Sept. 21, 1965 R. C. EDSTROM 3,207,167

TOP LOADING DISHWASHING APPARATUS

Filed Aug. 30, 1963 2 Sheets-Sheet 1

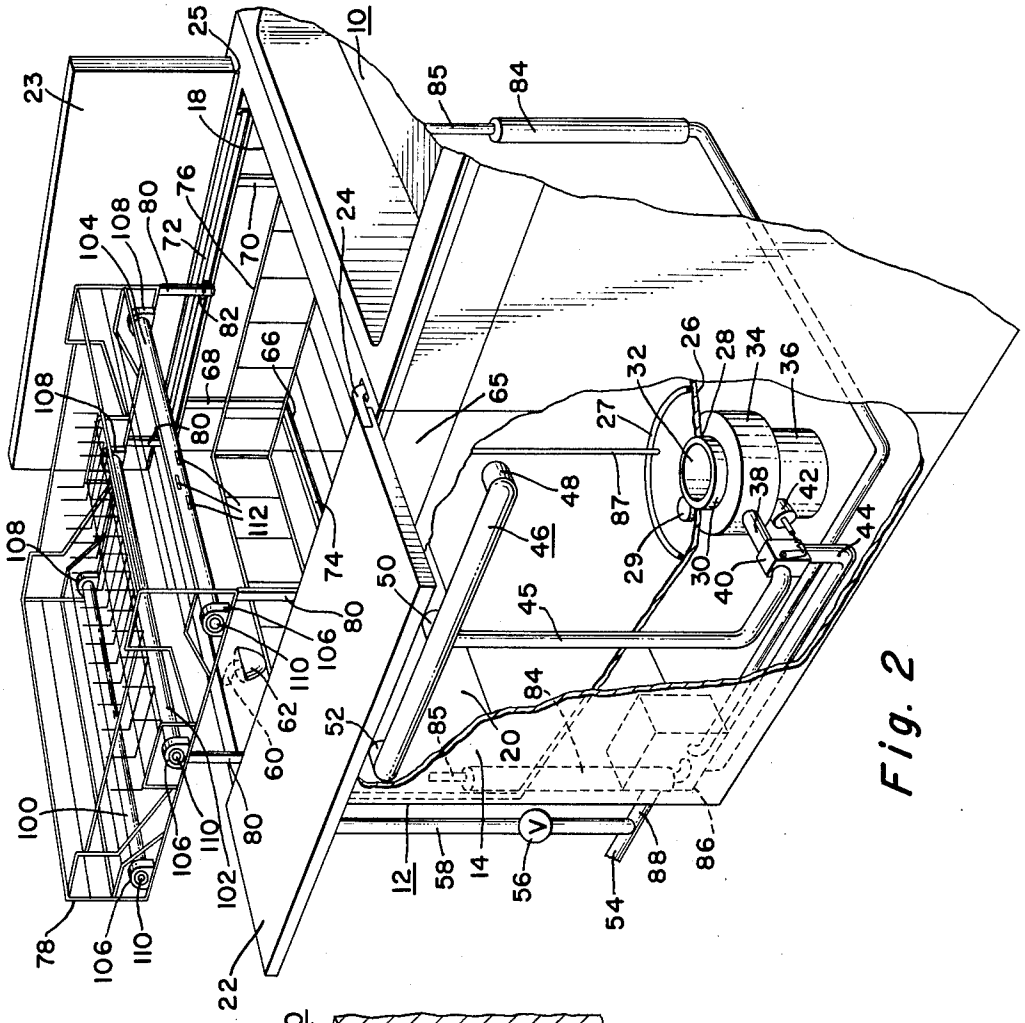


Fig. 2

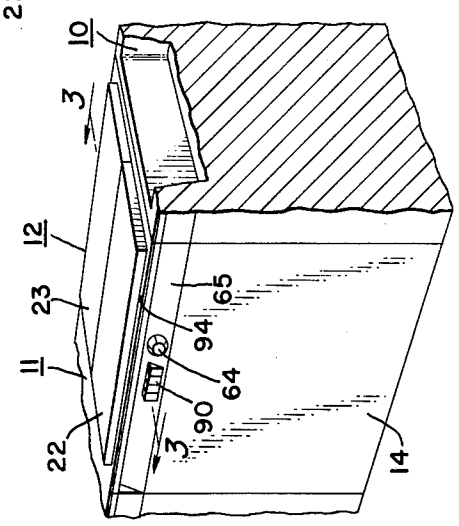


Fig. 1

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TOP LOADING DISHWASHING APPARATUS

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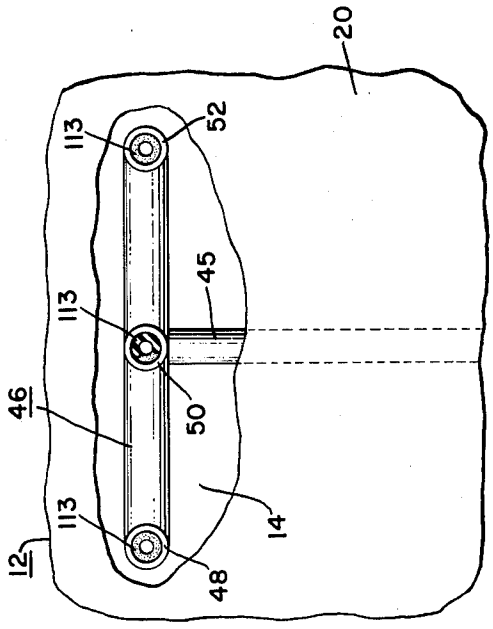


Fig. 4

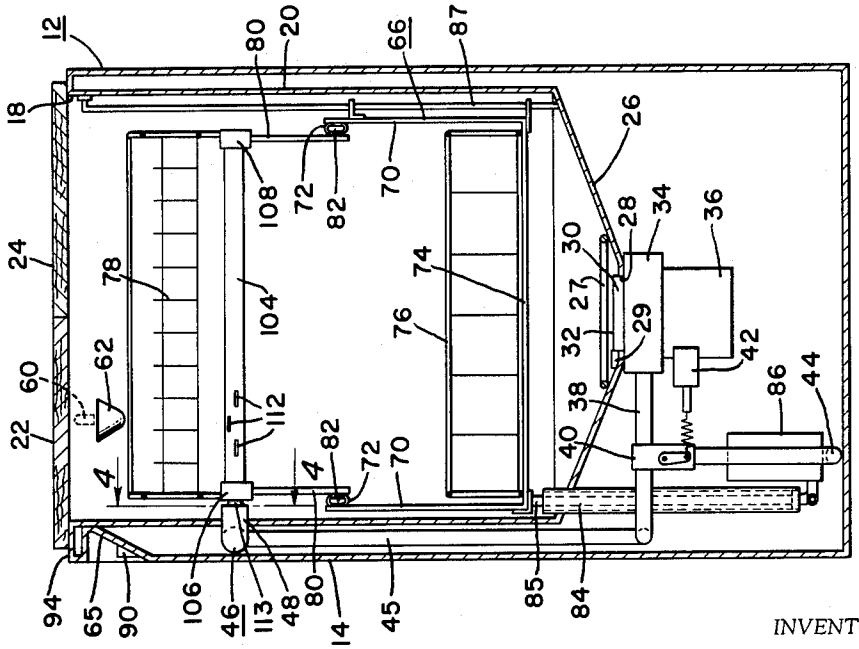


Fig. 3

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TOP LOADING DISHWASHING APPARATUS

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5 Claims. (Cl. 134—144)

This invention relates to a domestic appliance and more particularly to dishwashing apparatus.

One problem with built-in dishwashing apparatus has been that of how to quickly load dishes therein without having drawers, racks or the like sliding outwardly into limited kitchen work space. One solution has been to provide a top loading access opening in the dishwashing apparatus cabinet but these arrangements require that a user spend an undue amount of time in loading and unloading articles. Furthermore, the arrangement of dish racks within such apparatus and door clearances through the top opening therein tend to contribute to breakage of glass articles and the like being placed therein.

An object of the present invention, therefore, is to improve built-in dishwashers having top access openings by the provision of a movable dish rack arrangement including multiple, stacked loading tiers operable in a manner to allow dishes to be loaded on each tier within easy reach of a kitchen work ledge level.

A further object of the present invention is to provide an improved built-in dishwashing apparatus having a top access opening thereto including means for providing an improved spray pattern within a washing enclosure portion of the apparatus including a horizontal spray tube supported on a movable dish supporting receptacle for movement therewith into and out of the washing enclosure to allow for quick, breakage-free loading of dishes and the like within the enclosure at a point below the horizontal spray tube when it is in its operative position.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of the present invention is clearly shown.

In the drawings:

FIGURE 1 is a view in perspective of part of a built-in kitchen arrangement including the dishwashing apparatus of the present invention;

FIGURE 2 is an enlarged, partially broken view in perspective of the dishwashing apparatus;

FIGURE 3 is an enlarged view in vertical section taken along the line 3—3 of FIGURE 1; and

FIGURE 4 is an enlarged fragmentary view in vertical section taken along the line 4—4 of FIGURE 3.

Referring now to the drawings, FIGURE 1 illustrates a portion of a built-in kitchen arrangement including a sink **10** and a work surface level **11** located on either side of a built-in dishwashing apparatus **12** including an outer cabinet **14** having the front surface thereof aligned with the front surface of other units of the kitchen arrangement. The outer cabinet **14** has a top opening **18** formed therein providing access to a water container or tub **20** serving as a dishwashing enclosure in the apparatus **12**. The access opening **18** is closed by front and rear folding doors **22, 23** pivoted to the cabinet **14** by suitable hinge means **24, 25**, respectively, to form a kitchen work level surface adjacent to the sink **10** when in a closed position as illustrated in FIGURE 1. In a preferred arrangement the doors **22, 23** may be constructed of a suitable material such as wood, synthetic fiber or the like suitable for use as a cutting board in the built-in kitchen arrangement.

The dishwashing arrangement **12**, as best shown in FIGURES 2 and 3, includes a sump **26** at the lower end of the tub **20** having a heating element **27** therein for drying articles in the washing compartments and an electric pressure switch **29** for controlling liquid level therein. The sump **26** has an opening **28** located centrally therein at the lowermost portion thereof. A tubular fitting **30** received within opening **28** is secured to sump **26** to form an inlet opening **32** to a pump, representatively illustrated as being a vane type centrifugal pump **34**, driven by suitable means, for example, an electric motor **36**. The pump has an outlet conduit **38** therefrom connected to a two-way valve mechanism **40** controlled by means of a solenoid actuator **42** for selectively directing fluid discharged from the pump **34** through a conduit **44** to drain and a conduit **45** located between the front wall of outer cabinet **14** and the water container **20** to a header **46** located adjacent an upper portion of container **20**. The header **46** is representatively shown as having three outlets **48, 50, 52** directed through the front wall of container **20** interiorly thereof to serve as a washing fluid supply means into the washing enclosure formed by the container **20**.

The inlet water supply for the dishwashing apparatus **12** includes an inlet conduit **54** from a household water supply source connected through a solenoid valve **56** to an inlet conduit **58** having a terminus **60** supplying fluid through an air gap into a funnel **62** that serves to fill the container **20** with a predetermined amount of water for carrying out a desired dishwashing operation under the control of a suitable timer mechanism **64** representatively illustrated as being mounted on a top panel **65** directed across the top of the front wall of cabinet **14**. The timer mechanism **64** progresses through a predetermined program to sequentially energize the solenoid valves **42, 56**, heating element **27** and electric motor **36** to carry out a predetermined desired dishwashing operation, for example, an operation of the type set forth in the U.S. Patent 3,064,661 issued November 20, 1962 to Jacobs, including a wash, a rinse and a drying cycle in the controlling sequence.

In accordance with certain of the principles of the present invention, improved means are arranged within the dishwashing enclosure formed by the container **20** for improving loading and unloading access to the dishwashing apparatus. More particularly, within the container **20** a framework **66** is located including a pair of spaced straps **68, 70** at both the front and rear of the washing enclosure interconnected by an elongated channel-shaped track element **72** at the upper ends thereof. The opposed straps **68, 70** are interconnected by suitable framing elements **74** at the bottom ends thereof with the elements **74** forming a support platform for a lower dish supporting rack or receptacle **76** for carrying articles in a lower tier within the washing compartment **20**. Located above the lower tier defined by the receptacle **76** is located an upper dish supporting rack or receptacle **78** that is supported at both the front and rear portions thereof on a pair of spaced legs **80** having their upper ends secured to the underside of receptacle **78** and their lower ends secured to rollers **82** mounted within the track **72** for horizontal movement therealong.

The framework **66** is movable vertically within the container **20** by means of power cylinders **84** located in the outer casing **14** of the apparatus **12** at diagonally opposite corners thereof, representatively illustrated as being located at the left front corner and right rear corner as illustrated in FIGURE 2 where a piston rod **85** is directed upwardly from each of the power cylinders **84** into container **20** where the upper ends thereof are secured to corner gussets on the framework **66**. Rods **87** secured within container **20** adjacent the inner surface thereof are directed through gussets on the remaining framework

corners to guide these corners. In the illustrated embodiment, the power cylinders **84** are hydraulically actuated by pressurized fluid from conduit **54** that is directed into a four-way valve assembly **86** through a conduit **88** with the four-way valve **86** being operatively associated with suitable control buttons **90** adjacent the timer mechanism **64** to be conditioned so as to direct fluid flow from the conduit **88** into the cylinders **84** to force the piston rods **85** upwardly so as to raise the framework **66** toward the access opening **18** and also being conditioned by the control buttons **90** to communicate the power cylinders **84** with the drain conduit **44** when it is desired to lower the framework **66** into the container **20**.

By virtue of the above-described arrangement, when it is desired to load the improved dishwasher of the present invention, a user merely has to open the folding doors **22, 23** into the positions illustrated in FIGURE 2 so that the rear door **23** will be located in a position generally perpendicular to the work surface of the built-in kitchen and the front door **22** will be located by hinge means **24** in a horizontal plane to form an extension of the work surface on which articles can be placed prior to loading or after unloading from the dish-carrying receptacles supported within the container **20**. When the front door **22** is in its extended position, it is supported by a top edge portion **94** at the front of the outer cabinet **14**.

Once the doors are in their open position, by depressing one of the control buttons **90**, the four-way valve **86** is conditioned to cause the power cylinders **84** to raise the framework **66** upwardly toward the access opening **18** until the upper receptacle **78** is raised out of the cabinet **14**. Once in this position, the receptacle can be moved horizontally on tracks **72** out of vertical alignment with the lower receptacle **76** to a position shown in FIGURE 1. This allows all portions of the dish supporting structure to be within easy reach of the general work level surface of the kitchen. Once the upper and lower receptacles have been filled with articles to be cleaned, a user locates the upper receptacle **78** in vertical alignment with the lower receptacle **76** and another of the buttons **90** is depressed to condition the four-way valve **86** to direct fluid in the cylinders **84** to the drain conduit **44** and the weight of the articles in the receptacles will cause the framework **66** to gradually be lowered into the container **20** under the control of the fluid restricting characteristics of the discharge openings from valve **86**. The doors **22, 24** are then closed and the timer mechanism **64** is positioned to carry out a desired predetermined dishwashing operation.

In accordance with certain of the other concepts of the present invention, improved means are included in the apparatus **12** for providing an unusually thorough spray pattern against articles supported by the upper and lower receptacles **76, 78**. This improved spray pattern is attributable to the provision of horizontal spray tubes **100, 102, 104** located intermediate the upper and lower dish receptacles in the above-described multi-tiered stacked arrangement. The three spray tubes are directed transversely across the container **20** at spaced locations therein with each of the horizontal spray tubes **100, 102, 104** having the opposite ends thereof rotatably supported in bearing points **106, 108** secured to the receptacle **78**. Each of the tubes **100, 102, 104** has an inlet opening **110** thereto and slots **112** formed throughout the length thereof from which spray is directed against articles supported on the upper and lower receptacles **78, 76**. The inlet openings **110** are arranged so that each communicates with one of the outlets **48, 50, 52** in the header **46** when the framework **66** is in its lowered position as best illustrated in FIGURE 3. An outlet seal element **113** of resilient material located around each of the header outlets is inflated by fluid flow through the outlets to sealingly engage the ends of the tubes around the inlet openings **110** to prevent fluid leakage between the header **46** and the tubes **100, 102, 104** when pressurized fluid is supplied to the header **46** from the pump **34**. The tubes are of the type set forth in U.S. Patent 3,044,842 issued July 17, 1962 to Abresch et al. which discloses a horizontal spray tube arrangement that is rotatable by pressurized flow of fluid thereto. Accordingly, in the illustrated arrangement the tubes will rotate during the washing cycle to completely blanket the articles in the upper and lower receptacles with a high-pressure spray to remove foreign matter from all portions of the articles to be cleaned.

The feature of providing receptacle supported spray tubes of the above-described rotatable type produces an improved spray pattern in the washing compartment without interfering with the loading or unloading of articles from receptacles therein since the spray tubes will be carried by the receptacles **78** outwardly of the washing compartment and then moved horizontally on the tracks **72** out of interfering alignment with the lower receptacle **76**. However, when the upper receptacle is aligned vertically with the lower receptacle and lowered into the container **20**, the tubes will be communicated with the header **46** to carry out the above-described washing action.

Because of the improved multi-tiered dish receptacle arrangement, including the provision of receptacle supported horizontal spray distributing tubes, a relatively compact top loading dishwashing apparatus is provided that is especially suited for use as a built-in unit of a built-in kitchen arrangement. Moreover, the improved built-in appliance, because of the interrelationship of dish supporting receptacles and spray distributing means therein, can be quickly loaded and unloaded without materially blocking or interfering with kitchen work space while offering the advantage of an unusually good spray distribution pattern within a washing compartment of the apparatus.

While the embodiment of the present invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. In a top loading dishwasher the combination of, a tub forming a washing enclosure having a top opening therein, washing fluid supply means for directing washing fluid into said tub, a movable dish supporting receptacle having a bottom portion, means for supporting said receptacle in said tub, a washing fluid distributing tube for spraying articles supported by said receptacle, means for securing said washing fluid distributing tube on said receptacle whereby said tube is located substantially in the plane of the bottom portion of the receptacle, means including said receptacle support means for moving said receptacle out of said tub through the top opening therein to provide access for loading and unloading dishes to and from said receptacle, said receptacle support means serving to align said washing fluid distributing tube in fluid communication with said washing fluid supply means when said receptacle is located at a predetermined position within said tub for directing washing fluid through said tube to be sprayed against articles carried by said receptacle.

2. In a top loading dishwasher the combination of, a tub forming a washing enclosure having a top opening therein, washing fluid supply means for directing washing fluid into said tub, a movable dish supporting receptacle having a bottom portion, means for supporting said receptacle in said tub, a horizontally arranged washing fluid distributing tube for spraying articles supported by said receptacle, means for rotatably securing said washing fluid distributing tube on said receptacle so that the longitudinal axis of the tube is substantially in the plane of the bottom portion of said receptacle, means for moving said receptacle out of said tub through the top opening therein to provide access for loading and unloading dishes to and from said receptacle, said receptacle support means serving to align said washing fluid distributing tube in fluid communication with said washing fluid supply means when said receptacle is located within said tub for directing washing fluid into said tube, and means located internal-

ly of said tube reacting to the washing fluid directed into said tube for rotatably driving said tube relative to articles carried in said receptacle.

3. In a top loading dishwashing unit the combination of, a tub forming a washing enclosure having a top opening therein, washing fluid supply means for directing washing fluid into said tub including a plurality of washing fluid outlets, a movable dish supporting receptacle having a bottom portion, means for supporting said receptacle in said tub, a plurality of horizontally arranged washing fluid distributing tubes for spraying articles supported by said receptacle, means for securing each of said washing fluid distributing tubes at spaced points on said receptacle so that the longitudinal axis of said tubes are substantially in the plane of the bottom portion of said receptacle, means for moving said receptacle and the tubes secured thereto out of said tub through the top opening therein to provide access for loading and unloading dishes to and from said receptacle, said receptacle support means serving to align each of said washing fluid distributing tubes in fluid communication with one of the outlets of said washing fluid supply means when said receptacle is located at a predetermined position within said tub for directing washing fluid through said tubes to be sprayed against articles carried by said receptacle.

4. In a top loading dishwasher the combination of, a tub forming a washing enclosure having a top opening therein, washing fluid supply means for directing washing fluid into said tub, a movable dish supporting receptacle, means for supporting said receptacle in said tub for movement outwardly thereof through the top opening therein, said receptacle support means including a framework for supporting a dish rack in a lower portion of said tub below said receptacle in stacked relationship therewith, a washing fluid distributing tube for spraying articles supported in said receptacle and in a dash rack supported by said framework, means for securing said washing fluid distributing tube on said receptacle at a location beneath said receptacle and above a dish rack supported by said framework, means for moving said receptacle along with said washing fluid distributing tube out of said tub through the top opening therein to provide access for loading and unloading dishes to and from said reeptacle, said receptacle support means including means for guidingly directing said receptacle horizontally when raised out of said tub into a position offset relative to said framework in order to have access to the dish rack supported thereon, said receptacle support means serving to align said washing fluid distributing tube in fluid communication with said washing fluid supply means when said receptacle is located at a predetermined position within said tub for directing washing fluid through said tube to be sprayed against articles carried by said receptacle and the dish rack.

5. In a top loading dishwasher for association with a kitchen counter arrangement the combination of, a cabinet having front and rear surfaces and a top access opening, closure means for said top access opening including a first movable portion having one edge thereof pivotally secured to said cabinet adjacent its front surface and a second movable portion having one edge thereof pivotally secured to said cabinet adjacent its back surface, said movable portions being pivotable into an open position and into a closed position where they serve as a countertop portion of a kitchen counter arrangement, a tub located within said cabinet forming a washing enclosure having an open upper end aligned with said top access opening, washing fluid supply means for directing water into said tub, a movable dish supporting receptacle, means for supporting said receptacle in said tub for movement outwardly thereof through the top opening therein when said movable top portions are in their open position, said receptacle support means including a framework for supporting a dish rack in a lower portion of said tub below said receptacle in stacked relationship therewith, a washing fluid distributing tube for spraying articles supported on said recepatcle and on a dish rack supported by said framework, means for securing said washing fluid distributing tube on said receptacle at a location beneath said receptacle and above a dish rack supported by said framework, means for moving said receptacle out of said tub through the top opening therein to provide access for loading and unloading dishes to and from said receptacle, said receptacle support means including means for guidingly directing said receptacle horizontally when raised out of said tub into a position offset relative to said framework in order to provide access to the dish rack supported thereon, said receptacle support means serving to align said washing fluid distributing tube in fluid communication with said washing fluid supply means when said receptacle is located at a predetermined position within said tub for directing washing fluid through said tube to be sprayed against articles carried by said receptacle and the dish rack.

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