

Aug. 13, 1935.

J. H. FORD

2,011,357

REINFORCED METAL SHELF

Filed Oct. 19, 1932

2 Sheets-Sheet 1

Fig. 1

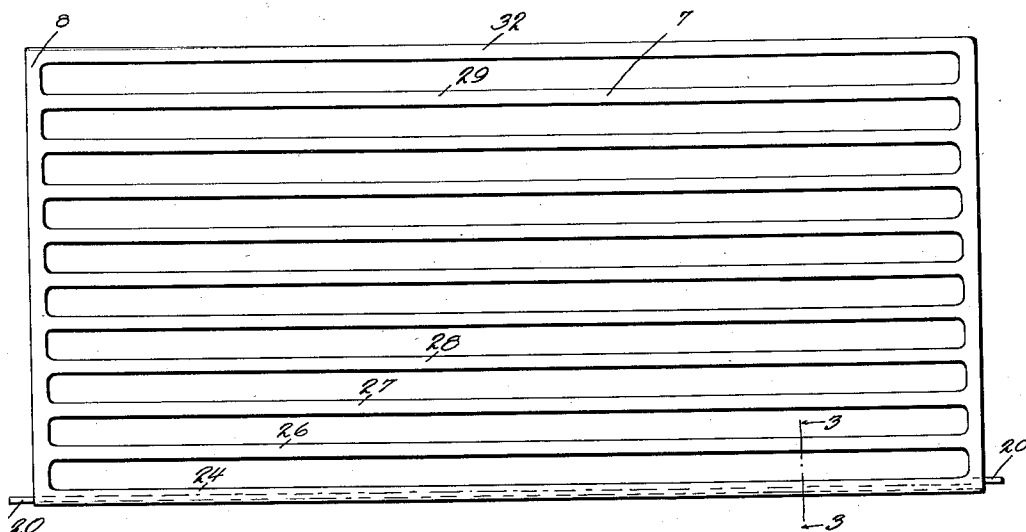


Fig. 2

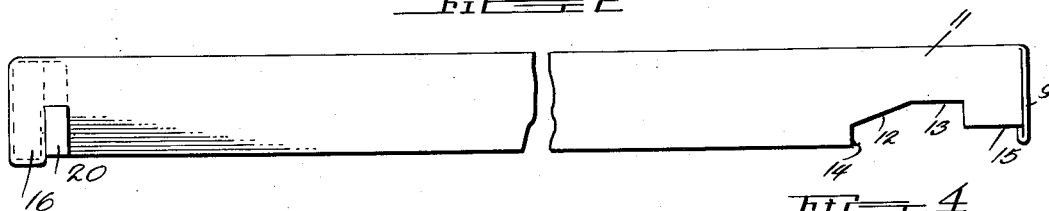


Fig. 3

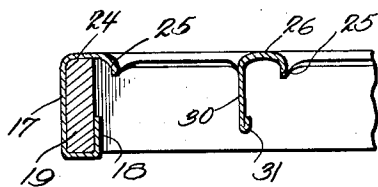
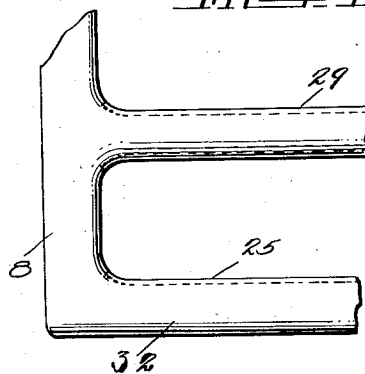


Fig. 4



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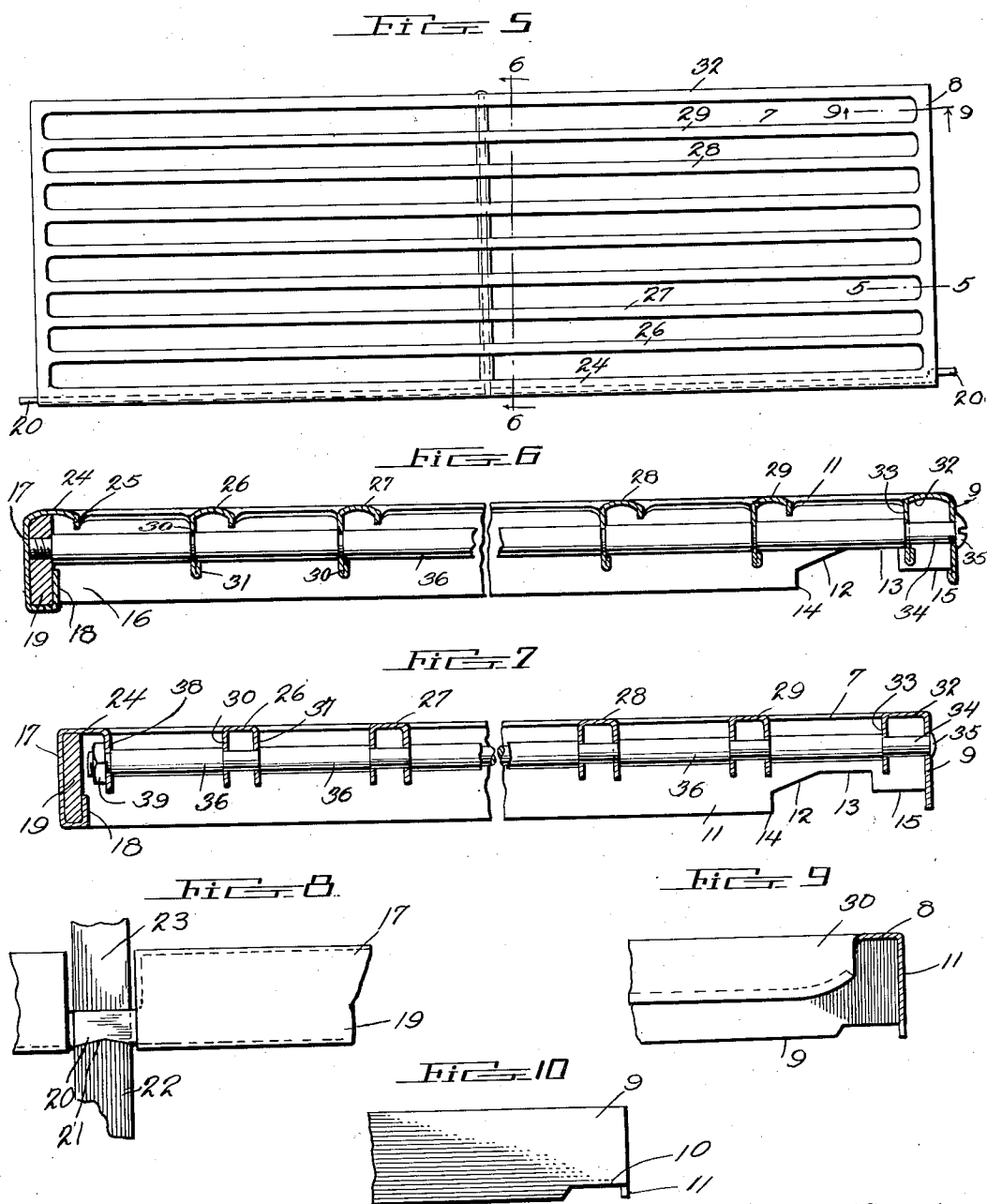
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UNITED STATES PATENT OFFICE

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REENFORCED METAL SHELF

John Howard Ford, Washington, D. C.

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14 Claims. (Cl. 211-153)

This invention relates to improvements in reenforced metal shelves of the type generally used in the construction and assembly of bookstacks and similar structures. To successfully meet the requirements of such shelves it is essential that these shelf units be interchangeable. It is also of prime importance that the units be of rugged construction amply reinforced to withstand considerable loads and strains. These objects must be attained without added expense for material and labor or complicated modes of assembly.

One of the objects of my invention is to provide a shelf of open construction which will offer no lodgment for dust.

A further object of my invention is to provide an open shelf from sheet metal of small gauge by a minimum of operations and economy of manufacture.

Among the objects of my invention is to reduce the number of edges that may project beneath the top and be scraped by an up-tilted book when placed on a shelf beneath.

It is a further object of my invention to provide such a shelf with adequate reenforcement along the front edge in conjunction with a reenforcement running laterally of the middle of the device.

One of the objects of my invention is to utilize the lateral reenforcement in positioning and bracing the individual ledges of which the shelf is composed.

Other objects of my invention and advantages in the improved construction will appear from the following description of the preferred form of my device as illustrated in the accompanying drawings in which:

Fig. 1 is a plan view of the improved shelf;

Fig. 2 is a side elevation of the right hand end of the shelf shown in Fig. 1;

Fig. 3 is an enlarged transverse section on the line 3-3 of Fig. 1;

Fig. 4 is an enlarged plan view of one rear corner;

Fig. 5 is a plan view of the shelf including a transverse reenforcement;

Fig. 6 is a transverse section on the line 6-6 of Fig. 5;

Fig. 7 is a similar cross-section of a modified form;

Fig. 8 is a detailed elevation showing a mounting of these shelf units on a vertical rack;

Fig. 9 is an enlarged vertical section on the line 9-9 of Fig. 5 and

Fig. 10 is an enlarged elevation of the opposite rear corner of the shelf.

The shelf denoted generally by the numeral 7 is composed of a piece of sheet metal 8. This sheet of metal has its edges bent down to form flanges at the front, rear and sides. The rear flange 9 is generally the full depth of the device and extends from end to end thereof. At the corners as illustrated in Fig. 10 this flange is cut away as shown at 10 to provide clearance required in sliding the shelf into place over the customary supporting lugs found in the usual shelf racks.

The side flanges 11 are also bent down from the top 8 for the full depth of the device. At the rear these flanges 11 are notched or cut out to form a slope 12, a bearing portion 13, a front edge 14 and a rear stop 15. The front edge 14 and the stop 15 engage opposite sides of the support upon which the bearing portion 13 rests.

The front edge of the flanges 11 are also cut away to provide a tongue 16 behind which is an outlet for the ends of a reenforcing bar.

The front of the shelf is formed by a flange 17 which is bent down from the sheet metal and has an inner upstanding edge 18. A reenforcing bar 19 fits between the top of the shelf and the flanges 17 and 18 in the manner indicated in Fig. 6.

The reenforcing bar 19 has extensions or feet 20 at each end. These feet are of reduced height as shown in Figs. 2 and 3. Each foot has a centrally sloping bottom edge 21. By means of the feet 20 the shelf rests upon the lugs 22 of the usual shelving rack 23. Any tendency toward movement of the feet 20 due to the weight of the load being carried will tend to insure proper mounting of the shelf on the rack.

The main portion of the sheet metal 8 is slotted longitudinally to form a series of horizontal ledges. The front ledge 24 is indicated as extending backwardly from the front flange 17. In the form shown in detail in Figs. 3, 4, and 6, the ledges are arched or given a curved cross-section to reduce the surface actually in contact with the articles such as books which are carried on the shelf. This reduces the sliding friction and at the same time minimizes the tendency of the ledges to accumulate dust.

The ledge 24 has a rear edge 25 which extends downwardly from the top of the shelf. The curving of the ledge in this manner adds greatly to its rigidity. As it is not necessary to extend the edge 25 downwardly for any substantial distance, the ledges may thus be brought closer together. If desired the edge 25 may be continued around

the end of the slot to the adjacent ledge as shown in Fig. 4.

The top of the shelf will be formed with as many ledges 26, 27, 28, and 29 as are desired. It will be apparent that the ledges may have different spacing and that excess material may be cut away from the flanges incidental to manufacture.

The ledge 26 is shown to have a front flange 30. This is bent down at right angles to the plane of the shelf and extends for a substantial part of the depth of the shelf. The free edge of the flange 30 is doubled over as shown at 31 to provide strengthening of this flange. The edge also when doubled over gives a smooth curved surface which will not injure the hand of the person or the top edge of the book which may be inserted between the shelves. In this connection it is to be understood that very little clearance is afforded between shelves of this type and that in moving books into or out of the shelves, it is the usual practice to tilt the books so that their top edges are in danger of being scraped by the shelf above.

The rear edge of the ledge 26 is also bent down to form an edge 25 but as this edge is not extended for a great distance and does not project as far as the flange 30 and the latter serves as a protection for the edge 25. In forming the ledges with one long flange 30 and a short edge 25 the greater portion of the sheet material forms part of the reinforcing flange 30 which is found most desirable from the standpoint of design.

Each of the ledges 26 to 29 inclusive are similar in form and as shown in Fig. 6 the rear ledge 32 is formed from the sheet metal extending forwardly from the rear flange 9. A front flange 33 is provided for the ledge 32 comparable with the flange 30 and also has a doubled-over free edge 31.

Where the ratio of the length of the shelf to its width is not excessive, the above design provides ample rigidity. The longitudinal reinforcement 19 and the parallel flanges 30 are sufficient to prevent distortion of the several ledges 24, 26, 29, and 30. In this way a very satisfactory structure is developed.

However, where the length of the shelf is out of proportion to its width, an added stiffening can be obtained by the use of a transverse reinforcement such as is illustrated in Figs. 5, 6, and 7. For this purpose the flanges 30 and 33 are punched out to form a series of aligned openings through which a transverse reinforcement is applied.

This reenforcement consists of a rod 34, the head 35 of which is held by the flange 9. This rod extends through the intermediate flanges and is screw-threaded into the longitudinal reinforcing bar 19.

In order to maintain rigid spacing between the intermediate ledges, I have provided a series of spacing sleeves 36, 36. These sleeves fit loosely around the rod 34 and are of sufficient length to fit closely between the flanges of adjacent ledges. In this way the ledges 24, 26, 27, 28, 29, and 32 are held in rigid spaced positions. This position is also firmly established with respect to the longitudinal bar 19 so that the shelf does not suffer by bending. At the same time the end flanges may be relatively distorted to a slight degree in order to maintain a four-point support on the end racks even though the latter may be somewhat out of the common plane.

In Fig. 7 I have shown a modified form of shelf in which the rear edge 25 of each ledge

is extended downwardly to form a rear flange 37 which is co-extensive with and parallel to the front flange 30. This gives each ledge an inverted U-shape. In this arrangement the front ledge 24 has a similar depending flange 38.

In this design the transverse reenforcement 34 extends beyond the rear flange 38 of the ledge 24. At this end the rod 34 is screw-threaded to receive a nut 39. Tightening this nut will serve to clamp the sleeves 36 on the spaced parallel flanges 30 and 37 so that the respective ledges are maintained in supported position.

A shelf formed as above described is readily and economically assembled from stock material with a minimum of labor. Machine operation can be used for the formation of the ledges and depending flanges. In like manner the assembly of the reenforcing bar 19 is readily accomplished. The provision of the transverse reenforcing rod 34 holds the several parts against lateral movement providing a firm grille. The shelf is thus supported in two directions with a wide margin of safety. The arrangement of the top is well adapted for use where it is desired to have an open structure with ample support for books or other articles which are generally slid into place.

While the preferred form of this device has been illustrated and described by way of example, still it will be readily apparent to those familiar with such devices that many variations in proportion, details and size may be made within the scope of the following claims.

What I claim is:

1. A shelf made of a single piece of sheet metal slotted to form a series of parallel ledges, a flange depending from each ledge, a bar beneath the front end ledge of the series, the flange of said ledge being folded upwardly around the bottom edge of said bar, a reenforcing rod running transversely through the flanges of the remaining ledges and connected to said bar, and spacing sleeves on the rod between the flanges of adjacent ledges.

2. A shelf made of a single piece of sheet metal slotted to form a series of parallel ledges, a flange depending from each ledge, a bar beneath the front end ledge of the series, the flange of said ledge being folded upwardly around the bottom edge of said bar, and a reenforcing rod running transversely through the flanges of the remaining ledges and connected to said bar.

3. A shelf made of a single piece of sheet metal slotted to form a series of parallel ledges, a single flange depending from each intermediate ledge of the series, a reenforcing rod running transversely through said flanges, and spacing sleeves carried on said rod and abutting the opposite sides of each of said flanges.

4. A shelf made of a single piece of sheet metal slotted to form a series of parallel ledges, and a flange depending from one side only of each ledge, said flanges having their free edges doubled over and each flange being composed of substantially all of the material in the sheet between adjacent ledges.

5. A shelf made of a single piece of sheet metal slotted to form a series of parallel ledges each having an inverted L-shape, a longitudinal reenforcement beneath the front ledge of the series and forming a continuous support upon which the said ledge rests throughout its length.

6. A shelf made of a single piece of sheet metal, depending flanges on the side and end margins of the sheet, a reenforcing bar held by one of said flanges, an off-set end to said bar, said reenforc-

ing bar having an extension passing through a marginal end flange to form a shelf-supporting projection, and a tongue formed in said marginal end flange to retain said extension of the bar.

5 7. A shelf made of a single piece of sheet metal slotted to form a series of inverted L-shaped parallel ledges, the depending flange portion of each intermediate ledge comprising the material from the adjacent slot, a reinforcing rod running
10 transversely through said flanges and spacing sleeves carried on said rod and abutting the opposite sides of the flanges of adjacent ledges.

8. A shelf made of a single piece of sheet metal formed with a series of inverted L-shaped parallel ledges having their supporting surfaces upwardly convexed, said ledges being separated by slots, each ledge, along one side only thereof, having its single depending flange portion formed
15 from all the metal from the adjacent slot and extending downwardly for a depth greater than the width of the connected supporting surface.

9. A shelf made of a single piece of sheet metal slotted to form a series of inverted L-shaped parallel ledges, the single flange portion depending
20 from each intermediate ledge comprising the material from the adjacent slot.

10. A shelf made from a single piece of sheet metal slotted to form a series of parallel ledges, one edge of each intermediate ledge being depressed slightly from the plane of the ledge, and a flange depending from the other edge of the ledge for a depth greater than the width of the connected supporting surface and comprising the
25 material from the adjacent slot.

11. A shelf made of a single piece of sheet metal slotted to form a series of inverted L-shaped parallel ledges including a flange portion depending from each of the intermediate ledges comprising the material from the adjacent slot, the front
30 ledge of the series being reenforced by an inserted bar clamped beneath the said front ledge by an upturned fold of the depending flange, and a transverse reenforcement connected to the bar and intersecting the depending flanges of the remaining ledges.

12. An article resistant to bending made from a single piece of sheet metal slotted to form a series of spaced ledges of inverted L-shaped section, each intermediate ledge of the series comprising an article-supporting portion and a single
10 reinforcing flange portion on one side only of the supporting portion, the said flange portion comprising the material from the adjacent slot and depending at right angles from the said supporting portion, said flange portions having their free edges doubled over.

13. A shelf made from a single piece of sheet metal slotted to form a series of inverted L-shaped parallel ledges, the depending flange portion of each ledge in the series comprising the material from the adjacent slot, and a ledge at each end of the series having outer flanges containing a relatively greater amount of material than the flanges of the first named ledges.
20

14. A shelf or similar structure comprising a frame, a series of supporting units supported on said frame, each supporting unit being resistant to bending and comprising a single strip of sheet metal forming an inverted L-shaped cross-section, the upper portion thereof being convexed upwardly for compressive rigidity and the other portion constituting a depending flange of a depth substantially equivalent to the distance between the adjacent units and having its free edge doubled over to strengthen the unit at the portion receiving maximum tension.
25 30 35

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