SIDE DOOR FOR THE ROTARY CYLINDER OF A WASHER-EXTRACTOR

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This invention relates to a novel side door construction for the rotary cylinders of washers and of washer-extractors. More particularly, the invention relates to a novel mounting and locking mechanism for such doors.

The cylinder of a washer or washer-extractor has perforated walls and is provided with end shafts by which it is journalcd in a stationary tub or casing. In washer-extractors, these cylinders are rotated at a sufficiently high speed to drive the washing liquid by centrifugal force from the clothes being washed through the perforations in the cylinder walls. The present mounting and locking mechanism is of the type wherein the door is hinged to move between opened and closed positions and when moved to a closed position is then shifted bodily to lock it against opening.

Another object of the present invention is to provide a side door for the rotating cylinder of a washer-extractor which is easy to open and close and which when closed is held in a tight firm manner capable of withstanding the heavy centrifugal force to which the door is subjected during an extracting operation.

Another object is to provide a combined shifting and locking mechanism for the side door of a rotary cylinder of a washer-extractor.

Another object is to provide a mounting and locking mechanism for the side door of the rotary cylinder of a washer-extractor wherein the door is spring-biased lengthwise of the cylinder to a locked position.

Further objects of the invention reside in the novel structural details of the door mounting and locking mechanism, and will be apparent from the following description and the appended claims.

In the description of the invention, reference is had to the accompanying drawings, of which:

FIGURE 1 is a side view of the rotary cylinder of a washer-extractor showing thereon two identical doors of a construction according to the present invention;
FIGURE 2 is a plan view to a larger scale of one of these doors;
FIGURE 3 is a transverse sectional view taken through the door on line 3—3 of FIGURE 2;
FIGURE 4 is a transverse sectional view taken through the door on the line 4—4 of FIGURE 2;
FIGURE 5 is a longitudinal sectional view taken on the line 5—5 of FIGURE 2, showing the door in a closed-locked position;
FIGURE 6 is a longitudinal sectional view taken on the line 6—6 of FIGURE 2, showing the door in a closed-unlocked position;
FIGURE 7 is a detailed sectional view of the slideable mounting for the door taken on the line 7—7 of FIGURE 6;
FIGURE 8 is a fractional sectional view of a corner portion of the door taken on the line 8—8 of FIGURE 7;
FIGURE 9 is a fractional sectional view taken on the line 9—9 of FIGURE 8; and
FIGURE 10 is a fractional side elevational view of the door taken on the line 10—10 of FIGURE 2.

It is to be understood that a washer-extractor differs from a washer in that it is operated not only at a working speed but is thereafter rotated at a higher speed to extract the bulk of the washing liquid from the clothes through the perforated walls of the cylinder by centrifugal force. The present door is of a construction especially adapted for use on the cylinder of a washer-extractor, and can therefore of course be used also on a washer.

In the illustrative embodiment in FIGURE 1 there is shown a rotary cylinder 10 of a comparatively large size having end shafts 11 by which it is mounted in suitable bearings (not shown) for rotation within a stationary tub or casing (not shown). This rotary cylinder is divided into four compartments by longitudinal and transverse partitions of which one of the longitudinal partitions is shown at 15 in FIGURES 3 and 4. The rotary cylinder has a pair of reinforcing bands 17 inset from the end walls thereof and has another pair of adjacent reinforcing bands 18 near the center. Between these reinforcing bands are the perforated cylindrical walls. However, formed in the perforated walls between the pair of reinforcing bands 17 and 18 is a horizontal flange 19 close by respective doors 12 according to the invention, there being a door for each compartment. The doors are set in pairs at diametrically opposite sides of the cylinder and are arranged so that their larger dimensions extend longitudinally of the cylinder. Although the doors are identical they are reversibly mounted so that each door moves outwardly towards the respective end of the cylinder.

All of the several detailed views herein shown refer to the left-hand door in FIGURE 1.

Each door opening is bordered along its narrower sides by the reinforcing bands 17 and 18 and is bordered along its opposite sides respectively by a partition wall 15 (FIGURE 3) and by a radially extending clothes tumbling rib 16. The partition wall 15 may be provided with a corrugation 15a directly underlying the door as shown in FIGURE 3.

Each door is of a rectangular construction having a frame made of four parallel channel members 13a, 13b, 13c and 13d. All of the channel members are seated on and welded to a rectangular sheet metal base plate 14 which is also perforated as indicated in FIGURE 1. The two outside channel members 13a and 13d are located along the respective edges of the base plate and are and are oriented so that their channels face outwardly as shown in FIGURES 3 and 4. The other two channel members 13b and 13c are located near the center line of the door and oriented so that their channels face away from each other. The opposite ends of all four channel members are beveled and the respective end portions of the base plate 14 are inclined upwardly to conform thereto and form inclined end walls 14e and 14f as shown in FIGURE 5. Thus, each door is of a pan-shaped construction having a depth equal to the width of the channel members wherein the two outside channel members 13a and 13b form parallel side walls, the inclined end portions 14a and 14b of the base plate form inclined end walls, and the two channel members 13b and 13c constitute spaced reinforcing bars along the central portion of the door.

At the opposite ends of the door opening bounded by the circular bands 17 and 18 there are internal segmental filler pieces 19 and 20 which conform to the undersides of the bands (FIGURES 3 to 6). These are thick metal pieces secured to the bands by machine screws 17a and 19a. The lower flat edges of the filler pieces overlie the opposite ends of the frame channels 13 of the door when the door is in a closed-locked position and serve to hold the door firmly against outward opening movement. The inclined end walls 14e and 14f of the door have triangular side extensions 14a(e) and 14b(e) which conform at one side of the door to the partition wall 15 and at the other side of the door to the tumbling rib (FIGURE 3) and which conform at the ends of the door to
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portions of the bands 17 and 18 just beyond the filler pieces 19 and 20 so as to close the door opening at the corners when the door is in its closed position (FIGURES 2, 3 and 4).

Each door is hinged at its end facing the end of the cylinder 10, and is also slidably mounted for short endwise shifting movement between locked and unlocked positions. The hinge mounting comprises a pair of spaced hinge bearings 21 secured to the respective filler piece 19 and carrying a hinge shaft 23. Between the hinge bearings is a bracket 22 having spaced bearing portions 22a on the shaft 23 and an interconnecting cross portion 22b below the shaft 23. Projecting upwardly from the cross portion 22b of the bracket 22 is a member which serves as an abutment against the band 17 when the door is opened to stop the door in a fully opened position.

Riveted to the cross portion of the bracket 22 is a pair of spaced parallel rods 24, and bolted to the channel members 13b and 13c is a bracket plate 25 having two apertured lugs 25a at each side (FIGURE 6), which are slidably mounted on the respective rods 24. A compression spring 26 on each rod is interposed between the forward lug 25a and a pinned washer 27 on the rod to bias the door toward a locked position. The door is shown in FIGURE 5 in a closed and locked position, and is shown in FIGURE 6 in the shifted position which it has when it is still closed but unlocked. In this closed-unlocked position the far end of the door clears the lower edge of the filler piece 20 to permit the door to be swung open.

It will be seen in FIGURE 5 that when the door is in a closed-locked position, both the hinged end portion and the far end portion of the channel members 13 underlie respectively the filler members 19 and 20 to hold the door securely in a locked position against the outward centrifugal forces. A pair of bracket members 28 secured to the far end of the door have inclined cam portions 29a on which when the door is shifted to a locked position are moved against the outer surface of the circular band 18 to cam the door slightly outwardly and bring the far end portions of the channel members 13 firmly against the filler member 20. (See FIGURE 5.) A bar 29 at each far corner of the door opening may be secured as by a screw or a pin 30 in an angular position to be contacted by the respective bracket member 28 so as to hold the door centered and against lateral "play" when the door is locked.

A novel feature of the invention resides in the means for shifting the door to and from its locked position. For this purpose the link 30 secured to the hinged end of the door to the cross piece 22b of the hinge bracket 22 (FIGURE 7) and extended therefrom between the two central channel members 13b and 13c towards the far end of the door. A small plate 13a (FIGURE 2) is secured across the top of the two channe members to retain the link between the channel members. Secured to the far end of the link is a shoulder bolt 31 and pivoted thereon is a cross bar 32 forming a handle for opening the door. Just to the outer side of the channel member 13b the handle bar 32 has a slot 32a receiving the upper end of a stud 33 secured firmly to the door as by being staked into the plate 14 and anchored to the channel 13b by a brace 34. As is shown in FIGURE 3, the handle bar 32 has a certain amount of up and down freedom of movement on the pivot bolt 31a but is normally held in an upper position by compression spring 35 on the stud 33 between the handle bar and the brace 34. By turning the handle bar 32 in a counterclockwise direction about the stud 33 as a center (FIGURE 2) the entire door 12 is shifted through the link 20 relative to the hinge 21-22 with compression of the spring 26 to its unlocked position wherein the door clears the filler piece 20 at its far end.

The ends of the handle bar underlie U-shaped retaining members 36 and 37 secured respectively to the door channel members 13d and 13c. When the door is in a locked position shown in FIGURES 2 and 5, the handle bar 32 is straight across, as shown, and the portion that is under the retainer 37 is at the right end thereof to the front of a lug or detent piece 37a (FIGURE 5). The other end of the handle bar 32 is at the same time near the left end of the retainer 36 as is shown in FIGURES 2 and 10. A lug 34a on this retainer is provided just ahead of the handle bar. Since the door is biased by the compression springs 26 to locked position in a direction which is at right angles to the centrifugal forces acting on the door, the centrifugal forces are ineffective to shift the door to a released position. Rather, there are forces that hold the bar firmly in latched positions relative to the detent lugs on the retainers 36 and 37.

To release the door the operator presses down on the handle bar 32 so that the ends clear the respective detent lugs and then pivots the handle bar in a counterclockwise direction until the ends of the handle have passed the detent lugs. Upon then releasing the handle bar the same is spring biased outwardly and latched in position by the detent lugs. In this counterclockwise swinging movement of the handle bar the door is shifted sidewise on the studs 24 to a released position as before-described. The door may then be pulled outwardly by the handle bar to swing about the hinge 21-22 to an open position. An important feature of the present door locking mechanism is that the operating handle bar serves to combine the door shifting and locking functions. Also, the door itself is spring biased to a locked position in a direction which is at right angles to the centrifugal forces tending to open the door. In contrast to prior door locking arrangements which have used a latch bolt, a stronger door mounting and locking mechanism is herein provided in that each of the channel frame members of the door are locked at their outer ends below the filler pieces 19 and 20 which are themselves supported by the strong reinforcing bands 17 and 18 around the cylinder.

The embodiment of my invention herein particularly shown and described is intended to be illustrative and not necessarily limiting of my invention since the same is subject to changes and modifications without departure from the scope of my invention, which I endeavor to express according to the following claims.

1. A door for a side opening in the rotary cylinder of a washer-extractor, comprising a metal plate having a contour conforming to the profile of said opening, a plurality of channel bars secured to the outer face of said metal plate and extending lengthwise of the door, a hinge between one end of the door and said cylinder for permitting the door to be swung between open and closed positions, coupling means between said door and said hinge permitting longitudinal movement of the door relative to the cylinder for enabling the door when in a closed position to be moved to bring a far end portion of the door into locking relationship with an adjacent portion of said cylinder, said coupling means including a pair of slide members secured to and extending from said hinge, a pair of bearing members on said door slidably mounted on said slide members, spring means mounted on said slide members and pressing against said bearing members for biasing said door outwardly from said hinge into a position for locking engagement with a portion of said cylinder and including said opening, and including said opening on said door for shifting the door on said slide members against the force of said spring means to unlock the door, and releasable means for latching said shifting means to hold said door unlocked.

2. The combination set forth in claim 1 wherein said shifting and latching means comprise a crossbar on said door, a pivot stud connected to said door and said crossbar pivotally and slidably connected, a link bar connected at one end to said hinge and pivotally con-
nected at the other end to said crossbar at a point spaced from said pivot stud whereby the door is shifted relative to said stud, said crossbar is turned on said stud, a second spring means outwardly biasing said crossbar relative to said door, and detent means for said crossbar disengageable therefrom as the crossbar is pressed inwardly against said second spring means.

3. In combination, a rotary cylinder of a washer-extractor having a rectangular opening lengthwise of the cylinder bordered by edges of the peripheral wall of the cylinder at the sides of the opening and by vertical segmental pieces at the ends of the opening extending inwardly from the peripheral wall of the cylinder, said segmental pieces terminating in straight inner edges in the plane of said side edges, a rectangular door for said opening comprising a metal plate having a contour conforming to said opening, a plurality of channel bars secured to the outer face of said plate and extending lengthwise of the door, a hinge securing one end of the door to the corresponding one of said segmental pieces to permit the door to be swung between open and closed positions and for locating said door when closed in a position inset in said opening wherein the outer faces of said channel bars are substantially in the plane of said edges, slidable means interposed between the door and said hinge for permitting the door to be shifted longitudinally in closed position to place a far end portion of the door in said inner edges of the corresponding one of said segmental pieces to lock the door against opening, radial walls extending inwardly from the side edges of said opening, said metal plate being continuous with said radial walls on lines inset from said plane of said side edges substantially by a distance equal to the width of said channel bars, said channel bars having inclined end faces extending from the inner to the outer walls of the channel bars, and said metal plate having inclined end portions conforming to said inclined end faces and terminating at the inner edges of said segmental pieces when the door is in closed position.

4. The combination set forth in claim 3 wherein the inclined end portions of said metal plate of said door have triangular side extensions to conform to said segmental pieces and to said radial walls to close the spaces at the corners of the door when the door is in closed position.

5. A door for a side opening in the rotary cylinder of a washer-extractor, comprising a metal plate having a contour conforming to the profile of said opening, a plurality of channel bars secured to the outer face of said metal plate and extending lengthwise of the door, a hinge between one end of the door and said cylinder for permitting the door to be swung between open and closed positions, a shiftable means for said door comprising a link bar connected to said hinge and extending centrally along said door, a crossbar pivotally connected to said link bar and pivotally connected to said door at a pivot offset from said link bar whereby back and forth pivotal movement of the crossbar will shift the door back and forth relative to said cylinder, U-shaped retainer members on said door overlying the said portions of said crossbar, spring means biasing said crossbar outwardly against said retainer members, and detent means for latching said crossbar in its end positions, said detent members extending into the path of said crossbar and permitting the crossbar to be moved past the detent members when the crossbar is pressed inwardly against said spring means.

6. In combination, a rotary cylinder of a washer-extractor having a rectangular opening lengthwise of the cylinder bordered by edges of the peripheral wall of the cylinder at the sides of the opening and by vertical segmental pieces at the ends of the opening extending inwardly from the peripheral wall of the cylinder, said segmental pieces terminating in straight inner edges in the plane of said side edges, a rectangular door for said opening comprising a metal plate having a contour conforming to said opening, a pair of spaced parallel bars secured to the outer face of said plate and extending along a central portion thereof lengthwise of the door, a hinge at one end of said bars connected to the corresponding one of said segmental pieces and having a pair of studs thereon slidably connected to said bars to permit said door both to be swung between open and closed positions and to be shifted longitudinally when in closed position to bring an outer end portion of the door in engagement with the underside of the corresponding one of said segmental pieces to lock the door against opening, first spring means biasing said door along said studs into locked position, a link bar between said bars connected at one end to said hinge, a pivot stud on said door at an outer side of said bars, a crossbar on said door having a slidable and pivotable connection to said pivot stud and having a slidable and pivotable connection to the other end of said link bar whereby upon turning said crossbar the door is shifted longitudinally relative to said cylinder, second spring means on said pivot stud outwardly biasing said crossbar relative to said door, U-shaped retainer members on said door overlying end portions of said crossbar, and inwardly extending detent lugs on said retainer members across said crossbar movable to shift said door when the crossbar is pressed inwardly against said second spring means and for latching said crossbar in its respective shifted positions when the crossbar is released to engage said retainer members.

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