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(54) Dishwasher with detergent container and brightener container associated with a movable tray thereof

(57) A dishwasher (1) comprises a tub (3) containing at least one removable tray (6, 7) for supporting kitchenware (14) to be washed, washing means (9, 10, 15) for feeding water jets towards said kitchenware (14), pipes (11, 12, 16) for feeding water to said wash means (9, 10, 15), and means (17) for feeding water to said pipes, said tray (6, 7) comprising an element (23) able to contain sufficient detergent for implementing at least one operating stage of the dishwasher (1). The tray (6, 7) also supports the container (24) for the usual brightener which is not however provided with electrical means for feeding the brightener into the tub, said feed being achieved instead by mechanical means (38) operationally associated with said container (24).

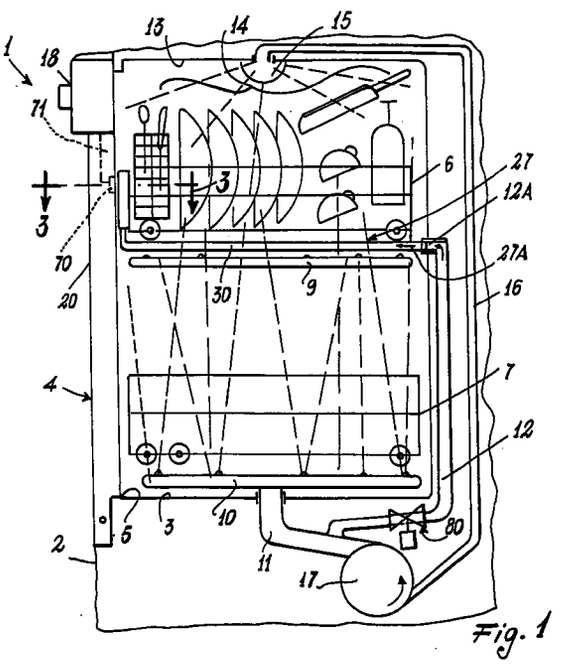

Fig. 1

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Description

This invention relates to a dishwasher in accordance with the introduction to the main claim.

Dishwashers are known comprising a detergent container associated with one of their trays, said detergent being able to be fed into the tub during at least one particular operating stage of the dishwasher.

EP-A-0517015 describes a dishwasher comprising a tray with which there is associated a container-dispenser for the detergent, which is fed into the tub specifically during the kitchenware prewash stage. However this prior patent indicates that the dishwasher is still provided with the traditional detergent container-dispenser which, in known manner, is usually positioned on the tub access door.

Consequently in the known arrangements the tub access door is provided internally with containers for the detergent and brightener. As a result, there must be provided within the door structure the necessary members to enable the usual detergent container closure element to be opened when this is required by the particular operating stage of the dishwasher. There must also be provided within this structure the necessary members for feeding a controlled quantity of brightener into the tub.

Because of the presence of said members (and the usual electrical feed and activation cables), the door structure of commercially available dishwashers is of relatively considerable thickness, and in any event penalizes the useful tub volume. As a result, the dimensions of the trays are also necessarily limited, to the detriment of their loading capacity.

An object of the present invention is to provide a dishwasher which obviates the drawbacks of known dishwashers and which, in particular, has a tub with a useful volume greater than these latter.

A further object is to provide a dishwasher in which each of its trays has a greater loading capacity than the trays of similar know dishwashers.

A further object is to provide a dishwasher of the stated type into which the detergent and brightener can be fed in a simple and rapid manner.

A further object is to provide a dishwasher of the stated type which is of reliable use.

These and further objects which will be apparent to the expert of the art are attained by a dishwasher in accordance with the accompanying claims.

The present invention will be more apparent from the accompanying drawing, which is provided by way of non-limiting example and in which:

Figure 1 is a schematic cross-section through a dishwasher according to the invention;

Figure 2 is a schematic perspective view of a detail of Figure 1; and

Figure 3 is a section on the line 3-3 of Figure 1.

With reference to said figures, a dishwasher is indicated overall by 1 and comprises a cabinet 2, an internal tub 3, and a door 4 positioned on an aperture 5 providing access to the tub 3. In this latter there are provided trays 6 and 7 movable in known manner along usual guides (not shown) present in the tub 3 and arranged to support kitchenware to be washed. Usual rotors 9 and 10 are provided to feed water jets towards the trays, said rotors being fed via pipes 11 and 12 respectively. On the roof 13 of the tub 3 there is provided a further diffuser 15 for water fed via a pipe 16. This latter and the pipes 11 and 12 are at least partially positioned external to the tub 3 within the cabinet 2, and are connected to a usual pump 17. The dishwasher 1 also comprises usual operation control members 18 for example positioned on the outside 20 of the door 4.

A detergent container 23 and a brightener container 24 are associated with the (upper) tray 6, preferably with that side 22 thereof facing the door 4. These containers, preferably positioned one to the side of the other, are provided with their own closure elements 25, for example cooperating with the respective container by screwing. Other fastener devices are however possible for fastening each element 25 to its container.

More specifically, the detergent container 23 is connected to the pipe 12 via a pipe 27 associated with the container 6 and movable therewith. The pipe 27 can be removably connected watertightly in known manner, for example by a snap connector, to the pipe 12. In this manner the container can also be removed from the tub 3 and then reinserted into it, while still obtaining a watertight connection between the free end 27A of the pipe 27 and the free end 12A of the pipe 12 such as to be able to feed to the container 23 a sufficient quantity of water for the purpose indicated hereinafter.

From the container 23 there extends a second pipe 30 terminating in the rotor 9.

The container 24 is used for containing the brightener, as stated.

It comprises an internal cavity 24A of suitable known shape such as to enable the closure element 25 to be removed from it without the liquid (brightener) contained in it being able to escape (obviously while maintaining the tray 6 in position on the relative guides - not shown - or parallel to itself). The closure element has a body 33 comprising usual seal members 35 (only one of which is shown in Figure 3) and a threaded portion 36 arranged to cooperate with a suitable seat in the container 24. The closure element 25 comprises means 38 for expelling the brightener from said container.

More specifically, the expulsion means 38 comprise a member 40 movable against a spring 41 within a seat 42 provided in the body 33 of the closure element 25. This movable member comprises a first widened end 43 supporting a magnetic body 45 of known polarity and facing the door 4, said end 43 cooperating with the spring 41 located in the seat 42 and resting with its free end 47 on a step 48 of this seat. From this latter there extends a duct 50 which communicates with the cavity 24A of the container 24.

Within this duct there moves a stem 51 of the member 40 which terminates in a second widened end 53 of this latter. Usual seal members are associated with said member 40, such that when the element 25 closes the container 24, escape of the brightener from this latter is prevented.

Prom the cavity 24A of the container 24 there extends a duct 56 opening on the outside of the container 24 and containing a one-way valving member 57. This member comprises for example a substantially mushroom-shaped element 59 movable against a spring 60 positioned within a widened portion 62 of the duct 56. The element 59 comprises a stem 63 movable within an end portion 66 of said duct, but of lesser cross-section than this latter. The widened head 67 of the element 59, this head being subjected to the action of the spring 60, closes an initial portion 69 of the duct 56 (with reference to the cavity 24A) when no brightener flows from the container 24.

To achieve this, on that surface or face 69 of the door 4 facing the tub 3 there is provided an electromagnet 70 powered via a cable 71 connected to the aforesaid control members 18. Said electromagnet is of small overall size, and its presence does not result in a noticeable increase in the thickness of the door 4, which in any event is much narrower than the doors of known dishwashers.

The pipe 12 is provided with a valve member 80 opened and closed under the control of the members 18 on the basis of the actual operating stage of the dishwasher. Finally, to the side of the containers 23 and 24 there is provided a compartment 88 for cutlery or for small objects to be washed.

The described dishwasher 1 is used in the following manner. It will be assumed that the dishwasher is to carry out a complete wash, ie including prewash. It will also be assumed that the detergent and brightener have been placed in the containers 23 and 24.

Under these conditions, after switching on the dishwasher the valve 80 remains closed so as to feed water only to the (lower) rotor 11 and to the diffuser 15. A prewash stage is then carried out without using detergent. The said operating condition is maintained even when the dishwasher is only rinsing the kitchenware positioned on the trays 6 and 7.

After the prewash stage, the valve 80 is opened and the pump 17 also feeds water to the pipe 12. This water reaches the pipe 27 and penetrates into the container 23 to remove therefrom the detergent present in it. The water with detergent then reaches the upper rotor 9 and is fed into the tub 3 to achieve optimum distribution of the detergent and complete washing of the kitchenware.

The electromagnet 70 is electrically powered during the use of the dishwasher in accordance with the requirements for feeding the brightener. By this means and by suitably arranging the poles which form in said electromagnet, a repulsive force is generated on the magnet 45 which causes the member 40 to move against the spring 41 within the seat 42. The end 53 of this member penetrates into the cavity 24A to generate a pressure on the liquid contained in it. This pressurized liquid passes into the duct 56 and presses against the valving member 57. This moves within the portion 62 of the duct 56 against the spring, its head 67 opening the portion 69 of said duct. The brightener is hence able to pass from the cavity 24A into the portion 62 and then through the portion 66 of the duct to pass into the tub 3. In accordance with known operating requirements (or in accordance with a usual preset wash program), power to the electromagnet ceases and the member 40 returns to its rest position under the action of the spring 41. In this manner, pressure on the liquid in the cavity 24A of the container 24 ceases and by virtue of the force exerted by the spring 60 on the valving member 57, this latter recloses the duct 56. Brightener feed into the tub 3 hence ceases.

By virtue of the invention, the useful space for arranging the trays 6 and 7 is greater than in known dishwashers, and the dishwasher of the invention has a likewise greater loading capacity.

Moreover, as the door 4 no longer has to comprise special members as in known dishwashers, it can be constructed of plastics material with obvious advantages in terms of production and lightness of the dishwasher.

One embodiment of the invention has been described. Others are however possible without leaving the scope of the present document.

Claims

1. A dishwasher (1) comprising, closed by a door (4), a tub (3) containing at least one removable tray (6, 7) for supporting kitchenware (14) to be washed, washing means (9, 10, 15) for feeding water jets towards said kitchenware (14), pipes (11, 12, 16) for feeding water to said wash means (9, 10, 15), and means (17) for feeding water to said pipes, said tray (6, 7) comprising a seat or container (23) able to contain sufficient detergent for implementing at least one operating stage of the dishwasher (1), characterised in that said tray (6, 7) comprises a further seat or container (24) for the usual brightener, mechanical means (38) being provided operationally associated with said further seat (24) for expelling the brightener and feeding it into the tub (3).

2. A dishwasher as claimed in claim 1, characterised in that the mechanical means (38) are a member (40) movable relative to the brightener seat (24) and arranged to create, in a cavity (24A) of this latter in which said brightener is placed, a pressure able to expel said brightener from said seat.

3. A dishwasher as claimed in claim 2, characterised in that the movable member (40) is subjected to the force of a spring (41) which opposes its movement.

4. A dishwasher as claimed in claim 2, characterised in that the movable member supports a magnetic element (45) of known polarity facing the door (4) and arranged to cooperate with an electromagnet (70) positioned on said door, said electromagnet (70) being powered in known manner during a particular operating stage of the dishwasher (1) so as to generate a magnetic force acting on the magnetic element (45) such as to cause the movable element (40) to move, with the expulsion of a metered quantity of brightener.

5. A dishwasher as claimed in claim 2, characterised in that the cavity (24A) in the brightener seat (24) communicates with the tub (3) via a duct (56) provided with a one-way valving member (57).

6. A dishwasher as claimed in claim 1, characterised in that the detergent seat or container (23) is connected to an inlet pipe (27) able to be removably connected in a watertight manner to one (12) of the water feed pipes (11, 12, 16), from said seat (23) there also extending an outlet pipe (30) connected to the wash means (9) associated with the tray (6, 7), said inlet pipe (27) carrying the water into said seat (23) so as to remove the detergent therefrom and feed it to the wash means (9).

7. A dishwasher as claimed in claim 6, characterised in that a controllable valve (80) is positioned in the water feed pipe (12) connected to the inlet pipe (27) to the detergent seat (23) in order to interrupt water flow to said seat during particular operating stages of the dishwasher.

8. A dishwasher as claimed in claim 1, characterised in that the detergent and brightener seats (23, 24) are of such a form as to enable them to be loaded with said products while maintaining the tray (6,7) within the tub (3) or in a position analogous to that assumed in this latter.

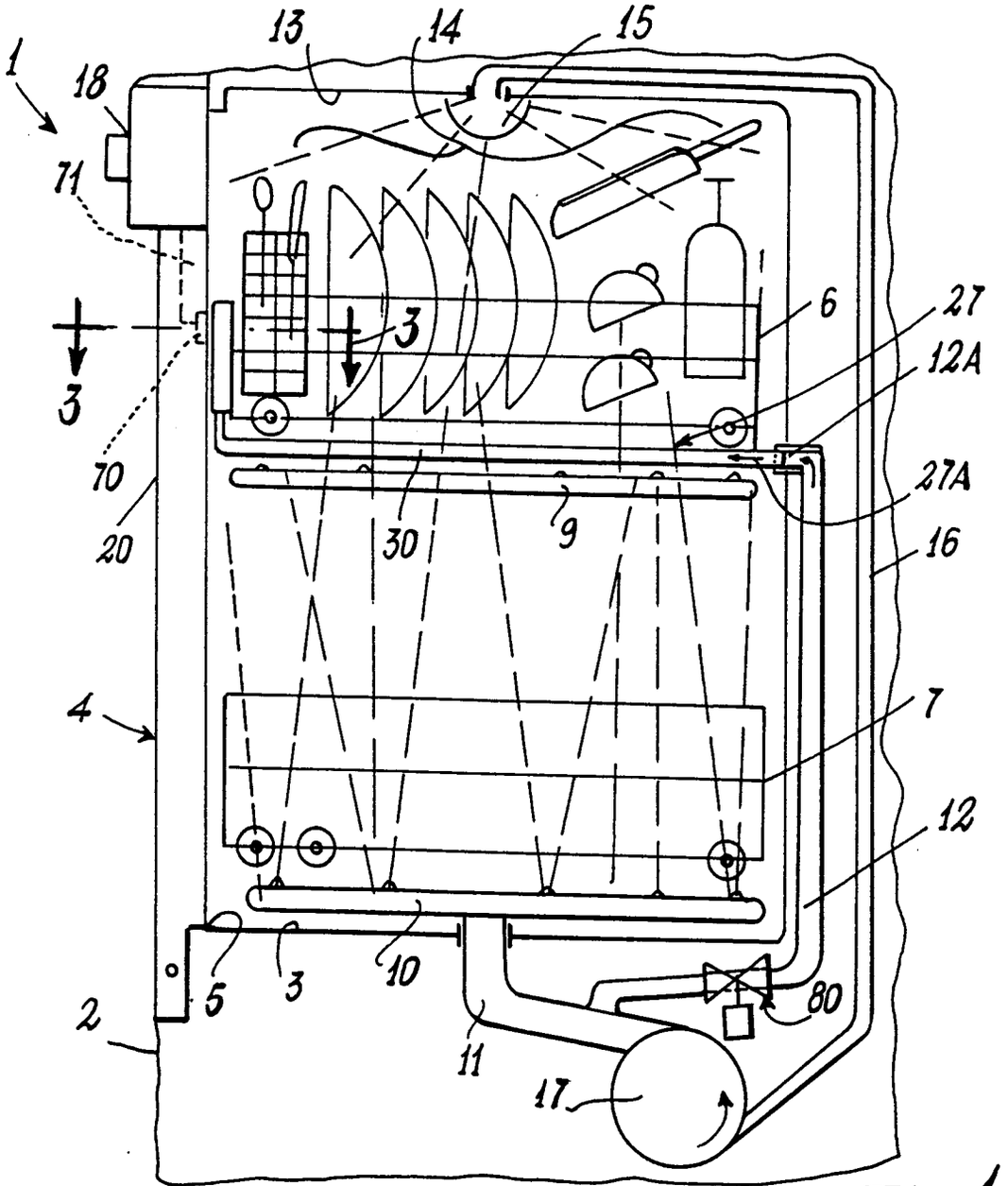

Fig. 1

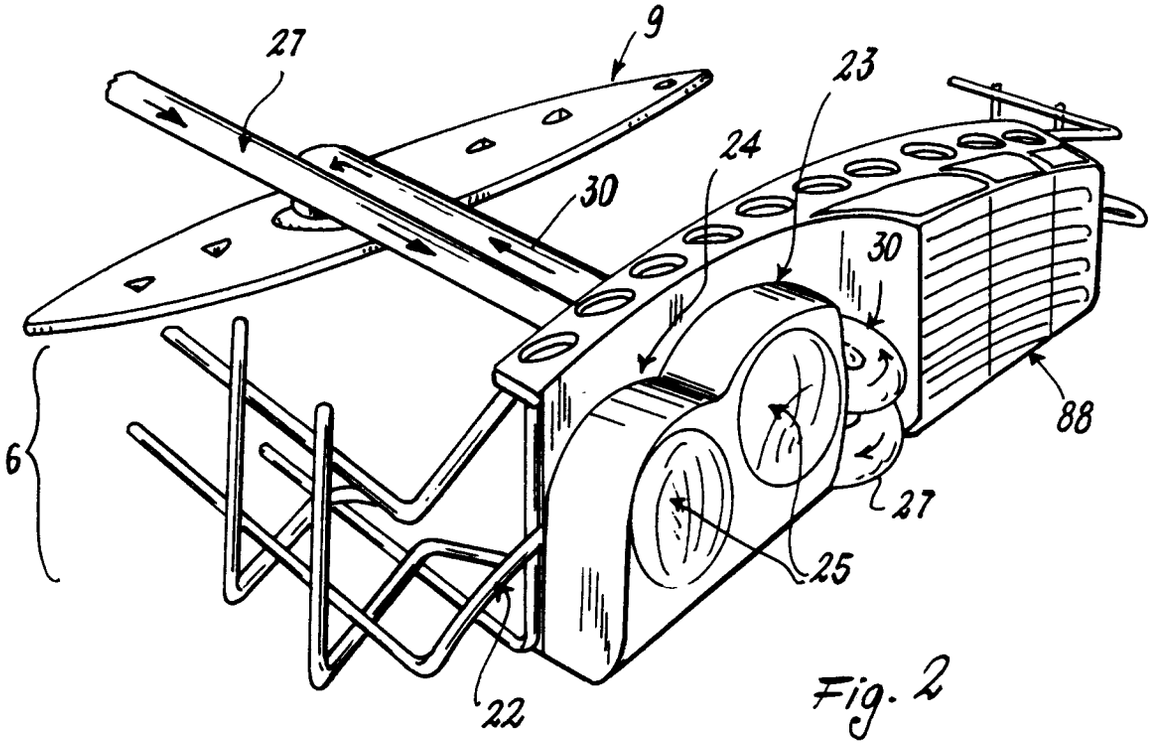
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Fig. 2

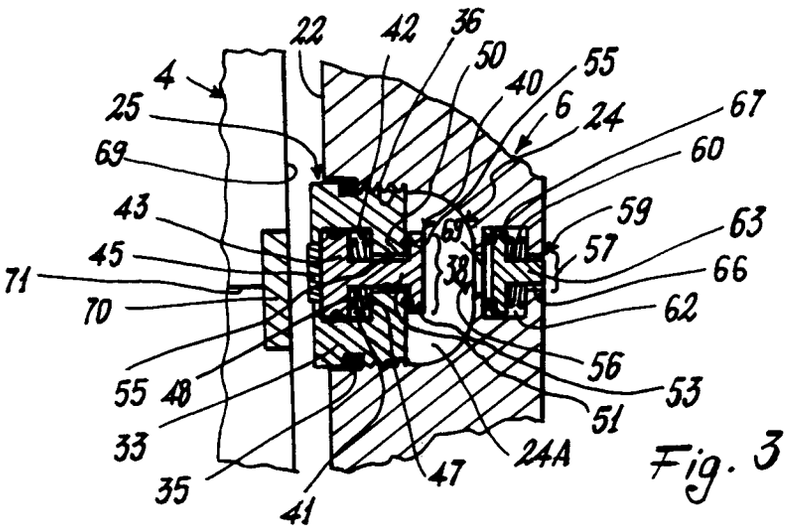
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Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 95 11 1877

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.6)
D,A	EP-A-0 517 015 (ZANUSSI ELETTRODOMESTICI SPA) * abstract; claims; figures *	1	A47L15/44
A	US-A-2 895 646 (G.J. FEDERIGHI) * column 2, line 33 - line 62; figures *	1	
A	US-A-2 552 852 (J.G. IDLE) * column 3, line 44 - column 4, line 55; figures *	1	
A	US-A-2 671 037 (E.S. STODDARD) * column 5, line 27 - column 6, line 40; figures 2-6 *	1	
A	GB-A-1 040 925 (BULPITT & SONS LTD)		

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	15 December 1995	Vanmol, M

CATEGORY OF CITED DOCUMENTS

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