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April 4, 1939. V. W. CUNNINGHAM 2,153,238

METHOD OF AND APPARATUS FOR WASHING RECEPTACLES SUCH AS TUMBLERS AND THE LIKE

Filed May 14, 1932 2 Sheets-Sheet 1

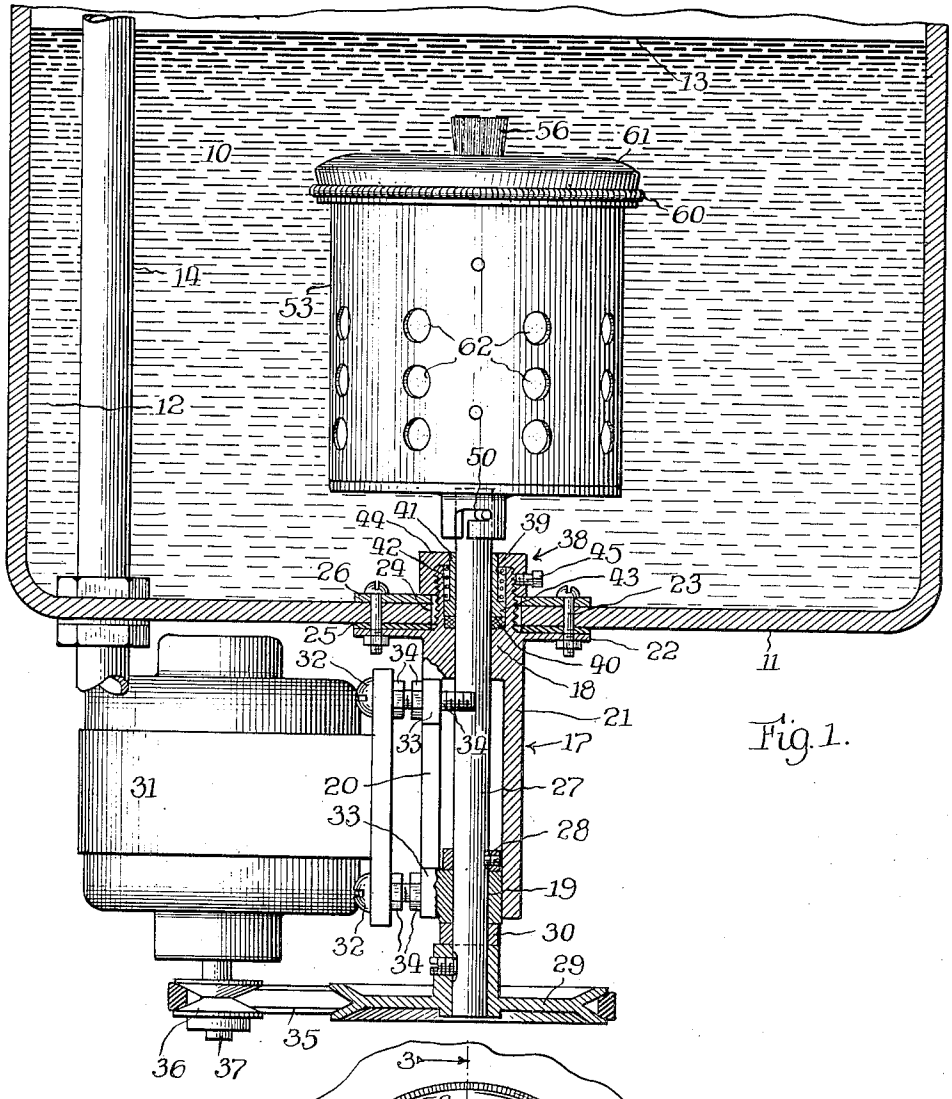
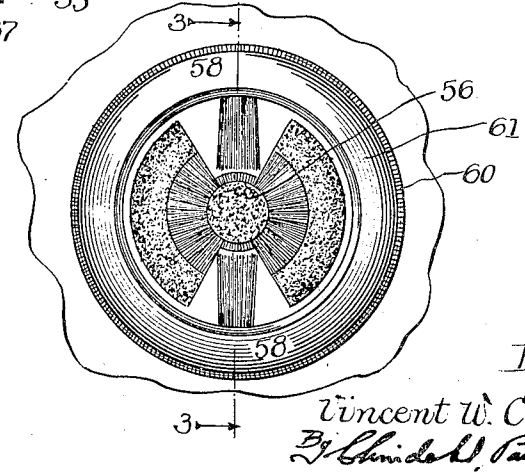


Fig. 1.

Fig. 2.



Inventor:
Vincent W. Cunningham,
By Schmidt, Pahlen & Bauer
Attys.

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Filed May 14, 1932 2 Sheets-Sheet 2

Fig. 3.

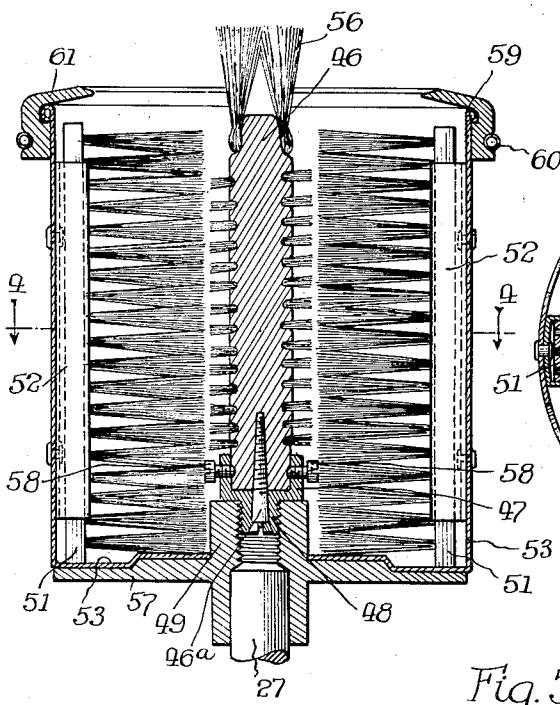


Fig. 4.

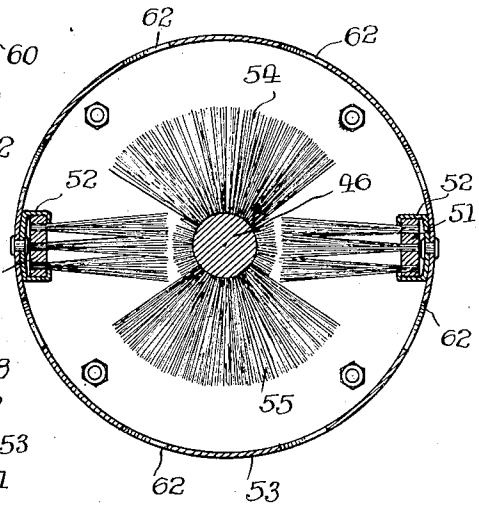
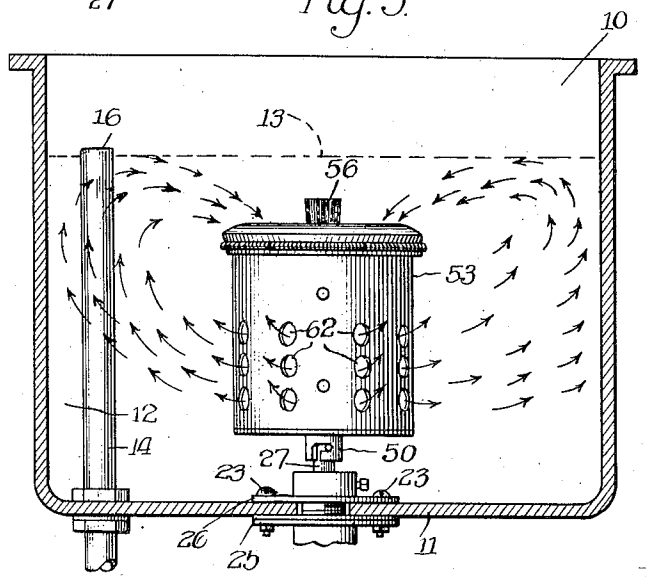


Fig. 5.



Inventor:
Vincent W. Cunningham,
By Churchill, Parker & Davison.
Attys.

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UNITED STATES PATENT OFFICE

2,153,238

METHOD OF AND APPARATUS FOR WASHING RECEPTACLES SUCH AS TUMBLERS AND THE LIKE

Vincent W. Cunningham, Chicago, Ill.

Application May 14, 1932, Serial No. 611,263

10 Claims. (Cl. 15—76)

The invention relates to a method of washing tumblers which comprises agitating the cleansing fluid in a tank to cause an outward flow of the fluid in all directions adjacent the bottom of the tank, then an upward flow in proximity to the side walls of the tank, then an inward flow from all directions to cause the fluid to converge in a downwardly moving column, and scrubbing the tumblers, while immersed in the moving column of cleansing fluid.

An object of the invention is the provision of an apparatus in which the scrubbing elements are immersed in a cleansing bath which is agitated to produce a flow of cleansing fluid through the scrubbing elements as an incident to operation of the apparatus.

A more specific object of the invention is to provide an apparatus of the above character in which internal and external brushing elements contribute to the creation of currents within a batch of cleansing fluid, which currents are caused to flow throughout the length of the brushing elements.

It is another object of the invention to provide an apparatus of the above character comprising a unitary attachment adapted for ready application to a tank or other receptacle.

A specific object of the invention is the provision of a tumbler scrubbing apparatus in which the scrubbing elements are mounted in an immersed cylindrical member open at its upper end and provided with outlets adjacent its closed lower end to permit the ejection of cleansing fluid therefrom as an incident to rotation of the member.

Other objects and advantages will become apparent from the following description taken in connection with the accompanying drawings, in which:

Figure 1 is a vertical sectional view of an apparatus embodying a preferred form of the invention.

Fig. 2 is a fragmentary horizontal plan view of the scrubbing device.

Fig. 3 is an enlarged vertical sectional view taken along the line 3—3 of Fig. 2.

Fig. 4 is a horizontal sectional view taken along the line 4—4 of Fig. 3.

Fig. 5 is a view showing the currents of the washing fluid resulting from the operation of the apparatus.

While the invention is susceptible of various modifications and alternative constructions, I have shown in the drawings and will herein describe in detail the preferred embodiment, but it is to be understood that I do not thereby intend to limit the invention to the specific form disclosed, but intend to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

Referring more particularly to the drawings, the invention in the present instance is embodied in a scrubbing apparatus including a tank 10, having bottom and side walls 11 and 12 respectively. The tank is adapted to be substantially filled with any desirable reagent in the form of a cleansing liquid, the upper surface of which is indicated at 13. The maximum height of the level of the liquid in the tank may be regulated by an overflow pipe 14 which projects through, and is secured to the bottom wall of the tank as shown in Fig. 1, the upper end 16 of the drain being positioned substantially below the upper edge of the tank.

The component elements of the apparatus are oriented to a single part 17 which in turn is adapted for ready attachment to the tank. In the present embodiment of the invention the element 17 comprises an irregularly shaped bracket formed with axially alined bearings 18 and 19 which are rigidly supported in spaced relation by diametrically opposed arms 20 and 21. A normally extending radial flange 22, formed intermediate the ends of the bearing 18 is provided with bolts 23 adapted to effect a removable connection between the bracket and tank. Referring to Fig. 1 it will be seen that when the bracket is in position on the tank, the portion of bearing 18 which extends above the flange 22 projects interiorly of the tank through a suitable aperture 24 in the bottom wall 11.

A gasket 25 between flange 22 and the bottom of the tank, effectively prevents leakage of fluid from aperture 24, and an annular ring 26, coextensive with the flange provides a firm anchor for the interior ends of bolts 23 thereby insuring strength and rigidity in the assembled apparatus.

Journaled in the bearings 18 and 19 is a shaft 27 fitted with a thrust collar 28 which acts against the upper end of bearing 19 to prevent downward longitudinal displacement of the shaft. The lower end of shaft 27 extends below the bearing 19 and has non-rotatably secured thereto a driving pulley 29. A loose collar 30 intermediate the hub of the pulley wheel and the lower end of bearing 19 restricts endwise play of shaft 27.

Driving means, in this instance an electric motor 31, is adjustably mounted on the bracket 17 by bolts 32 arranged to engage similar arms 33

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which are formed integrally with the arm 20 and extend substantially normally of the plane defined by the arms 20 and 21. The driving motor 31 may be moved bodily with respect to the arms 33 by a plurality of nuts 34 carried by the bolts 32 and arranged to engage the respective faces of the arms 33 and the under surface of the base of the motor. A belt 35 which engages a pulley 36 non-rotatably attached to the motor shaft 37 is effective to provide a driving connection between the motor and the pulley 29.

The upper end of the shaft 27 projects inwardly of the tank above the top of the bearing 18. A stuffing box generally indicated at 38 is effective to prevent leakage of the cleansing fluid between the shaft and its bearing. The stuffing box 38 in the present embodiment of the invention includes a counterbore 39, formed in the upper end of the bearing 18, the counterbore being provided at its closed bottom end with packing material 40 against which a sleeve 41 is yieldably pressed by a spring 42. The spring 42 acts between a radial shoulder 43 provided on the lower end of the sleeve 41 and the internal surface of a packing nut 44 which is threaded onto the external surface of the upper end of the bearing 18. A lock nut 45 is effective to rigidly maintain the packing nut 44 in any desired rotative position so as to effect the desired degree of compressive stress in the spring 42.

An elongated brush 46 is attached to the upper end of the shaft 27 with its axis substantially coincident with the axis of the shaft. Referring particularly to Fig. 3, the brush 46 will be seen to be seated in a socket 47 which is formed with an axial depending threaded hub 48. The brush is secured against removal from the socket by means of a screw 46a adapted to be threaded into the core of the brush through an axial bore extending through the socket and its hub. The threaded hub 48 is received in the upper threaded end of a tubular fitting 49 which in turn is arranged to be attached to the upper end of the shaft 27 and secured against rotation in one direction relative thereto by means of a bayonet connection 50 (Figs. 1 and 5).

A pair of similar elongated brushes 51, substantially coextensive with the brush 46, are provided for the purpose of scrubbing the exterior of a tumbler simultaneously with the action of the inner brush in scrubbing the interior of the glass. The brushes 51 are slidably carried in elongated guides 52 which are secured diametrically opposite one another on the inner surface of a hollow member 53. The bristles of the respective brushes 51 extend radially inward toward the axis of the brush 46 and are of such length as to intersect a circle defining the circumference of oppositely disposed groups of bristles 54 and 55 on the central brush 46. The central brush 46 is provided with an upwardly extending tuft of bristles 56 effective to scrub the inner bottom surface of a tumbler.

The brushes 51 are adapted for rotation with the central brush 46 so that no relative movement will occur between the respective brush elements. To this latter end the hollow member 53, which carries the brushes 51, is rigidly secured to a radially extending flange 57 which in this instance is formed integrally with the tubular member 49. Thus it will be apparent that the respective brushing elements will rotate in unison.

In order to permit registration of the brushes 51 with the spaces defined between the groups of bristles 54 and 55 of the central brush 46, means to effect relative rotative adjustment of the brushes is provided. In the present instance this end is effected by fitting the lower end of the brush 46 into the socket 47 loosely enough to permit slight rotation of those respective parts, a pair of set screws 58 serving to rigidly lock the core of the brush and the socket in any desired position of adjustment.

The upper end of the hollow member 53 is rolled to define a peripheral bead 59 which cooperates with a coiled spring 60 to retain a yieldable annular flange 61 in position on the upper end of the hollow member. The hollow member 53 is preferably cylindrical in form and is provided adjacent its lower end with a plurality of peripherally spaced apertures 62.

In operation, rotary movement is imparted to the shaft 27 from the motor 31 and belt 35 which rotary motion is communicated to the cylindrical member 53 through the tubular fitting 49 and bayonet connection 50, the central brush 46, as well as the brushes 51, rotating in unison with the member 53.

It will be evident that the cleansing fluid within the immersed hollow cylindrical member 53 will be rotated by the combined action of the brush elements and the frictional engagement of the fluid with the walls of the hollow member, and that this rotary movement will in turn give rise to a centrifugal force tending to throw the liquid outwardly in all directions. The cylindrical member 53 functions to control the centrifugal force thus imparted to the fluid therein so as to effect a constant flushing of the brushes.

Referring now to Fig. 5, the centrifugal forces created as an incident to the operation of the apparatus will be seen to cause a flow of cleaning fluid outwardly in all directions near the bottom of the tank from the apertures 62, the current being directed upwardly by the side walls of the tank to form a surface current flowing inwardly in all directions toward the axis of the hollow member. The inwardly flowing surface stream of liquid is turned down into the hollow member over the flange 61 and, with the amount of fluid shown in Fig. 1, the stream completely covers the central and side brushes. Thus a constant flooding and cleansing of both central and side brushes occurs while the rotary member is in operation. During the actual scrubbing of a tumbler, the tumbler's external surface as well as the side brushes are subjected to a vigorously moving stream which serves to maintain the brushes in a clean condition as well as to flush the surface of the tumbler.

I claim as my invention:

1. The method of cleansing tumblers in a washing fluid tank consisting in agitating an enclosed body of cleansing fluid in such a way as to create a vigorously flowing current moving downwardly and internally and externally scrubbing a tumbler while its outer side surface is completely immersed in the downwardly moving current of fluid.

2. A tumbler washing machine comprising in combination, a washing fluid tank, a hollow member rotatably supported on a vertical axis in said tank, said member having a side wall with an imperforate upper portion, a closed bottom end, an open top end lying substantially below the top edge of the tank and beneath the normal fluid level therein to provide for ingress of the fluid into the hollow member, and being apertured adjacent the lower end of said member

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to provide for egress of the fluid from the interior of the hollow member to the interior of the tank, the part of the top opening which is most remote from said axis being closer to said axis than said apertured portion, radially disposed brush elements in said hollow member adapted to scrub the interior and exterior of the tumbler and positioned substantially in their entirety at and above the lowermost apertures in the side wall to be completely flushed by the fluid, and means to rotate said brush elements and said member simultaneously together with the fluid within said member whereby to discharge fluid centrifugally from said apertured portion of the hollow member adjacent the lower end thereof, and create a flushing flow of fluid into the open top end of the member and throughout substantially the entire length of said brush elements.

3. A tumbler washing device comprising in combination, a tank, a hollow member adapted to be immersed completely in fluid in said tank and journaled in said tank on a vertical axis, brushing means mounted in said hollow member, said hollow member having an open upper end to permit the insertion of a tumbler therethrough into association with said brushing means, said hollow member having outlets near its lower portion to permit egress of washing fluid by centrifugal action and having an inwardly turned flange at its upper end preventing egress of the fluid over the upper edge of the hollow member, and means for rotating said brushing means and said hollow member as a unit.

4. A machine for washing tumblers comprising, in combination, a tank for washing fluid, a hollow member therein having its bottom end closed and its upper end open with peripheral apertures adjacent its lower end, rotary brushing means within said member, a flange on the upper end of said member extending radially inward to prevent flow of fluid from said member over the upper edge thereof but permitting entry of the fluid centrally thereof, and means for rapidly rotating said brushing means.

5. A machine for washing tumblers comprising, in combination, a tank for washing fluid, a cylindrical member positioned on a vertical axis within the tank with its upper end open and below the normal level of fluid, said member having peripheral openings adjacent its lower end, means to prevent escape of fluid from said member over the upper edge thereof, rotary brushing means within said member and having a substantial part of the volume of said member free for passage of fluid, said brushing means being constructed to produce a current of fluid from the main body of fluid in said tank about said member, such current entering the top of said member and escaping through said peripheral openings, and means for rapidly rotating said brushing means, said tank having a large volume relative to the volume of said member.

6. A machine for scrubbing tumblers comprising, in combination, a tank for cleansing fluid, rotatable brushing means in said tank, a hollow housing surrounding said brushing means and having a substantially cylindrical side wall and transverse end walls, one of said end walls defining an inlet opening substantially centered on the axis of rotation of said brushing means below the normal fluid level in said tank and through which fluid may flow into the adjacent end of said brushing means, and one of the other walls defining an outlet opening at least a portion of which is spaced a distance from said axis, which is greater than the distance between said axis and the most remote portion of said inlet opening, and said outlet opening being spaced axially from said inlet opening substantially at the other end of said brushing means so that fluid flowing through said housing from said inlet opening to said outlet opening traverses and flushes the brushing means throughout its entire length, and means for rapidly rotating said brushing means.

7. A machine for washing tumblers comprising, in combination, a tank for washing fluid, a hollow member of generally cylindrical form positioned in said tank, rotary brushing means within said member, a flange on one end of said member extending radially inward toward the central axis of the cylindrical member to restrain flow of fluid along the side of said cylindrical member and from said end of the member but permitting entry of the fluid into said member centrally of the flange, said member at a point spaced axially from said end being shaped to form an outlet for egress of the fluid adjacent the periphery of the cylindrical portion of the member, and means for rapidly rotating said brushing means.

8. A tumbler scrubbing machine comprising, in combination, a tank for washing fluid, scrubbing means mounted in said tank and comprising a vertical central brush and an opposed vertically extending side brush for engaging the inner and outer side surfaces respectively of a tumbler, means for rapidly rotating said scrubbing means about a vertical axis, a hollow housing including a cylindrical portion centered substantially upon said axis and enclosing said scrubbing means, said housing having openings adjacent the upper and lower ends of said scrubbing means, one of said openings constituting an inlet opening and being substantially centered on said axis and having a diameter less than the diameter of said cylindrical portion of said housing, and the other of said openings constituting an outlet opening at least a part of which is spaced radially from said axis a distance greater than the distance between said axis and the outermost portion of said inlet opening.

9. A machine for washing tumblers comprising, in combination, a tank for washing fluid, brushing means rotatable about a substantially vertical axis in said tank and comprising opposed elongated brush elements for the exterior and the interior of the tumbler positioned parallel to said axis with their opposed effective faces located at different distances from said axis, means for rapidly rotating said brushing means, and means for creating a current in the fluid having a path completely including the interior brush element when the tumbler is removed from the machine to thoroughly rinse the interior brush element, said means comprising a hollow member surrounding the brush elements and having a central opening at one end adjacent one end of the interior brush element and an opening adjacent the other end of the interior brush element, said openings being positioned with their most remote portions with respect to said axis located at different distances from said axis whereby the centrifugal action in the rotating fluid discharges fluid from the opening having its most remote portion located at the greater distance from said axis and causes a flow of fluid into the other opening and throughout the length of said member.

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10. In a tumbler scrubbing and flushing machine, the combination of a tank for washing fluid, scrubbing means mounted in said tank for rotation about a substantially vertical axis and comprising an elongated center brush tufted at its upper end and centered on said axis and a pair of elongated side brushes located on opposite sides of and substantially parallel to said axis, said center and side brushes being mounted for rapid rotation as a unit about said axis to scrub simultaneously the inner surfaces and the outer side surface of an inverted tumbler, and means for continually flushing said brushes with washing fluid during rotation of said scrubbing means comprising a hollow housing including a cylindrical portion centered substantially upon said axis and enclosing said center and side brushes, said housing having openings adjacent the upper and lower ends of said scrubbing means, one of said openings constituting an inlet opening and being substantially centered on said axis and having a diameter less than the diameter of said cylindrical portion of said housing, and the other of said openings constituting an outlet opening at least a part of which is spaced radially from said axis a distance greater than the distance between said axis and the outermost portion of said inlet opening, said center brush having groups of bristles on opposite sides extending in opposite directions generally at right angles to a plane passing through said axis and said side brushes but with said groups of bristles terminating a substantial distance from said cylindrical portion of said housing, and said side brushes being relatively narrow and having bristles extending radially inwardly toward said axis and of such a length as to extend inwardly into clear spaces between said groups of bristles a substantial distance beyond a circle defining the circumference of said oppositely disposed groups of bristles of said center brush, whereby to provide for scrubbing contact of said bristles with both the inside surfaces and the outer side surfaces of tumblers of different diameters while providing a free passage space of substantial area for vigorous flushing movement of the washing fluid longitudinally through said housing.

VINCENT W. CUNNINGHAM.