June 29, 1943. N. RANSOHOFF 2,323,154

WASHING APPARATUS

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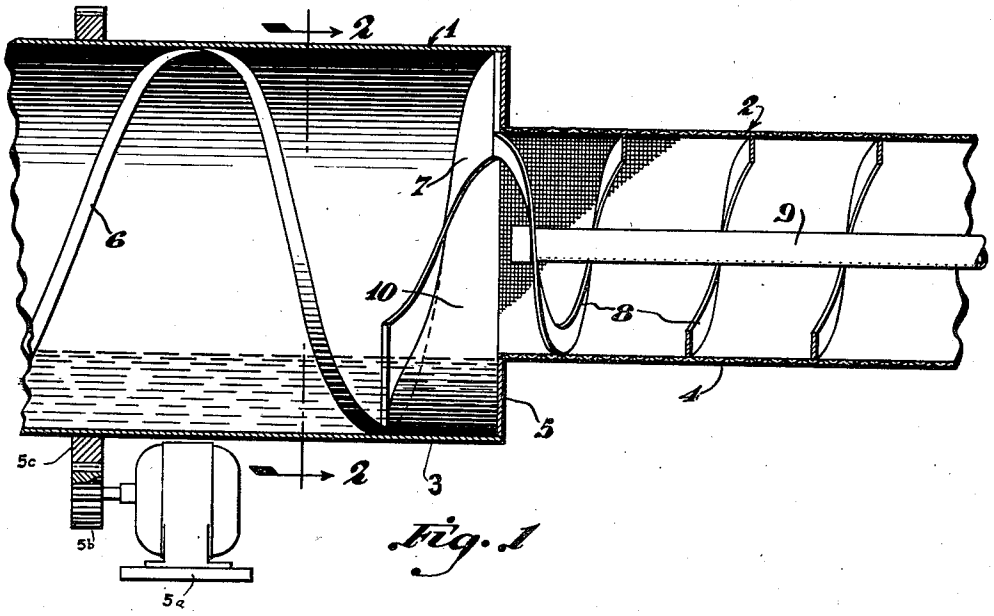


Fig. 1

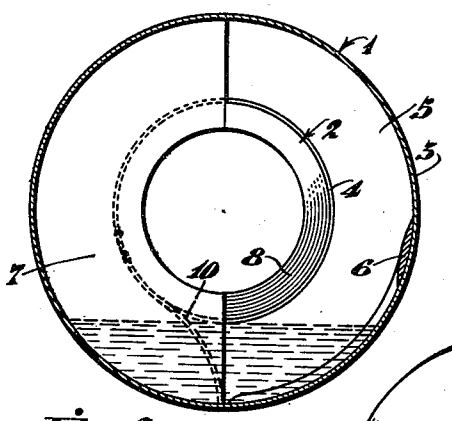


Fig. 2

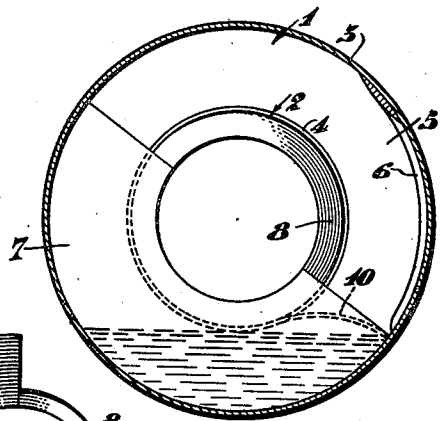


Fig. 3

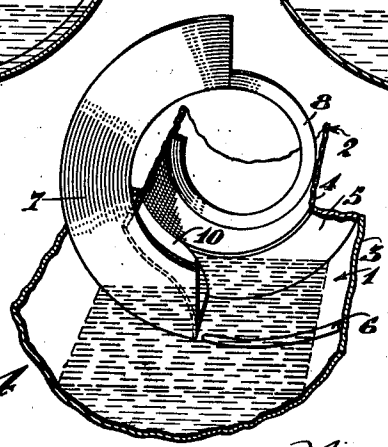


Fig. 4

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WASHING APPARATUS

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5 Claims. (Cl. 141—1)

This invention relates to washing machines of the type adapted for industrial usage, for instance, in washing castings or metal parts, to clean them of dirt, oil and grease, or chips.

The present patent application is a continuation-in-part of my copending application, Serial No. 328,915, filed April 10, 1940, for "Washing apparatus," now Patent No. 2,288,742, dated July 7, 1942.

The invention is directed particularly to a washing machine of the type embodying a tumbler drum which rotates about a substantially horizontal axis. The washing operation is conducted in one portion of the drum, for instance in an alkaline detergent solution, while in another portion of it the parts are rinsed, or sprayed with a liquid, or permitted to drain.

The principal object of the present invention has been to provide a washing machine having a relatively large washing drum into which a substantial volume of parts can be discharged, a relatively small drum in which parts may be rinsed after they have been washed in the adjacent member, and a conveyor for feeding parts at a relatively uniform rate of discharge from the large drum to the small drum. The machines of the present invention are arranged to be operated continuously. From time to time a batch of parts is fed into the large washing chamber, for instance, an operator may dump a barrel or two into this portion of the apparatus while the machine is rotating. These parts are stored in the washing chamber as well as washed therein and subsequently removed therefrom automatically at a uniform rate of discharge to the rinse portion of the apparatus.

A further object of the invention is to provide a tumbling apparatus having a wash drum in which a substantial volume of detergent solution can be maintained to cleanse the parts therein, and also to provide means for confining this solution to the wash portion of the apparatus so that it does not escape from the machine through the rinse chamber.

An object of the invention has been to provide means for agitating the pieces confined within the wash drum and cooperable means for advancing the pieces from the wash drum to the rinse drum at a uniform rate and without congestion of the parts as they pass from the one portion of the apparatus to the other.

An object of the invention, also has been to provide means for conveying the parts from the washing drum to the rinsing and draining portion of the apparatus without simultaneously conveying the detergent solution;—in other words, to provide a dam for preventing the flow or conveyance of the detergent solution from the washing drum to the rinsing portion of the apparatus.

Other objectives and the advantages which the present invention provides are disclosed in the accompanying drawing which illustrate a preferred embodiment of the improvement and in the following description of the drawing.

In the drawing,

Figure 1 is a sectional view taken longitudinally through the apparatus.

Figure 2 is a cross sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a view similar to Figure 2, but shows the drum in a different position of rotation.

Figure 4 is a fragmentary perspective view showing the operation of the damming portion of the apparatus.

As illustrated in Figure 1, the machine may be divided roughly into two portions, (*a*) the washing and storage zone indicated generally at 1, and (*b*) the rinsing and draining zone indicated generally at 2.

The washing portion is comprised of a drum 3 which may be sufficiently large in diameter to constitute a receptacle in which a substantial volume of parts may be introduced through a charging door located in the end of the apparatus. It is preferable that the doorway be accessible so that successive batches of parts can be discharged through it while the machine is in operation. The drum 3 may be circular or octagonal and it is preferably constituted of sheet metal.

The rinsing drum 4 is considerably smaller in diameter than the washing drum, but it is substantially coaxial therewith and it is joined thereto by means of the annular wall 5. It is preferable that the rinsing drum be either provided with a plurality of apertures in its wall to permit the rinsing fluid to escape therefrom or, better still, be made of screen material.

The two drums 3 and 4 are suitably journalled or supported to rotate in unison, and the wall 5 is a solid continuous member uniting the drums to one another. The drums may be driven in any suitable manner as, for example, by means of a motor 5*a* having a pinion 5*b* meshed with a ring gear 5*c* mounted on the periphery of the drum 1.

A vane 6 of a spiral form is located at the

interior of the washing drum 3. This vane has two functions, the first being to provide a gentle agitation of the parts during the drum rotation and the second being to advance the parts gradually toward the rinsing portion of the apparatus as the drum revolves. In the preferred structure the vane 6 is as shown in Figure 2, that is, a member relatively flat and wide, presenting a convex surface at the drum interior.

A vane 7 extends spirally from the annular wall 5 into the washing drum to meet the vane 6, but vane 7 is of substantial height, preferably being constructed so that its interior edge resides inwardly of the wall of the rinse drum 4. Vane 6 joins vane 7 so that the two form a substantially continuous spiral as shown in perspective in Figure 4.

Conveyor spiral 8 extends from vane 7 through the rinsing portion of the apparatus and constitutes the conveyor by which parts are advanced toward the discharge end of the rinsing chamber beneath the jets of solution being discharged from the rinse pipe 9 therein.

Spiral vanes of the type of vanes 6, 7 and 8 have been used in washing machines of the past, but in the present structure the annular wall 5 constitutes an obstruction over which the parts must be elevated before they can be discharged from the washing drum into the rinse drum. It is desirable that a minimum of detergent solution be carried over into the rinse chamber to avoid wasting the solution and to avoid the necessity of replenishing it at periodic intervals.

Still more important, it is desirable that parts or pieces be fed uniformly from the bulk of the supply contained within the storage chamber to the rinse portion without causing any congestion of parts in the passageway between the two. This permits parts to be introduced into the washing chamber in batch lots and removed therefrom at a uniform rate of discharge, with the parts being cleansed in the washing chamber while they are awaiting discharge. A gradual discharge through the chamber 2 also permits each part to be sprayed thoroughly by the solution projected against it from the spray pipe 9.

In accordance with the present invention the lift dam 10 is provided for this purpose. This member is a configurated plate or ramp which is disposed intermediate the vane 7 and the annular wall 5. It is preferably of compound curvature or ogee shape, that is, concave at the portion at which it joins the rinse drum, so as to complement the contour thereof, and convex at the portion adjacent the wash drum, to join the periphery thereof at an approximately normal angle. With the arrangement, as will be seen by referring to Figure 3, the central portion of the ramp is above the level of the detergent solution, and the ramp way drains toward the body of solution in the wash drum until the ramp actually leaves the solution during drum rotation. This configuration also is recommended because it provides an easy, gradual ramp across which the parts may be conveyed without being subjected to a too violent degree of agitation. However, it will also be understood that the plate may be of other form, if desirable for special purposes. In the preferred structure the ramp 10 extends along the periphery of the drum 4 from the point of tangency to that end of the vane which contacts the annular wall 5.

The dam plate 10 extends across the passageway intermediate the vane 7 and the end wall 5 and therefore acts to prevent parts from being caught in the restricted area between the end wall and the annular plate, and also acts to sweep the detergent solution back into the washing chamber as the apparatus is rotated. As will be seen, there is no danger of the ramp acting as a bucket tending to lift detergent solution from the wash chamber to the rinse chamber during each revolution of the drum.

While the chamber 2 has been referred to in the specification as a rinse chamber, cleansing solutions may be discharged against the pieces from the spray pipe 9 instead of rinse water. It will be understood that this chamber may constitute a cleansing chamber or a secondary treatment chamber just as well as a rinsing chamber.

The operation of the device is substantially as follows: While the machine is rotating, the parts to be cleaned are introduced into the washing chamber, with or without the usual cleaning stars and abrasive particles conventionally used in tumbling operations. Then the detergent solution or "wash water" is run into the wash chamber, and during the operation of the machine the level of the solution is maintained at a point approximating the lowermost point on the periphery of the rinse drum. After a short period of time the vane 6 will have conveyed some of the parts to the ramp 10, and the parts will have moved up the ramp into the rinse chamber. At this time the rinse water or other solution can be turned on so that the parts are sprayed and rinsed as they pass through this portion of the apparatus. This operation is continued until all of the parts have been passed from the one zone to the other and out through the discharge end of the machine.

Since the spiral vane 6 is of limited height and is convex in cross section, it provides a gentle agitation and acts also to urge the parts toward the ramp to be picked up thereby. A substantial quantity of materials can be introduced into the wash zone and held therein until they are cleaned. There is no glutting of the rinsing portion of the apparatus as the machine is revolved.

Having described my invention, I claim:

1. A washing apparatus, which comprises a wash drum of a relatively large diameter, a rinse drum of a relatively smaller diameter extending longitudinally from the wash drum and being substantially coaxial therewith, an annular wall member joining the rinse drum and the wash drum, a vane extending spirally from the annular wall into the wash drum, the said vane terminating in a portion of reduced height whereby it is adapted to act as an agitator of parts deposited in the washing drum and as a conveyor for urging parts toward the rinse drum, and a dam and lift member residing intermediate the vane and the annular wall and extending substantially tangentially from the periphery of the rinse drum to the periphery of the wash drum.

2. A washing apparatus, which comprises a wash drum of a relatively large diameter, a rinse drum of a relatively smaller diameter extending longitudinally from the wash drum and being substantially coaxial therewith, an annular wall member joining the rinse drum and the wash drum, a vane extending spirally from the annular wall into the wash drum and terminating in a vane portion of reduced height which is adapted to act as an agitator of parts discharged into the wash drum and as a conveyor for urging parts toward the rinse drum, and a dam and lift member disposed to interconnect the wall of the

wash drum with the rinse drum intermediate said vane and said annular wall, said member being configurated to drain wash solution caught thereon to the wash drum as the apparatus is revolved, the said dam and lift member having a portion thereof coinciding with the periphery of the rinse drum.

3. A washing apparatus, which comprises a wash drum of a relatively large diameter, a rinse drum of a relatively smaller diameter extending longitudinally from the wash drum and being substantially coaxial therewith, an annular wall member joining the rinse drum and the wash drum, a vane extending spirally from the annular wall into the wash drum, a dam and lift member extending intermediate the vane and the annular wall to provide a conveyor ramp between the periphery of the wash drum and the periphery of the rinse drum, and spiral means lesser in height than said vane leading to said vane within the wash drum for providing agitation to parts therein to be cleaned.

4. A washing machine, comprising a washing drum sufficiently large in diameter to receive a quantity of parts to be cleaned, a rinsing drum of smaller diameter extending longitudinally from the washing drum and being substantially coaxial therewith, an annular wall interconnecting the two drums for unitary rotation of them, a vane extending spirally from the annular wall into the washing drum and terminating in a vane portion of reduced height whereby it is adapted to act as an agitator of the parts discharged into the washing drum and as a conveyor urging the parts towards the rinse drum, means for advancing parts from the wash drum to the rinse drum comprising a ramp positioned substantially tangentially with respect to the rinse drum and extending therefrom to the periphery of the wash drum, and means for advancing parts discharged from the wash drum through the rinse drum.

5. A washing machine, comprising an elongated drum, means for rotating the drum about a substantially horizontal axis, an annular wall member extending transversely of the drum and dividing said drum into a pair of chambers with at least one of the chambers being sufficiently large in diameter to receive a substantial quantity of parts to be cleaned, a vane residing within said latter chamber and leading toward said annular wall, a ramp positioned between said vane and the annular wall for lifting parts caught by the vane over the annular wall for discharging the parts into the adjacent chamber, and a second vane leading to the first, the second vane being of lesser height than the first and adapted to act as an agitator for parts and also as a conveyor for urging parts toward the first vane.

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