

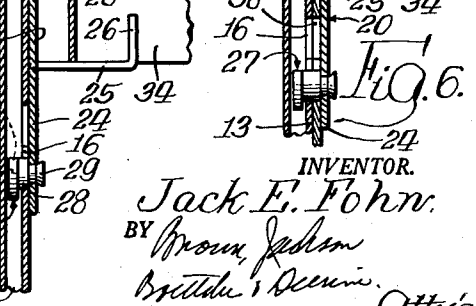
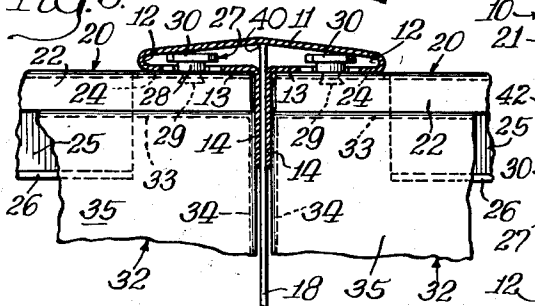
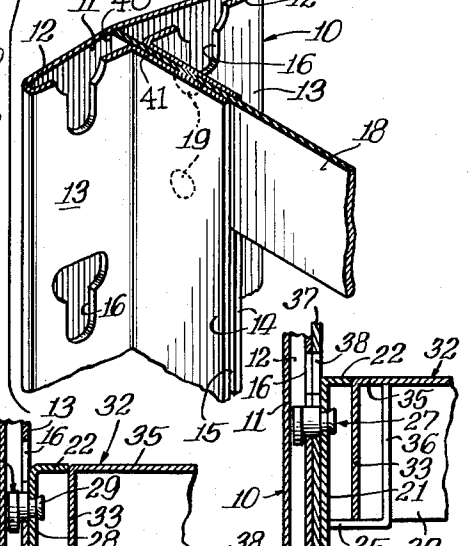
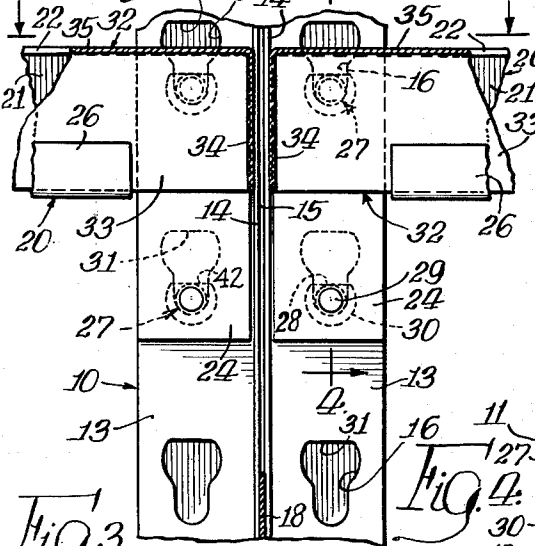
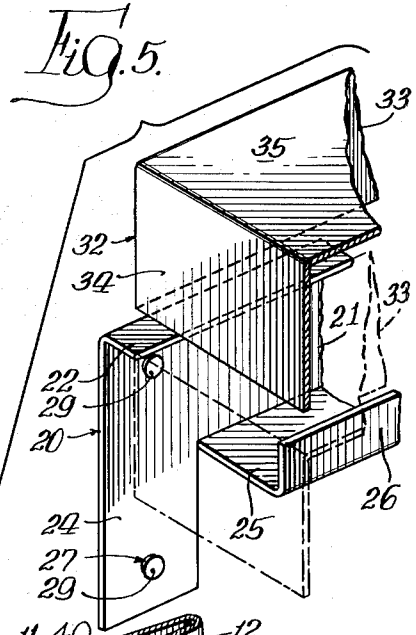
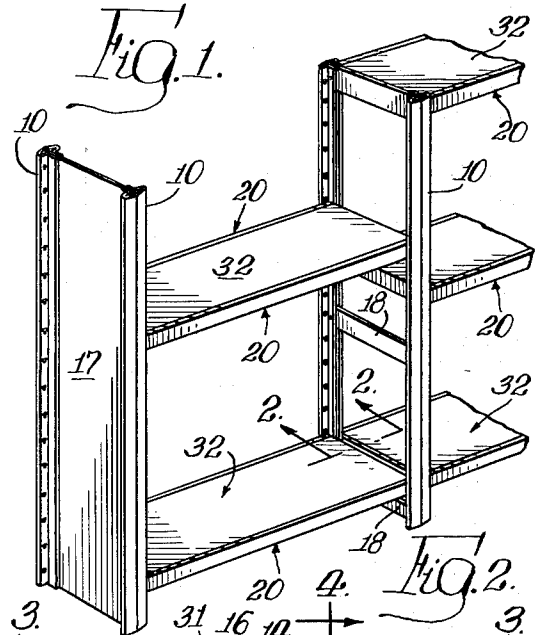
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2,992,744

SHELVING ASSEMBLY

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2,992,744

**SHELVING ASSEMBLY**

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7 Claims. (Cl. 211-148)

The present invention relates to a knockdown metal shelving assembly, and more particularly to such a shelving assembly requiring no fasteners for securing the parts together.

The invention is disclosed herein as embodied in a structure comprising uprights of hollow form provided with keyhole slots for securing cooperation with retaining means projecting from shelf supports which extend between adjacent uprights and have horizontal flanges formed thereon for supporting the shelves. The shelf supports are of integral one-piece construction, resulting in greater strength and the elimination of any possibility of looseness developing to cause weaving or wobbling of the shelving assembly. The uprights are connected by web members extending into the hollow interiors and engaging against wall portions thereof, which may thus be placed under some tension, so as to increase the rigidity and load-bearing capacity of the uprights. The slots and retaining means are shaped to facilitate both assembly and disassembly of the shelving structure. Backing or bracing means may be attached by means of these same slots and retaining elements.

A very firm, rigid, non-weaving shelf assembly is provided by the structure of this invention, and one which may very simply and easily be assembled or disassembled without tools, and which employs no loose or separate fastening elements for securing the parts together.

It is accordingly an object of the invention to provide a knockdown shelving assembly or construction which may readily be assembled and disassembled without tools and which requires no bolts or other loose and losable fasteners to secure the parts together, yet which is strong, rigid and substantially non-weaving.

Another object is the provision of a separable shelving assembly employing hollow uprights of cross-sectional shape affording oppositely extending web means for support of adjacent edges of oppositely extending shelves.

Another object is the provision of knockdown shelving having hollow vertical uprights of cross-sectional shape affording web portions slotted for the reception of retaining means of shelf structures, and a wall portion concealing the slots and retaining means.

A further object is the provision of a knockdown shelving assembly including shelf supports of flanged construction for supporting flanged shelves which provide ledges for receiving shelf flanges thereon and surface means complementing the shelf load-carrying surfaces.

It is also an object of the invention to provide a knockdown shelving assembly including shelf supports for flanged shelves, said supports having horizontally extending portions for receiving shelf flanges thereon and formed with upwardly extending lips paralleling such flanges and engaging the undersurfaces of the shelves.

Another object is the provision of knockdown shelving incorporating shelf support structure allowing of minimum flanging of the shelves.

Another object is the provision of knockdown shelving in which horizontal shelf structures are provided with headed retaining means for engagement in cooperating T-shaped slots in supporting uprights, the retaining means and slots being formed to facilitate disengagement thereof in disassembly of the parts, and avoid catching of the retaining means on the slot edges in withdrawal therefrom.

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A further object of the invention is the provision of a shelving construction in which backing and/or bracing means may readily be applied without requiring any fastening means in addition to those employed for the securement of the shelves.

Other and further objects, advantages and features of the invention will be apparent to those skilled in the art from the following detailed description, taken with the accompanying drawings, in which:

FIG. 1 is a perspective view of a portion of one embodiment of a shelving assembly according to the invention, showing one section in full, and a portion of an adjacent section;

FIG. 2 is an enlarged fragmentary sectional view taken substantially as indicated by the line 2-2 of FIG. 1;

FIG. 3 is a horizontal sectional view taken substantially as indicated by the line 3-3 of FIG. 2;

FIG. 4 is a vertical sectional view taken substantially as indicated by the line 4-4 of FIG. 2;

FIG. 5 is a fragmentary exploded or disassembled view of the structure shown in FIG. 2; and

FIG. 6 is a view similar to FIG. 4, but illustrating a slightly modified construction.

Referring to the drawings, there is shown in FIG. 1 a shelving structure or assembly comprising two pairs of vertical supports or uprights 10. As best shown in FIGS. 3 and 5, each upright 10 is hollow and of general T-shape in cross section, formed of sheet metal of suitable gauge bent to provide a main wall portion 11 which may as shown be bent along its centerline to define two halves thereof extending at an angle to each other. Bent portions 12 at each end of the wall portion 11 integrally connect thereto web portions 13 which extend toward each other in substantially a common plane and terminate in upturned flanges 14 which may be slightly spaced from each other or which while engaged against each other may in assembly be resiliently sprung apart. The flanges 14 define therebetween a slot or throat 15 opening from the interior of the upright 10 and extending in a plane which intersects the wall portion 11 substantially at the centerline thereof. A plurality of keyhole slots 16 are formed in each of the web portions 13, in vertically spaced relation therealong, the spacing of the slots preferably being equal throughout the height of the web portion.

The uprights of each pair are arranged so that the flanges 14, or more precisely the throats 15 defined therebetween, extend in substantially the same plane, and the corresponding uprights of the two pairs are arranged so that the web portions 13 thereof are in substantially a common plane, each having a web portion extending toward the other, all as will be clear from FIG. 1. Web members connect the uprights of each pair, and determine the depth of the shelving assembly. In FIG. 1, the web member at the left of the shelving section is shown as a sheet or panel 17, while at the right a plate or strip 18 comprises the web member, a plurality of the strips 18 being employed, extending horizontally between the uprights, and being vertically spaced from each other. The web members are disposed in the opposed throats 15 of the uprights of each pair, being received between the pairs of flanges 14, to which they are secured by means of spot welds 19 or other suitable means. The vertical edges 40 of the web members abut against the wall portions 11 of the uprights substantially along the centerlines thereof, so as to provide for a firm engagement of the parts which tends to minimize any weaving or like movement thereof. The end portion 41 of the web member and the edge abutting the wall portion 11 may if desired be of sufficient extent to place the wall portion under some tension, so as to increase the rigidity and load-

bearing strength of the upright. The panel 17 when used at the end of a shelving assembly provides an enclosed, finished appearance, as well as preventing articles from being pushed off the adjacent ends of the shelves, while the strips 18 provide an economical construction for uprights spaced inwardly from the ends of a series of adjacent shelving sections in an assembly. The form of the uprights 10 results in the slots 16 being covered and concealed from exteriorly of the assembly by the wall portion 11, resulting in a trim, finished appearance. Such appearance is enhanced by the concealment of joints between adjacent sections by the wall portions 11, which act as battens, and by the angled configuration of the wall portions.

Supported by the uprights 10 is a plurality of shelf structures, each comprising a pair of shelf supports engaged with the uprights and a shelf carried by the shelf supports. Each shelf support, generally designated 20 is formed of a sheet or plate of metal of rectangular shape, comprising a flat body portion 21 of a length to extend horizontally between corresponding uprights of adjacent pairs of uprights, and disposed in a vertical plane with its ends overlying the web portion 13. A flange 22 is formed at the upper edge of the body portion 21 to extend in a direction away from the web portions of the uprights. At each end of the body portion a gusset portion 24 extends downwardly in the same plane. Each gusset portion is formed by a vertical slit or cut in the sheet or plate extending upwardly from the lower edge thereof, the material extending between the cuts, or in other words between the gusset portions 24, being bent upwardly to provide a rebent flange having a horizontal portion 25 extending from the body portion 21 parallel to the flange 22, with an upturned lip 26 formed at its free edge. The horizontal portion 25 of the rebent flange is wider than the flange 22 by a desired margin, and is spaced therefrom by a predetermined distance, the height of the lip 26 similarly being predetermined. The length or vertical extent of the gusset portions 24 is greater than the vertical spacing between adjacent slots 16 in the web portions of the uprights 10, as best shown in FIGS. 2 and 4. Each gusset portion is provided with a pair of headed retainer elements 27, spaced apart vertically by a distance equal to the spacing between adjacent keyhole slots 16. The retainer elements 27 each comprise a shank portion 28 having at one end a reduced portion 29 which extends through a suitable aperture in the gusset portion 24 and is peened or upset to secure the retainer element to the shelf support 20, the shank portion extending in the direction of the adjacent web portion 13 and being adapted to enter one of the slots 16, being of a size to fit within the narrow portion of the slot. At its other or free end, the retainer element shank 28 has an enlarged head 30 small enough to pass through the larger portion of the slot 16 and too large to pass through the smaller slot portion. The head 30 is of a form presenting a substantially straight or flat edge portion 42 tangent to the shank 28 at the portion thereof which is uppermost in the horizontal attaching position thereof, the remainder of the head edge being shown as arcuate, although of course it may have other conformation if desired. The larger portion of the slot 16 is formed to correspond to the outline of the head 30, in this case having its upper edge flattened as shown at 31, with arcuate side edge portions connecting with the smaller slot portion edge. It will be evident that in disengaging the retainer element 27 from the slot 16, which involves upward movement of the element from the smaller to the larger portion of the slot and then movement outwardly from within the interior of the upright 10, the element 27 will not catch on the upper edge of the slot to complicate and hinder disengagement of the parts, since there is no projection or lip portion of the head 30 to engage behind the upper slot edge.

The shelf supports are mounted on the uprights 10

by engagement of the retainer elements 27 of each gusset portion 24 in two adjacent slots 16 in the adjacent web portion 13 by inward movement through the larger and upper slot portions and downward movement to dispose the shanks 28 in the smaller slot portions, with the heads 30 within the interior of the upright. The length of the shanks 28 is just sufficiently greater than the thickness of the web portion 13 to provide clearance facilitating the interengagement of retainer elements 27 in the slots and accommodating manufacturing tolerances of the parts, without occasioning such looseness as appreciably to affect the solidity and non-weaving attachment of the parts. Such clearance, without regard to actual dimensions or proportions, is shown in FIGS. 3 and 4. After mounting of a pair of supports 20 extending between adjacent pairs of uprights, the supports being of course substantially parallel and at the same level, a shelf 32 is disposed thereon. Each shelf has a pair of depending flanges 33 on the opposite edges thereof extending between the pairs of uprights, and a pair of flanges 34 on the edges extending between the uprights of each pair. The width or height of flanges 33 and 34 determines the vertical spacing between the upper flange 22 and the horizontal portion 25 of the lower rebent flange of the support 20, and the maximum height of the lip 26 of the rebent flange. The shelf is disposed with the lower edge of each flange 33 resting on the horizontal portion 25 of one of the shelf supports 20, and with the free edges of the flanges 22 of the shelf supports abutting the flanges 33, or the edges of the load-bearing portion 35 of the shelf, in substantially flush relation therewith. The flanges 22 thus complement and extend or complete the shelf portion 35. The width of the horizontal portion 25 of the rebent flange exceeds the width of the flange 22 by at least the thickness of the shelf flange 33 to permit this disposition of the shelf. As will be evident from FIG. 1, one of the shelf structures may be employed as the top of the shelving assembly, as indicated at the right of the figure, thus avoiding any need for providing a special top or cover construction, and reducing the number of parts required for the shelving construction. It will also be evident that a shelf structure may be employed at the very bottom of a shelving section as a base element, if desired.

The upstanding lip 26 of the rebent flange of each shelf support 20 is shown in FIGS. 2, 4, and 5 as of sufficient height to lend the desired degree of rigidity to the rebent flange and prevent buckling thereof under an applied load. In FIG. 6, a modified construction of the rebent flange of the shelf support is illustrated in which the lip 36 on the horizontal portion 25 of the flange is of a height corresponding to the width of the adjacent shelf flange 33, so as to engage the lower surface of the shelf portion 35 and thus in addition to stiffening the rebent flange provide support for the shelf additional to that afforded by the flange 33 and its engagement on the horizontal portion 25 of the rebent flange. The portion 25 is in this instance shown as only slightly wider than the flange 22, so that the lip 36 is disposed close to the shelf flange 33, against which it may engage if desired so as in effect to double the thickness of the flange 33, although an appreciable spacing of the lip from the shelf flange provides a hollow box or tubular construction of great strength. Depending upon the height of the shelf flange 33 and the width of the horizontal portion 25, the metal blank or plate from which the shelf support 20 is formed may need to be wider than in the case of the support as shown in FIG. 4, for example, in order to provide sufficient material for the higher lip 36.

As will be obvious, the shelf supports 20 and shelf 32 may be formed as an integral shelf structure, with the body portions 21 of the supports replacing the shelf flanges 33.

It will be evident that the shelving assembly of this invention readily lends itself to the inclusion or incorpora-

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tion therein when desired of a back panel or sheet to close one side of the assembly or of a section thereof, without requiring any additional fastening means or interfering with the securement of the parts as hereinabove described. Such a sheet 37 is shown in FIG. 6 as included in the shelving assembly, disposed between the web portions 13 and the shelf supports 20. The sheet is provided along its vertical edges with a number of keyhole slots 38 substantially identical to the slots 16 of the web portions 13 of the uprights 10, and spaced so as to coincide with the slots 16 when the sheet 37 is placed in position with its vertical edge portions engaging in overlapped relation with the web portion 13. The sheet is secured in assembled relation with the other parts of the shelving construction by insertion of the retainer elements 27 of the shelf supports 20 through the registering slots 38 and 16 of the sheet and the uprights, as clearly shown in FIG. 6, the shanks 28 being formed of appropriate length. The retainer elements thus serve not only to attach the shelf supports and thereby the shelves to the uprights, but to secure the back panel or sheet in place and hold it in assembly with the other part of the structure.

A panel or sheet such as the sheet 37 adds greatly to the strength and stability of the shelving section in which it is secured, as is well known in the art. If such increased stability and rigidity is desired without the closing of one side of the shelf section, or without employing as much material as is required by the sheet, suitable brace members may be employed instead, being secured to the web portions of the uprights in the same manner as described in connection with the sheet 37. That is, such braces may have keyhole slots in the end edge portions thereof to register with the slots 16 in the web portions 13, with the retainer elements of the shelf supports 20 extending through the registered slots to secure the parts together.

It will be understood that while more than one embodiment of the invention have been disclosed herein, these are exemplary and not exhaustive of the invention since many variations and modifications of the invention as specifically disclosed may be made without departure from the inventive concept. Accordingly, it is not intended that the invention be limited otherwise than as required by the spirit and scope of the appended claims.

I claim:

1. A metal shelving assembly comprising a shelf having a depending flange at an edge thereof, a support member for said shelf including a sheet portion having a pair of integral flanges extending from parallel edge portions thereof each substantially normal thereto and spaced from each other by substantially the height of said shelf flange, one of said support member flanges being wider than the other and having a rebent portion substantially perpendicular thereto extending toward the plane of said other flange, said sheet portion also having at each end an integral gusset portion extending substantially in the plane thereof and projecting beyond one of said edge portions, a pair of spaced vertical members each disposed adjacent one of said gusset portions and extending in a plane parallel to said sheet portion, and cooperating means on said vertical members and gusset portions detachably securing the gusset portions on the vertical members, said shelf being disposed with the depending flange engaged on said one support member flange and said shelf edge engaged against the free edge of said other flange, the top of said shelf and said other flange extending substantially in the same horizontal plane.

2. A metal shelving construction comprising a pair of spaced vertical members, a shelf support extending between said members having a main vertically disposed portion lying against said members with a first horizontal flange extending from the upper edge thereof away from the members and a second horizontal flange parallel to said first flange and of greater width extending from a lower edge of said main portion, means securing said shelf support to said vertical members, and a shelf sup-

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ported by the shelf support having a load-carrying portion disposed in substantially the plane of said first flange and engaging thereagainst and also having a flange depending from the portion thereof adjacent the first flange and engaging said second horizontal flange.

3. A metal shelving assembly comprising a pair of spaced vertical members each having a web portion extending toward that of the other and substantially in the same vertical plane, a shelf having an edge portion of dimension to extend in overlapping relation with said web portions and a depending flange on said edge portion, and means for supporting said shelf on said members comprising a sheet portion disposed in a vertical plane and of a length to extend over said web portions and having a horizontal flange on the upper edge thereof extending away from the web portions, a gusset portion at each end of said sheet portion integral therewith and projecting therebelow in the plane thereof, a rebent flange on the lower edge of the sheet portion extending between said gusset portions having a horizontal portion parallel to said horizontal flange spaced therebelow by substantially the height of said shelf flange, said rebent flange also having a vertical portion extending upwardly from said horizontal portion for a distance substantially equal to said shelf flange height and spaced from the sheet portion by a distance greater than the width of the horizontal flange by at least the thickness of the shelf flange, and means securing said gusset portions in mounted relation on said vertical member web portions, said shelf being disposed with said edge portion thereof engaging the horizontal flange of said supporting means and with the depending flange thereof engaging the horizontal portion of said rebent flange, and the vertical portion of the rebent flange engaging the lower surface of the shelf.

4. A metal shelving assembly comprising a shelf having a depending flange at an edge thereof, a support member for said shelf including a body portion having a pair of integral flanges substantially normal thereto extending from parallel edge portions thereof spaced from each other by substantially the height of said shelf flange, one of said support member flanges being wider than the other and having a lip substantially perpendicular thereto extending toward the plane of said other flange, said shelf being disposed on said support member, said body portion having headed retainer elements projecting from the end portions thereof in the direction opposite to said support member flanges, a pair of hollow vertical members each disposed adjacent one of said end portions and having a web portion extending in a plane parallel to said body portion and overlapped by an end portion, vertically spaced keyhole slots in each of said web portions adapted to receive said headed retainer elements in interlocking relation, a back sheet for bracing said vertical members and closing one side of the assembly extending between the vertical members with vertical edge portions thereof overlapping said web portions and disposed between the web portions and said end portions, and keyhole slots in said sheet edge portions registering with said web portion slots receiving said retainer elements there-through for securement of said back sheet by disposition of the retainer elements extending through the registered slots.

5. A metal shelving assembly comprising a shelf having a depending flange at an edge thereof, a support member for said shelf receiving the shelf thereon and including a body portion having a pair of integral flanges substantially normal thereto extending from parallel edge portions thereof spaced from each other by substantially the height of said shelf flange, one of said support member flanges being wider than the other and having a lip substantially perpendicular thereto extending toward the plane of said other flange, said body portion having headed retainer elements projecting from the end portions thereof in the direction opposite to said support member flanges, a pair of hollow vertical members each

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disposed adjacent one of said end portions and having a web portion extending in a plane parallel to said body portion and overlapped by an end portion, vertically spaced keyhole slots in each of said web portions adapted to receive said headed retainer elements in interlocking relation, means for bracing at least one of said vertical members having an edge portion thereof overlapping a web portion and disposed between the web portion and the adjacent end portion, and a keyhole slot in said edge portion registering with a web portion slot receiving a retainer element therethrough for securement of said bracing means by disposition of the retainer element extending through the registered slots.

6. In a shelving construction comprising a pair of vertical members each providing a web in substantially the same plane as the other, a shelf structure comprising a vertically disposed flat portion extending between said vertical members with end portions thereof overlapping said webs, a horizontal flange extending substantially normal to the flat portion between said end portions, an upwardly extending lip on said flange, substantially flat load-carrying means extending horizontally from said flat portion over the upper edge of said lip and supportingly engaged thereby, and means for detachably securing said end portions to said webs.

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7. A shelving construction comprising a pair of hollow vertically disposed members each of general T-shape in cross section and having a longitudinal throat opening therefrom defined by a pair of parallel flanges and also having a wall extending transversely of said throat in spaced relation thereto, said members being disposed with the respective pairs of flanges thereof extending toward each other, a web member connecting said vertical members disposed between the flanges of each vertical member with its ends abutting said transverse walls, and means securing said web member to said flanges, each end edge portion of the web member between the securing means adjacent thereto and the wall abutted thereby being of sufficient extent to place the wall under tension to increase the rigidity of the vertical member.

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