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2,276,801

DETERGENT CUP FOR WASHING APPARATUS

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Fig. 1.

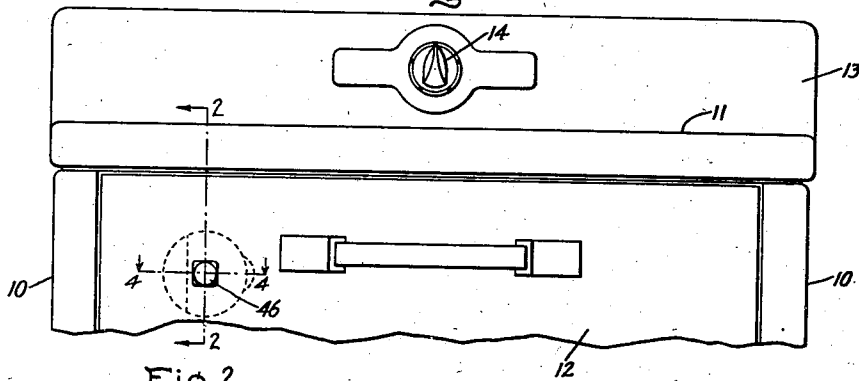


Fig. 2.

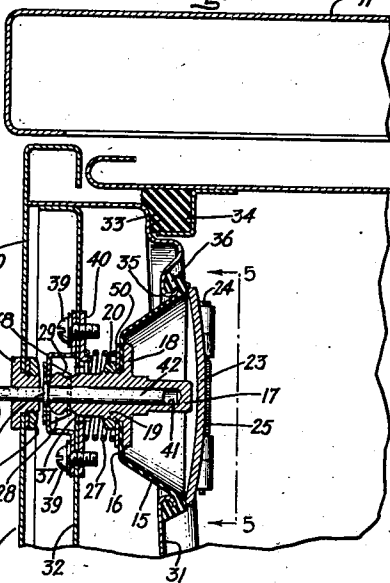


Fig. 3.

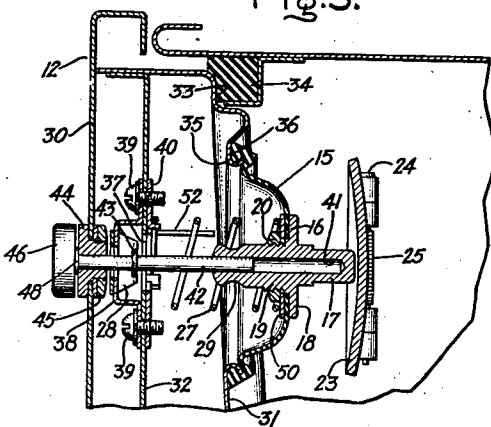


Fig. 4.

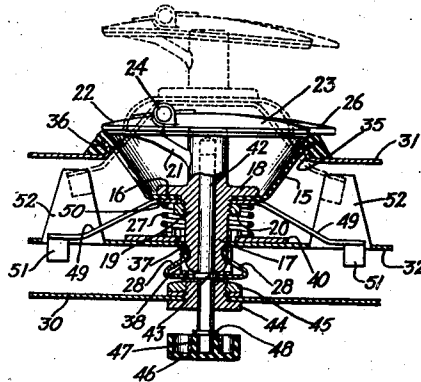
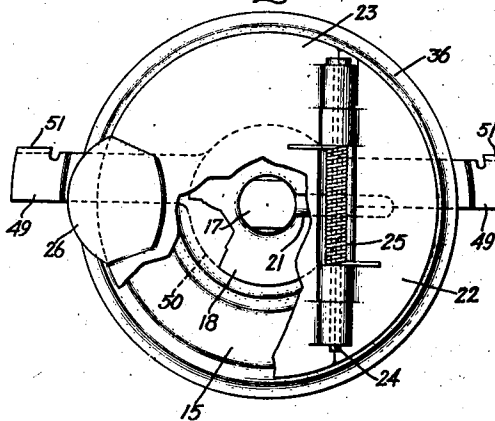


Fig. 5.



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UNITED STATES PATENT OFFICE

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DETERGENT CUP FOR WASHING APPARATUS

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10 Claims. (Cl. 141—9)

This invention relates to a detergent cup for washing apparatus and more particularly a detergent cup for use in a dishwashing apparatus and has for its object the provision of a new and improved arrangement by which a detergent may be added to a washing fluid without affecting the operation of the washing apparatus.

It is a further object of this invention to provide a new and improved detergent cup which is simple in construction, readily assembled, easily operated, and inexpensive to manufacture.

It is a further object of this invention to provide a new and improved detergent cup which may be mounted on one of the inner walls of the washing apparatus and operated to discharge a quantity of detergent into the apparatus without disturbing the contents of the washing apparatus.

It is a still more specific object of this invention to provide a new and improved detergent cup which is particularly adapted to be mounted on the door of a dishwashing apparatus and to be operated to discharge a quantity of detergent into the dishwashing apparatus without changing the position of the door.

In accordance with this invention there is provided a detergent cup which may be mounted on an inner wall or door of the washing apparatus. The detergent cup comprises a flexible diaphragm having a loading position in which the diaphragm defines a cup-like container to hold a quantity of detergent and a discharge position in which the diaphragm is collapsed to eject the quantity of detergent loaded thereon into the washing vat. A cover is provided for the diaphragm and this cover is provided with a movable portion through which detergent may be loaded into or discharged from the diaphragm. In accordance with this invention the diaphragm is biased to its collapsed position and is maintained in its extended position by means of suitable latch means which may be released when it is desired to supply the detergent to the washing apparatus.

For a more complete understanding of this invention reference should be had to the accompanying drawing in which Fig. 1 represents a fragmentary elevational view of a dishwashing apparatus with the new and improved detergent cup of this invention applied to the door thereof; Fig. 2 is a fragmentary sectional view taken on the line 2—2 of Fig. 1 showing details of the new and improved detergent cup assembly of this invention; Fig. 3 is a view similar to Fig. 2 showing the detergent cup in its discharge position; Fig. 4 is a fragmentary sectional view taken on the line 4—4 of Fig. 1 showing additional details of the detergent cup assembly, the assembly being shown in its loading position in full lines and in its discharge position in dotted lines; and Fig. 5 is a vertical view taken on the line 5—5 of Fig.

2 showing additional details of the detergent cup assembly of this invention.

Referring now to the drawing, it will be observed that the improved detergent cup assembly of this invention is shown applied to a dishwashing apparatus having side walls 10, a top wall 11 and a front opening type door 12, the door forming a portion of one wall of a washing vat. Provided at the back of the top wall 11 is a backsplasher plate 13 upon which is mounted a suitable control device 14 for controlling the cycle of operation of the dishwashing apparatus.

While I have shown my improved detergent cup assembly applied to a dishwashing apparatus it is to be understood that this showing is merely for the purposes of illustration for my improved assembly may be readily applied to other types of washing apparatus, e. g., clothes washing apparatus, when it is desired to have means for supplying a quantity of detergent to the apparatus without reopening the machine.

Referring to Figs. 2-5, it will be observed that my improved detergent cup assembly comprises a diaphragm 15 which is preferably of a flexible rubber-like material. This diaphragm is constructed so as to have a loading position, shown in Fig. 2, in which it is extended to define a cup-like receptacle and a discharge position, shown in Fig. 3 in which it is inverted to eject the detergent loaded therein when it is in the position shown in Fig. 2. Included in the diaphragm is a relatively flat wall portion 16 which is provided with a suitable opening through which extends a bushing 17. This bushing is provided with a flange 18 which lies on one side of the wall 16 and a threaded portion 19 which lies on the opposite side of the wall 16 and receives a nut 20. In securing the bushing to the diaphragm its threaded end is first inserted through the opening in the diaphragm and the nut then tightened to compress the adjacent portion of the wall 16 between the nut 20 and the flange 18. Provided on one end of the bushing 17, the right-hand end as viewed in Figs. 2 and 3, is an arm 21 to which is secured a cover plate which is adapted to engage the outer periphery of the diaphragm as shown in Fig. 2. This cover plate is provided with a fixed portion 22 and a movable portion 23 which is hinged to the fixed portion by means of the hinge pin 24. A torsion spring 25 (see Fig. 5) is provided for biasing the movable portion of the cover to the closed position and a projection 26 is provided on the movable portion to facilitate opening this portion to supply a quantity of detergent to the diaphragm when it is in the position shown in Fig. 2.

In order to bias the diaphragm to its collapsed or discharge position shown in Fig. 3, there is provided a compression spring 27 which as shown in Figs. 2 and 3 surrounds the left-hand end of

the bushing 17 and lies between the wall 16 of the diaphragm and a fixed support described below.

In order to hold the diaphragm in its extended or loading position against the force of the spring 27, there is provided a pair of resilient latch arms 28 which are adapted to snap over the adjacent end of the bushing 17 and into a circumferential groove 29 provided at this end of the bushing.

In actuating the parts described thus far, the diaphragm is moved to the left as viewed in Fig. 2 until the arms 28 snap into the groove 29. The diaphragm will then be in its loading position and will define a cup-like member as shown in Fig. 2. When in this position and the door 12 in a horizontal position, the movable portion 23 of the cover plate can be raised and a specific quantity of detergent placed in the diaphragm. When this loading is completed the cover portion 23 will spring closed under the influence of spring 25 and the detergent will be held in place irrespective of the position of the door. When it is desired to discharge the detergent it is merely necessary to release the latch arms 28. In the modification shown this is accomplished by pressing inwardly on the bushing 17, thereby causing the arms to be moved out of the groove 29. The diaphragm 15 is then moved to its inverted position, shown in Fig. 3, under the force of the spring 27. Simultaneously the cover plate is moved outwardly away from the periphery of the diaphragm. Thus, the detergent contained in the diaphragm will be forcibly discharged therefrom.

As previously mentioned, the new and improved detergent cup of this invention is illustrated as applied to a dishwashing apparatus and in particular a dishwashing apparatus of the front opening type. With such apparatus the detergent cup is mounted on the door 12 which is constructed so as to have an outer wall 30, an inner wall 31 spaced from the outer wall and a reinforcement plate 32 mounted between the inner and outer walls. Provided at the edge of the inner wall is a flange portion 33 which is adapted to engage a gasket 34 provided at the top and side walls of the dishwasher vat so as to seal the front opening when the door 12 is closed.

In order to mount the detergent cup assembly on the door 12 there is provided in the inner wall 31 an opening having a reversely turned edge portion 35. This edge portion is adapted to extend into a preformed flange portion 36 provided on the outer periphery of the resilient diaphragm 15. In mounting the diaphragm on the inner wall, the bushing and the portion of the diaphragm secured thereto are inserted through the opening and the flange 36 is then snapped over the reversely turned edge portion 35. Thus the diaphragm is firmly yet removably secured to the inner wall.

Provided in the reinforcement plate 32 is an opening 37 into which the latching end of the bushing 17 is adapted to extend when the diaphragm 15 is in its extended or loading position. Mounted on one side of the reinforcement plate so as to overlie the opening 37 is a bracket 38 to which the resilient arms 28 are secured. The bracket 38 is secured to the plate 32 by means of screws 39 which extend through the plate and are threaded into screw plate 40. Besides serving as the fastening plate for screws 39, it will be observed in Figs. 2-4 that the plate 40 also functions as the bearing plate for the left-hand

end (Figs. 2 and 3) of compression spring 27. When the detergent cup assembly is in the position shown in Fig. 2 it will be apparent that the right-hand end of the assembly is supported by the wall 31 and the left-hand end by the resilient arms 28.

In order to support the bushing 17 when the diaphragm is moved to the discharge or inverted position shown in Fig. 3 and also to provide means for releasing the latch arms from outside the front wall 30, the bushing 17 is provided with a centrally located aperture 41 which extends substantially throughout the length of the bushing. Telescopically received in the aperture 41 is one end of a push rod 42. This push rod is provided intermediate its ends with a collar 43 which is adapted to engage the end surface of the bushing 17. The end of the push rod opposite the end received in the aperture 41 is adapted to extend outwardly through the front wall of the door 12 and to provide a bearing for this end, a bushing 44 is secured in the surface 30 by means of a nut 45. The outermost extremity of the push rod is provided with a button type knob 46 which is adapted to be held in position on the rod by means of a suitable spring 47. In order to prevent the push rod from being drawn through the bushing 44 a second collar 48 is removably mounted thereon as shown in Figs. 2 and 4.

To prevent the diaphragm from being unduly stressed when it is moved from its extended to its inverted position, a pair of strain relief arms 49 is provided which is adapted to engage the reversely turned edge 35 of the opening provided in the inner wall 31 when the diaphragm is moved outwardly under the influence of the spring 27 (see Fig. 4). These arms are integrally formed on a collar 50 as shown in Fig. 5 and this collar is securely clamped between the nut 20 and the surface 16 of the diaphragm as shown in Fig. 4. These strain relief arms are preferably made from some suitable resilient metallic material. Provided at the outer extremity of each arm is a depending flange 51 each of which is adapted to engage a flange 52 struck up from the reinforcement plate 32. These flanges 51 and 52 prevent relative rotation of the strain relief arms and thus prevent loosening of the nut 20 during the operation of the cup assembly.

In assembling my improved detergent cup to the door 12, the latch member with its arms 28 is first secured to the bracket 38 by some suitable means such as welding and the bracket is secured to the reinforcement plate 32. Next the bushing 17 with the cover plate secured thereto, the diaphragm 15, and the strain relief arms 49 are assembled as a unit and nut 20 tightened to hold the elements in their assembled relation. The biasing spring 27 is then slipped over the left-hand end of the bushing 17 and the entire left-hand portion of the assembly projected through the opening in the wall 31 an amount sufficient to permit the latch arms 28 to engage the groove 29. Since the strain relief members 49 are made of resilient material they may be bent an amount sufficient to permit their insertion through the opening provided in the wall 31. With the elements thus positioned the flanged portion 36 of the diaphragm is snapped over the turned back edge portion 35. Prior to the projection of the cup assembly through the opening in the wall 31 the push rod 42 will have been assembled in the bushing 44 and this bushing attached to the

front surface of the door. Thus in projecting the assembly through the opening in the wall 31 the right-hand end of the push rod 42 will be inserted in the opening 41 in the bushing 17. The last operation is to mount the knob 46 on the projecting end of the push rod and to secure the collar 48 on the push rod so as to prevent its left-hand end from being lost in the bushing 44 during operation of the detergent cup.

In considering the operation of the improved detergent cup arrangement of this invention as applied to a dishwashing apparatus, it will be assumed that the door 12 of the dishwashing apparatus is open and that the component elements of the detergent cup assembly are in the position shown in Fig. 3. The first operation is to press downwardly on the cover plate so that the latch arms 28 are snapped into the groove 29 to hold the diaphragm in its extended or loading position shown in Fig. 2. When in this position the diaphragm is adapted to receive and hold a quantity of detergent. The operator then supplies this detergent by raising the movable portion 23 of the cover plate and after the detergent has been loaded in the diaphragm, the movable portion 23 of the cover plate will be moved to its closed position under the influence of the spring 25 so that the charge of detergent is maintained in the diaphragm. With the detergent cup assembly thus loaded the door member 12 may be closed and the washing cycle begun. In most dishwashing cycles the first operation is a rinse operation and no detergent is required. However, detergent is required for the washing operation which usually immediately follows the rinse operation and when this point is reached in the washing cycle the operator need only press the button 46 which causes the collar 43 to engage the end surface of the bushing 17 to move the latch members 28 out of engagement with the groove 29 on the bushing. Thus the diaphragm assembly is released and it is moved to the right, as shown in Fig. 3, or upwardly as shown in Fig. 4, under the influence of the compression spring 27. This movement continues until it is restricted by engagement of the strain relief arms 49 with the edge 35 of the opening in the inner wall 31, as shown in dotted lines in Fig. 4. This movement is sufficient to invert the diaphragm completely, as shown in Fig. 3, and the detergent contained in the diaphragm is discharged into the washing apparatus. After completion of the washing cycle the door 12 may be opened and the detergent cup recharged as described above.

It is to be particularly observed that with the improved detergent cup arrangement of this invention detergent may be supplied to the washing apparatus at the proper time in the washing cycle without interrupting the cycle and particularly without opening the door 12. It is to be further observed from the foregoing detailed description that there is provided a detergent cup assembly which is simple yet rugged in construction, easy to assemble and operate, and inexpensive to manufacture.

While the improved detergent cup of this invention has been illustrated and described as applied to a dishwashing apparatus and particularly a dishwashing apparatus of the front opening type, it is to be understood it is of more general application and may be applied to any type of washing apparatus. Moreover, while only one modification of this invention has been described, it is to be understood that it is not to be limited thereto since many modifications may be made.

It is, therefore, contemplated to cover by the appended claims any such modifications as fall within the true spirit and scope of this invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a washing apparatus, a washing vat having a wall provided with an aperture, a detergent cup comprising a flexible diaphragm supported on said wall so as to cover said aperture, said diaphragm having an extended position in which it defines a cuplike member for the reception of a quantity of detergent and an inverted position in which the detergent placed on said diaphragm when said diaphragm is in said first mentioned position is discharged into said washing vat, a cover member adapted to engage the outer periphery of said diaphragm so as to form a closure for the cup portion defined by said diaphragm when it is in said extended position, and means for moving said cover member away from said periphery when said diaphragm is moved to said inverted position.

2. A detergent cup for supplying a quantity of detergent to a washing apparatus comprising a flexible diaphragm supported at its periphery, said flexible member having one position in which it defines a cuplike receptacle for receiving a quantity of detergent and a second position in which any detergent contained in said diaphragm in said first position is completely discharged therefrom, means for moving said diaphragm to said position in which any detergent contained therein will be discharged therefrom, and means for latching said diaphragm against movement to said discharging position.

3. A detergent cup for supplying a quantity of detergent to a washing apparatus comprising a resilient cup member movable between a position in which it holds a quantity of detergent and a position in which a quantity of detergent contained therein is discharged, a cover for said resilient cup having a movable portion through which detergent may be supplied to said cup, means for biasing said resilient cup to said position in which detergent contained therein will be discharged therefrom, and means for latching said cup against the force of said biasing means in said position in which detergent may be contained therein.

4. In a washing apparatus, a washing vat having a wall provided with an aperture, a detergent cup comprising a flexible diaphragm supported on said wall so as to cover said aperture, said diaphragm having an extended position in which it defines a cuplike member in which a quantity of detergent may be placed and an inverted position in which the quantity of detergent placed in said cuplike member will be discharged therefrom, means for biasing said diaphragm to its inverted position, means for latching said diaphragm in its extended position, means for releasing said latch means, and means for relieving strains on said diaphragm when said diaphragm is moved from its extended to its inverted position under the influence of said biasing means.

5. In a washing apparatus, a washing vat having a wall provided with an aperture, a detergent cup comprising a flexible diaphragm supported on said wall so as to cover said aperture, a bushing mounted on said diaphragm in the central portion thereof, a cover support mounted near one end of said bushing, a cover mounted on said cover support, said cover having a rela-

tively movable portion through which detergent may be supplied to said diaphragm, a resilient member biasing said diaphragm to a position in which detergent loaded therein will be discharged, and manually operated latch means for restraining said biasing means and holding said diaphragm in position to form a cup for holding a quantity of detergent.

6. A detergent cup for supplying a quantity of detergent to a washing apparatus comprising a flexible diaphragm supported at its outer periphery, said diaphragm having one position in which it defines a cuplike member for receiving a quantity of detergent and a second position in which it is inverted so that any detergent contained therein is discharged therefrom, a cover member adapted to engage the outer periphery of said diaphragm so as to form a closure for the cup portion defined by said diaphragm when it is in said first mentioned position, a movable portion on said cover member through which a quantity of detergent may be supplied to said diaphragm, means biasing said diaphragm to its inverted position, means latching said diaphragm in its cuplike position against the force of said biasing means, means for releasing said latch means, and resilient means for limiting the inversion of said diaphragm so as to prevent said diaphragm from being pulled loose at its peripheral support.

7. In a washing apparatus, a washing vat having a wall provided with an aperture, a detergent cup comprising a flexible diaphragm supported on said wall so as to cover said aperture, said diaphragm having a loading position in which it defines a cuplike member in which a quantity of detergent may be loaded and a discharging position in which it is inverted so that any detergent contained therein will be discharged therefrom, a bushing centrally mounted on said diaphragm, a cover member mounted on said bushing and adapted to enclose the cuplike volume when said diaphragm is in its loading position, a movable portion on said cover member through which a quantity of detergent may be loaded on said diaphragm, said movable portion being biased to its closed position, means for biasing said diaphragm to its discharging position, means for latching said diaphragm in its loading position against the force of said last mentioned biasing means, and means operable from the exterior of said vat for releasing said latching means manually so as to cause the quantity of detergent placed in said diaphragm to be discharged into said washing vat.

8. In a washing apparatus, a washing vat having a wall provided with an aperture, a detergent cup comprising a flexible diaphragm supported on said wall so as to cover said aperture, said diaphragm having a loading position in which a quantity of detergent may be placed therein and a discharging position in which any detergent in said diaphragm will be ejected therefrom, a bushing centrally mounted on said diaphragm so as to have end portions projecting in opposite directions from said diaphragm, a cover support mounted on the end portion of said bushing lying nearest said edge of said diaphragm, a cover mounted on said support and having a movable portion through which a quantity of detergent may be loaded into said diaphragm, a spring adapted to bias said diaphragm to its discharging position, latch means engaging the opposite end of said bushing to hold said

diaphragm in its loading position against the force of said spring, manually operated means for releasing said latch member, and means secured to said bushing for preventing undue stressing of said diaphragm when it is moved to its discharge position.

9. In a washing apparatus, a washing vat having a wall portion formed by a pivotally mounted door, said wall portion having an aperture therein, a detergent cup comprising a flexible diaphragm supported on said wall portion so as to cover said aperture, said diaphragm having a loading position in which it defines a cuplike member for receiving a quantity of detergent and a discharging position in which said cuplike form is inverted to discharge the detergent held thereby, a bushing mounted in said diaphragm, a member mounted on one end of said bushing and engaging the outer periphery of said diaphragm so as to form a cover therefor, said member having a movable portion through which detergent may be supplied to said diaphragm, a groove provided on the opposite end of said bushing, means surrounding said opposite end of said bushing and engaging a portion of said diaphragm so as to bias said diaphragm to its discharging position, means adapted to be supported on said door so as to engage said groove on said bushing to latch said diaphragm in its loading position against the force of said biasing means and a push rod having one end adapted to be telescopically received in said bushing and its opposite end adapted to extend through said door for manually releasing said latch means to cause said diaphragm to be moved from its loading position to its discharging position.

10. In a dishwashing apparatus, a pivotally mounted door member having an outer wall and an inner wall and a reinforcing plate lying intermediate said outer and inner walls, said inner wall having an opening therein provided with a reversely turned edge portion, a resilient diaphragm having a bead at its outer periphery adapted to engage said reversely turned portion and be supported thereby, a bushing extending through the central portion of said diaphragm, means for securing said bushing to said diaphragm, a member mounted on one end of said bushing so as to engage the outer surface of said bead to form a cover for said diaphragm, said member including a movable portion by which a quantity of detergent may be supplied to said diaphragm, a coil spring surrounding the opposite end of said bushing and lying between said reinforcing plate and said diaphragm so as to bias said diaphragm to a collapsed position in which detergent contained therein will be discharged therefrom, latch means secured to said reinforcing plate adapted to engage said opposite end of said bushing to restrain the movement of said diaphragm to its inverted position under the influence of said biasing spring, a plunger having one end telescopically received in said bushing and its opposite end extending through said outer wall of said door, means on said plunger adapted to engage said bushing so as to force said bushing out of engagement with said latch means, and a knob mounted on the outwardly projecting portion of said plunger adapted to be manipulated to operate said latch means.

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