

- [54] **WASHING APPLIANCE HAVING AN IMPROVED SPRAY ARM ASSEMBLY**
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- [51] **Int. Cl.:** B05b 3/06
- [58] **Field of Search:** 134/176, 179, 183; 239/243-261

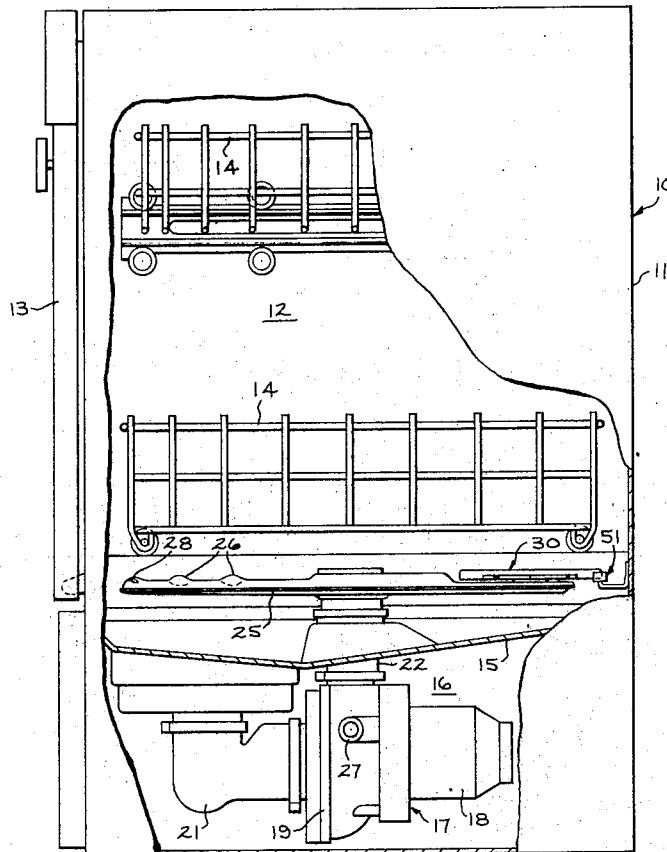
2,459,244	1/1949	Sellars.....	239/244
3,468,486	9/1969	Mercer	239/251
3,677,473	7/1972	Belaieff.....	239/251

Primary Examiner—M. Henson Wood, Jr.
Assistant Examiner—John J. Love
Attorney—George C. Atwell et al.

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 2,279,619 4/1942 Fisher 134/179 X

[57] **ABSTRACT**
 A dishwashing machine has a rotatable spray arm with a repositionable fluid distributor disposed thereon for discharging washing fluid over articles being washed in the machine's wash chamber. The distributor is provided with a plurality of discharge ports for directing streams of fluid therefrom in a predetermined pattern, and repositioning the distributor on the spray arm during operation of the appliance effects reorientation of the streams to provide more uniform and thorough fluid distribution throughout the chamber.

10 Claims, 5 Drawing Figures



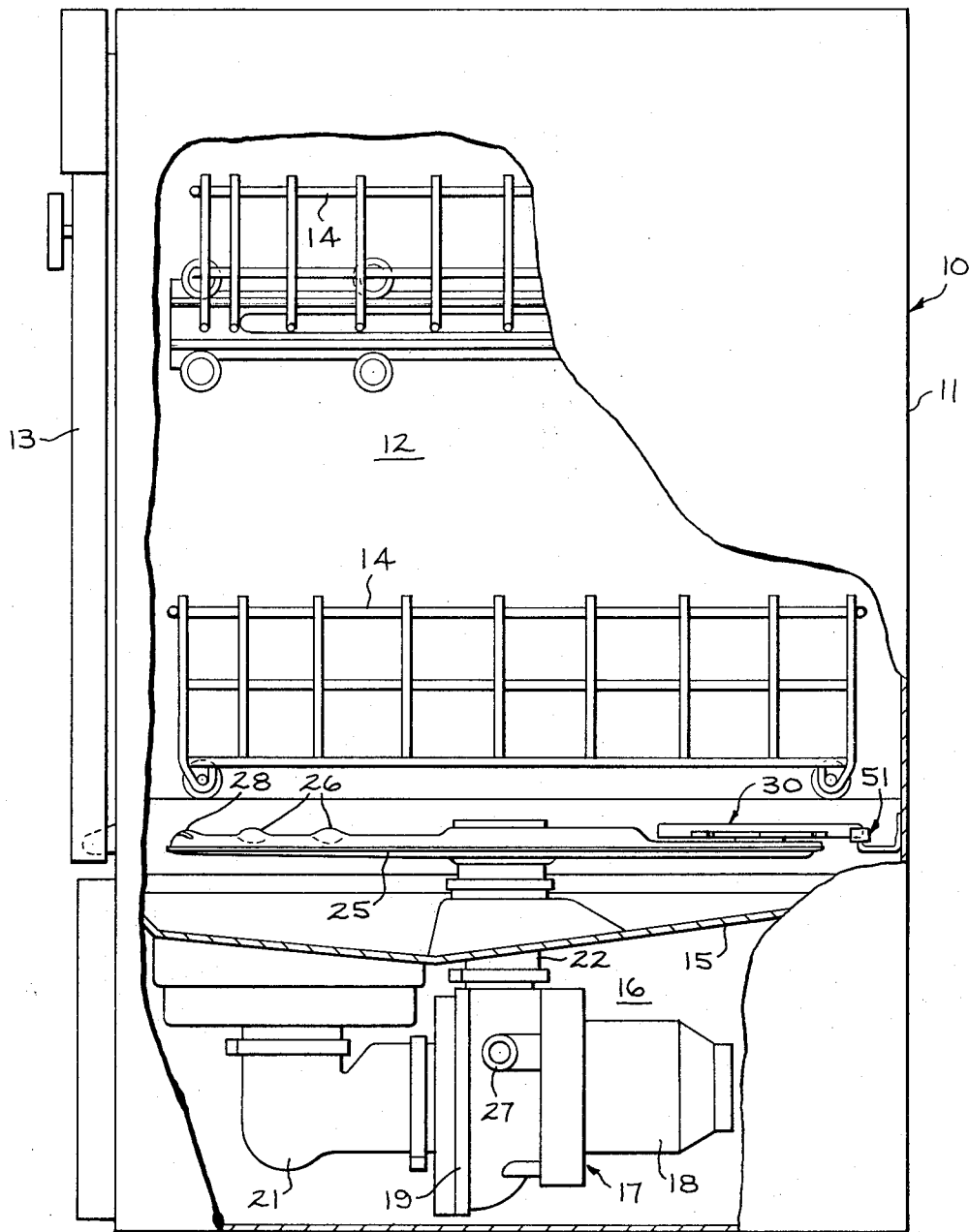


FIG. 1

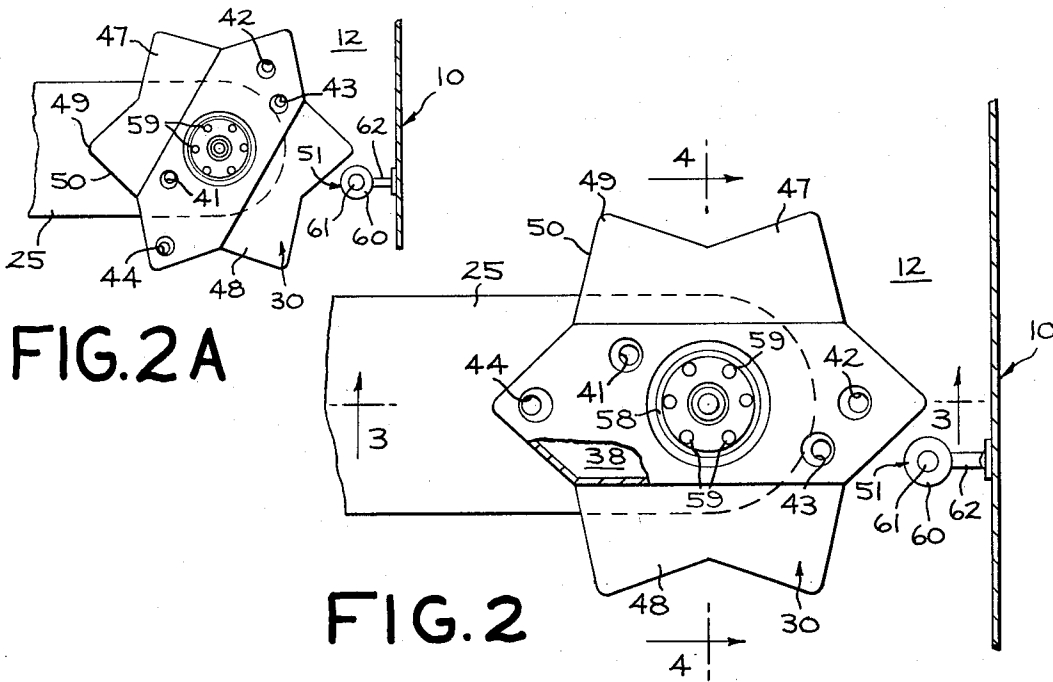


FIG. 2A

FIG. 2

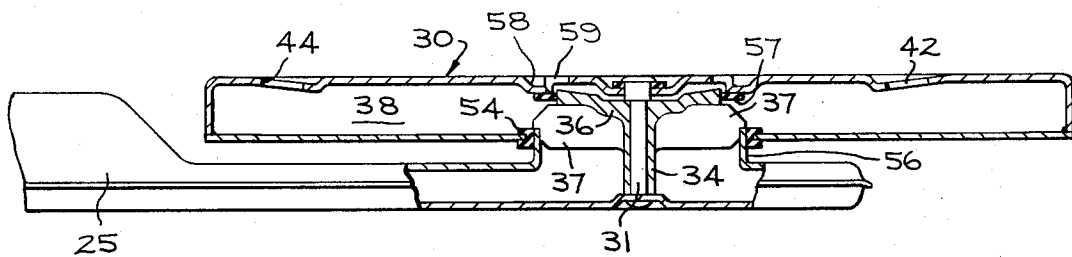


FIG. 3

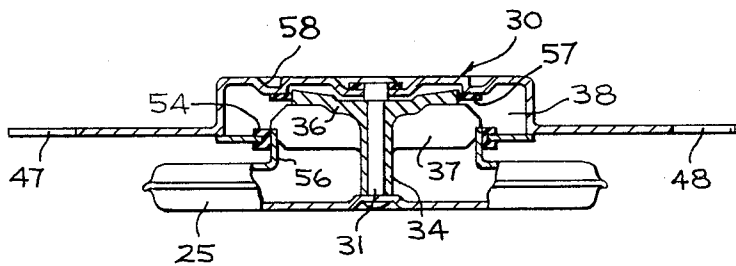


FIG. 4

WASHING APPLIANCE HAVING AN IMPROVED SPRAY ARM ASSEMBLY

BACKGROUND OF THE INVENTION

In dishwashing machines it has become quite common to provide a rotatable spray arm in order to maximize washing fluid distribution in the dishwasher chamber. Various features and modifications have been proposed for the rotatable spray arm in a dishwasher to attain more thorough distribution of the washing fluid. For example, U.S. Pat. No. 3,468,486, issued Sept. 23, 1969, discloses a spray arm mounted to be rotatable in a horizontal plane and having a secondary or auxiliary spray arm mounted for rotation on the major spray arm. Another approach to improving fluid distribution in a dishwasher chamber has been to provide means to automatically reverse rotation of the spray arm as disclosed in U.S. Pat. No. 3,596,834, issued Aug. 3, 1971, and U.S. Pat. No. 3,642,208, issued Feb. 15, 1972.

SUMMARY OF THE INVENTION

The present invention may be broadly summarized as a washing appliance of the type having a non-reversible rotatable spray arm for distributing washing fluid on items stored for washing within the appliance wash chamber, wherein the spray arm has a repositionable fluid distributor mounted thereon at some distance outwardly from the spray arm's axis of rotation. The fluid distributor preferably has a plurality of discharge ports for discharging fluid received from the spray arm. The fluid distributor is repositionable on the spray arm, preferably by a rotative arrangement thereon, whereby the orientation of the ports of the distributor is changed each time the distributor is repositioned. It is preferred that the fluid distributor be normally resistant to movement or change in position on the spray arm and that means be provided for causing the distributor to advance to a relatively new position and reorientation of its ports each time the spray arm rotationally advances a predetermined number of degrees in its rotational movement.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a side elevational view of an automatic dishwashing machine having a portion of the side wall thereof cut away to reveal the internal components thereof;

FIG. 2 is a fragmentary enlarged top plan view of the end of the spray arm and the associated wash chamber side wall as first shown in FIG. 1;

FIG. 2A is a reduced scale view of the structure shown in FIG. 2 showing repositioning of certain components in accordance with the dishwashing machine operation;

FIG. 3 is a view taken along line 3—3 of FIG. 2; and

FIG. 4 is a view taken along line 4—4 of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIG. 1 there is illustrated an automatic dishwashing machine 10 including a cabinet 11 defining therein a washing chamber 12. Access to the washing chamber 12 is obtained by opening a door 13 pivoted at its lower end and located on the front side of the cabinet 11. Upper and lower dish supporting racks 14 are supported for slidable movement within the washing chamber 12 so that either may be separately slid outwardly

to extend through the cabinet's front access opening to facilitate loading and unloading of items to be washed in the machine. The lower end of the washing chamber 12 is defined by a bottom wall or floor portion 15 that separates it from a lower motor-pump compartment 16. Housed within the compartment 16 is a motor-pump assembly 17 including an electric motor 18 that powers a pump means 19 for recirculating washing fluid to and from the washing chamber 12 and for draining washing fluid from the machine to the household sewage system.

The operational cycle of such a machine generally includes a number of rinsing and washing steps and a final drying step. In a dishwashing machine, such as that shown in FIG. 1, heated water from the household supply line is directed into the washing chamber 12 by valve means (not shown). The water accumulates to a predetermined level on the floor portion 15 and then a timer control means (not shown) of the machine activates the electric motor 18 to drive the pump 19 in a recirculation operation. In the recirculation operation, the accumulated washing fluid is drained outwardly from the washing chamber 12 by means of a conduit 21 leading to the pump 19 and is then forced upwardly by the pump 19 through a conduit 22 leading to a hollow elongated longitudinally disposed spray arm 25 located within the lower portion of the washing chamber 12.

Generally, clean water is introduced into the machine for the wash step and each rinse step, and detergent is added, by automatic means (not shown), for the wash step. The term "washing fluid" is therefore used herein in a generic sense to refer broadly to any form of cleansing liquid utilized for recirculation within the dishwashing machine. The washing fluid is distributed from the spray arm 25 by means of orifices 26 spaced therealong. The orifices 26 serve to separate the fluid flow into a spray pattern over the tableware contained in the racks 14. The recirculation of the washing fluid from the washing chamber 12, through the pump 19 and through the spray arm 25, is continued for a predetermined length of time after which the electrical circuit to the motor 18 is automatically interrupted to halt the pumping action. Thereafter, a drain valve (not shown) is automatically opened and the motor 18 is reenergized whereby the pump 19 pumps the fluid from the washing chamber 12 and outwardly through a drain opening 27 leading to the household sewage system.

In the form of the improved spray arm assembly of the present invention, as illustrated in the drawing, the longitudinally elongated spray arm 25 has an orifice at one end thereof that serves as a jet nozzle 28 for imparting rotative action to the spray arm during the recirculation operation. The jet discharge emitted from the nozzle 28 exerts a reactive force or counterimpetus against the end of the spray arm whereby the spray arm is urged to rotate about a vertical axis coincidental with the axis of the conduit 22.

Moving from the end of the spray arm 25 having the jet nozzle 28 to the spray arm's opposite end, FIG. 1 shows that a fluid distribution means or distributor 30 is located on the upwardly facing side of the spray arm 25. The distributor 30, which is more clearly shown in FIGS. 2-4, is mounted to the spray arm 25 by means of a shaft 31 and is thereby adapted to rotate on a vertical axis generally perpendicular to the longitudinal axis of the spray arm 25. The distributor 30 is supported on the shaft 31 by a spider 34 having a center-bored collar

portion 35 for accommodating the shaft 31 and having a radially outwardly extending upper circular portion 36. The spider 34 also has radially outwardly extending vanes 37 disposed in a circumferentially spaced apart arrangement. Like the spray arm 25, the distributor 30 is a hollow body arrangement and it has an internal fluid flow area 38 which receives fluid from the spray arm 25. The fluid flow within the spray arm 25 flows between vanes 37 of the spider 34 and radially outwardly into the area 38 for dispersal through asymmetrically disposed discharge ports 41, 42, 43 and 44.

The body of the distributor 30 also has oppositely disposed non-hollow wing portions 47 and 48 that are shared cooperatively with the radially outward ends of the distributor's hollow portion to provide a symmetrical distributor peripheral edge configuration resembling a six-pointed star. This shape serves a functional purpose to be hereafter described.

The distributor 30 has six points 49, and adjacent points 49 are separated by edge portions 50 which serve as camming surfaces for contacting a stationary member or strike 51 as the spray arm 25 rotates within the wash chamber 12. As shown in FIGS. 3 and 4, an annular sealing gasket 54 is fixedly mounted to the distributor 30 about its under surface opening through which washing fluid is conducted from the spray arm 25. The spray arm 25 has a cooperating annular lip 56 that provides a bearing and sealing surface for the gasket 54. The gasket 54 preferably fits rather snugly against the lip 56. Therefore, the distributor 30 will tend to maintain a set position on the spray arm 25 until such time as the then most outwardly protruding point 49 moves past the strike 51 as the spray arm 25 rotates. An upper annular gasket in the form of a split ring seal 57 is disposed subjacent a circular groove 58 in the upper surface of the distributor and circumjacent the portion 36 of the spider 34. A plurality of small holes 59 are provided in a concentric pattern in the distributor's upper surface and radially inward from the seal 57. The holes 59 serve as outlets for drainage of fluid that may leak radially inward past the seal 57 so that such leakage will not have an unbalancing effect on the distributor.

In the preferred embodiment of the invention shown, viewing the spray arm 25 from above, as shown in FIG. 2, each full 360° rotation of the spray arm 25 in a clockwise direction results in a 60° rotation of the distributor 30 on the spray arm 25. As the distributor contacts the strike 51 the distributor body is caused to rotate 60° relative to the spray arm whereby the next adjacent point 49 is moved into the outwardly extending position. The camming surface 50 rides against the strike 51 whereby the distributor body rotates from the position shown in FIG. 2 to the next position as shown in FIG. 2A during which spray arm 25 will have made one complete rotation on its axis.

The strike 51, which may be mounted to the wash chamber 12 side wall, may comprise a small freely rotatable wheel or roller 60 journaled on a vertical axis 61 and supported a short distance from the wash chamber wall by means of a support member 62. The free turning roller 60 serves to reduce friction between the strike 51 and the distributor 30 so that the speed of the rotating spray arm is not noticeably reduced by the contact of the distributor against the strike.

With reference to all the ports 41-44, shown in FIG. 2, it is preferred that the reaction forces of upwardly

directed streams from ports 41-44 be essentially balanced around pivot 31 to minimize unbalanced friction forces inherent in the distributor mounting arrangement. The ports may be canted in respectively different directions, as shown in FIG. 3, whereby the washing fluid will be discharged from some of the ports in streams at various angles from vertical to provide effective and thorough distribution of the washing fluid throughout the wash chamber 12. Further, port opening shapes may be modified to obtain narrow or fan-shaped streams as desired. The ports 41, 42, 43 and 44 are purposely located in a pattern on the distributor such that each time the distributor is caused to rotatably advance on the spray arm, as heretofore described, the distance of each distributor discharge port from the spray arm's axis of rotation is changed relative to its distance when the distributor is at any other one of the available positions on the spray arm. Therefore, each time the distributor is advanced, the stream emitted by each port 41, 42, 43 and 44 is rotationally moved through a relatively new concentric path relative to the spray arm's vertical axis. The embodiment of the invention heretofore described accomplishes concentric relocation of the streams coming from the distributor in response to each full rotation of the spray arm until six successively different distribution patterns have occurred. Thereafter, the six successive steps are repeated.

It should be appreciated that the preferred embodiment of the invention heretofore described and shown in the drawing discloses only a presently preferred form for a repositionable fluid distributor mounted on the spray arm in the washing chamber of a dishwashing machine. It is anticipated that other means could be provided for repositioning the distributor relative to the spray arm and that such repositioning can be made to occur more or less often than one full 360° rotation of the spray arm.

As compared to the prior art this invention provides a rotatable spray arm in a dishwasher with a repositionable distributor that is substantially freely rotatable on the spray arm such that it may be relatively easily advanced from one position to a next position and thence preferably through a total of six different positions to provide six entirely different upward spray patterns for cleaning comparatively heavily soiled dishes and cookware. Rather than a constantly rotating distributor providing random spray distribution as heretofore taught in the prior art, the present invention comprehends holding the distributor at a predetermined position during a full sweep of the main spray arm which may constitute, for example, a 360° rotation of the spray arm or a 180° rotation of the spray arm. The location of the discharge ports on the upwardly facing surface of the distributor is such that each new position of the distributor achieves an intense and relatively new pattern of discharge streams of washing liquid being directed against the items to be cleaned thereabove. Experimentation has shown that concentrating the flow of the streams in successive specific patterns, as heretofore described, achieves a cleansing action on heavily soiled items not heretofore obtainable from the conventional spray arm or variations thereof presented in the prior art.

We claim:

1. An automatic article washing machine having a washing chamber, means for supplying pressurized

washing fluid to the chamber, a spray arm mounted for non-reversible rotation within the chamber and adapted to receive the pressurized washing fluid there-through and distribute the fluid outwardly on to articles stored within the chamber, a repositionable fluid distributor mounted on the spray arm radially outwardly from the spray arm axis of rotation, the distributor having at least one port for discharging fluid received from the spray arm, the distributor being repositionable on the spray arm from at least a first to a second position whereby the distance of the port from the spray arm axis is changed, the distributor being adapted to remain static relative to the spray arm for a predetermined time when disposed at one of the positions and means for causing the distributor to change positions on the spray arm during spray arm rotation.

2. The invention of claim 1 wherein the distributor is adapted to be repositionable between at least three successive positions, the distributor is provided with a plurality of discharge ports, and each port is located a different distance from the distributor axis of rotation as compared to the first port.

3. The invention of claim 1 wherein the distributor is provided with a plurality of discharge ports, and at least one of the ports is adapted to discharge a fluid stream in a direction whereby streams from the ports are non-parallel relative to each other.

4. The invention of claim 1 wherein the distributor is mounted to be repositionable by rotation on an axis generally parallel to the axis of rotation of the spray arm.

5. The invention of claim 1 wherein the distributor is adapted to be repositioned as an incident of a single rotational movement of the spray arm.

6. The invention of claim 1 wherein the spray arm is a hollow elongated member rotatable on a vertical axis, the spray arm has at least one fluid discharge port adja-

cent a first end thereof, and the distributor is mounted on the spray arm at the end of the spray arm opposite the spray arm discharge port.

7. The invention of claim 1 wherein the means for causing the distributor to change positions includes a stationary member in the chamber contacted by the distributor as the spray arm rotates.

8. A spray arm assembly in an automatic dishwashing machine comprising a rotatable spray arm adapted to receive a pressurized fluid, a rotatable fluid discharge means mounted on the spray arm and adapted to be normally resistive to rotation thereon, and the fluid discharge means being adapted to rotate on the spray arm less than 180° during one full rotation of the spray arm.

9. The invention of claim 8 wherein the fluid distribution means is adapted to rotatably advance in successive steps wherein each advancement is a function of rotation of the spray arm.

10. An automatic article washing machine having a washing chamber, means for supplying pressurized washing fluid to the chamber, a hollow fluid-conducting spray arm mounted for rotation in response to the reactive force of fluid discharged therefrom, a hollow fluid distributor mounted on the spray arm for substantially free rotational movement thereon and in fluid flow communication with the spray arm, the distributor having discharge ports thereon for directing fluid streams onto articles to be washed in the chamber, the discharge ports being located and sized such that the distributor is substantially balanced during fluid discharge therefrom, and means for incrementally rotationally advancing the distributor on the spray arm and holding the distributor stationary relative to the spray arm for a predetermined number of degrees of rotation of the spray arm between each incremental advancement of the distributor.

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