Dec. 30, 1969 M. R. KAUFMAN ET AL 3,486,804

FRONT OPENING DISHWASHER WITH IMPROVED RACK ASSEMBLY

Filed Nov. 24, 1967 3 Sheets-Sheet 1

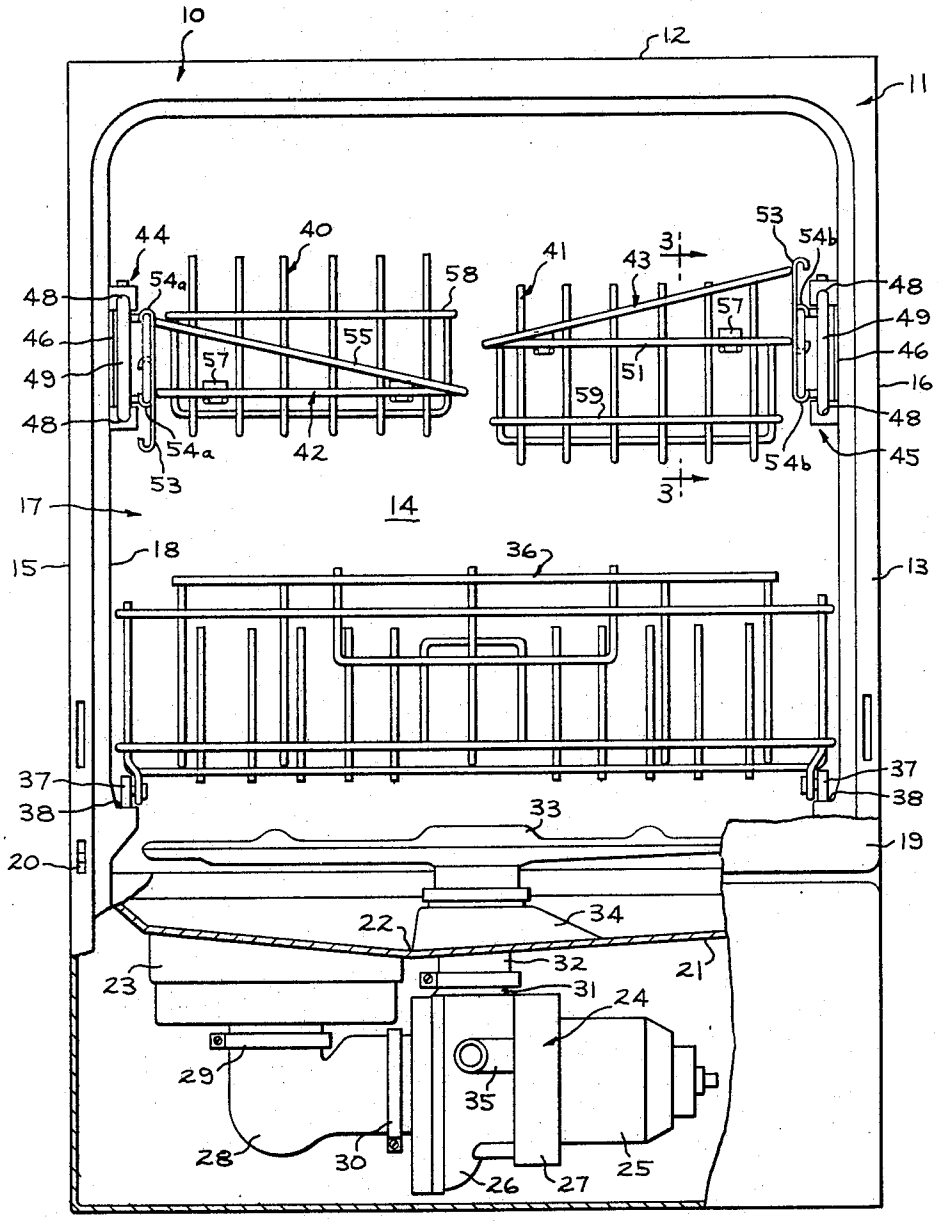

FIG. 1

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FIG. 3

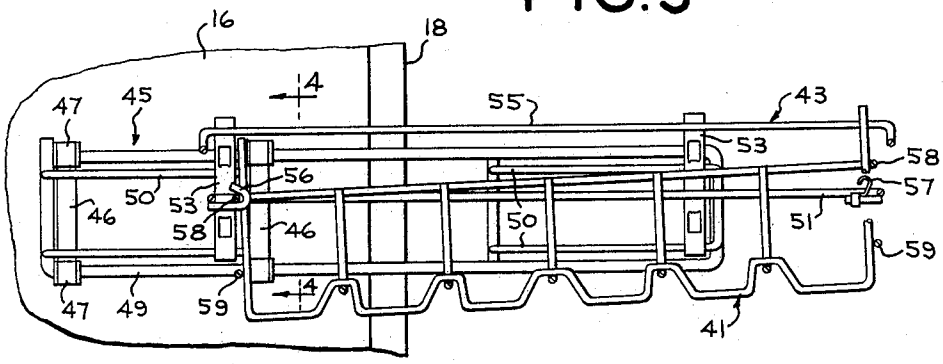
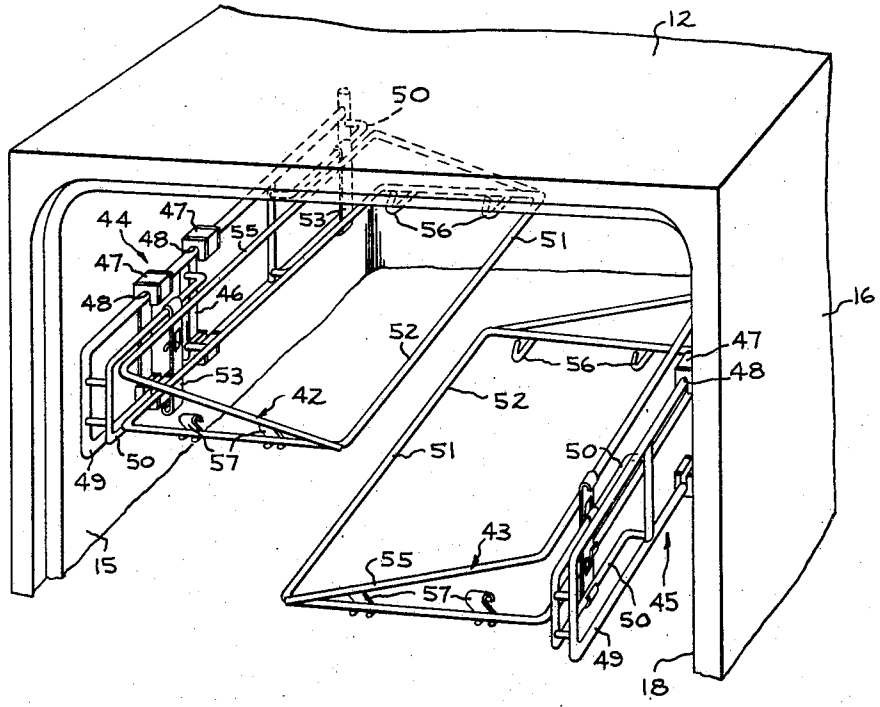


FIG. 2



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Filed Nov. 24, 1967 3 Sheets-Sheet 3

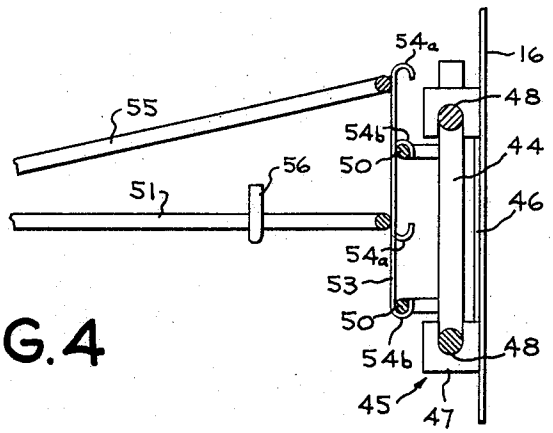

FIG.4

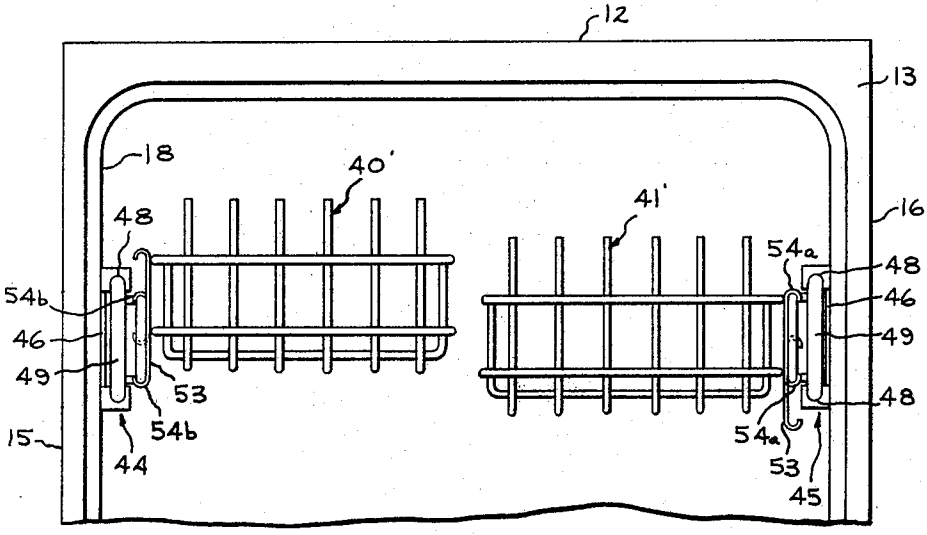

FIG.5

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United States Patent Office 3,486,804 Patented Dec. 30, 1969

3,486,804

FRONT OPENING DISHWASHER WITH IMPROVED RACK ASSEMBLY

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Filed Nov. 24, 1967, Ser. No. 685,468
Int. Cl. B08b 9/08; A47b 55/02
U.S. Cl. 312—338 9 Claims

ABSTRACT OF THE DISCLOSURE

An improved rack assembly for a dishwasher of the type including a washing enclosure having top, bottom, and side walls with an access opening through the front side wall. The rack assembly includes upper and lower open framework dish racks positionable within the enclosure in a vertically spaced relationship. The lower rack extends over substantially the entire horizontal cross-sectional area of the enclosure when positioned therein and the upper rack is split from front to rear into left and right sections which have a combined cross-sectional area approximating that of the lower rack. Support means are provided in the upper portion of the enclosure for removably supporting the upper rack sections selectively at several different elevations above the lower rack for substantially horizontal sliding movement through the access opening independently of the lower rack and of one another. The support means are arranged such that the left and right upper rack sections can be respectively cantilevered from the enclosure side walls at the left and right sides of the access opening.

CROSS REFERENCE TO RELATED APPLICATIONS

The present application is directed to a dishwasher rack assembly forming a further improvement on the invention disclosed in our copending application Ser. No. 665,559, filed Sept. 5, 1967, and assigned to the General Electric Company, assignee of the present invention.

BACKGROUND OF THE INVENTION

The present invention relates to dishwashing machines of the type having a front opening and racks which move substantially horizontally through that opening, and, more particularly, to an improved rack assembly which provides optimum effectiveness for such machines.

Dishwashing machines often have a washing enclosure with an access opening through the front side wall thereof. Such machines are usually provided with the door hinged at its bottom for pivotal movement from a vertical to a horizontal position to permit access to the washing enclosure. In such machines, there are usually two vertically spaced racks for receiving the articles to be washed. Each of these racks has a cross-sectional area substantially equal to that of the horizontal cross-section of the enclosure and is slidable independently of the other horizontally through the access opening to extend over the open door. It is conventional to form the bottom rack to receive larger dishes and the top rack to receive smaller dishes and glasses. While this conventional arrangement has substantial advantages, it also has the disadvantage that, when a mixed load of dishes is to be inserted into the dishwasher, the operator must move the top rack in and out continuously. This results in the fact that each time a large dish is to be inserted into the lower rack the upper rack must be moved back into the enclosure to allow access to the lower rack, while each time a glass or small dish is positioned for washing, the upper rack must be pulled back out again.

As indicated in our above-noted copending application, it is desirable to split the upper rack from front to rear into left and right sections, so that the operator can gain access to the lower rack without moving the entire upper rack back into the enclosure, and to provide means for removably supporting the upper rack sections at various selectively adjustable elevations within the enclosure, so that articles of different heights may be accommodated in both the upper and lower racks and so that practically the entire height of all or part of the enclosure can be utilized for washing very large articles by removing one or both of the upper rack sections.

The present invention comprises a dishwasher rack assembly which provides the just-mentioned desirable features, while further providing an arrangement which eliminates support means from the area between the split upper rack sections. With the present invention, the area between the upper rack sections is unobstructed and their elevation adjustment or removal facilitated.

SUMMARY OF THE INVENTION

The present invention provides an improved rack assembly for an automatic dishwasher of the type including a washing enclosure having an access opening formed in its front side wall.

In one presently preferred form, the assembly comprises: (A) a lower rack positionable within the lower portion of the enclosure for substantially horizontal movement through the access opening; (B) an upper rack positionable within the upper portion of the enclosure vertically spaced from the lower rack and split from front to rear into a left section and a right section; and (C) support means in the enclosure for respectively cantilevering the left and right upper rack sections from the enclosure side walls of the left and right of the access opening for substantially horizontal sliding movement through the access opening independently of one another and the lower rack.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is illustrated in the accompanying drawings, wherein:

FIGURE 1 is a front elevational view, with some of the parts broken away to illustrate details, of a dishwasher incorporating a first form of the improved rack asembly of the present invention;

FIGURE 2 is a fragmentary front elevational perspective view of the upper portion of the dishwasher of FIGURE 1 with the door open and the upper rack sections removed to show details of their support means;

FIGURE 3 is a fragmentary sectional view taken along line 3—3 of FIGURE 1, showing the right section of the upper rack and its support means extended through the enclosure access opening;

FIGURE 4 is a fragmentary sectional view taken along lines 4—4 of FIGURE 3 with the rack section removed from its support means; and

FIGURE 5 is a fragmentary front elevational view of the upper portion of a dishwasher incorporating a second form of the rack assembly of the present invention with the door open.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings and particularly to FIGURE 1 thereof, there is illustrated a front opening automatic dishwasher **10**. The dishwasher includes an outer cabinet **11** having a top wall **12**, a front wall **13**, a rear wall **14** and left and right side walls **15** and **16**. The aforementioned walls define therein a washing enclosure **17**. The cabinet has an opening **18** in its front wall **13** which serves as an access opening for the admission of articles to and the

removal of articles from the washing enclosure **17**. This access opening **18** is provided with a closure member or door **19** pivoted at its bottom edge by hinge means **20** to the cabinet front wall **13** adjacent the lower edge of the access opening **18**. The door **19** is movable between a substantially vertical position closing the opening **18** and a substantially horizontal position opening the opening **18**. The bottom of the washing enclosure **17** is defined by a bottom wall **21** which is connected in a liquid-tight relationship to the walls **13–16**. The bottom wall **21** gradually slopes to a low point **22** near the center of the dishwasher. Disposed below the low point **22** is a sump **23** which may be formed integrally in the bottom wall **21** or which may be a separate element secured to the bottom wall. Disposed below and supported by the bottom wall **21** is a motor-pump assembly **24** which includes an electric motor **25**, a pump **26** and an electrically-operated valve **27** (shown in block). The sump **23** and the inlet of the pump **26** are interconnected by a large diameter conduit **28**. The conduit **28** is secured to the sump **23** by means of a clamp **29** and to the housing of the pump **26** by means of a clamp **30**. The pump has a main outlet **31** communicating with a conduit **32** which in turn communicates with a spray head **33** that is rotatably mounted atop a centrally-bored pedestal **34** formed in the bottom wall **21**.

The pump **26** is also provided with a discharge outlet **35** which is controlled by the valve **27** and is connected to the household sewage system (not shown) by suitable conduit means (not shown). The valve **27** includes an element (not shown) within the housing of the pump **26** that is movable between two positions. In one of these positions the element closes the effluent discharge outlet **35** and opens the main outlet **31** and, in the other of these positions, closes the main outlet and opens the effluent discharge outlet. An electrical resistance heating element (not shown) may be provided in the lower portion of the washing enclosure **17** to facilitate drying of articles supported therein upon completion of the normal wash and rinse operations.

An electrically operated fill valve (not shown) is provided to admit water to the washing enclosure **17** and electric sequence control means (not shown) of a well-known type is provided for sequentially operating the pump valve **27** and the fill valve.

It should, of course, be understood that all the structure thus far described may be modified a great deal without seriously affecting the present invention since the structure is substantially conventional and comprises only one illustrated structure with which the present invention is compatible.

Of course, means must be provided within the washing enclosure **17** to support articels or dishes to be washed in a manner wherein the washing action generated by the spray head **33** effectuates cleansing of the articles. With the dishwasher as thus far described, it has been conventional heretofore to provide separate upper and lower racks, each of which constitutes a unitary structure having horizontal dimensions substantially equal to the internal horizontal dimensions of the washing enclosure **17**. With this arrangement, the lower rack is provided with rollers which allow it to be withdrawn at least partially from the washing enclosure onto the open door **19** which, upon opening, pivots into horizontal alignment with means supporting the lower rack within the washing enclosure. It also has been conventional to provide a unitary upper rack with a slide mechanism to allow the upper rack to be withdrawn at least partially in a horizontal direction out of the washing enclosure **17**. As discussed above, with this conventional arrangement, it is necessary to withdraw the entire unitary upper rack so that the upper rack may be loaded; however when the unitary upper rack is so withdrawn, it significantly interferes with the attempts of the operator to load the lower rack.

The improved rack assembly of the present invention includes a conventional unitary lower rack **36** having a horizontal cross-sectional area substantially equal to that of the washing enclosure **17**. The lower rack **36** is provided with rollers **37** on its lower left and right edges. When the lower rack is positioned within the washing enclosure **17**, the rollers **37** rest upon horizontal surfaces **38** formed on the interior of the cabinet left and right side walls **15** and **16**, respectively. The surfaces **38** can be formed of suitable pieces of sheet metal, suitably shaped and secured to their respective side walls **15** and **16**. The surfaces **38** extend forwardly from the cabinet rear wall **14** and terminate adjacent the access opening **18** in the front of the cabinet wall. The inner face of the door **19** is provided with surfaces or tracks (not shown) which, when the door is pivoted to its open position or in horizontal alignment with the surfaces **38** within the washing enclosure to permit the lower rack **36** to be rolled or slid onto the door **19**.

In the form of the present invention illustrated in FIGURES 1–4, the upper rack is split from front to rear along the center of the washing enclosure **17** and includes a left rack section **40** and a right rack section **41**. The upper rack sections **40** and **41** are substantially identical and comprise substantially rectangular open framework racks or baskets, which have a combined horizontal cross-sectional area approximately equal to that of the lower rack **36**.

In accordance with the present invention, the left and right upper rack sections can be respectively removably cantilevered from the enclosure side walls **15** and **16** selectively at various elevations above the lower rack **36** for substantially horizontal sliding movement in a fore-and-aft direction through the access opening **18** independently of one another and of the lower rack **36** by support means located in the upper portion of the washing enclosure **17**.

In the form of the present invention illustrated in FIGURES 1–4, the support means for the upper rack sections **40** and **41** include centrally open, left and right, thick wire frames **42** and **43** and left and right mounting means **44** and **45** for respectively slidably mounting the left and right frames **42** and **43** to the enclosure side walls **15** and **16**.

As best shown in FIGURE 2, the left and right mounting means **44** and **45** are substantially the same and each includes a pair of horizontally-spaced vertically-arranged substantially C-shaped brackets **46** suitably fastened to the interior of each of the enclosure side walls **15** and **16**. As illustrated, the jaws **47** of the brackets **46** extend inwardly into the enclosure **17** and are lined with a plastic bearing material, such as Teflon or the like, to form upper and lower tracks **48**.

The tracks **48** on each of the side walls **15**, **16** receive a slide member **49** for horizontal sliding movement therein through the access opening **18**. Each of the slide members **49** is formed from suitably interconnected structurally strong rods and includes a pair of vertically-spaced rods at its opposite ends which extend horizontally in a direction from the front to the rear of the enclosure to provide rails **50**.

Each of the frames **42** and **43** has a generally rectangular hoop-like base **51** which is provided with a central opening **52** in which the left and right rack sections **40** and **41** are respectively removably received. Each of the frame bases **51** has an outer edge adjacent one of the enclosure side walls **15** or **16** and an inner edge adjacent the split between the upper rack sections **40** and **41**.

The outer edge of the base **51** of each of the frames **42** and **43** has a pair of horizontally-spaced vertically-arranged brackets **53** rigidly attached to it, which are each formed with upper and lower jaw sets **54***a* and **54***b*. Each of the jaw sets **54***a* and **54***b* is adapted to be selectively slidably engaged over the rails **50** on the adjacent slide member **49** to provide at least two different vertical positions for each of the frames **42** and **43**. As illustrated, the lower end of each of the frame brackets **53** is suit-

ably fastened by welding or other suitable means to the outer edge of the frame base **51** and has its upper end similarly fastened to a brace member **55**, which is fixed to and angled upwardly and outwardly from the inner edge of the frame base. The jaws **54***a* and **54***b* are also each preferably lined with a plastic bearing material, such as Teflon or the like, to promote sliding on the rails **50**.

With this arrangement, each of the frames **42** and **43** can slide relative to its slide member **49** on the rails **50**, and its slide member **49** can slide relative to its cabinet side wall **15** or **16** in the tracks **48**. Each of the frames **42** and **43** can be readily completely removed from the dishwasher **10** by sliding the bracket jaws **54***a* and **54***b* free from the rails **50** on its slide member **49**. The slide members **49** are sized so that they can be moved rearwardly into the enclosure **17** to an extent whereby the foremost edges of the frames **42** and **43** can be fully retracted within the enclosure **17**.

As previously noted, the left and right upper rack sections **40** and **41** are respectively removably mounted in the central opening **52** in the base **51** of the left and right frames **42** and **43** and means are provided for selectively positioning the rack sections **40** and **41** at various elevations relative to one another and to the lower rack **36**. This elevation selection is made possible by the previously-noted jaw sets **54***a* and **54***b* on the frames **42** and **43** and by the provision of complementary elevation positioning means on the rack sections **40** and **41** and their respective frames **42** and **43**. In the embodiment illustrated in FIGURES 1–4, these latter elevation positioning means include a pair of upwardly and rearwardly extending hooks **56** formed on the rear edge of the central opening **52** in each of the frames **42** and **43** and a pair of upwardly opening resilient clips **57** mounted on the front edge of the central opening **52** in each of the frames **42** and **43**.

As best illustrated in FIGURE 3, each of the open framework upper rack sections **40** and **41** is provided with a pair of vertically spaced horizontal rods **58** and **59**, respectively adjacent the top and bottom of its front and rear ends, which are selectively engageable in the hooks and clips **56** and **57**. If it is desired to position one of the upper rack sections **40** or **41** at a higher elevation within the washing enclosure **17** (note the left upper rack section **40** in FIGURE 1), its bottom rods **59** are engaged in the complementary hooks **56** and clips **57** of its frame **42** or **43**, when the rack section is mounted within the frame central opening. Alternatively, for positioning at a lower elevation (note the right upper rack section **41** in FIGURES 1 and 3), its upper rods **58** are so engaged.

FIGURE 5 illustrates another form of the present invention which is similar to that shown in FIGURES 1–4, except that the frames **42** and **43** are omitted and left and right upper rack sections **40'** and **41'** are directly removably slidably mounted to the rails **50** on the slide members **49** by the brackets **53** which are directly fastened by welding or other suitable means to the outer edges of the upper rack sections **40'** and **41'**. With the form of the present invention shown in FIGURE 5, the upper and lower jaw sets **54***a* and **54***b* on the brackets **53** comprise the means for varying the elevation of the upper rack sections **40'** and **41'** relative to one another and to the lower rack **36**. As shown in FIGURE 5, the left rack section **40'** is slidably mounted on the rails **50** of the slide member **49** of the left mounting means **44** by the lower set of bracket jaws **54***b* and is thus cantilevered from the enclosure left side wall **15** at a higher elevation than the right upper rack section **41'**, which is mounted on the rails **50** of slide member **49** of the right mounting means **45** by the upper set of bracket jaws **54***a*.

By providing the above-described support means by which the upper rack sections **40** and **41** or **40'** and **41'** can be respectively cantilevered from the left and right enclosure side walls **15** and **16**, the present invention obviates the need for inner support means such as those provided in our above-noted copending application in the area between the upper rack sections. Hence, as best shown in FIGURES 1 and 5, the area between the upper rack sections **40** and **41** or **40'** and **41'** can be unobstructed and their elevation adjustment or removal facilitated.

As will be evident from the foregoing description, certain aspects of the present invention are not limited to the particular details of construction of the examples illustrated, and it is contemplated that various other modifications or applications will occur to those skilled in the art. It is therefore intended that the appended claims shall cover such modifications and applications as do not depart from the true spirit and scope of the invention.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. In a dishwasher of the type including a washing enclosure having top, bottom and side walls and an access opening in one of the side walls, an improved rack assembly for supporting articles to be washed positioned within the enclosure, comprising:

(a) a lower rack positionable within the lower portion of the enclosure for substantially horizontal movement through the access opening;

(b) an upper rack positionable within the upper portion of the enclosure vertically spaced from said lower rack;

(c) said upper rack being split from front to rear into a left section and a right section; and

(d) support means in the enclosure for respectively cantilevering said left and right upper rack sections from the enclosure side walls at the left and right of the access opening for substantially horizontal sliding movement through the access opening independently of one another and of said lower rack.

2. The invention of claim **1**, further including selectively engageable elevation positioning means on at least one of said upper rack sections and its support means for varying the elevation of said one of said upper rack sections relative to the other of said upper rack sections and said lower rack.

3. In a dishwasher of the type including a washing enclosure having top, bottom and side walls and an access opening in one of the side walls, an improved rack assembly for supporting articles to be washed positioned within the enclosure, comprising:

(a) a lower rack positionable within the lower portion of the enclosure for substantially horizontal movement through the access opening;

(b) an upper rack positionable within the upper portion of the enclosure vertically spaced from said lower rack;

(c) said upper rack being split from front to rear into a left section and a right section; and

(d) support means in the enclosure for respectively cantilevering said left and right upper rack sections from the enclosure side walls at the left and right of the access opening for substantially horizontal sliding movement through the access opening independently of one another and said lower rack;

(e) said support means including:

(i) a slide member slidable on track means mounted on one of the enclosure side walls for substantially horizontal sliding movement relative to the one enclosure side wall, and

(ii) means for removably cantilevering one of said upper rack sections selectively at a plurality of elevations on rail means provided on said slide member for substantially horizontal sliding movement relative to said slide member and through said access opening.

4. The invention of claim **3**, wherein said means for removably cantilevering said one of said upper rack sections on said slide member includes:

(a) a centrally open frame for removably receiving said one of said upper rack sections;

(b) jaw means on said frame selectively slidably mountable on said rails at a plurality of elevations; and

(c) selectively engageable elevation positioning means on said one of said upper rack sections and said frame.

5. In a dishwasher of the type including a washing enclosure having top, bottom and side walls and an access opening in one of the side walls, an improved rack assembly for supporting articles to be positioned within the enclosure, comprising:

(a) a left rack section;

(b) a right rack section;

(c) support means in the enclosure for respectively cantilevering said rack sections from the enclosure side walls at the left and right of the access opening for substantially horizontal sliding movement through the access opening independently of one another; and

(d) selectively engageable elevation positioning means on at least one of said rack sections and its support means for varying the elevation of one of said rack sections relative to the other of said rack sections.

6. In a dishwasher of the type including a washing enclosure having top, bottom and side walls and an access opening in one of the side walls, an improved rack assembly for supporting articles to be positioned within the enclosure, comprising:

(a) a left rack section;

(b) a right rack section; and

(c) a support means in the enclosure for respectively cantilevering said rack sections from the enclosure

side walls at the left and right of the access opening for substantially horizontal sliding movement through the access opening independently of one another, said support means including a centrally open frame for receiving at least one of said rack sections and mounting means on one of the enclosure side walls for mounting said frame for sliding movement through the access opening.

7. The invention of claim **6**, wherein said frame is removable from its mounting means whereby it can be completely removed from the dishwasher.

8. The invention of claim **6**, where said frame is mountable on its mounting means in at least two different positions whereby its elevation within the enclosure can be varied.

9. The invention of claim **6**, further including selectively engageable elevation positioning means on said frame and on said one of said rack sections for varying the elevation of said one of said rack sections relative to the other of said sections.

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U.S. Cl. X.R.

312—311, 351