

Sept. 28, 1965

L. MASLOW

3,208,408

KNOCKDOWN SHELVING UNIT

Filed March 1, 1963

2 Sheets-Sheet 1

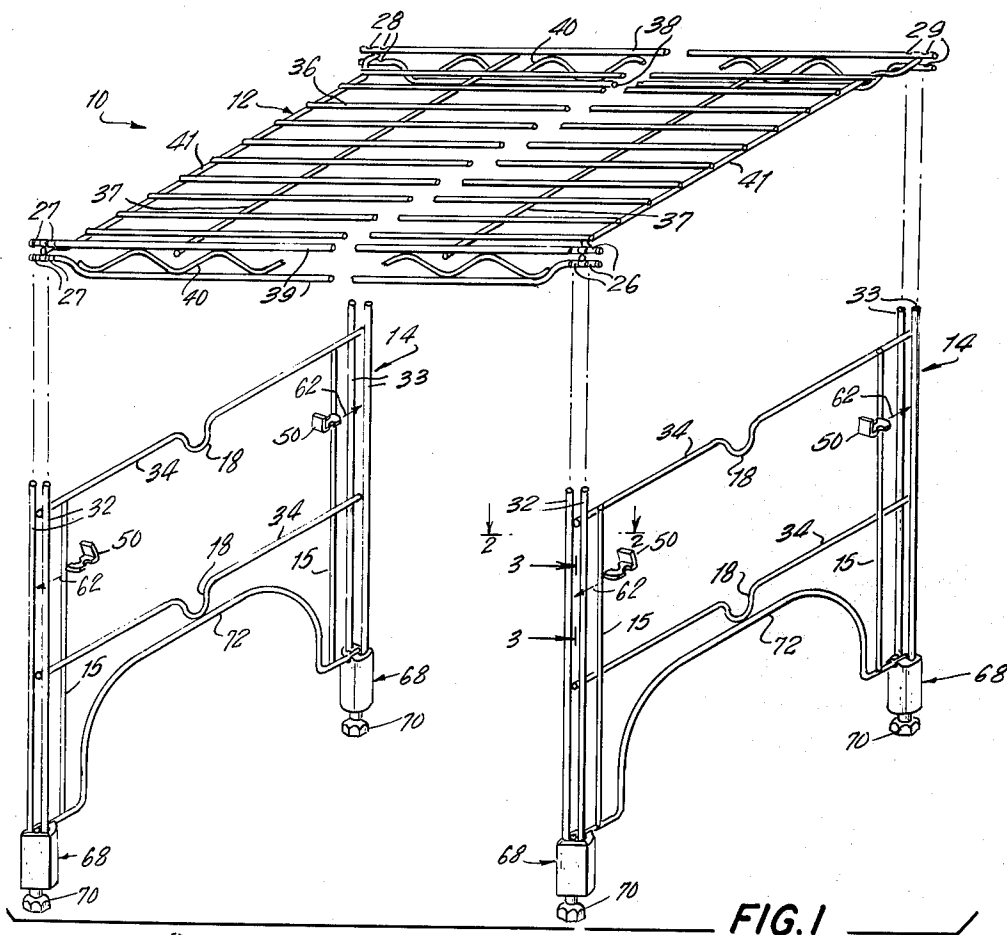


FIG. 1

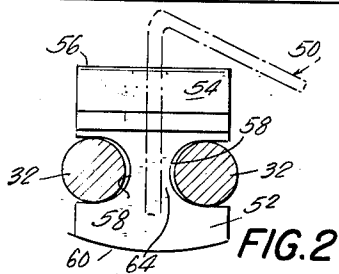


FIG. 2

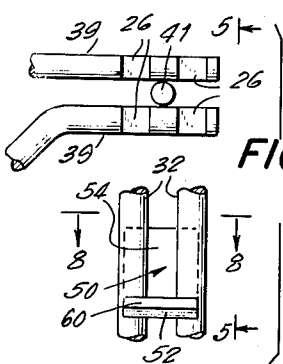


FIG. 4

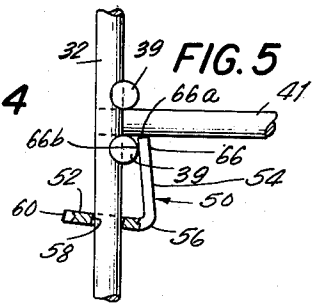


FIG. 5

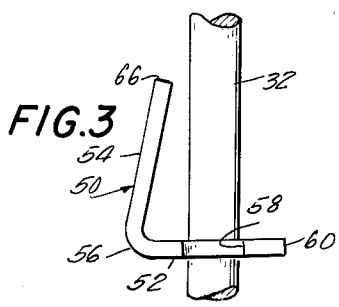


FIG. 3

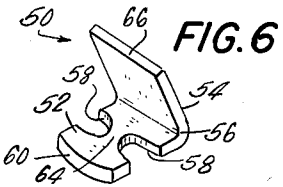


FIG. 6

INVENTOR
LOUIS MASLOW
BY
Friedman & Goodman
ATTORNEYS

Sept. 28, 1965

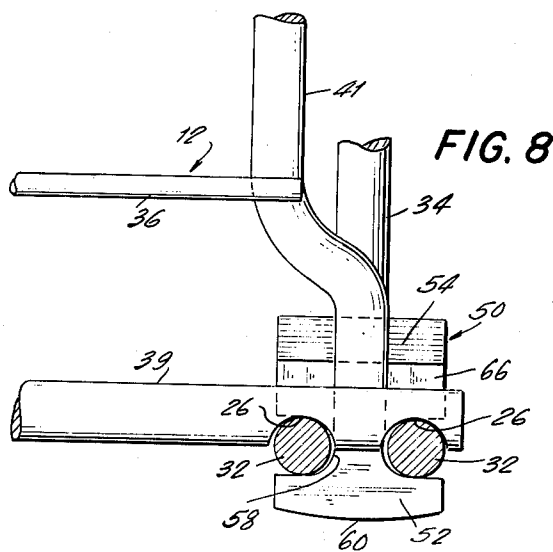
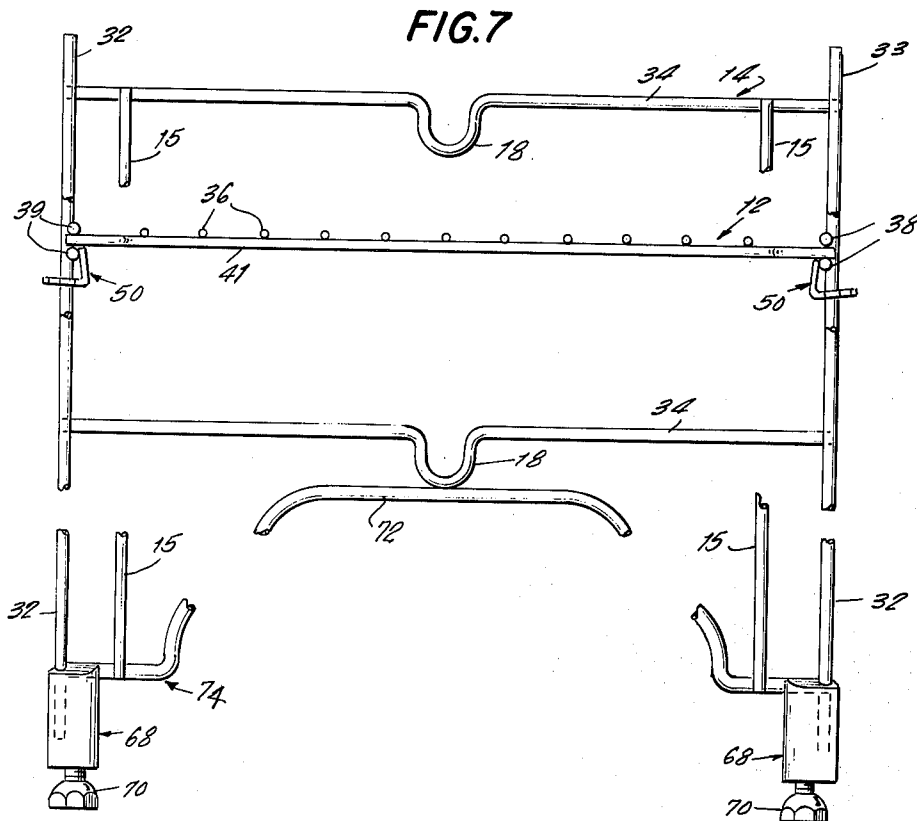
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2 Sheets-Sheet 2



INVENTOR.
LOUIS MASLOW
BY
Friedman & Goodman
ATTORNEYS

1

3,208,408

KNOCKDOWN SHELVING UNIT
Louis Maslow, Huntsville Road, Dallas, Pa.
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3 Claims. (Cl. 108—148)

The present invention relates to further improvements in the construction of furniture such as cabinets, shelves, bookcases or the like which can be readily assembled from component parts dismantled or modified. Knock-down shelving units of the type to which the present invention relates are illustrated and disclosed in my United States Patent No. 2,919,817, issued on January 5, 1960, and in my co-pending application Serial No. 126,709, filed on July 25, 1961, now Patent No. 3,138,123, granted June 23, 1964.

The present invention is directed to frames of substantially similar construction which can be joined by a non-skilled person to form a variety of shelving units and may be dismantled or modified. The coupling means are integrally incorporated in the frames requiring but a simple operation to effect an assembly or the dismantling of an existing assembly. In particular, the present invention is directed toward a highly novel arrangement which provides for vertical adjustability of the shelf units.

In prior art devices of the type to which the present invention relates, the vertical spacing between superimposed shelf units was dependent upon the vertical spacing of horizontal stiffening members on the end supports which supported the shelf members. The shelf members rested upon said horizontal supports and as a result the initial spacing between the horizontal supports of the end members predetermined the vertical spacing between the superimposed shelves.

In view of the foregoing, it is a primary object of the present invention to provide a shelving construction of the described type wherein the vertical spacing between the horizontally disposed shelf units is not limited to the vertical spacing of horizontal support members on the end support units.

It is another object of the present invention to provide a shelving construction of the described type wherein the vertical spacing between the superimposed horizontal shelf units may be varied or adjusted as may be required or desired.

In connection with the foregoing object, it is another object of the present invention to provide means for accomplishing the adjustment in the vertical spacing between superimposed horizontal shelf units in a very simple and inexpensive manner and without requiring the necessity for any tools whatsoever.

In this connection, it is a further object of the present invention to provide for a highly novel clip which can be adjustably secured in any desired position along the vertical extent of the end support members to provide a supporting means thereon for mounting the horizontal shelf unit thereon.

It is a still further object of the present invention to provide an inexpensive shelving construction adapted for mass production methods of fabrication which can be readily assembled or modified into a variety assortment of furniture shapes or dismantled into substantially similar units adapted for transportation and storage without tools wherein the means for coupling the components are integrally incorporated in the components requiring a relatively simple manual operation to either dismantle or secure the components together and wherein provision is made for facilitating the coupling of the components together at various adjusted vertical positions of horizontal components relative to vertical components which provision results in a superior type of coupling action.

2

A still further object of the present invention is the provision of economical frames designed particularly for production techniques wherein the said frames can readily be joined and wherein vertically adjustable coupling means are provided to permit an unskilled person to manually dismantle or assemble the frames without the aid of tools and yet to provide a simplified and superior adjustable coupling action.

Other and further objects and advantages of the present invention will become readily apparent to those skilled in the art from a consideration of the following specification taken in connection with the appended drawings which illustrate the best mode presently contemplated for carrying out the invention.

In the drawings:

FIGURE 1 is an exploded view of a knockdown shelving unit pursuant to the present invention which is provided with means for adjustably coupling the horizontal shelf units to the end support units in a vertical direction as required;

FIGURE 2 is a fragmentary sectional view on an enlarged scale taken on the line 2—2 of FIGURE 1 and illustrates a clip coupled in position on an end member prior to the mounting of the horizontal shelf unit thereon;

FIGURE 3 is a sectional view on an enlarged scale taken on the line 3—3 of FIGURE 1 and illustrates the clip in position on the end support unit;

FIGURE 4 is an exploded fragmentary detail view illustrating the manner in which the horizontal shelf unit is coupled to the adjustable supporting clip on the end support member;

FIGURE 5 is a fragmentary detail taken on the line 5—5 of FIGURE 4 and illustrates the shelf unit coupled to the end support unit by means of the clip of the present invention;

FIGURE 6 is a perspective view of a clip in accordance with the present invention;

FIGURE 7 is an end view of an assembled knockdown shelving unit pursuant to the present invention with portions broken away for purposes of illustration; and

FIGURE 8 is a fragmentary sectional view on an enlarged scale taken on the line 8—8 of FIGURE 4.

Referring now to the drawings in detail, there is shown a knockdown shelving unit 10 of the type illustrated and described in my previously identified patent and patent application. The shelving unit 10 is constituted by a shelf or frame component 12 which is supported between a pair of support or frame components 14. The frame or shelf 12 comprises spaced ribs 36 secured to transverse rods 37. As best shown in FIGURE 1, the front and rear edges of the frame comprise pairs of spaced ribs 38 and 39 which are closely spaced adjacent the ends of the frame and more widely spaced in parallel relation along the central portion thereof. The pairs of spaced ribs 38 and 39 are further provided with a truss-like reinforcement in the form of a sinuously bent wire 40 which is secured to the upper and lower members or ribs 38 and 39 at abutting points thereof as by welding. The longitudinal edges of the frame are thus substantially reinforced against bending stresses and a more rigid assembly is achieved wherein considerably greater weights may be supported over substantially increased stands. The ribs 36 are welded to the upper surfaces of the transverse rods 37. However, at each of the opposite ends of the shelf frame 12, provision is made for an additional transverse rod 41 which is welded to the lower surfaces of the ribs 36. The exterior edges of the ribs 38 and 39 are provided at their respective ends with curvate pairs of notches 26, 27, 28 and 29 which provide means for securing the frame 12 to transverse supporting frames 14 as will be disclosed.

The supporting frames 14 each comprise pairs of ver-

tical supports 32 and 33 which are interconnected with a pair of spaced horizontal stiffeners 34 and with a third horizontal stiffener 74 having an upward bow 72, which form transverse supports for the shelves. The stiffeners are interconnected by vertical supporting struts 15. The space separating the pairs of supports 32 and 33 is smaller than the overall width of the shelf frame 12. That is, the out-to-out dimension from the ribs 38 to the ribs 39 is greater than the space separating the inner surfaces of the supports 32 and 33. Consequently, the notches 26, 27, 28 and 29 are made large enough to permit the insertion of the frame between the supports 32 and 33 of the supporting frame members 14.

As described in detail in my identified copending application, each of the horizontal stiffeners 34 of the support frames 14 is provided centrally thereof with an integral U-shaped portion 18. The U-shaped portions 18 form expansion elements or beams within the horizontal stiffeners 34 so that when the shelf elements 12 are associated or mounted by the end supports 14, as hereinafter described in detail, the expansion means 18 will expand slightly so as to increase the lateral distance between the horizontal supports 32 and 33 to facilitate the full movement of the shelf element 12 to its normal horizontal position. When the element 12 reaches its normal horizontal position, the expansion means 18 will compress somewhat or reduce its horizontal dimension so as to provide the necessary compressive force to effect a secure coupling between the shelf frames 12 and the support frames 14.

Heretofore, the vertical spacing between the stiffener elements 34 predetermined the vertical spacing between the assembled shelf units 12 on the end supports 14 in view of the fact that the shelves 12 rested upon the underlying horizontal stiffener elements 34. However, pursuant to the present invention, the vertical means between overlying shelves 12 is not limited to the vertical spacing between the stiffener elements 34 so that the shelves 12 may be vertically adjusted as desired on the supports 14. In this connection, provision is made for the clips 50 which may be provided on the supports 14 for mounting the shelves 12 in vertically adjusted relation thereon. Four clips are required for each shelf 12 so as to accommodate the four respective corners thereof. The clips 50 are initially formed of soft steel which is case hardened after fabrication so that it is much harder than the material of which the supports 14 are formed.

Each clip 50 is of generally V formation constituted by the cooperating integrally relating arms 52 and 54 which are joined together at the apex 56 of the clip. While the arm 54 is generally of rectangular conformation, the arm 52 differs therefrom and is provided with a pair of opposing inwardly directed and transversely extending notches 58 and with a generally arcuate free marginal edge 60. In order to mount a clip 50 on an associated pair of vertical supports 32 or 33 as the case may be, the clip is moved into engagement with the associated pair of supports from a position inwardly of the support element 14 as illustrated in FIGURE 1 the clip being moved into engagement with the associated vertical support rods as indicated by the arrows 62. It will be noted that in the position of the clips illustrated in FIGURE 1, the curved marginal edge 60 of each clip is the foremost portion thereof. The clip is rotated by 90 degrees before it enters between the associated pair of vertical ribs as illustrated in broken line condition of the clip 50 in FIGURE 2. With the clip in the broken line position thereof, the arm 52 may readily pass between the associated pair of vertical supports 32 or 33 as the case may be. It will be noted that each arm 52 of clip 50 is provided with a narrow neck 64 which is defined by the associated pair of notches 58. When the neck is disposed between the associated pair of vertical supports 32 or 33, as the case may be during the insertion of the clip therebetween it being apparent that the wider portion of the arm 52 ex-

tending from the neck 64 to the arcuate edge 60 has passed beyond the associated vertical supports, the clip is then rotated in a counter-clockwise direction viewing the broken line position thereof in FIGURE 2 so that the associated vertical supports will be engaged by the notches 58 of the clip as illustrated in the full line position of the clip in FIGURES 2 and 3. It will be noted, as best seen in FIGURE 3 that in said position of the clip 50 the arm 52 thereof is disposed in a direction normal to the associated vertically extending supports 32 or 33 as the case may be and that the arm 54 extends at an acute angle relative to the vertical supports. In said position of the clip, the free end 66 of arm 54 is only slightly spaced from the associated vertical supports. The notches 58 of the clip are dimensioned so that they will have a relatively loose fit on the respective vertical supports nevertheless when a clip is mounted in the position thereof illustrated in FIGURE 3, the clip will remain in the mounted position on the vertical supports. As previously indicated, four clips, two on each support until 14, are required to mount one shelf 12. Assuming now that four clips 50 have been mounted on a pair of supports 14, it being understood that there are two clips on each such support, and that such clips are mounted on each support in a predetermined vertical position thereon between a pair of the horizontal struts 34 thereof, the shelf 12 may then be mounted on the supports 14 to form the assembly 10. It will be understood that the horizontal shelf frame 12 is tilted relative to the horizontal position and that the notches 26, 27, 28 and 29 are aligned with the associated vertical supports 32 and 33, as required. The horizontal frames 12 are then forced downwardly toward the horizontal position thereof causing the notches to securely engage and encompass the supports 32 and 33. Each corner of the shelf 12 as it moves downwardly along the associated vertical supports 32 or 33 as the case may be will initially engage the free marginal edge 66 of the associated clip 50. Continued downward movement of the shelf 12 will cause the clip 50 to pivot relative to the vertical rods on which it is mounted so that the arm 54 thereof will move outwardly away from the vertical rods as illustrated in FIGURE 5 while the lower arm 52 will move upwardly thereon in a generally clockwise direction viewing FIGURE 5 so that the edges of the notches 58 will dig into the softer material of the vertical support rods 32 or 33 as the case may be. Each corner of a shelf 12 is firmly seated on its associated clip 50 when the lower transverse rib 38 or 39 thereof as the case may be is engaged between arm 54 and the adjacent vertical supports 32 or 33, as the case may be, and the associated rod 41 is in abutment with the marginal edge 66a of free end 66 of arm 54 of the clip as shown in FIGURE 5, it being understood that the clip is now biting into the vertical supports 32 or 33 since the clip is formed of a harder material than said supports so that the clip will thereafter not slip along the vertical supports but will remain in position thereon due to the fact that the clip bites into the vertical rod. Moreover, it will be understood that due to the stressed condition of arm 54 of the clip, the inner surface 66b thereof applies a bias against the rib 38 or 39 engaged thereby. The previously described expansion and contraction of the U-shaped portions 18 facilitate the engagement of the shelves 12 on the clips 50 provided on the supports 14. It will be understood that when a shelf 12 is mounted by the clips 50 in adjusted vertical position on the supports 14 there is sufficient compressive pressure between the walls of the notches and the vertical supports to prevent dislodgment during normal use, said compressive pressure being aided by the contraction of the expansion unit or means 18 in the stiffener element 34. In addition, as previously stated, it will be noted that the lower ones of each of the pairs of ribs 38 and 39 are biased against the adjacent vertical supports 32 or 33 by the stressed clip arms 54 and the end rods 41 bear upon marginal edges 66a of the clips 50 which are

5

firmly seated on the vertical supports 32 and 33 by the described inter-engagement therewith so as to augment the retaining frictional engagement between said ribs and the supports 32 and 33.

The disposition of the supports 32 and 33 within the notches prevents longitudinal and transverse movement of the frame. Since the frame is only called upon to resist vertical downward pressure from objects placed on the ribs, it is not necessary to positively restrict upward movement of the frame 12 relative to the supports 14. However, it will be understood that the tendency for such upward movement is resisted by the compressive force applied by the expansion elements 18 as they tend to contract after the horizontal frame elements 12 reach their full horizontal position.

To dismantle the assembly, it is only necessary to force manually one pair of ribs upward relative to the engaging supports. Such upward pressure causes the ribs to move beyond the free end 66 of the associated clips 50 and the frame then tilts relative to the horizontal so as to reduce the frictional engagement between the supports and the ribs. The dimensions of the horizontal frame relative to the support spacing is such that the induced frictional forces can be readily overcome by manual force applied by a person of less than average strength.

By reference to FIGURES 7 and 8, it will be readily apparent that a wide range of vertical adjustment of each shelf 12 is possible between each pair of spaced horizontal stiffener elements 34. As a result, the shelves 12 may be vertically spaced as desired vertically of the supports 14. As here shown, it will be noted that each support 14 is provided also with an adjustable leg assembly 68 having a vertically adjustable leg 70 which may be vertically adjusted relative to the associated support 14.

While I have illustrated and described the presently

6

preferred embodiment of the invention, it will be readily apparent that various changes and modifications may be made therein without however departing from the spirit and scope thereof as set forth in the appended claims.

I claim:

1. A clip for a knockdown shelving unit comprising a V-shaped member having a pair of arms diverging from a common apex, one of said arms having provision to engage a support in biting relation therewith and the other of said arms being operable to cant said one arm to effect said biting relation, said one arm having notch means defined therein to effect said biting relation, said notch means comprising a pair of opposing outwardly extending notches defined in said one arm.

2. A clip as in claim 1, said notches defining a narrowed throat portion therebetween.

3. A clip as in claim 2, said one arm having a free arcuate marginal edge, said throat portion being disposed between said apex and said edge.

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FRANK B. SHERRY, *Primary Examiner*.