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 [21] Appl. No. **878,394**  
 [22] Filed **Nov. 20, 1969**  
 [45] Patented **Jan. 4, 1972**

3,557,439 1/1971 Dykeman ..... 29/200 A X  
 FOREIGN PATENTS  
 555,226 8/1943 Great Britain..... 29/200

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[54] **APPARATUS FOR ERECTING SHELVING**  
 7 Claims, 9 Drawing Figs.

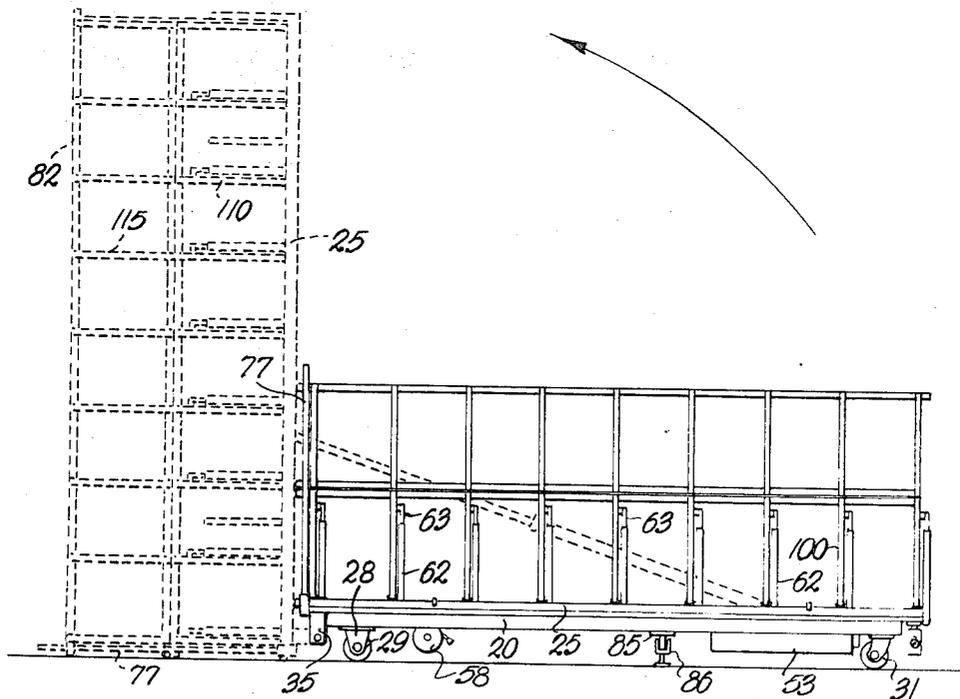
[52] U.S. Cl. .... 29/200 R,  
 29/200 A  
 [51] Int. Cl. .... B23p 19/00  
 [50] Field of Search..... 29/200 R,  
 200 A, 200 B, 211 M

[56] **References Cited**

**UNITED STATES PATENTS**

3,413,703 12/1968 Sanford ..... 29/200 B X  
 3,538,578 11/1970 Heise et al. .... 29/200 B

**ABSTRACT:** Removable shelver apparatus for and method of assembling a plurality of metal shelves into an integral shelving unit in a horizontal position and then erecting the shelving unit to a vertical position. Shelves are vertically placed in spaced relationship on a rectangular upper frame which is pivotally mounted on one end to and horizontally disposed on a rectangular lower base frame. Adjustable extensions having associated gripping means are connected to the upper frame and hold the metal shelves in place while structural members are bolted to the shelves to form an integral shelving unit. Locking means bias the shelving unit to the upper frame as the same is pivoted 90° with respect to the base frame to place the unit in an upright position.



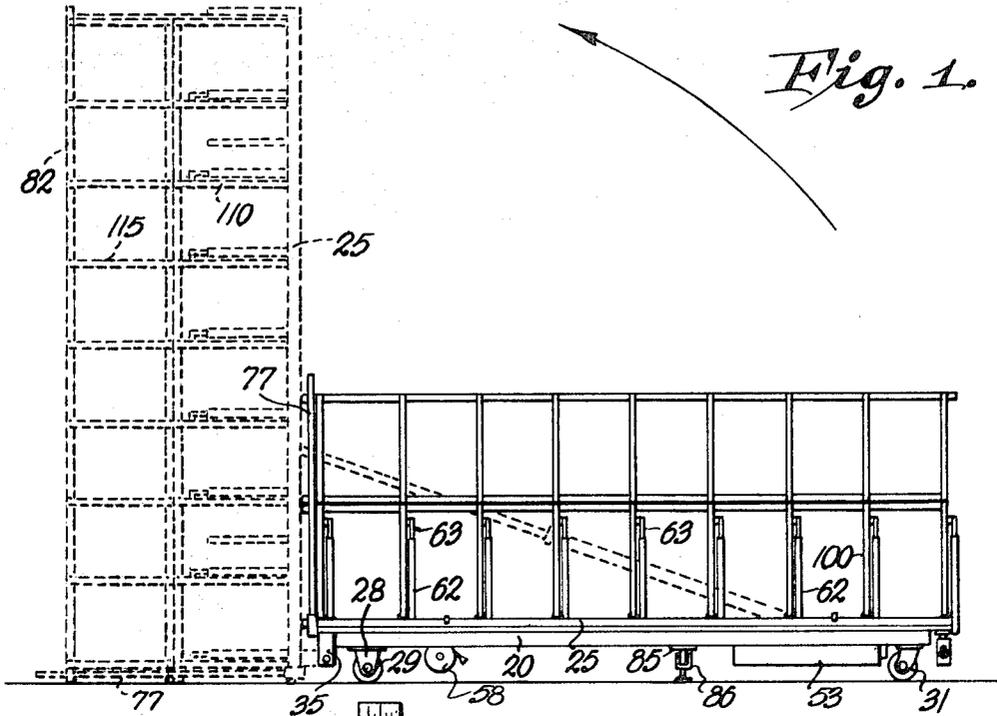


Fig. 1.

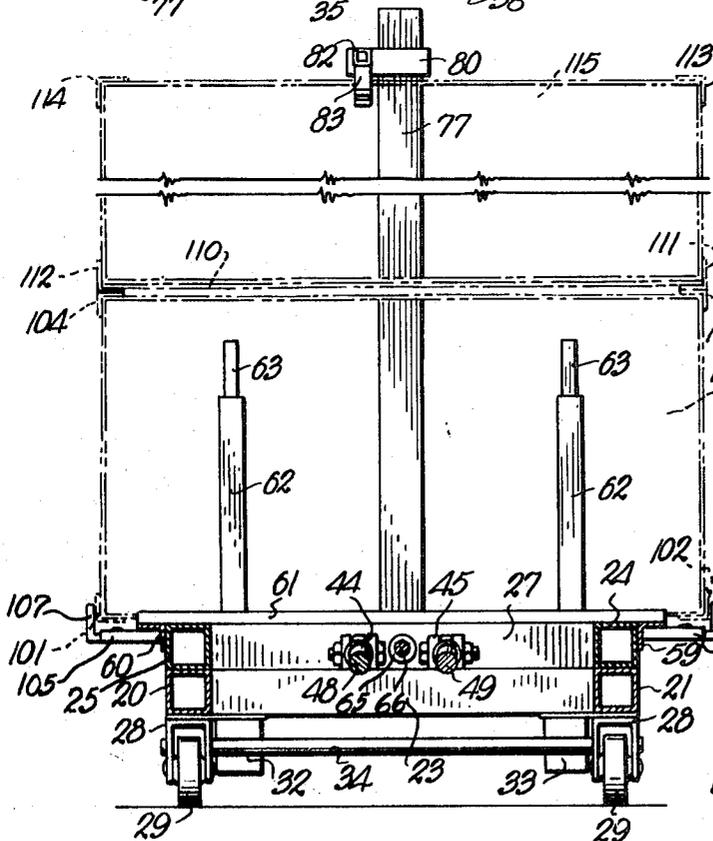


Fig. 6.

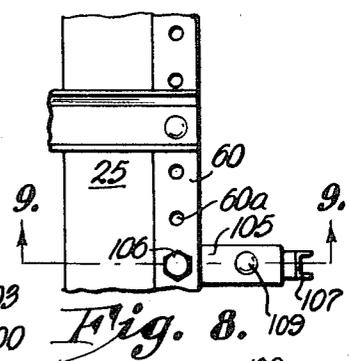


Fig. 8.

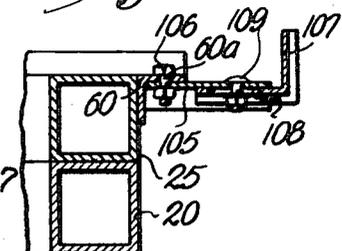


Fig. 9.

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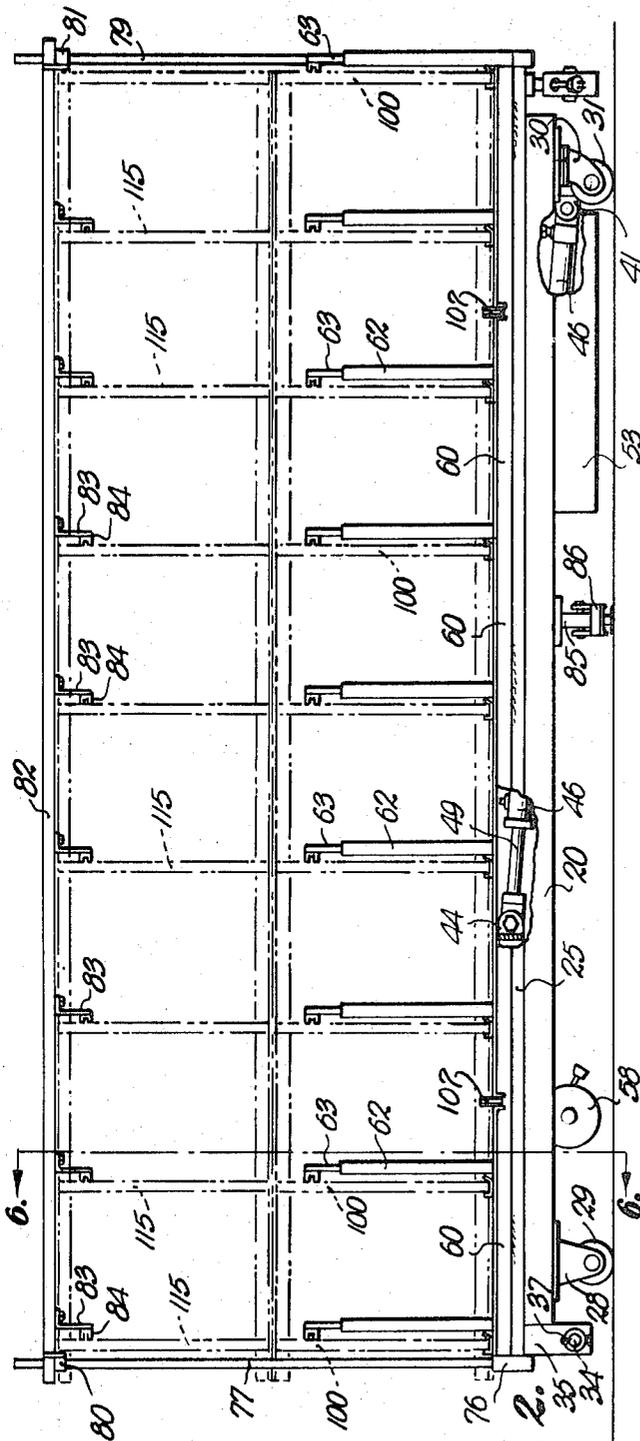


Fig. 2.

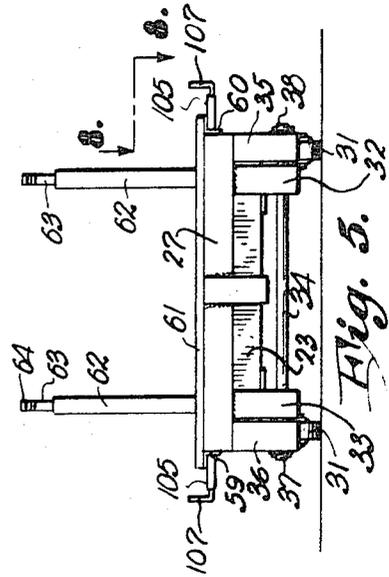


Fig. 5.

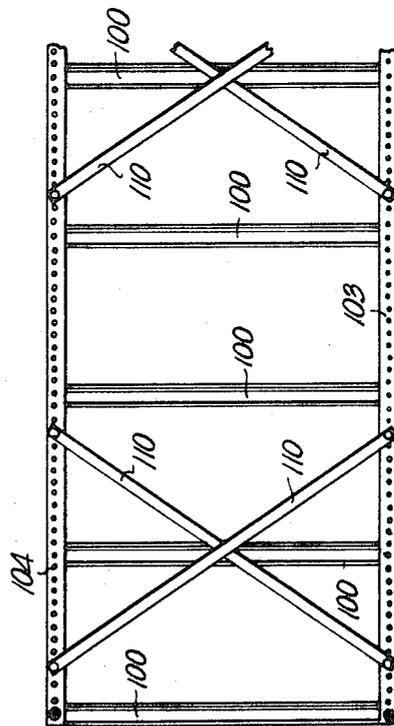


Fig. 7.

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## APPARATUS FOR ERECTING SHELVING

## BACKGROUND AND SUMMARY OF THE INVENTION

For many businesses which handle goods, storage space is an exceedingly important consideration. Shelving has long been recognized as a solution to the problem of storage space. Where the need is particularly acute as for example in warehouses, stock rooms, and the like, shelving of metal construction is employed for its superior strength and durability.

A typical metal shelf can be characterized as a piece of sheet metal in the form of a rectangle with its edges turned down to form a peripheral lip. A plurality of angle irons and cross braces are commonly bolted to several shelves at their peripheral lips to form an integral shelving construction.

In addition to the shelving material, shelving construction represents a sizable investment in both time and labor. There has long been the need for an apparatus and method to speed the assembly and erection of metal shelves, while at the same time to reduce the labor force required for the assembly and erection of metal shelves.

The primary purpose of this invention is to provide an apparatus and method to speed the assembly and erection of metal shelves of the type which require structural bracing and bolting in the assembly thereof to provide stability in the assembled erected product.

Another object of the invention is to provide a device which operates to reduce the cost of shelf assembly and erection be well over 50 percent.

Another object of the invention is to provide a shelf assembling and erecting device which, in addition to greatly reducing the time and labor required, affords marked safety advantages to personnel and virtually eliminates any conceivable damage to the shelving during the erection process.

Another object of the invention is to provide such a shelf assembling and erecting device which serves as a transporter of the assembled shelving in horizontal position to and from the erecting and shelf-using area.

Another object of the invention is to provide a device operative to aid in the assembling and erecting of shelving which equally provides savings when used for disassembly and removal or shelf rearrangement.

Another object of the invention is to provide a shelver, aiding in both assembling and erecting, which will make the Federal Prison Industry's shelving competitive with the new proprietary commercial design.

Another object of the invention is to provide such a device for aiding in shelving assembly and construction which can be packaged easily and compactly for shipping.

Another object of the invention is to provide a shelving unit aiding in shelving assembly, disassembly, erection and removal which, when operated by two men, quickly, easily and safely handles shelving units weighing up to 1,000 lbs.

Another object of the invention is to provide a smoothly operating self-powered shelving unit which as a 12-volt hydraulic system and 110-volt reel-type outlets for power tools to aid in shelving assembly.

Another object of the invention is to provide such a shelver which permits efficient, quick adjustments for achieving desired shelf spacing.

Yet another object of the invention is to provide a versatile shelving erection and removal device which permits for turning, guiding and moving of same with a minimum effort.

Other and further objects of the invention will appear in the course of the following description thereof.

## DESCRIPTION OF THE DRAWINGS

In the drawings, which form a part of the instant specification and are to be read in conjunction therewith, an embodiment of the invention is shown and, in the various views, like numerals are employed to indicate like parts.

FIG. 1, in full lines, is a side view of the shelf lifting and assembling device or shelver with an assembled shelf unit mounted thereon prior to raising of the same; in broken lines,

the shelf assembly and upper frame of the shelver have been fully elevated.

FIG. 2 is an enlarged side view of the shelf lifting and assembling device with an assembled shelf mounted thereon prior to raising, the assembled shelf unit locked in place on the shelver; cutaways show the attachment of the hydraulic piston and arm on the frame of the shelver which are used to raise or lower the upper frame thereof as the assembled shelving is either raised or lowered with respect to the basic shelver.

FIG. 3 is a top plan view of the device showing a few shelves (in broken lines) inserted in a preliminary assembly step. The top bar for locking the shelving in place for lifting after assembly (see the top of FIG. 2) is in place for the purposes of illustration but would not normally be in place at this stage of assembly.

FIG. 4 is an enlarged, side detail, of portions of the device, with the parts in section and cutaway to better illustrate the nature of the invention; what is shown are large details of the forward and rear ends, in section.

FIG. 5 is an end view of the left end of the device in FIGS. 1, 2, 3, and 4, looking from left to right in the views.

FIG. 6 is a partially sectional view taken along line 6-6 of FIG. 2 in the direction of the arrows.

FIG. 7 is a view showing the cross bracing of the shelves either on top of the assembled shelves on the device or through the middle section as a double section of shelves is assembled.

FIG. 8 is an enlarged fragmentary view of one of the side members which receive the elongate angle irons at the edges of the shelves or the corners thereof taken along line 8-8 of FIG. 5 in the direction of the arrows.

FIG. 9 is a sectional view taken along line 9-9 of FIG. 8 in the direction of the arrows.

Referring to the drawings, and particularly to FIGS. 4 and 6, there is provided a basic rectangular frame which is made up of two longitudinal box beam members 20 and 21 joined together at their ends by a pair of transverse box beam members 22 and 23. Overlying this basic frame is a secondary frame made up of a pair of longitudinal box beams 24 and 25 rigidly connected to one another at the ends thereof by box beam members 26 and 27 to make the secondary rectangular frame. Rigid wheel brackets 28 are fixed to the undersides of longitudinal lower frame members or beams 20 and 21 at the "forward" end thereof (to the left in FIGS. 1, 2, 3 and 4) to receive in rotation wheels 29 therein. Swivel casters 30, at the "rear" end (to the right in FIGS. 1, 2, 3 and 4) of said frame members 20 and 21, receive rotatable wheels 31 therein to enable the total frame system to be "steered" from the rear end thereof.

As best viewed in FIG. 5, a pair of blocks 32 and 33 extend downwardly from the underside of the front member 27 of the upper frame and each has an opening therethrough to receive shaft 34. Another pair of blocks 35 and 36 are rigidly affixed to the forward face of beam member 23 and extend downwardly along the outer sides of blocks 32 and 33 respectively. Likewise, blocks 35 and 36 have central openings therethrough aligned with the openings in blocks 32 and 33 to receive shaft 34. Suitable retainer keys or pins 37 and 38 removably retain shaft 34 with respect to said members 32-36, inclusive.

Referring to FIGS. 3 and 4 particularly, at the rear end of the lower frame, beam 39 is welded or otherwise fixedly attached to the front face of crossmember 22. To the forward face of beam 39 is attached a pair of brackets 40 and 41. A transverse box beam 43 is fastened between the inside faces of longitudinal beams 24 and 25 of the upper frame. Beam 43, in turn, has fixed to its rearward face a pair of brackets 44 and 45. A pair of hydraulic cylinders 46 and 47 are connected at their rearward end to brackets 40 and 41, respectively, while the piston rods thereof, 48 and 49, respectively, are connected at their forward ends to brackets 44 and 45. Extension of the rods 48 and 49 in the views of FIGS. 3 and 4 cause the upper frame to move in a 90° arc to the position seen in FIG. 1.

Hydraulic lines are seen at 50 (extension) and 51 (retraction). Hydraulic pump 52 is provided mounted on the lower frame with reservoir 53 and motor 54 driving pump 52 through shaft 55. A battery 56a having an associated battery charger 56b, is provided as a power source for motor 54.

A pair of electric cord reels 57 and 58 are provided with plug-ins thereon for power takeoff from the battery 56a to operate power tools, such as electric screwdrivers, used to assemble the shelving construction.

Fixed to the outside faces of upper frame longitudinal beams 24 and 25 are angle irons 59 and 60 (FIGS. 3, 6, 8, and 9 particularly). Member 60 has perforations or holes 60a in the horizontal upper surface thereof extending therethrough, while member 59 has openings 59a therethrough.

Fixed to the upper surfaces of the members 59 and 60, but movable, adjustable and refixable thereon, are a plurality of channel irons 61 which have, fixed to the rear face thereof, a plurality (two as shown in FIG. 3) of upright sheaths 62 which receive, in telescoping fashion, elongate rod 63 having magnets 64 fixed to the top ends and front faces thereof.

Fixed to the rearward face of transverse front beam member 27 is a socket 65 which receives the front end of a rod 66 which extends the length of the upper frame and is received at its rearward end in a socket 67 which is fixed to the front face of transverse box beam member 26 of the top frame. Rod 66 passes through passage 68 in beam 43. Clamp 69 with setscrew 70 threaded thereinto engages rod 66 along its length. Clamp 69 is fixed to the center of rod 71 which is removably connected by pins 72 to a pair of brackets 73. The latter are fixed to the inner face of elongate beam members 24 and 25. Pins 72 may be moved to one of two positions (see in FIG. 4) for a locked position (shown in dotted lines) for the shelves to be assembled, and an unlocked position (shown in full lines). A plurality of shelf-engaging brackets 74 are mounted along shaft 66, adjustable along the length thereof by setscrews 75.

On the front face of transverse beam 27 there is provided a socket 76 to removably receive a vertical rod 77 therein. Likewise, on the rearward face of box beam 26 there is provided a socket 78 adapted to removably receive therein another elongate vertical rod or beam 79. Beams or rods 77 and 79 have mounted, respectively, at the top ends thereof, clips 80 and 81 which are adapted to receive therein an elongate beam or rod 82. Rod 82 has connected to the underside thereof a plurality of adjustable brackets 83 with magnets 84 on the front faces thereof for a purpose to be described.

There is fixed to the underside of each beam member 20 and 21 a bracket member 85 which has pivotally mounted thereon brake means 86. Brakes 86 may be put into action, once the device is in place with the shelf ready to be raised, by a simple pivot action on the part of the operator.

In operation of the device seen in the drawings, shelving is assembled and raised as follows. Referring to FIG. 4, as well as FIG. 2, it is assumed that beams 77 and 79 with clips 80 and 81 thereon and the long upper horizontal member 82 are not in place. The channel irons 61 have been placed at their desired spacing along the members 59 and 60 and bolted into place. This being the case, then, a plurality of first shelves 100 are mounted with one side edge thereof received in the channel irons 61 and with the upper receiving faces thereof gripped by magnetic force from magnets 64. The application of these shelves into this engagement is seen centrally of FIG. 4 with the engaged shelves being seen to the left and right thereof. Once the shelves 100 are placed in the channels 61, then the rod 66 is moved, in FIG. 4 from the full line to the dotted line position of FIG. 4 to firmly grip the shelves against the channel irons 61 and the upstanding members 62, 63 and magnet 64. This is accomplished by moving the bar 71 with bolts 72 from the full line position of FIGS. 3 and 4 to the dotted line position of FIG. 4.

Once the shelving is put into place, or before same is put into place, the elongate corner angle irons (best seen in FIG. 6) 101-104, inclusive, are put into place and bolted or screwed to the shelves 100 along their length. The member 60

has at least two additional members best seen in FIGS. 3, 8 and 9, which comprise C-shaped members 105 removably bolted by bolts 106 to member 60. L-shaped members 107 having a slot 108 in the horizontal portions thereon are bolted by bolts 109 to member 105 in order to give an adjustable side limit to the shelving which spaces same to receive the edge angles 101-104, inclusive, previously mentioned.

FIG. 7 shows a top view of a first assembled layer of shelving having, additionally, crossmembers 110 for bracing and stability of the shelves bolted to the members 103 and 104. Like crossmembers may be attached, if desired, to the other sides of the shelves once they are erected. At this point, the shelves may be erected in the manner seen in FIG. 1, that is, it is not necessary to have a second deck of shelving applied. However, it will be assumed that, for purposes of description, a second level of shelving, as may be seen in FIGS. 1, 6 and 2 are desired to be provided. Such will now be described.

With the longitudinal members 101 and 102 bolted onto the shelves, the members 77 and 79 are put into sockets 76 and 78 and longitudinal bar or beam 82 placed into clips 80. Suspended downwardly from bar 82 is the plurality of members 83 which have magnets 84 thereon and which have been adjusted to the spacing of the shelves. The longitudinal members 103 and 104 are next laid on the shelves 100 and followed by longitudinal members 111 and 112 to form a T-shaped elongate connector. The crossmembers 110 can then be applied, followed by a second set of shelves 115, and the entire assembly is bolted together.

There are several ways in which the two sets of shelving can be bolted together with the bracing. At any rate, with the shelving bolted to form an integral construction, the bar 82 and member 79 are removed and the unit is ready for erection to the position seen in FIG. 1.

To erect, the pressure cylinders 46 and 47 are energized through hoses 50 from pump 52 and the piston arms 48 and 49 extended. This pivots the entire top rectangular frame, consisting of members 24, 25, 26 and 27 around shaft 34 whereby the entire assembly is erected as may be seen in FIG. 1.

With the shelving unit in the upright position, the locking bar 71 is moved to the full line position of FIGS. 3 and 4, thus unloading the shelves from the rectangular frame, and the shelver is backed away from the shelving unit.

From the foregoing, it will be seen that this invention is one well adapted to attain all of the ends and objects hereinabove set forth together with other advantages which are obvious and which are inherent to the structure.

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations.

As many possible embodiments may be made of the invention without departing from the scope thereof, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim:

1. Apparatus for assembling and erecting shelving comprising:

a first lower rectangular frame,  
a second upper rectangular frame,  
said second frame pivotally mounted at one end thereof with respect to one end of said lower frame, whereby to be erectable at 90° relative thereto while normally overlying same in parallel relationship,  
means on the upper surface of said second frame for receiving and gripping a plurality of shelves in spaced array,  
means for circumferentially gripping an assembled shelf array to said second frame for erection therewith,  
and means for erecting said second frame at 90° to said first frame.

2. Apparatus as in claim 1 including the means on the upper surface of said second frame for receiving and gripping a plurality of shelves in spaced array longitudinally adjustable thereon.

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- 3. Apparatus as in claim 1 wherein the means for gripping the shelves on said second frame are magnetic at least in part.
- 4. Apparatus as in claim 1 including wheels mounted on the underside of said first frame.
- 5. Apparatus as in claim 1 including vertical beams at each end of said second frame and a horizontal beam connectable therebetween with means suspended therefrom for gripping and holding a second set of shelves in spaced array for assembly into a total unit.
- 6. Apparatus as in claim 1 wherein said means for erecting

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said second frame at 90° to said first frame include at least one hydraulic piston connecting between said first and second frame.

7. Apparatus as in claim 1 wherein said means for gripping said shelves on said second frame include an elongate rod having a plurality of angle members thereon movable from a non-gripping position to a gripping position of the lower portions of said shelves when same are mounted on said second frame.

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