

[54] ADJUSTABLE SHELVING

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[22] Filed: Jan. 5, 1972

[21] Appl. No.: 215,579

[52] U.S. Cl. 108/144

[51] Int. Cl. A47b 9/00

[58] Field of Search 108/144, 148;
248/411-413

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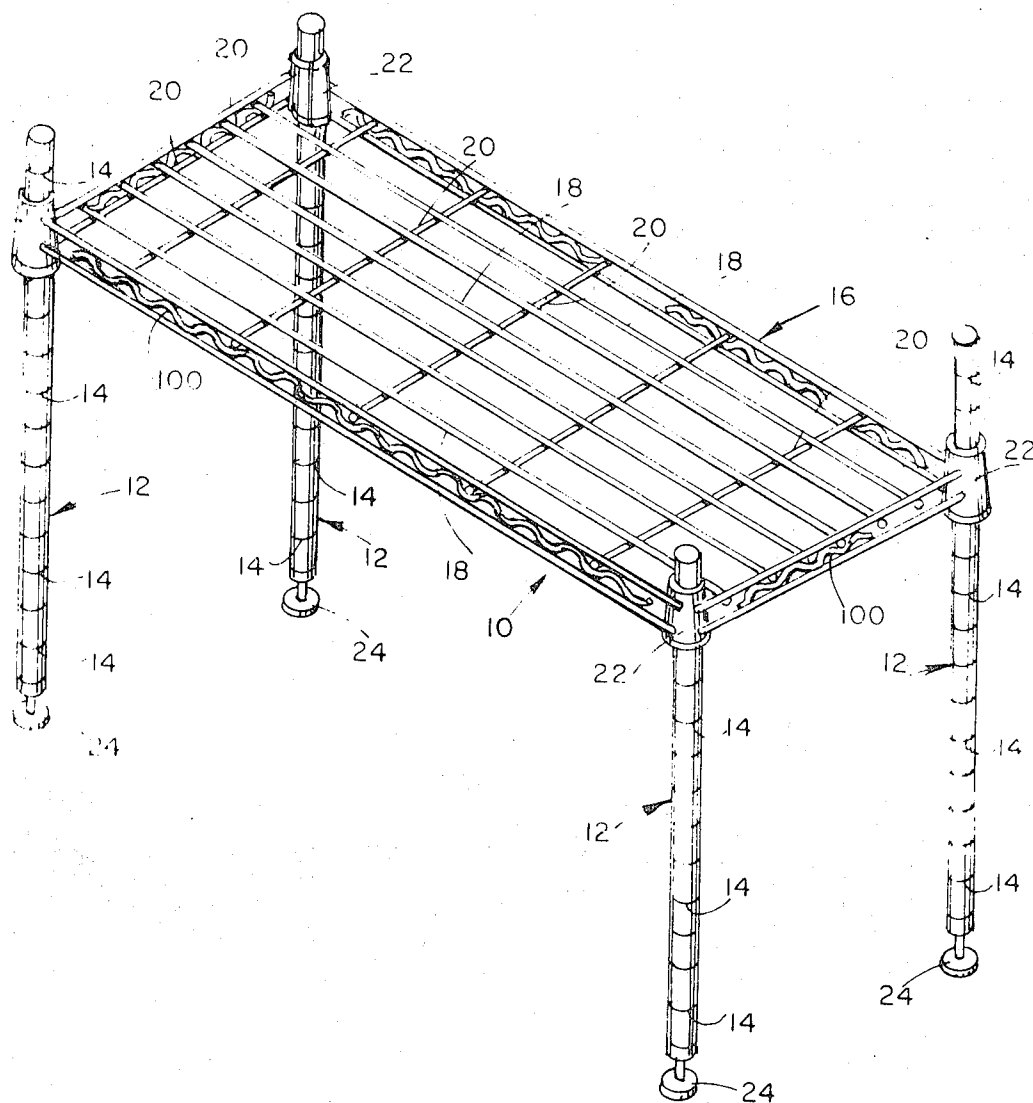
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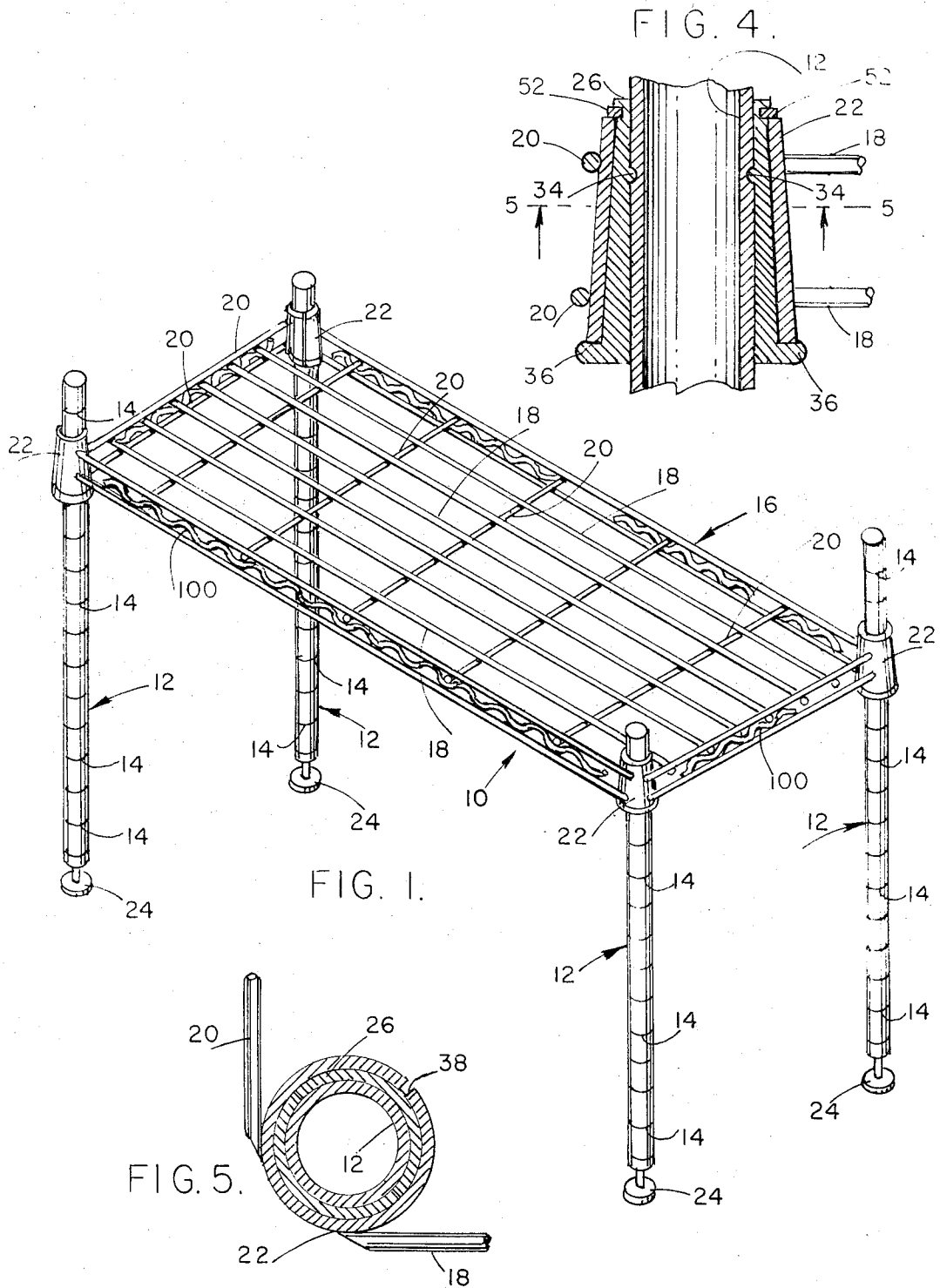
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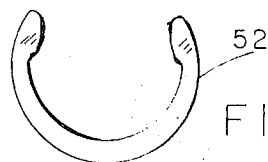
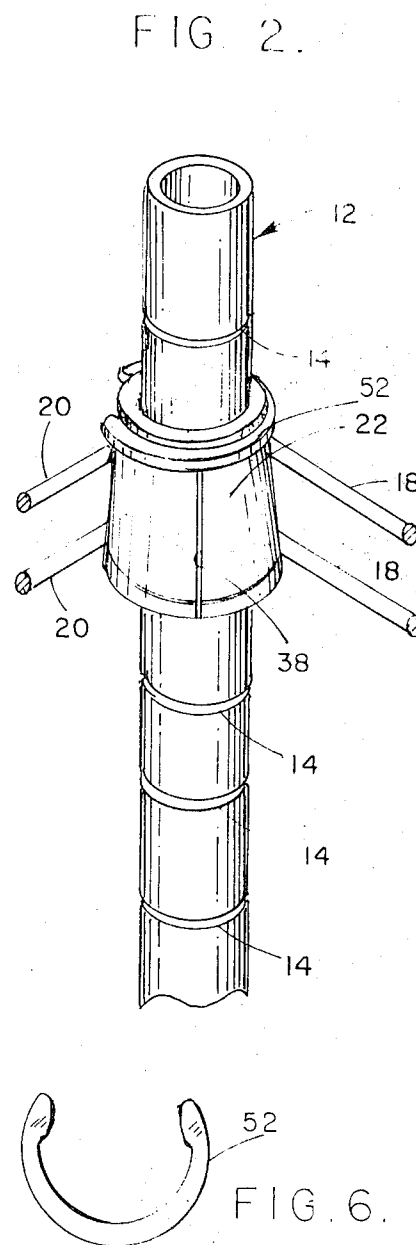
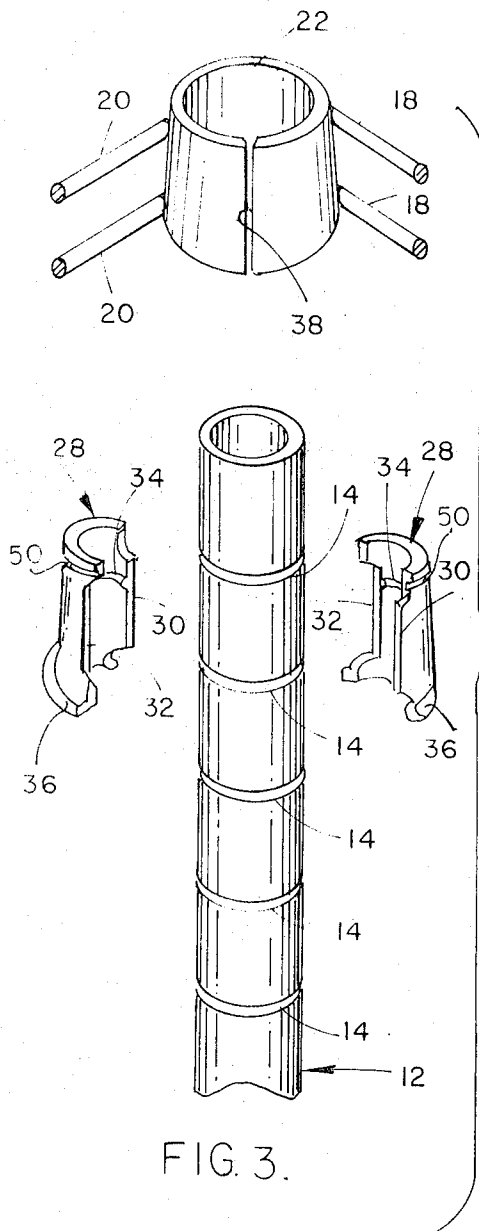
[57] ABSTRACT

Adjustable shelving comprising a plurality of posts for supporting shelves in adjustable relation. Each of the shelves includes sleeves at the corners thereof respectively, the sleeves being generally frusto-conical and provided with a split wall so as to permit partial elastic lateral expansion thereof such that each of the sleeves are accurately positionable opposite one another at a common elevation, in surrounding relation, along the respective posts. The split wall elastically accounts for tolerance differences in the configuration of each of the frusto-conical sleeves and a frusto-conical support arrangement interpositionable between the sleeves and associated posts.

8 Claims, 6 Drawing Figures







ADJUSTABLE SHELVING

BACKGROUND OF THE INVENTION

The present invention relates generally to adjustable shelving, and more particularly to adjustable shelving which compensates for discrepancies in tolerance differences between certain interfitting portions so that each of the shelves when supported properly will extend such that each of the respective corner portions thereof are at a common elevation in a horizontal plane.

As is well known, adjustable shelving of the so called "knock-down" variety often utilize thumb screws and the like for permitting adjustments of the shelves relative to supporting posts on which the shelves are mounted. Clearly, the disadvantage of using thumb screws for fastening the shelves to the appropriate posts therefore, lies in the fact that the thumb screws often cause a disfiguration of the posts as the thumb screws are often overtightened against the posts thereby leaving the latter with many dimpled portions which are of unsightly nature.

The utilization of thumb screws has been obviated by an arrangement wherein shelves incorporate frusto-conical interfitting members such as a frusto-conical sleeve and mating frusto-conical insert elements interpositionable between the sleeves and the posts which support the shelves. However, as those skilled in the art well understand, during the manufacture of frusto-conical elements which are to be associated with one another in interfitting relation, there often results tolerance differences between the interfitting members, and therefore, although there is a partial interfit between the frusto-conical members, the tolerance differences may prevent full penetration of an inner frusto-conical assembly within an outer frusto-conical assembly and thereby prevent the shelf from being positioned into a truly horizontal plane. Obviously, unless the shelf is in a horizontal plane, the contents supported upon the shelf will not be reliably maintained thereon.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide adjustable shelving which obviates the need for thumb screws and the like.

It is another object of the present invention to provide adjustable shelving which incorporates interfitting frusto-conical members.

It is still another object of the present invention to provide adjustable shelving having interfitting frusto-conical elements which may be sidably adjusted elastically relative to one another at least partially such that each shelf will be positioned in a horizontal plane.

To this end, the present invention relates generally to adjustable shelving comprising a plurality of posts, at least one shelf including a plurality of sleeves for association with said posts respectively, and support means detachably interpositionable between associated posts and sleeves for restraining said sleeves against axial movement downwardly relative to said posts, each of said support means and sleeves including mutually abutting tapered surfaces, each of said sleeves including a split wall for permitting partially elastic lateral expansion thereof such that said mutually abutting tapered surfaces of each of said sleeves and associated support means are partially slidably positionable oppo-

site one another at a common elevation along said posts.

BRIEF DESCRIPTION OF THE DRAWINGS

With the above and additional objects and advantages in view as will hereinafter appear, this invention comprises the devices, combinations and arrangements of parts hereinafter described and illustrated in the accompanying drawings of a preferred embodiment in which:

FIG. 1 illustrates a perspective view of the assembled adjustable shelving pursuant to the present invention;

FIG. 2 illustrates an enlarged fragmentary assembled view of the operative elements of one portion of the shelving unit pursuant to the present invention;

FIG. 3 illustrates an exploded perspective view of the elements of the invention illustrated in FIG. 2;

FIG. 4 illustrates an enlarged vertical cross-sectional view of the elements pursuant to the invention illustrated in FIG. 3;

FIG. 5 illustrates a cross-sectional view taken along the line 5-5 in FIG. 4; and

FIG. 6 illustrates a C-ring for association with structure illustrated in FIG. 4.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawings and more particularly to FIG. 1 thereof, the present invention relates generally to adjustable shelving denoted by the reference character 10. The shelving 10 includes four vertical generally hollow posts 12, each of the posts 12 provided with a plurality of generally equally spaced annular grooves 14 axially separated from one another. The vertical posts 12 act to support a plurality of shelves, a typical shelf 16 illustrated in FIG. 1. Each shelf may be of completely solid extent or may include a plurality of longitudinally extending members 18 and a plurality of transversely extending members 20, all generally welded to one another or the like into a rigid shelf having a rectangularly surrounding snake-like frame 100 and supporting at the corner portions thereof respectively frusto-conical sleeves 22 which at least partially surround the respective posts 12 and are axially shiftable relative to the latter in a manner as will be clarified below. Moreover, each of the vertical posts 12 may be provided with an adjustable foot 24 threadedly associated therewith, or otherwise, for permitting adjusting the elevation of each of the posts relative to one another independently.

Referring now to FIGS. 2-5, the adjustable shelving 10 pursuant to the present invention furthermore includes a support arrangement 26 (denoted in FIGS. 4 and 5) which is of frusto-conical nature when assembled. In this respect, the support arrangement 26 includes a pair of semi-annular segments or insert elements 28 each provided with interfitting tongue and grooves 30 and 32 respectively such that when assembled will mate with one another so as to provide the aforementioned frusto-conical support arrangement 26.

Each of the semi-annular insert elements 28 is provided with an inner semi-annular rib 34 which may be readily received in a selected one of the spaced annular grooves 14 of the vertical posts 12 so as to prevent axial shifting of the semi-annular insert elements 28 relative to the posts 12. Moreover, each of the semi-annular insert elements 28 is provided with a lowermost outer

semi-annular ledge 36 upon which may rest the lowermost portion of an associated one of the frusto-conical sleeves 22 in a manner illustrated in FIG. 4.

Thus, the adjustable shelving 10 may be assembled and adjusted selectively simply by positioning the mating semi-annular insert elements 28 opposite one another such that the respective inner semi-annular ribs 34 thereof are confined within the selected one of the spaced annular grooves 14 of the vertical posts 12. The mating semi-annular insert element 28 each have a generally semi-circular extent which exceeds 180° and are preferably constituted of plastic or metal which is at least partially laterally expandable so that the opposite free edges in which are provided the tongue and grooves 30 and 32 respectively, will act to snap onto the posts 12 and will self-secure themselves opposite one another without the necessity for being held manually or by other means on the posts 12. Thus, a selected one of the frusto-conical sleeves 22, which are fixed to the shelf 16, may be disposed above the associated post 12 and brought downwardly so as to capture the mating semi-annular insert elements 28.

As illustrated in FIG. 4, each of the semi-annular insert elements 28 in longitudinal cross-section is generally frusto-conical such that the upper portion thereof has a lesser thickness than the lower portion thereof adjacent the lower outer semi-annular ledges 36 thereof respectively. Thus, the mating semi-annular insert elements 28 present a frusto-conical appearance when interpositioned between the selected sleeves 22, which are likewise complementary frusto-conical, and therefore, the support arrangement 26 acts as a wedge, as interpositioned between the post 12 and the sleeve 22, permitting the selected sleeve 22 to be brought downwardly thereupon in one direction and prevents downward movement of the sleeves 22 upon contact of the inner sleeve surface with that of the outer frusto-conical surface 26.

Accordingly, the support arrangement 26 and the inner frusto-conical surface of the sleeves 22 are provided with what may be characterized as mutually abutting tapered surfaces for adjustably restraining the sleeves against shifting axially along the posts in a downward direction.

As those skilled in the art will readily understand, during the manufacture of the frusto-conical sleeves 22 and the semi-annular insert elements 28, which in longitudinal cross-section are frusto-conical, there often results tolerance differences between the contour of the interfitted frusto-conical members i.e., the maximum inner diameter of the lowermost portion of the sleeves 22 being less than the maximum outer diameter of the lower portion of the frusto-conical support arrangement 26. Thus, when there is an attempt to bring the lowermost portion of a particular sleeve 22 into engagement with the semi-annular ledges 36, provided on the semi-annular insert elements 28 respectively, the combined diametral extent of the support arrangement 26, when improperly of greater extent than that of the inner maximum diameter of the sleeve 22, because of tolerance differences, may in fact prevent the sleeve or sleeves 22 from actually contacting or abutting against the semi-annular ledge 36.

Should this happen, it is quite possible that the shelves 16 may not lie in a true horizontal plane, since the corner portions thereof, to which the sleeves 22 are fixedly connected, may be slightly out of alignment

with the horizontal plane as specifically defined by the semi-annular ledges 36 of the support arrangements 26.

Accordingly, it is a feature of the present invention to provide each of the sleeves 22 with means for permitting at least partial internal elastic lateral expansion thereof such that the mutually abutting tapered surfaces of the inner portion of the sleeves 22 and outer portions of the semi-annular insert elements 28 respectively will be at least partially slidable relative to one another, after contact; such that each of the sleeves 22 will be brought into a position of common elevation along the posts, namely in contact with the semi-annular ledges 36 of each of the insert elements 28.

In this respect, although the entire adjustable shelving 10 is constituted preferably of metallic content, the sleeves 22 may be provided with a split wall portion 38 as illustrated in FIGS. 2, 3 and 5, and therefore because of the provision of the split wall portion 38 in each of the sleeves 22, although the sleeves 22 are of metallic nature, the split wall portion 38 permits a partial lateral expansion of the inner diameter thereof so that, when necessary, when the maximum inner diameter of the sleeve 22, because of tolerance discrepancies is less than the maximum outer diameter of the support arrangement 26 proximate the semi-annular ledges 36 thereof, the sleeve 22 may be slidably moved along the support arrangement 26 downwardly while expanding partially such that the sleeves 22 will contact the semi-annular ledges 36 and permit the shelves 16 to be positioned in a horizontal plane defined by the semi-annular ledges 36.

Another feature of the present invention is the provision of a semi-annular groove 50 externally of each of the elements 28, as illustrated in FIG. 3, which semi-annular grooves 50 extend above or are exposed relative to the uppermost portion of the sleeves 22 respectively for effectively receiving a C-ring 52 illustrated in FIG. 6. The C-ring, as is well known, is partially elastic laterally and may be snapped into the semi-annular grooves 50, as illustrated in FIG. 4 and, thereby, resist inadvertent uplift of the sleeves 22 relative to the cooperating elements 28 such as may be necessary when the entire shelving unit is moved from one location to the next. Thus, the C-ring 52 acts to most effectively lock the sleeves 22 relative to the posts 12 respectively.

As those skilled in the art will readily understand, the split wall portion 38 in each of the sleeves 22 will permit the sleeves 22 to be moved or slid relative to the cooperating elements 28, whenever necessary, because of the tolerance differences, so as to fully expose the semi-annular grooves 50 and permit the latter to receive the C-ring 52.

Numerous alterations of the structure herein disclosed will suggest themselves to those skilled in the art. However, it is to be understood that the present disclosure relates to a preferred embodiment of the invention which is for purposes of illustration only and is not to be construed as a limitation of the invention.

What is claimed is:

1. Adjustable shelving comprising a plurality of shelf-support posts, at least one shelf detachably supportable by said posts, said shelf including corner portions adjustably associated with said posts respectively, said corner portions including respective sleeves for at least partially surrounding said posts, sleeve-support insert means for being detachably interpositioned respectively between each of said posts and respective sleeves

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associated with said posts, each of said insert means including inwardly extending rib means on an interior periphery for engagement within any one of a plurality of horizontally running indentations on said posts, each of said sleeves including a split side wall for permitting lateral expansion thereof for movement along said insert means, each of said insert means including exteriorly disposed ridge means on a lower portion thereof for engaging said sleeves to prevent downward movement of said sleeves, each of said insert means including exteriorly disposed groove means in an upper portion thereof, and abutment means for insertion into each of said groove means for overlying said sleeves to prevent upward movement of said sleeves.

2. Adjustable shelving as claimed in claim 1 wherein each said insert means includes a pair of semi-annular segments cooperatively associated with one another for embracing each of said posts.

3. Adjustable shelving as claimed in claim 2 wherein said indentations on said posts define a plurality of spaced annular grooves on each posts, each of said

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semi-annular segments including a semi-annular rib receivable in said annular grooves to define said rib means.

4. Adjustable shelving as claimed in claim 2 wherein each of said semi-annular segments is generally frusto-conical in longitudinal cross-section.

5. Adjustable shelving as claimed in claim 4 wherein said split side wall which permits lateral expansion of each of said sleeves is a split frusto-conical wall.

6. Adjustable shelving as claimed in claim 2 wherein each of said semi-annular segments includes a semi-annular transverse ledge defining said ridge means for being engaged by an associated sleeve.

7. Adjustable shelving as claimed in claim 2 wherein said semi-annular segments of each pair includes mutually interfitting surfaces with one another.

8. Adjustable shelving as claimed in claim 1 wherein said abutment means includes C-rings for snap-fit insertion into said groove means.

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