

[54] **INVERTIBLE DUAL ACTION SPRAY ARM FOR DISHWASHER** 3,677,473 7/1972 Balaieff..... 239/251

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[52] **U.S. Cl.** **239/243; 239/251; 239/559**

[51] **Int. Cl.²** **B05B 3/00**

[58] **Field of Search** 239/243, 244, 245, 246, 239/251, 559

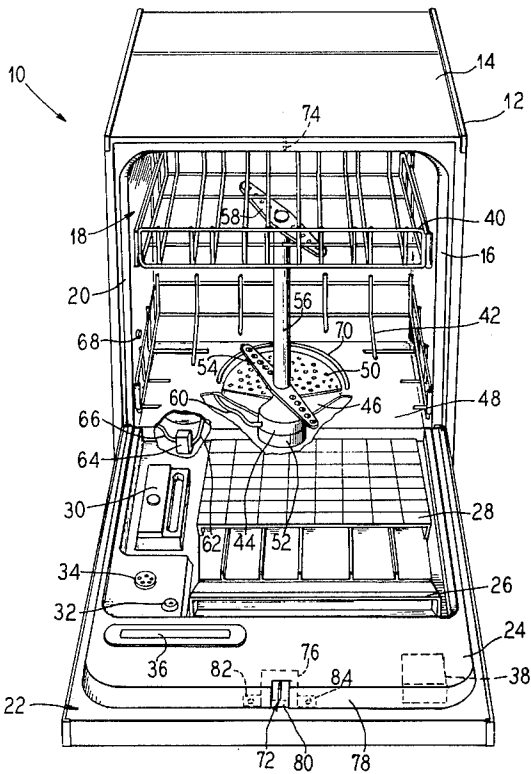
Primary Examiner—Lloyd L. King
Attorney, Agent, or Firm—Hill, Gross, Simpson, Van Santen, Steadman, Chiara & Simpson

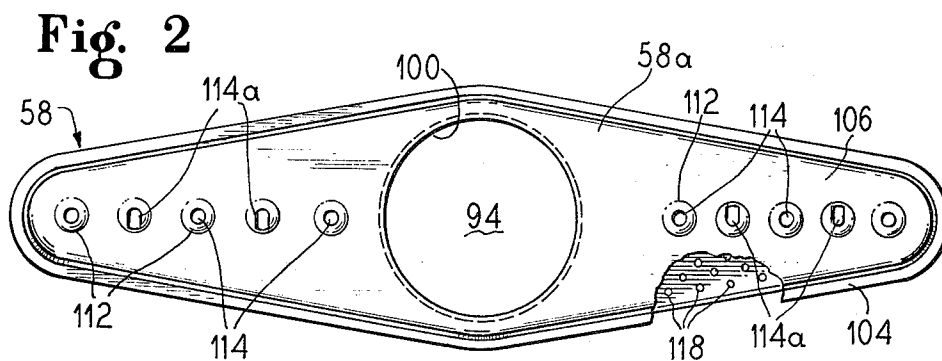
[57] **ABSTRACT**

An invertible spray arm for a dishwasher comprises two separate sets of spray nozzles, each in communication with a separate chamber in the spray arm and each providing a different spray pattern within a dishwasher. The spray arm includes a central member which may be of sheet material, which divides the spray arm into the two chambers and which, together with a supporting column, fluidically seals one chamber from the other. The spray arm includes a central aperture for receiving a manifold end of an upstanding hollow fluid carrying column and may be mounted on the manifold with either side of the spray arm up to effect fluid communication between the manifold and a desired chamber for obtaining a desired spray pattern.

11 Claims, 5 Drawing Figures

[56] References Cited			
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1,677,486	7/1928	Nelson	239/251
2,275,189	3/1942	Wiegart	239/243
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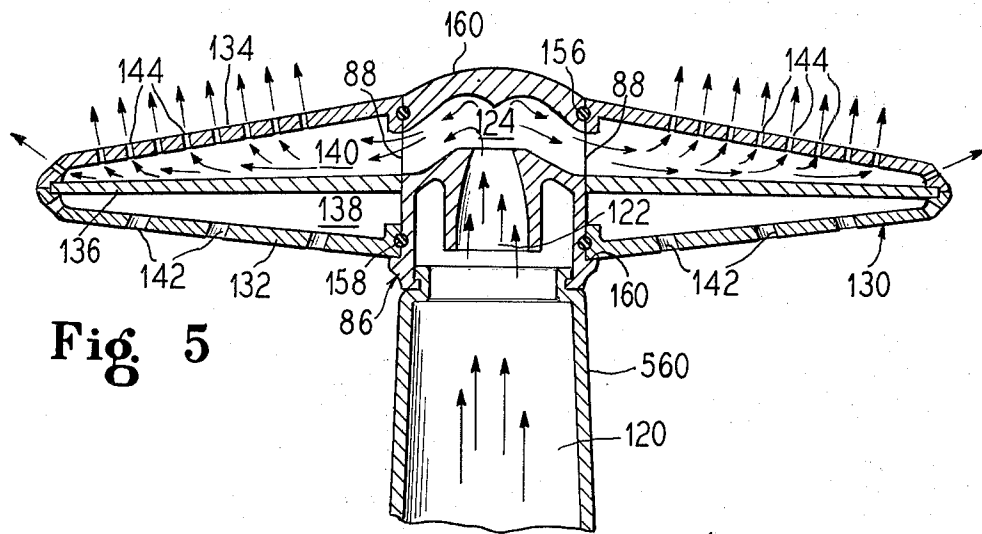


Fig. 5

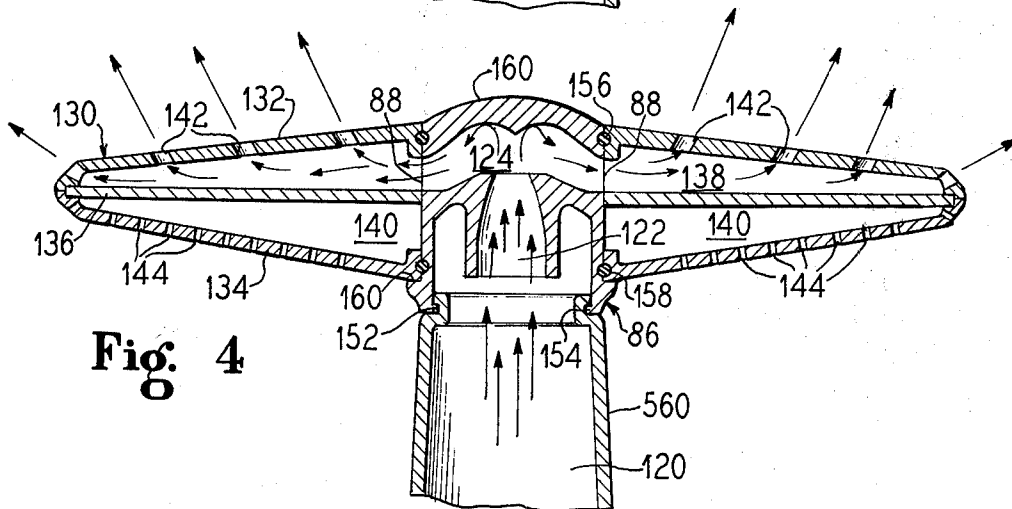


Fig. 4

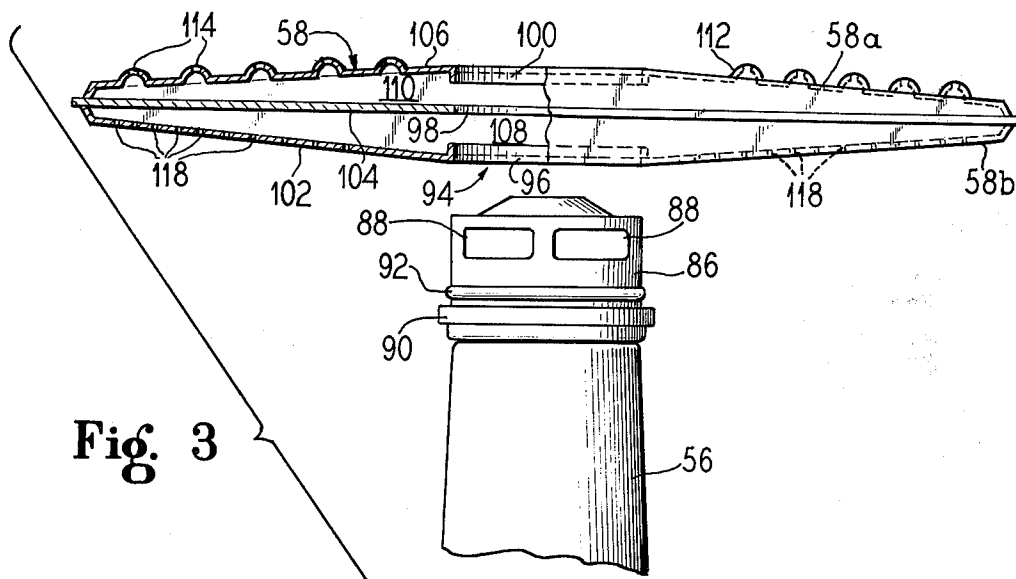


Fig. 3

INVERTIBLE DUAL ACTION SPRAY ARM FOR DISHWASHER

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to dishwashers, and is more particularly concerned with the provision of a "normal" spray or jet action for washing ordinary dishware and the like, and a "gentle" spray action for washing fragile or delicate items such as crystal glassware or fine china.

2. Description of the Prior Art

U.S. Pat. No. 3,064,665 discloses apparatus for providing a gentle wash in a dishwasher spray arm wherein a cone-shaped element is inserted into a valve opening of a spray arm to effect a soft spray pattern.

U.S. Pat. No. 3,342,421 illustrates the use of a vortex jet to obtain vigorous cleaning action in an automatic dishwasher.

Also, U.S. Pat. No. 3,258,208 discloses an aerosol valve in which the actuator button has different size ports and can be inverted to provide a normal spray and a fine spray.

Other techniques are also known in the art for obtaining different types of washing actions by providing different spray actions.

SUMMARY OF THE INVENTION

The primary object of the invention is to provide a unique spray arm for a dishwasher which effects two different washing actions, and which may easily be changed from one washing action to another.

According to the invention, a dishwasher spray arm, which may be inverted on its mounting manifold to alter the character of spray produced so as to affect the washing operation, is divided into two chambers along its horizontal axis and mounted for rotation on the manifold so that only the upper chamber receives liquid from the dishwasher pump. The spray arm is dynamically balanced so that the flow of water there-through from the manifold will hold it in place without any form of mechanical fastening, although snap seals, such as O-rings, may be employed. A first set of spray ports which communicate with one chamber of the spray arm produces a normal spray pattern, while the spray ports of a second set of spray ports which communicate with the other chamber are sized and configured to produce a more gentle spray. In order to change from one spray pattern to the other spray pattern, the spray arm is simply lifted from the manifold, turned over, and then replaced on the manifold.

Although the following description is specifically directed to an upper spray arm, a spray arm constructed in accordance with the principles of the present invention may be utilized equally as well when employed as a lower spray arm. Accordingly, the following description is concerned with an invertible spray arm mounted on the manifold end of a tower or column.

The spray arm, as noted above, may be designed to be rotatably mounted upon the manifold of a column and be retained thereon by means of a snap ring or similar device, or it may be designed to fit freely over the manifold and be held there only by the dynamics of the liquid flowing through the arm.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects, features and advantages of the invention, its organization, construction and operation will be best understood from the following detailed description of a preferred embodiment of the invention, taken in conjunction with the accompanying drawings, in which:

FIG. 1 illustrates a front loading dishwasher with the door in an open position and with portions of the dishwasher broken away for purpose of illustration;

FIG. 2 is a plan view of a spray arm which may be constructed in accordance with the present invention with a portion of the spray arm removed to show the openings in the lower side of the spray arm;

FIG. 3 is an exploded elevational view of a spray arm and cooperable manifold end of a tower, with the spray arm partially broken away to illustrate the separate fluid chambers provided in accordance with the invention; and

FIGS. 4 and 5 illustrate a spray arm construction mounted on a manifold, FIG. 4 illustrating the spray arm positioned for normal jet washing action and FIG. 5 illustrating the spray arm inverted for a gentle spray action.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1, a front loading dishwasher 10 comprises a cabinet 12 having a top 14. The cabinet 12 is provided with an opening 16 on one side which allows entry into a washing chamber or enclosure 18. The opening 16 is provided with a seal or gasket 20 which extends around the sides and top of the opening. To close the opening 16, a closure such as a hollow door 22 is pivotally connected to the bottom of the opening and is movable from a position illustrated in FIG. 1 to a position closing the opening 16. When in the closed position, an inner panel 24 of the door 22 tightly engages the gasket 20 to provide a sealing condition to prevent leakage of water from the chamber 18.

As illustrated, the inner panel 24 of the door 22 has mounted thereon silverware baskets 26 and 28, a detergent dispenser 30, a rinse additive dispenser having a filling cap 32 and a discharge opening 34, and a vent opening 36 which allows hot humid air to escape from the chamber 18 during a drying cycle. Mounted in the hollow door 22 beneath the panel 24 is a timer 38 which utilized to control various cycles of washing, draining or rinsing and drying along with the dispensing of the rinse additive.

Within the washing chamber 18 are movable upper dish rack 40 and movable lower dish rack 42. To provide a spray of washing and rinsing liquid to the dishes in the racks 40 and 42, a pump 44 is disposed in a recessed or depressed sump area 46 in a bottom wall 48 of the chamber 18. To remove food particles from the liquid prior to being circulated by the pump, a filter screen 50 is provided. The pump 44, which is driven by a motor 52, has two pump chambers (not shown) to provide washing liquid under pressure to a lower spray arm 54 and through a column or tower 56 to an upper spray arm 58 which is attached beneath the upper dish rack 40 by a mount which enables the arm 58 to be free to rotate, as will be set forth in detail below. The pump 44, which provides a washing liquid under pressure to the spray arms 54 and 58 during a washing cycle, pumps the washing 18 to heat a drain (not shown)

through a discharge conduit 60 during a draining or pumpout portion of the cycle. To fill the washing chamber 18, a washing liquid is introduced from an appropriate source by a conduit 62 to pass through an inlet valve 64, and a conduit 66 to an inlet opening 68 which is provided in a wall of the chamber 18. The valve 64 contains a flow control washer to limit the flow through the valve to a given flow rate. A heating element 70, of the sheathed electrical resistance type, is provided in the chamber 18 to heat the washing liquid during the wash cycle and to heat the air during a drying cycle.

To hold the door 22 in a sealing position on the gasket or seal 20, a latch device, generally indicated at 72 in FIG. 1, is provided. The device 72 includes a strike plate 74 which is secured by appropriate fastening elements in the opening 16 of the cabinet 12 to define an edge portion thereof. The remaining portion of the latch device 72 is contained in a housing 76. The housing 76 is mounted in the hollow door 22 in a space between the inner panel 24 and an outer panel (not shown) of the door or closure 22. The panel 24 has a peripheral flange 78 that is attached to the outer panel to form the space therebetween. The flange 78 is provided with a cut-out portion or opening 80 to furnish clearance for the strike 74 and enable portions of the latch device contained in the housing 76 to engage the strike. To mount the housing 76 in the desired position with respect to the opening 80, the housing is provided with a pair of mounting ears 82 and 84 which are secured to the flange 78 by conventional means. For additional details concerning the construction and operation of this particular latch, reference may be made to Spiegel et al. U.S. Pat. application Ser. No. 385,051, filed Aug. 2, 1973 and assigned to Whirlpool Corporation. Other latch structures, however, may also be advantageously utilized with the dishwasher 10.

Referring to FIGS. 2 and 3, the upper spray arm 58 and the upper end of the tower 56 are illustrated in greater detail, wherein a manifold 86 is mounted at the upper end of the tower 56 and comprises a plurality of transversely directed fluid discharge openings 88. The manifold 86 also includes a flange 90, which functions as a stop to position the spray arm 58, and may be provided with a snap-type seal, such as an O-ring 92.

The spray arm 58 includes a central opening 94 therethrough for receiving the manifold 86 from either direction. The central opening 94 comprises a plurality of aligned openings 96, 98 and 100 formed in respective sheet members 102, 104 and 106 which are substantially coextensive and spaced apart and sealed at the edges thereof to define a pair of fluidically separate chambers 108 and 110.

The upper side of the spray arm 58, identified by the reference numeral 58a as illustrated in FIGS. 2 and 3, produces a normal or vigorous spray pattern or spray action and comprises a plurality of hollow protrusions 112 each having an opening therein comprising first nozzle means for fluid communication with the chamber 110. Some of the openings may be round openings 114 and some may be somewhat slot-shaped openings 114a. Similarly, the lower side of the spray arm 58b produces a gentle spray pattern or action and has a plurality of relatively small round openings or ports 118 therein comprising second nozzle means in fluid communication with the lower chamber 108. The ports 114, 114a and 118 provide the washing jet sprays and are constructed such that one set of ports on the upper side 58a of spray arm 58 with somewhat larger individ-

ual ports provides a normal or vigorous jet spray pattern, while the other set of ports, more numerous and smaller in size, on the lower side 58b provides a gentle fine spray pattern. In one embodiment of the invention, which demonstrated the principles and advantages of the invention, the upper side of the spray arm which produced a normal spray action, was provided with five holes on each side, three of them being round holes approximately 5/32 inch in diameter and two of them being slot-shaped openings approximately 3/16 inch by 11/32, inch, for a total of ten openings on upper side 58a. The lower side 58b of the spray arm 58 which produced a gentle spray action, was provided with twenty-three round openings or holes on each side, each approximately 3/32 inch in diameter, for a total of 46 openings on lower side 58b. The normal spray pattern may, of course, be advantageously utilized for washing loads of ordinary dishes and silverware, whereas the finer spray has been found to be of great advantage in washing crystal, fine china and delicate or fragile items.

Although the foregoing has described the provision of a normal jet spray and a gentle jet spray, the invention may also be embodied to provide other combinations of spray patterns including a very strong spray pattern for washing more difficult loads. Therefore, the present invention may be embodied in structure to provide a variety of pairs of spray patterns and a number of different spray arms may be used to advantage in a single dishwasher.

Referring to FIGS. 4 and 5, an invertible spray arm 130 is illustrated as mounted for operation at the upper end of a tower 560. A cap member 160 tops whichever side of the spray arm 130 is uppermost as shown in FIGS. 4 and 5. The tower 560 includes a hollow tube having a fluid passage 120 which communicates with a hollow, generally vertical passage portion 122 of the manifold 86. The hollow portion 122, in turn, communicates with a hollow portion 124 which develops into the fluid discharge apertures 88, which in turn communicate with the uppermost chamber of the spray arm 130.

In FIG. 4 the spray arm 130 is illustrated as mounted for providing a normal jet spray and is illustrated as comprising an upper sheet member 132, a lower sheet member 134 and an intermediate sheet member 136. The sheet members 132, 134 and 136 are substantially coextensive, spaced apart and sealed together at their edges so as to provide a pair of fluidically separated chambers 138 and 140 when mounted on the manifold 86.

The sheet member 132 has a plurality of ports 142 therein which communicate with the fluid chamber 138, while the sheet member 134 includes a plurality of spray means or openings 144, not all of which are shown, which communicate with the fluid chamber 140. In FIG. 4, only the chamber 138 is in communication with the fluid discharge apertures 88 of the manifold 86; whereas, in FIG. 5 the spray arm 130 is inverted on the manifold so as to provide fluid communication between the fluid discharge apertures 88 and the fluid chamber 140. As mentioned above, the ports 142 provide a normal jet washing action and the ports 150 provide a more gentle washing action.

The upper end of the tower 560 is provided with a circumferential groove 152 which receives an intumed flange 154 of the manifold 86 in a manner such that the manifold 86 is free to rotate with respect to the tower 560. The manifold 86 is also provided with a circumfer-

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ential flange 160 which limits the downward positioning of the spray arm 130 and acts as a seat therefor so that the spray arm is properly positioned with one or the other of the chambers 138 and 140 only in communication with the fluid discharge apertures 88.

The spray arm 130 is dynamically balanced and the pressure in the arm will hold it down on the shoulder 160. Snap type seals, such as O-rings 156 and 158 may be used, however, to improve the sealing and holding of the arm.

We have disclosed a spray arm for a dishwasher which features and advantageously provides different washing actions. In addition, we have disclosed a spray arm which is easily removed and inverted, or interchanged with another arm, in a very simple manner so that a user can readily adapt a particular dishwasher to a desired washing action. Furthermore, we have provided a unique spray arm and mount therefor which obviates the necessity of changing or modifying jet nozzles or varying other machine operations in order to obtain a variety of washing actions.

Although we have described our invention by reference to particular embodiments thereof, many changes and modifications of the invention may become apparent to those skilled in the art without departing from the spirit and scope of the invention. We therefore intend to include within the patent warranted hereon all such changes and modifications as may reasonably and properly be included within the scope of our contribution to the art.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a dishwasher having a washing chamber for containing items to be washed, an apertured conduit within the washing chamber, and pump means for supplying washing liquid under pressure through said conduit; a spray device for mounting within the washing chamber comprising:

means forming fluidically-separate substantially-symmetrical first and second chambers;

first nozzle means a fluid communication with the first chamber for directing spray to the items to be washed;

second nozzle means in fluid communication with the second chamber for directing spray to the items to be washed; and

means for rotatably mounting the spray device in a primary position on the conduit with the first chamber of said spray device covering the apertures in said conduit for fluid communication therebetween, and an inverted position on said conduit with the second chamber of said spray device covering said apertures in said conduit for fluid communication therebetween.

2. In a dishwasher according to claim 1, wherein said first nozzle means includes means for developing a first spray pattern and said second nozzle means includes means for developing a second spray pattern.

3. In a dishwasher according to claim 1, wherein said spray device comprises first, second and third generally coextensive and spaced sheet members sealed together along the respective edges to form said first and second chambers, said first nozzle carried by said first sheet member, said second nozzle means carried by said second sheet member, and first, second and third apertures in respective ones of said sheet members aligned with each other to receive the apertured conduit.

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4. In a dishwasher according to claim 3, wherein the apertured conduit comprises sealing means for engaging one of said sheet members.

5. A spray device for mounting on an apertured end of a fluid conduit having a stop spaced from the end thereof, comprising:

first, second and third generally coextensive and spaced sheet members sealed together along their edges to define substantially symmetrical first and second chambers;

first nozzle means carried by said first sheet member in fluid communication with said first chamber;

second nozzle means carried by said second sheet member in fluid communication with said second chamber; and first, second and third apertures in respective ones of the sheet members aligned to receive the fluid conduit with a selected one of said first and second sheet members contacting the stop so that only one of said chambers is in fluid communication with the apertured end of the conduit, said third sheet member fluidically separating said chambers.

6. In a dishwasher of the type wherein a spray device is rotatably mounted on and receives liquid under pressure from a conduit mounted within a washing chamber, the improvement therein for providing either a normal vigorous spray action or a gentle spray action comprising:

means dividing the spray device into first and second fluidically-separate chambers, said first chamber having first nozzle means having a small number of relatively large holes in communication therewith for effecting a first normal vigorous spray pattern and said second chamber having second nozzle means having a large number of relatively small holes in communication therewith for effecting a second gentle spray pattern, and means for selectively mounting said spray device on the conduit with a selected one of said chambers in fluid communication with the conduit.

7. A dishwasher comprising:

a washing chamber;

an apertured conduit within the washing chamber; pump means for supplying washing liquid under pressure through the conduit;

a spray arm having fluidically-separate first and second chambers;

first nozzle means carried by the spray arm and in fluid communication with the first chamber for directing a first spray pattern within the washing chamber;

second nozzle means carried by the spray arm and in fluid communication with the second chamber for directing a second spray pattern within the washing chamber; and

means for rotatably mounting the spray arm in a first position on the conduit with the first chamber of said spray arm covering the apertures in said conduit for fluid communication therebetween, and a second position on said conduit with the second chamber of said spray arm covering said apertures in said conduit for fluid communication therebetween.

8. A dishwasher comprising:

a washing chamber;

a conduit in said washing chamber including a hollow tube having an end, a manifold mounted on the end of said tube, said manifold comprising a hollow

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portion in communication with said hollow tube and fluid discharge apertures in communication with said hollow portion;

pump means for supplying liquid under pressure through said conduit;

a spray arm including first and second chambers, first and second nozzle means carried by said spray arm in communication with respective ones of said chambers for directing respective spray patterns within said washing chamber; and

means on said manifold for selectively mounting said spray arm with one of said first and second chambers in communication with said fluid discharge apertures to obtain a desired spray pattern.

9. A dishwasher according to claim 8, wherein said spray arm comprises means defining an aperture for re-

ceiving said manifold, and said manifold comprises sealing means for sealingly engaging the aperture defining means.

10. A dishwasher according to claim 8, wherein said spray arm includes an aperture therethrough for receiving said manifold therethrough, and said means for selectively mounting said spray arm includes stop means on said manifold to contact and define operating positions of said spray arm.

11. A dishwasher according to claim 10, wherein said first and second nozzle means are carried on opposite sides of said spray arm, said first and second chambers are on opposite sides of said spray arm and said spray arm is invertible whereby either side thereof may contact said stop means.

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UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 3, 918, 644
DATED : November 11, 1975
INVENTOR(S) : Clark I. Platt and James I. Czech

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Claim 1, column 5, line 40, correct the spelling of
--fluidically--.

Claim 1, column 5, line 42, substitute --in-- for "a".

Signed and Sealed this
Twenty-sixth **Day of** October 1976

[SEAL]

Attest:

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Attesting Officer

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Commissioner of Patents and Trademarks