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(71) Applicant: **SMEG S.p.A.**
**Guastalla (Reggio Emilia) (IT)**

(72) Inventor: **Bertazzoni, Roberto**
**Guastalla (Reggio Emilia) (IT)**

(74) Representative: **Adorno, Silvano et al**
**c/o SOCIETA' ITALIANA BREVETTI S.p.A.**
**Via Carducci, 8**
**20123 Milano (IT)**

## (54) Revolving sprinkling assembly for dishwashers, provided with horizontal reciprocating motion

(57) An orbital sprinkling assembly for dishwashers includes a pair of sprinklers (4) each of which is centrally pivoted on a vertical shaft (3) located at one end of a supporting arm (2), which is in turn centrally pivoted on a vertical feed duct (1) through which water under pressure is fed. The revolving of the sprinklers (4) is synchronized so as to generate an oscillation of the arm (2), and the amplitude of said horizontal reciprocating motion of the arm (2) is limited by a pair of stops (7).

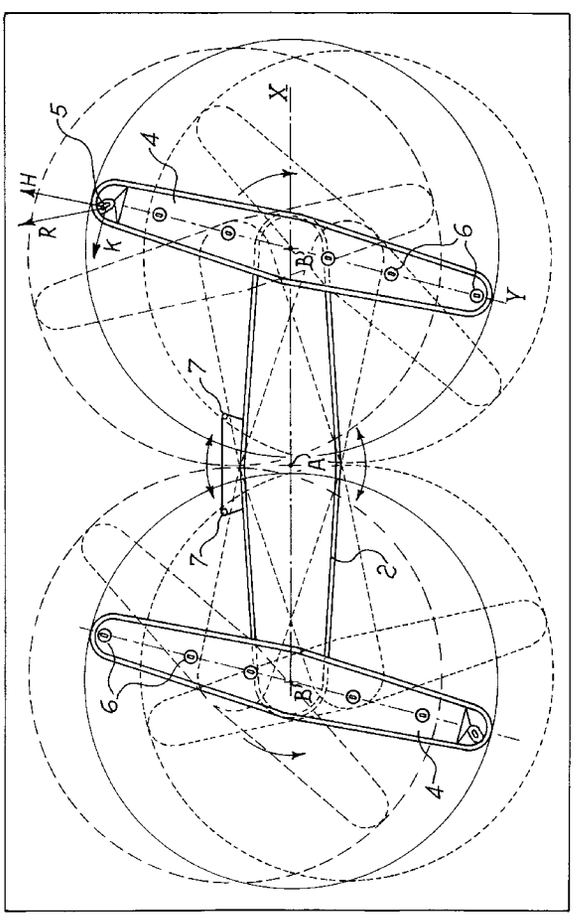


Fig.1

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## Description

The present invention relates to revolving sprinkling assemblies for dishwashers, and in particular to an orbital sprinkling assembly provided with a synchronized reciprocating motion in the horizontal plane.

It is known that conventional revolving sprinklers essentially consist of a single device pivoted on a vertical axis central shaft and provided with at least one propulsion nozzle at one end, as well as with other nozzles arranged along said device to sprinkle the dishes contained in the dishwasher basket. Since the rotation axis of said device is fixed, the resulting paths of the nozzles consist in circumferences centered on the rotation axis.

From this follows that the above-mentioned device sprinkles always and only the surfaces of the dishes which are along said circular paths, with a limited washing effectiveness. Moreover, the area which can be reached by the water ejected from the nozzles approximately corresponds to the area of the square circumscribed about the circular path of the outermost nozzle.

The first aspect of the problem has already been dealt with and effectively solved by the applicant through a revolving sprinkling assembly of orbital type. Such an orbital sprinkler covers a much greater surface of the dishes thanks to the combination of the motion of a lower supporting arm with that of a pair of upper revolving sprinklers mounted in an eccentric position at the ends of the lower supporting arm, yet retaining the same dimension of a conventional sprinkler.

However, this effective solution does not allow to reach an area greater than the above-mentioned one, i. e. it can be usefully applied only in the case of a dishwasher whose washing space has a substantially square plan.

Therefore, the object of the present invention is to provide an orbital sprinkling assembly which overcomes the above-mentioned limitations of prior art sprinklers.

This object is achieved by means of a sprinkling assembly having the characteristics cited in claim 1.

The main advantage of the sprinkling assembly according to the present invention is its capacity of directly sprinkling all the dishes even when they are arranged in a rectangular washing space.

A further advantage of the present sprinkler is given by the synchronization of the revolving motion of the two sprinklers which also generates the reciprocating motion. In this way, in fact, the orbital sprinkling assembly is balanced and the resulting overall motion is very regular.

These and other advantages and characteristics of the sprinkling assembly according to the present invention will be apparent to those skilled in the art from the following detailed description of a preferred embodiment thereof with reference to the annexed drawings wherein:

Fig.1 is a schematic top plan view showing the extreme positions reached by the sprinkling assembly according to the invention;

Fig.2 is a partially sectional schematic front view of the sprinkling assembly of fig. 1; and

Fig.3 is an enlarged sectional view of the coupling mechanism for the synchronization.

In said figures 1 and 2, there is seen that the present sprinkling assembly essentially consists of a vertical feed duct 1, at the top of which a horizontal supporting arm 2 is centrally pivoted and carries at each end a vertical shaft 3, on which a sprinkler 4 is in turn centrally pivoted as it will be explained further on. This sprinkler 4 has a reduced size with respect to the supporting arm 2, i.e. half of its length is shorter than the distance between its rotation axis B and the rotation axis A of arm 2. This is apparent from the top plan view of fig.1, wherein the three circles which indicate the paths of the ends of a sprinkler 4 in the central position (shown in continuous line) and in the two extreme positions of the reciprocating motion (in broken lines) do not overlap those of the other sprinkler 4.

Said horizontal reciprocating motion is generated by sprinklers 4 themselves due to the effect of the distance between the axes of rotation A and B. In fact, the water under pressure passes through duct 1, arm 2 and shaft 3 and reaches each sprinkler 4, which revolves due to the effect of at least one propulsion end nozzle 5. The inclined jet of said nozzle 5 generates a reaction force R which can be broken up into a first component H along the Y axis of sprinkler 4 and a second component K along a direction perpendicular thereto. While this second component K is the one which generates the revolution of sprinkler 4 around axis B, the component H is discharged on shaft 3 located on the X axis of the supporting arm 2. This results, therefore, in a horizontal rotation of said arm 2 around axis A, moving alternately from right to left and backwards according to the revolution of sprinklers 4, i.e. according to the direction from which the components H arrive on shafts 3.

Obviously, sprinkler 4 also includes washing nozzles 6 which however do not give any contribution to the motion since their jets are substantially vertical. It should be noted that the propulsion nozzles 5 also have a washing function, since their jets also have a vertical component. Furthermore, their characteristics (number, position, orientation, etc.) define the revolving speed of sprinklers 4 and therefore also the frequency and reciprocating speed of the supporting arm 2.

In order to prevent that the horizontal shifting of arm 2 is excessive, thus leading sprinklers 4 to hit the walls of the washing space, it is advisable to provide end stops 7 which define the amplitude of the travel of arm 2. Said stops 7 simply consist of vertical pins secured to the floor of the washing space in such a position as to obtain a wider or narrower oscillation of arm 2 according to the ratio between the sides of the rectangular washing space.

In order to achieve a balanced sprinkling assembly provided with a uniform motion, the revolution of the two sprinklers 4 is synchronized so as to sum the rotation moments generated by the pushing forces of components H at the ends of arm 2. This synchronization is achieved by mutually connecting sprinklers 4 through a drive shaft 8 located inside the supporting arm 2.

As better shown in the enlarged view of fig.3, shaft 8 is provided at each end with a conical gear 9 which engages a similar conical gear 10 located at the base of a revolving support 11 mounted on shaft 3. The removable sprinkler 4 is mounted on shaft 3 through a socket 12 which is inserted within support 11 and externally snapped onto the base thereof. The mutually parallel position of sprinklers 4 (see fig.1) is assured by a proper tooth 13 of socket 12, which is inserted into a reference notch formed on support 11. It is clear that the synchronization can be achieved by means of any mechanical arrangement equivalent to the one described above.

In the illustrated embodiment, the two sprinklers 4 are different only in having the propulsion nozzles 5 oriented in opposite directions, so that one of sprinklers 4 revolves clockwise and the other one counterclockwise (see fig.1). However, it is possible to change the synchronization mechanism so as to have two identical sprinklers 4 revolving in the same direction.

It should be noted that the illustrated embodiment concerning an orbital sprinkling assembly secured to the floor of the washing space for sprinkling the lower basket has a merely exemplificative purpose, since the same structure can be applied upside-down above the upper basket by securing it to the ceiling of the washing space. Similarly, the end stops 7 can be made in any suitable way, even adjustable if required.

## Claims

1. An orbital sprinkling assembly for dishwashers including a pair of sprinklers (4) each of which is provided with at least one propulsion nozzle (5) and centrally pivoted on a vertical shaft (3) located at one end of a supporting arm (2), which is in turn centrally pivoted on a vertical feed duct (1) through which water under pressure is fed, characterized in that the revolving of said sprinklers (4) is synchronized by means of a coupling mechanism, and in that the amplitude of the resulting horizontal reciprocating motion of the supporting arm (2) is limited by a pair of stops (7).

2. A sprinkling assembly according to claim 1, characterized in that the synchronization mechanism consists of a drive shaft (8) located inside the supporting arm (2) and provided at each end with a conical gear (9) which engages a similar conical gear (10) located at the base of a revolving support (11) mounted on the shaft (3) of the relevant sprinkler (4), said sprinkler (4) being mounted on said shaft (3) through a socket (12) which is inserted within the support (11) and externally snapped onto the base thereof, the mutually parallel position of the sprinklers (4) being assured by a proper tooth (13) which is inserted into a reference notch formed on the support (11).

3. A sprinkling assembly according to claim 1 or 2, characterized in that the propulsion nozzles (5) are oriented in opposite directions, so that one of the sprinklers (4) revolves clockwise and the other one counterclockwise.

Fig.1

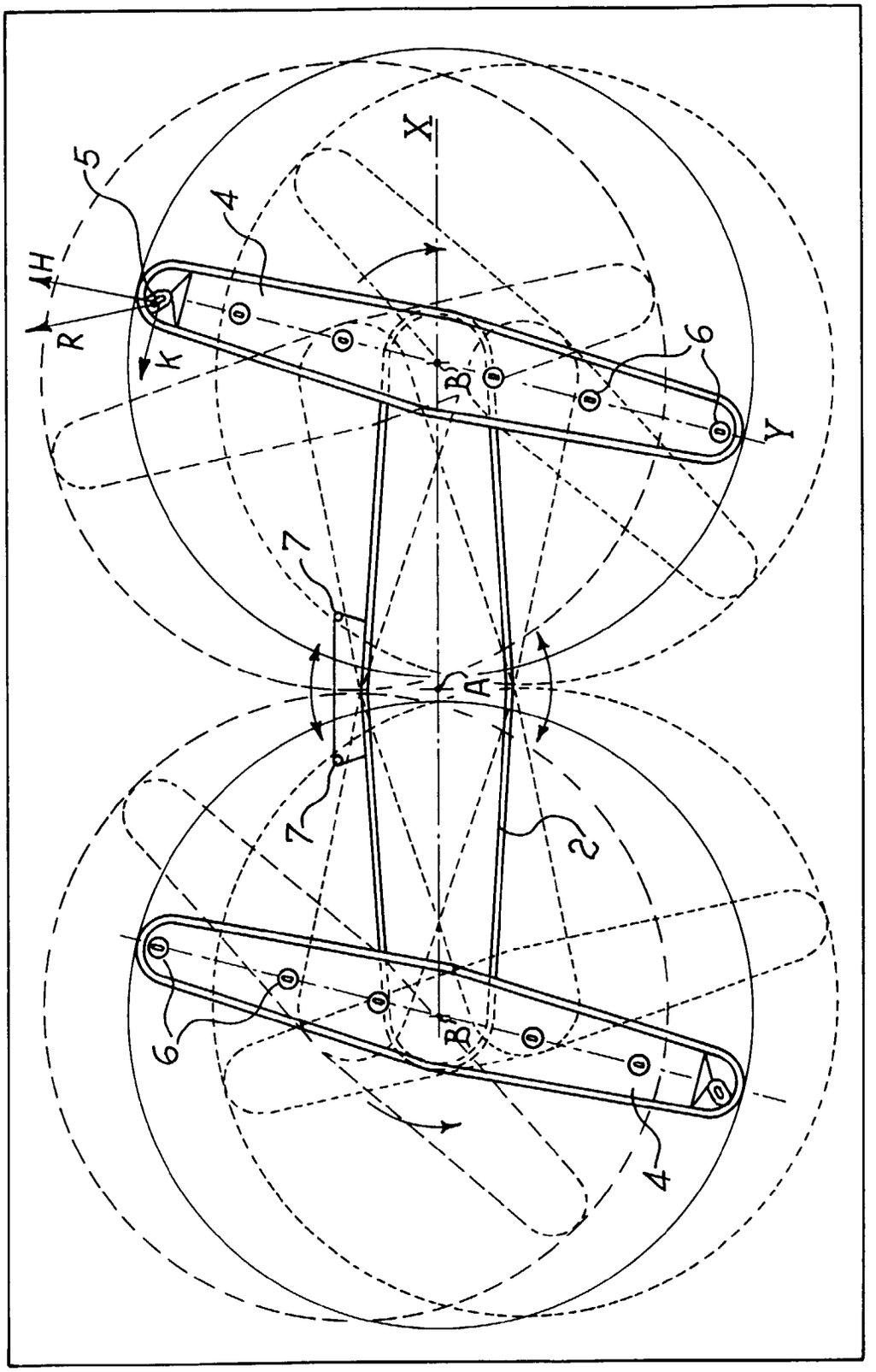

Fig.2

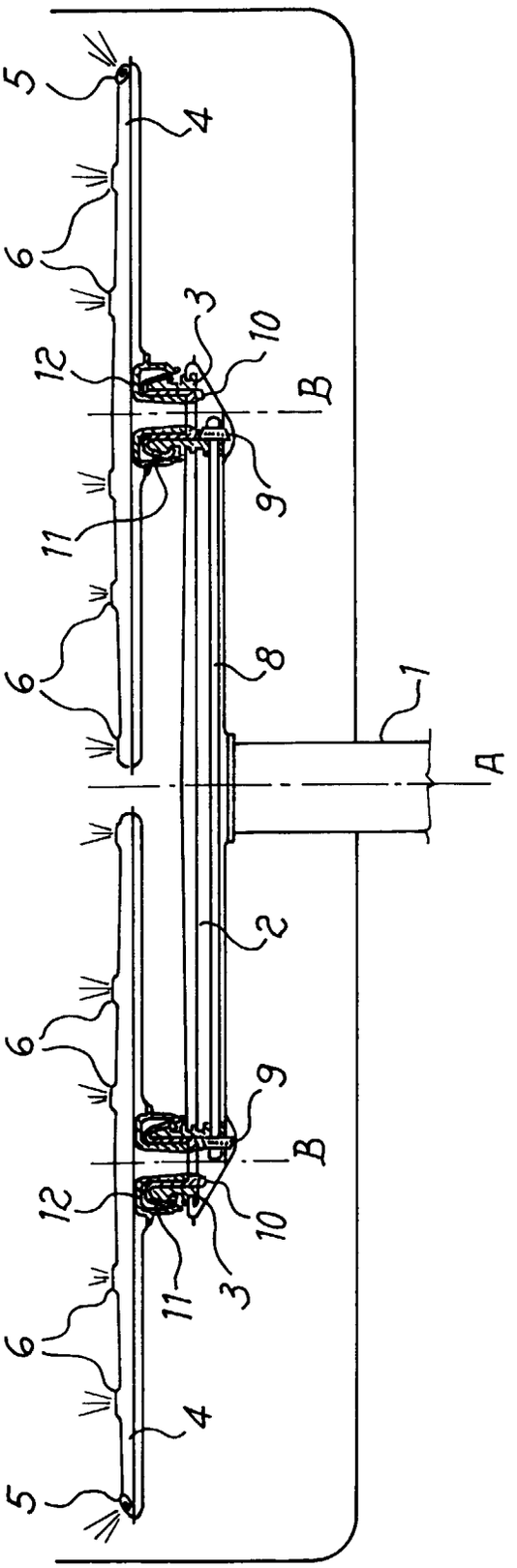

Fig.3