May 25, 1965 A. E. O. ANDREASSEN 3,185,315

SHELF STRUCTURE

Filed Aug. 6, 1963 3 Sheets-Sheet 1

Fig. 1

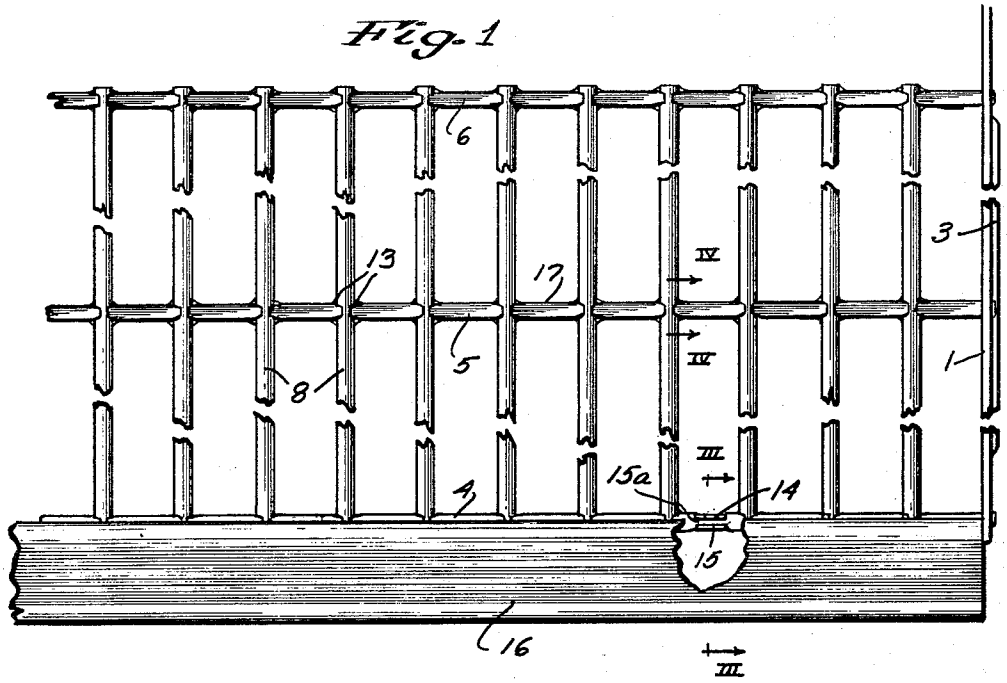


Fig. 2

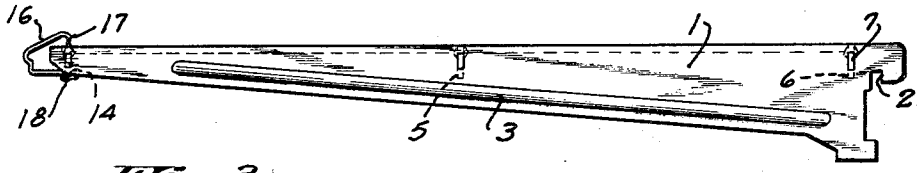


Fig. 3

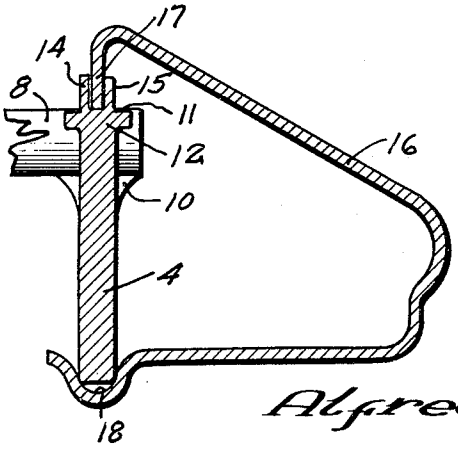
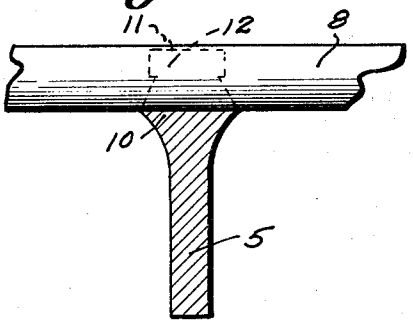


Fig. 4



INVENTOR.

Alfred E.O. Andreassen

BY

Hill, Sherman, Meroni, Gross & Simpson

ATTORNEYS

May 25, 1965 A. E. O. ANDREASSEN 3,185,315

SHELF STRUCTURE

Filed Aug. 6, 1963 3 Sheets-Sheet 2

Fig. 5

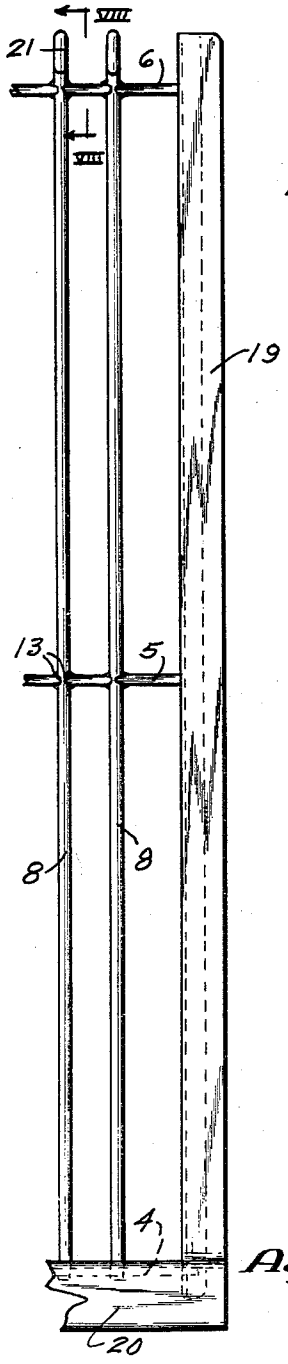


Fig. 6

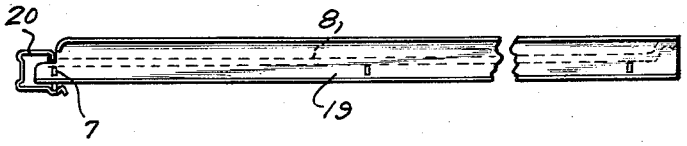


Fig. 7

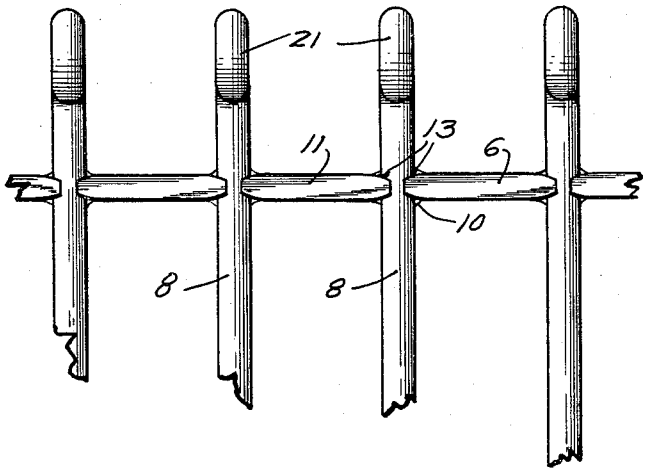
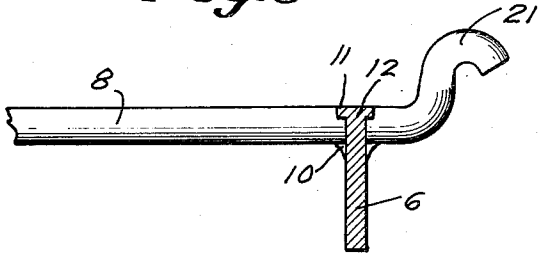


Fig. 8



INVENTOR.

Alfred E. O. Andreassen

BY

Hill, Sherman, Meroni, Gross & Simpson

ATTORNEYS

May 25, 1965 A. E. O. ANDREASSEN 3,185,315

SHELF STRUCTURE

Filed Aug. 6, 1963 3 Sheets-Sheet 3

Fig 9

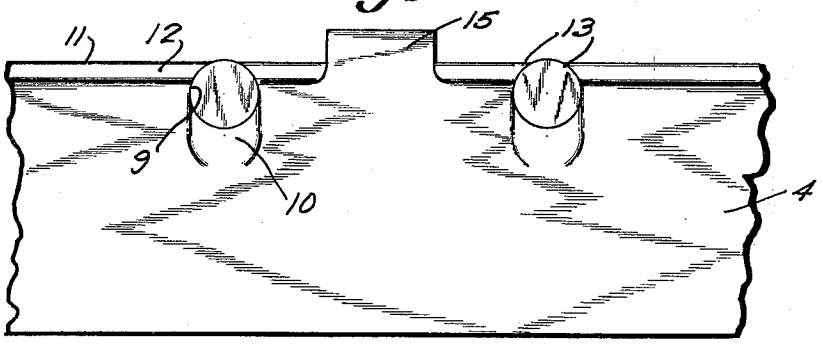


Fig. 10

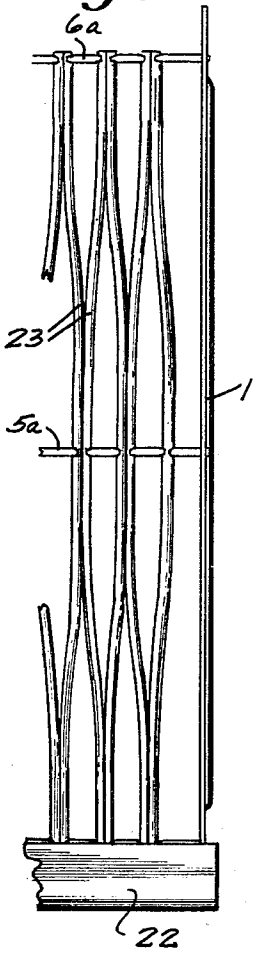


Fig. 11

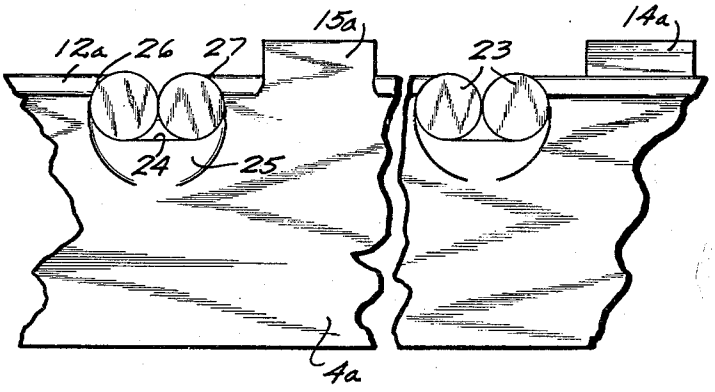
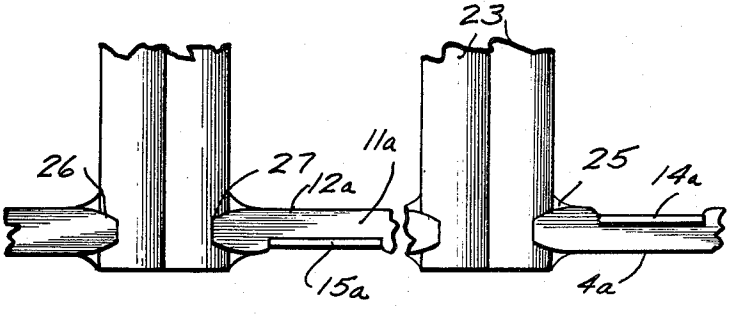


Fig. 12



INVENTOR.

Alfred E. O. Andreassen

BY

Hill, Sherman, Meroni, Gross & Simpson

ATTORNEYS

United States Patent Office 3,185,315 Patented May 25, 1965

3,185,315

SHELF STRUCTURE

Alfred E. O. Andreassen, Waterloo, Iowa, assignor to Chamberlain Corporation, Waterloo, Iowa, a corporation of Iowa

Filed Aug. 6, 1963, Ser. No. 300,279
7 Claims. (Cl. 211—153)

This invention relates to improvements in shelf structures, and more particularly to fabricated metallic shelves highly desirable for use in refrigerators, freezers, storage closets and cabinets, and in numerous other locations as will be apparent to one skilled in the art.

Many and various forms of shelf structures of the general character of the instant invention have been developed in the past for refrigerators, stoves, cabinets, and other home, office, or commercial appliances. In the main such shelves consisted of front, center, and rear cross bars secured between a pair of opposed side members. Rods or wires extended from the front cross bar to the rear cross bar and in most cases were riveted to the front and rear cross bars and staked in notches in the center bar. Riveting the ends of the rods or wires to the front and rear bars was a tedious and costly operation; while the staking of the wires to the center cross bar resulted in an unsightly and rather disrupted appearance. Further, with staking, the wires in many cases became loosened, since not enough of the wire circumference was engaged by the staking, and the wire projected an objectionable amount above the cross bar. With such arrangements as heretofore known, it was necessary to use a relatively heavy cross bar in an endeavor to insure sufficient engagement with the wires, and cross bars of that gauge had to be purchased in straight lengths and could not be manipulated from a coil, owing to the difficulty in straightening the bar when uncoiled. Objectionable difficulty was also experienced in attaching a front trim member on such shelves, and some difficulty was also experienced in providing a front trim of different color than the shelf itself. For glideout shelves a rear rail as an extra piece was frequently essential, and that also added to the cost of manufacture. Previous shelves, therefore, necessitated the use of heavier stock and were objectionably expensive. In a competitive field of this character, economy of production is of considerable importance.

With the foregoing in mind, it is an important object of the instant invention to provide a fabricated metallic shelf structure of such character that it lends itself to automation with a noticeably increased rate of production.

Also an important object of this invention is the provision of a shelf structure that may be manufactured at a definitely lower cost than heretofore, economy being evident not only in the manufacture of the shelf structure, but also in the original cost of material.

A further feature of the instant invention resides in the provision of a fabricated metallic shelf structure wherein lighter and narrower cross bars may be utilized, which may readily be severed from a coil of bar material, in a continuous feeding operation.

Another desideratum of the invention is the provision of a fabricated metallic shelf having lighter cross bars than was heretofore possible, so constructed as to effect a stronger and more positive anchorage of the wires with a greater size bed in which the wires are locked.

It is also a feature of this invention to provide a fabricated metallic shelf structure embodying spaced wires or rods and cross bars, and in which riveting of the ends of the wires is completely eliminated.

It is also a feature of this invention to provide a fabricated metallic shelf structure in which the trim member

may be separately fabricated in substantially any desired color, and simply and quickly snapped or telescoped to the front cross bar of the shelf structure.

It is a further object of the invention to provide a fabricated shelf structure which when made in the form of a glideout shelf need have no rear rail as an extra part added, but the function of such rear rail may be accomplished by a shaping of the wires or rods.

Still another desideratum of the invention is the provision of a fabricated metal shelf structure involving spaced wires and cross bars, in which lighter cross bars may be utilized and the whole shelf is much stronger than shelves heretofore made using heavier cross bars, and wherein the wires are substantially engaged around 80% of the circumference of the wire as distinguished from 66% of the circumference of the wire in structures where the wires are held by staking.

A further object of the invention resides in the provision of a shelf embodying wires and cross bars, and wherein the cross bars are provided with a saddle seat for each wire and the tops of the cross bars are thickened or widened, whereby the wires are firmly seated and held by more than ample contact.

Still another feature of this invention is the provision of a shelf structure embodying spaced wires and cross bars wherein the top of the shelf structure is smooth and pleasing in appearance and does not have the disrupted unattractive appearance of staking.

While some of the more salient features, characteristics and advantages of the instant invention have been above pointed out, others will become apparent from the following disclosures taken in conjunction with the accompanying drawings, in which—

FIGURE 1 is a fragmentary top plan view of a shelf embodying principles of the instant invention, with parts broken away to reveal parts therebeneath;

FIGURE 2 is a reduced side elevational view of the structure of FIGURE 1;

FIGURE 3 is a greatly magnified fragmentary vertical sectional view taken substantially as indicated by the line III—III of FIGURE 1, looking in the direction of the arrows;

FIGURE 4 is a greatly enlarged fragmentary vertical sectional view taken substantially as indicated by the line IV—IV of FIGURE 1;

FIGURE 5 is a fragmentary top plan view of a shelf embodying principles of the instant invention but of a somewhat different construction;

FIGURE 6 is a fragmentary side elevational view of the structure of FIGURE 5;

FIGURE 7 is a greatly enlarged fragmentary top plan view of the rear portion of the shelf of FIGURE 5;

FIGURE 8 is a greatly enlarged fragmentary vertical sectional view taken substantially as indicated by the line VIII—VIII of FIGURE 5;

FIGURE 9 is a greatly enlarged front elevational view of a portion of either of the previous shelf structures, with the trim member removed;

FIGURE 10 is a fragmentary top plan view of a shelf embodying the principles of the invention but of a still different construction;

FIGURE 11 is a greatly enlarged fragmentary front elevational view of the structure of FIGURE 10 with the trim member removed; and

FIGURE 12 is a greatly enlarged fragmentary top plan view of a portion of the structure of FIGURE 10 with the trim member removed.

As shown on the drawings:

It will be understood by those skilled in the art that the instant invention may resolve itself into shelf structures of various types, such as cantilever shelves, glide-

out shelves, double wire shelves, swing out shelves, vertically pivotal shelves, inter alia. It will further be understood by those skilled in the art that in the event the shelf is of a small size, the center cross bar may be eliminated. To this end, and by way of example but not by way of limitation, I have illustrated a cantilever shelf in FIGURES 1–4 inclusive of the type which is anchored to the rear wall of a cabinet or closet. In FIGURES 5–8 inclusive I have illustrated a glideout shelf which may be pulled forwardly at least partially out of the cabinet or closet: In FIGURES 10–12 inclusive I have illustrated a double wire shelf. In all three of the illustrated embodiments the structure of the cross bars and their engagement with the wires or rods are fundamentally the same.

In the first illustrated embodiment of the instant invention, the cantilever shelf, the structure embodies a pair of opposed allochiral side members 1, only one of which is illustrated in the drawing. The side member, as seen in FIGURE 2, preferably narrows gradually forwardly and the rear end of this member is provided with a hook or latching element 2 for engagement with a bracket or through a slot in a rear cabinet wall. Such engagement by both side members supports the shelf in fixed position. Preferably each side member is provided with an embossed strengthening rib 3 therealong.

Extending between the side members 1, are front, center, and rear cross bars 4, 5 and 6 respectively. Each of these cross bars is provided with a reduced end portion as indicated at 7 in FIGURE 2 which extends through a suitable aperture in the side member and is riveted to the side member at that point. A series of spaced wires extending from the front cross bar 4 to the rear cross bar 6 are engaged with the cross bars in a manner about to be described to form the face or platform of the shelf structure. These wires or rods 8 are preferably round and of a diameter consistent with the intended capacity and size of the shelf.

The cross bars 4, 5 and 6 are thinner than cross bars heretofore used for comparative sizes of shelves. As a result of that thinness the cross bars may be cut from a coil of bar stock and easily straightened into pieces of desired length. Each cross bar is provided with a notch as indicated at 9 in FIGURE 9 for each of the wires or rods 8, at the base of each such notch the bar is widened or thickened to provide a saddle or seat 10 for a wire. After the wires have been placed in the respective notches on the seats 10, the top marginal portion of each cross bar is swaged or upset downwardly to provide a flat widened upper face 11 giving the cross bar the shape of a T-beam in the upper portion thereof as indicated at 12. At the same time the cross bar extends inwardly well over each wire as indicated at 13 to positively hold each wire in its respective notch. The widening of the cross bar at the top at 12 and the provision of the saddle 10 effectively compensates for the original thinness or narrowness of the cross bar. In fact, the cross bar has a better grip on each wire 8 than was heretofore possible by staking the cross bar to cause it to grip the wire. It will also be noted the overall shelf structure is considerably flat, and that the wire is embedded in each cross bar notch substantially or more than 80% of the circumference of the wire.

The saddle 10 and T formation 12 on the cross bars approximate the thickness of cross bars heretofore used and which could only be handled from strip stock. The instant thinner and lighter cross bars are more economical since they can be cut from a coil or roll of bar stock, and much more easily handled. The notches and saddle can readily be formed with a suitable compression die, and another compression die establishes the top T shape and anchors the wires to the cross rods.

The front cross bar 4, by way of leaving voids in the compression die, is provided at spaced intervals with inner and outer upstanding lugs 14 and 15 respectively. These

upstanding lugs or projections may be disposed oppositely each other as seen in FIGURES 1 and 3, or staggered relatively to each other as seen in FIGURE 11. These lugs 14 and 15, in effect, form a track or retention groove 15a for a front trim member.

A trim member 16 may be fabricated in any desired shape separate and apart from the shelf structure per se and in the illustrated instance this trim member is tubular when associated with the front cross bar. The trim member is hollow and is provided with a depending flange 17 to seat between the lugs or projections 14 and 15, and also with a groove formation 18 in its under portion to receive the lower edge of the cross bar 4. So constructed, the trim member may be snapped into position on the front cross bar by first inserting the flange 17 between the lugs, and then pressing downwardly and inwardly until the groove formation 18 snaps around the lower edge of the cross bar. Preferably, however, the trim member 16 is telescoped over the front cross bar by sliding it on the bar from one end to the other. This permits a closed or partially closed end formation on the trim member, if so desired, which might be opened in a somewhat unsightly manner should the trim member be snapped into position. Obviously, the trim member may be made in any desired color without any difficulty whatever since it is not directly engaged with the wires and is formed separately and apart from the shelf.

In FIGURES 5–8 inclusive I have shown what is commonly termed a glideout shelf, in that it can be withdrawn at least partially from the cabinet or enclosure. In this instance, the same cross bars 4, 5 and 6, and the same wires 8 as above described are included, and the wires are engaged with the cross bars in the same manner as above described, with the notches 9, the saddles 10, and the flattened and widened upper marginal portions 12 of the cross bars.

In this instance, however, the shelf structure is provided with opposed side rails or members 19 of channel shape so as to receive rollers mounted on the inside of the cabinets therein. These channel side members are connected to the cross bars in the same manner as previously described, namely riveted as indicated at 7. This shelf structure is also provided with a relatively square tubular front trim member 20 mounted on the main shelf structure in the same manner as above described, but having a different shape because in this instance it functions as a handle to move the shelf outwardly and inwardly.

With a glideout shelf, it is preferable to have a slight elevation around the sides and back of the shelf to prevent articles disposed on the shelf from accidentally slipping off when the shelf is moved suddenly. To that end it will be noted, from the showing in FIGURE 6, that the side rails 19 extend upwardly above the wires 8 so as to provide a slight elevation at each side of the shelf. A rear elevation for the shelf was formerly provided by the attachment of an added rear rail extending above the wires. With the instant structure such a rear rail is not necessary. The wires 8 extend beyond the rear cross bar 6 and are provided each with an upwardly extending approximate S-curve 21 which provides the necessary rear elevation on the shelf in a highly economical manner. This bent formation 21 in each wire need not necessarily be an ogee, but may be any formation that provides the desired elevation at the rear end of the shelf, although an ogee is simple to form and is smooth on the top.

In FIGURES 10, 11 and 12, I have illustrated how the instant invention may be incorporated in a double wire shelf. Such a shelf has advantages in that smaller and narrower articles may be placed upon the shelf without danger of tipping due to the spaces between wires, and smaller wires may be utilized without the sacrifice of strength.

In this instance, cross bars 4a, 5a and 6a are associated with side rails 1 in the manner above described. Stag-

gered upward projections **14***a* and **15***a* are provided on the front cross bar **4***a* and a trim member **22** is associated with that cross bar as above described.

Wires or rods **23**, which may be smaller than the wires **8**, are arranged in pairs with each cross bar having notches **24** therein each of which is of a size sufficient to accommodate two wires. At the bottom of each notch is a saddle formation **25** wide enough to seat both wires.

As seen clearly in FIGURE 10, the notches in the center cross bar **5***a* are staggered with relationship to the notches in the front and rear cross bars **4***a* and **6***a*. The same pair of wires enters a notch in the front cross bar and the corresponding notch in the rear cross bar, but each notch in the center cross bar, except for the terminal side notches, contains a wire from adjacent pairs in the front and rear cross bar, each wire being laterally bent a short distance to engage the notch in the center cross bar. When the upper marginal portions of the cross bars are pressed downwardly to form the T formation **12***a*, it will be seen from the showing in FIGURES 11 and 12 that the top portions of the cross bar on one side of the notch engage over one wire as indicated at **26**, and the cross bar on the opposite side of the notch engages over a wire as indicated at **27**. The point where the wires are in contact with each other and the engagement point are well to one side of the diameter of the wire, so that both wires are firmly held against dislodgement.

Shelf structures embodying the instant invention may be made of aluminum, steel, or any other suitable metal, depending upon the purpose for which the shelf structures are to be used.

From the foregoing, it is apparent that I have provided an economical, light weight, exceedingly strong and durable shelf structure utilizing lighter material than heretofore possible for a shelf structure having the same strength. The instant invention also facilitates an increased production rate, lends itself to automation, eliminates costly operations heretofore found necessary in shelf building, and is economical to produce.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:

1. In a metallic shelf structure,
front and rear cross-bars,
spaced wires secured to said cross-bars,
upstanding inner and outer lugs on said front cross-bar, and
a front trim member engaged with said lugs to hold the same on said front cross-bar.

2. In a metallic shelf structure,
front and rear cross-bars,
spaced wires secured to said cross-bars,
upstanding inner and outer lugs on said front cross-bar,
a front trim member of hollow channel shape opening inwardly,
a downwardly extending flange on said trim member engaging between said lugs, and
said trim member having a groove therein receiving the lower edge of said front cross-bar.

3. In a metallic shelf structure,
front and rear cross-bars,
said cross-bars having spaced notches therein of sufficient width to accommodate a pair of wires,
a widened saddle formation at the base of each of said notches,
a pair of abutting wires in each of said notches, and
a widened and flattened top on said cross-bars between said notches with lateral extensions each overlapping a part of the adjacent wire to anchor the wires in each notch.

4. In a metal shelf,
a frame comprising opposed side members and front, center and rear cross-bars having their ends secured to said side members,
each of said cross-bars having a series of notches therein,
a widened saddle defining the lower portion of each said notch,
wires disposed in said notches, and said cross-bars having flattened transversely widened top portions between said notches which portions extend longitudinally of the cross-bars at their ends to partially overlie the respective wires and in cooperation with said saddles grip the wires circumferentially thereof and longitudinally thereof a distance greater than the normal width of a cross-bar.

5. In a metal shelf,
front and rear cross-bars,
each of said cross-bars having a series of notches therein,
a widened curvate saddle at the base of each notch,
wires disposed in said notches on said saddles, and said cross-bars having flattened transversely widened top portions between said notches and which portions extend longitudinally of the cross-bars at the ends thereof to partially overlie the respective wires and in cooperation with said saddles firmly grip the wires circumferentially thereof and longitudinally thereof a distance greater than the normal width of a cross-bar.

6. In a metal shelf,
front and rear cross-bars,
each of said cross-bars having a series of notches therein,
a widened curvate saddle defining the lower portion of each said notch,
wires in said notches on said saddles, and said cross-bars having flattened transversely widened top portions between said notches and extending longitudinally of the cross-bar to partially overlie the adjacent wires and with said saddles grip the wires approximately 80 percent circumferentially thereof and longitudinally thereof a distance exceeding the normal thickness of a cross-bar.

7. In a metallic shelf structure,
front and rear cross-bars,
spaced wires secured to said cross-bars,
upstanding lugs spaced along the front cross-bar, and a front trim member engaged with said lugs,
said trim member having a groove in the lower part thereof snapped over the under edge of the front cross-bar.

References Cited by the Examiner

UNITED STATES PATENTS

1,577,267	3/26	Spaulding	211—153 X
1,636,592	7/27	Cushwa	211—153 X
2,033,792	3/36	Sywert	211—153
2,551,062	5/51	Skar	108—27
2,636,189	4/53	Feldman	20—74 X
2,811,407	10/57	Moore	312—351
2,872,270	2/59	D'Olive	211—153 X

FOREIGN PATENTS

1,139,808	2/57	France.

CLAUDE A. LE ROY, *Primary Examiner.*