

Aug. 20, 1957

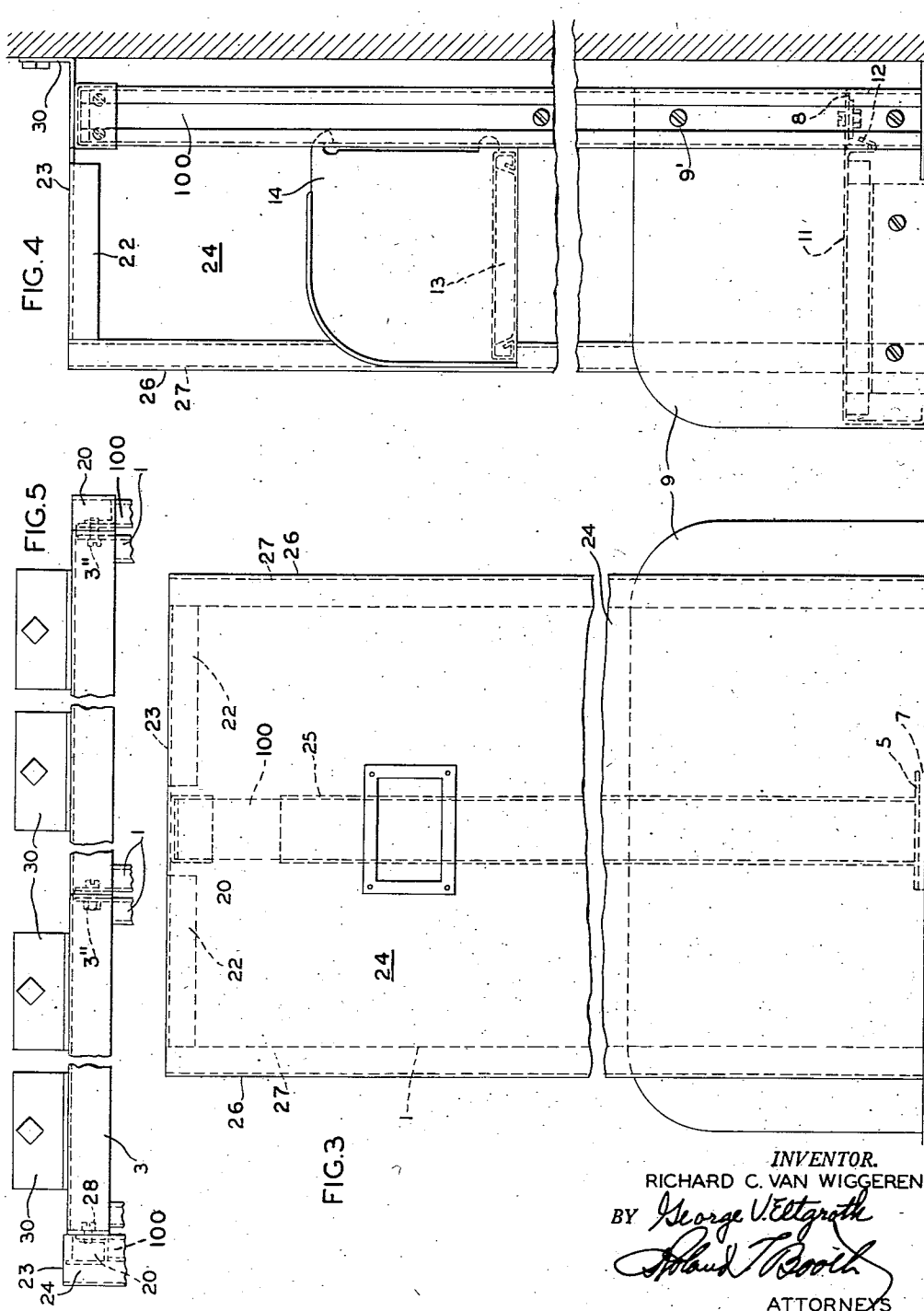
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2,803,351

UNIT TYPE BOOKSTACK

Filed Dec. 12, 1952

3 Sheets-Sheet 2



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FIG. 6

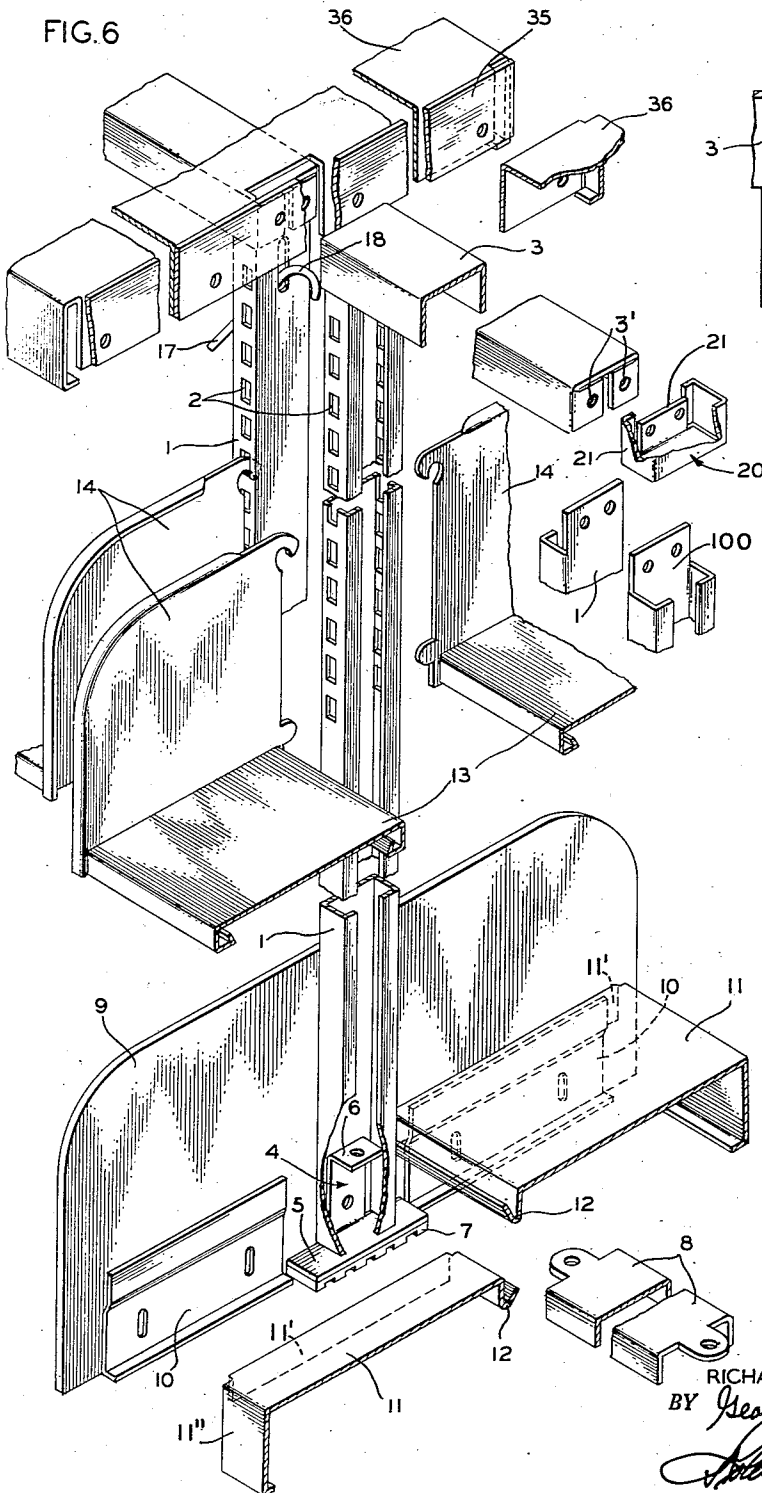


FIG. 7

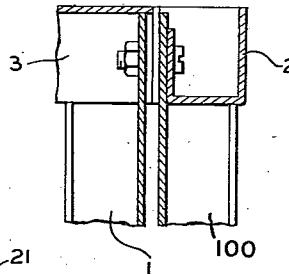


FIG. 8

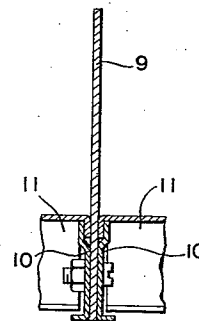
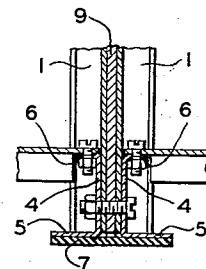


FIG. 9



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2,803,351

UNIT TYPE BOOKSTACK

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6 Claims. (Cl. 211-136)

This invention relates to book stack construction of the type particularly adapted for use in libraries.

The present invention provides a book stack that is readily usable in small offices or rooms where only a limited number of books are to be stored, as well as providing a construction that can be expanded by the addition of one or more duplicate units to form one or more rows of stack units having shelves on one side along a wall structure and on opposite sides when placed in spaced relation to a wall and toward the middle portion of a room.

The invention provides a stack unit having a plurality of duplicate units assembled together in aligned relation in forming a single stack row, which may be placed on the usual floor coverings now used on building floors, so that the floor surface coverings will not be marred or damaged in any way by the weight of the stack, or the portions thereof in contact with the surface of the floor covering.

The invention provides a unit type of stack construction wherein upright members forming portions of a stack column are arranged at opposite ends of each stack unit and connected by top and bottom tie bars having opposite ends rigidly secured to the upper and lower ends of the upright members for the unit to provide a rectangular unit frame. Supporting plates are attached to the lower ends of the upright members in transversely and outwardly extending relation to the side portion of the stack structure so the lower edge of the vertically extending plates will engage the floor surface and support the stack structure in vertical position against sidewise tilting movement. The supporting plates are arranged between the upright members at the end of adjacent units with the adjacent upright members secured together in spaced adjacent relation on opposite sides of the supporting plate to provide a complete stack upright in cooperation. Diagonal sway bars with turnbuckles connect the spaced uprights of at least one unit to hold all of the rectangular stack frames of all of the units in a stack, in vertical relation within the plane of the frame forming the aligned and connected units. Leveling brackets applied to the outer ends of the supporting plates provide additional means for supporting the stack in vertical position when supporting floors having uneven surfaces, the leveling brackets being adjustable to compensate for unevenness of the floor surface. Substantially the entire weight of the stack is carried by the upright members having supporting feet applied to the lower ends thereof and formed with horizontal flat plate portions for engagement with the floor covering to distribute the weight of the stack to the floor. Rubber composition foot plates are attached to the under-surface of each plate of a supporting foot and interposed between the supporting foot plate and the floor surface on which the stack is supported to eliminate marring of the floor surface covering and also to prevent walking or shifting movement of the stack structure on the floor.

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The invention provides unit type end members attached to the end of the end unit in an assembled stack consisting of one or more units in which an end wall member of substantially imperforate sheet material is detachably connected by complementary parts at the top of the end wall to an upright member forming part of the end unit. The lower end of the upright member on the end unit is attached to the adjacent upright member of the stack unit and its supporting plate in adjacent spaced relation with the lower end portion of the end wall detachably connected to the lower portion of the upright member and also to the end supporting plate. The end wall is formed to extend between opposite shelf edges across the end of the stack unit and is formed with rounded edge portions terminating adjacent the end of the shelves on the end stack unit for enclosing the end of the unit, concealing the frame structure at the end of the stack and providing a neat and attractive assembled stack unit structure.

All of the structural members including the upright members, tie bars, supporting feet and supporting plates are open and accessible for cleaning and refinishing in case of corrosion while at the same time eliminating the provision of any structural portions that will harbor insects in an inaccessible location.

The stack units are constructed to provide a rigid assembled stack unit whether the structure is limited to the use of only one section for a few books or two or more sections for supporting many books.

In the drawings;

Fig. 1 is a fragmentary side elevation of two stack units in assembled relation.

Fig. 2 is a fragmentary end elevation of the stack unit as shown in Fig. 1.

Fig. 3 is a fragmentary end elevation of the stack unit at the end showing the end unit in end elevation.

Fig. 4 is a fragmentary end elevation of a stack unit as shown in the previous views but in which only one set of shelves are used so that the unit frames may be secured adjacent to a wall structure with brackets for connecting the frame members to the adjacent wall.

Fig. 5 is a fragmentary side elevation of the upper portion of the stack shown in Fig. 4 illustrating how the brackets are attached to the upper tie bar of each unit.

Fig. 6 is an exploded fragmentary view showing adjacent end portions of two stack units in perspective to illustrate details of construction.

Fig. 7 is an enlarged detail cross section taken on line 7-7 of Fig. 2.

Fig. 8 is an enlarged detail cross section taken on line 8-8 of Fig. 2.

Fig. 9 is an enlarged detail cross section taken on line 9-9 of Fig. 2.

The library stack made according to the present invention is constructed for use in building rooms of various sizes where the floors may have the usual commercial types of floor covering such as plastic tile, linoleum or the usual wood flooring. The stack construction is made in unit form for assembly of one or more units in aligned relation to provide one or more rows of shelves for supporting books in an efficient and economical manner.

Each stack unit has a pair of upright channel members 1 arranged at opposite ends of the unit and each forming an upright stack column. Each upright member or column section is of channel shape with the central web or section of each channel disposed at the end of the unit and the flanges extending inwardly toward one another. The side flanges of each upright channel member are formed with a row of apertures to provide shelf supporting means for attachment of book supporting shelf members in outwardly projecting relation from the upright members. This row of apertures is formed on

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opposite sides of each upright member, as indicated at 2. The upper ends of the pair of upright members of a stack unit are secured together in spaced relation by an upper tie bar 3 of channel shape in cross section arranged in inverted relation so that the flanges of the channel bar extend downwardly along opposite sides of the side flanges on the upper end of upright channel member 1. The ends of the flanges on upper tie bar 3 have inturned lips 3' (Fig. 6) extending over the web portion of each upright member at the end of the unit and are perforated for bolting to the web portion of each upright member 1 to rigidly secure and retain the ends of tie bar 3 and upright members 1 in assembled relation.

A bottom or base bracket 4 is formed to provide a horizontal base plate 5 having a vertically extending portion from the center of one side of base plate 5 terminating in attaching ear 6. Base bracket 4 has the upstanding portion engaged against the web portion of upright channel member 1, one being provided for each upright member with the base bracket arranged on the inside face of the web. Base plate 5 of bracket 4 is arranged to engage under the side flanges below the lower terminal portion of an upright member 1 and provides support for the upright member having the lower face disposed toward the floor supporting the stack unit. Base plate 5 may be arranged to engage and rest upon the surface of the floor, if desired. A base pad 7 formed of suitable resilient composition material such as rubber or a material known by the trade name "Neoprene" is attached to the lower face of base plate 5 to directly engage the floor surface under base plate 5 and carry the weight of the upright member. The central portion of the upright part of base bracket 4 is bolted to the inner portion of upright member 1 in a manner hereinafter more clearly described.

A bottom connecting channel, tie, or spacing bar 8 has opposite ends engaged with attaching ears 6 of the base brackets mounted on the lower ends of the pair of upright members at each end of a unit. The bottom tie bar is secured to ears 6 at opposite ends for retaining the lower end portions of upright members 1 in the same spaced relation as upper tie bar 3. Bottom connecting channel 8 is of U-shape in cross section and arranged in inverted relation when in assembled position in the stack unit for cooperation with upper tie bar 3 and the pair of upright members 1 to form a rectangular unit supporting frame.

Supporting plates or base brackets 9 in the form of flat plate members are arranged in vertically extending relation against the outer face of upright members 1, one against each upright member with the central portion in engagement with the upright member. Each supporting plate is rigidly secured to adjacent upright member 1 with the lower edge of supporting plate 9 arranged at the lower extremity of base pad 7 on upright member 1, so that the lower edge will rest on the floor supporting the stack in transversely extending relation to the plane of the frame member. This provides a transverse support for each unit frame at opposite ends that will have bearing engagement with the surface of the floor on which the stack is supported for holding the frame in upright position against lateral swaying or tilting and thereby provide a rigidly supported stack unit.

Where two or more stack units are arranged in stack forming end to end relation as shown in Fig. 1 for example, adjacent upright members 1 of each unit are arranged in adjacent spaced relation on opposite sides of a single supporting plate 9. Bolts or other suitable securing means 9' (Fig. 9) are engaged through aligned apertures in the adjacent web portions of upright members 1 of each adjacent unit and supporting plate 9. The lower securing bolt 9' extends through the upright portions of base brackets 4 for each upright member, as well as the upright members and supporting plate 9. In this way the lower portions of upright members 1 of ad-

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jacent stack units are secured together and to a supporting plate 9 to provide a rigid stack construction joining the two units with adjacent upright members 1 in adjacent spaced relation. The upper ends of adjacent upright members 1 in a pair of assembled units are also connected together by bolts 3' (Fig. 5) with the inturned lips 3' on upper tie bars 3 engaged with one another between the upper ends of adjacent upright members 1 and have the same bolts extending through the upright members and the lips to rigidly secure the upper ends of adjacent upright members 1 together in spaced stack unit forming relation.

Slotted levelling brackets 10 are mounted on the free ends of each supporting plate on opposite sides thereof and are connected by bolts 10' (Fig. 2) to the supporting plate for vertical adjustment so that the lower face of the bracket can be moved relative to supporting plate 9 on which it is mounted to engage the adjacent floor surface in order to cooperate with the supporting plate in rigidly supporting the stack unit are in upright position, even through the floor surface may be uneven. These levelling brackets 10 cooperate with each supporting plate 9 to compensate for unevenness in floor surfaces at each stack column. The upper ends of each leveling bracket 10 are offset (Fig. 6) from supporting plate 9 to provide a groove along the face of supporting plate 9 for receiving and supporting the end portions of leveling shelf unit 11. Base shelf 11 (Fig. 6) is formed of sheet metal and has a hook-shaped depending projection 12 along the inner edge thereof formed to engage about the lower edge of the side flange on bottom connecting channel 8 to position and retain the base shelf in position at the bottom of a stack unit. The edges of base shelf 11 are formed with depending flanges 11' engaging in the grooves, above mentioned, between offset upper edges of leveling brackets 10 and supporting plate 9. The outer free edges of base shelf 11 is formed to provide a depending outer wall 11' terminating in an inwardly extending flange along the lower edge adapted to seat on the floor surface and extend between the outer end portions of supporting plates 9 at opposite ends of the stack unit, as shown for example in Figs. 1 and 2. Adjustable shelves 13 have end members 14 connected to each end of the shelf and arranged in spaced parallel relation. End members 14 are formed with interlocking projections arranged to engage in selected apertures 2 in upright members 1 of the stack unit for cooperation with the upright members in supporting each adjustable book shelf at a desired position on the stack unit with the shelf 13 in horizontal position to support books between end members 14.

Sway bars 17 have hooks 18 on opposite ends extending through apertures 18' (Figs. 1 and 6) in the web portions of adjacent assembled upright members 1 of the stack units and extend between upper and lower portions of upright members 1 at opposite ends of a stack unit in diagonal relation, as clearly shown in the drawings. Sway bars 17 are formed of a pair of rod sections having oppositely threaded inner ends threadedly engaged in a turn-buckle 19 so that rotation of central member 19 will move the rods toward or away from each other depending upon the direction of rotation of member 19. With a pair of these sway bars 17 extending in diagonal relation to each other in one or more units of a stack structure, it will be understood that any tendency toward endwise swaying of the stack units within the plane of upright members 1 is eliminated and that these sway braces provide a means for adjusting upright members 1 and all of the stack units assembled in stack forming relation into position with upright members 1 in vertical relation to form a rigid assembled stack unit structure.

When the end of an assembled stack unit is exposed in a room away from a wall, it is desirable to provide some means of finishing the end or ends of the stack unit as assembled and for this purpose an end unit is provided for

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assembly on the free end or ends of a stack unit. Each end unit has an upright member 100 provided with the usual base bracket 4 having a base pad 7 on the bottom of base plate 5 thereof. This upright member 100 is secured to the adjacent upright member 1 at the free end of the assembled stack unit. A cap member is engaged on the upper end of the upright member 100 of the end unit, as indicated at 20 (Fig. 6). Cap member 20 is formed of sheet metal and has an angular portion 21 engaged within the upper end of upright member 100 for receiving the attaching bolt that secures upright member 100 at the upper end to the adjacent upper end of the end stack unit by means of the usual bolt, as used in securing adjacent stack units together, as hereinabove described. The end unit also includes a plate 24 having a top flat portion 23 and downwardly depending short stiffening flanges 22.

End wall 24 is formed of substantially imperforate sheet metal having a width equal to the distance between upright members 1 and the outer edges of shelves 13 carried thereby. In the case of a double or two-sided stack where shelves are supported on opposite sides of upright members 1, as shown in Figs. 1 and 2 for example, end member 24 would extend between the free edges of the shelves on opposite sides of upright members 1, as shown in Fig. 3. End wall 24 is formed with a curved section 26 extending laterally to the main wall portion and terminating in inturned flanges 27 to simulate a thick end structure at the sides of the stack, in alignment with the free edges of the shelf. The lower edge of end wall 24 may also be formed with an inturned horizontal flange (not shown) to provide a supporting foot for the end wall. An attaching channel 25 is secured to the central portion of end wall 24 in vertically extending relation with the flanges of said channel extending in perpendicular relation from the inner face of the end wall toward the end stack unit. These flanges are spaced apart a distance sufficient to engage on opposite sides of end unit upright member 100 where the attaching channel is formed with apertures (not shown) adapted for alignment with apertures 2 in upright member 1 of the end unit to receive suitable securing bolts 28 for rigidly attaching upright member 100 of the end unit and end wall 24 in assembled relation. The inturned flanges on the curved side edge portions of end wall 24 are perforated at the bottom for engagement against the adjacent face of supporting plate 9 at the end of the stack to receive the attaching bolts 16' which also secure leveling brackets 10 thereto (Fig. 2). In this way, the end wall unit is securely attached in assembly relation to the end unit of the assembled stack structure.

Where it is desired to locate stack shelving against a room or building wall, it is preferable to use the stack units hereinabove described with shelves extending from upright members 1 on one side only. In providing this structure adjacent a wall, upright members 1 as hereinabove described, are formed into rectangular frame units which are arranged in adjacent but slightly spaced relation from the surface of the wall on which the stack is being mounted. Top attaching brackets 30 are secured to upper tie bar 3 of each stack unit, as shown in Figs. 4 and 5 for example, and also secured to the adjacent wall portion to secure each stack unit in vertically extending relation adjacent the wall. In this wall type construction, supporting plates 9 are constructed so that they are attached to upright members 1 in the same manner hereinabove described, in which they extend transversely from one side only of the upright members, as distinguished from extending in opposite directions, as shown in Figs. 1 and 2. Otherwise, the structure of the supporting plates is exactly the same as that shown and described previously. These supporting plates for a wall type unit stack are essentially a little more than half the length of the plates used with a stack unit having shelves on both sides of the rectangular unit frame.

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In some instances it is desirable to provide canopies for the top of the stack structure. For this purpose, canopy supporting brackets 35 in the form of flat plate members are positioned between the upper ends of upright members 1 at the adjacent ends of assembled stack units with the central portions perforated to receive the securing bolts which normally secure the upper ends of the stack units together in assembled relation. The free ends of these canopy supporting brackets extend outwardly in transverse relation from the upper ends of the upright members in a stack assembly having shelves on opposite sides and from only one side where the stack assembly is secured to the wall. These canopy supporting brackets are arranged in transversely extending relation from between the ends of each assembled stack unit.

Canopy members 36 in the form of sheet metal plates have depending flanges on opposite ends and the outer free edge portions are positioned between the outwardly extending ends of adjacent canopy supporting brackets 35 to which they are suitably bolted so as to extend between these brackets over the shelves carried by upright members 1. These canopy members extend from the upper tie bars to the outer edges of the shelves. In stack units having shelves on opposite sides of upright members 1 two canopy members are used, one on each side of the upper tie bar. In a stack unit secured to a wall, as above described, a canopy is used on one side only of the upper tie bar to cover the shelves on the one side thereof.

One or more of these stack units can be placed at any desired position on the floor of a building, in any room thereof, since the length of the unit from one upright member to the other, is limited to a length for example, of about three feet. By constructing units of about this length for example, one or more units can be assembled in aligned relation to provide the desired amount of shelf space for the books to be stored, either in a double face deck, or in a wall type stack with shelves on one side only. In order to improve the appearance of the assembled stack, end units may be applied to one or both ends of an assembled stack unit, or plurality of units, as the case may be. An assembled stack structure with or without its end unit, is placed on any type of floor covering used in buildings where it is desired to store books on shelving of this character for convenient access and will provide a unit that can be quickly set up, one that is very economical to manufacture and assemble in the position of its use. When assembled on the floor surface, the base pads and base brackets carry substantially the entire load of the stack units for distributing it to the floor and by reason of the rubber or other composition pad used will prevent the stack unit from shifting on the floor and from creeping or walking which might be caused from pushing on the stack or pulling upon it in placing or removing books or otherwise placing manual pressure against the stack tending to cause it to move in an unintentional manner. The supporting plates cooperate with the feet on upright members 1 and the pads in providing a rigid non-tilting support for the assembled stack structure and stack units when properly engaged with the floor, either with or without the cooperation of the leveling brackets. The sway braces or bars also cooperate to prevent endwise swaying movement of the assembled stack units and provide a simple cooperative assembly of unit frames forming a rigid stack unit for supporting a maximum number of books in a given space. The end members provide the desired finished appearance at the ends of the stack unit and conceal the assembly mechanism for the stack units. In this way stacks may be placed in any room of any building capable of supporting the weight of the books to be stored and arranged in rows with aisles between to provide access to the books with double faced stack units and single face stack units mounted against adjacent walls in spaced relation in the same row arrangement as the double faced units spaced from the wall.

In this way any desired arrangement of stack units may be made for storing books in a conveniently accessible manner in which the stack units may be easily disassembled to decrease the stack space or remove the stack unit from location for erection in another in an economical manner.

Upright members 1 at opposite ends of each unit rectangular frame structure forming the essential part of the unit, are arranged to have the flanges of the channel members open with the web portions together in adjacent spaced relation to provide for cleaning of the upright members, refinishing in case of corrosion and accessible through the open character of the construction to eliminate inaccessible hiding places for insects.

The invention claimed is:

1. A unit type book stack construction comprising a unit having a pair of spaced parallel upright channel members of substantially U-shape in cross-section with the central sections arranged in spaced parallel relation and opposite side flanges extending toward each other in aligned relation, said side flanges being formed with shelf supporting means cooperating on at least one side of said unit in supporting shelves extending between the ends of said unit, an upper tie bar connecting the upper ends of said upright channel members, a bottom spacer bar connecting the lower ends of said upright channel members and cooperating with said tie bar in retaining said upright channel members in spaced substantially parallel relation to form a rectangular frame unit, sway rods connecting the upright channel members of said unit in diagonal relation and retaining said upright channel members in vertical relation in the plane thereof, a supporting plate mounted on the lower end of each upright channel member against the outer sides of the central sections in substantially vertical transversely extending relation to the plane of said unit, the outer free ends of said plates extending to the outer edges of shelves supported on said upright channel members for supporting said unit in vertical relation against lateral tilting, supporting feet mounted one on the lower end of each upright channel member having a plate portion with the upper face engaging the lower edges of said upright channel member and the lower face engaging the floor surface for transmitting substantially the entire stack unit load to the floor supporting said stack construction, leveling brackets, and means adjustably mounting said brackets on the outer ends of said supporting plates to extend below the supporting plates for engaging the floor and compensating for unevenness of said floor in supporting said unit in upright position in cooperation with said supporting plates.

2. A library stack as claimed in claim 1 having composition rubber base pads mounted on the bottom face of said plate portions on said supporting feet and engaging the floor supporting said stack for cooperation to retain said stack unit against movement on said floor and eliminating marring of said floor.

3. A library stack as claimed in claim 1, having an end unit comprising an upright member secured to the outside face of an upright member of the stack unit, a substantially imperforate end wall, interengaging members on the upper ends of said end wall and upright member detachably retaining said upper ends in assembled relation, and means attaching the lower end of said end wall to said upright member to provide an end unit having said end wall formed to extend in transverse relation to the plane of said upright members outwardly to the free edges of bookshelves supported by said unit.

4. A unit type book stack construction comprising a plurality of stack units supported on a building floor in aligned adjacent interconnected relation, each unit having a pair of spaced parallel upright channel members of substantially U-shape in cross-section with the central sections arranged in spaced parallel relation and opposite side flanges extending toward each other in aligned rela-

tion, said side flanges being formed with shelf supporting means cooperating on at least one side of said unit in supporting shelves extending between the ends of said unit, an upper tie bar connecting the upper ends of said upright channel members, a bottom spacer bar connecting the lower ends of said upright channel members and cooperating with said tie bar in retaining said upright channel members in spaced substantially parallel relation to form a rectangular frame unit, sway rods connecting the upright channel members of at least one of said units in diagonal relation and retaining said upright channel members in vertical relation in the plane of said stack units, a supporting plate having opposite faces engaged in vertical transversely extending relation to said units between and with the central sections of adjacent upright channel members at adjacent lower ends of adjacent stack units, the outer free ends of said plates extending to the outer edges of shelves supported on said upright channel members for supporting said unit in vertical relation against lateral tilting, spacing means mounted between the upper ends of the upright channel members at adjacent ends of adjacent units cooperating with said supporting plate to retain adjacent units in spaced parallel relation, means securing adjacent ends of adjacent units in assembled cooperative stack forming relation, supporting feet mounted one on the lower end of each upright channel member having a plate portion with the upper face engaging the lower edges of said upright channel member and the lower face engaging the floor surface for transmitting substantially the entire stack unit load to the floor supporting said stack construction, leveling brackets, and means adjustably mounting said brackets on the outer ends of said supporting plates to extend below the supporting plates for engaging the floor and compensating for unevenness of said floor in supporting said unit in upright position in cooperation with said supporting plates.

5. A library bookshelf unit structure as claimed in claim 4 having rubber composition supporting pads between said supporting feet and floor in retaining said units in position on said floor against latter movement and eliminating damage to floor surface covering material.

6. A library bookshelf unit structure as claimed in claim 4 having an end unit mounted at one end of a plurality of interconnected units comprising an upright member secured to an adjacent upright member on the end stack unit in adjacent spaced relation and column forming cooperation, an end wall of substantially imperforate sheet material, interengaged connecting means on the top center portion of said wall and the upper end of said upright member securing said wall in assembled relation on said upright member, attaching means detachably connecting the lower end of said wall to said upright member in end unit forming relation, said end wall having the sheet material along opposite side edges formed into inwardly curved return bend portions forming rounded corner portions at opposite sides of said stack and at the ends of the shelves therein.

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