

Feb. 7, 1961

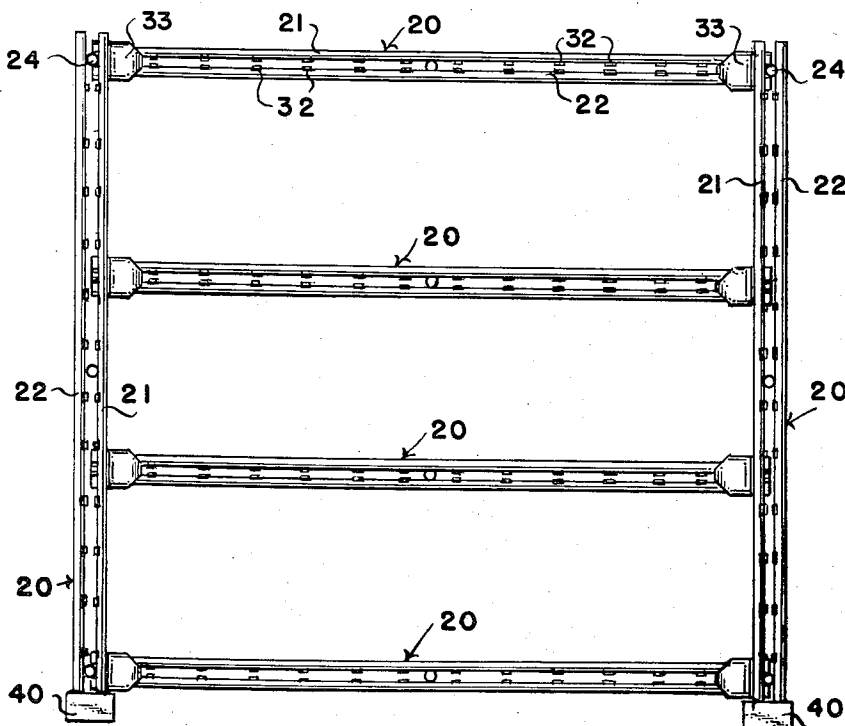
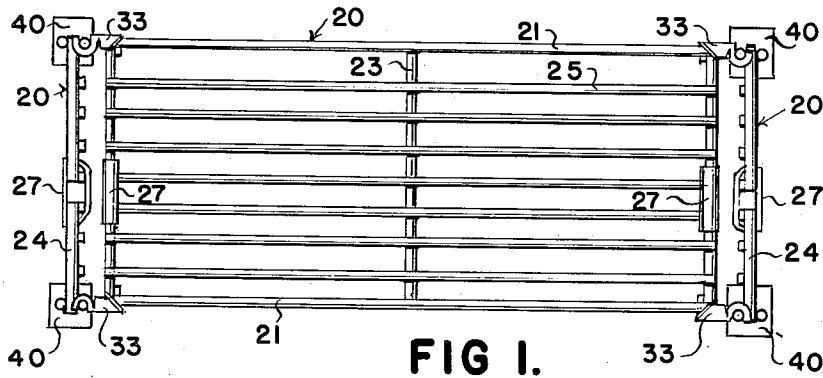
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2,970,702

STRUCTURAL UNIT FOR SHELVING

Filed March 11, 1958

3 Sheets-Sheet 1



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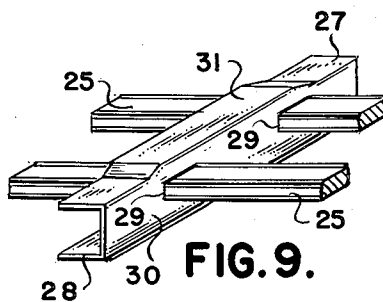
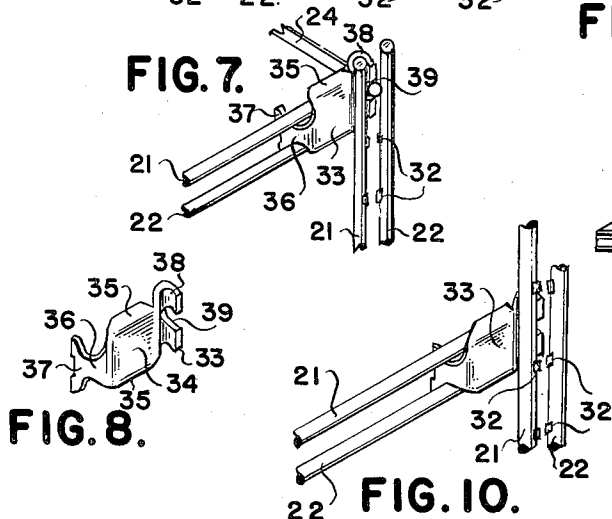
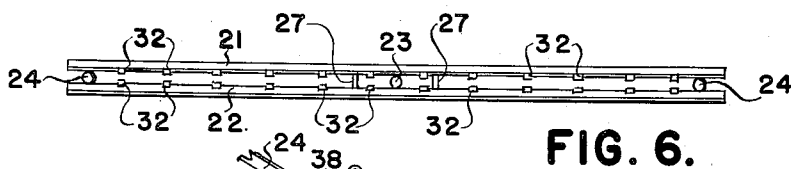
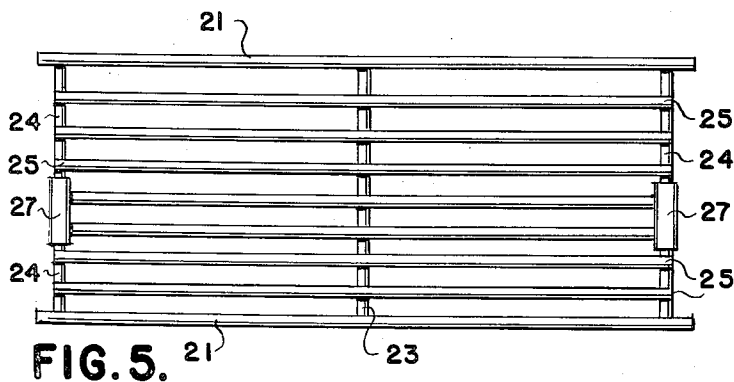
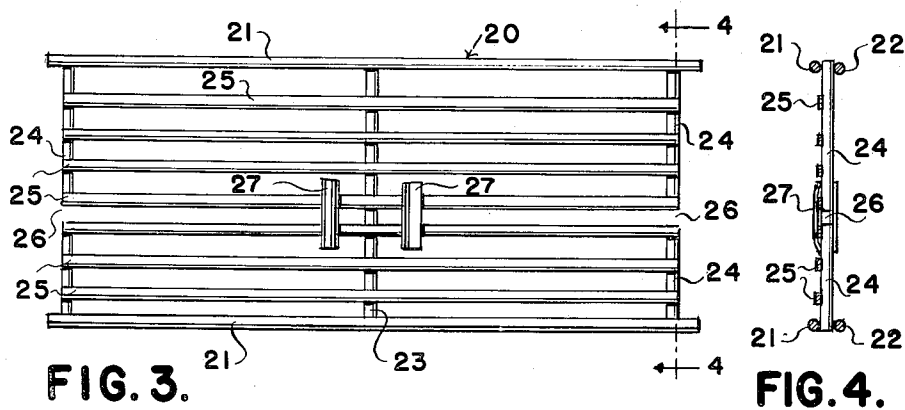
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STRUCTURAL UNIT FOR SHELVING

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3 Sheets-Sheet 2



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STRUCTURAL UNIT FOR SHELVING

Filed March 11, 1958

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FIG. II.

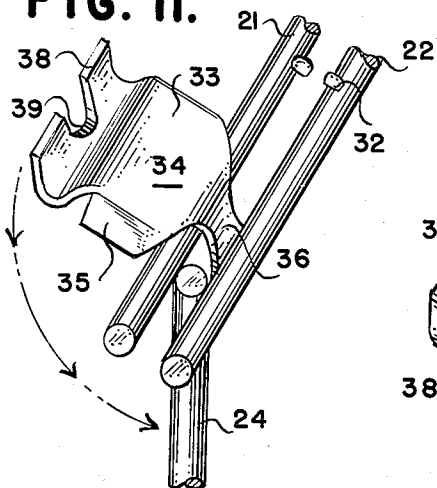


FIG. 12.

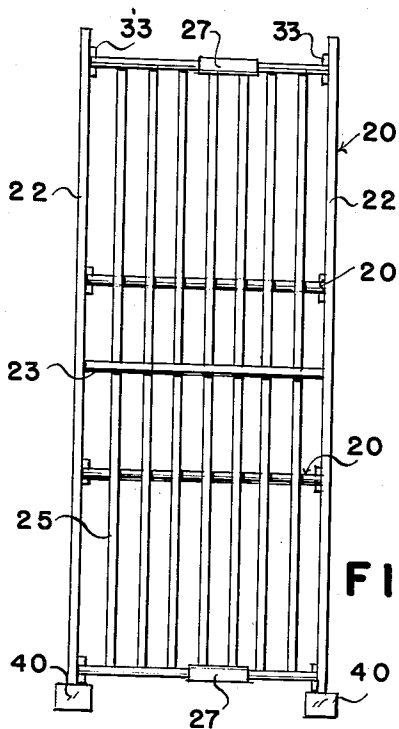
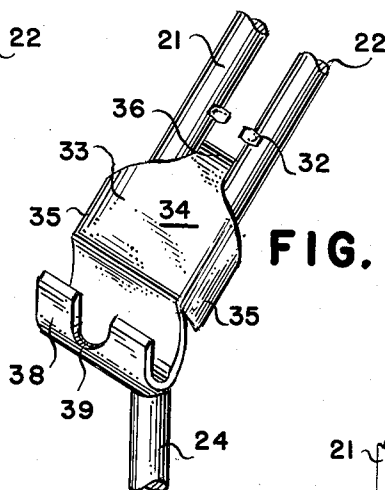


FIG. 13.

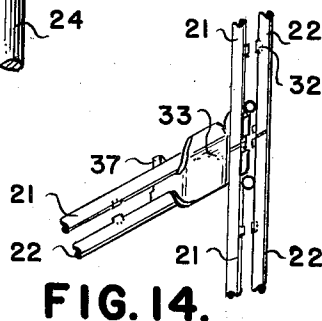


FIG. 14.

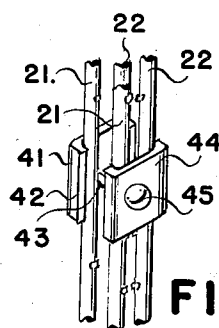


FIG. 15.

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2,970,702

STRUCTURAL UNIT FOR SHELVING

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Filed Mar. 11, 1958, Ser. No. 720,799

9 Claims. (Cl. 211-148)

This invention relates in general to easily erected structural units and in particular to structural units capable of being assembled into articles of furniture such as shelving, book cases, and the like.

An object of this invention is to provide prefabricated structural units of standard dimensions adapted to be quickly and easily secured together into exceptionally well joined assemblies without the use of tools.

Another object of this invention is to provide structural units capable of being secured one to the other in a wide variety of possible positions to allow the construction of more greatly varied and differently designed shelf combinations.

Yet another object of this invention is to provide structural units which may be assembled into shelving wherein a single structural unit may either be used as a shelf member or as a vertical shelf support.

Still another object of this invention is to provide structural units each of which may have its ends flexed together during its assembly with another unit after which it ends may be locked apart to secure its assembly.

A further object of this invention is to provide an improved clip, which may be used to positively secure a first structural unit perpendicular to a second structural unit so that the first structural unit is not only locked against movement in its own plane, but is also locked against movement in a direction normal to its plane.

A still further object of this invention is to provide easily assembled structural units wherein each side of each structural unit comprises two parallel wires disposed one above the other and being attached to and separated by cross wires which extend from one side of each structural unit to the other side except for the two end cross wires which have a portion removed in order to allow the ends of the sides of each of the structural units to be forced together to thus enable hooked clips which are attached to the ends of the parallel wires to be hooked between the sides of another similar structural unit.

Additional objects, advantages and features of invention reside in the construction, arrangement, and combination of parts involved in the embodiment of the invention and its practice otherwise as will be understood from the following description and accompanying drawings wherein:

Figure 1 is a top view of a book case assembled from identical structural units;

Figure 2 is a front view of the book case;

Figure 3 is a top view of a structural unit with the slide locks in the unlocked position;

Figure 4 is an end view of a structural unit;

Figure 5 is a top view of a structural unit with the slide locks in the locked position;

Figure 6 is a side view of a structural unit with the slide locks in the unlocked position;

Figure 7 is a perspective view of a fragment of one end of a structural unit secured to the top of another structural unit by means of a clip;

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Figure 8 is a perspective view of a clip;

Figure 9 is a perspective view of a portion of two adjacent longitudinal members of a structural unit with a slide lock shown in position about them;

Figure 10 is a perspective view of a fragment of the end of a structural unit secured in an intermediate position to another structural unit by means of a clip;

Figure 11 is a perspective view of a fragment of the end of a structural unit showing a clip being secured into position;

Figure 12 is a perspective view of a fragment of the end of a structural unit showing a clip secured into position;

Figure 13 is a side view of the book case shown in Figure 1;

Figure 14 is a perspective view of fragments of the ends of one horizontal structural unit and two abutting vertical units secured by means of a clip; and

Figure 15 is a perspective view of fragments of the sides of two parallel and side by side structural units secured by means of a clip.

Referring to the drawings in detail, Figure 3, Figure 4 and Figure 6 show a structural unit 20 which has two upper side members 21 and two lower side members 22. These side members are disposed parallel to each other with the upper side members directly over the lower side members and in parallel alignment therewith. The side members may be held in relation to each other by being secured to the centrally disposed cross member 23 and the end cross members 24. The side members may be welded or otherwise attached to the cross members depending upon the material of which the structural units are made.

Parallel to the upper side members 21 and attached in a like manner to the cross members are the longitudinal members 25 which are disposed close enough together to be able to define an actual shelf surface for the support of books or other articles. The end cross members 24 are cut away between two longitudinal members 25 to form the gaps 26. Disposed about the two longitudinal members 25 that extend on either side of the gaps 26 are the slide locks 27. As shown in Figure 9, each slide lock 27 consists of an outward facing channel member 28 having two apertures 29 in its connecting back portion 30 through which pass the two longitudinal members 25. The channel member 28 may have a slightly raised upper central portion 31 to allow the slide lock to be more easily grasped to slide it along the longitudinal members 25. In their cross-section, the longitudinal members 25 may be round, square, rectangular as shown, or any other suitable shape. As shown in Figure 6, the upper surface of the lower side member 22 and the lower surface of the upper side member 21 have a series of regularly spaced projections 32 pinched out from the material of the side members or otherwise formed to project from them. Each projection 32 on the upper side member 21 has a corresponding projection 32 formed on the lower side member 22 directly below and opposite it.

To assemble structural units 20 into a book case or like object, clips such as are shown in Figure 8 are used. Each clip 33 consists of a flat body portion 34 with two backward turned flanges 35 adapted to fit above and below a pair of side members of a structural unit. An anchor portion shank 36 extends backward from one end of the clip and terminates in the wider locking tip 37. Opposite the locking portion shank 36, there extends backwards and then curves forwards the semi-cylindrical hook portion 38 containing the slot 39. Figure 11 shows how these clips 33 are secured to a structural unit. The anchor portion shank 36 and the locking tip 37 are turned sideways and inserted between the upper side member 21

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and the lower side member 22 just behind the end cross member 24. The clip is then rotated as shown by the arrows in Figure 11 into the position shown in Figure 12 in which the backward turned flanges 35 extend above the upper side member 21 and below the lower side member 22 as the locking portion shank 36 extends between these side members 21 and 22 terminates behind them in the wider locking tip 37 which now cannot pass between the side members 21 and 22. At the same time the hook portion 38 of the clip 33 lies beyond and directly in front of the ends of the upper and lower side members so that, as long as the clip 33 remains in the same relative position, it cannot move.

To assemble these identical structural units into a book case as shown in Figure 1, Figure 2 and Figure 13, two structural units would have their slide locks 27 slid outwards into the position shown in Figure 5. It can be seen that in this outward, locked position that the slide locks 27 span the gaps 26 to hold the end cross members 24 to act as if they were a single piece. These two units then have the base blocks 40, as shown in Figure 1, Figure 2 and Figure 13, secured to one end. These base blocks may be made of wood or any other suitable material. They are pre-drilled to snugly receive an upper and lower side member 21 and 22 in each block. The two structural units are then placed in a vertical position on the base blocks whereon the structural units to be placed horizontally are prepared. Each of these structural units have clips attached to its four corners in the manner described. These structural units are then attached between the vertical structural units in the following manner. Their slide locks 27 are placed in the unlocked position shown in Figure 3 after which the sides of each end are forced together to close the gaps 26 and allow the hooked portions 38 of the clips 33 to be placed inside the vertical side members 21 and 22 of the two vertical structural units. Then, as shown in Figure 1, the slide locks are moved outwards to enlarge the gaps forcing the side members outwards thereby causing the clips to be pressed against the side members of the structural units in vertical position and locking the horizontal units in position. The spreading action serves to prevent the clips fixed to the ends of a structural unit from moving together and becoming unhooked. In order to prevent the side members of the vertically disposed unit from being spread apart and to increase the gripping action of the clips against the vertically disposed side members, the slide locks 27 on the vertically disposed units are also moved into locked position.

As shown in Figure 7, an upper, a lower, or an intermediate structural unit used as a shelf may be secured to a vertical structural unit so that an end cross member or a centrally disposed cross member lies in the slot 39 in the hook portion 38 of the clips 33. In this manner the slots 39 and the cross member disposed within them firmly anchor the clips to prevent any vertical movement of the horizontal structural units. As is further shown in Figure 10, each clip and therefore each structural unit forming a shelf may be secured in a number of intermediate positions between the upper or lower side members of the vertical shelf supporting structural units. The clips are retained in these intermediate positions either by the hooked portions 38 of the clips 33 resting on one of the many projections 32 as in the case of clip 33 shown in Figure 10, or the clips 33 are retained by having the slot 39 in the hooked portion 38 of a clip disposed about a projection 32. The slot 39 in the clips thus doubles the number of intermediate positions in which a horizontal structural unit may be placed to be thereupon secured in position by means of clips and projections.

The practice of this invention is not limited to the construction of a simple book case from identical units as is shown in Figure 2. The structural units may be made in any number of standard lengths, however the longer

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structural units may need to have more than one centrally disposed cross member to retain their rigidity. If a number of standard structural units are manufactured of differing lengths, those units of one given length may be used interchangeably as either vertical shelf supports or as horizontal shelves. In this manner, many combinations become possible with a number of standard lengths. In addition, if it is desirable to extend the length of an assembled structure such as that shown in Figure 2, additional horizontal structural units may be attached by one end in the manner described to the outwardly facing side members of one of the vertical structural units and attached by their other ends to a third similar vertical shelf supporting structural unit. In this manner structures may be assembled of any length. They may have their horizontal structural units at the same or different heights between the various vertical structural units.

If it is desired to extend a given structure upwards, the uppermost horizontal structural unit is secured as shown in Figure 14 with the clips above and resting on the end cross members 24. In this manner only the lower half of each clip engages the lower vertical structural unit and an upper vertical structural unit can be placed in an abutting relationship upon the lower vertical structural unit so that the upper half of each clip can also engage the upper vertical structural unit. In addition the extreme inner end of each upper and lower side member may have a small projection 32 formed on it so that these adjacent projections on both the upper and lower vertical structural units may both extend through the slot 39 in the hooked portion 38 of a clip 33. This securely locks the upper and lower vertical structural units together. This very desirable feature which enables a completed assembly to be lifted or suspended from the top is made possible by the slot 39 in the clips 33.

If a section of a book case is to be doubled in thickness to support a television set or for a like purpose, a simple clamp 41 such as shown in Figure 15 may be employed. This clamp 41 consists of a back portion 42 containing a threaded aperture 43 and a front portion 44 having a larger aperture through which the screw 45 may be passed to enter the threaded aperture 43. To use the clamp 41, one book case or like assembly is placed in front of another and the clamps 41 are used to secure the front edge of one structural unit to the back edge of another structural unit as shown in Figure 15.

This invention enjoys many advantages. Since a single unit may be used as either a shelf or a vertical shelf support, only one basic type of unit need be manufactured with the result that superior and less expensive structural units may be provided. As has been pointed out, these structural units and the clips may be combined into a greater number of combinations. Because the structural units are clean cut and simple in their appearance, they may be combined to form aesthetically pleasing structures such as room dividers, book cases, and the like. Although units of a single thickness may be assembled without tools and by a completely unskilled person, the assembled furniture is structurally rigid and cannot come apart even if the shelves are urged upwards.

While I have disclosed my invention with particularity in the best form now known to me, it will nevertheless be understood that this is purely exemplary and that modifications in the construction, arrangement, and combination of parts, substitution of materials and substitution of equivalents mechanically and otherwise, may be made without departing from the spirit of the invention.

I claim:

1. A structural unit adapted to be assembled into shelving with similar structural units, said unit comprising a pair of upper side-members, a pair of lower side-members and at least one centrally located cross-member fixed below and between said upper side-members and above and between said lower side-members to hold said side-members substantially parallel with said upper side-

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members disposed directly above said lower side-members, small regularly spaced projections extending from the lower side of said upper side-members and from the upper side of said lower side-members, a pair of end cross-members fixed to said side-members in the same manner and said centrally located cross-member, longitudinal members fixed to said cross-members with a gap formed in each of said end cross-members between two adjacent longitudinal members, slide locks mounted on said longitudinal members so that said slide locks may be slid outwards along said longitudinal members to span the gaps in said end members, and clips with each of said clips having a flat body portion, two parallel flanges on said body portion, a backward extending anchor shank, a wider locking tip on said anchor shank, and an outwardly facing hook portion containing a central slot adapted to span one of said cross-members so that one of said clips may be secured to each corner of one of said structural units by the insertion of said anchor shank and said locking tip sideways between said upper and lower side-members behind said end cross-member and by the rotation of said clip to lie with said flanges alongside said side-members while said outwardly facing hooked portion extends in front of the ends of said side-members and said anchor shank portion passes between said side-members behind said end cross-member so that said locking tip is prevented from passing between said side-members and thus secures said clip to said structural unit so that said structural unit may be secured horizontally between two of said structural units in vertical positions by squeezing the ends of said horizontal structural unit together to hook said outwardly facing hook portions of said clips inside said side-members of said vertical structural units and moving said slide locks outwards to lock said horizontal structural unit in a position where said hook portions of said clips may be retained by said small projections.

2. A structural unit adapted to be assembled with similar structural units to form shelving, said structural unit comprising side members disposed in parallel spaced relation and longitudinal members disposed intermediate said side members, a cross member disposed transversely of said side members securing said side and longitudinal members in position, end members disposed adjacent the ends of said side and longitudinal members and secured thereto, each of said end members being provided with a gap therebetween, adjacent longitudinal members being secured to said end members on each side of the gaps in said end cross members whereby the ends of said side members may be flexed toward and away from each other, locking means disposed across said gaps and slidably mounted on said adjacent longitudinal members for movement toward and away therefrom, said locking means when disposed remote from said gaps permitting the ends of said side members to be flexed and preventing such flexure when disposed adjacent to said gaps to thereby lock the ends of said side members a fixed distance apart.

3. A unit in accordance with claim 2 wherein said locking means comprises a channel member having a connecting back portion provided with spaced apertures through which said longitudinal members extend.

4. A unit in accordance with claim 2 wherein the actuation of said locking means serves to lock the ends of said side member in maximum spaced apart position.

5. A structural unit adapted to be assembled into shelving with similar units, said structural unit comprising two upper side-members, two lower side-members, at least one centrally located cross-member fixed below and between said upper side-members and above and between said lower side-members to hold said lower side-members substantially parallel with said upper side-members disposed directly above said lower side-members, end cross-members fixed to said side-members in the same manner as said centrally located cross-members with a

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gap in each of said end cross-members to allow the ends of said side-members to be flexed together, longitudinal members fixed to said cross-members and said end cross-members disposed parallel to said upper side-members with adjacent longitudinal members secured on either side of the gaps in said end cross-members, slide locks mounted on adjacent longitudinal members to slide outwards and span the gaps in said end cross-members, and clips adapted to be attached to the ends of said side-members having a slotted hooked portion facing outward so that a structural unit may be attached horizontally between two structural units in vertical positions by flexing together the ends of the side-members of the horizontal structural unit to hook the clips to the side-members of the vertical structural units whereon the actuation of said slide locks prevents the unhooking of the horizontal structural unit, spaced projections provided extending from said side-members so that said clips may be selectively located along said side-members by abutment with at least one of said projections including projections formed at the extreme ends of said side-members so that, as one of said structural units is secured horizontally between the two of said structural units in vertical positions, said clips may be secured above and rest upon the uppermost of the end cross-members of the vertical structural units so that two additional structural units may be secured above and rest upon the uppermost of the end cross-members of the vertical structural units so that two additional structural units may be placed vertically and in abutting relationship upon the vertical structural units with each of said clips having two of said small projections on the ends of said side-members of each of two of the abutting vertical structural units extend together through the slot in the hooked portion of each of said clips.

6. A structural unit adapted to be assembled with similar structural units to form shelving, said structural unit comprising side-members disposed in parallel spaced relation and longitudinal members disposed intermediate said side-members, a cross-member disposed between said side-members securing said side-members in position, end cross-members disposed adjacent the ends of said side-members, said end members being provided with a gap and being secured to the ends of said longitudinal members, the ends of said side-members being free to be flexed toward and away from each other in the region of said gap, said gap in the end members being disposed between adjacent longitudinal members and a locking means disposed about the longitudinal members extending along the sides of said gap, said lock being provided with apertures within which said longitudinal members are received and retained in fixed spaced-apart relation in the region of said lock and being slidable along said longitudinal members from a position remote from said gap to a position adjacent thereto, said locking means when disposed remote from said gap permitting the ends of said side-members to be flexed toward each other and restoring said ends to spread condition when disposed adjacent said gap, whereby said end members are disposed a fixed distance apart, when said locking means is disposed in said last-named position.

7. The unit according to claim 6, including clips carried by the ends of said side-members, said clips having a hooked portion facing outward so that a unit may be attached horizontally between two similar units in vertical position by flexing together the ends of the side-members of the horizontal unit to hook the clips to the side-members of the vertical units whereon the actuation of said locking means causes the hooked portion of said clips to bear against the side-members of the vertical units thereby locking said units with respect to each other.

8. The device according to claim 7, wherein spaced projections are provided extending from said side-members so that said clips may be selectively located along said

side-members by abutment with at least one of said projections.

9. The device according to claim 7, wherein a slot is provided in the hooked portion of said clips, said slot being adapted to receive one of said end cross-members. 5

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