

A Storage Area Under A Portal For Reducing Portal Size In A Multi-Storey Structure

Field of the Invention

This invention relates to a portal, such as a door or a window having a reduced size. More particularly, this invention relates to the placing of a sunken portion of a ceiling near a wall including the portal to make the reduced size of the window aesthetically pleasing. Still more particularly, this invention relates to a sunken ceiling that makes the reduced sized portal aesthetically pleasing and provides a storage area incorporated into the floor under a portal in an apartment directly above the portal having a reduced size.

Summary of the Prior Art

Multi-level buildings are a favored form of residential construction because these buildings provide for improved land use in land scarce, urban areas. These buildings usually include a large number of apartment units on each floor. As the number of apartments on each floor is maximized, the space in each particular apartment is typically small. To make an apartment appear more spacious, designers often include either full-length windows or portals; or bay windows in the outer walls to make the apartment aesthetically more spacious and more appealing to a potential buyer. A bay window refers to a projection from a room that extends from some height above the floor to the ceiling of the room and holds a set of windows. Preferably, this projection is often in the form of a rectangular ledge or alcove.

However, in today's society, buyers are demanding for more energy efficient apartments. While spacious portals, such as bay windows and full-length windows, may aesthetically improve the apartment, the use and effective placement of these portals results in more direct sunlight entering and heating the apartment. This is especially true of northern and/or southern exposures in desert and tropical environments. Thus, the extensive use of large portals, such as bay and full-length windows in an apartment is often the cause of higher energy costs, as the air conditioning would have to be increased to maintain an optimal temperature in these apartments. The extensive provision of bay and full-length windows therefore runs counter to the objective of encouraging energy efficient building design and sustainability. Thus, there is a need in the art for bay window designs that meet energy efficiency requirements without sacrificing the aesthetic aspect of the building or individual apartment units.

Furthermore, storage space is a concern in all multi-storied housing structures. Storage is a particular concern in apartments where the living space is quite limited. It is usually the goal of architects and designers to find a balance between the aesthetics of a building, the construction costs of a building and the useable space in each apartment unit.

Recently, in order to increase the storage space in an apartment unit, some building designers have created multi-purpose storage spaces by extending a section of a floor slab downwards, reducing an equivalent portion of the ceiling height of the apartment unit below. This multi-purpose storage space can be used to accommodate piping, wiring or to increase the height of cupboards and wardrobes.

The room beneath this multi-purpose storage with a sunken ceiling is designed in such a way that the space under the sunken ceiling is not used as a living area or is used for a specific purpose that does not require high ceilings. For example, the area with the sunken ceiling can be used to place electrical appliances such as refrigerators or washing machines. Thus, the provision of a storage space in this manner is disadvantageous as the sunken ceiling limits the layout and functionality of the underlying rooms in an apartment unit. A design with such a storage area is discussed in Japanese Patent Application No. 2002-285716 in the name of Sato Benec Co Ltd titled "Apartment House", published 3 October 2002.

Therefore, those skilled in the art are constantly striving for configurations of apartments in a building that balances the desire for more functional space and energy efficiency.

Summary of the Invention

The above and other problems are solved and an advance in the art is made by a multi-storey structure configured in accordance with this invention. A first advantage of a structure in accordance with this invention is that it reduces the height of a portal, such as a door or window in a structure while maintaining the aesthetic appeal of the portal. Thus, the total area of portals in exterior walls may be reduced to reduce the amount of heat generated by sunlight entering the structure. A second advantage of a structure configured in accordance with this invention is that the sunken ceiling used to reduce the height of the portal on a lower floor may be used to provide a storage area under the floor of an upper floor. A third advantage of a structure configured in accordance with this invention is that the living

space of an underlying room is not affected by placing the sunken ceiling near a portal of the room.

In accordance with the present invention, a multi-storied structure is configured in the following manner. The structure includes a first level and a second level. A ceiling of the first level forms a floor of the second level. A first wall of the first level is substantially co-planar with a second wall of the second level. A sunken portion of the ceiling of the first level is near the first wall of the first level. The sunken portion of ceiling has a hollow enclosure defined within the sunken portion to form a storage area that is accessible through an opening in the floor of the second level near the second wall. A first portal through the first wall in the first level has a top end that is near the sunken portion of the ceiling. Thus, the sunken portion of the ceiling reduces the height of the first portal and enhances the aesthetics of the ceiling and the first portal.

In accordance with some embodiments of the invention, the first portal is a door. In other embodiments, the portal is a bay window. In these embodiments, the bay window includes a bottom end at a height distal from a floor of the first level and a ledge that extends outward from the first wall to the bottom end of the bay window. The bay window may also include a top end and an extension that extends from the first wall to the top end of the window.

In accordance with some embodiments, the second wall includes a second portal through the wall over the opening in the floor. In some particular embodiments, the second portal is a bay window. The bay window may include a bottom end at a

height distal from the floor of the second level and a ledge that extends outward from the second wall to the bottom end of the bay window. In some of these particular embodiments, a cover for the opening may extend inward from the ledge over the opening and a wall that extends upward from the floor near the opening to a bottom surface of the cover. The cover may include a first hinge element that connects the cover to the ledge and allows the cover to move between a closed position substantially parallel to the ledge and an open position in which the cover is not parallel to the ledge. Some more particular embodiments may include a second hinge element that connects a portion of the wall to the cover and allows the wall to move between a first position in which a wall surface is substantially perpendicular to the cover and a second position, which allows access to the opening. In still other particular embodiments, the second hinge element connects a portion of the wall to the floor to allow the portion of the wall to move to allow access to the opening.

In accordance with other embodiments of this invention, a piece of furniture may incorporate the cover into the structure of the piece of furniture. Particular ones of these embodiments may include a bed or a table.

Brief Description of the Drawings

The above and other features and advantages of a structure configured in accordance with this invention are set forth in the following Detailed Description and are shown in the following drawings:

Figure 1 illustrating a forward view looking at a bay window having a reduced size under a sunken ceiling in accordance with an embodiment of this invention;

Figure 2 illustrating a cross sectional view of two levels of a structure incorporating a reduced bay window under a sunken ceiling in accordance with an embodiment of this invention;

Figure 3 illustrating a cross section view of two levels of a structure incorporating a reduced bay window with a storage area cover incorporated into a piece of furniture in accordance with another embodiment of this invention;

Figure 4 illustrating a cross sectional downward view of a second level bay window with a bed incorporated into a storage area covering in accordance with an embodiment of this invention;

Figure 5 illustrating a cross sectional view of two levels of a structure incorporating a reduced height glass window and/or door in accordance with an embodiment of this invention;

Figure 6 illustrating a cross sectional view of two levels of a structure incorporating a reduced height door or window with an outside planter in accordance with an embodiment of this invention;

Figure 7 illustrating a downward cross sectional view of a second level doorway with a planter in accordance with an embodiment of this invention;

Figure 8 illustrating a downward cross sectional view of a second level doorway with a balcony in accordance with an embodiment of this invention;

Figure 9 illustrating a cross sectional view of two levels of a structure incorporating an alternative embodiment of a structure with a reduced ceiling of a first level over a shelving system in accordance with this invention; and

Figure 10 illustrating a cross sectional view of two levels of a structure incorporating an alternative embodiment of a structure with a reduced ceiling that is incorporated into a wardrobe in accordance with this invention.

Detailed Description

This invention relates to multi-storey structures. More particularly, this invention relates to a design of a multi-storey structure that provides reduced height portals, such as doorways and windows in the structure. Still more particularly, this invention relates to a provision of a sunken ceiling over a portal to reduce the height of the portal while maintaining the aesthetics of the portal and allowing for the provision of a storage area in the floor above the sunken ceiling.

The present invention relates to a manner of configuring a structure to enhance the aesthetic appeal of a reduced size portal through a wall. For purposes of this discussion, a portal is a doorway, door, window, or any other void extending through a wall. To mitigate the void or “emptiness” between the top end of the portal and the ceiling, a sunken ceiling is provided near the portal. The sunken ceiling frames the portal to eliminate the void and makes the portal appear to extend to the ceiling.

Figure 1 illustrates a room in a first level of a structure that incorporates an embodiment of this invention. Room 100 has a ceiling 105 and a floor 160. Bay window 115 is installed in wall 121. Sunken ceiling 110 is a portion of ceiling 105 proximate bay window 115 that has a reduced height compared to the rest of ceiling 105. Although, sunken ceiling 110 is shown having a rectangular shape, one skilled in the art will recognize that sunken ceiling 110 may be any shape, including but not limited to, sloped or curved edges without departing from this invention. Bay window 115 includes ledge 120 and a top extension (Not Shown) that extends outward from wall 121 to enclose a bay area between bay window 115 and wall 121. As can be seen in Figure 1, the bottom end of bay window 115 is above the ground

level. Thus, cover 125 extends inward into room 100 from wall 121 and covers storage area 155.

Figure 2 illustrates a cross sectional view of two levels of a structure that have a reduced height window and sunken ceiling in accordance with an embodiment of this invention. Window 115 is a portal through a wall 121 of room 100 on a first level. Room 100 has a ceiling 105 and a floor 160. Ceiling 105 includes a sunken portion 110 proximate a top end of window 115. Ledge 120 extends outwards from wall 121 to a bottom end of window 115.

Room 200 is a room on a second level directly above room 100 on the first level. Room 200 has a floor 260 that is directly over ceiling 105 of room 100. Storage area 255 is provided in the area defined by the sunken portion 110 of ceiling 105 to allow second room 200 on the second level to utilize the space captured by sunken portion 110. Preferably, storage area 255 is proximate wall 221 that is co-planar with wall 121. Cover 250 fits into an opening over storage space 255 and is moveable to allow access to storage space 255 from room 200. Second wall 221 may also have a portal, such as second bay window 215 through second wall 221. Second bay window 215 includes ledge 220 that extends out from wall 221 to a bottom end of window 215. Preferably, second window 215 is aligned with storage area 255 under floor 260.

As shown, floor 160 of room 100 may also have a storage area 155 enclosed in a sunken portion of the ceiling of the level below room 100 to allow each level of the structure to have a storage area. Cover 150 fits into an opening in floor 160. This

opening allows access to storage space 155 and cover 150 is moveable to allow access to storage area 155.

A cross sectional view of two levels of a structure that has a reduced height window and a sunken ceiling in accordance with an embodiment of this invention is shown in Figure 3. In accordance with this embodiment, covers 150 and 250 are replaced by covers 125 and 225; and sidewalls 135 and 235 respectively. Covers 125 and 225 extend inwards into rooms 100 and 200 from ledges 120 and 220 respectfully. Sidewalls 135 and 235 extend upward from the floor surrounding the opening into storage areas 155 and 255 to the bottom surfaces of covers 125 and 225. As shown with respect to room 100, cover 125 may be connected to first hinge element 141 that allows cover 125 to move from a closed position to open position 140. When cover 135 is in open position 140, a user is allowed access to storage area 155. To further allow access, a second hinged element (Not Shown) may connect a portion of sidewall 135 to a movable portion of cover 125 or the floor to allow a portion of sidewall 135 to pivot about the second hinge element to allow access to storage area 155. One skilled in the art will recognize that although hinge connections for the covers are shown and described in this embodiment, any other type of movement couplings may used including but not limited to sliding rails and removal of the cover from the opening. Also as shown in Figure 3, a cover, such as cover 225, may be incorporated into a piece of furniture such as bed 226. Figure 4 shows a downward view of bed 226.

Figure 5 illustrates a cross sectional view of two levels of a structure that has a reduced height sliding glass window and/or door 315 and sunken ceiling 310 in

accordance with an embodiment of this invention. Sliding glass window and or door 315 is a portal through a wall 321 of room 300 on a first level. In the shown embodiment, door 315 is a sliding glass door. However, other types of windows and/or doors may be used without departing from this invention. Room 300 has a ceiling 305 and a floor 360. Ceiling 305 includes a sunken portion 310 proximate a top end of door 315.

Room 400 is a room on a second level directly above room 300 on the first level. Room 400 has a floor 460 that is directly over ceiling 305 of room 300. Storage area 455 is provided in the area defined by the sunken portion 310 of ceiling 305 to allow second room 400 on the second level to utilize the space captured by sunken portion 310. Preferably, storage area 455 is proximate wall 421 that is co-planar with wall 321. Cover 450 fits into an opening over storage space 455 and is moveable to allow access to storage space 455 from room 400. Second wall 421 may also have a portal, such as second door 415 through second wall 421. Preferably, second door 415 is aligned with storage area 455 under floor 460. In the shown embodiment, door 415 is a sliding glass door. However, other types of doors may be used without departing from this invention

As shown, floor 360 of room 300 may also have a storage area 355 enclosed in a sunken portion of a ceiling in the level below room 300 to allow each level of the structure to have a storage area. Cover 350 fits into an opening in floor 360. This opening allows access to storage space 355 and cover 350 is moveable to allow access to storage area 355. As shown in Figure 6, planter boxes 370 and 470 or other types of balconies may be incorporated into the structure to extend outwards

from walls 321 and 421 on the exterior side of the portals without departing from this invention. Figures 7 and 8 show downwards views of alternative embodiments in which a planter 370 and a balcony 380 are on the other side of wall 321.

Figure 9 shows an alternative embodiment in accordance with this invention in which sunken ceiling 510 is incorporated into a shelving system. Thus, the sunken ceiling does not reduce the function of any living space in room 500. Room 500 is on a first level of a structure. Room 500 includes ceiling 505 and floor 560. Ceiling 505 includes a sunken portion 510 proximate a top end of a shelving system including overhead shelves 580 and cabinets 570 on the ground. Cabinets 570 may include multiple shelves 575.

Room 600 is a room on a second level directly above room 500 on the first level. Room 600 has a floor 660 that is directly over ceiling 505 of room 500. Storage area 655 is provided in the area defined by the sunken portion 510 of ceiling 505 to allow second room 600 on the second level to utilize the space captured by sunken portion 510. Preferably, storage area 655 is proximate wall 621 that is co-planar with wall 521. Cover 650 fits into an opening over storage space 655 and is moveable to allow access to storage space 655 from room 600. Second wall 621 may be exposed or may include a shelving system similar to the shelving system described with regards to room 500 without departing from this invention.

As shown in Figure 9, floor 560 of room 500 may also have a storage area 555 enclosed in a sunken portion of a ceiling of the level below room 500 to allow each level of the structure to have additional storage area with cabinets 570.

Figure 10 shows another alternative embodiment of the invention. In accordance with this embodiment of the invention, sunken ceiling 715 is incorporated into storage system 790. Thus, the sunken ceiling does not reduce the function of any living space in room 700. Room 700 is on a first level of a structure. Room 700 includes ceiling 710 and floor 760. Ceiling 710 includes a sunken portion 715 proximate a top end of storage system 790. Storage system 790 is a closet or other storage system that includes wardrobe 785 and adjustable hanger rods 770 and 780 defined in storage space 755 along wall 721.

Room 800 is a room on a second level directly above room 700 on the first level. Room 800 has a floor 860 that is directly over ceiling 710 of room 700. Storage area 855 is provided in the area defined by the sunken portion 715 of ceiling 710 to allow second room 800 on the second level to utilize the space captured by sunken portion 715. Preferably, storage area 855 is proximate wall 821 that is co-planar with wall 721. Cover 850 fits into an opening over storage space 855 and is moveable to allow access to storage space 855 from room 800. Second wall 821 may be exposed or may be incorporated into a storage system similar to storage system 790 without departing from this invention.

As shown, floor 760 of room 700 may also have a storage area 755 enclosed in a sunken portion of the ceiling of the level below room 700 to allow each level of the structure to have a storage area with storage system 790 as shown.

The above is a description of embodiments of a structure in accordance with the invention as set forth below. It is envisioned that those skilled in the art can and will design alternative embodiments of this invention based upon this invention that may infringe on this invention as set forth in the following claims.

What is claimed is:

1. A multi-storied building structure comprising:
 - a first level and a second level wherein a ceiling of said first level forms a floor of said second level;
 - a first wall of said first level;
 - a second wall of said second level substantially co-planar with said exterior wall of said first level;
 - a sunken portion of said ceiling of said first level proximate said first wall of said first level wherein a hollow enclosure is defined within said sunken portion of said ceiling to form a storage area accessible through an opening in said floor of said second level proximate said second wall of said second level; and
 - a first portal through said first wall of said first level that has a top end that is proximate said sunken portion of said ceiling wherein said sunken portion of said ceiling is to reduce the height of said first portal and enhance the aesthetics of said ceiling and said first portal.
2. The multi-storied building of claim 1 further comprising:
 - a second portal through said second wall over said opening in said floor of said second level.
3. The multi-storied building of claim 2 wherein said second portal is a bay window.
4. The multi-storied building of claim 3 wherein said second portal further comprises:
 - a bottom end at a height distal from said floor of said second level; and

a ledge that extends outward from said second wall of said second level to said bottom end of said second window.

5. The multi-storied building of claim 4 further comprising:

a cover that extends inward from said ledge over said opening in said floor; and
a wall that extends upward from said floor proximate said opening to a bottom surface of said cover.

6. The multi-storied building of claim 5 further comprising:

a first hinge element that connects said cover to said ledge and allows said cover to move between a closed position substantially parallel to said ledge and an open position in which said cover is not parallel to said ledge to allow access to said hollow enclosure through said opening.

7. The multi-storied building of claim 5 further comprising:

a second hinge element connecting a portion of said wall to said cover to allow said wall to move between a first position in which a wall surface is substantially perpendicular to said cover and a second position which allows access to said opening.

8. The multi-storied building of claim 5 further comprising:

a second hinge element connecting a portion of said wall to said floor of said second level to allow said wall to move between a first position in which a wall surface is substantially perpendicular to said floor and a second position which allows access to said opening.

9. The multi-storied structure of claim 5 further comprising:
a piece of furniture incorporating said cover into said structure of said piece of furniture.
10. The multi-storied structure of claim 9 wherein said piece of furniture is a bed.
11. The multi-storied building of claim 4 wherein said second window comprises:
a top end; and
an extension that extends from said second wall to said top end of said second portal.
12. The multi-storied building of claim 1 wherein said first portal is a door.
13. The multi-storied building of claim 1 wherein said first portal is a bay window.
14. The multi-storied building of claim 13 wherein said first portal further comprises:
a bottom end at a height distal from a floor of said first level; and
a ledge that extends outward from said first wall of said first level to said bottom end of said first portal.
15. The multi-storied building of claim 14 wherein said first portal comprises:
a top end; and
an extension that extends from said first wall to said top end of said first portal.