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2,861,581

DISHWASHING MACHINE WITH DETERGENT DISPENSER

Filed July 24, 1957

3 Sheets-Sheet 1

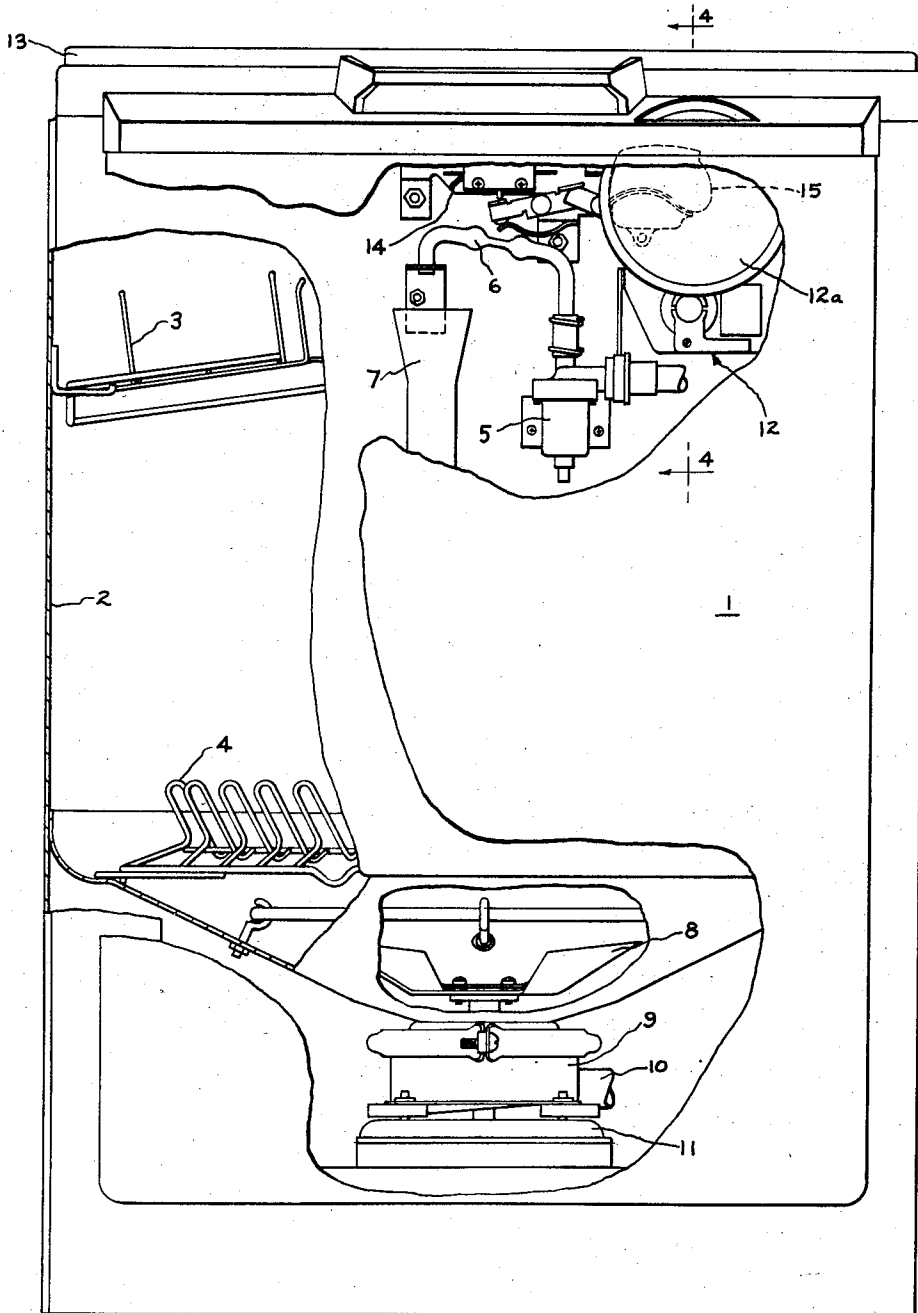


FIG. 1

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FIG. 2

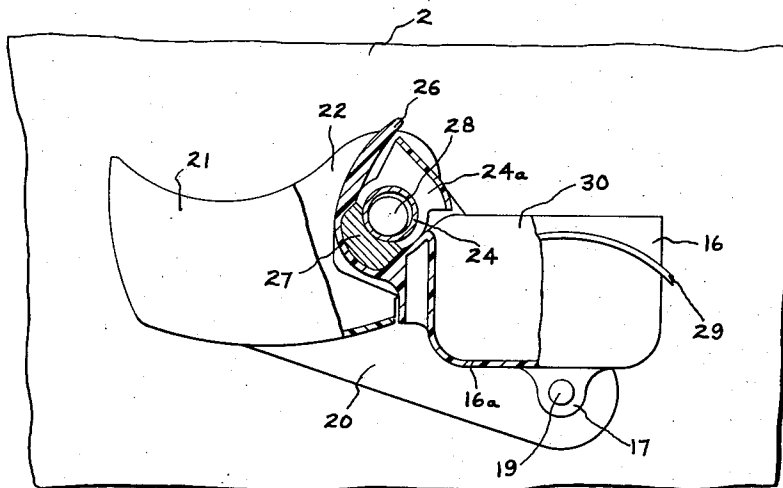
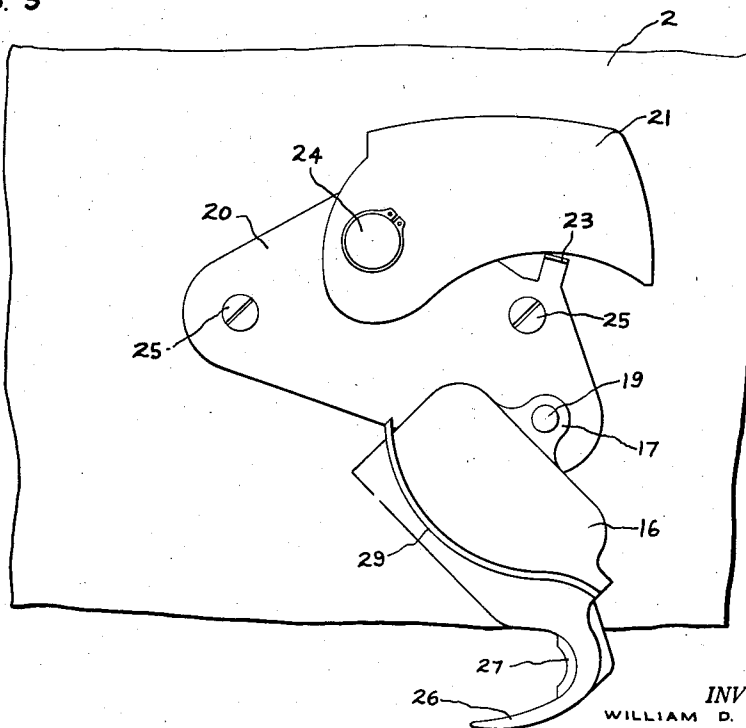


FIG. 3



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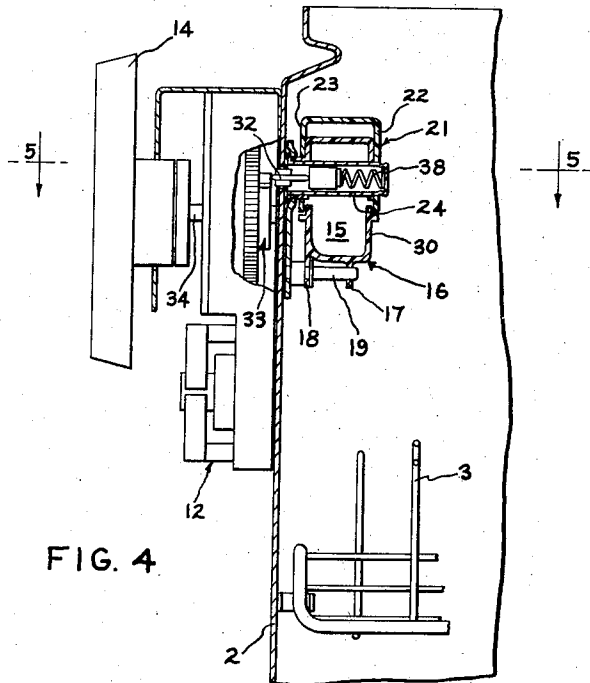


FIG. 4

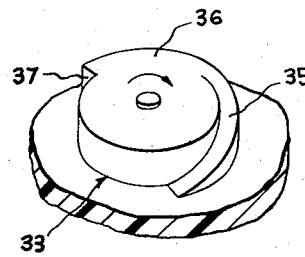


FIG. 6

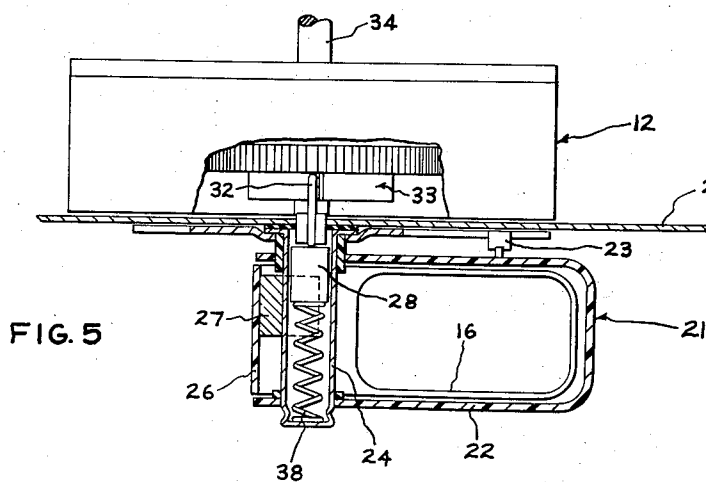


FIG. 5

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DISHWASHING MACHINE WITH DETERGENT DISPENSER

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Application July 24, 1957, Serial No. 673,894

10 Claims. (Cl. 134—58)

This invention relates to washing machines, and more particularly to a dishwasher including means for automatically introducing a charge of detergent or the like into the washing compartment.

A principal object of this invention is to provide a washing machine including an improved and simplified detergent dispenser suitable for automatic operation.

Another object of this invention is to provide a washing machine including a detergent dispenser having magnetic actuating means.

Another object of this invention is to provide an automatic dishwasher including a magnetically actuated detergent dispenser controlled by a sequence timing device.

Further objects and advantages of the invention will become apparent as the following description proceeds, and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

Briefly stated, in accordance with one aspect of this invention there is provided a detergent container pivotally mounted within a washing machine tub for movement between an upright position and an inverted position by the force of gravity, permanent magnet means for supporting the container in its upright position, and means for disabling the magnet means so as to allow the container to pivot to its inverted position.

For a better understanding of this invention reference may be made to the following description and the accompanying drawing in which:

Fig. 1 is a front elevation view, with some of the parts broken away, of a dishwasher embodying the present invention.

Fig. 2 is a front elevation view, with some of the parts broken away, of the detergent dispenser of the present invention mounted within a dishwasher tub.

Fig. 3 is similar to Fig. 2 but shows the parts in another position.

Fig. 4 is a sectional view taken along the line 4—4 in Fig. 1.

Fig. 5 is a sectional view taken along the line 5—5 in Fig. 4.

Fig. 6 is an enlarged perspective view of one of the parts of the mechanism shown in Fig. 4.

Referring to Fig. 1 of the drawing, there is shown a dishwasher designated by the numeral 1 having an enclosed washing compartment or tub 2 of generally rectangular configuration in which is mounted an upper rack 3 and a lower rack 4 arranged to support dishes or the like during washing operations. Dishwasher 1 is provided with a water inlet valve 5 adapted to be connected to a water supply system, a water inlet conduit 6, and a fill funnel 7 communicating with the interior of tub 2. Located at the bottom of the tub 2 and arranged to circulate washing fluid throughout the washing compartment is a rotary impeller 8. A drain pump 9 having an inlet communicating with tub 2 and an outlet connected to drain conduit 10 is supported beneath the tub, the housing of pump 9 being arranged to support an electric

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motor 11 which drives the impeller 8 so as to circulate fluid in the tub when rotating in one direction, and to operate pump 9 so as to discharge fluid through conduit 10 when driven in the other direction. This washing impeller and drain pump arrangement is the invention of Russell M. Sasnett and Lauren W. Guth, and is more fully described and claimed in application Serial Number 671,070, filed July 10, 1957 and assigned to the assignee of the present application. Automatic operation of dishwasher 1 is effected by a timer control assembly, generally designated by the numeral 12, arranged to control the energization of inlet valve 5 and motor 11 as well as the actuation of the detergent dispensing means of the present invention. Timer 12 includes a switch actuating rotary cam driven by a constant speed motor, such devices being well known in the art. Tub 2 has a top access opening which is closed by a hinged top cover 13 during washing operations, being held in closed position by a latch mechanism 14 which includes an interlock arrangement mechanically connected to rotary control member 12a of timer 12. This cover latch mechanism is disclosed and claimed in application Serial Number 670,400 filed July 8, 1957 by Melvin R. Kauffman and John A. Dickens, Jr., and assigned to the assignee of the present application.

A typical operating cycle of dishwasher 1 includes a number of rinsing, washing and drying steps which may comprise the following sequence, for example;

(1) A preliminary rinse in which the inlet valve 5 is opened to admit a predetermined quantity of water into the tub 2, impeller 8 is rotated by motor 11 for a short period of time (two minutes, for example) to circulate water within the tub, and finally motor 11 is reversed so as to operate drain pump 9 and discharge the first charge of washing fluid from the tub.

(2) Second preliminary rinse in which step 1 is repeated.

(3) A washing step, similar to steps 1 and 2 except that detergent is introduced into the water at the beginning of the step and the water is circulated in the tub for a somewhat longer period of time (5 or 6 minutes, for example).

(4) At least one and preferably three rinse steps similar to step 1.

(5) A drying step, in which air is permitted to circulate through the tub.

In accordance with the present invention, a detergent dispensing device generally designated by the numeral 15 is provided to effect introduction of detergent or other water conditioning materials into the washing compartment of a washing machine during a cycle such as that described above.

As best shown in Figs. 2 and 3 of the drawing, detergent dispenser 15 comprises a container 16, preferably made of a molded plastic material, pivotally mounted on the front wall of tub 2 for movement between an upright position (Fig. 2) and a discharge or dumping position (Fig. 3) by the force of gravity, for example. Thus, container 16 is provided with a pair of support lugs 17 and 18 (Fig. 4) projecting from the bottom wall 16a of the container in a laterally offset position with respect to its center of gravity, the lugs having aligned openings to accommodate mounting pin 19 secured to mounting plate 20. Also supported on the same wall of tub 2 is a cover 21, formed of molded plastic material, for example, pivotally mounted for movement between a position overlying container 16 (Fig. 3) and another position displaced from the container (Fig. 2). Cover 21 is provided with a hollow portion formed by side walls 22, and is pivotally mounted on hollow tube 24 which is secured to mounting plate 20. Mounting plate 20 is fixedly secured to the front wall of tub 2 in operative relationship with timer control assembly 12 by means

of screws 25, for example, and includes a stop portion 23 for supporting cover 21 when the latter is in the position shown in Fig. 3.

As best shown in Figs. 2 and 5, detergent container 16 includes a projecting portion 26 of curved configuration arranged to partially encircle tube 24, and a permanent magnet 27 fixedly secured to the inner surface of portion 26. Tube 24 on which cover 21 is pivotally mounted is made of non-magnetic material, such as brass, for example, and forms a housing for a movable magnet 28 arranged to magnetically attract magnet 27 when in one position (see Fig. 4) and to repel magnet 27 when in another position (see Fig. 5). If desired, tube 24 may be protected by a shield 24a which cooperates with portion 26 of container 16 to substantially enclose the tube when the dispenser is in position to be loaded with detergent (Fig. 2).

Thus, in accordance with this invention, detergent container 16 may be retained in its upright position by magnetic attraction between magnets 27 and 28 until it is desired to introduce detergent into the washing compartment at which time this may be effected by shifting magnet 28 from its attracting position to its repelling position. Inasmuch as container 16 is pivotally mounted at a point offset from its center of gravity and thus tends to rotate from the position shown in Fig. 2 to the position shown in Fig. 3, movement of magnet 28 to its repelling position permits the container to rotate to an inverted position, thus dumping the detergent contained therein into tub 2. In order to minimize entrance of water into detergent container 16 during preliminary rinsing operations, when the container and the cover 21 are in the positions shown in dotted lines in Fig. 1, there is preferably provided a sealing ledge 29 on the side walls 30 and end wall 31 of the container 16. It will be noted that ledge 29 is shaped so as to conform to the lower edges of the side walls of cover 21 and thus substantially prevents the entrance of water into the container.

In order to permit detergent dispenser 15 to be actuated at the desired time during a washing operation, means are provided for shifting magnet 28 from its attracting to its repelling position at the desired time during the washing cycle. Thus, in the illustrated embodiment of the invention there is provided a cam follower 32 axially aligned with magnet tube 24 and in engagement with one end of magnet 28. Cam follower 32 also engages a rotary cam 33 which is secured to and rotates with the main shaft 34 of timer control assembly 12. Cam 32 includes an inclined cam surface 35, a raised cam surface 36 and a drop-off ledge 37, each of which successively engages cam follower 32 as shaft 34 rotates during a timed washing operation. It will be evident that cam follower 32 will be maintained in the position shown in Fig. 4 during the interval when it engages cam surface 36 and that it will rapidly shift to the position shown in Fig. 5 as the follower passes over drop-off ledge 37. The force for this shifting movement is supplied by a compression spring 38 located in magnet tube 24 and arranged to compress magnet 28 against cam follower 32 which in turn is forced against cam 33. Thus it will be seen that during a complete rotation of cam 33, corresponding to a complete cycle of operation of dishwasher 1, cam follower 32 rests on surface 36 at the beginning of the preliminary rinse step described above and remains on this surface until the beginning of the washing step at which time it passes over drop-off ledge 37, whereupon magnet 28 shifts to the repelling position shown in Fig. 5 and the contents of container 16 are discharged into the tub 2 as it rotates to its inverted position. As cam 33 continues to rotate cam follower 32 eventually rides up inclined surface 35 during the latter portion of the washing operation and is positioned on raised portion 36 at the completion of the washing operation so that magnet 28 is again in position to attract magnet 27 when the next washing operation is performed.

In describing the operation of the present invention it will be assumed that dishes to be washed have been placed on the racks 3 and 4 in tub 2 of the dishwasher, and that the machine has been prepared for washing operation by the connection of the inlet side of inlet valve 5 to a suitable hot water supply and the connection of drain conduit 10 to the waste pipe of a plumbing system. At the completion of each washing operation, the parts will be in the position shown in Fig. 3 of the drawing, and accordingly the first step in preparing the detergent dispenser for operation is rotation of container 16 from its discharge position to upright position whereupon the parts will be in the position shown in Fig. 1, magnets 27 and 28 providing the force holding container 16 in position. Next the cover 21 is rotated to its displaced position as shown in Fig. 2 and the detergent or other water conditioning material is placed in container 16, it being understood that it is still retained in its upright position by magnetic attraction between magnets 27 and 28. If it is desired to add an additional charge of detergent or other water conditioning material to the first preliminary rinse, a measured quantity may be added by pouring it into the hollow portion of cover 21 so that it will be immediately discharged into tub 2 as the cover is rotated to its closed position shown in Fig. 3. After cover 21 is closed, the container and cover of dispenser 15 are in the position shown in broken lines in Fig. 1, and thus the detergent in container 16 is protected from the water circulated in tub 2 during the preliminary rinse steps. Upon energization of the dishwasher by means of timer 12, cam 33 is rotated in the manner previously described, and at the beginning of the wash step cam follower 32 passes over drop-off ledge 37, whereupon magnet 28 shifts to its repelling position and container 16 pivots from its upright position to the inverted discharge position shown in Fig. 3, thus introducing a charge of detergent into the washing compartment.

While I have shown and described a specific embodiment of my invention, I do not desire the invention to be limited to the particular construction disclosed, and I intend by the appended claims to cover all modifications within the true spirit and scope of my invention.

What I claim is:

1. A washing machine comprising a tub, a container including a bottom wall for supporting detergent and the like within said tub, means for movably mounting said wall within said tub for movement between a supporting position and a discharge position, permanent magnet means for supporting said wall in its supporting position solely by magnetic force, and means for disabling said magnet means so as to allow said wall to move to its discharge position.
2. A washing machine as defined in claim 1 in which said magnetic means includes a first magnet element fixedly secured to said wall, and a second magnet element movably mounted on said tub in cooperating relation with said first magnet element, and said disabling means includes means for moving said second magnet element from a first position in which said wall is supported in its supporting position by magnetic attraction between said magnet elements to a second position in which said magnetic attraction is insufficient to support said wall.
3. A washing machine as defined in claim 1 including a cover for said container pivotally mounted on said tub for movement between a first position overlying said container and a second position displaced from said container.
4. A washing machine as defined in claim 3 in which said cover includes a hollow portion adapted to hold a quantity of detergent or the like when in its displaced position.
5. A washing machine comprising a tub, valve means for controlling the admission of water to said tub, means for rapidly circulating water within said tub, an open top

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container for detergent and the like within said tub, means for pivotally mounting said container within said tub for movement between an upright position and a dumping position, a first magnet element secured to said container, a second magnet element movably mounted on said tub in cooperating relation with said first magnet element, means for moving said second magnet element from a first position in which said container is supported in its upright position by magnetic attraction between said magnet elements to a second position in which said magnetic attraction is insufficient to hold said container in its upright position, and timer means adapted to control the sequence of operation of said valve means, said water circulating means and said magnet moving means.

6. A washing machine as defined in claim 5 in which said second magnet element is supported in a non-magnetic housing extending within said tub, said magnet moving means includes a cam follower projecting into said housing in engagement with said second magnet element, and said timer means includes cam means for actuating said cam follower.

7. A washing machine as defined in claim 6 including a cover for said container pivotally mounted on said housing for movement between a first position overlying said container and a second position displaced from said container.

8. A washing machine as defined in claim 5 in which said container mounting means includes a pivotal connection laterally offset from the center of gravity of said container, whereby said container is movable from its upright position to its dumping position by the force of gravity.

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9. A dishwashing machine comprising a tub adapted to contain dishes and the like, valve means for controlling the admission of water to said tub, means for rapidly circulating water within said tub, a container for detergent and the like within said tub, a support for said container including a mounting pin fixedly secured to said tub and a lug on the bottom of said container offset from the center of gravity thereof and pivotally connected to said mounting pin, a non-magnetic tube extending within said tub adjacent said container and overlying a portion thereof, a first magnet element secured to said portion of said container, a second magnet element supported within said non-magnetic tube for movement between a first position in which said container is supported in an upright position by magnetic attraction between said magnet elements and a second position in which said magnetic elements repel each other so that said container is free to pivot to an inverted position, timer means adapted to control the operation of said valve means and said water circulating means, and cam means operated by said timer means for actuating said second magnet between said first and second positions.

10. A dishwashing machine as defined in claim 8 including a cover for said container pivotally mounted on said non-magnetic tube for movement between a first position overlying said container and a second position displaced from said container.

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