W. A. BORDEN.

LIBRARY BOOK STACK.

APPLICATION FILED NOV. 19, 1914.

1,165,566.

Patented Dec. 28, 1915.

4 SHEETS—SHEET 1.

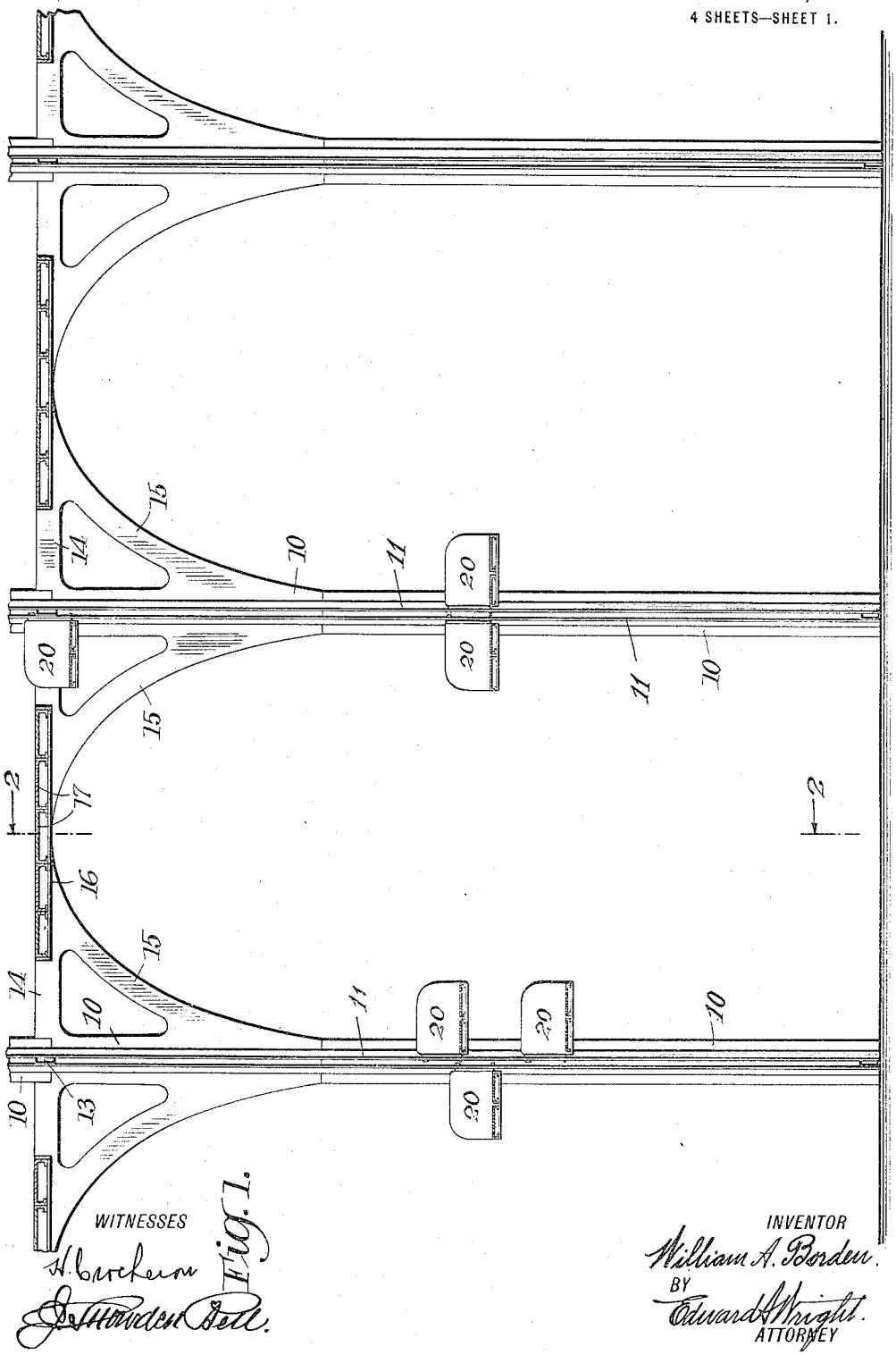


Fig. 1.

WITNESSES

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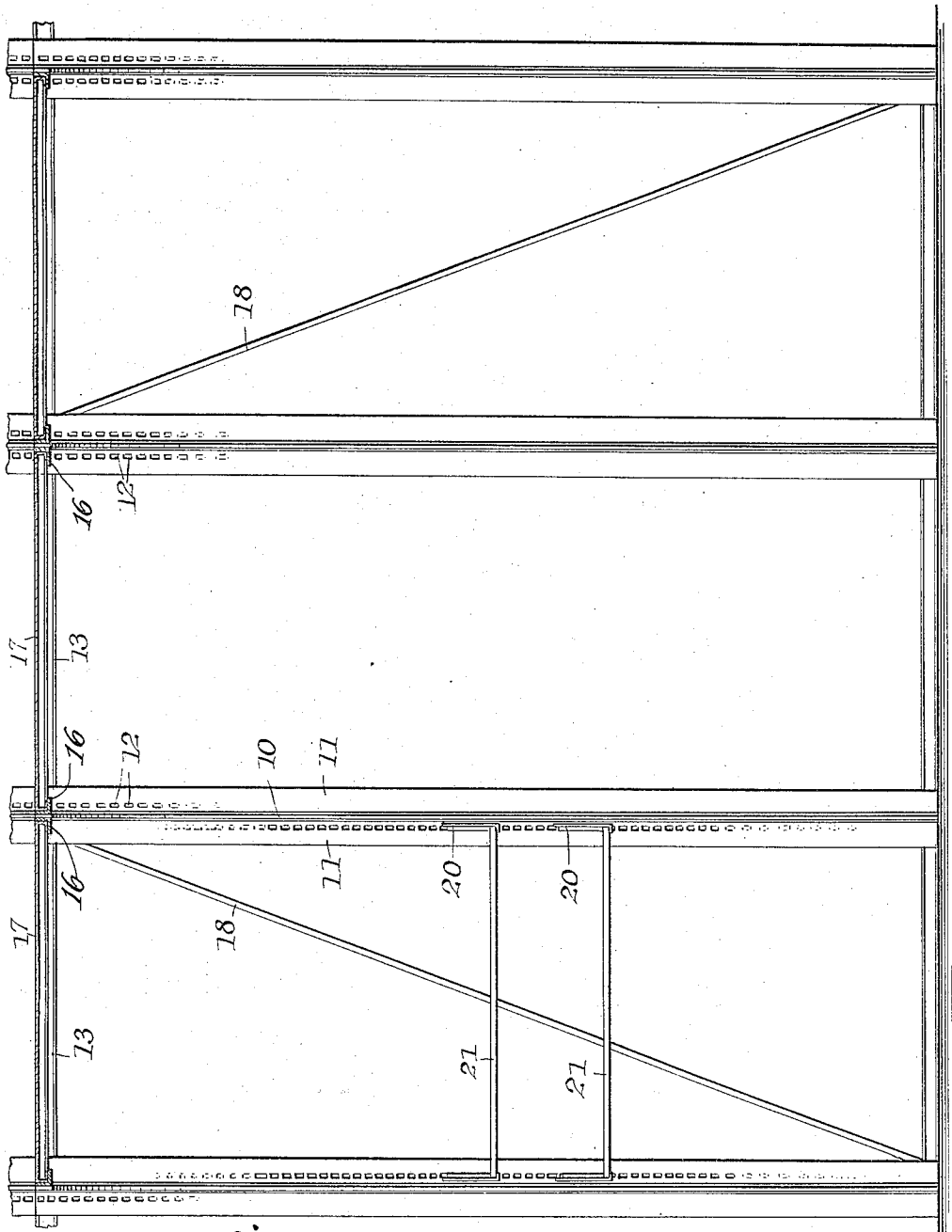


Fig. 2.

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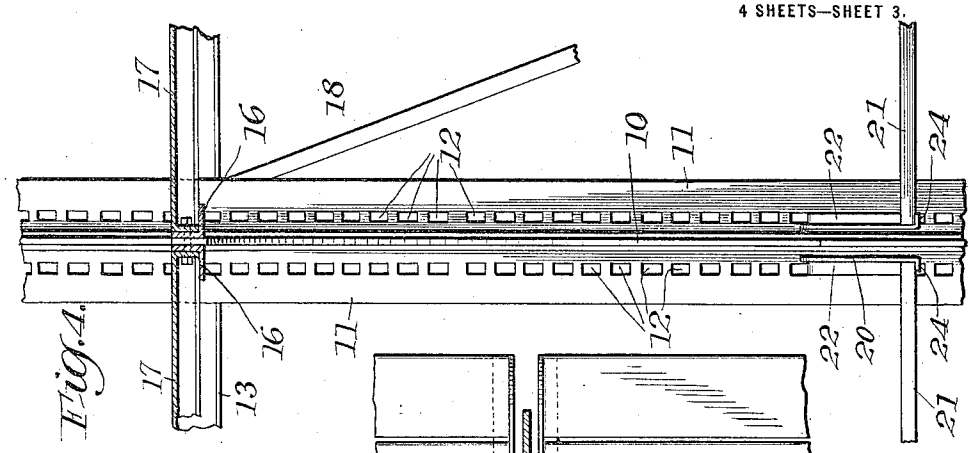


Fig. 4.

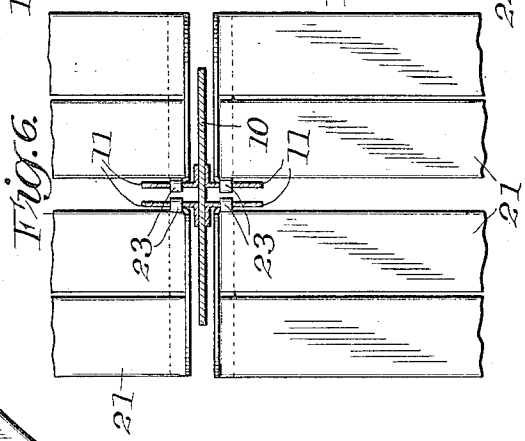


Fig. 6.

Fig. 3.

Fig. 5.

WITNESSES

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4 SHEETS—SHEET 4.

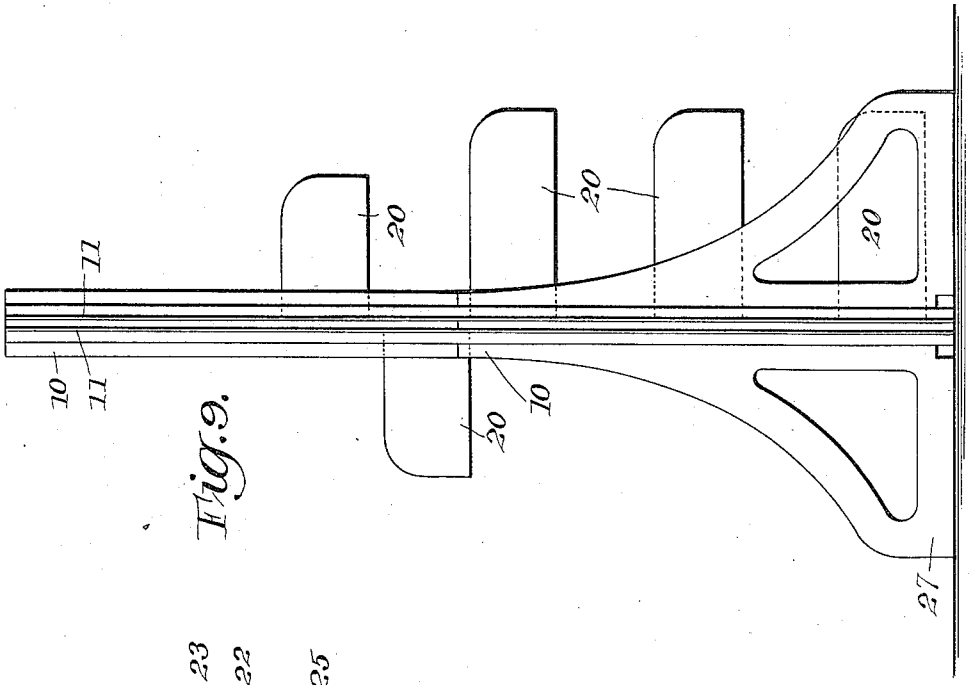


Fig. 9.

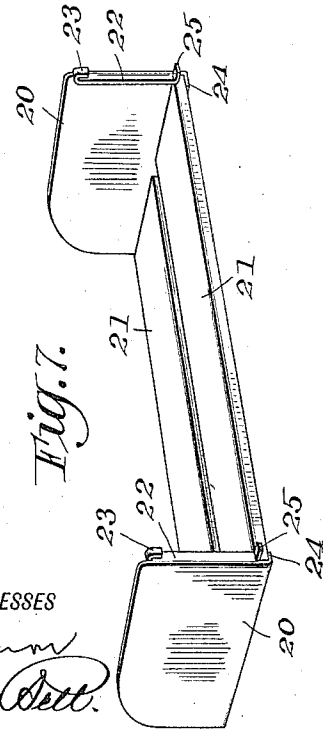


Fig. 7.

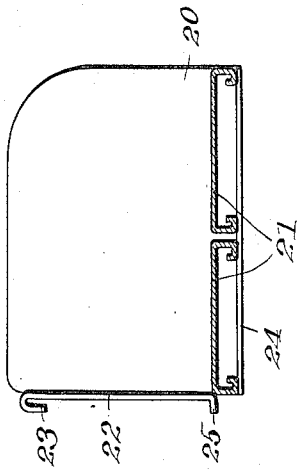


Fig. 8.

WITNESSES

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LIBRARY BOOK-STACK.

1,165,566. Specification of Letters Patent. Patented Dec. 28, 1915.

Application filed November 19, 1914. Serial No. 872,825.

To all whom it may concern:

Be it known that I, WILLIAM A. BORDEN, a citizen of the United States, and a resident of Westport, in the county of Fairfield and State of Connecticut, have invented a certain new and useful Improvement in Library Book-Stacks, of which improvement the following is a specification.

This invention relates to book stack construction for libraries, and more particularly to that type of construction in which the bracket form of shelf is employed.

Some of its objects are to provide an improved structure of this character, which shall be simple and light, but strong and securely braced against longitudinal and lateral swaying; which shall provide for the ready adjustment of book shelves of the bracket type upward or downward, without removing them laterally from the case or section; which shall have a free space for the circulation of air entirely around each shelf of books; which shall have all its parts and all the surfaces of the upright supports or columns freely exposed to light and air, and readily accessible for cleaning, fumigation, painting, and repair; which shall provide for a minimum clearance between the backs, and between the ends of the adjoining book shelves, thereby economizing space; which shall provide for the erection of the sections in successive stories of any desired number, and supporting the decks for balconies or passage ways at the respective stories upon the transverse bracing; and which shall allow for the free adjustment of a book shelf at the point of connection between one story and the next without interfering with the connections of the longitudinal and lateral sway bracing. A preferred form of construction in which these objects are attained will now be more fully described in detail, the features of novelty being set forth in the appended claims.

In the accompanying drawings: Figure 1 is a transverse sectional view showing three tiers or sections of a book stack construction embodying my improvement; Fig. 2, a longitudinal section taken on the line 2—2 of Fig. 1; Fig. 3, a transverse sectional view on a larger scale, showing the trussed cantaliver construction of one of the up-rights; Fig. 4, a view of the same, taken at right angles to Fig. 3, and showing the deck in longitudinal section; Fig. 5, a detail view showing the method of connecting the longitudinal sway bracing to the up-right; Fig. 6, a horizontal section of the upright, taken on the line 6—6 of Fig. 3, and showing the ends of four shelves supported thereon; Fig. 7, a perspective view of one of the bracket shelves; Fig. 8, a transverse section of the same; and, Fig. 9, a side elevation of one of the up-right sections when used only as a one story stack.

According to the construction shown in the drawings, the up-right supports or columns, which are arranged in longitudinal rows and spaced at about a standard shelf length apart, are composed of metal, preferably steel, sections having a transverse web portion, 10, extending between the ends of the book shelves, and flanges, 11, upon opposite sides of the web, extending between the rear edges of the book shelves and serving as a support therefor. While the flanges may be formed integral with the web portion, it is preferred to construct the same of a pair of stiffening angles rigidly secured, as by welding, upon each side of the web plate, 10. The book shelves are provided with hooks and the flanges, 11, of the angles are formed with a series of notches or slots, 12, extending in a continuous vertical row upon each flange for receiving the hooks on the book shelves, and supporting the same in any desired position. The two flanges upon each side of the web plate are spaced apart a sufficient distance to provide clearance for the hooks of the two shelves mounted back to back, and to receive the horizontal member, 13, of the longitudinal sway bracing at the top of each story of the stack.

When the stacks or cases are low, that is only one story or less in height, there will be no need for lateral or transverse bracing between the cases, but in book stacks of two or more stories, as now used in all large libraries, it is necessary to provide transverse bracing between the longitudinal tiers or sections for resisting lateral sway and insuring stability of the whole stack. Another feature of my improvement relates to this lateral sway bracing and comprises a trussed cantaliver construction, extending laterally from each one of the up-rights at each story, the cantalivers of opposite up-rights meeting together and forming an arch connection between the same. Each cantaliver truss preferably comprises a horizontal arm, 14, and a diagonal brace, 15, rigidly formed with the transverse web

plate, 10, of the up-right, and may be integral therewith, as shown, the diagonal brace being curved to give an arch effect. For all intermediate rows of up-rights, the cantalivers are ordinarily double, that is they project upon both sides of the up-rights, while on the end row, or with wall cases, the cantaliver has a single arm, and brace extending on one side only. The cantaliver truss will thus be formed of the same thickness as the web of the up-right, and may be either cut out with a special die from a single metal plate of the proper thickness or may be formed of separate pieces welded together. The stiffening angles, 11, which are welded to the sides of the web are preferably continuous for the height of each story, and give the desired strength and rigidity to the up-rights. For the purpose of connecting the successive sections of the up-right together at each story, a rectangular notch may be cut in the top of the web portion of one member to receive the lower end of the web of the up-right for the next tier above. The two pair of angles extending beyond this notch on each side will securely hold the foot of the next upper section in place without further fastening. In this way the stack may be extended upward to any desired height and number of stories.

The horizontal arms of the cantaliver trusses are designed to support the decks of the intermediate passageways at each story, and for this purpose, angles, 16, are secured upon opposite sides of the said arms for supporting the deck plates, 17, the ends of which are bent over to form flanges for the fastening bolts. These bolts may extend through the arm of the cantaliver, and the supporting angles and floor plate flanges on both sides of the cantaliver, thus firmly securing all these parts together and bracing the structure. Each deck plate may also be formed with double turned stiffening flanges along its side edges, thereby greatly increasing the strength and rigidity of the passage-ways. The deck plates do not extend transversely the full width of the space between the up-rights, but sufficient clearance is left on each side for the movement of the book shelves in vertical adjustment, past the edge of the deck, this space preferably being a little greater than the width of the standard book shelf.

The longitudinal braces, 13, are preferably in the form of channel sections having short flanges adapted to fit in between the angles, 11, of the up-rights to which they are bolted, the diagonal braces, or tension bars, 18, also being attached by means of the same bolt, as shown in Fig. 5. In order that the sway bracing connections shall not interfere with the adjustment of the shelves at the top of each story, the braces, 13, do not extend in between the flanges, 11, far enough to cover the slots, 12, but are bolted to said flanges outside of the vertical row of slots, 12, which are spaced uniformly along the flanges from the top to the bottom. In this way there is nothing to interfere with the free vertical adjustment of the shelves at any point, including the space opposite the decks between stories, and this is an important feature, since it is sometimes very desirable to be able to raise the top shelf of a story a notch or two, or to lower a bottom shelf a similar amount, and thereby greatly increase the capacity of the section and the stack.

The shelves are of the bracket type, having side plates or brackets, 20, and bottom plates, 21, the whole being formed of thin sheet metal, the bottom plates having their ends and side edges bent over to form stiffening flanges and rigidly secured to the side plates preferably by electric welding. The side plates also have their bottom edges bent at right angles to form horizontal supporting flanges, 24, and their back edges bent over to form flanges, 22, the upper ends of which are cut down and bent over to form the hooks, 23, for engaging the slots in the up-right angles for supporting the shelves. The bottom end of the back flange, 22, may be turned to form a projection, 25, for extending into another slot in the up-right and prevent the shelf from being dislodged by an accidental upward blow, the projections being spaced the proper distance below the hooks to engage the top edge of the slots. By means of this construction, a very light and strong shelf is provided, and one which takes up the minimum amount of book room. To adjust the position of a shelf up or down, it is simply necessary to pull out the shelf at the bottom very slightly to withdraw the projection from the lower slots, then raise the shelf sufficiently to release the hooks from their slots and move the shelf vertically to the desired location.

With my improved construction of up-rights, it will be seen by reference particularly to Fig. 6, that little or no room is wasted, as the backs of the shelves are brought up close together with their respective hooks substantially touching each other when inserted in opposite holes or slots of the flanges. This enables the rows of cases of the stack to be spaced closer together on centers than heretofore, and increases the capacity of the stack materially, particularly in large stacks. Another advantage is that all of the surfaces of the columns are freely exposed and readily accessible for disinfection, cleaning, repainting, and repairs.

Where the book cases are low, that is less than one story in height, as in children's libraries, or for wall cases, the cantaliver trusses may be inverted with the tapered

ends rounded off to form a base, 27, resting upon the floor for supporting the cases, as shown in Fig. 9. Otherwise the section of the uprights is the same as before described, and the shelves, 20, are adjustably supported thereon. This structure is entirely self-supporting and does not require any attachment to the walls. Where this structure is employed for wall cases around the sides of a room, the projection at the base will, of course, extend on one side only, and this constitutes an adequate support for the case so that no connections to the wall are necessary.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a book stack, an upright section formed of a transverse web plate having laterally extending arms at its upper end, and diagonal braces to form a cantaliver, and metal angles rigidly secured to opposite sides of said web plate.

2. In a book stack, an upright metal section formed of a transverse web plate, angles rigidly secured to opposite sides of said plate and having longitudinally projecting flanges spaced apart and provided with notches for supporting the book shelves.

3. In a book stack, an upright metal section formed with a transverse web plate and a pair of spaced flanges extending longitudinally from each side thereof and provided with vertical rows of slots for the adjustment of the book shelves.

4. A book stack construction comprising a plurality of rows of metal uprights, and cantaliver trusses comprising horizontal arms and diagonals forming transverse bracing between the uprights of adjacent rows.

5. A book stack construction comprising a plurality of rows of metal uprights, each formed of a transverse web plate and flanges projecting upon opposite sides and having a series of notches for supporting the book shelves, and a cantaliver truss extending from said uprights at the top of each story and comprising a horizontal arm and a diagonal brace formed integral with the web plate.

6. A book stack construction comprising a plurality of rows of metal uprights each formed of a transverse web plate and two spaced stiffening angles upon each side rigidly connected therewith, each of the longitudinally projecting flanges being provided with a series of holes for supporting the ends of the book shelves, and all surfaces being exposed and accessible for cleaning, painting, etc.

7. A book stack construction comprising a plurality of rows of metal uprights each formed of a transverse web plate having stiffening flanges upon each side, each of said flanges being provided with a series of slots for supporting the book shelves, and longitudinal braces connected to said flanges outside of said slots whereby the bracing does not interfere with the adjustment of the shelves.

8. A book stack construction comprising a plurality of rows of metal uprights each formed of a transverse web plate and a pair of stiffening angles rigidly connected thereto upon each side, the flanges of said angles having vertical rows of slots, book shelves having side brackets provided with hooks for engaging said slots, and longitudinal braces connected to said flanges outside of the row of slots.

9. A book stack construction comprising a plurality of rows of metal uprights, each formed of a transverse web plate having stiffening flanges upon each side, said flanges being provided with series of slots for supporting the shelves, cantaliver trusses connecting the opposite uprights, and comprising horizontal arms and diagonal braces formed rigidly with the webs of the respective uprights, and deck plates for passageways supported on said cantaliver trusses.

10. A book stack construction comprising a plurality of rows of metal uprights, each formed of a transverse web plate having stiffening flanges upon each side, said flanges being provided with vertical rows of slots, and book shelves, each comprising a bottom and two side plates, said side plates having their back edges bent over to form a flange and the top of said flange being turned over into a hook for engaging said slots.

11. A bracket book shelf comprising a bottom and two side plates rigidly connected together, the side plates having their back edges turned at right angles to form vertical flanges, and hooks at the top of said flanges.

12. A bracket book shelf comprising a bottom and two side plates rigidly connected together, the side plates having their back edges turned at right angles to form vertical flanges, hooks at the top of said flanges, and projections at the bottom thereof.

WILLIAM A. BORDEN.

Witnesses:
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A. S. FOWLER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."