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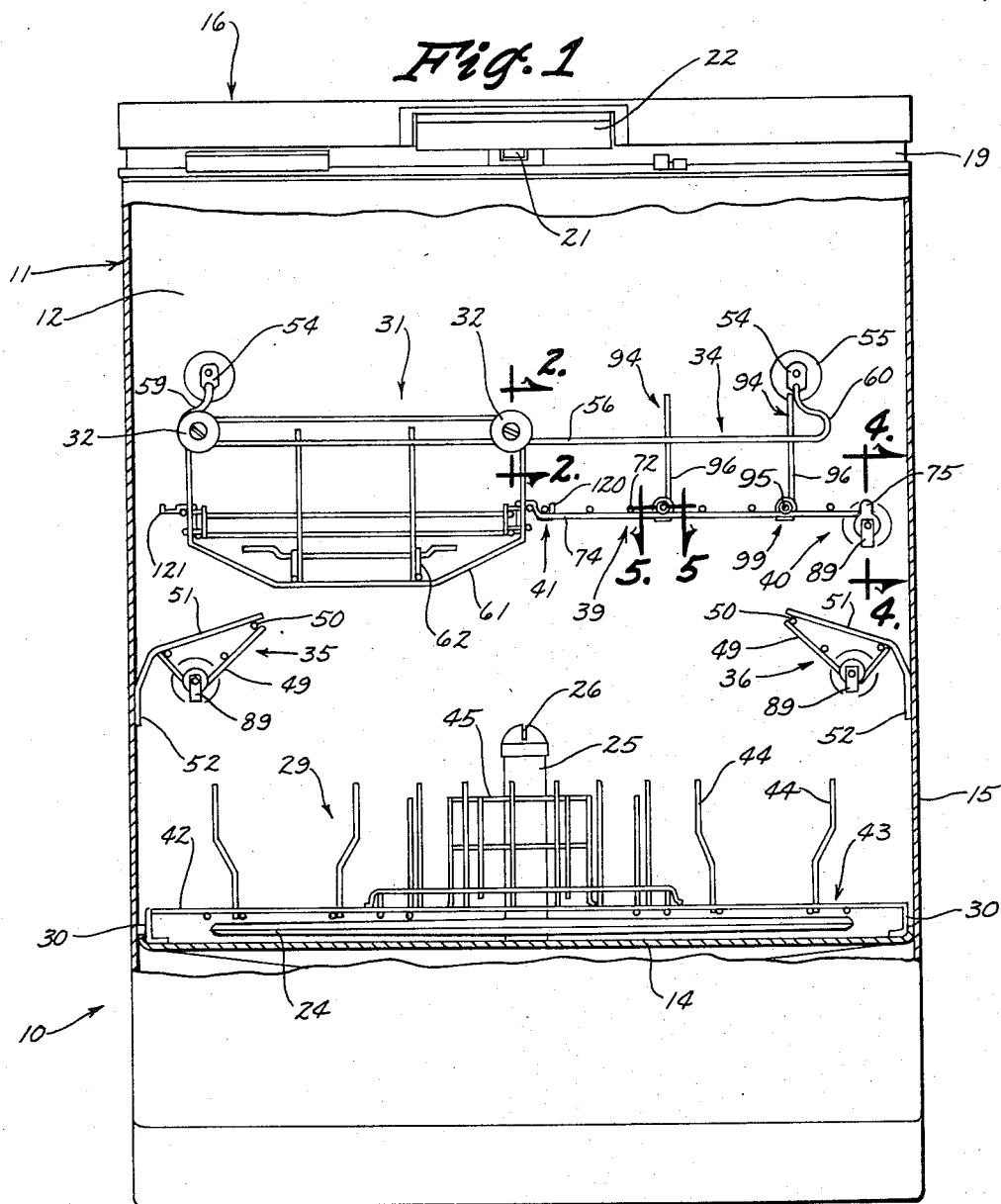
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3,402,975

DISHWASHER RACKING SYSTEM

Filed June 16, 1967

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

*Fig. 2*

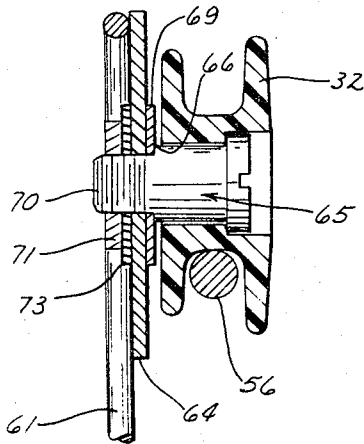


*Fig. 4*

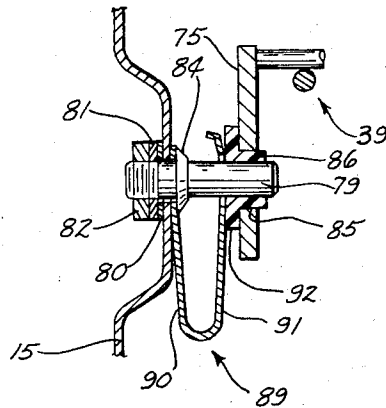


*Fig. 5*

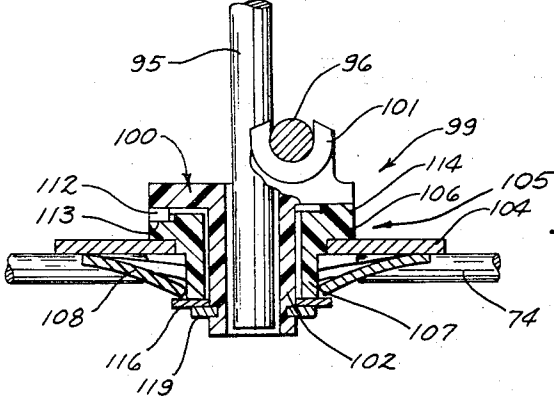
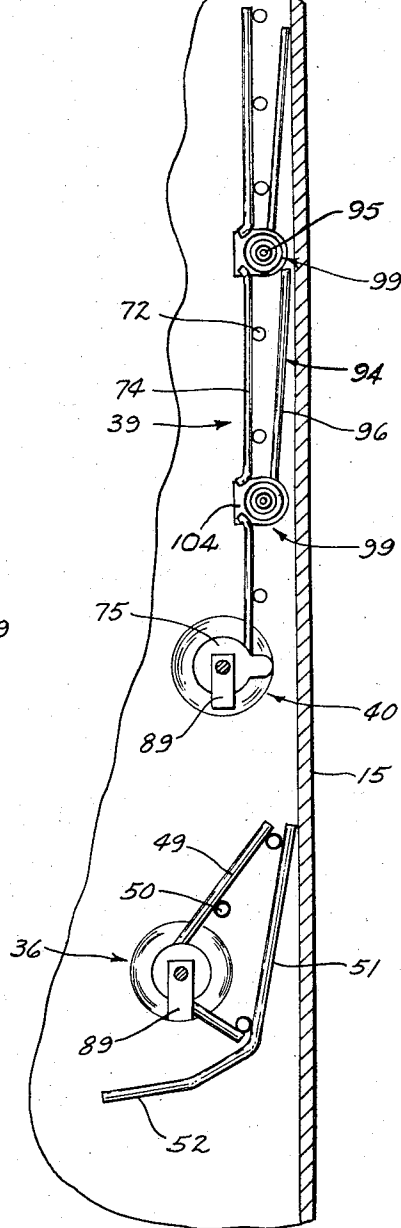


*Fig. 3*



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## DISHWASHER RACKING SYSTEM

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### ABSTRACT OF THE DISCLOSURE

A racking system for a top loading dishwashing appliance including a lower rack resting on the bottom wall of the washing enclosure, intermediate cup racks pivotally mounted on the sidewall of the enclosure, an upper rack mounted on rollers and movable between first and second positions, and a hinged shelf pivotally supported at one edge by the sidewall of the enclosure and supported on the opposite edge by the roller mounted upper rack. The hinged shelf includes dividers pivotally mounted on the shelf for movement from a detented upright position to a folded position to facilitate movement of the hinged shelf out of the article-receiving position and into a retracted position against the sidewall of the washing chamber enclosure.

### Background of the invention

**Field of the invention.**—This invention relates to a racking system for a dishwashing appliance and more particularly to an improved racking system for a top loading dishwasher having a combination of movably mounted racks and shelves for providing a large capacity and a high degree of flexibility in the loading of the dishwashing appliance.

**Prior art.**—Prior patents show that concentrated effort has been directed to devising dishwasher racking arrangements for achieving both maximum loading and flexibility in the arrangement of the articles to be washed while achieving efficient and thorough cleaning of the articles placed within the washing chamber. Prior art patents have shown roller mounted racks, pivotally mounted racks, and relatively stationary racks. In addition, specialized racks have been devised for plates, cups, or other specific dishware items but the search goes on for a system proving the optimum combination of maximum loading capacity, flexibility of loading, and efficient cleansing of the articles. Previous arrangements have required the removal of certain rack portions from the dishwasher in order to load the balance of the racks. In still others, the specialized racks, which are useful only a portion of the time, are in a position to interfere with optimum usage of other racks.

### Summary of the invention

It is therefore an object of this invention to provide an improved dishwasher racking system for achieving maximum loading capacity and flexibility of loading arrangement while retaining a high degree of cleansing efficiency.

It is a further object of this invention to provide an improved racking system for a dishwashing appliance having a novel arrangement of movable and pivotal article-receiving supports positionable within a washing chamber to receive a maximum quantity of articles to be washed while being movable or pivotable to provide the flexibility required for receiving and washing miscellaneous articles.

It is a further object of this invention to provide an improved racking system for a dishwashing apparatus having a novel combination of movable and pivotable racks positionable within the dishwashing chamber to receive a maximum quantity of articles to be washed while being movable or pivotable within the washing chamber to facilitate easy loading of the dishwashing chamber while obviating the need for removing racks from the washing chamber during the loading operation.

The instant invention achieves the above objectives in a dishwashing appliance having a racking system comprising a first rack generally supported by the sidewall of the washing chamber enclosure and movable between first and second positions on rollers, a second rack positioned below the first rack and pivotally operable between a first position for receiving articles to be washed and a second position for moving the rack to a retracted position, and a hinged shelf pivotally supported at one edge by the sidewall of the washing chamber enclosure and supported at the opposite edge by the first rack in its first position. The unique combination of a first movable rack and a hinged shelf supported in part by the first rack provides a racking system not shown in prior art patents.

Operation of the device and further objects and advantages thereof will become evident as the description proceeds and from an examination of the accompanying two pages of drawings which illustrate a preferred embodiment of the invention and in which similar numerals refer to similar parts through the several views.

### Brief description of the drawings

FIGURE 1 is an elevational view of a dishwashing apparatus wherein a major portion of the front panel and front wall of the washing chamber is removed to show the interior of the washing chamber and the racking system contained therein;

FIGURE 2 is a fragmentary sectional view showing one of the roller mounts as taken along lines 2—2 of FIGURE 1;

FIGURE 3 is a fragmentary sectional view of a portion of the washing chamber showing a pivotal rack and hinged shelf in the retracted position against the sidewall of the washing chamber enclosure;

FIGURE 4 is a fragmentary sectional view of the pivotal mounting associated with the hinged shelf and pivotal intermediate racks; and

FIGURE 5 is a fragmentary sectional view of a pivot and detent assembly for mounting pivotal dividers on the hinged shelf within the washing chamber.

### Description of the preferred embodiment

Referring to FIGURE 1, there is shown a dishwashing apparatus generally defined by a cabinet 10 and including an enclosure 11 defining a washing chamber 12. A substantially horizontal bottom wall 14 is cooperable with an upwardly extending sidewall 15 to define the upwardly opening washing chamber 12. The term sidewall is intended to include the four wall portions defining the sides and front and back of the washing chamber. The dishwasher further includes a hinged lid assembly 16 movable between a first position for closing and sealing the upper access opening to the washing chamber 12 and a second position for allowing access into the washing chamber 12 to facilitate loading and unloading of articles to be washed.

The dishwashing device may be installed in a relatively fixed condition or it may be provided with wheels or rollers for use as a portable device.

The lid assembly 16 is cooperable with a compression seal 19 to close the gap between the lid 16 and the cabinet at the access opening into the washing chamber 12 and includes a latch 21 for securing the lid 16 in sealing engagement and a manually engageable handle 22 for operating the latch 21 and for opening and closing the hinged lid 16.

The dishwashing device will include a fluid or water system including means for effecting distribution of washing fluid to all parts of the washing chamber to effect cleansing of the articles placed therein. The dishwashing apparatus of FIGURE 1 shows a lower spray arm 24 positioned adjacent the bottom wall 14 for effecting an upward spray of fluid onto the articles positioned

within the racks. Also shown is an upwardly extending centrally located spray nozzle 25 having a generally upwardly directed opening 26 for effecting a moving spray of water into the washing chamber 12. The lower spray arm 24 and the spray nozzle 25 rotate under the reactive force of the water emitted therefrom to distribute washing fluid throughout the washing chamber 12. An additional upper spray arm (not shown) may be provided adjacent the top of the washing chamber 12 and depending from the underside of the hinged lid assembly 16 to effect additional water action within the washing chamber.

The racking system for the dishwashing apparatus shown in this application includes a lower rack 29 having a plurality of depending legs 30 for supporting the rack 29 on and adjacent to the bottom wall 14, an upper rack 31 movably supported within the washing chamber 12 on a plurality of rollers 32 carried by a pair of rails 34 mounted on opposite portions of the sidewall 15, a pair of intermediate cup racks 35 and 36 pivotally supported on the sidewall 15, and a hinged shelf 39 pivotally supported on the sidewall 15 at one edge 40 and supported by the upper rack 31 at the opposite edge 41. Silverware baskets, though not shown, may be used in conjunction with this racking system.

Referring more particularly to the lower rack 29, as shown in FIGURE 1, a plurality of generally horizontally extending wire members 42, for example, are joined to form a frame or base 43 covering substantially the entire bottom wall 14 and spaced above the lower spray arm 24. A plurality of upwardly extending wire members 44 are joined to the frame or base member 43 and are formed to receive and support, in spaced relationship, the various articles to be washed. The lower rack 29 also includes a plurality of wire members 45 positioned adjacent the spray nozzle and joined in a manner to provide a housing surrounding the spray nozzle 25 for preventing interference with the rotatable spray nozzle 25. The wire members may be joined as by welding and then plastic coated to form the complete assembly. The lower rack 29 is designed to receive a plurality of glasses, plates, bowls, and similar type of articles.

The pair of intermediate racks 35, 36 are positioned above the lower rack 29 adjacent opposite portions of the sidewall 15. These intermediate racks 35, 36 have a generally V-shaped configuration for receiving cups and small glasses. The V-shaped frame includes a plurality of longitudinally spaced V-shaped wire members 49 joined by a plurality of longitudinally extending wire members 50. An additional wire member 51 joins the upper two longitudinally extending wire members 50, as in FIGURE 1, at each end of the intermediate racks 35, 36 and includes a depending portion 52 engageable with the sidewall 15 when the rack is in its operative position. The intermediate racks 35, 36 are pivotally operable from the article supporting position as shown in FIGURE 1 to an out-of-the-way retracted position as shown in FIGURE 3. Movement of the intermediate racks 35, 36 to the position as shown in FIGURE 3 places the rack in a position allowing greater access to the bottom rack 29.

The upper rack 31 is supported by a roller mounting arrangement including a pair of rollers 32 at each end of the upper rack 31 that are in turn carried by a supporting rail 34 mounted on opposite portions of the sidewall 15. The rail 34 includes mounting flanges 54 at the ends for attachment to inwardly extending embossments 55 in the sidewall 15 and is formed to space the roller support portion 56 inwardly from the sidewall 15. The horizontal roller support portion 56 of the rail member 34 allows free movement of the upper rack 31 between first and second end loops 59 and 60 that serve as positive stops at the first and second positions.

The upper rack 31 includes wire members forming an end frame 61 at each end of the upper rack 31 that

are joined by a plurality of generally longitudinally extending wire members, such as 62, to form the basic frame for the upper rack 31. The upper rack 31 further includes a number of longitudinally, transversely, and/or upwardly extending wire members joined into a rack assembly for receiving and supporting a plurality of articles to be washed.

At the upper corners of the end frame 61 a flange or mounting plate 64, shown in section in FIGURE 2, is securely attached to a portion of the end frame 61, as by welding, and adapted to receive a pin member 65 for supporting the roller 32. The roller pin 65 includes a shoulder 66 engageable with a washer 69 and a threaded portion 70 engageable by a nut 71 engageable with washer 73 for securely attaching the pin 65 to the mounting plate 64. The roller pin 65 in turn provides a bearing support for the roller 32 as the upper rack 31 is moved along the side rails 34.

A hinged shelf 39 is positioned in the upper portion of the washing chamber 12 at substantially the same elevation as the roller mounted upper rack 31. The shelf 39 includes a plurality of longitudinally and transversely extending wire members 72 and 74, respectively, joined to form a substantially flat shelf. The shelf 39 includes a mounting plate or flange 75 at each of the opposite ends of one edge 40. The mounting plates 75 are attached to the wire members forming the shelf and are positioned adjacent the sidewall 15 for pivotal mounting thereto. The pivotal or hinged operation of the shelf 39 allows positioning of the hinged shelf between an article-receiving position as shown in FIGURE 1 and a retracted position as shown in FIGURE 3. While in the retracted position, the hinged shelf 39 is out of the main portion of the washing chamber so as to allow movement of the upper rack 31 between the first and second positions and to allow access to all parts of the lower rack 29 without removing any racks from the dishwasher.

The pivotal mounting of the hinged shelf 39 is shown in FIGURE 4. A pivot pin 79 extends through a hole in the cabinet sidewall 15 and receives a resilient seal washer 80, a rigid clamping washer 81, and a nut 82 which is tightened on the threaded pivot pin 79 to securely clamp the pivot pin 79 to the sidewall 15 through the flange portion 84 of the pin 79. The mounting plate 75 attached to one corner of the shelf 39 includes an opening 85 having a square or other formed shape to non-rotatably receive a bearing insert 86 which is in turn rotatably positioned on the pivot pin 79. This pivot arrangement is positioned at each end of the hinged side of the shelf 39. A leaf spring member 89 is positioned at each pivot pin location and has one leg 90 retained between the sidewall 15 and the pivot pin flange 84 with the other leg 91 bearing against the bearing insert flange 92 to maintain the hinged shelf 39 in a centered orientation relative to the opposed sidewalls.

The shelf 39 may be removed from the washing chamber by moving the shelf longitudinally so that the bearing insert 85 slides axially on the pivot pin 79 and depresses the leaf spring 89. This movement allows the bearing insert at the opposite end to slide off the pivot pin and allow removal of the shelf 39 from the washing chamber 12.

This hinge or pivot structure as applied to the hinged shelf 39 is also used to pivotally mount the intermediate racks 35 and 36.

The pivot pins, such as 79, for supporting the shelf 39 and racks 35, 36 and the bolts for supporting the roller rails 34 extend through the front and back portions of the sidewall 15 of the washing chamber enclosure 11 and are concealed by front and back panels.

The hinged shelf 39 also includes a pair of pivotal divider assemblies 94 carried by the hinged shelf 39 and operable between a first generally upwardly extending position with the shelf in its article-receiving position and a collapsed position laying substantially flat against the

shelf 39 to allow the hinged shelf to fold flat against the sidewall 15 as shown in FIGURE 3. The pivotal divider assembly 94 includes a longitudinally extending lower wire member 95 serving as a support for the upwardly extending wire member 96 and also serving as a pivot member for the divider assembly as will be more fully shown hereinafter.

The divider assembly 94 may be maintained in the upright position as shown in FIGURE 1 by a detent assembly 99 provided at one end of the longitudinally extending pivot member 95 and as shown more specifically in FIGURE 5. The detent assembly 99 includes an index member 100 fixed to the divider 94 by a substantially semi-circular portion 101 engageable with one of the upwardly extending wire members 96. A clamping ring may be assembled around portion 101 to retain member 100 on the divider. The index member 100 also includes a sleeve portion 102 extending along one end of the pivot member 95. A mounting plate 104, fixed to the shelf base member 74, is formed to non-rotatably receive a divider stop member 105 having a flange portion 106 and a longitudinally extending bearing portion 107 into which the sleeve portion 102 of the index member 100 is inserted. A spring retainer 108 is positioned over and grips the outside of the longitudinally extending bearing portion 67 of the divider stop member 105 to retain the stop member within the formed opening of the mounting plate 104. The index member 100 includes a projecting detent 112 engageable with a detent recess 113 in the flange portion 106 of the divider stop member 105 to position and retain the divider assembly 94 in the upwardly extending position as shown in FIGURE 1. The flange portion 106 of the divider stop member 105 includes a projecting lug, such as 114, against which a projecting lug of the index member 100 engages upon movement of divider assembly 94 into the upright position shown in FIGURE 1 for preventing movement of the divider past the detented position. A washer 116 is placed on the sleeve portion 102 of the divider index member 100 against the end of the stop member bearing portion 107 and a ring retainer 119 is secured to the sleeve portion 102 and axially engageable with the washer 116 to prevent longitudinal movement of the divider index member 100 and of the divider itself to insure positive engagement of the detent projection 112 and detent recess 113.

The other edge 41 of the hinged shelf 39 is supported by the movable upper rack 31. Hook means 120 project from the upper rack 31 and are engageable by one of the longitudinally extending wire members 72 of the shelf 39 to support the shelf in a substantially horizontal article-receiving position. The engagement between the hook members 120 and the hinged shelf 39 also serve to substantially lock or retain the upper rack 31 in a first position as shown in FIGURE 1. Duplicate hooks 121 may be provided on the other side of the upper rack 31 to facilitate interchangeability of the rack within the washing chamber 12. The hooks might also be attached to the shelf instead of the upper rack as shown.

For loading the dishwasher, the two intermediate racks 35, 36 may be pivoted out of position and the hinged shelf may be moved against the sidewall 15 to allow maximum ease in loading the lower rack 29. In addition, the upper rack 31 may be moved from side to side to permit greater accessibility to lower corners of the bottom rack 29. The intermediate racks 35, 36 may then be pivoted into position and loaded with additional articles. As a last step, the hinged shelf 39 and upper rack 31 can be moved into the position as shown in FIGURE 1 to receive additional articles to be washed. It may thus be seen that the large lower rack 29, pivotally operable intermediate racks 35 and 36, movably mounted upper rack 31, and hinged shelf 39 provide a racking system achieving maximum convenience in loading the articles into the racks while retaining maximum capacity and flexibility of loading by

virtue of the selectivity of positioning the rack members between article-receiving and retracted positions.

It may also be seen that the roller mounted upper rack 31 and the removably mounted hinged shelf 39 and pivotal racks 35, 36 are easily removed to facilitate cleaning of the washing chamber 12 and to provide maximum access to the spraying apparatus and sump area of the washing chamber for improved serviceability.

It is further seen that the pivotal mounting of the intermediate racks 35, 36 and hinged shelf 39, the use of integral depending legs for locating the intermediate racks 35, 36 and lower rack 29, and the mounting of the movable rack 31 on rollers 32 effectively provides a dishwasher racking system relatively free of debris-catching ledges and brackets. This freedom from debris-catching projections effectively contributes to the efficient cleansing of the articles within the washing chamber.

In the drawings and specifications, there has been set forth a preferred embodiment of the invention and although specific terms are employed, these are used in a generic and descriptive sense only and not for purposes of limitation. Changes in form and the proportion of parts as well as the substitution of equivalents are contemplated as circumstances may suggest or render expedient without departing from the spirit or scope of this invention as further defined in the following claims.

I claim:

1. A racking system for a dishwashing machine having an upwardly opening washing chamber defined by a bottom wall and an upwardly extending sidewall wherein said racking system is disposed within said washing chamber and comprises: a rack for receiving and positioning a plurality of articles to be washed within said chamber; means for supporting said rack on said sidewall; a shelf positioned adjacent said rack; means for hinging said shelf on said sidewall; means for effecting engagement between said rack and said shelf for positioning and supporting said shelf for receiving articles to be washed.

2. A racking system for a dishwashing machine as defined in claim 1 wherein said rack is supported for movement in a substantially horizontal plane and wherein said shelf is positioned in a horizontal plane upon engagement between said rack and said shelf.

3. A racking system for a dishwashing machine as defined in claim 1 and further including dividers pivotally attached to said shelf and operable between a substantially upright position and a folded position substantially flat against said shelf.

4. A racking system for a dishwashing machine as defined in claim 3 and further including detent means operatively associated with said shelf and said dividers for selectively effecting detented positioning of said dividers in said substantially upright position.

5. A racking system for a dishwashing machine as defined in claim 1 wherein said hinge means includes a pivot pin extending between each end of the hinged edge of said shelf and the adjacent sidewall portion.

6. A racking system for a dishwashing machine as defined in claim 5 wherein said hinge means further includes biasing means operating between said sidewall and said shelf for maintaining said shelf substantially centered between the opposite sidewall portions and responsive to manually induced axial movement of the shelf for allowing removal of the shelf from said pivot pin.

7. A racking system for a dishwashing machine having an upwardly opening washing chamber defined by a bottom wall and an upwardly extending sidewall portion wherein said racking system is disposed within said washing chamber and comprises: a lower rack juxtaposed to said bottom wall; an upper rack; a hinged shelf adjacent to and supported in part by said upper rack; and at least one intermediate rack pivotally supported by said sidewall.

8. A racking system for a dishwashing machine as defined in claim 7 wherein said intermediate rack includes a depending leg portion engageable with said sidewall for

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positioning and supporting said intermediate rack for receiving articles to be washed.

9. A racking system for a dishwashing machine as defined in claim 7 wherein said shelf is pivotally operable to a retracted position substantially flat against said sidewall, wherein said upper rack is movable in a substantially horizontal plane when said shelf is pivoted against said sidewall and wherein said intermediate rack is pivotally operable to a position adjacent said sidewall for facilitating convenient access to said lower rack.

10. A racking system for a dishwashing machine having an upwardly opening washing chamber defined by a bottom wall and an upwardly extending sidewall wherein said racking system is disposed within said washing chamber and comprises: a rack for receiving and positioning a plurality of articles to be washed within said chamber; means including at least one pair of rollers for supporting said rack on said sidewall for substantially horizontal movement between first and second positions; a shelf positioned adjacent said rack; means for pivotally supporting said shelf on said sidewall; means for effecting engagement between said rack and said shelf with said rack in

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said first position for positioning and supporting said shelf for receiving articles to be washed.

11. A racking system for a dishwashing machine as defined in claim 10 wherein said shelf includes pivotally operable dividers movable between an upright position and a folded position to allow movement of said shelf to a retracted position against said sidewall and to facilitate movement of said rack from said first position to a second position occupying substantially that portion of the washing chamber occupied by said shelf in its article-receiving position.

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