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(54) A rotational device for wash jets in dishwashers and dishwashers equipped with said device.

(57) A rotational device for washing jets in dishwasher and dishwasher equipped with said device, having rotatable arms (1,2) with a nozzles plurality (3,3') to spray the washing fluid toward the ware to wash and having means to allow teh rotation of said arms (1,2) during the washing operation, characterized in that at least a number of said washing jet nozzles are orientated/swinging in inclination direction of the respective jet to give themselves a rotational component to the arm in order to explicate the double function both of washing and of rotational propulsion.

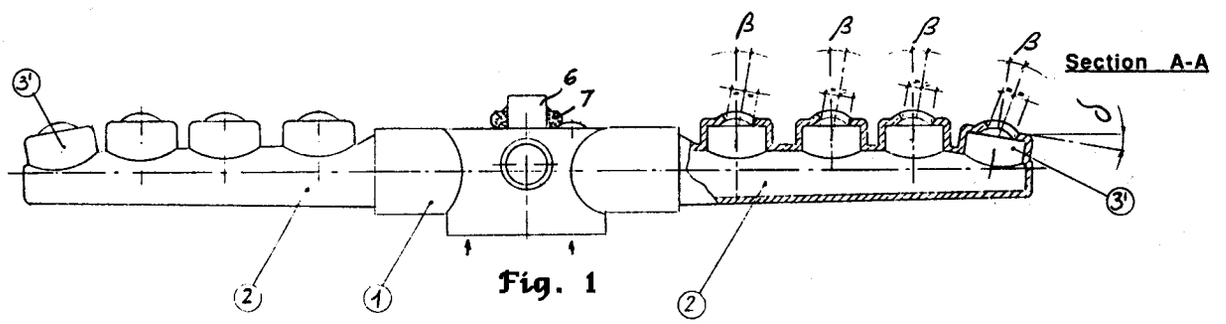

Fig. 1

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The present invention concerns a rotational device for washing jets in dishwasher and dishwasher equipped with said device.

This solution is conveniently applicable in industrial dishwashers but can be used also in home dishwashers.

In the prior art rotative dishwasher jet device involves substantially two free rotatable horizontal arms supported on central vertical axis each arm having two opposed semiarms each semiarm having a plurality of washing jets to hit the ware to wash disposed in the washing chamber of the dishwasher between said two arms.

The rotational movement of the arms is obtained utilizing generally a couple of external jets for each arm, (one external motion jet for each semiarm placed at its extremity), tangentially orientated in opposition which have the specific function of the rotation only.

The drawback of these well known solutions (separate nozzles for arm-rotation) is a reduction of the washing flow, and the washing performance is reduced until 25%.

Scope of the present invention is to obviate said drawback.

This and other scopes are reached with the present invention as claimed, by means of a rotational device for washing jets in dishwasher and dishwasher equipped with said device, comprising jet rotatable arms with a plurality of jet nozzles and means to allow the rotation of said arms during the washing operation, characterized in that at least a number of said washing jet nozzles are inclined to give themselves a rotational component reaction in order to explicate the double function both of washing and rotational propulsion.

With this solution we obtain a total utilization of the water in circle as mechanical effect on the components in washing, avoiding that a part of it is used for rotation only.

The rotatory motion of the washing arms with the invention in fact, is not given by a specific pushing external nozzle, but by the sum of the push components of the washing jet nozzles, increasing up to 25 % the wash efficiency.

The invention is better understood with the enclosed description and drawings supplied for example only, in which:

Figure 1 represents a side view of one washing arm according to this invention with a semiarm end partially axially sectioned according to plane of

Figure 2, for the visualization of the washing jets.

Figure 2 represents a top view of the washing arm of Figure 1.

Figure 3 represents a transverse section view on the plane B-B of Figure 2 of the washing arm in correspondence of a sprayer nozzle.

The Figures disclose that the invention regards a rotational device for washing jets in dishwasher and dishwasher equipped with said devices, the device being a rotational arm, having a couple of semiarms (1, 2) with a nozzles plurality (3, 3') to spray the washing fluid toward the ware to wash and means to allow the rotation of said arm (1, 2) during the washing operation, characterized in that at least a number of said washing jet nozzles are orientated to give themselves a rotational component in order to explicate the double function both of washing and of rotational propulsion.

In particular it is disclosed that the jet pray nozzles are distributed in equal mode and symmetrically along the respective semiarms (2) that extend from a rotational central body (1) in misaligned mode (Figure 2) for a value of approximately 10 millimeters.

The number of the jets is four for each semiarm and all present a jet fissure nozzle (g) on convex surface to give to a jet the fan shape.

The fissures (g) are orientated if compared to a transverse plane with an angle f comprised between 50° and 63° and with a slope if compared to the perpendicular μ angle between 2° and 10° preferably 5°.

The medium jet axis of each nozzle is lightly inclined toward the external with an angle β between 7° and 13°, with exception of the external nozzle 3' that is obtained on tilted plane at the end of the semiarm with an angle ð between 7° and 13° consequently this end nozzle (3') is more tilted toward the external if compared to the interns ones (ð) forming a total slope of $\beta + ð$ angle namely between 14° and 26°.

The Figures disclose furthermore that in adjacency to the hub of the central portion of the arm (1) there is a central nozzle sprayer (4) lightly eccentric if compared to the rotation axis which jet having the function to cover the shade central zone that generally is scantily invested by the nozzles (3) of the semiarms.

The washing water feeding is made under the hub 1 in known mode.

The solution in Figure includes the realization of the rotary arm in an unique piece in diecast plastic material, but it is evident that the same can be made even in other materials, and even made in more pieces and in particular three pieces: one central as hub and two interchangeable baionet-pluggable detachable semiarms.

We point out furthermore that the hole (5) of the central hub (1) is endowed with two toothed wings (6) that lodge a blockage screw bolt (7) retained by this head. This bolt being used for securing the arm on the rotation axis support, this screw-bolt have substantially a knurled cylindric

head (7) semicylindrically retained in loose mode between said two wings (6) that prevents its axial extraction but does not prevent the screwing rotation or unscrewing rotation and this obviously to allow easily the assembly and the disassembly of the respective arms for the respective cleanness and maintenance, even manually and without danger to lose the respective fixation bolt.

In a more expensive variation the spraying nozzles (3, 3') can be obtained by means of rotatable bush, in such case rotating the bush that bears the respective jet fissures "g" we can even vary the orientation of the jet giving even a variable rotational component force. This allowing adjustment of the rotation speed of the arm being said carvings (g) tilted as describe above.

Claims

1. A rotational device for washing jets in dishwasher and dishwasher equipped with said device, having rotatable arms (1,2) with a nozzles plurality (3,3') to spray the washing fluid toward the ware to wash and having means to allow teh rotation of said arms (1,2) during the washing operation, characterized in that at least a number of said washing jet nozzles are orientated/swinging in inclination direction of the respective jet to give themselves a rotational component to the arm in order to explicate the double function both of washing and of rotational propulsion.

2. A rotational device for washing jets in dishwasher and dishwasher equipped with said device according to claim 1, characterized in that said washing nozzles (3, 3') have a fissure shape (g) and present a convex surface.

3. A rotational device for washing jets in dishwasher and dishwasher equipped with said device according to claim 1, characterized in that said washing nozzles (3, 3') have a fissure form (g), the fissure being inclined in respect of a transverse plane of the arm with an angle f between 50° and 63°.

4. A rotational device for washing jets in dishwasher and dishwasher equipped with said device according to claim 1, characterized in that said washing nozzles (3, 3'):
   - Have a fissure form (g):
   - Said fissure (g) is tilted from a transverse plane of the arm with an horizontal angle f between 50° and 63°;
   - The corresponding jet axis of said fissure is tilted from the vertical on the transverse plane of the arm with a vertical angle μ between 2° and 10°.

5. A rotational device for washing jets in dishwasher and dishwasher equipped with said device according to claim 1, characterized in that said washing nozzles (3, 3'):
   - Have a fissure form (g):
   - Said fissure (g) is tilted from a transverse plane of the arm with an horizontal angle f between 50° and 63°;
   - The corresponding jet axis of said fissure is tilted from the vertical on the transverse plane of the arm with a vertical angle μ between 2° and 10°;
   - The jet axis of of the nozzles (3, 3') is lightly inclined in opposition, toward the external side with an angle (β, $\beta + \delta$) between 7° and 26°.

6. A rotational device for washing jets in dishwasher and dishwasher equipped with said device according to claim 1, characterized in that said washing nozzles (3, 3'):
   - Have a fissure form (g):
   - Said fissure (g) is tilted from a transverse plane of the arm with an horizontal angle f between 50° and 63°;
   - The corresponding jet axis of said fissure is tilted from the vertical on the transverse plane of the arm with a vertical angle μ between 2° and 10°;
   - The jet axis of the nozzles (3) with exception of that of end one (3') is lightly inclined toward the external side with an angle (β) between 7° and 13° and the extreme nozzle is more tilted if compared to the previous ones.

7. A rotational device for washing jets in dishwasher and dishwasher equipped with said device according to claim 1, characterized in that said washing nozzles (3, 3'):
   - Have a fissure form (g):
   - Said fissure (g) is tilted from a transverse plane of the arm with an horizontal angle f between 50° and 63°;
   - The corresponding jet axis of said fissure is tilted from the vertical on the transverse plane of the arm with a vertical angle μ between 2° and 10°;
   - The jet axis of the nozzles (3) with exception of that of end one (3') is lightly inclined toward the external side with an angle (β) between 7° and 13° and the extreme nozzle is more tilted in the same sense for a value angle ($\beta + \delta$) between 14° and 26°.

8. A rotational device for washing jets in dishwasher and dishwasher equipped with said device according to claim 1, characterized in that said nozzles are disposed on rotational bushes to be oriented to vary the slope of the respective jets for the respective rotational component.

9. A rotational device for washing jets in dishwasher and dishwasher equipped with said device according to claim 1, characterized in that the fissures of said nozzles (3, 3') are substantially parallel between them.

10. A rotational device for washing jets in dishwasher and dishwasher equipped with said device according to claim 1, characterized in that in proximity of the hub (1) is obtained at least a further nozzle (4) lightly eccentric placed if compared to the rotational axis.

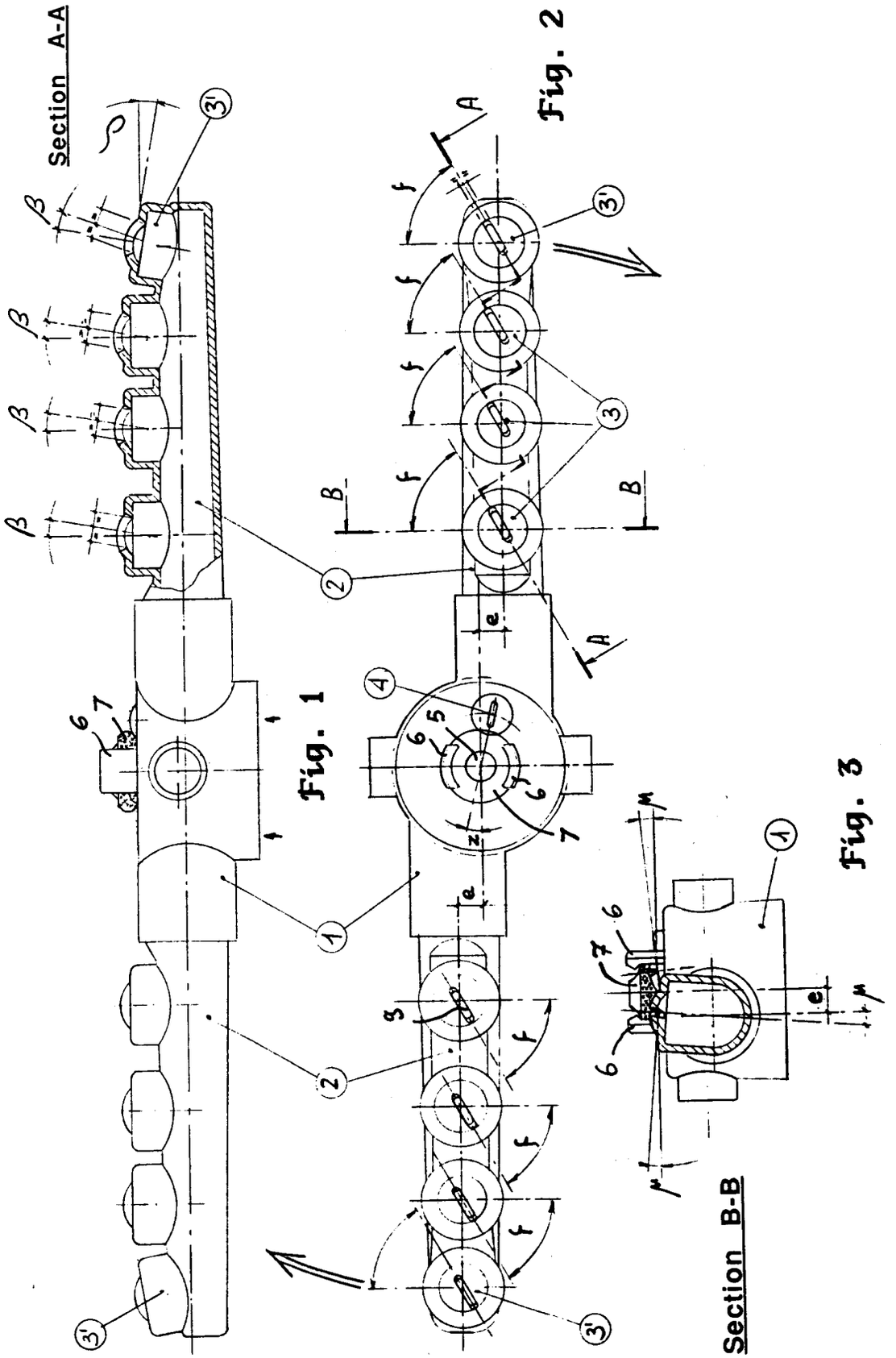
11. A rotational device for washing jets in dishwasher and dishwasher equipped with said device according to claim 1, characterized in that said arm:

- is made in plastic material,
- presents an axial holing (5) for the fixation with screw bolt means (7) to a rotation axis.

and over this axial holing (5) two opposite arcuate yielding resiliently wings with internal dent (6) that encapsulate and clamp and maintain in position the respective bolt head of said screw means (7) the clamping of said two dent wings being with opposite arch are realized in such a way to prevent the free extraction of the screw but sufficiently loose to allow the rotation of its in the arm (1).

12. A rotational device for washing jets in dishwasher and dishwasher equipped with said device according to claim 1, characterized in that said arm:

- is made in plastic material,
- presents an axial holing (5) for the fixation with screw bolt means (7) to a rotation axis and over the respective axial holing (5) protrudes upward two opposite clamping means (6) to clamp and maintain in position encapsulating the head of said bolt (7);
- said head bolt (7) being substantially knurled and cylindric;
- said two opposite wings are arcuate and
- have a respective dent realized in such a way to prevent the free axial exit of said ring (7) but sufficiently loose to allow rotation of the screw in the arm (1).


Section A-A
Section B-B
Fig. 1
Fig. 2
Fig. 3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 12 3066

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X,A	DE-A-1 628 547 (CONSTRUCTA-WERKE GMBH) * the whole document *	1,2,3,9,4, 11,12	A 47 L 15/23
X,A	DE-A-1 428 349 (ROBERT BOSCH GMBH) * the whole document *	1,2,3,5-7	
A	DE-A-3 246 460 (BOSCH-SIEMENS HAUSGERÄTE GMBH) * figure 1 *	11,12	
A	US-A-3 458 136 (J. BELAIEFF) * the whole document *	4,10	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

A 47 L

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	25 July 91	KELLNER F.M.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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