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(54) **Building construction systems and methods.**

(57) Building construction systems and methods for providing multiple low cost housing units which comprise: an integral self supporting free standing separate permanently erected exterior structure including a roof, side walls, and a floor which together define an enclosure of relatively large area and volume; and a multiplicity of permanently erected interior structures fabricated separately of the walls and roof of exterior structure and being supported on the floor of the exterior structure within the confines of the walls and roof of the exterior building and being constructed and arranged in side by side relationship in at least two separate spaced parallel rows defining a mall area therebetween, and each of the individual separate interior units of each row having a outer side wall portion located in juxtaposition to a side wall portion of the exterior structure.

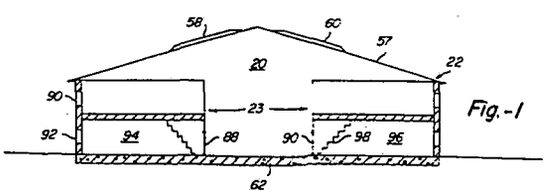

Fig.-1

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BUILDING CONSTRUCTION SYSTEMS AND METHODS

This invention generally relates to building construction systems and methods of constructing buildings. More particularly, this invention involves the general concept of use of low cost multiple individual structural units, such as hotel and motel rooms, apartments, offices or the like, within an enclosing low cost outer structure or shell comprising a concrete foundation and floor, side walls and a roof.

A continuing problem in the building construction art is the lack of low cost building constructions and methods of construction. Another continuing problem in this art is the lack of security for tenants and users of buildings. Still another continuing problem is the high cost and unavailability of energy products for heating and cooling of buildings. These problems are particularly acute with respect to multiple unit buildings. While the known prior art, as illustrated by United States Patents of Santoro 3623296, Steele 3839833, and Moore Jr. 4078343, indicates that some attempts have been made heretofore to solve some of these problems, the present invention provides a unique and more complete solution thereto.

The purpose of this invention is to solve these problems by utilizing an outer shell or enclosing unit of low cost construction to enclose individual units of low cost construction and by utilizing low cost methods of construction. In general, the presently preferred method of this invention involves initial construction of a low

cost outer shell unit of desired configuration. Then low cost individual units of desired configuration and design may be constructed and/or arranged within the outer shell unit. As a result the environment within and access to the interior of the outer shell unit may be selectively controlled. In addition, the individual units do not require the use of high cost exterior finishing materials such as siding, paint and roofing materials and the like.

The methods and construction of the present invention provide many advantages over conventional methods and construction.

The interior units are protected from wind and precipitation. Therefore the heat loss from the interior units is reduced because the interior units are protected from wind loads and resulting convection heat losses. Additionally, any heat loss from the interior unit is a heat gain to the inside of the exterior building and thus the exterior building temperature rises. This, in turn, reduces the heat loss from the interior units. If interior units are at a temperature T1 and the exterior building is at a temperature T2 when T1 is greater than T2 then heat will be lost in proportion to (T1 -T2). However, as heat is lost to T2, T2 will become larger reducing the value of (T1 -T2) and therefore reducing heat loss, i.e., heat lost from T1 is not really lost because it makes the exterior building warmer. The only real heat loss is from the exterior building to the outside environment. The same advantage applies for cooling by air conditioning. If only interior units are air conditioned and the resultant heat rejection is located outside the exterior building, the air conditioning units work against lower temperature environment, i.e., the inside of the exterior building will be cooler than the atmosphere when there is either a natural or fan recirculating system for the exterior building. The exterior building may also be designed and oriented as a solar collector. Therefore, the amount of energy required to heat the interior units can be

considerably reduced.

Construction costs are reduced because the methods and construction of the present invention enable accurate project scheduling particularly in geographic locations having short construction seasons because of weather conditions. The exterior building can be erected in very short time spans and the interior units assembled, constructed, erected and finished within the exterior building independent of weather conditions. In addition, by using a mall arrangement of the interior units, mass production methods, such as a moving assembly line technique, may be employed for fabrication and installation of the interior units with wall sections assembled on a movable platform and moved into place at the proper location, i.e., a prefabricated housing factory can be set up in the exterior building. By leaving one end of the exterior building open during construction, prefabricated units can also be brought in and simply set in place in the exterior building. In certain situations, it is contemplated that the interior units could be fabricated, temporarily weather protected, and set in place. The exterior building could then be constructed around the interior units and temporary weather protection removed. The interior units can be decoratively finished at considerably reduced cost since they are not exposed to weather. Materials normally used only in the interiors of buildings can be used on the exteriors of the interior units. This provides not only less expensive finishes but a wider variety of finishes.

The exterior building may be constructed in any conventional manner and employ any conventional materials. The presently preferred exterior building unit is a conventional structure employing prefabricated metal materials such as available from the Butler Manufacturing Company of Kansas City, Missouri and sold under the trademark Widespan. Such systems comprise a rigid frame of prefabricated metallic structural members providing a pitched roof profile.

The buildings may be constructed in a variety of widths, heights, lengths, with a variety of structural design options, including a variety of roof and wall system choices. The roof may be flat or of varied slope. The roof style presently preferred is that with a high roof slope, i.e., 4" on 12", to provide ample gable area for ventilation and overhead installation of utilities and lighting fixtures while also creating a studio ceiling effect. The basic components of this type of exterior building comprise corner columns, intermediate longitudinally spaced arch-like frames consisting of oppositely spaced vertical columns spanned by roof beams, and end wall frames mounted between the corner columns. The intermediate frames support roof structurals (purlins) and side wall structurals (girts). Columns and roof beams are made of metallic material with I shape cross-sections which may be uniform or tapered depending on the particular structural system to be used. The end wall frames are usually lighter than the intermediate frames and comprise a simple beam and post end wall frame mounted on corner columns. End wall roof beams extend between corner columns. The roof and side wall structurals are made of relatively light weight metallic material having a Z shape cross-section. The roof structurals may be single span extending between adjacent ones of the roof beams or in a continuous configuration extending the entire length of the building to support prefabricated metallic roof panels thereon. The side wall structurals are fastened to the columns of the intermediate frames, the corner columns and the end wall posts to support prefabricated metallic wall panels. The side wall structurals are available as simple stands or continuous stands. The prefabricated roof and side wall panels may be insulated and made of varying materials, such as concrete, metal, wood, of varying designs with varying factory applied color finishes. A variety of accessories are available including ventilators, light panels, gutter, gable and eave trim, and overhangs and canopies.

While the aforedescribed prefabricated metal building structure is presently generally preferred for use as the exterior building of the present invention, it is to be understood that other types of exterior building structure may be utilized. For example, the exterior building may have masonry walls with roof supporting wooden or steel girders of conventional construction, preferably prefabricated, and a shingle roof of convenional construction.

The size and shape of the exterior building may be varied as necessary or desirable depending upon the size and shape and topography of the building site as well as the number and kinds of interior units to be provided therewithin. In order to reduce construction costs and maximize utilization of the interior space of the exterior building, a polygonally shape exterior building configuration is presently considered to be most advantageous.

In one form of the invention, the exterior structure comprises at least one rectangularly shaped exterior building having relatively long, spaced, parallel, side walls and relatively short end walls. The exterior building may comprise a plurality of rectangularly shaped wing portions extending outwardly from a central connecting area. The interior units are arranged therewithin in parallel spaced rows with each row extending along one of the opposite side walls of the exterior building to provide a central elongated mall area between the rows and each interior unit has an outermost exterior side wall located in juxtaposition to the associated one of the side walls of the exterior building.

In one form of the invention, each interior unit has at least one window opening in the outermost exterior side wall portion associated with a corresponding window opening in the adjacent side wall portion of the exterior building. Each interior unit also has at least one door opening in an innermost mall side wall to enable access to and from the mall area. The individual interior units of

each row are preferably arranged in side by side abutting relationship with adjacent units having a common lateral side wall. Each row preferably comprises multiple level individual units with a common ceiling-floor structure between vertically adjacent individual units. The various level units may be directly connected to the mall area by stairways or by walkways and decks located above the floor of the mall area.

In the most economical form of construction, the concrete floor of the exterior building serves as the floor of the lower level interior units which may be covered with carpet or title. A common support joist structure is provided for conventional ceiling materials for the lower level units and for conventional floor materials of the next above interior units. The uppermost level units having a ceiling support joist structure for mounting of any conventional ceiling materials. The side walls of the interior units are of conventional vertical stud and cross brace construction. Conventional interior wall and finishing materials are utilized but no conventional exterior wall or roofing materials are required which results in substantial cost savings. The only exterior walls of the interior units which need to be finished are the mall side walls and they may be finished with less expensive materials than would be required if they were exposed to the atmosphere. The ceiling joist structure of the uppermost level interior units may be uncovered or covered by inexpensive sheet material such as plywood or plastic with or without insulation depending on climactic conditions at the building site.

Each interior unit may be provided with individual heating and/or cooling devices or central heating and/or cooling devices may be provided in common space. Electrical and plumbing lines may be located in vertical spaces along one of the walls of the interior units and connected to common lines located in space provided below the concrete floor or the mall floor. The exterior building may have

heating and cooling devices located in any suitable place such as in the space above one or more of the individual units or in a space below the concrete floor or the mall floor.

In general, any suitable construction materials and methods of construction of the interior units may be employed depending on cost decisions and design features selected by the builder or owner. The presently preferred and generally least expensive construction materials are conventional wooden building products. Thus, the wall frame construction may be of 2 x 4 inch vertical stud type construction and the ceiling-floor frame construction may be of 2 x 6 inch, 2 x 8 inch and 2 x 10 inch joist type construction. Plywood, particle board and gypsum board products may be used for walls, floors and ceilings. In the preferred method of construction, frames are prefabricated at a remote location or inside the exterior building and placed into position within the exterior building. In most cases, it will be unnecessary to fasten the interior units to the exterior building or to the concrete floor but, if it is necessary or desirable to fasten them in place, they may be fastened to the concrete floor in any conventional manner. The interior units may be free standing because they are protected by the exterior building against any lateral loads and are permanently connected to one another whereby their weight alone is sufficient to preclude lateral displacement.

The concepts of the present invention are illustrated in the accompanying drawing in which:

Fig. 1 is a schematic plan view of an illustrative embodiment of the invention;

Fig. 2 is a schematic cross-sectional view of the embodiment of Fig. 1;

Fig. 3 is a schematic front side elevational view of one wing portion of another embodiment of the invention;

Fig. 4 is a schematic end view of the embodiment

of Fig. 3;

Fig. 5 is a cross-sectional view taken along line 5-5 in Fig. 3;

Fig. 6 is a cross-sectional view taken along line 6-6 in Fig. 3;

Fig. 7 is a cross-sectional view taken along line 7-7 of Fig. 3;

Fig. 8 is a cross-sectional view taken along line 8-8 of Fig. 4;

Fig. 9 is an exterior cut-away perspective view of another illustrative embodiment of the invention;

Fig. 10 is an enlarged floor plan view of a portion of the embodiment of Fig. 9;

Fig. 11 is an enlarged plan view of one interior unit of the embodiment of Fig. 9;

Figs. 12A & 12B are an enlarged cross-sectional view of a portion of the embodiment of Fig. 9;

Fig. 13 is an enlarged interior perspective view of one illustrative form of the interior wall portion of the embodiment of Fig. 9;

Fig. 14 is a schematic cross-sectional view of another illustrative embodiment of the invention;

Fig. 15 is a floor plan of the first level of the embodiment of Fig. 14;

Fig. 16 is a floor of the second level of the embodiment of Fig. 14;

Fig. 17 is a schematic perspective view of the construction of interior units of the type of Fig. 9;

Figs. 18-21 are schematic perspective views of a method of construction of another illustrative embodiment of the invention;

Fig. 22 is an enlarged side elevational view of the embodiment of Fig. 21;

Fig. 23 is a cross-sectional view taken along line 23-23 of Fig. 22; and

Fig. 24 is a plan view of the embodiment of Fig. 21.

Referring now to Figs. 1 and 2, a permanent

building construction 20 is shown to comprise permanent exterior construction 22 of long span Butler type prefabricated steel material and a plurality of interior units 23. The exterior unit may have a plurality of wing sections 24, 26, 28 connected by a central common area 30. Each wing section comprises elongated spaced parallel side wall portions 32, 24; 36, 38; and 40, 42, respectively, connected by transverse end walls 44, 46, 48, respectively. Closable entrances 50, 52, 54 may be provided in the end walls of each section and another closable entrance 56 may be provided at the central area 30 between side wall portions 32, 26. Each of the wing sections and the central area are covered by a roof 57 of sheet material or the like. Skylights 58, 60, which may be openable and closable may be provided in the roof. A concrete slab foundation and floor 62 or the like supports the side and wall portions.

In the presently preferred method of construction of the building 20, the exterior structure is first constructed in a conventional manner by laying the foundation and floor portion 62. Then structural steel side wall and roof members (not shown) are mounted on the foundation and floor portion 62. Next the sheet steel material side walls, end walls and roof are mounted on the structural steel members. One or more of the end wall portions may be mounted at a later time to provide access to the interior of the exterior structure during construction and erection and placement of permanent interior structures therewithin as hereinafter described.

The permanent interior structures are arranged in side by side relationship in spaced parallel rows 64, 66; 68, 70 and 72, 74 along and adjacent to the side walls of the exterior structure. Each row comprises a plurality of individual separate and separately accessible individual units 76, 78, 80, etc. Each row is spaced from the opposite adjacent row by an elongated corridor or mall area 82, 84, 86 extending between the end wall portions 44, 46, 48 and the central common area 30. Each individual unit is con-

nected to the associated mall area or the central area by one or more doors 88, 90. Each individual unit is also provided with one or more windows 90, 92 located adjacent the side wall portions of the exterior structure and associated with correspondingly located windows or window openings therein which may be preformed or cut in the side wall sheet material. The individual units may be of the same or varied construction and design. For example, all or some may be apartments or rooms comprising at least sleeping, kitchen and bathroom facilities or they may be office or store or recreation or common bathroom facilities or combinations thereof. In the presently preferred embodiments, the units are multiple level as shown at 94, 96, Fig. 1. The upper and lower levels may be connected to provide multiple level individual units or separated to provide individual upper and lower individual units suitably connected to the corridors or malls by stairways 98.

Each individual unit may be provided with its own heating, laundry and utility facilities or centralized common facilities may be provided in the building in one or more of the individual units or in a basement area. In those geographic areas where it is necessary or desirable to provide additional air conditioning, a central heating and/or cooling system may be provided for the common space between the exterior structure and the individual interior units therewithin.

The use of the foregoing building construction provides a large interior space which may be completely enclosed by a low cost yet sturdy and durable exterior building of any desired design. Since the exterior unit fully protects the interior units from the elements, the interior units may be made from less costly materials and constructed by less costly methods. After the exterior unit has been erected, the interior units may be constructed within the exterior unit without interruption of construction work due to climatic and weather conditions. Working conditions may be better controlled and more efficiency obtained

than by conventional construction methods and techniques.

Referring now to Figs. 3-8, an illustrative use of the foregoing general concepts is shown in a wing section 100 of a building employing such concepts. The exterior unit 102 comprises a concrete slab floor 104 with outside footings 106, 108 and inside footings 110, 112, 114. Vertically extending structural steel I-beam type support members 116 are fastened to the footings and floor in a conventional manner. Roof span beams 118 of suitable design are fastened to and supported by support members 116. In the embodiment of Figs. 3-8, overhang roof portions 120, 122, etc. are provided by extended beam portions 124.

The roof comprises sheet metal panels 126, 128 supported by cross beams 130, 132 extending across the roof support span beams 118. Ventilation and lighting windows 134 are mounted in the overhang portions between roof panels 126, 128. Skylight window panels 136 are provided in roof panel 128 above the central interior portions of the exterior unit.

Each of the opposite parallel side wall portions 140, 142 comprises a series of horizontally extending vertically spaced wall panel members 144, 146, 148, 150 mounted on the I-beam members 116 and roof span members 118 by cross beam members 152, 154, 156, 158. Vertically extending facing panels 160, 162 cover the I-beam members 116. The panel members define inwardly extending horizontally elongated window well spaces 162, 164, 166 located between the I-beam members 116 and in front of window units 166, 168, 170 provided in the interior units as hereinafter described. The panel members further comprise vertically extending portions 172, 174, 176 on opposite sides of the window units.

The end wall portion 180 comprises vertically extending sheet metal panels 182, 184, etc. mounted on I-beam members 116 in a conventional manner. A large central access opening 186 is provided beneath a decorative overhang panel 188 to enable access to the interior of the

exterior structure during construction of the interior units and to subsequently receive glass window units 190, 192 and doors 194, 196.

The interior construction comprises spaced rows 198, 200 of three level individual apartment units 202, 204, 206 defining an elongated relatively wide corridor space 208 therebetween which has the same width as end door space 186 to facilitate interior construction and to subsequently provide a substantial size mall area between the opposite rows 198, 200. The individual units of each row have common inside and outside walls 210, 212.

A mall floor 214 is spaced above the floor 104 to provide a crawl or utility space 216 therebeneath and reduce the stair distance to the second and third floor units. Access to each apartment unit is obtained by stairways 218 inwardly offset from the mall area. Balconies 220 may be provided for the second and third floor units and decorative facades are provided including a false roof 222 at the top of the third floor units which have flat roofs spaced from the roof of the exterior structure.

Wing section 100 may be separated from an oppositely extending wing section of similar construction by a central common area portion 230 having a side entrance 232 with opposite access doors 234, 236, Figs. 3, 6 & 8. The lower units 238, 240 adjacent the central access area portion 230 may be utilized as laundry rooms, offices, commercial space or the like. Cross walks 242 may be provided as shown in Fig. 6. The inside walls 210 may include windows 242 and a decorative exterior surface finish as illustrated in Fig. 8.

Referring now to Figs. 9-13, another alternative embodiment of the invention is shown to comprise an exterior sheet metal structure 300 containing spaced rows 302, 304 of multiple level interior units 306, 308, etc., and 310, 312, etc., having a central elongated relatively wide corridor 314 therebetween to provide a common mall area.

The exterior structure comprises a concrete floor

315 and footings 316, 318, 320, etc. Prefabricated support span beam members 322, 324, 326, etc. are mounted above the footings and connected by a central cross beam member 330. Roof supporting cross beam members 332, 334, etc. are mounted on the support span beam members and support insulated double wall hollow sheet metal panel members 336, 338, etc. A skylight 340 may be provided. The side walls 342, 344 and end walls 346, 348 are provided by prefabricated double wall insulated sheet metal panels 350, 352, 354, etc. mounted on the beam frame work in a conventional manner.

Referring now to Figs. 9 & 12, the individual interior units are of conventional construction utilizing primary conventional wood material products such as lumber, plywood, gypsum board, etc. Each individual unit has an outer side wall 360 which may be a continuation of the outer side walls 362, 364 of adjacent units; an inner mall side wall 366 which may be a continuation of mall side walls 368 of adjacent units; and lateral side walls 370, 372 which are common walls of adjacent units. The outer side walls 360 are spaced from the exterior building wall panels 350, 352, 354 by a substantial air space 374 and have one or more window frame structures 376, 378 supporting interior windows 380, 382 located opposite exterior windows 384, 386 mounted on panels 350, 352, 354. Interior windows 380, 382 may be mounted in laterally offset window box or well structures as indicated to provide a window seat. The width of air space 374 is such as to accommodate the support span members 322, 324. A gap 387 is provided between window frames 376, 378 and side wall panels 350, 352, 354 to accommodate expansion and contraction of the panels. One or more windows 388 may be provided in inner mall side wall 366. An access door 389 connects each mall level unit to the mall area and stairs 390 provide access to lower and upper level units.

As shown in Fig. 12, the construction of wall 360, as well as the other walls of the interior units, comprises 2 x 4 inch studs 390 with 1/2 inch gypsum board covering

material 391. The floor of the lower level unit is the concrete slab 314 which may be covered by carpet or tile. The intermediary ceiling-floor structure 392 comprises 2 x 10 inch floor joist members 393 covered by 1/2 inch gypsum ceiling board material 394 and plywood or particle floor board material 395. The upper ceiling structure 396 comprises 2 x 8 inch ceiling joist members 397 covered interiorly by 1/2 inch gypsum ceiling board material 398 and exteriorly by any suitable low cost material such as plastic sheet, plywood, or the like or may be left uncovered. The exterior surfaces of the interior walls and the mall area floor are suitably decoratively finished with interior type materials to provide any selected type of appearance such as illustrated in Fig. 13.

Referring now to Figs. 14-16, another alternative embodiment of the invention is shown to comprise an exterior structure 400 comprising masonry side walls 402, 404 and end walls 405; conventional wooden roof supporting structural members 406, 408; a roof 410 of conventional shingle construction; and a concrete floor 412 on concrete footings 414, 415, 416, 417. Portions of the roof may be provided with a clerestory 418. The structure 400 contains spaced rows 420, 422 of multiple level interior units 424, 425, 426, 428, 429, 430, etc., having a central elongated relatively wide corridor 432 therebetween to provide a common mall area. A utility and water line space 434 may be provided beneath the concrete floor 412. Plumbing and utility lines are connected to each interior unit through vertical spaces 436, 437, etc. constructed along portions of common interior walls 438, 439 adjacent bathroom and kitchen areas. The lower level interior units 426, 430 are single level units connected directly to the mall area 432 by doors 439, 440. The upper level interior units 424, 425 and 428, 429 are two level units. Spaced decks 442 are built above the mall area as shown in Fig. 16 and connected thereto by stairs 444. Each second level unit is connected to the decks by doors 446, 447 and to the third levels by

inside stairs 448, 449. The individual interior units are constructed as previously described except that the common exterior walls 450, 452 are located against the masonry walls 402, 404. An entryway 453 is provided in end wall 405. Exterior windows 454, 456, 458, 460, etc., may be mounted in the masonry walls 402, 404 or the interior unit walls 450, 452.

Referring now to Fig. 17, the general construction of the interior units of the present invention is illustrated by reference to partially constructed adjacent multiple level interior structures 460, 461 which are of conventional wooden frame construction as previously described. Structure 460 is shown with the framing of a lower level unit 462 completed and only the interior mall side wall frame 464 of an upper level unit completed. The ceiling board 466 of the lower level unit has been mounted beneath ceiling-floor joist members 468 and some of the floor board 470 of the upper level unit has been mounted on the joist members. The framing of structure 461 has been completed to define a lower level unit 472 and an upper level unit 473. Side wall frame portions 474, 476 may be common to adjacent units 462, 474.

Referring now to Figs. 18-24, another alternative embodiment of the invention is shown to comprise an exterior structure 500 of pre-fabricated concrete construction including side walls 502, 504, made from vertically extending panels 506, 508 mounted between corner columns 510, 512, 514, 516 and supported by footings 518, 520. Cross beams 521, 522 extend between the corner columns and support concrete roof panels 523. In addition, a pair of vertical columns 524, 526 and stair well panels 528, 530 are located opposite one another. A central roof panel 532 is extended to connect with each stairwell panel. A pair of T-shape vertical walls 534, 536 are centrally located within the exterior structure as shown in Fig. 24. When the exterior structure has been constructed as illustrated in Fig. 18 opposite ends 538, 539 are left open to receive a plurality

of prefabricated modular interior units 540-547, etc. which may be of a size and shape to enable transportation by truck. Outer units 540, 542, 544, 546, etc. are constructed and arranged to be joined with inner units 541, 543, 545, 547, etc. to form individual apartments or the like as illustrated in Figs. 19 & 24. The interior units are inserted into the exterior structure, as illustrated in Fig. 20, and then the stairs and balconies 548, 549 are constructed as illustrated in Figs. 21 & 22.

As shown in Figs. 23-24, the interior units are constructed and arranged to be located in the exterior structure 500 with one side wall 550, 551 of each unit abutting a portion of one of the side walls of the exterior structure, a front wall 552 of each outer unit facing the open ends 538, 539, a side wall 554 of each inner unit spaced a substantial distance from the adjacent side wall 555 of the next adjacent unit to provide a common area 556 therebetween, and a rear wall 557 of each inner unit in substantially side by side relationship but spaced from the rear wall 558 of the next adjacent inner unit. In this manner, a mechanical and electrical chase 559 extends between the rear walls of the inner units which enables all electrical, plumbing and heating connections for all units to be made in pigtail fashion. The kitchen and bathroom areas 560, 562 are located in the inner units adjacent the inner wall 557. The construction and arrangement is such that only front wall 552 of each outer unit is a completely exterior wall requiring an exterior type finish.

In the illustrative embodiment of Figs. 18-24, eight apartment type interior structures 564 are provided by eight outer units 540 and eight inner units 541, Fig. 19. There are four lower level apartment structures, which may be supported on the ground or on a concrete floor, and four upper level apartment structures which are supported on the lower level apartment structures. The interior units may be placed in the exterior structure by any suitable construction equipment such as lift trucks, cranes, skid

devices, etc.

The foregoing embodiments of the present invention are intended to be illustrative and it is intended that the following claims be construed to include other alternative embodiments except insofar as limited by the prior art.

C L A I M S

1. A building construction system for providing multiple low cost housing units or the like comprising:

an exterior building structure being of integral free standing self supporting self contained permanent construction and having a roof and side walls with exterior surfaces exposed to the atmosphere and a foundation and a floor which define a relatively large enclosed space of relatively large area and volume protected from the atmosphere;

one or more interior building structures defining the multiple low cost housing units and being of integral free standing self supporting self contained permanent construction and located completely within said relatively large enclosed space of said exterior building structure and being completely surrounded by said roof and side walls of said exterior building structure;

each of said interior building structures being separately constructed and arranged within and relative to said roof and side walls of said exterior building structure whereby none of the exterior surfaces of said interior building structures are exposed to the atmosphere and all exterior surfaces of said interior building structures are protected from the atmosphere by said exterior building structure; and

each of said interior building structures including a plurality of relatively small enclosed housing units of relatively small area and volume and being located entirely within said relatively large enclosed space of said exterior building structure and being defined by a floor, side walls, and a ceiling.

2. The invention as defined in claim 1, and wherein:

each of said interior housing structures has its own separate heating and cooling system.

3. The invention as defined in claim 1, and which further comprises:

a heating and cooling system for heating and

cooling the interior of said exterior building structure.

4. The invention as defined in claim 1, and wherein:

each of said interior housing structures having a separate plumbing system therewithin; and

a common central plumbing system within said exterior building structure connecting each separate plumbing system of each of said interior housing structures.

5. The invention as defined in claim 1, wherein:

each of said interior housing structures having at least one side wall located next adjacent at least one side wall of a next adjacent one of said interior structures.

6. The invention as defined in claim 1, and wherein:

each of said interior structures having at least two floor levels including an upper floor level located above ground level of said integral separate exterior structure.

7. The invention as defined in claim 1, and wherein:

the roof of said integral separate exterior structure having light transmission portions.

8. The invention as defined in claim 1, and wherein each of said interior building structures further comprising:

side wall framing means of conventional construction, including laterally spaced parallel vertically extending wooden stud members and wooden cross brace members extending laterally between said stud members, for supporting wall materials thereon; and

ceiling frame means of conventional construction, including laterally spaced parallel horizontally extending wooden joist members supported by said side wall framing means and wooden cross brace members extending laterally between said joist members, for supporting ceiling materials thereon.

9. The invention as defined in claim 8, and wherein each of said interior building structures further comprising:

conventional interior wall means mounted on said side wall framing means for enclosing and defining said relatively small enclosed housing units; and

conventional interior ceiling means mounted on

said ceiling framing means for enclosing and defining said relatively small enclosed housing units.

10. The invention as defined in claim 9, and wherein each of said interior building structures being of multiple level construction and having a plurality of adjacent vertical rows of vertically spaced relatively small enclosed housing units.

11. The invention as defined in claim 10, and wherein each vertical row of said plurality of vertically spaced relatively small enclosed housing units comprises:

a lowermost relatively small enclosed housing unit with the floor thereof being a portion of the floor of the exterior building structure.

12. The invention as defined in claim 11, and wherein:

said floor of each of said plurality of vertically spaced relatively small enclosed housing units of each row located above said lowermost relatively small enclosed housing unit being mounted on the ceiling frame means of the next lower relatively small enclosed space.

13. The invention as defined in claim 12, and wherein:

said side wall frame means extends from the floor of the lowermost housing unit to the ceiling of the uppermost housing unit and is common to each of said vertically spaced relatively small enclosed housing units.

14. The invention as defined in claim 9, and wherein:

each of said interior building structures being of row construction and having a plurality of laterally spaced relatively small enclosed housing units located in side by side adjacent relationship.

15. The invention as defined in claim 14, and wherein:

each of said plurality of laterally spaced relatively small enclosed housing units located in side by side adjacent relationship have a common wall frame means therebetween.

16. The invention as defined in claim 1, and wherein:

each of the relatively small enclosed housing units having at least one side wall located adjacent one side wall of said exterior building structure.

17. The invention as defined in claim 16, and comprising:

first window means in one side wall of each of the relatively small enclosed housing units and second window means in the one side wall of said exterior building structure aligned and associated with said first window means for providing natural light to each of said relatively small enclosed housing units.

18. The invention as defined in claim 17, and wherein said interior building structures further comprising:

at least two laterally spaced parallel opposite rows of relatively small enclosed housing units having an elongated mall area therebetween;

each of the relatively small housing units of each of the two laterally spaced opposite rows having a side wall adjacent the mall area; and

door means in said side wall adjacent the mall area for providing access to each of the relatively small housing units.

19. The invention as defined in claim 16, and wherein said exterior building comprising:

at least two spaced opposite elongated side walls which are structurally disassociated from said interior building structures;

a plurality of roof support members extending laterally of and between said two spaced opposite elongated side walls and being located above and structurally disassociated from said interior building structures; and

a roof mounted on said roof support members and extending between said two spaced opposite elongated side walls and completely covering said relatively large enclosed space and said interior building structures therewithin and being structurally disassociated from said interior building structures.

20. The invention as defined in claim 19, and wherein said exterior building structure comprising:

a frame constructed essentially of prefabricated metallic structural members; and

the side walls and roof being constructed essentially of prefabricated metallic panel members.

21. The invention as defined in claim 19, and wherein said exterior building structure comprising:

side walls constructed essentially of masonry materials; and

said roof support members being mounted on said side walls.

22. The invention as defined in claim 1, and wherein:

said exterior building structure having a pair of oppositely spaced openings; and

said interior building structures comprising prefabricated units placed inside said exterior building structure through said openings.

23. The invention as defined in claim 22, and wherein said prefabricated units comprising:

outer units having an outer side wall facing said openings; and

an inner unit abutting and connected to each of said outer units to form a separate housing unit therewith.

24. The invention as defined in claim 23, and wherein said prefabricated units further comprising:

a first lower level group of separate housing units supported on the floor of said exterior building structure; and

a second upper level group of separate housing units mounted on and supported by said first lower level group of separate housing units.

25. A method of constructing multiple unit apartments or the like comprising the steps of:

constructing a separate exterior structure having at least a pair of opposite side walls and a roof defining a relatively large enclosed area on a building site; and

locating a multiplicity of interconnected interior unit apartments or the like within the relatively large enclosed area in separate spaced relationship to the separate exterior structure.

26. The method of claim 25, and further comprising the step of:

separately fabricating the interior unit apartments within the separate exterior structure at the building site.

27. The method of claim 26, and further comprising the steps of:

separately pre-fabricating the interior unit apartments or the like at a location other than the building site;

transporting the interior apartment units to the building site; and

inserting the interior unit apartments into the separate exterior structure at the building site.

28. The method of claim 27, and further comprising the steps of:

inserting a first group of lower level apartment units or the like into the separate exterior structure and supporting the first group of lower level apartment units or the like on the floor of the separate exterior structure; and

then inserting a second group of upper level apartment units or the like into the separate exterior structure and supporting the second group of upper level apartment units or the like on the first group of lower level apartment units or the like.

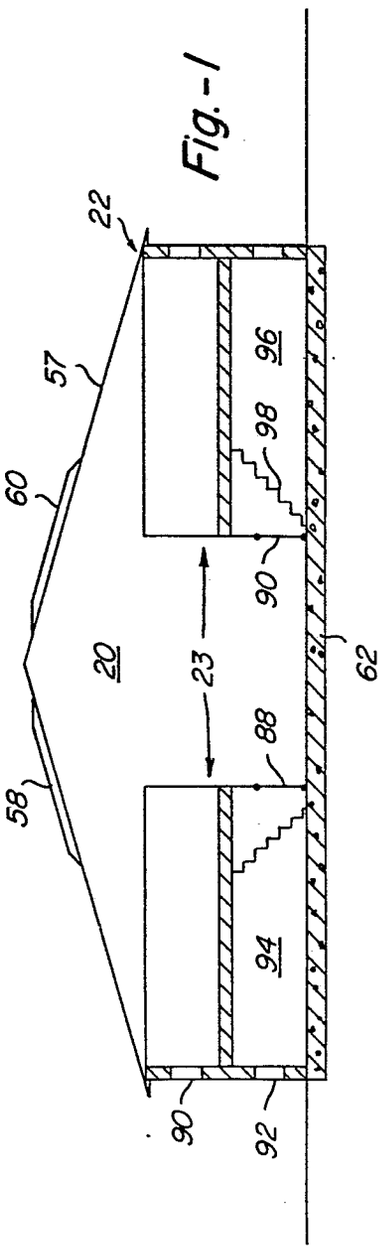
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Fig.-1

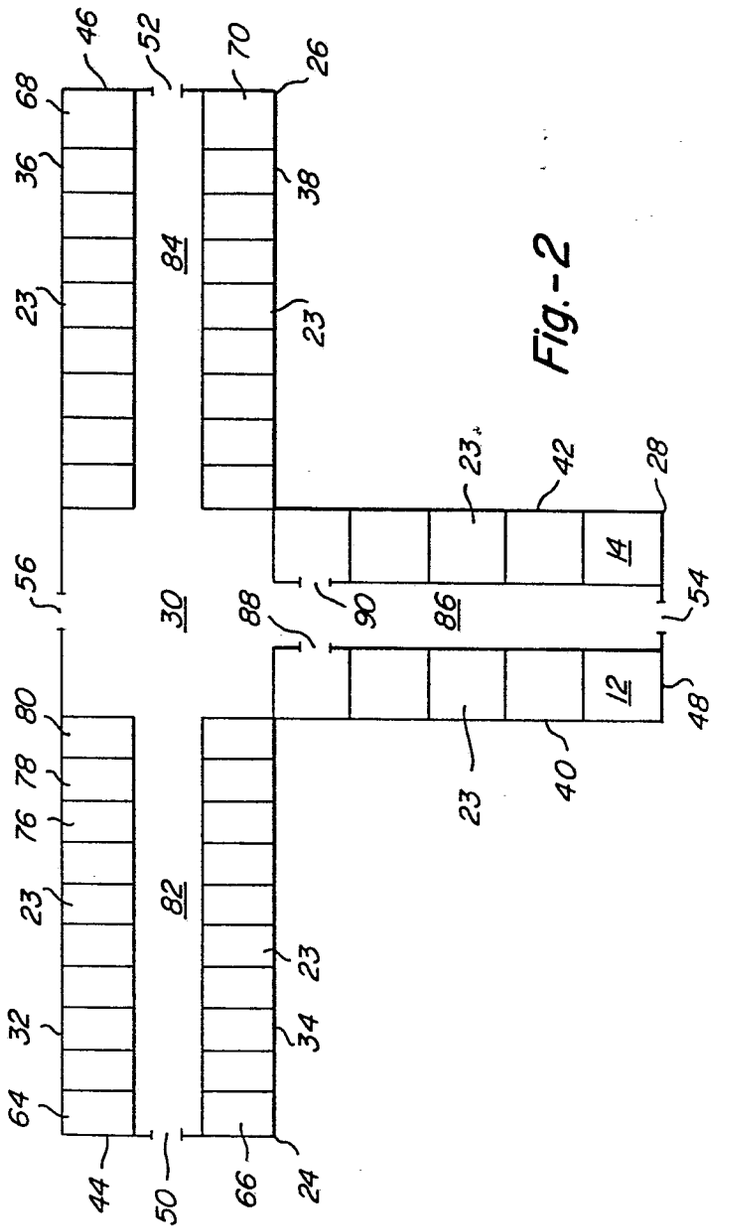
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Fig.-2

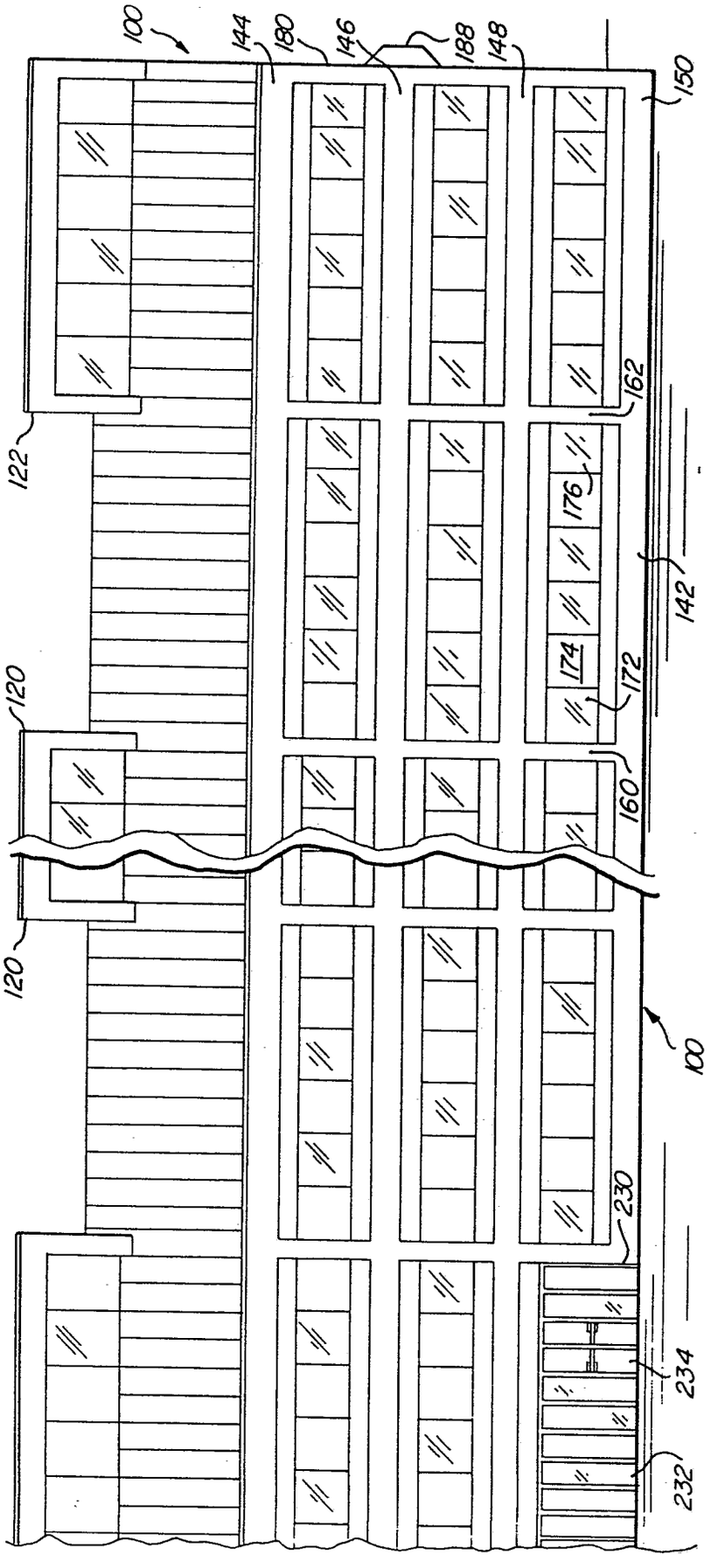
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Fig-3

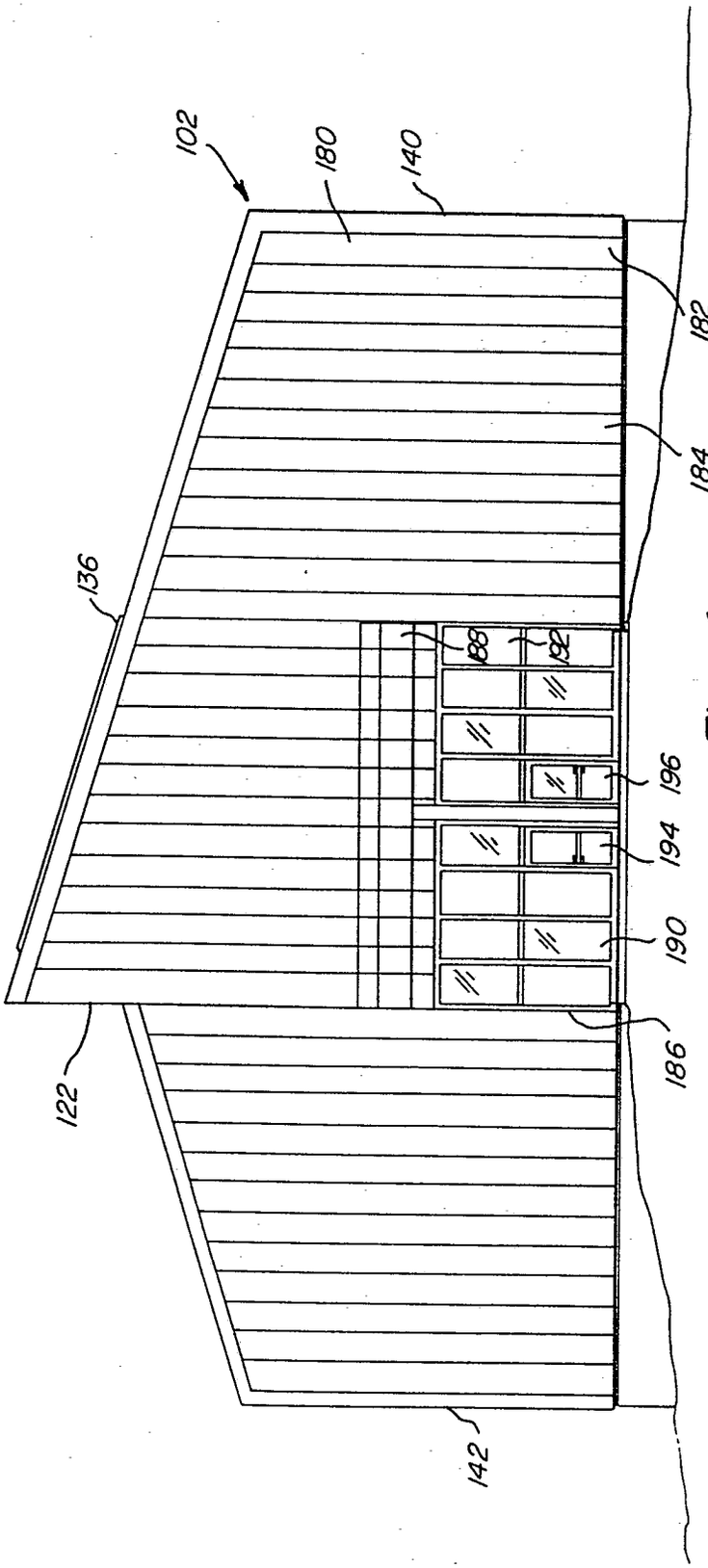

Fig.-4

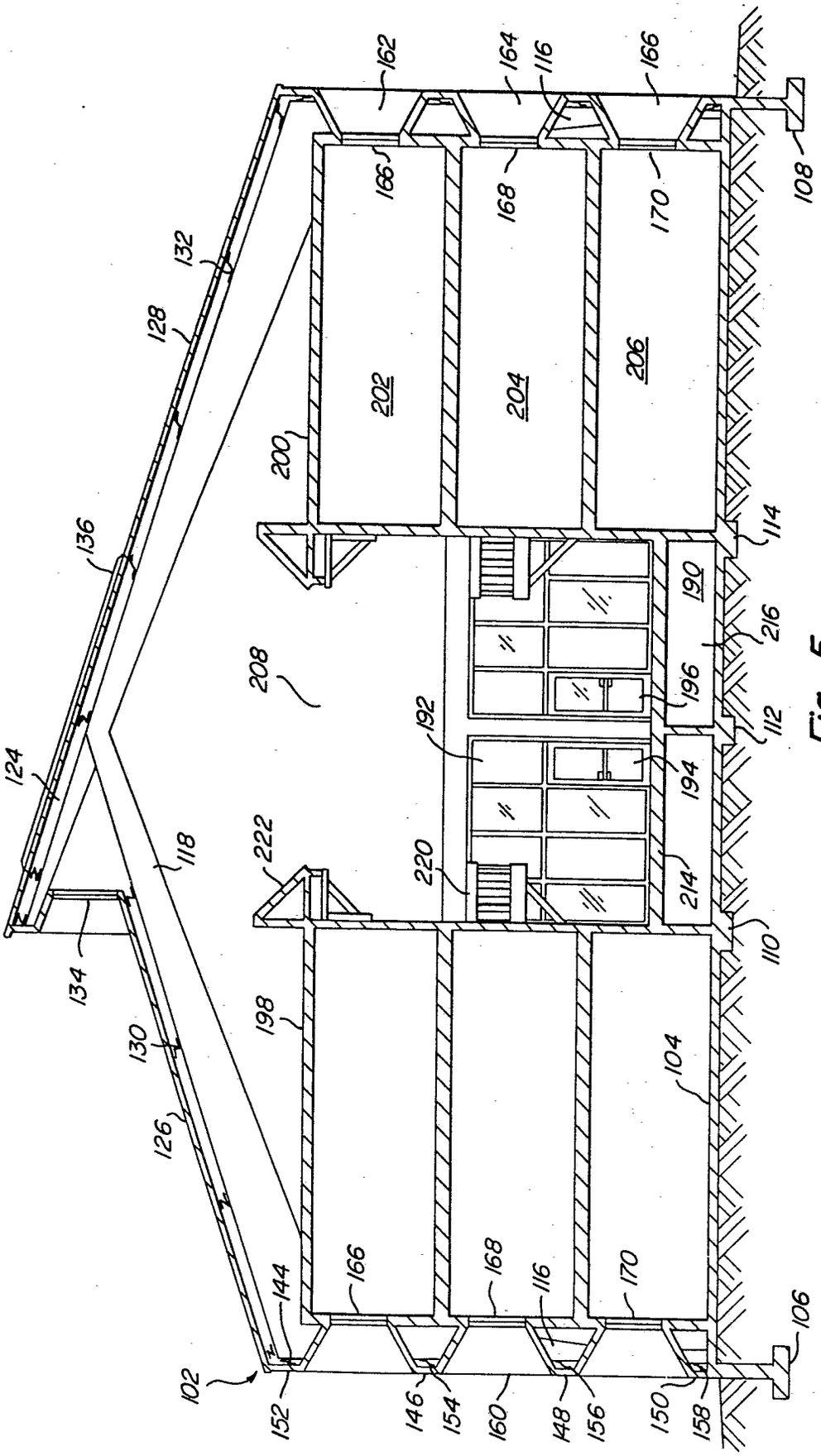
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Fig.-5

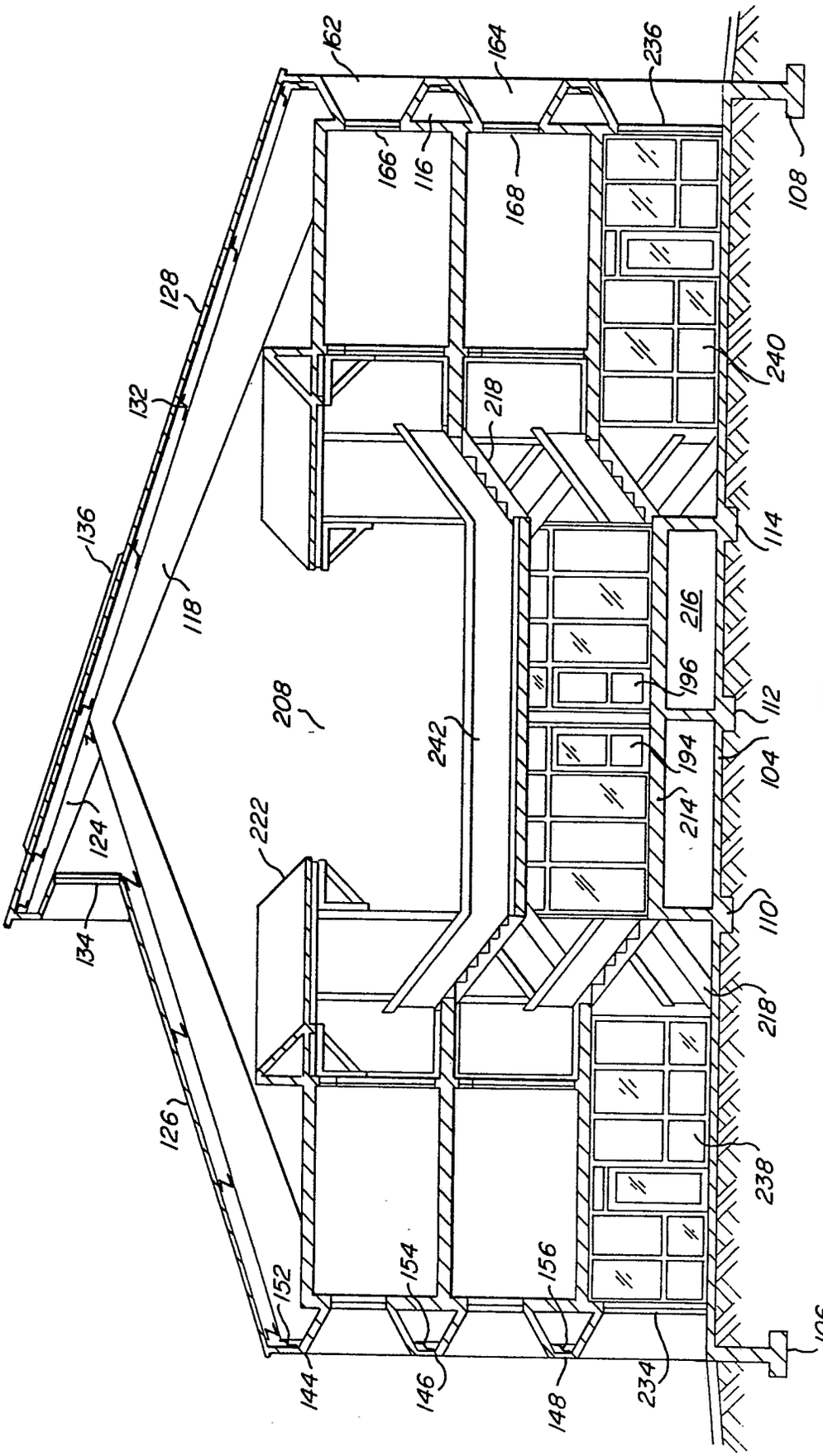
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Fig-6

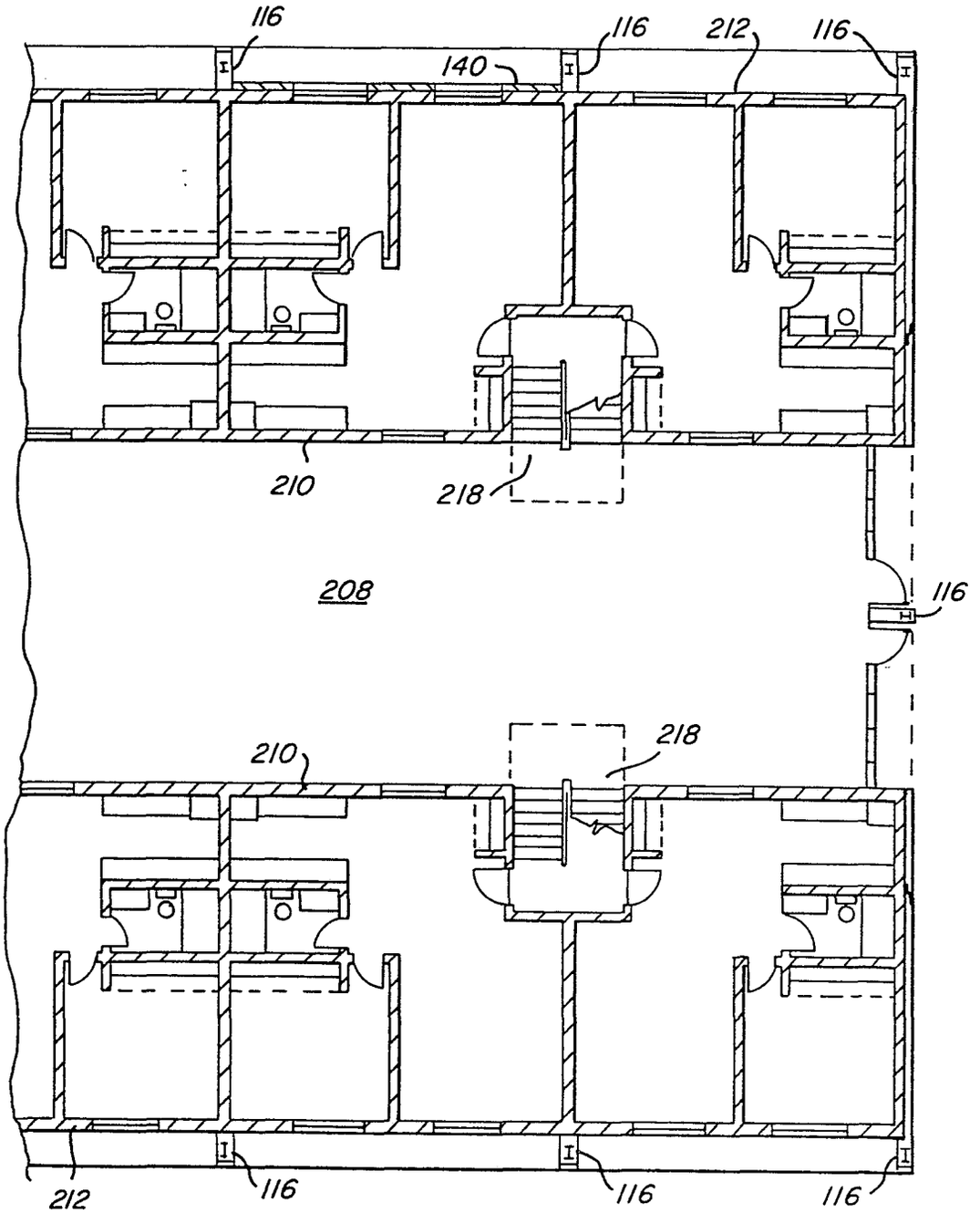
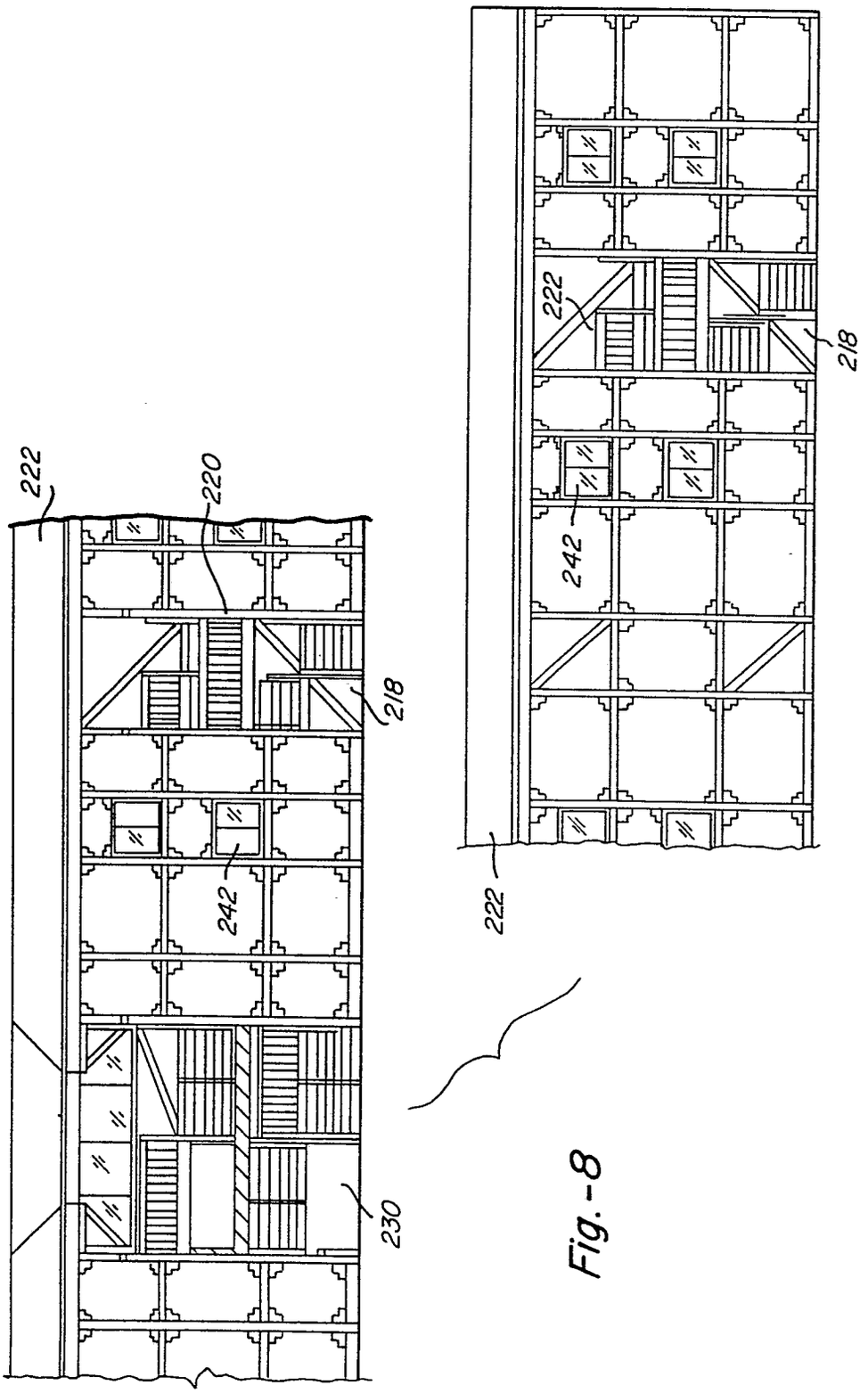


Fig-7



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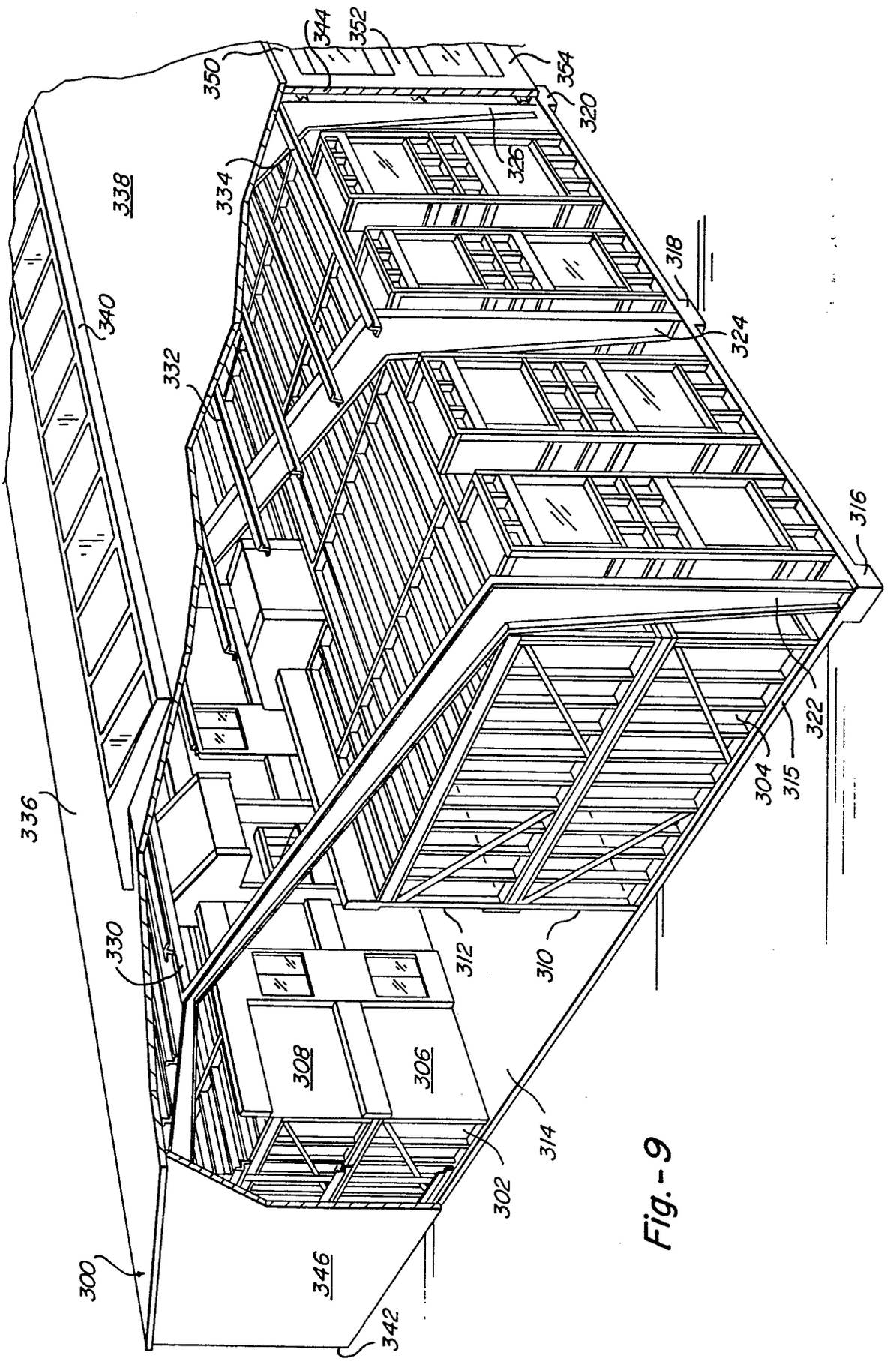
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Fig.-9

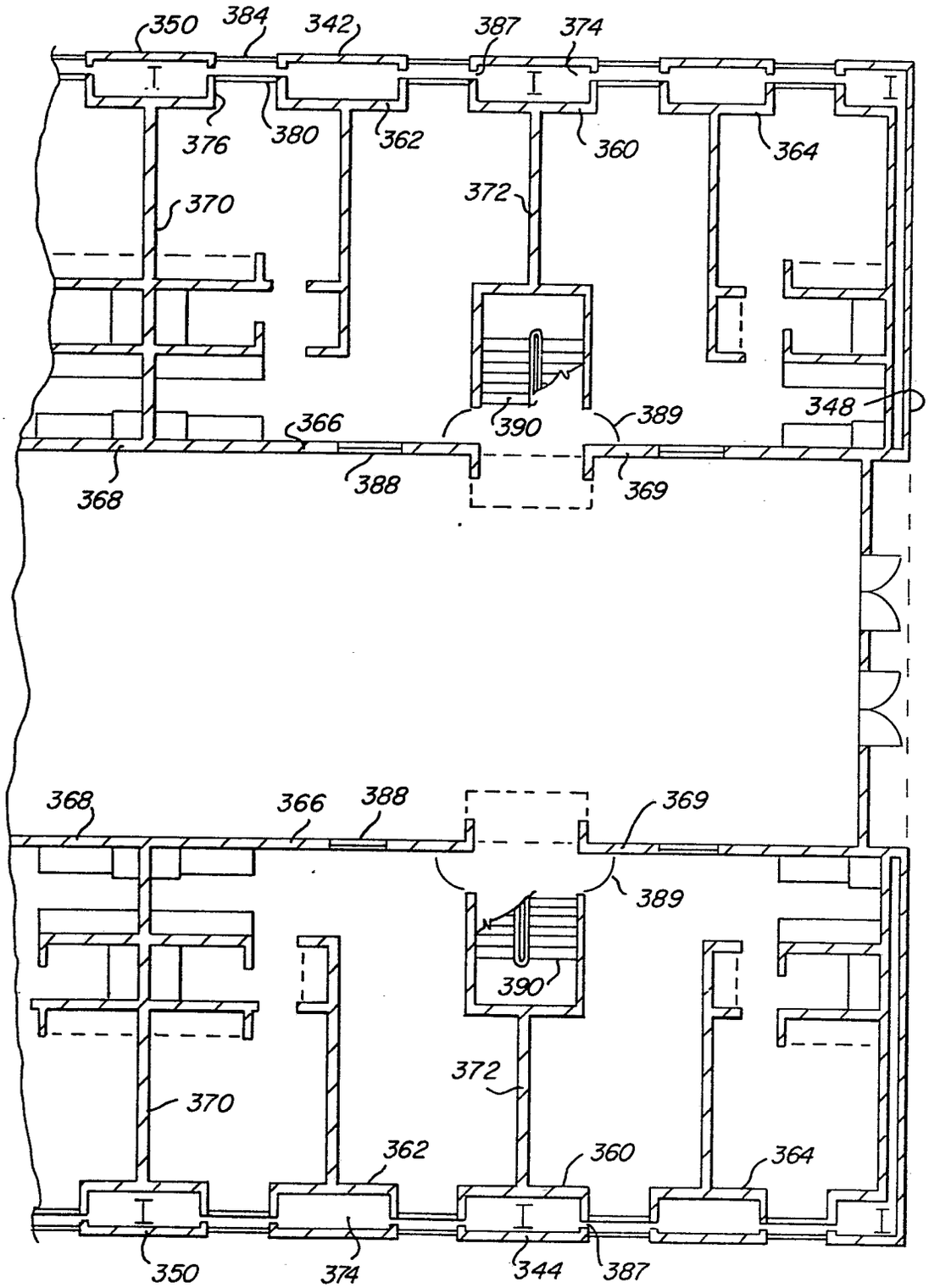
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Fig. - 10

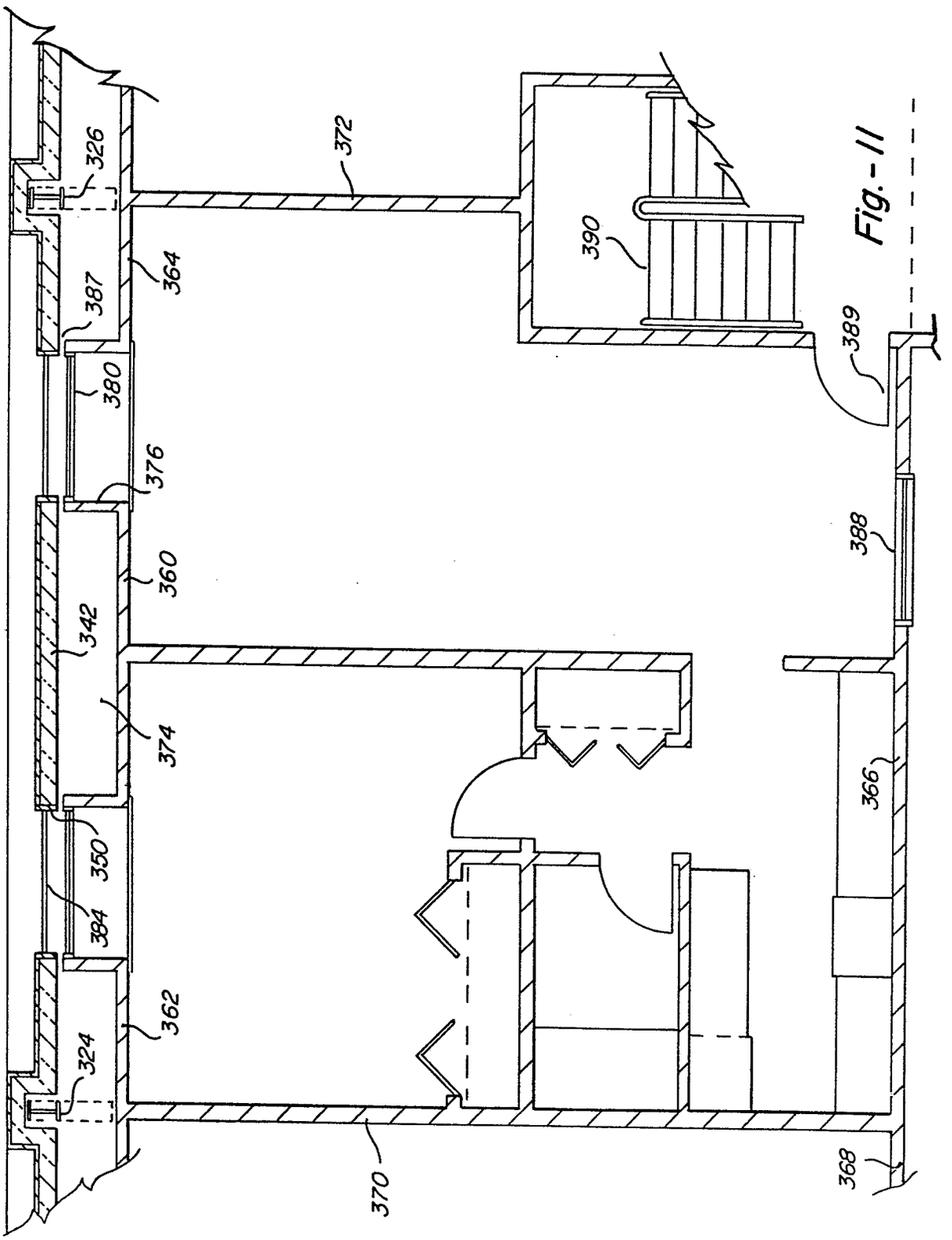
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Fig. - 11

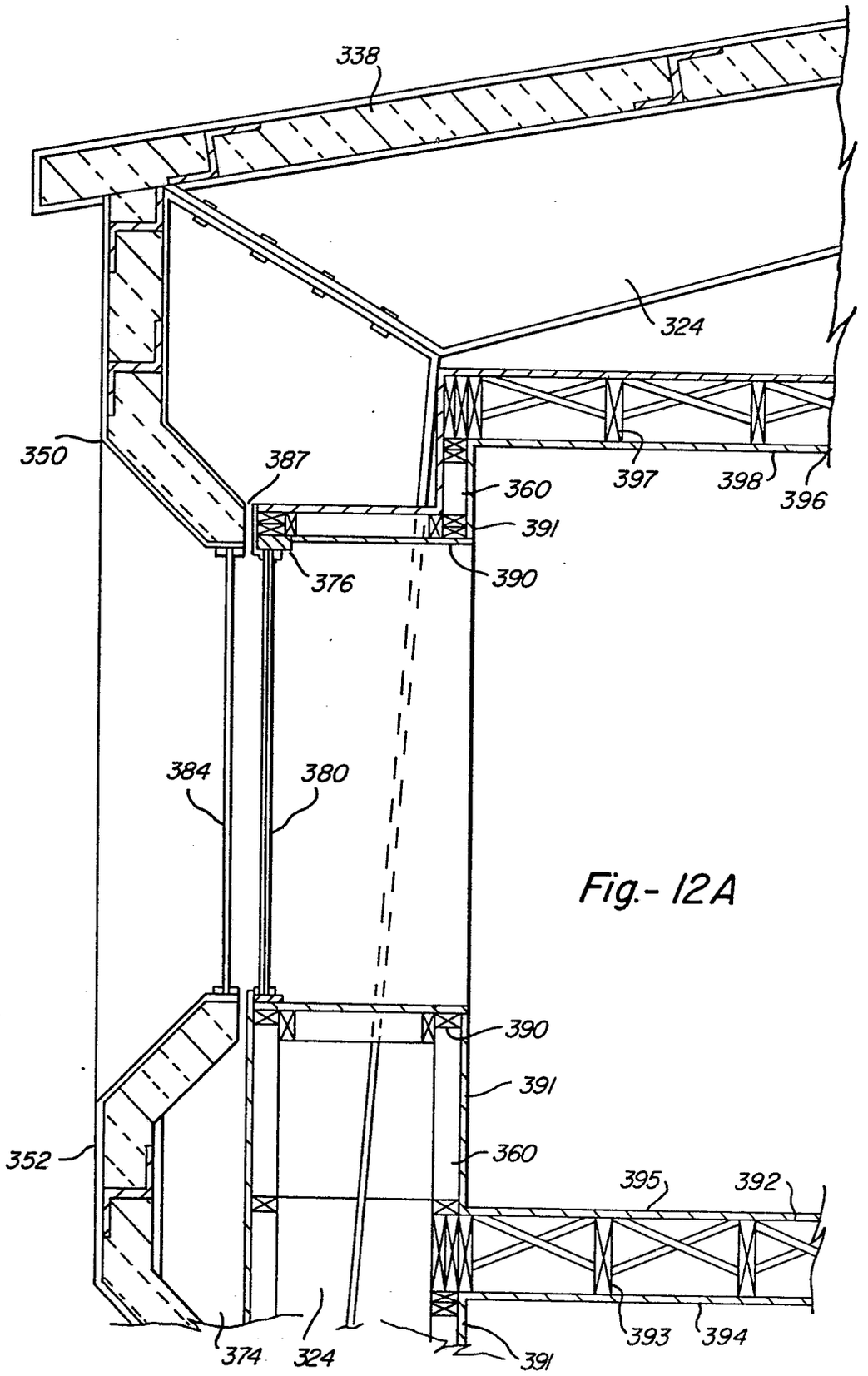
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Fig.- 12A

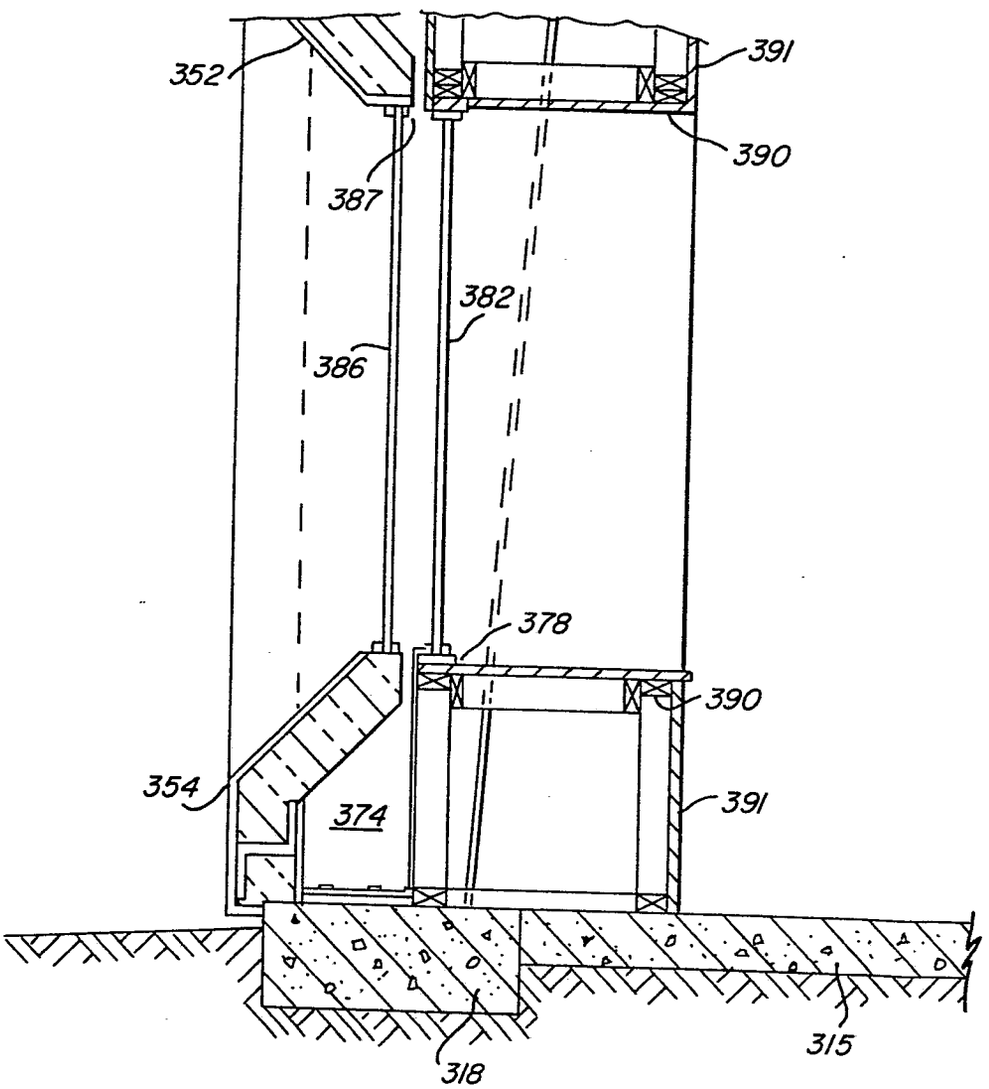

Fig.- 12B

Fig. - 13

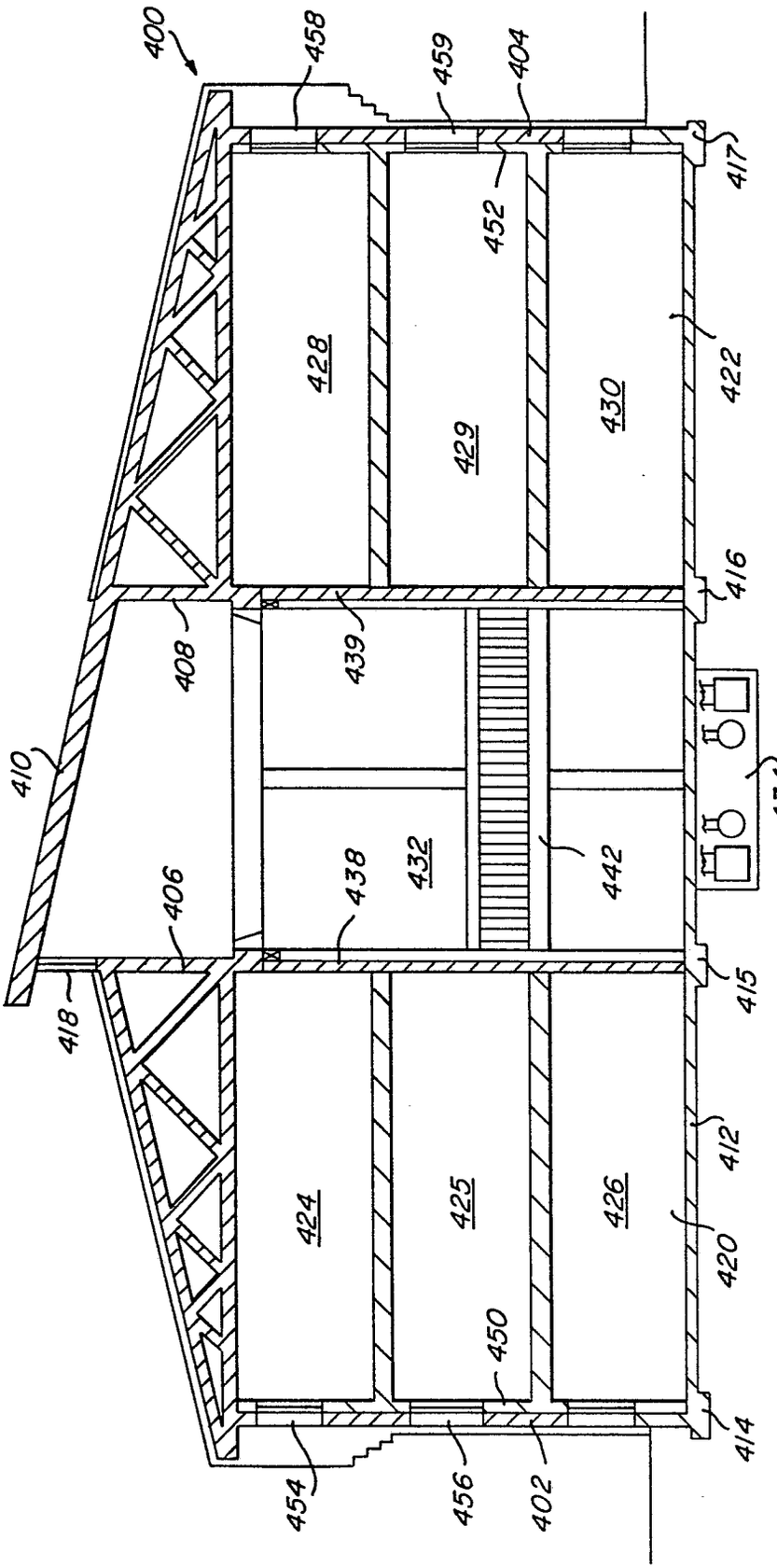
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Fig.-14

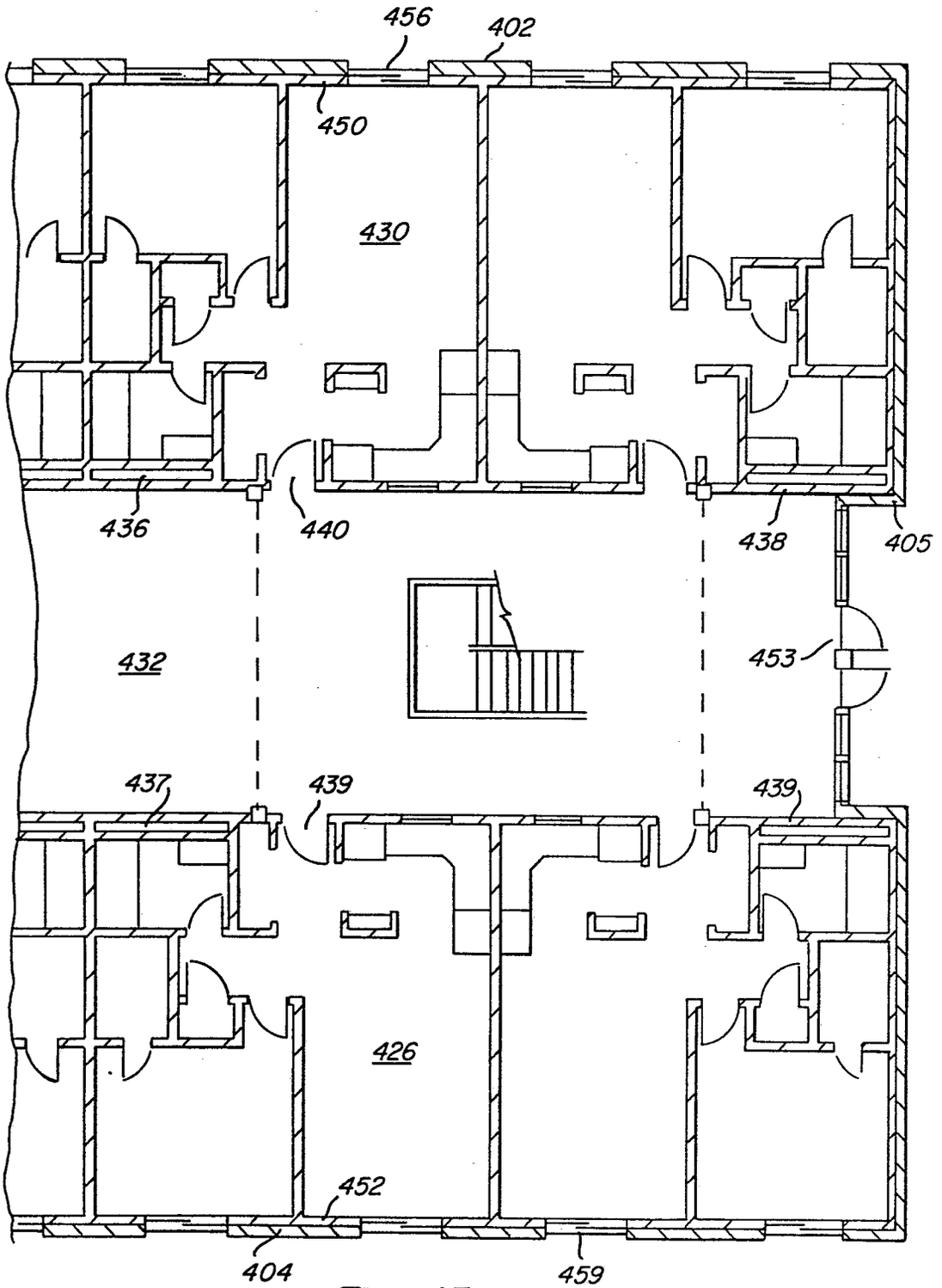
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Fig.-15

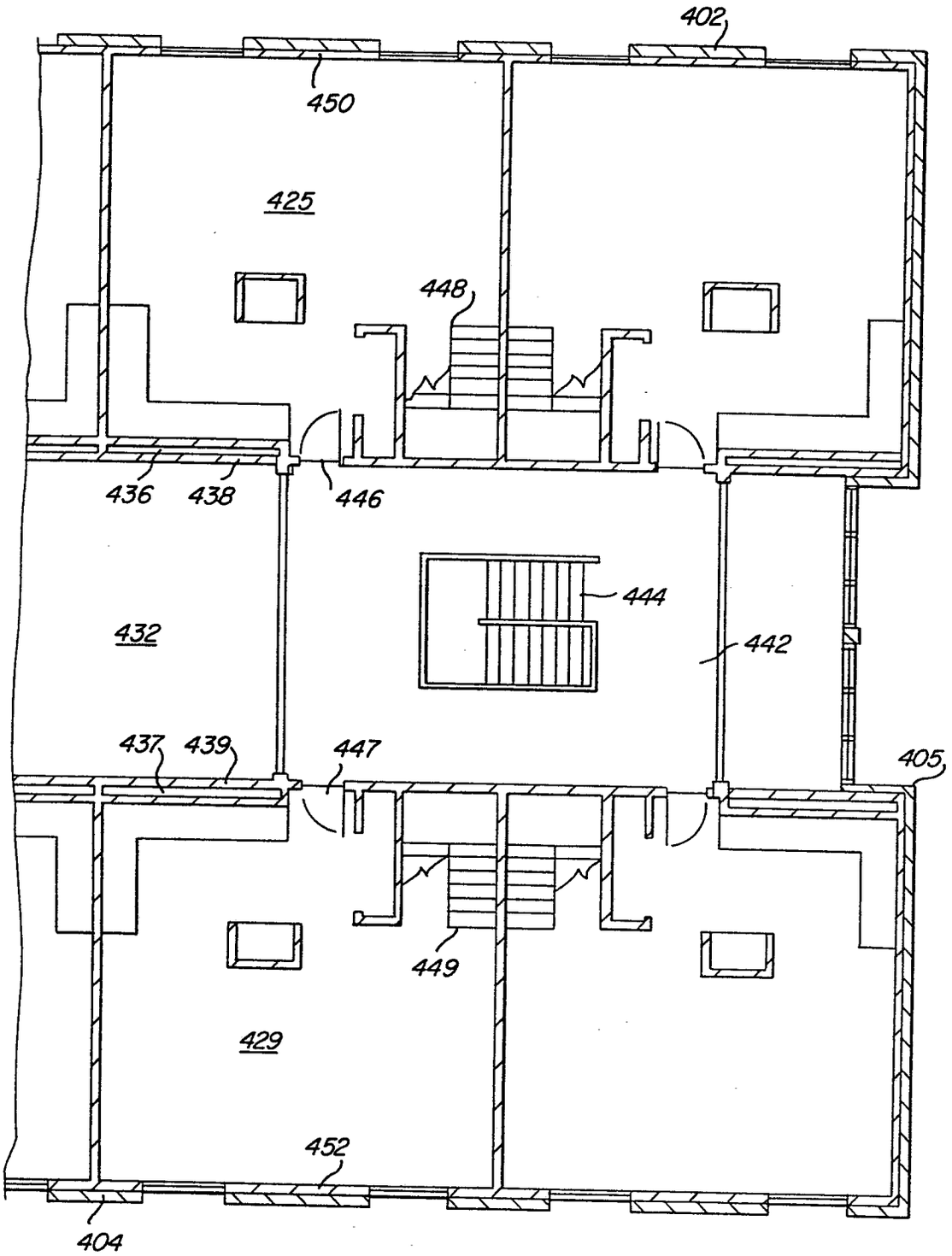
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Fig. - 16

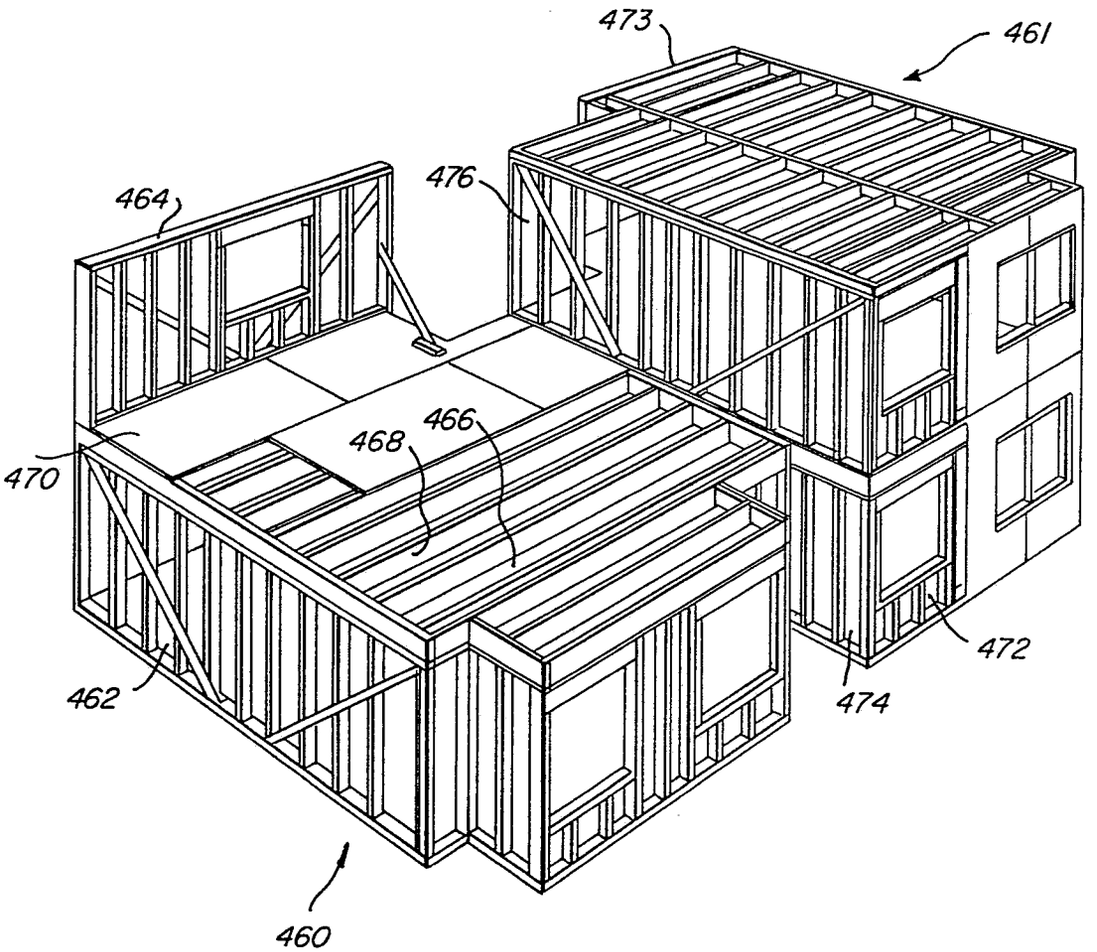

Fig.-17

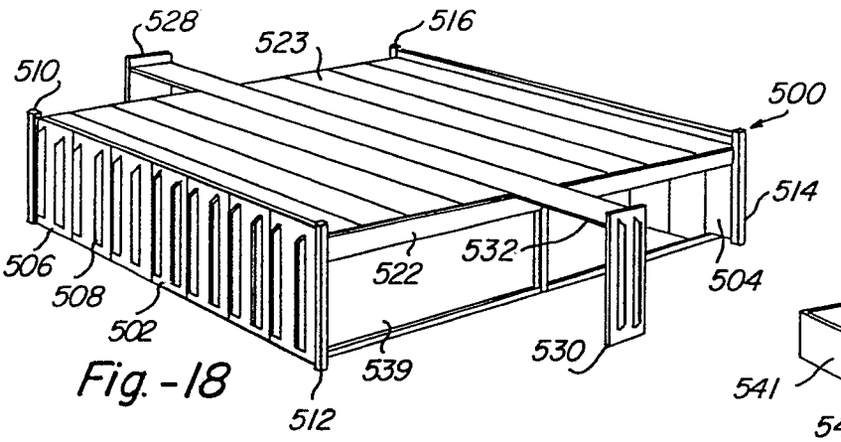

Fig.-18

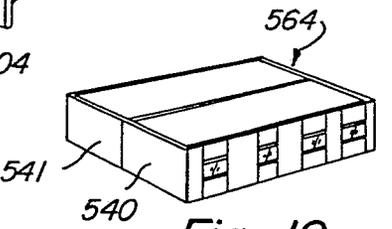

Fig.-19

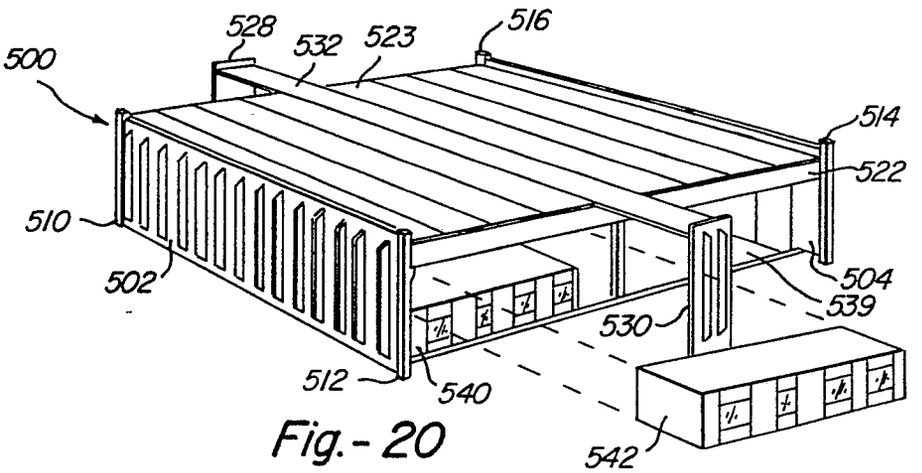

Fig.-20

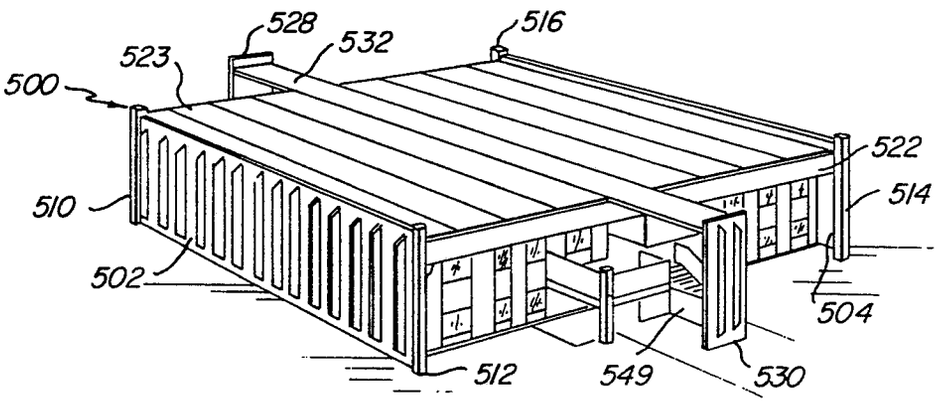

Fig.-21

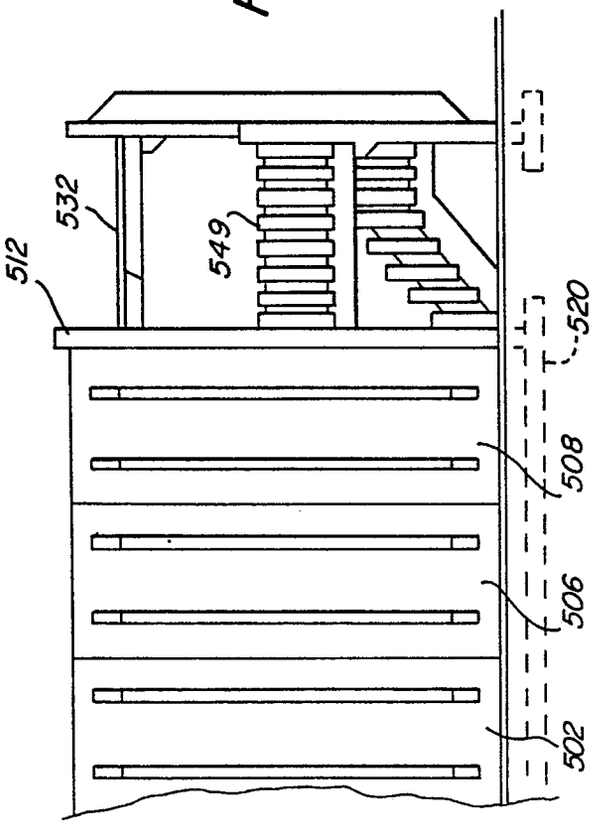
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Fig. - 22

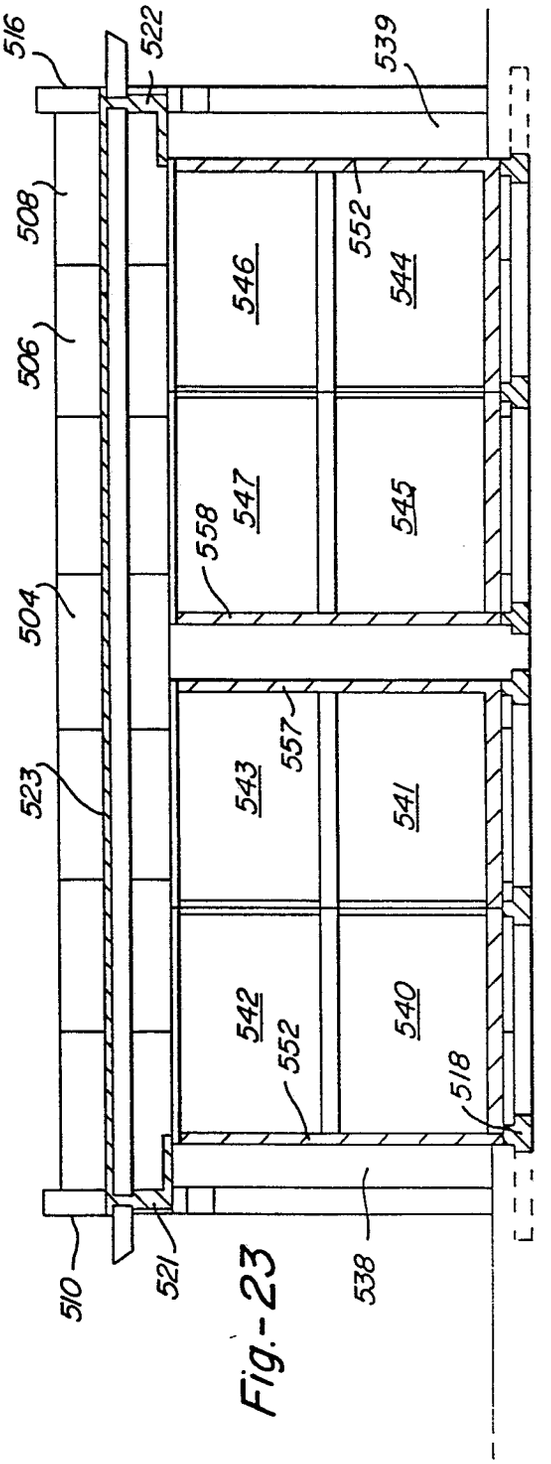
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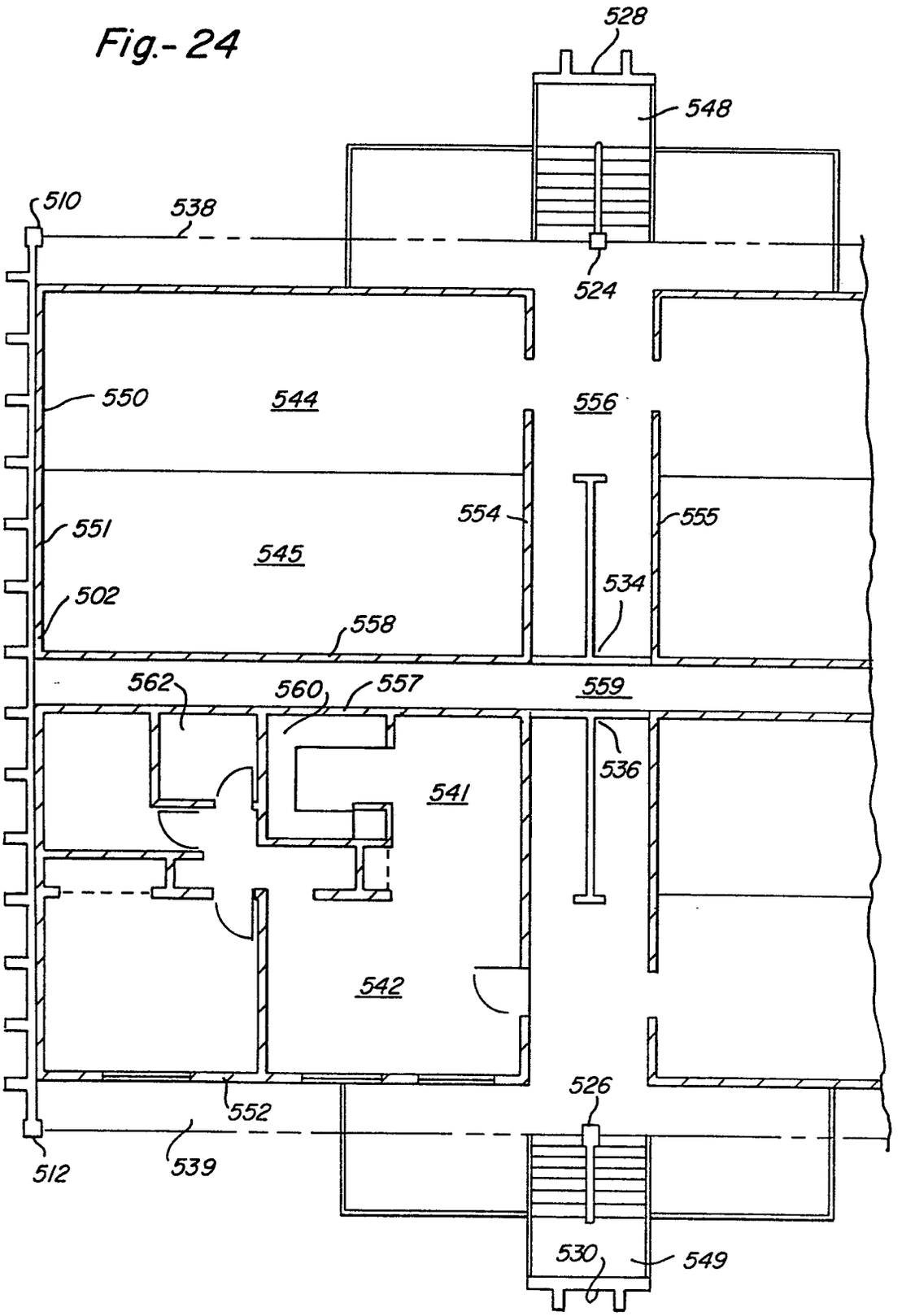
Fig. - 23

Fig.- 24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European Patent Office

EUROPEAN SEARCH REPORT

Application number
EP 81 30 3901

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
X	US - A - 2 499 498 (HAMMOND) * The whole document *	1,10, 14,16, 17,18, 19,25, 27	E 04 H 1/04 E 04 B 1/348
Y		4	
X	GB - A - 590 112 (SMITH) * The whole document *	1,8,9, 16,17, 19,25, 27	TECHNICAL FIELDS SEARCHED (Int.Cl. 3)
Y	DE - A - 2 719 953 (VIVIANI) * Pages 8,9,10,11; figures 1-6 *	1,2,4, 27	E 04 H E 04 B

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X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	05-02-1982	CAVALERI