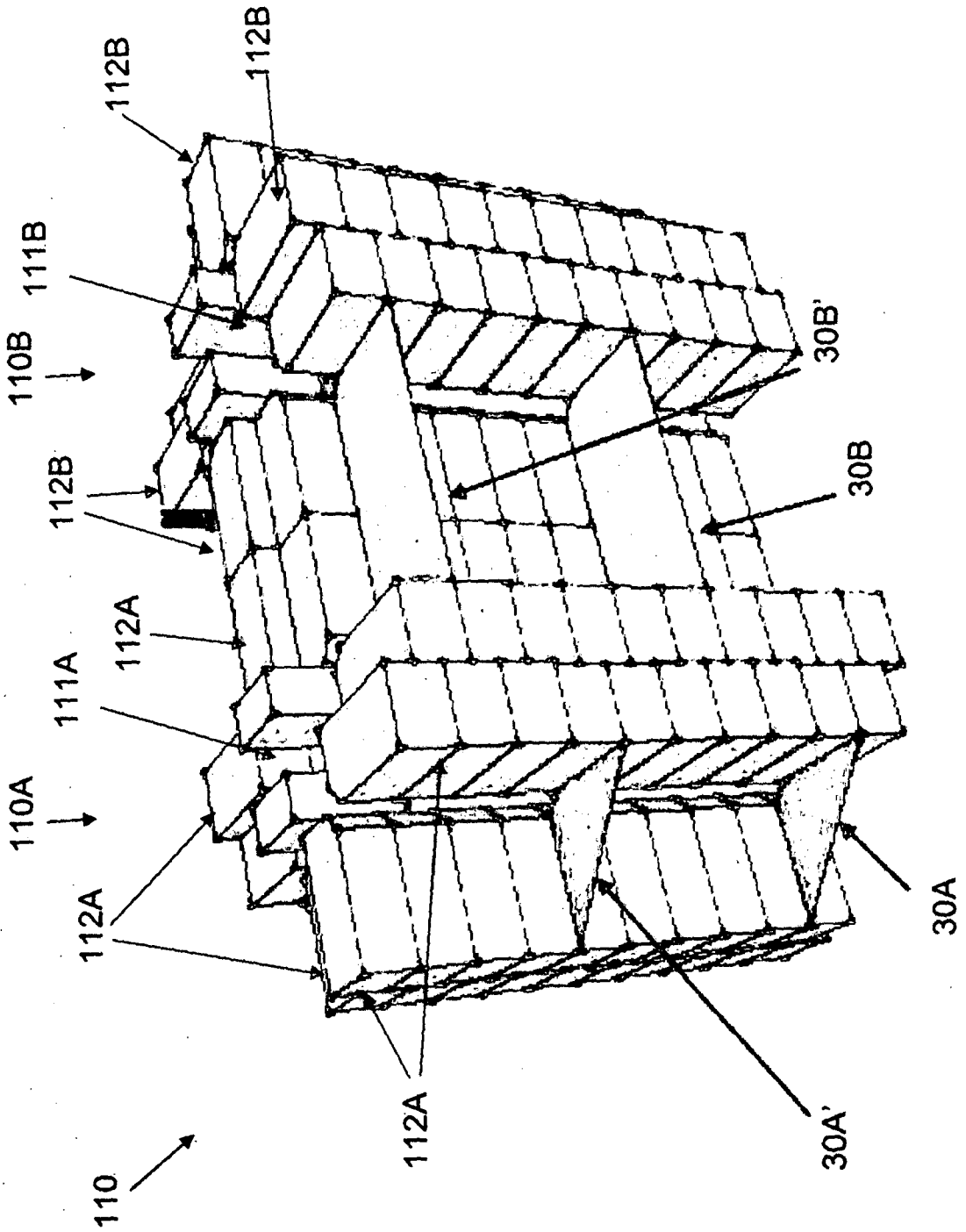

112B
112B
111B
110B
112B
112A
111A
110A
112A
110
112A
30A'
30A
30B
30B'

FIG. 10

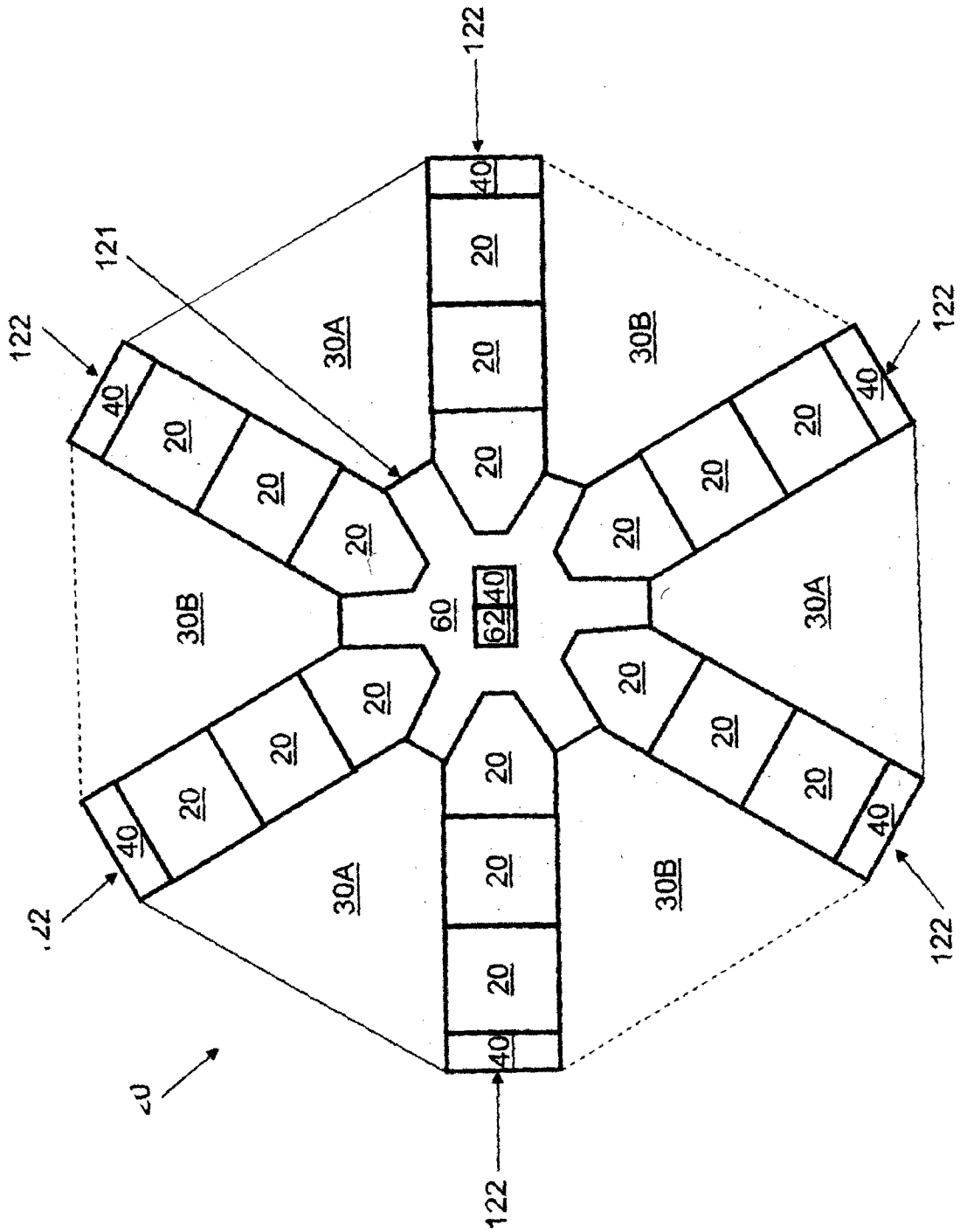


FIG. 11

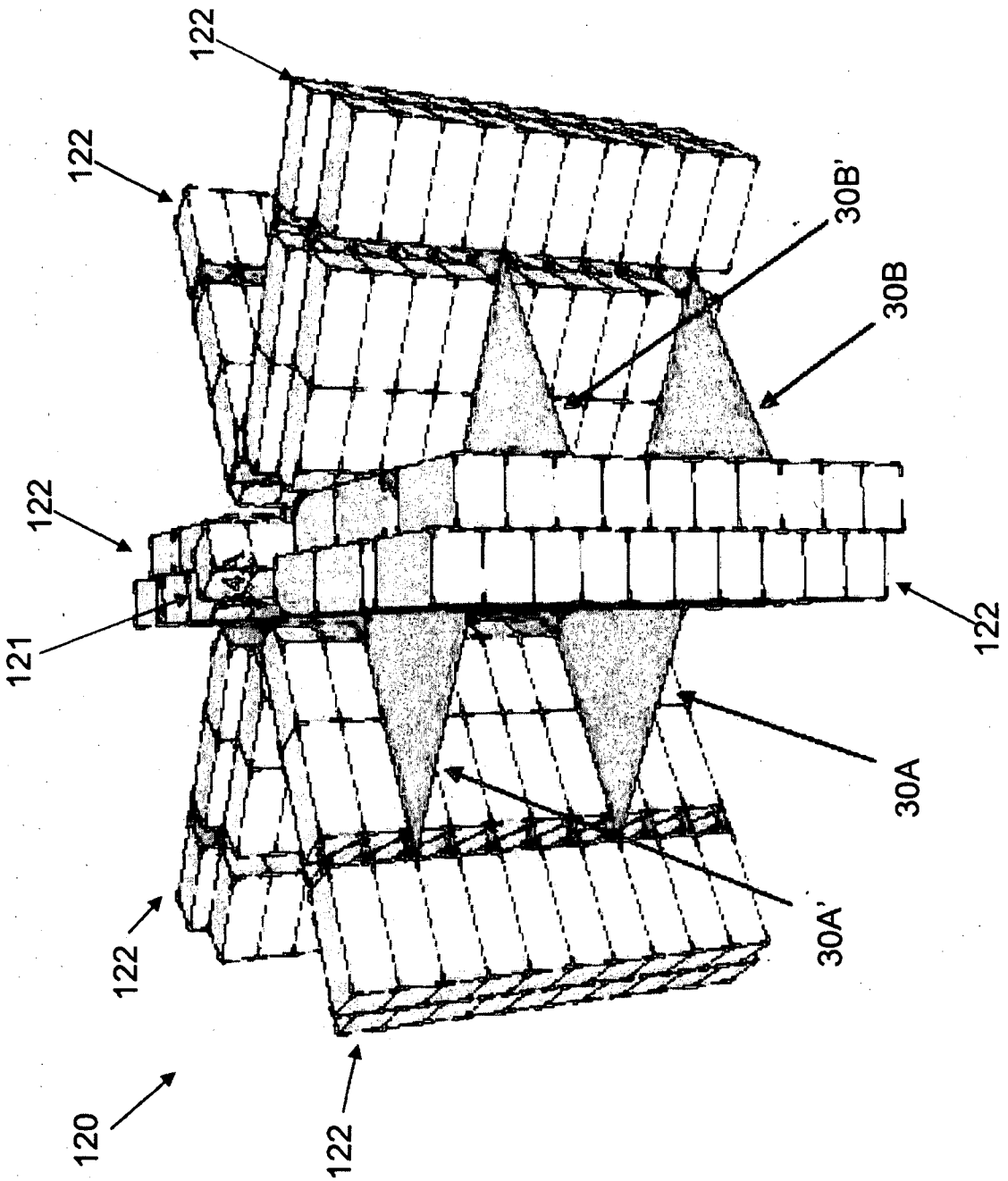


FIG. 12

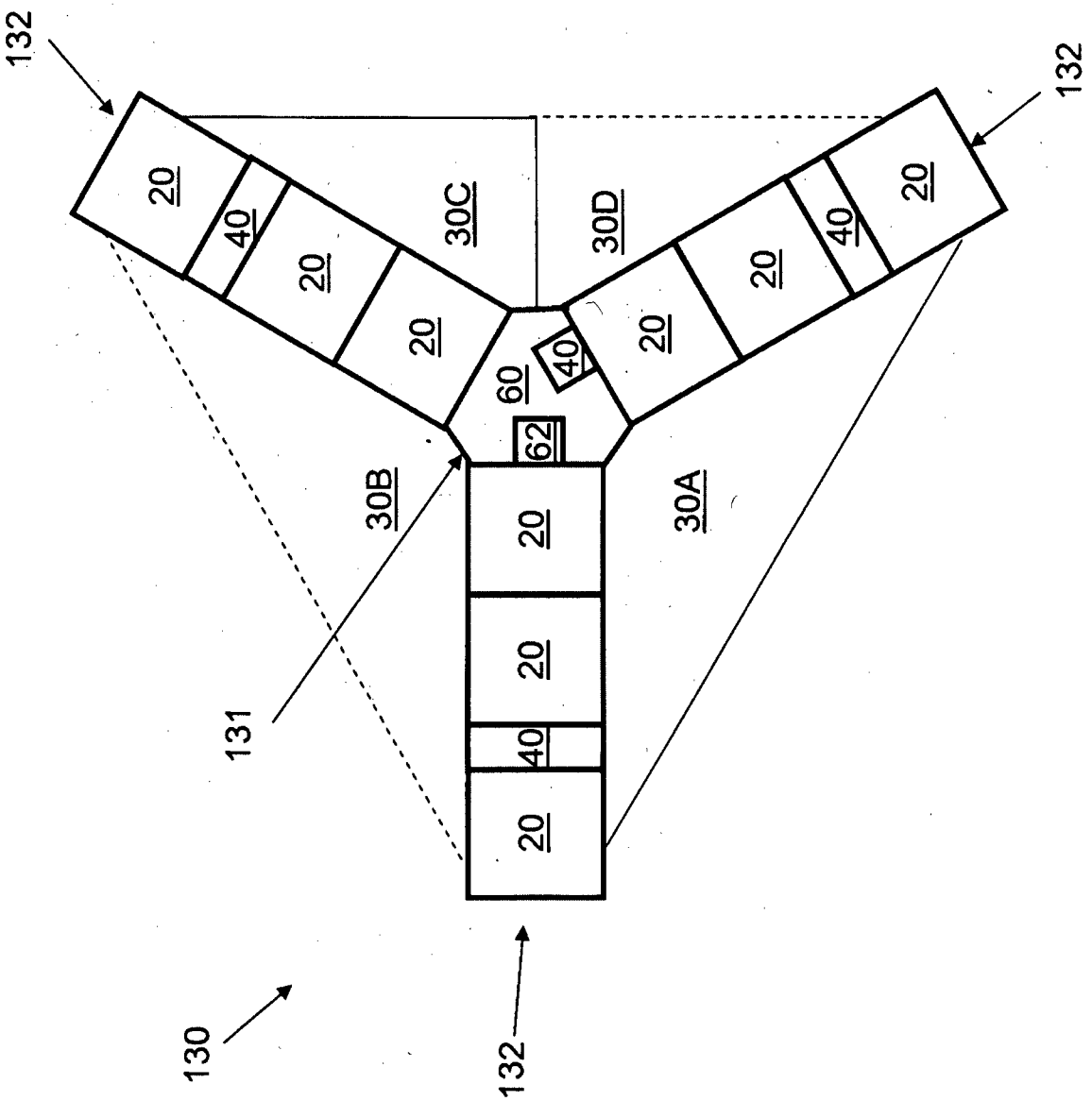

132
132
20
40
20
20
30C
30D
20
40
20
20
60
40
62
30B
30A
20
20
40
20
131
130
132

FIG. 13

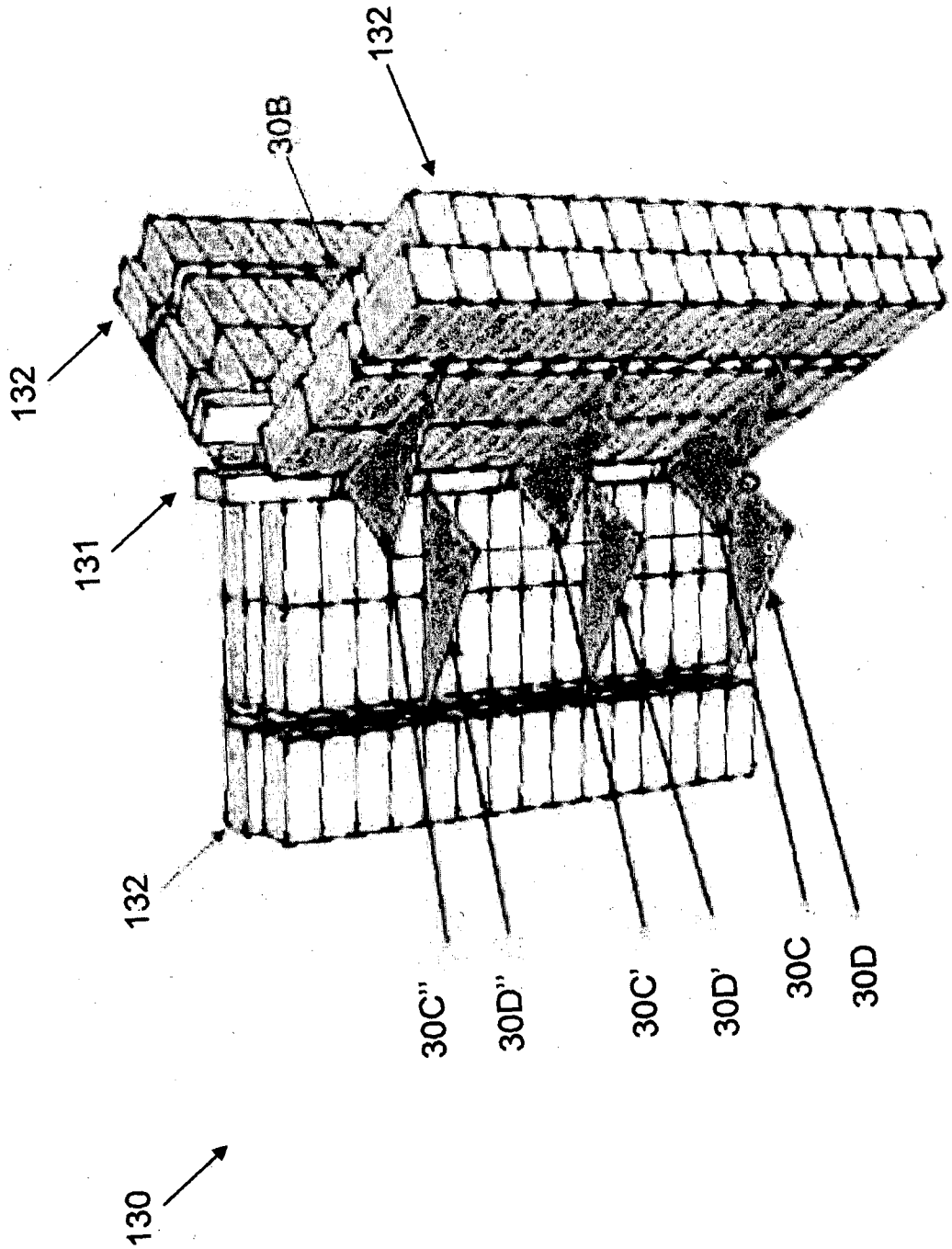


FIG. 14

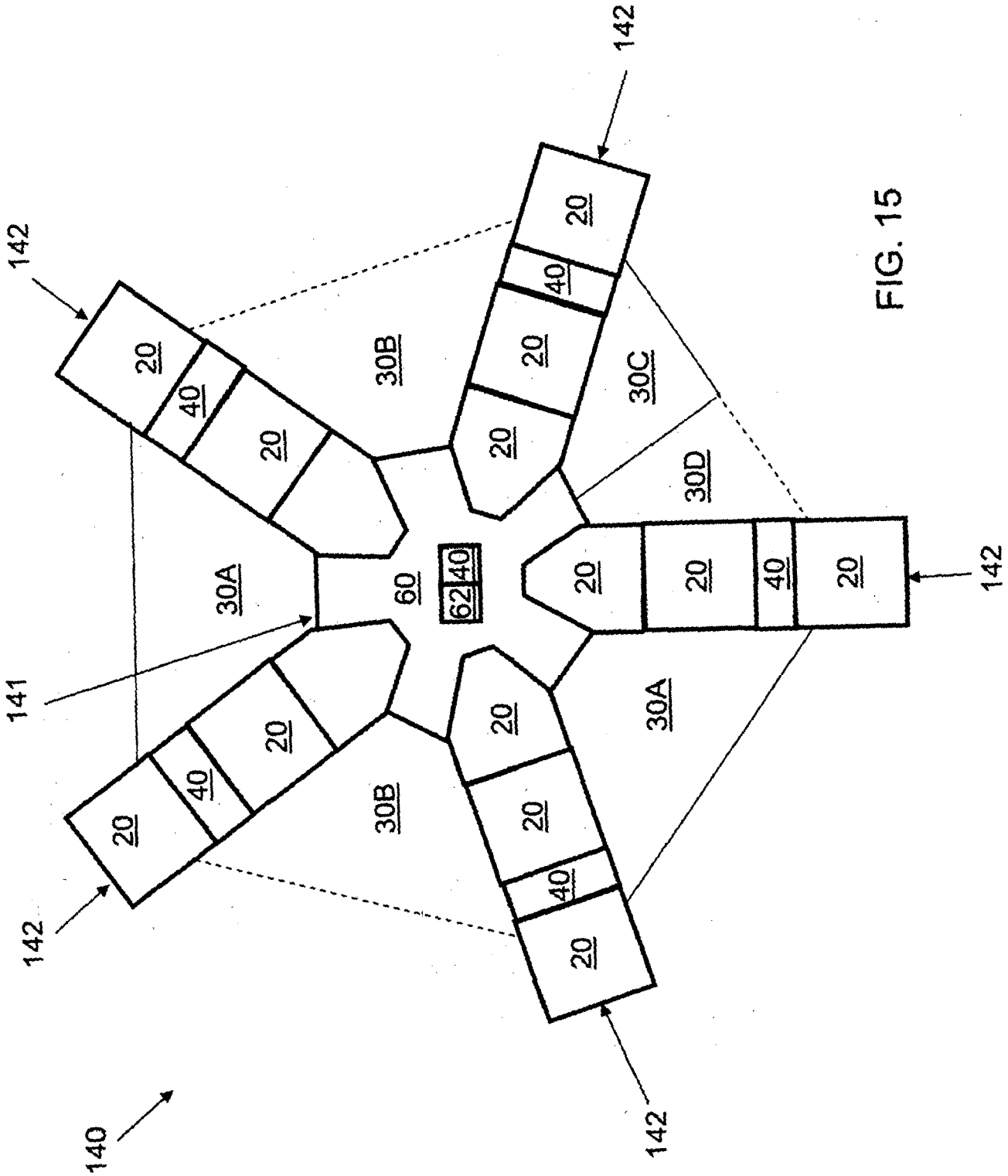


FIG. 15

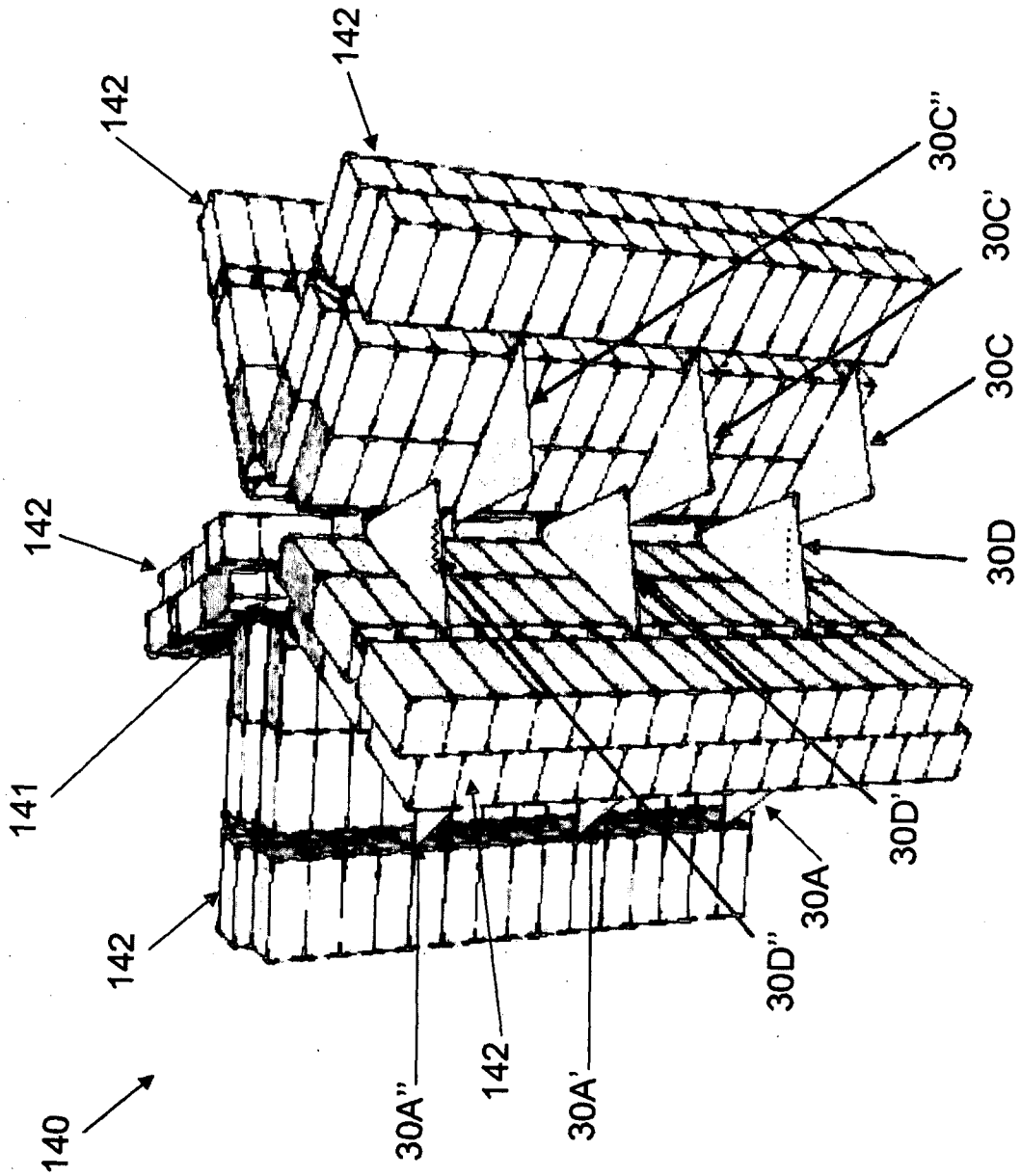


FIG. 16

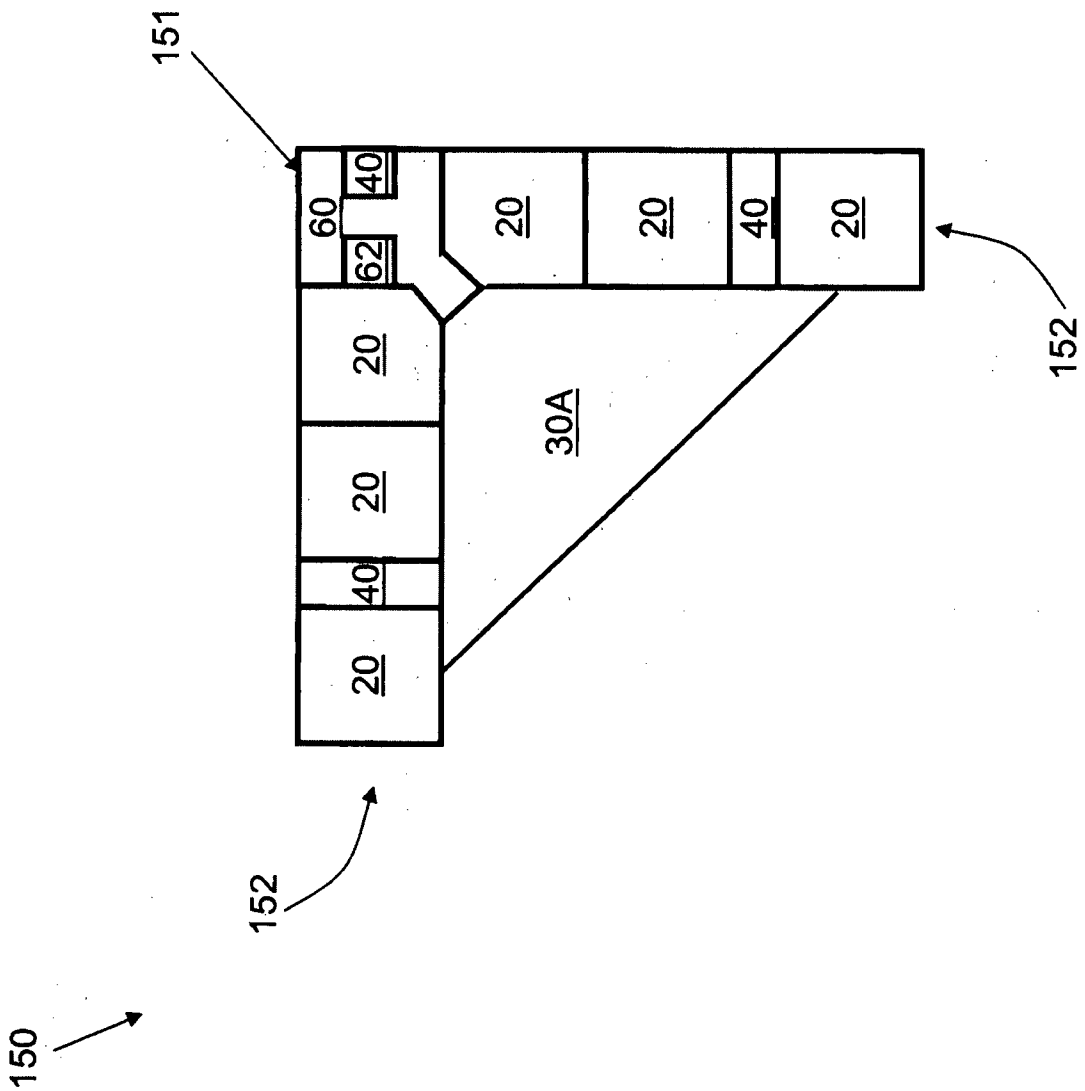


FIG. 17

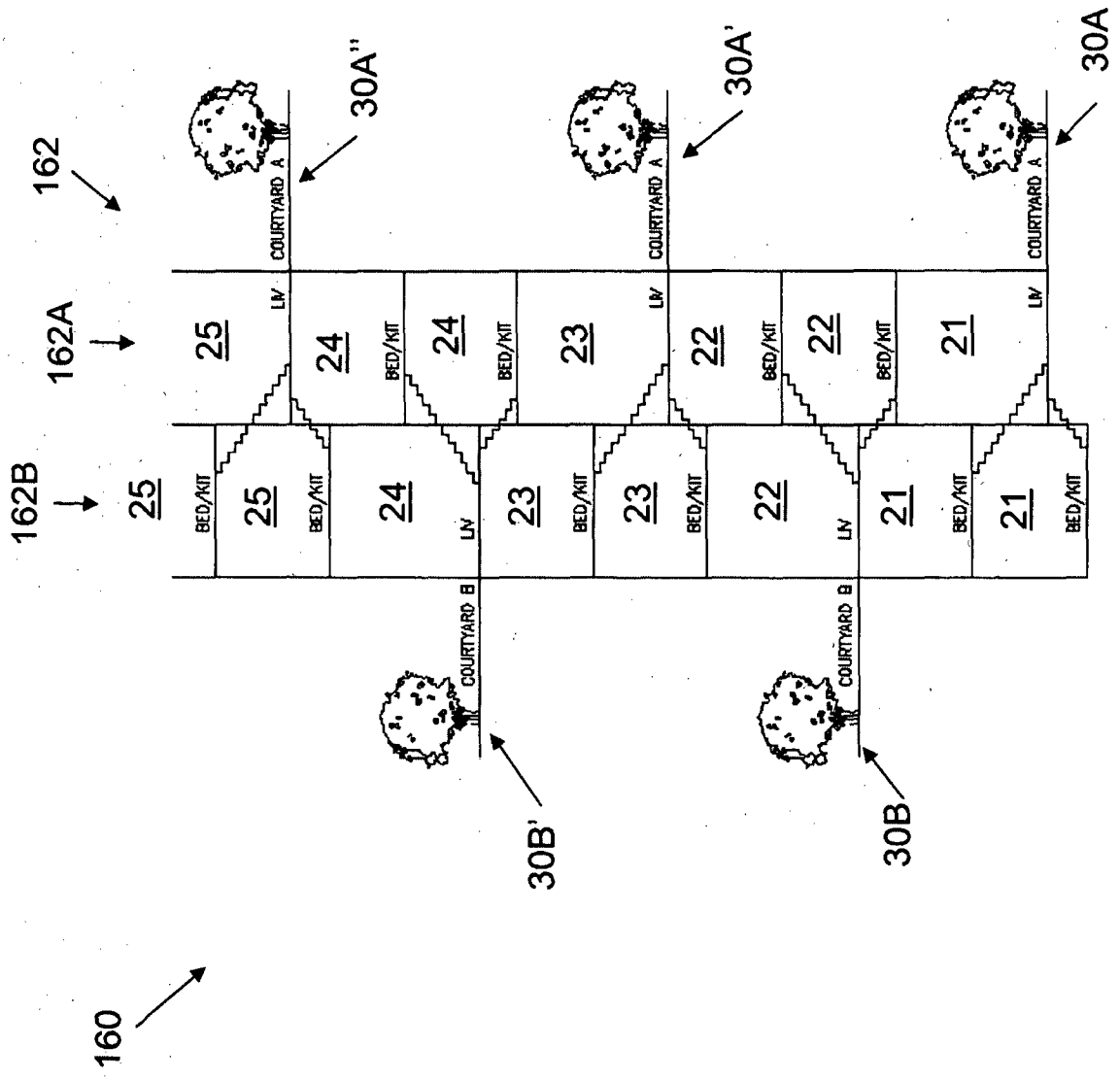

160
162
162A
162B
25
30A''
30A'
30A
30B'
30B
COURTYARD A
COURTYARD B
LIV
BED/KIT
25
24
23
22
21

FIG. 18

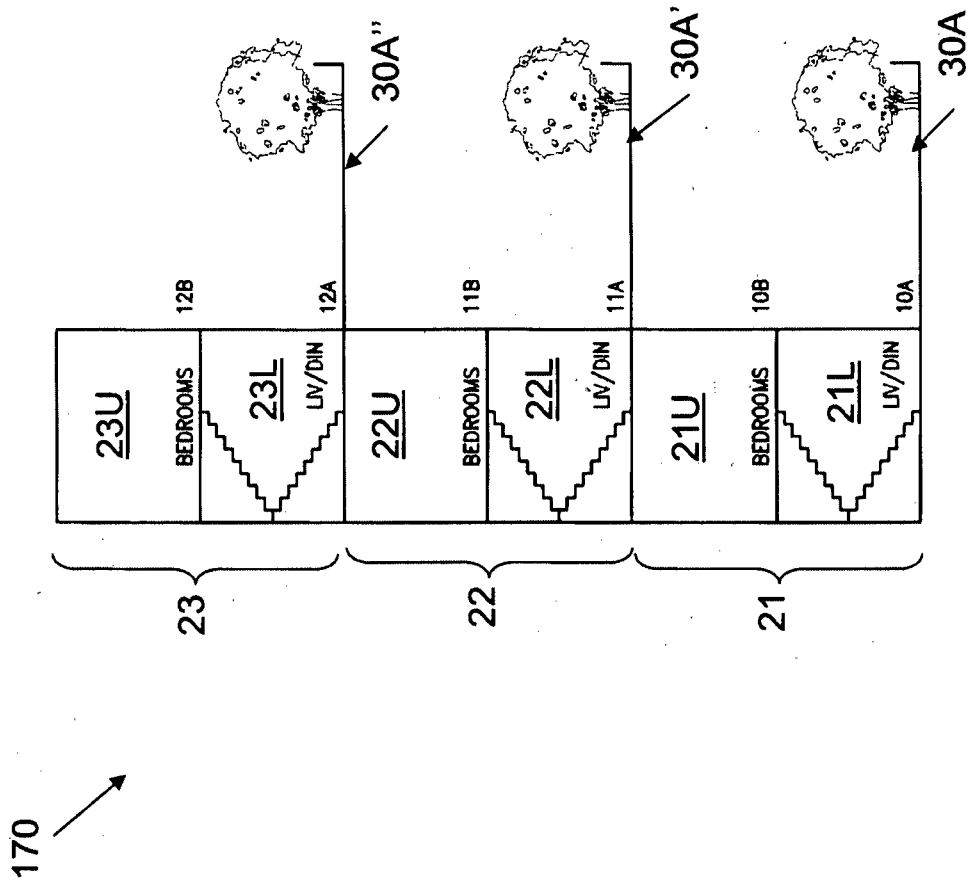

170
23
22
21
23U
BEDROOMS
23L
LIV/DIN
22U
BEDROOMS
22L
LIV/DIN
21U
BEDROOMS
21L
LIV/DIN
12B
12A
11B
11A
10B
10A
30A''
30A'
30A

FIG. 19

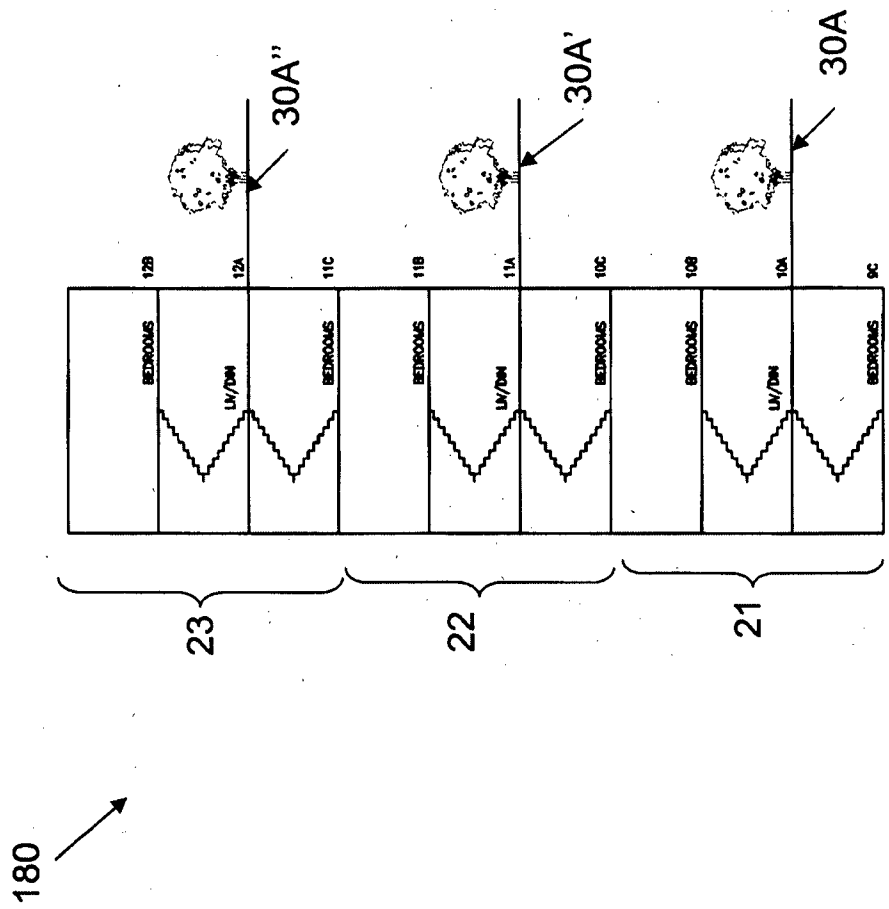

180
30A''
30A'
30A
12B
12A
11C
11B
11A
10C
10B
10A
9C
BEDROOMS
LIV/DIN
23
22
21

FIG. 20

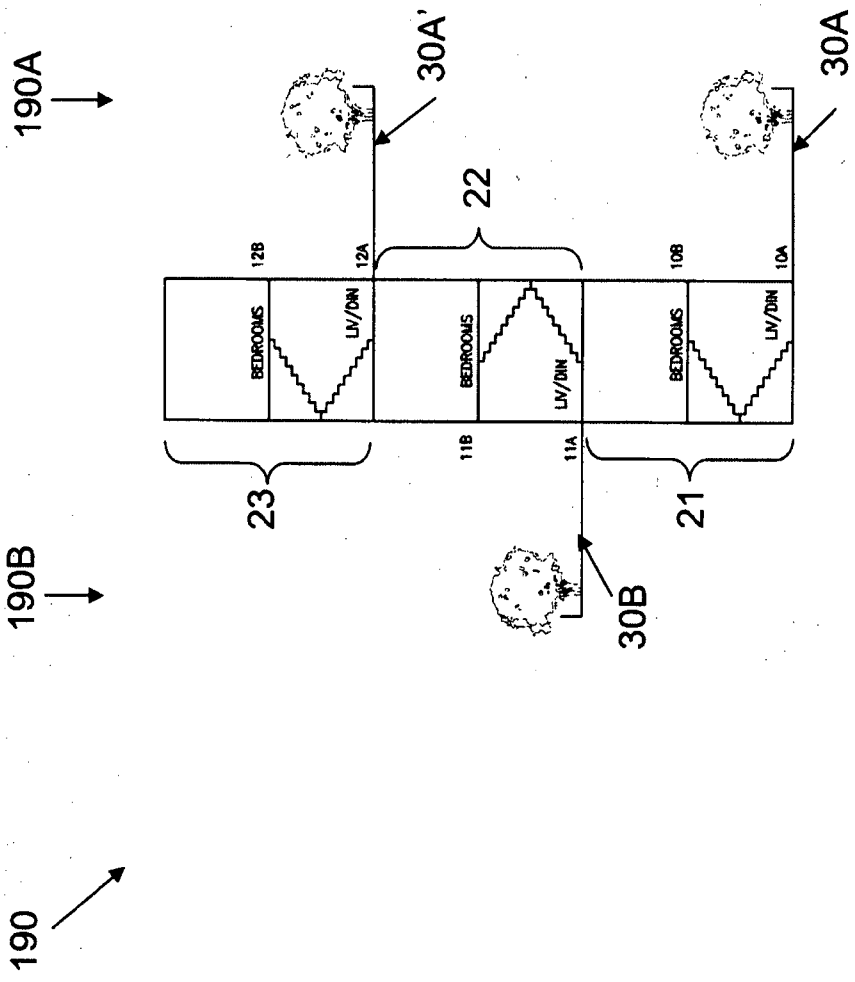

190
190A
190B
30A'
30A
30B
22
23
21
12B
12A
10B
10A
11B
11A
BEDROOMS
LIV/DIN
BEDROOMS
LIV/DIN
BEDROOMS
LIV/DIN

FIG. 21

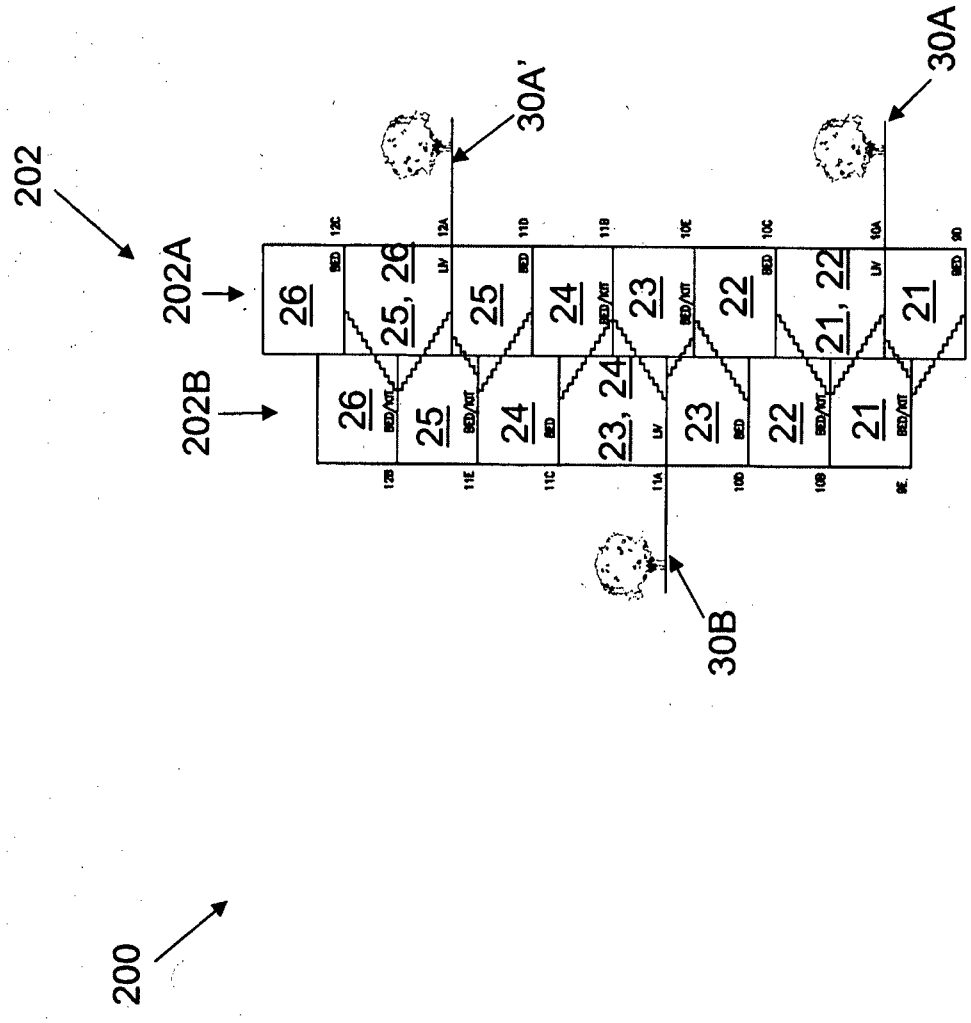


FIG. 22

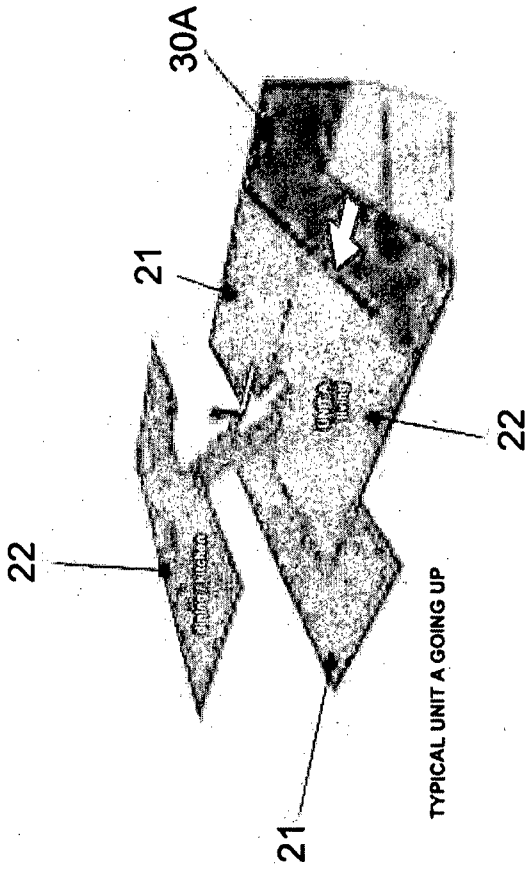


FIG. 23

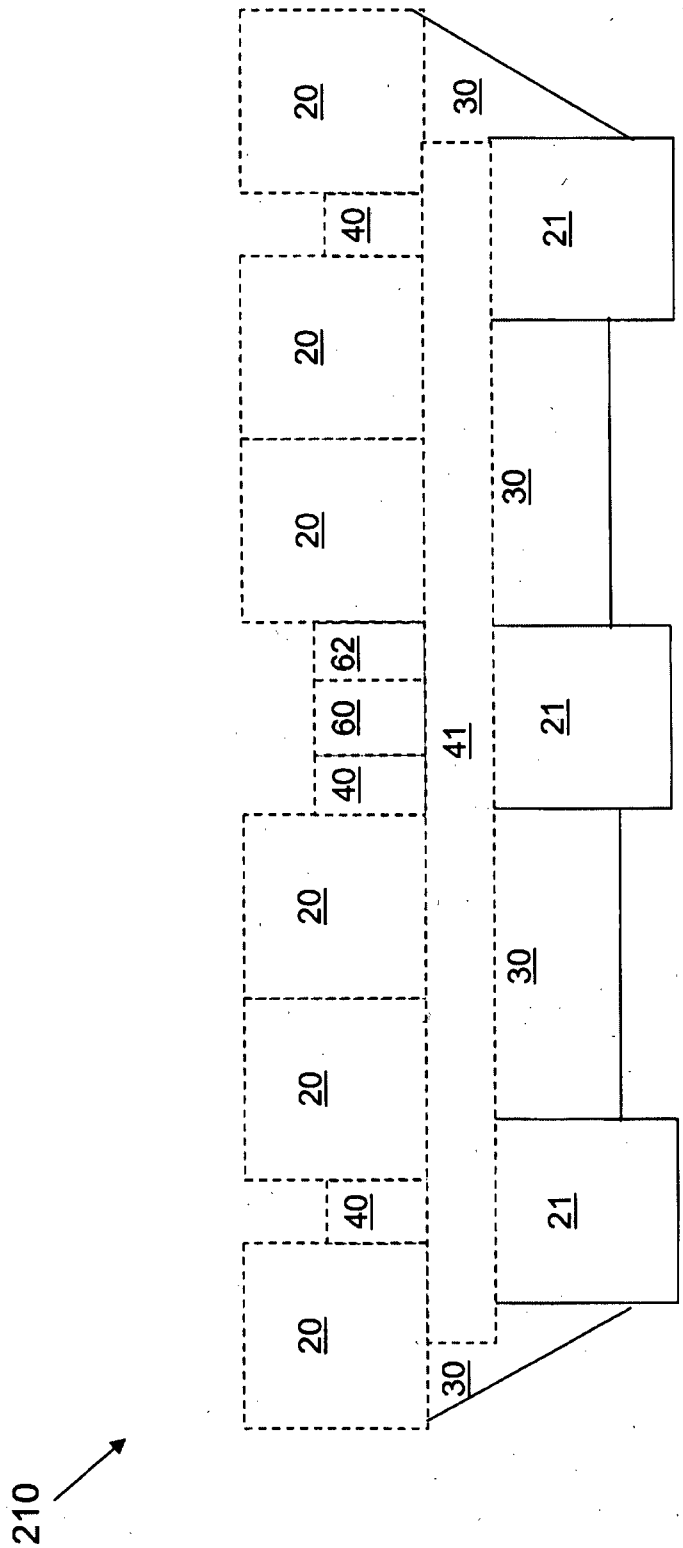


FIG. 24

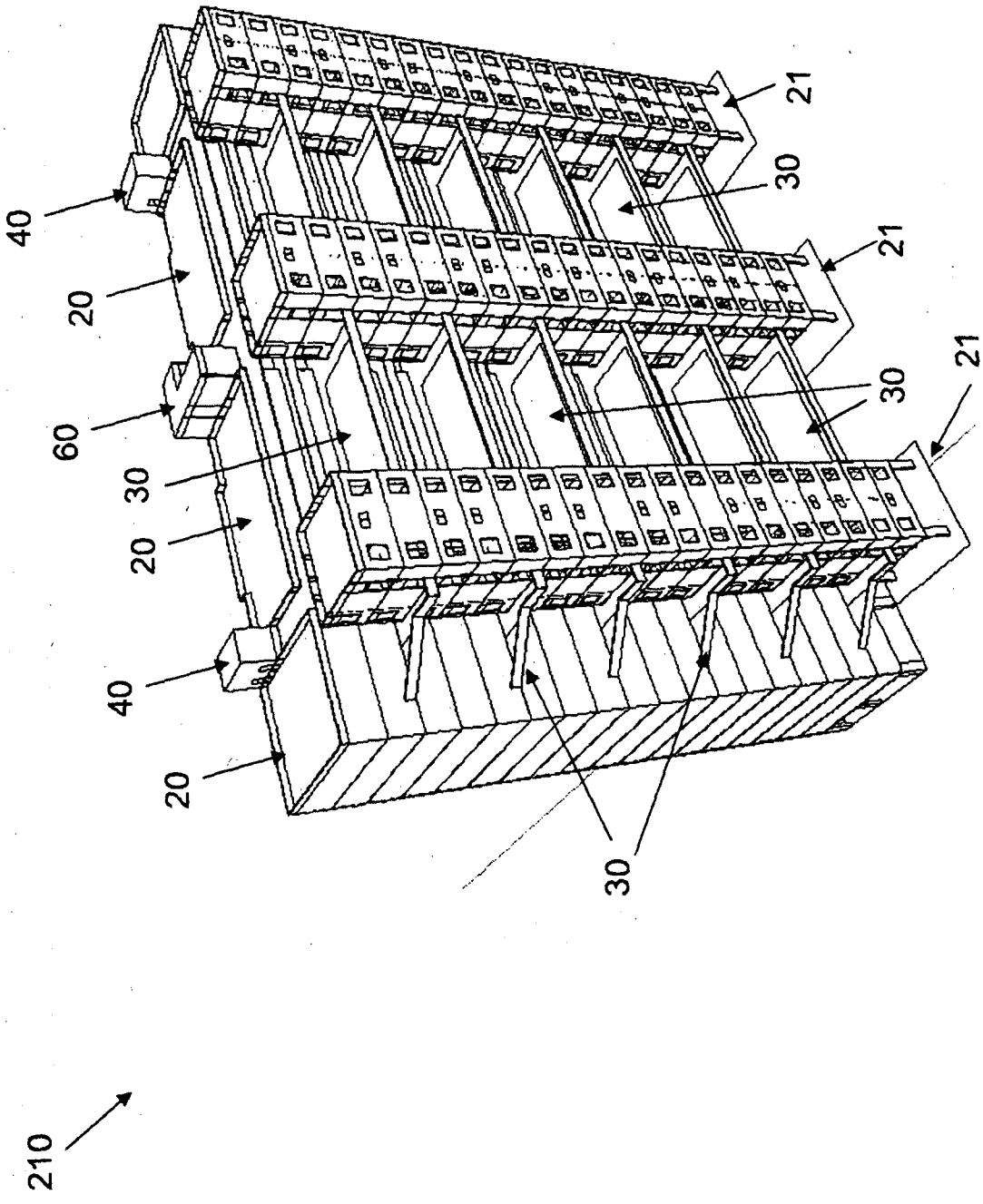


FIG. 25