May 26, 1964 F. W. BLANCHARD 3,134,487

DISHWASHING MACHINE

Filed May 21, 1962 6 Sheets-Sheet 1

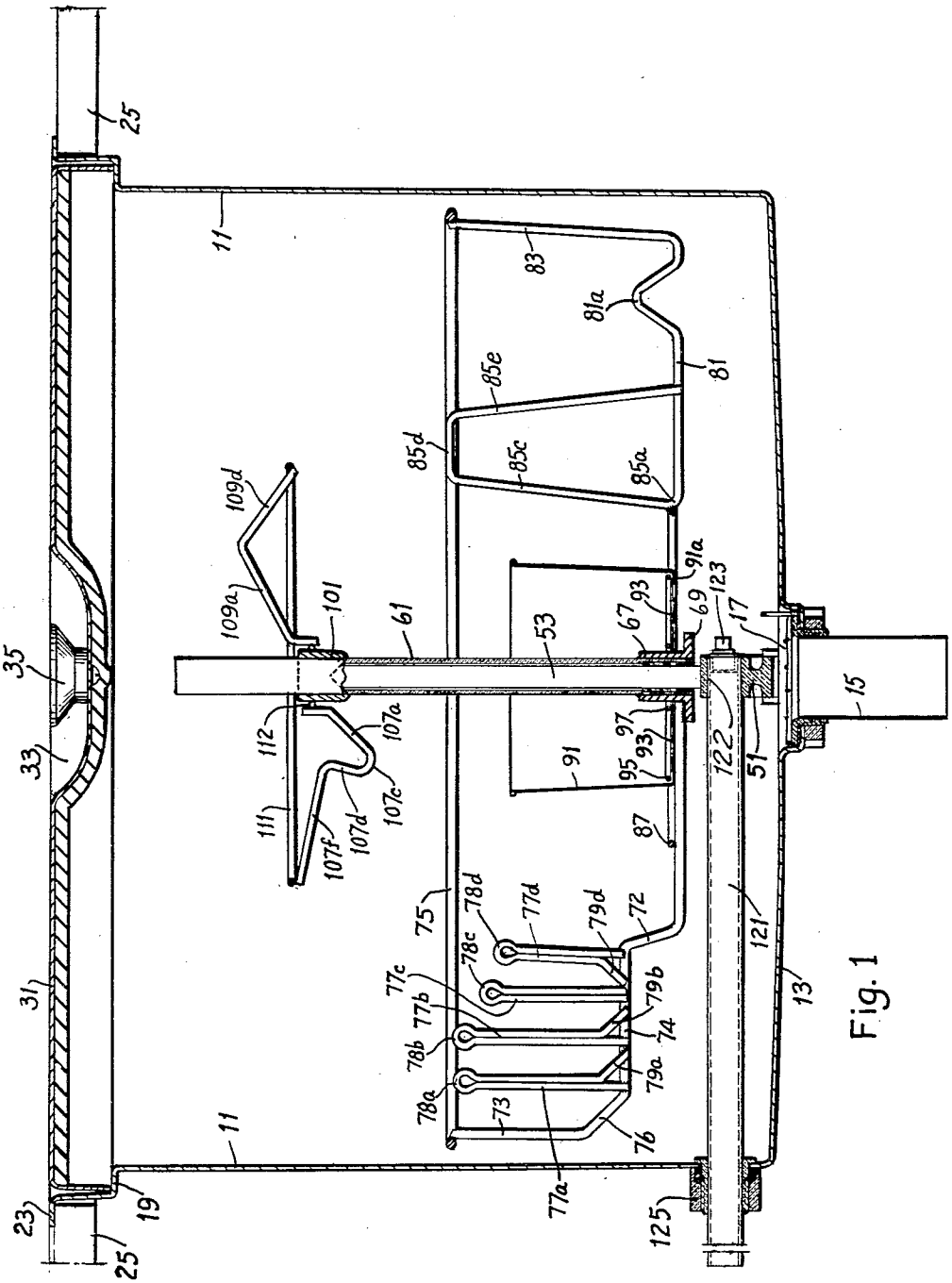

Fig. 1

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DISHWASHING MACHINE

Filed May 21, 1962 6 Sheets-Sheet 2

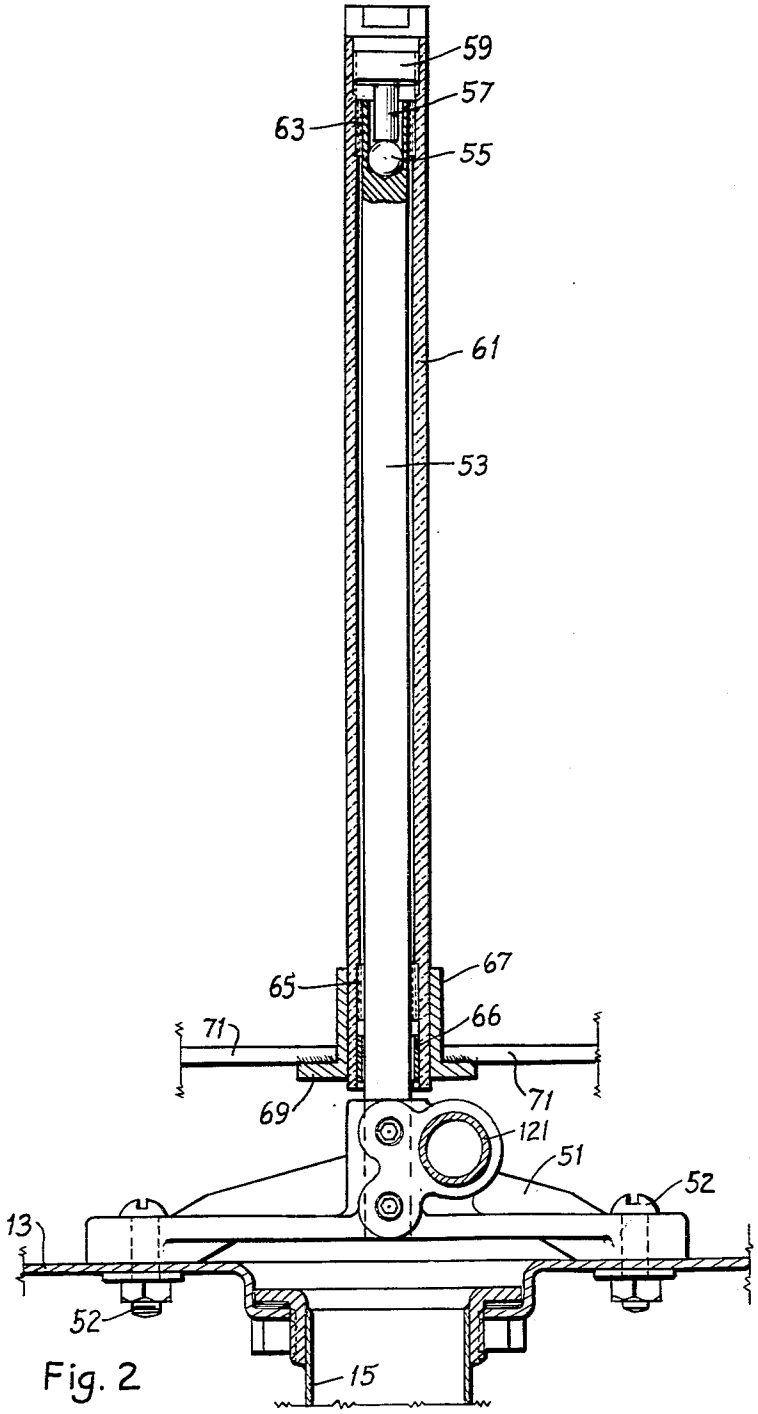

Fig. 2

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DISHWASHING MACHINE

Filed May 21, 1962 6 Sheets-Sheet 3

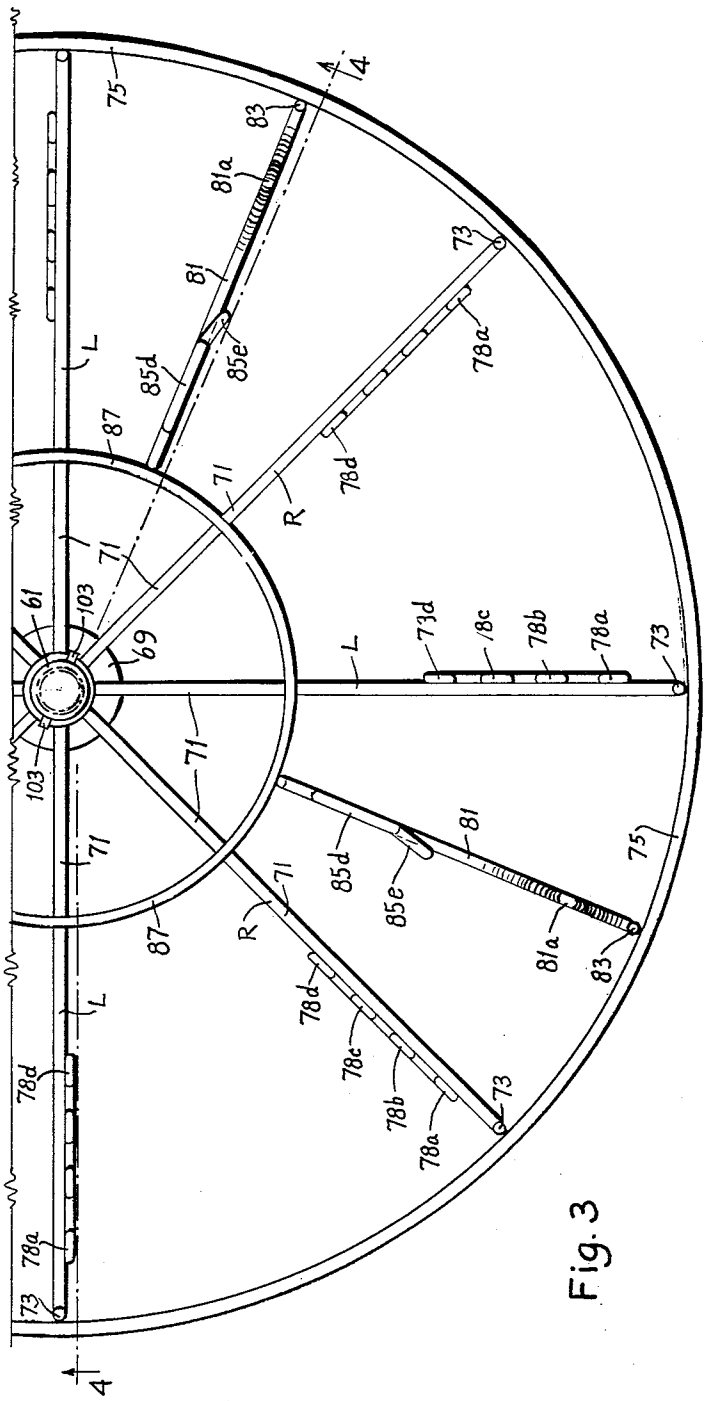

Fig. 3

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DISHWASHING MACHINE

Filed May 21, 1962 6 Sheets-Sheet 4

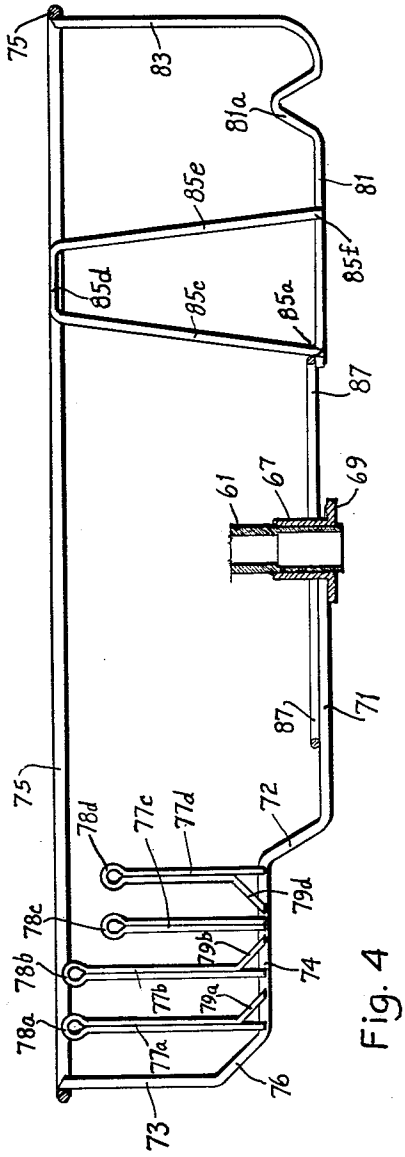

Fig. 4

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DISHWASHING MACHINE

Filed May 21, 1962 6 Sheets-Sheet 5

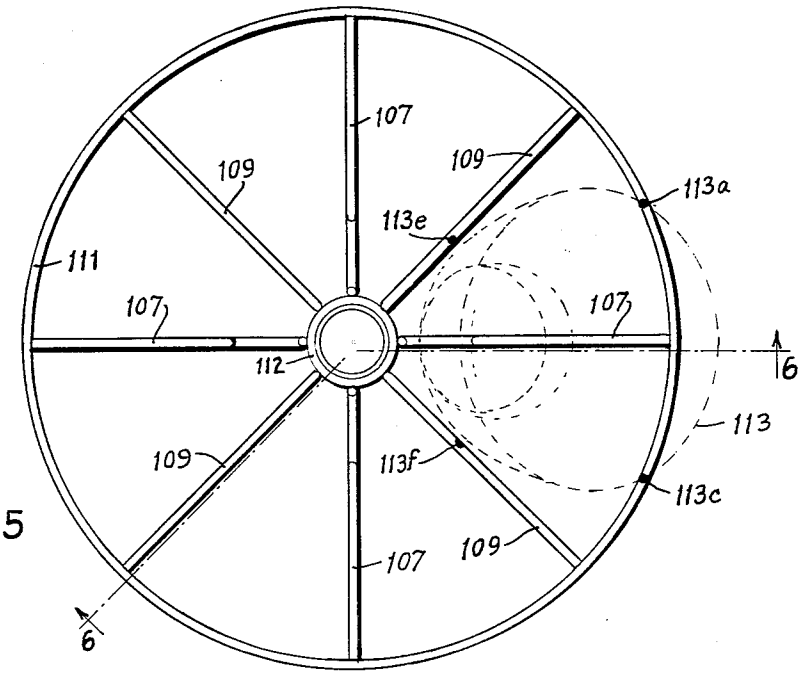

Fig. 5

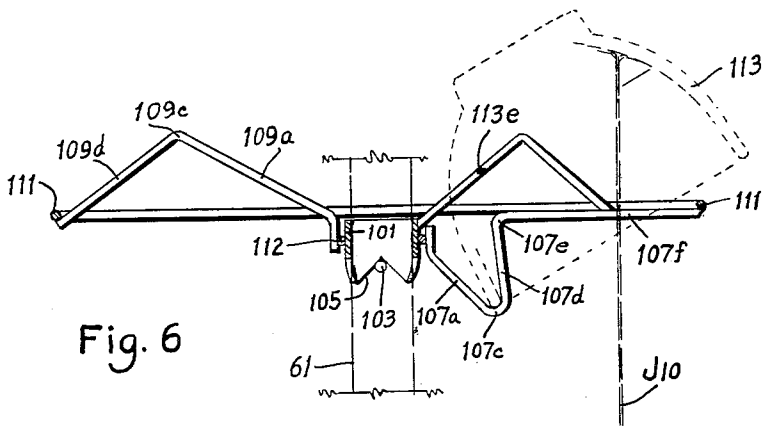

Fig. 6

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DISHWASHING MACHINE

Filed May 21, 1962 6 Sheets-Sheet 6

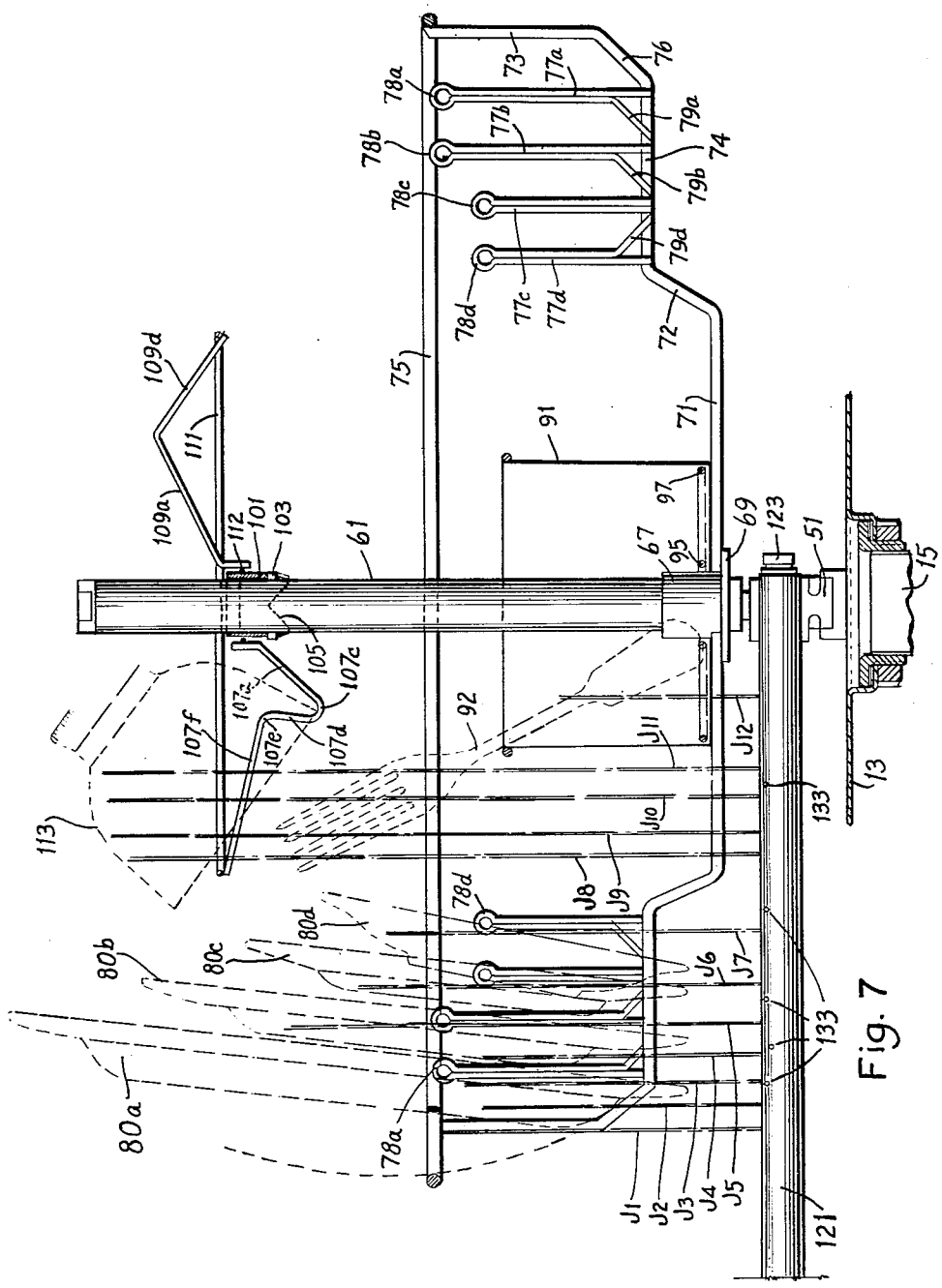

Fig. 7

United States Patent Office 3,134,487 Patented May 26, 1964

3,134,487

DISHWASHING MACHINE

Frederick W. Blanchard, Lachine, Quebec, Canada, assignor to F. W. Blanchard Inc., Montreal, Quebec, Canada, a corporation of Canada

Filed May 21, 1962, Ser. No. 196,142
10 Claims. (Cl. 211—78)

The invention relates to a dishwashing machine, and more particularly to the mounting and construction of the means for holding the tableware to be washed.

An object of the invention is the provision of a generally improved and more satisfactory dishwashing machine.

Another object is the provision of tableware holding means so designed and constructed as to be rotatable with great ease and with little frictional resistance, thus being particularly adaptable and useful in a dishwashing machine of the type where rotation is accomplished merely by the force of jets or sprays of water, without the need for a motor.

Still another object is the provision of improved means for holding plates and similar dishes in a proper upstanding position, adequately spaced from each other and properly placed to receive a maximum of efficient washing as a result of impingement of water sprays thereon.

A further object is the provision of improved means for holding cups and the like in washing position, the holding means being so designed that the cups are held effectively against accidental displacement by the force of water jets or sprays impinging upon them.

These and other desirable objects may be attained in the manner disclosed as an illustrative embodiment of the invention in the following description and in the accompanying drawings forming a part hereof, in which:

FIG. 1 is a vertical section taken approximately centrally through a dishwashing machine according to the present invention, showing the general arrangement thereof;

FIG. 2 is a vertical section through the pivot and pivot tube, illustrating details;

FIG. 3 is a plan of approximately half of a plate and tumbler holding basket constructed according to a preferred embodiment of the invention;

FIG. 4 is a vertical section taken approximately on the line 4—4 of FIG. 3;

FIG. 5 is a plan of a cup holder constructed in accordance with a preferred embodiment of the invention;

FIG. 6 is a vertical section taken approximately on the line 6—6 of FIG. 5; and

FIG. 7 is a schematic vertical section approximately diametrically through the machine, with parts broken away and parts omitted, but showing typical plates, cups, and other tableware in place in the holding means.

The present invention is a continuation in part of my United States patent application Serial No. 167,496, filed January 22, 1962. The prior application discloses and claims particularly the water jet or water spray arrangement of the machine, and the details of the cover of the machine. The present application discloses in greater detail, and also claims, the basket means for holding the tableware (plates, cups, tumblers, silverware, etc.) in washing position, and the means for mounting the holding basket for easy rotation.

Referring first to FIG. 1, to give merely a general outline of the machine as a whole (the reader being referred to the above mentioned prior application 167,496 for a more detailed description) the machine comprises, in general, the main casing or tub having side walls 11 of approximately cylindrical form, and a bottom 13 which is approximately flat but slopes slightly toward the center train or discharge conduit 15, the opening of which

is covered by a screen 17. A terminal flange 23 at the top of the casing extends radially outwardly so as to rest upon and be supported by any desired supporting structure 25, such as a counter top or a shelf. Near the top of the casing is a horizontal supporting flange 19 on which the lower edge of a cover 31 rests, the cover having a central depression 33 containing a knob 35 which serves as a handle for lifting the cover when the machine is to be loaded or unloaded.

In a typical installation intended for domestic use, the casing or tub 11 may have an internal diameter of about 18 or 19 inches, and a depth of about 13 inches, but these dimensions are given merely by way of example rather than by way of limitation.

Centrally located at the bottom of the tub is a casting 51 which bridges over the central drain opening in a direction at right angles to the plane of the paper in FIG. 1, but in the direction of the plane of the paper in FIG. 2, which is taken at right angles to the plane of FIG. 1. This casting 51 is firmly secured at its two ends to the bottom wall 13 of the tub, as for example by bolts 52. Fixed to and supported by this casting 51 is the vertical pivot 53 having at its upper end a depression or recess for receiving and retaining the hardened steel ball 55 which serves as a bearing for the lower end of a hardened steel thrust bearing 57, the upper end of which is enlarged at 59 and threaded, brazed, welded, or otherwise firmly secured to the upper end of a basket supporting tube 61 which extends down the length of the pivot rod 53 almost to the bottom thereof, and which is slightly spaced laterally from the rod. Bearing sleeves 63 and 65 of low friction material such as oil impregnated bushings, are located in a "floating" manner near the top and bottom, respectively, of the tube 61. That is, bearing sleeves 63 and 65 are not fastened rigidly to tube 61 and serve to bear lightly on the pivot rod 53 and to keep the remainder of the tube 61 spaced from the pivot rod. Below the lower bearing sleeve 65, and to retain bearing sleeve 65 in tube 61, there is a bushing 66 tightly mounted in the tube 61 and almost but not quite touching the pivot rod 53. This bushing has such internal diameter that it provides clearance with the rod 53.

Welded, soldered, brazed, or otherwise suitably secured around the bottom end of the tube 61 is a collar 67 having an outwardly turned bottom flange 69. Welded or otherwise suitably secured to the upper surface of this bottom flange 69 are the inner ends of the approximately radial rods 71 having the shapes best shown in FIGS. 1, 4, and 7, the outer ends of the rods being bent to extend substantially vertically upwardly as at 73 and being secured at their upper ends, by welding or the like, to a circular ring 75 which ties the outer ends of all of these rods 71 together, as will be understood from FIG. 3. It will be noted from FIGS. 1, 4, and 7 that the rods 71 extend horizontally outwardly from the flange 69 for some distance, and then are offset upwardly as at 72, then extend horizontally outwardly again at 74, and then obliquely or angularly upwardly for a short distance at 76 before reaching the vertical portion 73 previously mentioned.

Preferably there are eight of these rods 71, 73 equally spaced angularly from each other so that each of these rods is at 45 degrees from the next such rod, as will be seen from FIG. 3. The eight rods constitute four pairs of rods, each pair consisting of what may be called a left-hand rod or arm designated at L in FIG. 3, and a right-hand rod or arm designated at R in FIG. 3.

The horizontal portions 74 of all of these rods, both right-hand and left-hand, carry upstanding separators forming slots for maintaining plates in a suitable upstanding position to be washed. On each rod or arm, there are four such separators which may be collectively referred

to by the numeral **77**, but which may be individually referred to by the designations **77***a*, **77***b*, **77***c*, and **77***d*, respectively. Each separator, as seen to best advantage in FIG. 4, is made of a single rod or stiff wire, welded or soldered at one end to the horizontal portion **74** of one of the radial rods or arms, then rising vertically therefrom to an enlarged loop **78***a* or **78***b* or **78***c* or **78***d* at the top of the respective separator **77***a* or **77***b* or **77***c* or **77***d*, then extending downwardly again right next to or tight against the vertically ascending portion until it nearly reaches the horizontal arm portion **74**, then extending obliquely angularly (except in the case of the separator **77***c*) at **79***a*, **79***b*, and **79***d* respectively, toward the next adjacent separator, this oblique end of the separator also being welded or soldered or otherwise suitably secured to the radial arm portion **74**.

It is seen from FIG. 4 that the two outermost separators **77***a* and **77***b* are of the same height, the tops thereof being substantially at the same elevation as the ring **75**. The other two separators **77***c* and **77***d* are somewhat shorter, and can conveniently both be of the same height, although this is not necessarily the case.

The separators on the right-hand and left hand arms or rods constituting each pair are the same, except that the separators are preferably secured to that side of the radial arm which faces toward the other radial arm of the same pair. Thus the separators on a left-hand arm are secured to the right-hand side of such arm, while the separators on a right-hand arm are secured to the left side of such arm, all as can plainly be seen from FIG. 3. The plates and similar articles to be washed are placed in an upstanding position in the slots formed by the separators of each pair of arms. Thus plates of the largest size (e.g., dinner plates as shown at **80***a* in FIG. 7) are intended to be placed in the outermost slot formed between the vertical portion **73** of the arm **71** and the first separator **77***a* mounted on this arm, one edge of the plate being placed in such slot on the left-hand arm of a pair of arms, and the opposite edge of the plate being placed in the corresponding slot on the right-hand arm of the same pair of arms. The lower edge of the plate (in this upstanding position) will, of course, curve downwardly below the level of the supporting arms **74**. The next smaller size of plate (e.g., luncheon plates) as shown, for example, at **80***b* in FIG. 7, will be placed on the next inner slots of the two arms of the pair; that is, the slots formed between the separators **77***a* and **77***b*. The next smaller size of plates (e.g., bread and butter plates as shown for example at **80***c* in FIG. 7) will be placed in the next slot formed between the separators **77***b* and **77***c* of the two arms of the pair, and the smallest size of plates (e.g., saucers for teacups) will be placed in the innermost slot formed between the separators **77***c* and **77***d*. It is obvious that successively smaller plates will be positioned on the two arms of the pair in positions where the arms are successively closer to each other, so that the plates of smaller size will not drop down too far between the arms.

In this connection it is important to note the preferred angular arrangement of the angular parts **79***a*, **79***b*, and **79***d* of the separators. It is to be noted that the sloping part **76** of the arm as well as the sloping parts **79***a* and **79***b* of the separators all slope obliquely downwardly and inwardly toward the center of the machine, so that any plates placed in these particular slots will have their lower edges crowded inwardly toward the center, while the enlarged loops **78***a*, **78***b*, and **78***c* contacting with the plates at a higher elevation will prevent the upper parts of the plates from tilting too far inwardly toward the center and will hold the outermost three plates in approximately vertical positions. However, the action of the innermost slot, between the separators **77***c* and **77***d* is different, because here the sloping part **79***d* slopes obliquely downwardly and outwardly away from the center, rather than toward the center. The result is that any plate placed in this innermost slot will have its lower edge crowded outwardly away from the center, by the sloping part **79***d*, and thus the plate will not be held in such an upright position but will have its upper edge tilted more inwardly toward the center, as shown at **80***d* in FIG. 7. It is found by extensive tests and studies that this arrangement of the plates, tilting them in this way, gives the best washing action and more satisfactory operation than if all of the plates were held at equally upstanding angles, parallel to each other.

Between successive plate-holding pairs of arms **71**, there are other radially extending rods or arms **81**, the outer ends of which are bent upwardly and extend approximately vertically as at **83**, the upper ends of the portions **83** being welded or otherwise suitably secured to the ring **75**. At the radially innermost end of each rod **81**, it is bent upwardly at a corner **85***a*, thence extends upwardly at **85***c* at a slight outward inclination as shown, thence extends horizontally at **85***d* at an elevation approximately the same as that of the ring **75**, thence downwardly again at a slight outward inclination as shown at **85***e*, terminating in a lower end **85***f* which is welded or otherwise suitably secured to the horizontal portion **81** of the rod. The corner **85***a* of this structure is welded or otherwise suitably secured to a ring **87** concentric with the axis of rotation, which ring **87** overlies and is secured to and supported by the arms **71**.

These structures **81**, **83**, **85** are, as above stated, in vertical radial planes spaced mid-way between successive pairs of plate-holding arms **71**. In other words, as best seen in FIG. 3, these structures **81**, **83**, etc., lie mid-way between a left-hand arm of one pair of arms **71** and a right-hand arm of the next adjacent pair of arms in a clockwise direction. Since the arms **71** are at an angular spacing of 45 degrees from each other, and since the structures **81**, **83**, **85** are mid-way between certain of the arms **71**, it follows that these structures **81**, **83**, **85** will be at 22½ degrees from the adjacent arms **71** on either side thereof. The parts **85***c*, **85***d*, and **85***e* constitute tumbler holders, and are of the proper size and proportions so that a typical tumbler of average size can be turned upside down and placed in an inverted position on the parts **85***c*, **85***d*, and **85***e*, which parts will hold the tumbler in inverted position with its axis approximately vertical, which is the proper washing position for tumblers in a machine of this kind.

Preferably the rod **81** is bent upwardly and downwardly again at **81***a*, at a point radially outwardly from the point **85***f* and radially inwardly from the approximately vertical portion **83**. This portion **81***a* serves as an abutment for holding dishes or tableware of odd size or shape, to assist in preventing a dish from moving radially during the washing cycle. For example, a vegetable dish can be placed with its rim caught between the abutment portion **81***a* and the vertical portion **83**, and the body of the dish can be tilted inwardly to rest on the corner between the parts **85***d* and **85***e* of the tumbler holder, assuming that no tumbler is placed on this particular holder. If a tumbler is placed on the tumbler holder, a dish may still rest on the tumbler and be washed with equal facility.

Located centrally in the basket, concentrically around the tube **61**, is a generally cylindrical holder **91** for flatware or silverware, a typical example thereof being indicated schematically by broken lines **92** in FIG. 7. The holder **91** has inturned flanges **91***a* at its bottom, which flanges rest on and are supported by the arms **71**. Resting in turn on the flanges **91***a* is a screen **93** of rather coarse mesh, but sufficiently fine to prevent silverware from dropping down through the spaces in the screen. An outer ring **95** and an inner ring **97** are formed integrally as part of the screen, the former overlying the flange **91***a* and the latter embracing closely around the member **67**.

Mounted on the tube **61** a little below the top thereof, is a cup holder structure for holding teacups and the like in a suitable inverted position while being washed. It

is contemplated that the cup holder will occupy a definite angular position relative to the basket, so that the water jets will strike the teacups in a proper manner. The cup holder structure, best seen in FIGS. 5 and 6, comprises a hollow or tubular hub in the form of a sleeve **101**, the bottom of which rests on pins or lugs **103** projecting laterally from opposite sides of the tube **61**. The bottom edge of the hub sleeve **101** has angular notches **105**, preferably four in number, evenly spaced at 90 degrees from each other. Any two opposite notches may be engaged with the lugs **103**, simply by sliding the sleeve **101** downwardly over the tube **61** until it rests on the projections **103**, the notches **105** serving as coupling means or driving means to transmit the rotation of the tube **61** to the sleeve **101** so that the sleeve and all parts carried by it will rotate with the tube **61** and the basket which is fixed to the bottom part of the tube. It will be realized that the notches **105** serve to locate the cup holder structure relative to the basket so that proper angular position will be maintained.

Welded or otherwise suitably secured to the sleeve **101** are two sets of radial wires or rods **107** and **109**. There are four of the rods **107** extending radially at 90 degrees to each other when viewed in plan as in FIG. 5, and there are four of the other rods or wires **109** evenly spaced between the rods **107**, so that the rods **109** are at 90 degrees to each other and at 45 degrees to the adjacent rods **107**, when viewed in plan as in FIG. 5. The outer ends of both sets of rods **107** and **109** are welded or otherwise suitably secured to a circumferential ring **111**. As a matter of manufacturing convenience, it has been found preferable to weld or otherwise attach the rods to an inner ring denoted as **112**, and then attach ring **112** to sleeve **101**.

The first set of rods or arms **107** constitute the cup supporting rods, while the second set **109** serve to separate cups laterally from each other and also to anchor the cups in place on the rods **107**, as further explained below.

The supporting rods **107**, in a direction extending outwardly from the hub **101**, first extend in a downwardly inclined direction as shown at **107***a*, to a low point **107***c*, where there is a gentle curve rather than a sharp angle (so as not to grip too tightly on the edge of a cup) and then extend approximately vertically upwardly as shown at **107***d* to the point **107***e*, thence extending radially outwardly and approximately horizontally through the portion **107***f* to the previous mentioned peripheral or circumferential ring **111** to which the outer ends of all of the rods **107** are attached.

The other set of rods **109** extend initially from the hub outwardly in an upwardly inclined direction as at **109***a* to a high point **109***c*, thence inclined downwardly as at **109***d* to the circumferential ring **111**.

These parts shaped in this way provide a particularly satisfactory and effective cup holder for holding a maximum of four cups. The cups are placed in inverted position and slightly inclined, as shown for example by the broken or dotted outlines **113** in FIGS. 5, 6, and 7. One edge of the cup rests on the rod **107** in the notch at the curve **107***c* between the portions **107***a* and **107***d*. At two other points the rim of the cup rests on the circumferential ring **111**, at points of contact such as those indicated schematically in FIG. 5 at **113***a* and **113***c*. The side walls of the cup are close to the arms **109**, which serve to separate the cup from adjacent cups on adjacent arms **107**. These arms **109** also serve to anchor the cups in place against possible accidental displacement by the upward lifting force of a water jet impinging upwardly on them. The particular shapes of the arms **107** and **109** as illustrated in the drawings and described above have been worked out after much study and experimentation and test, and it is found that with these particular shapes, a force tending to lift the outer edge of the cup upwardly will cause the cup to tilt or pivot slightly about the point **107***c* as a pivotal axis, thereby swinging the side of the cup inwardly toward the center of the structure until the sides of the cup make contact with the portions **109***a* of the arms **109**, at contact points such as those indicated schematically at **113***e* and **113***f* in FIGS. 5 and 6. These pressure points are high enough up the sides of the cup so that, with a typical cup of average size and shape, the pressure points will occur on the side of the cup where it curves inwardly and is of reduced diameter. Thus the arms **109** produce a downward component of force on the cup when a jet of water tends to lift the outer edge of the cup upwardly, and there is a locking action which holds the cup in place with great security.

All of the structural parts connected to or supported from the rotating tube **61** may collectively be called the load basket or load carrier, and all of the tableware such as plates, tumblers, cups, silverware, etc., placed in or on the load carrier may collectively be called the load.

Near the bottom of the tub **11**, at an elevation slightly below the bottom of the load basket, is a spray tube **121** extending approximately radially into the machine, the inner end of the tube being held at or close to the center of the machine by a suitable socket **122** in the casting **51**. The inner end of the tube is closed as by means of a plug **123**. The tube passes approximately radially outwardly through the side wall **11** of the casing or tub, through a water tight collar indicated in general at **125**. The outer end of the tube is connected in any suitable way to any suitable supply of hot water. The connection to the water supply may be through a known form of timing cycle mechanism, or through a manually controlled valve, whereby the householder turns on the water supply to the dishwashing machine whenever desired, and leaves it on for such length of time as experience indicates is necessary for the proper washing of the load.

The spray tube **121** contains various orifices through which the water may issue to provide sprays or jets preferably of a plurality of different kinds at various predetermined directions, as more fully explained in said copending patent application, Serial No. 167,496. Since the water jet or spray arrangement is fully disclosed and is claimed in said copending patent application, and since the exact arrangement of the jets is not important for purposes of the subject matter claimed in this present application which relates particularly to the construction of the load basket or carrier, the detailed disclosure of the water jets is not repeated in this present application. It is sufficient for present purposes to say that the water jets do issue from the spray tube **121** in various definitely predetermined directions, upwardly in general, but certain ones of the jets are inclined obliquely upwardly and forwardly, others are inclined obliquely upwardly and rearwardly or reversely, the net effect of the various jets being that the water not only impinges upon various surfaces of the articles making up the load, so as to wash such articles, but also provides the necessary propulsion for rotating the load basket and contents, without any need for a separate motor.

Typical jets are indicated schematically in FIG. 7 by the numerals **J1** to **J12**, inclusive. In FIG. 7, these jets all appear to be vertical, but this is because they are viewed from a direction at right angles to the spray tube **121**. If they were viewed from a direction axially of the tube **121**, it would be seen that various jets are inclined at various predetermined angles, as fully disclosed in said copending patent application. The jets indicated at **J1** through **J12** in FIG. 7 issue from orifices which are hidden from view on the far side of the tube **121**. There are other jets which issue from other orifices on the near side of the tube, typical orifices on this side of the tube being shown at **133** in FIG. 7, but the jets issuing from these are not indicated in FIG. 7, in order not to complicate the drawing unduly. As explained in the copending patent application, the water jets are so planned and designed as to accomplish definite predetermined functions

with respect to the load which is to be washed, rather than to be merely haphazard sprays without specific direction or control. For example, it will be observed from FIG. 7 that jets J8 through J11 tend to project upwardly to impinge in and on the cups 113 in the cup holder; jet J12 comes up through the screen bottom of the silverware or tableware holder so as to clean the silverware therein; and jets J1 through J7 impinge at various angles upon the various plates or dishes placed between the separators 77 and the tumblers placed on the tumbler holders.

As stated in the copending application, the water jets are preferably designed to rotate the load basket or carrier at a rate in the neighborhood of about 50 revolutions per minute. For such a machine, powered entirely by the water jets and without any other motor, and for holding a load of relatively small size such as not more than four plates or dishes of any one size and style, the load carrier or basket according to the present invention as herein disclosed is particularly efficient, satisfactory, and simple both in construction and cost and in results achieved in cleaning the articles to be cleaned.

Preferably the various arms, rods, or wires of the main basket itself as well as the supplementary cup holder, are provided with a covering or coating of resilient plastic material or rubber-like material, for two principal purposes: to protect such members from corrosion and to make a softer contact with the load than would be the case with bare metal, thus avoiding any possibility of chipping the edges of the tableware.

It is seen from the foregoing disclosure that the above mentioned objects of the invention are well fulfilled. It is to be understood that the foregoing disclosure is given by way of illustrative example only, rather than by way of limitation, and that without departing from the invention, the details may be varied within the scope of the appended claims.

What is claimed is:

1. A rack for a dishwashing machine comprising a supporting member mounted for rotation about a vertical axis, arms extending approximately radially outwardly from said supporting member, and a plurality of upstanding separator members on certain of said radial arms to provide a plurality of plate-receiving slots for holding plates in upright position in said slots, and inclined means at the lower ends of certain of said slots tending to urge the lower edges of upstanding plates in such slots radially inwardly toward said axis of rotation.

2. A rack for a dishwashing machine comprising a supporting member mounted for rotation about a vertical axis, eight arms substantially evenly spaced at 45 degrees from each other and extending radially outwardly from said supporting member and having their outer ends extending upwardly, a circumferential ring member concentric with said axis of rotation and connected to the upper outer ends of all of said eight arms, and a plurality of separator members fixed to and extending upwardly from each of said arms, said separator members forming slots so placed that a plate to be washed may be held in an upstanding position partly within a slot between two adjacent separator members on one arm and partly within a corresponding slot between separator members on an adjacent arm, successive slots in a direction radially outwardly from the axis of rotation being adapted to receive plates of successively larger sizes, said rack also including four supplementary arms extending substantially radially and spaced substantially evenly at 90 degrees from each other and substantially midway between adjacent first-mentioned arms on either side, each of said supplementary arms having its outer end extending upwardly to and being fastened to said circumferential ring member, and an upstanding tumbler holder on each of said supplementary arms, each tumbler holder being shaped to extend upwardly into a tumbler placed in inverted position over the tumbler holder, to hold such tumbler in an inverted position to be washed.

3. A rack for a dishwashing machine comprising a supporting member mounted for rotation about a vertical axis, eight arms substantially evenly spaced at 45 degrees from each other and extending radially outwardly from said supporting member and having their outer ends extending upwardly, a circumferential ring member concentric with said axis of rotation and connected to the upper outer ends of all of said eight arms, and a plurality of separator members fixed to and extending upwardly from each of said arms, said separator members forming slots so placed that a plate to be washed may be held in an upstanding position partly within a slot between two adjacent separator members on one arm and partly within a corresponding slot between separator members on an adjacent arm, successive slots in a direction radially outwardly from the axis of rotation being adapted to receive plates of successively larger sizes, the innermost slot formed by said separator members having a bottom sloping downwardly and radially outwardly, to tend to move the lower edge of a saucer placed in such slot outwardly so that the upper edge thereof may tilt inwardly toward the axis of rotation.

4. A rack for a dishwashing machine comprising a supporting member mounted for rotation about a vertical axis, eight arms substantially evenly spaced at 45 degrees from each other and extending radially outwardly from said supporting member and having their outer ends extending upwardly, a circumferential ring member concentric with said axis of rotation and connected to the upper outer ends of all of said eight arms, and a plurality of separator members fixed to and extending upwardly from each of said arms, said separator members forming slots so placed that a plate to be washed may be held in an upstanding position partly within a slot between two adjacent separator members on one arm and partly within a corresponding slot between separator members on an adjacent arm, successive slots in a direction radially outwardly from the axis of rotation being adapted to receive plates of successively larger sizes, the innermost slot formed by said separator members having a bottom sloping downwardly and radially outwardly, to tend to move the lower edge of a saucer placed in such slot outwardly so that the upper edge thereof may tilt inwardly toward the axis of rotation, and the other slots formed by said separator members having bottoms sloping downwardly and radially inwardly toward the center of rotation, to tend to move the lower edges of plates placed in such slots inwardly toward the center of rotation.

5. A rack assembly for a dishwashing machine comprising means forming a vertical pivot, and a tableware carrying structure mounted for rotation on said pivot, said structure including a lower basket for holding plates, tumblers, and flatware and an upper basket for holding cups, said lower basket having a series of arms approximately radiating with respect to said pivot, certain adjacent arms having upstanding separator members forming slots adapted to hold plates in upstanding position with a portion of each plate in a slot formed by the separator members on one arm and another portion of the same plate in a slot formed by the separator members on an adjacent arm, others of said arms having upstanding tumbler holders on which tumblers may be impaled in an inverted position, said upper basket having a plurality of approximately radial arms formed to provide downwardly tapering acute notches near the inner ends of such arms for receiving certain portions of the rims of inverted cups, a circumferential ring fixed to the outer ends of all of such arms to support other portions of the rims of such inverted cups, and other arms spaced between said notch forming arms for contacting with the outer surfaces of the side walls of the inverted cups.

6. A rack assembly for a dishwashing machine comprising means forming a vertical pivot, and a tableware carrying structure mounted for rotation on said pivot, said structure including a lower basket for holding plates, tumblers, and flatware and an upper basket for holding cups, said upper basket having a plurality of approximately radial arms formed to provide downwardly tapering acute notches near the inner ends of such arms for receiving certain portions of the rims of inverted cups, a circumferential ring fixed to the outer ends of all of such arms to support other portions of the rims of such inverted cups, and other arms spaced between said notch forming arms for contacting with the outer surfaces of the side walls of the inverted cups.

7. A rack assembly for a dishwashing machine comprising a vertical rotary member having a lateral projection thereon, a sleeve mounted for vertical sliding movement on said rotary member and adapted to rest on said projection to be held thereby at a predetermined elevation, a circumferential ring spaced outwardly from and concentric with said sleeve, a first series of generally radial arms spaced angularly from each other, each of such arms extending from said sleeve obliquely downwardly and outwardly for a distance, thence approximately vertically upwardly for a distance, thence approximately horizontally outwardly to and being secured to said circumferential ring, and a second series of generally radial arms spaced angularly from each other and arranged intermediate between the arms of the first series, each arm of the second series extending from said sleeve obliquely upwardly and outwardly to a high point and thence obliquely downwardly and outwardly to and being secured to said circumferential ring, said arms and said ring collectively forming supporting means for holding cups in an inverted washing position.

8. A rack assembly for a dishwashing machine comprising a stationary vertical pivot rod, a tube rotatably mounted on said rod in surrounding relation thereto, a socket in the upper end of said rod, a hardened metal sphere in said socket, a thrust bearing member rigidly secured to said tube near the upper end thereof and bearing downwardly on said sphere to form a thrust bearing for supporting the weight of said tube and parts carried thereby rotatably on said rod, two bearing sleeves secured within said tube and bearing radially and rotatably on said rod, one of said sleeves being near the upper end of said rod and the other of said sleeves being near but above the lower end of said tube, said tube having an internal diameter greater than the diameter of said rod so that said sleeves serve to space said tube laterally from said rod, a bushing in the lower end of said tube below the lower one of said sleeves, said bushing almost but not quite contacting with said rod to tend to keep large volumes of water from rising within said tube to reach the lower one of said sleeves, and load carrying means mounted on and rotating with said tube for holding a load of tableware in position to be washed.

9. A rack for a dishwashing machine comprising a central hub member, a circumferential ring spaced outwardly from and concentric with said hub member, and a plurality of rods extending in a generally radial direction from said hub member to said ring, certain of said rods each being shaped to provide a deep downwardly extending notch for receiving the rim of a cup placed in an inverted position on said rack, others of said rods each being shaped to engage a portion of the outer surface of the side wall of a cup thus received in the notch of an adjacent rod, to resist upward movement of the inverted cup as a result of water impinging upwardly against it.

10. A construction as defined in claim 9, in which said notch is near the inner end of the rod in which it is formed, and is so placed that one point of the rim of an inverted cup is supported in the notch while two other points of the rim rest on and are supported by said circumferential ring, and in which the side of side notch farther from said hub member is sufficiently steep to prevent the engaged rim of a cup from moving radially outwardly away from said hub member.

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