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(54) Wash arm arrangement for a dishwasher

(57) This invention relates to a wash arm arrangement for a dishwasher comprising a treatment chamber (11) having one or several freely rotating support arms (16) that are provided with one or several freely rotating spray arms (20) through which liquid is distributed to the dish in the treatment chamber (11). All the movement of the support arm (16) is created as reaction forces and/or moments from the spray out of the spray arm (20).

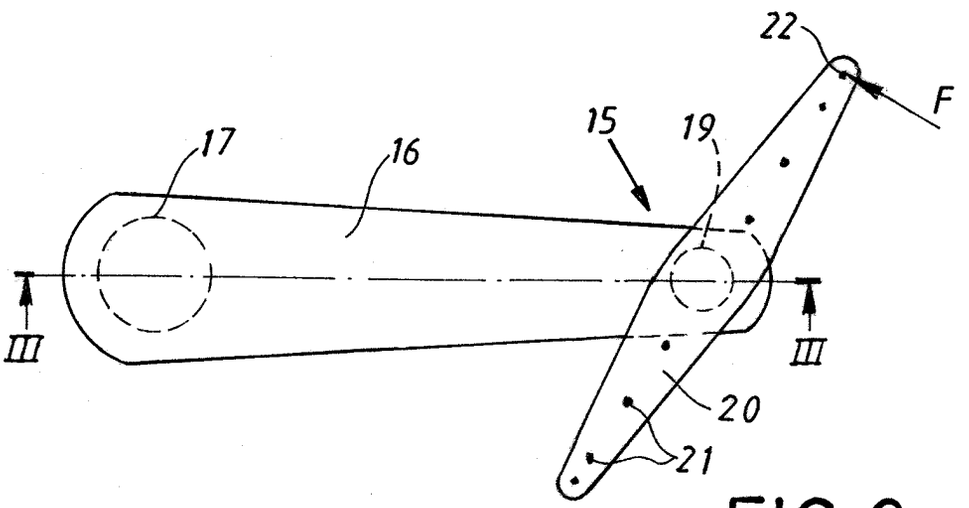

FIG. 2

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Description

[0001] This invention relates to a wash arm arrangement for a dishwasher comprising a treatment chamber having one or several freely rotating support arms that are provided with one or several freely rotating spray arms through which liquid is distributed to the dish in the treatment chamber

[0002] Conventional dishwashers of the household type are usually provided with an upper and a lower rotating wash arm provided with several spray nozzles distributing the cleaning liquid to the dish which is placed in the treatment chamber. At least one of the nozzles is arranged such that a reaction force is created causing the wash arm to rotate. These spray systems have the disadvantage that the each spray of the rotating nozzle hits the same circle every revolution.

[0003] There also are previously known dishwasher arrangements, see for instance US 5477874 or DE 4416655, operating with one or several rotating support arms on which a spray arm is rotating. The support arm as well as the spray arm are provided with several spray nozzles some of which are directed such that a horizontal force component is created directly on the support arm as well as the spray arm causing the two arms to rotate. This means that a part of the flow is used to rotate the support arm.

[0004] Another type of wash arm arrangement is shown in EP 727177. According to this arrangement there is a reciprocating support arm provided with a rotating spray arm at each end. The support arm achieves its reciprocating motion by means of nozzles provided at the spray arms and the spray arms are mutually connected by means of a gear mechanism in order to synchronize the motion of the spray arms such that a balanced uniform motion is created. This is however a complicated and rather expensive solution.

[0005] The purpose of this invention is, contrary to traditional wash arm systems, to use a dishwasher spraying system that is distributing the liquid in a non uniform way by driving the support arm in incremental steps. This means that a more effective and faster washing can be achieved resulting in less water and energy consumption. It also means a simple and cheap wash arm arrangement using a freely rotating support arm that is provided with a freely rotating spray arm for driving the support arm. The arrangement is such that all the liquid used in the washing procedure is arranged to flow through the spray nozzle and there is consequently no loss of flow in order to drive the support arm separately.

[0006] An embodiment of the invention will now be described with reference to the accompanying drawing on which Fig. 1 shows a perspective view of a dishwasher according to the invention, Fig. 2 is a schematic plan view of the wash arm arrangement according to the invention, Fig. 3 is a section on the line III-III in Fig 2 whereas Fig 4 shows the driving forces of the spray arm and the support arm.

[0007] Fig. 1 shows a dishwasher 10 having a treatments chamber 11 in which dish is inserted on a lower and an upper basket 12 and 13. The treatment chamber is provided with a door 14 and has a wash arm arrangement 15 placed below the lower basket 12 as well as below the upper basket 13. The dishwasher is in a conventional manner provided with a circulation pump that distributes a cleaning liquid from a collecting container at the bottom of the treatment chamber to the wash arm arrangement from which it is sprayed towards the dish which is placed on the baskets.

[0008] The wash arm arrangement 15 comprises a support arm 16 that is rotating freely on a feeding duct 17 to which the cleaning liquid is supplied by said circulation pump. The support arm has a closed structure with the exception of an inlet opening 18 placed at the feeding duct 17 and an outlet sleeve 19 at the outer end of the support arm. The outlet sleeve 19 supports a spray arm 20 that rotates freely on the sleeve. The spray arm is provided with several nozzles 21 that direct the flow mainly vertically towards the dish. The spray arm is further provided with an additional nozzle 22 at one of its ends through which a cleaning liquid jet is directed obliquely upwards or sideways.

[0009] The arrangement operates in the following way. Cleaning liquid is distributed from the feeding duct 17 via the opening 18 into the support arm 16 and further through the outlet sleeve 19 and the nozzles 21 via the spray arm 20. Simultaneously liquid is flowing out through the nozzle 22 mainly perpendicular to the length direction of the spray arm 20 causing a horizontal driving force F on the spray arm. This force F creates a momentum about the sleeve 19 such that the spray arm 20 starts to rotate. The rotation of the spray arm 20 generates a friction momentum C at the sleeve 19 that forces the support arm 16 to rotate. At the same time the force F is transmitted to the support arm 16 through the sleeve 19 by its component F1 parallel to the support arm 16 and F2 perpendicular to it. Component F2 creates a momentum around the feeding duct 17 which is added up to the friction momentum C at the sleeve 19 and contributes to the rotation of the support arm 16. Eventually the support arm 16 rotates with periodical angular velocity originated by a constant component C (friction given by satellite rotation) added up to a periodical one given by the component F2 of the force F. By choosing suitable friction at the feeding duct 17 and at the sleeve 19 the support arm 16 is rotated in incremental steps. Due to that the increment steps are not fixed the position of the sprays will vary continuously thereby minimizing the risk for areas not being washed. Thus, the system creates a heavy flow directed at the items above the wash arm and this flow transports the dirt away in an efficient manner.

Claims

1. Wash arm arrangement for a dishwasher comprising a treatment chamber (11) having one or several freely rotating support arms (16) that are provided with one or several freely rotating spray arms (20) through which liquid is distributed to the dish in the treatment chamber **characterized in that** all the movement of the support arm is created as reaction forces and/or moments from the spray out of the spray arm.

2. Arrangement according to claim 1, **characterized in that** all the liquid which is fed to the support arm (16) is arranged to flow out into the treatment chamber through the spray arm (20).

3. Arrangement according to claim 1 or 2, **characterized in that** the support arm (16) is a closed structure having one liquid inlet (18) and one liquid outlet (19).

4. Arrangement according to any of claims 1-3, **characterized in that** the support arm (16) is arranged to move in incremental steps when liquid is distributed through the wash arm.

5. Arrangement according to any of claims 1-3, **characterized in that** the spray arm (20) is provided with at least one nozzle (22) arranged such that one horizontal reaction force component (F) from the jet flowing out from the nozzle creates a moment (C) for the spray arm (20) about its rotation centre as well as a moment (M) for the support arm (16) about its rotation centre.

6. Arrangement according to any of claims 1-3, **characterized in that** the dishwasher is provided with at least one liquid feeding duct (17) on which the support arm is arranged to rotate.

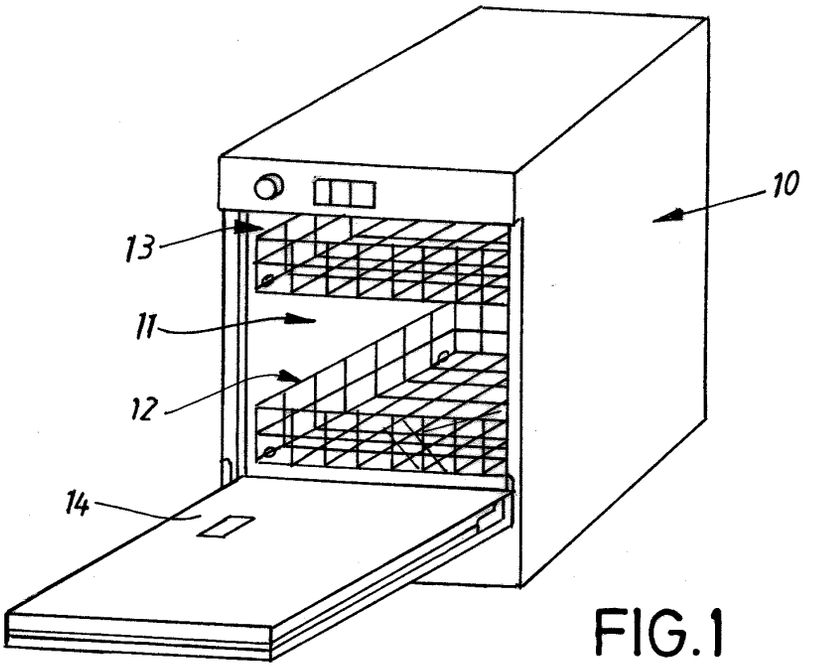

FIG.1

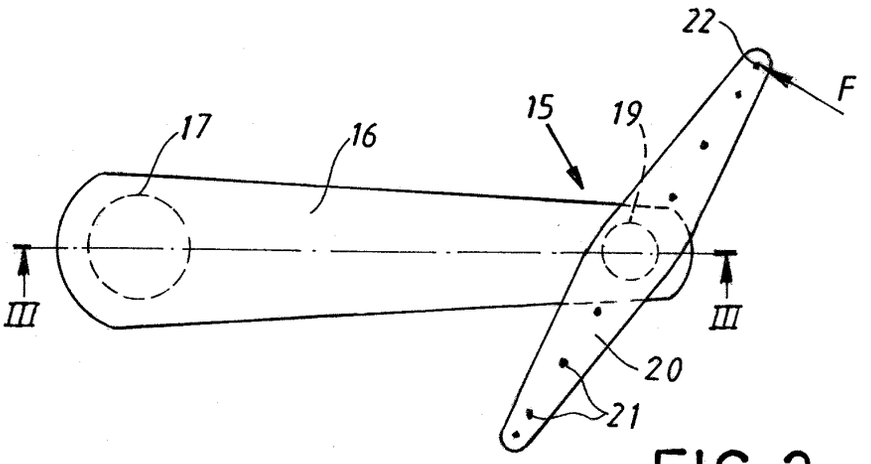

FIG. 2

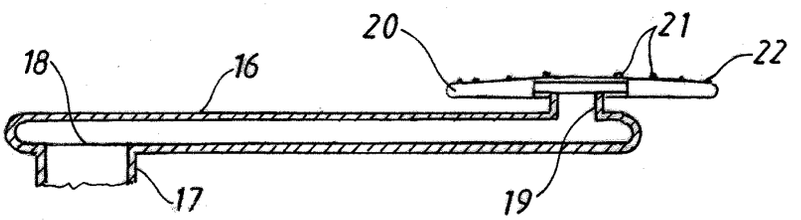

FIG. 3

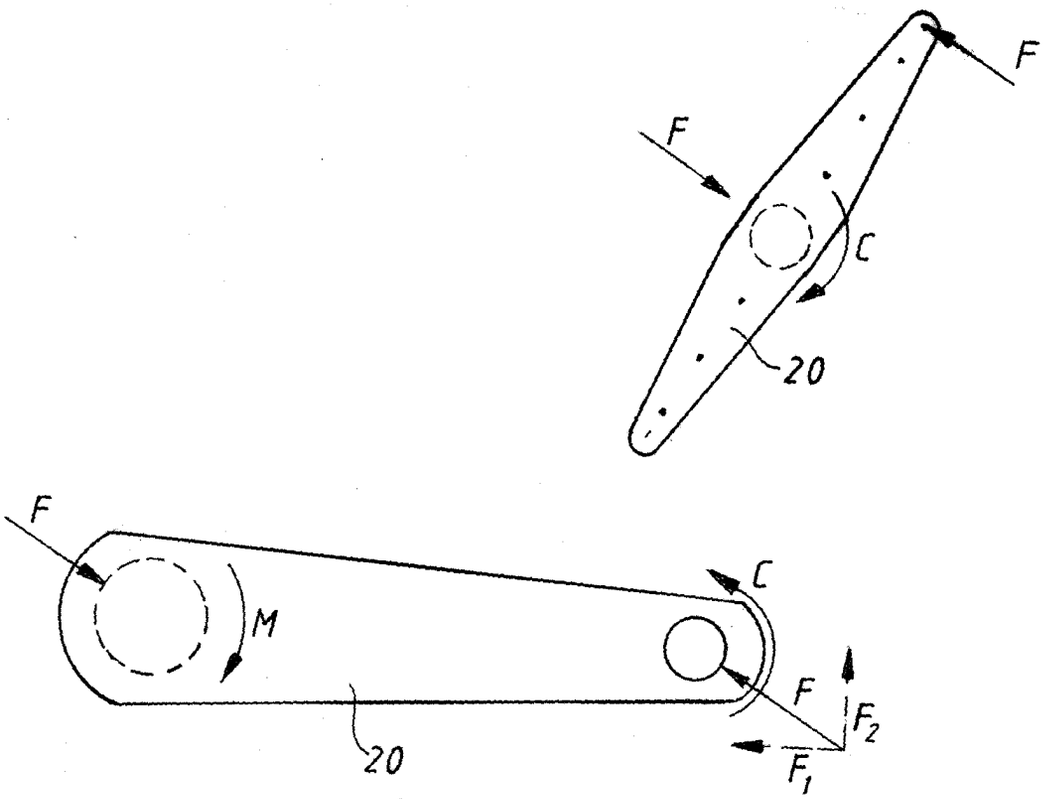

FIG. 4