July 6, 1948. L. M. HARVEY 2,444,603

WASHING MACHINE CYLINDER AND CLOSURE MEANS THEREFOR

Filed March 11, 1941 2 Sheets-Sheet 1

Fig. 1.

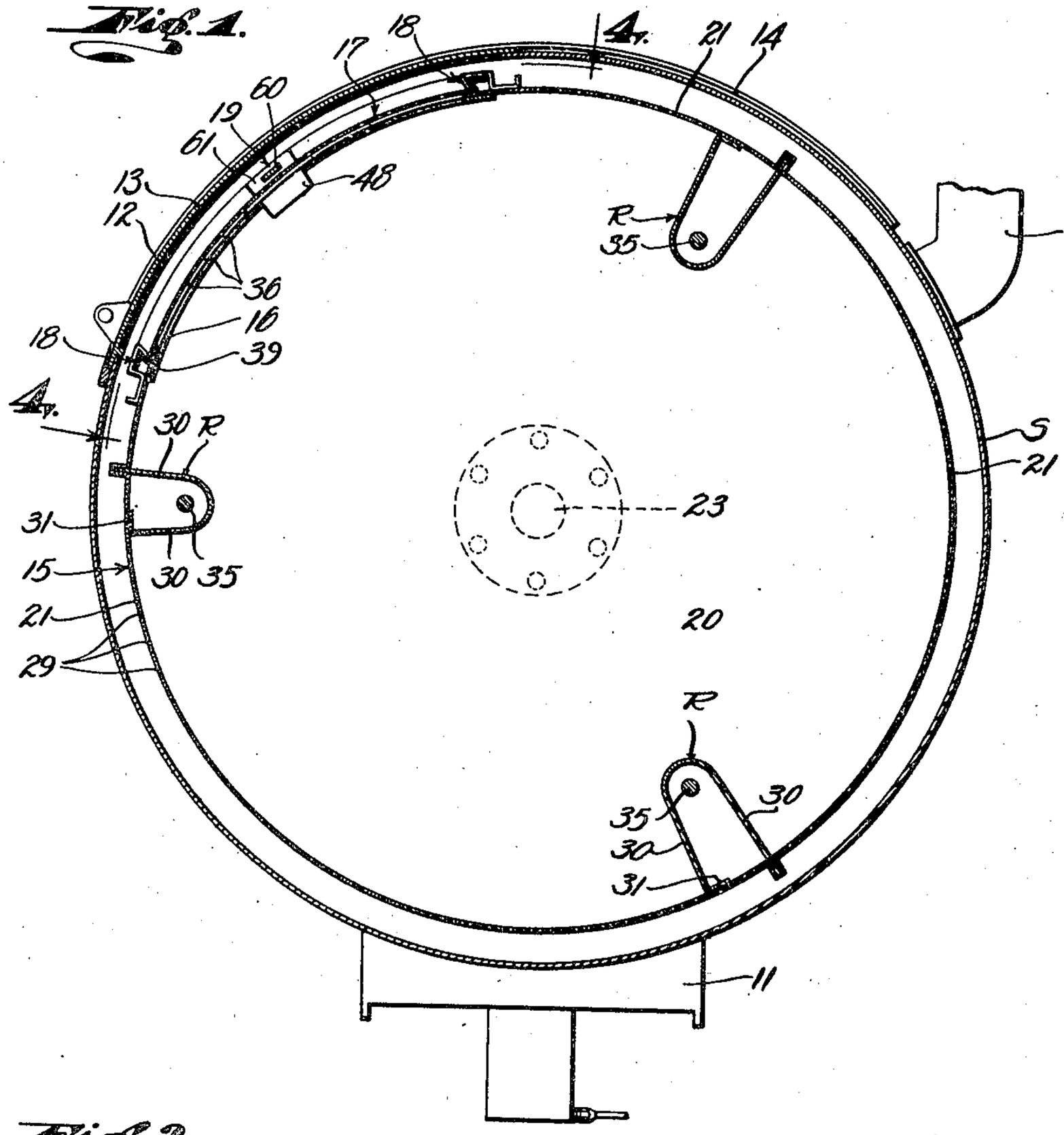

Fig. 2.

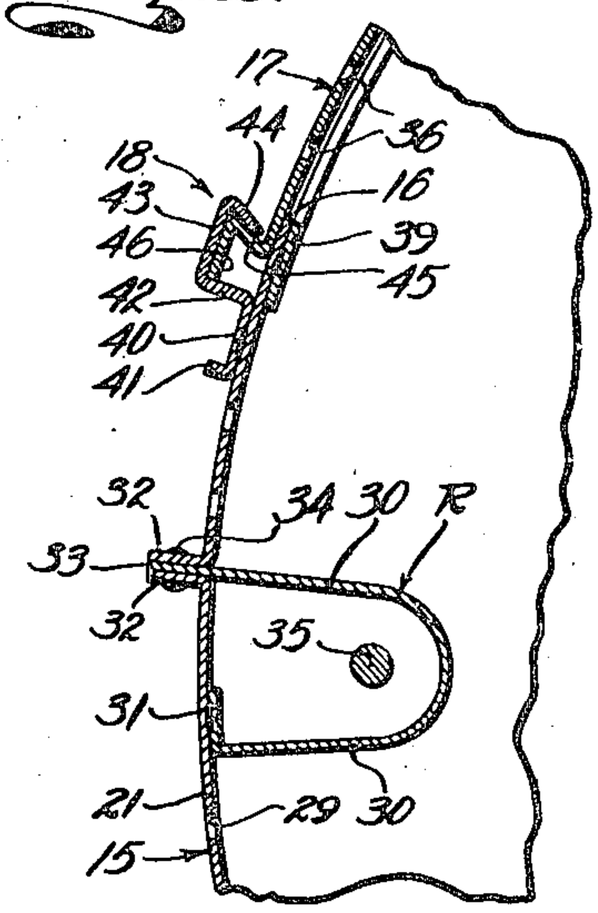

Fig. 3.

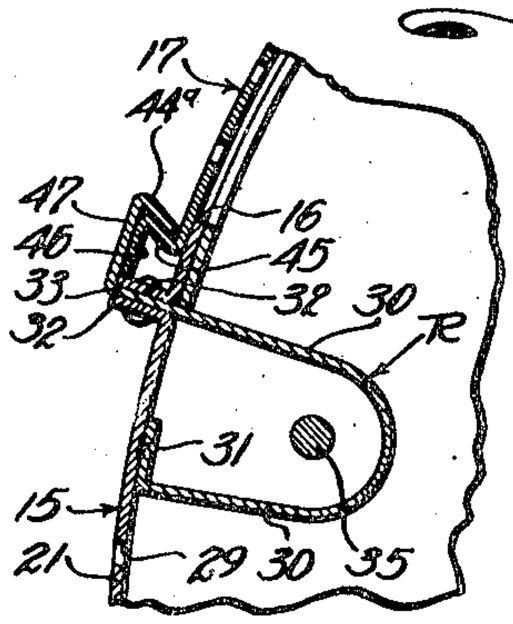

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Fig. 4.

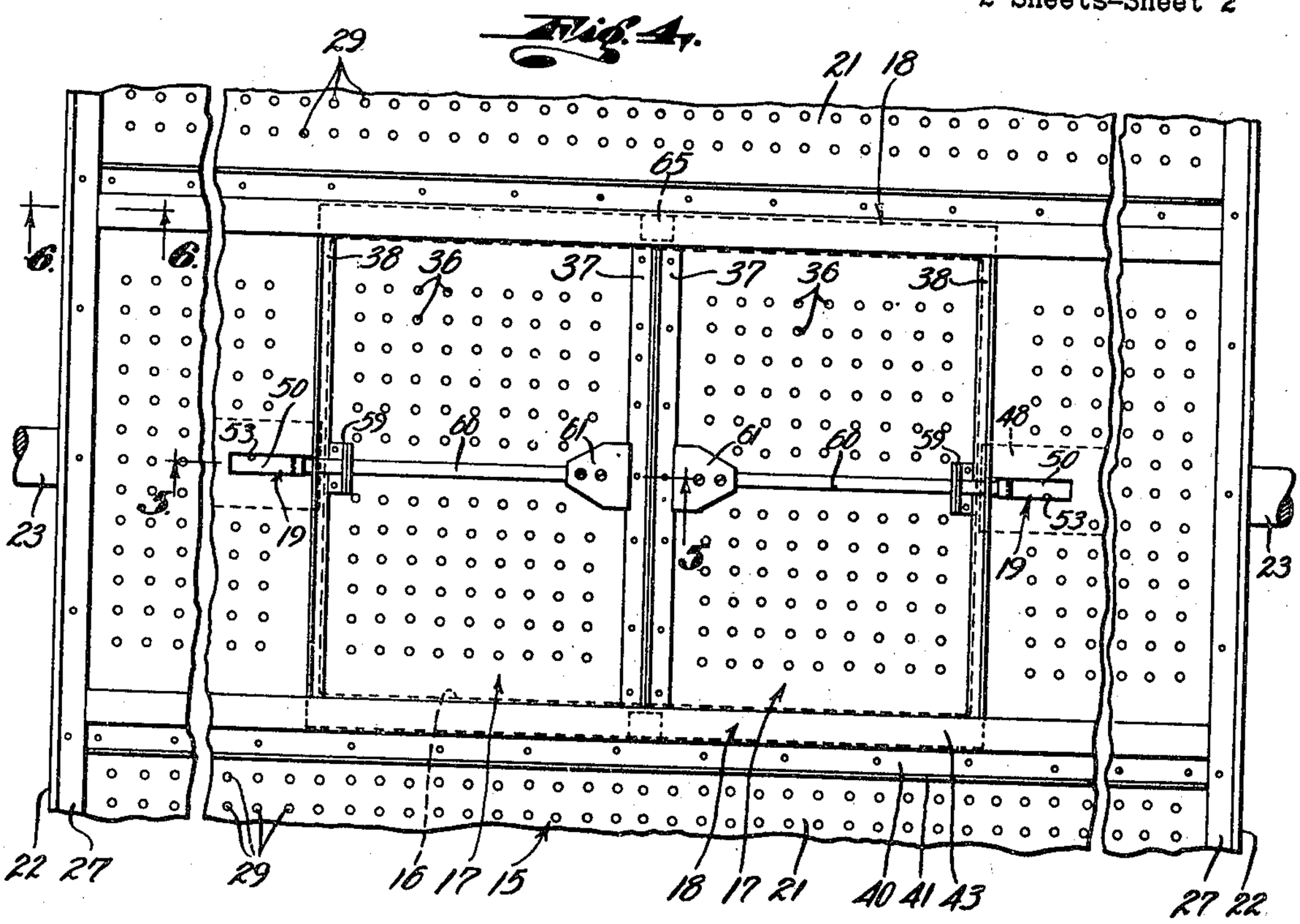


Fig. 5.

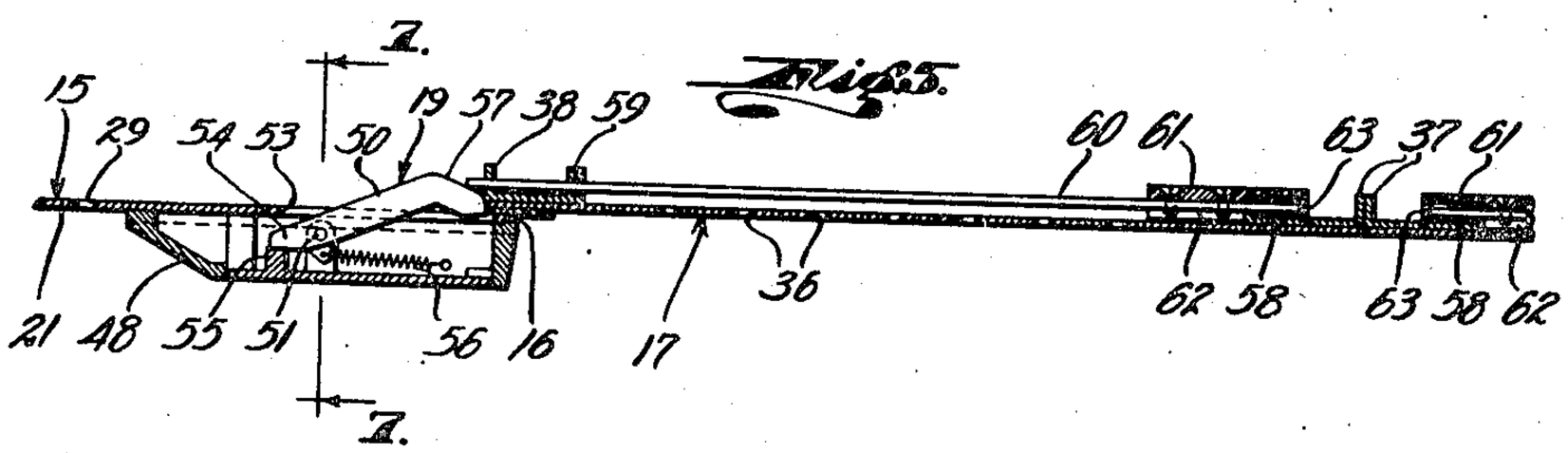


Fig. 6.

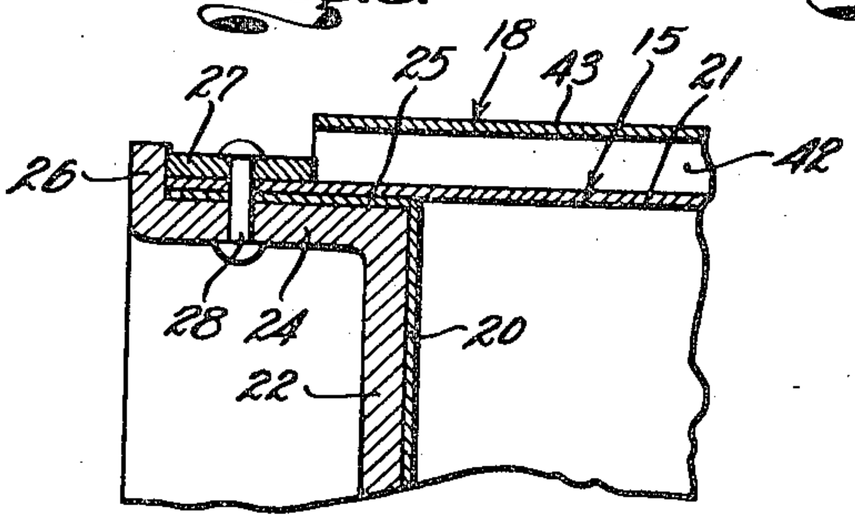
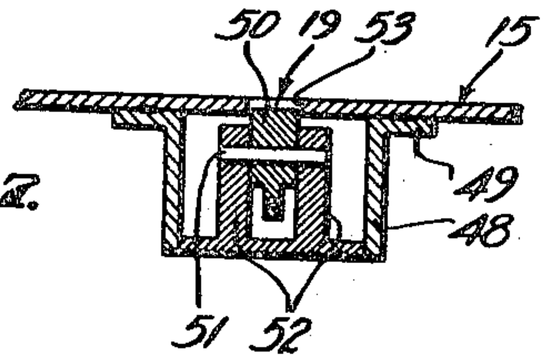


Fig. 7.



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UNITED STATES PATENT OFFICE

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WASHING MACHINE CYLINDER AND CLOSURE MEANS THEREFOR

Leo M. Harvey, Los Angeles, Calif.

Application March 11, 1941, Serial No. 382,715

9 Claims. (Cl. 68—142)

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This invention relates to washing machines and relates more particularly to the oscillatable or rotatable cylinders of commercial clothes washing machines. A general object of the invention is to provide an improved washing machine cylinder embodying dependable, effective and easily operable closure means for its access opening.

Commercial clothes washing machines usually embody a stationary washing shell and a rotatable or oscillating cylinder within the shell. The shell has suitable valves or admission means for the water, washing mixtures, sours, bleaches, etc., and is provided with a dump valve. The cylinder is a hollow perforated structure for containing the clothes during the various washing operations and is mounted in the shell to turn or oscillate with respect thereto. The shell and cylinder are provided with openings to permit the easy insertion and removal of the clothes and these openings are equipped with closures or doors. Difficulty is encountered in providing a suitable closure for the access opening of the cylinder. As the cylinder rotates or oscillates the heavy mass of wet material or clothes repeatedly strikes the walls of the cylinder and the closure and the repeated impacts distort, spring and displace the conventional closures making them noisy, difficult to operate and in time requiring their repair or replacement.

Another object of the invention is to provide a closure means for the access opening of a washing cylinder which effectively withstands the impacts of the wet mass of clothes and which does not become distorted, sprung, loose or difficult to operate.

Another object of the invention is to provide a closure means of the character referred to in which the doors are tied into or coupled with the walls of the cylinder to, in effect, form parts of the cylinder walls capable of withstanding the buckling and tensile forces resulting from the outward impacts of the wet clothes masses so that such forces are distributed throughout the cylinder wall relieving the doors, the door fittings and the adjacent portions of the cylinder structure of the concentrated forces which might otherwise rack, distort or loosen the parts. The doors are coupled with the cylinder walls to be tensioned when subjected to internal pressures so that they cannot be displaced by such forces.

Another object of this invention is to provide a closure means of the character referred to in which the guides supporting the doors for movement between the open and closed positions

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serve to tie the doors into the cylinder structure for the transmission and distribution of the forces resulting from the impact of the wet clothes masses against the doors and adjacent parts of the cylinder.

Another object of the invention is to provide a washing machine cylinder and closure structure embodying novel lock or latch means for the closures which are in the paths of the closed doors and which are under compression to positively hold the doors in the closed positions.

Another object of the invention is to provide a washing machine cylinder structure of the character referred to in which manual movement of the door handles in the door opening direction first releases the latches and then moves the doors to their open positions, each door requiring but one handle part for the release of its latch and to facilitate its opening and closing.

Another object of the invention is to provide a washing machine cylinder structure of the character referred to in which the locks or latches are substantially flush with the cylinder and are covered by the doors when the doors are open so that they do not interfere with the insertion and removal of the clothes.

A further object of this invention is to provide a novel inexpensive and particularly strong sectional washing machine cylinder of the character mentioned in which certain of the door guiding and retaining elements are formed on or constitute integral extensions of a clothes lifting rib of the cylinder which in turn is rigidly built into the sectional cylinder structure.

The various objects and features of my invention will be fully understood from the following detailed description of typical preferred forms of apparatus and manners of carrying out the method of the invention, throughout which description reference is made to the accompanying drawings, in which:

Fig. 1 is a vertical detailed sectional view of the cylinder provided by this invention in position within a washing shell showing the doors closed. Fig. 2 is an enlarged fragmentary vertical detailed sectional view of a portion of the shell illustrating one form of door guiding means. Fig. 3 is a view similar to Fig. 2 illustrating a slightly modified form of guiding structure. Fig. 4 is a fragmentary external view of the cylinder showing the doors in the closed position, being a view taken substantially as indicated by line 4—4 on Fig. 1. Fig. 5 is an enlarged fragmentary longitudinal detailed sectional view taken as indicated by line 5—5 on Fig. 4 illus-

trating one of the door locks. Fig. 6 is an enlarged fragmentary detailed sectional view taken as indicated by line 6—6 on Fig. 4 and Fig. 7 is a fragmentary sectional view taken as indicated by line 7—7 on Fig. 5.

The washing machine cylinder structure of the present invention is adapted for use in washing machines of different types and the invention may be modified to suit it for use in washing machines of different kinds. In the drawings I have shown one embodiment of the invention mounted in a stationary washing shell of the class employed in commercial washing machines. It is to be understood that the invention is not to be construed as limited or restricted to the specific form or application of the invention herein disclosed but is to be taken as including any features or modifications that may fall within the scope of the claims.

The washing machine shell S illustrated in Fig. 1 is a stationary cylindrical horizontally disposed member. The shell S has inlet means 10 for the water, washing materials, bleaching materials, sours, etc., and has a valve controlled dump or outlet 11 at its lower end. An access opening 12 is formed in the wall of the shell S to be conveniently accessible to the operators and is closed by a door 13. The door 13 is guided by guides 14 for movement between the closed and open positions. The opening 12 is of substantial size and is elongated horizontally of the shell S to give easy access to the interior of the shell.

The cylinder structure of the present invention may be said to comprise, generally, a sectional hollow cylinder 15 mounted in the shell S and having an opening 16 in its wall to allow for the insertion and removal of the clothes, doors 17 for the opening 16, means 18 for guiding the doors 17, and releasable means 19 for latching or locking the doors 17 in the closed positions.

The cylinder 15 is an elongate hollow structure supported in the shell S in concentric relation thereto for rotation or oscillation about its longitudinal axis. The cylinder 15 is a sectional sheet metal assembly comprising end plates 20 and a plurality of elongate curved or arcuate side wall sections 21. The end plates 20 are flat, parallel, disc-like members carried by heavy or rather thick wheels 22, see Fig. 6. Trunnions 23 are formed on or fixed to the wheels 22 to mount the cylinder 15 and one or both of the trunnions may serve for the transmission of the turning or driving forces. The cylinder wheels 22 have out-turned axial flanges 24 and the end plates 20 have similar out-turned rims 25 engaging about the flanges 24. The flanges 24 are provided at their outer ends with radially projecting annular lips or ribs 26 and the outer edges of the rims 25 engage or are adjacent the ribs. The longitudinal sections 21 of the cylinder 15 are joined together to form a cylindrical assembly which is connected between the cylinder ends. The opposite end portions of the sections 21 rest on the rims 25 and reenforcing rings 27 engage over these end parts of the sections 21. Rivets 28 or other securing members are passed through radial openings in the flanges 24, rims 25, sections 21 and rings 27 to securely tie or attach the cylindrical wall structure to the end plate structures. The wall sections 21 are perforated, having multiplicities of perforations 29 spaced throughout their extents to admit the water and washing liquids.

Lifting ribs R are provided on the interior of the shell 15 to lift and agitate the clothes when the cylinder is rotated or oscillated during the washing operations. The ribs R are elongate sheet metal members of substantially U-shaped transverse cross section, each having a rounded inner part and spaced side parts 30. One side part 30 of each rib R has an inturned flange 31 extending along its outer edge and this flange is welded, riveted or otherwise fixed to the interior of a cylinder section 21 adjacent a longitudinal edge of the section. As best illustrated in Fig. 2 of the drawings, outwardly projecting flanges 32 extend along the longitudinal edges of the sections 21. The flanges 32 may be continuous integral parts of the sections 21. One side part 30 of each rib R is extended or lengthened to engage between the opposing flanges 32 on the adjacent edges of a pair of connected sections 21. In practice each rib R has an inturned flange 31 extending along one edge and secured to a section 21 and has an outwardly extending portion 33 on its other side part 30 received between a pair of the flanges 32. Rivets 34, welding, or both, secure the opposing flanges 32 and the rib portions 33 together. This structure is clearly illustrated in Fig. 2. Tie rods 35 extend longitudinally through the hollow ribs R and are anchored at the wheels 22 to brace and reenforce the cylinder structure.

The opening 16 is provided to facilitate the easy insertion and removal of the clothes and is provided in one of the side wall sections 21 of the cylinder 15. The opening 16 is preferably rectangular and elongated longitudinally of the cylinder 15 as illustrated. In the form of the invention illustrated in Figs. 1, 2, 4 and 5 of the drawings, the opening 16 is spaced between the longitudinal edges of its side wall section 21.

The cylinder structure thus far described is fully disclosed and claimed in my co-pending application, Serial No. 352,582, filed August 14, 1940, now Patent No. 2,323,993 dated July 13, 1943.

The closures or doors 17 are provided to prevent the passage or loss of the clothes through the opening 16 during the operation of the machine. The doors 17 are shaped and proportioned to fully close or completely occupy the opening 16 and to form symmetrical continuations of the cylinder wall. While but one door 17 may be employed I prefer to use two doors of like size and shape. The pair of doors 17 forms a closure which is somewhat larger than the opening 16 so that the doors have marginal portions overlying and bearing on the cylinder 15 along the several edges of the opening 16, when the doors are in their closed positions. The doors 17 are elongate members of the same curvature of the cylinder sections 21 to be concentric with and to evenly bear on the outer surfaces of the section 21 which has the opening 16. Perforations 36 similar to or identical with the perforations 29 are provided in the doors 17. The inner edges of the doors 17 are reenforced by angular members 37 and the outer edges of the doors are reenforced by similar but somewhat angular members 38. The members 37 and 38 may be welded, riveted or otherwise fixed to the outer surfaces of the doors 17 and are arranged to have upstanding flanges or projecting flanges flush with the adjacent end edges of the doors. The wall of the cylinder 15 may be reenforced at the opening 16 by a reenforcing strip 39 riveted, welded or otherwise fixed to the

internal surface of the cylinder to surround the opening.

The means 18 for guiding the doors 17 is an important feature of the invention. The means 18, in addition to supporting and guiding the doors 17, ties the doors into the cylinder structure so that the doors dependably connect the portions of the cylinder at opposite sides of the opening 16 to strengthen and reenforce the cylinder structure and so that the doors themselves are dependably supported against displacement, buckling, racking, etc. In the form of the invention illustrated in Figs. 2 and 4 to 7, inclusive, of the drawings, the means 18 includes guide rails applied to the outer surface of the cylinder 15 to extend along the upper and lower edges of the opening 16. These rails are of like construction and each includes a base part 40 which is flat or slightly curved to lie against the outer face of the shell 15. The base parts 40 may have out-turned flanges 41 extending along what may be termed their outer edges to strengthen the rails. The rails further include parts 42 projecting outwardly or radially at the inner edges of the base parts 40 and parts 43 extending laterally from the outer edges of the parts 42 to be substantially parallel with the base parts 40 and to be spaced outwardly from the wall of the cylinder 15. Lips 44 are turned in at the outer edges of the parts 43 at abrupt or acute angles to the parts 43. The lips 44 are of less radial extent than the parts 42 so that their inner edges are spaced from the wall of the cylinder 15. The rails just described may each be a one piece continuous element extending throughout the length of the cylinder 15, that is between the reenforcing rings 27 on the opposite ends of the cylinder. The rails define grooves or channels which have restricted mouths or entrances facing toward one another. The guide rails are located so that their lips 44 are immediately adjacent the upper and lower walls of the opening 16.

The door guiding means 18 further includes runner parts on the doors 17 cooperating with the above described rails. In the preferred construction illustrated these runner parts are integral with the doors 17, it being understood that they may be separately formed elements suitably attached to the doors. The door runners extend along the upper and lower edges of the doors 17 and may be continuous. The door runners comprise parts 45 projecting outwardly from the doors 17 at acute angles thereto. The parts 45 are disposed at the same angles as the parts 44 and are arranged to bear or ride on the inner surface of the parts 44. The door runners further include substantially flat parts 46 on the outer edges of the parts 45 shaped and arranged to ride on the inner sides of the rail parts 43. The outer edges of the parts 46 slidably cooperate with the inner surface of the guide parts 42. It will be seen that the parts 45 cooperating with the parts 44 and the parts 46 slidably engaging with the parts 42 and 43 dependably hold the doors 17 against outward and circumferential displacement. The cooperation of these parts is such that the doors 17 may normally be under tension and is such that the doors effectively tie together the portions of the cylinder wall at the upper and lower sides of the opening 16 to aid in the transmission of the tensile forces resulting from the outward impacts of the clothes masses within the cylinder. The doors 17 tied into the sectional cylinder 15 by the means 18

reenforces the cylinder and completes the wall of the cylinder at the opening 16 so that the opening may be of suitable or adequate dimensions without weakening the cylinder structure. It is to be understood that the parts of the guide means 18 are related so that the doors 17 are freely shiftable between their closed and open positions.

Fig. 3 of the drawings illustrates a modified or alternative form of guide means in which the rail provided at one edge of the opening 16 is an extension or part of the adjacent clothes lifting rib R. In this construction the opening 16 has one longitudinal wall, say the lower wall, adjacent the rib R and the portion 33 of the rib R is provided with a laterally projecting extension or part 47. The part 47 corresponds to the above described parts 43 and projects toward the opening 16 in spaced generally parallel relation with the wall of the cylinder 15. A lip 44a corresponding to the lips 44 projects inwardly from the edge of the part 47 at an acute angle to cooperate with the runner part 45 on the doors 17. The part 46 slidably engages against the inner surface of the part 47 and its edge rides on the adjacent and opposing flange 32 of the cylinder 15. The door guiding means at the other edge or upper edge of the opening 16 may be as illustrated in Fig. 1.

The lock means or latch means 19 serves to hold the doors 17 in the closed positions when the machine is in operation and are readily releasable to allow the doors to move to their open positions. There is a separate latch means 19 for each door 17 and in the preferred structure each means 19 includes a case or housing 48. The housings 48 are welded, riveted or otherwise fixed to the inner surface of the cylinder 15 adjacent the opposite ends of the opening 16. In practice the housings 48 may have flanges 49 attached to the cylinder 15. A latch 50 is mounted in each housing 48. Pivot pins 51 pivotally support the latches 50 between pairs of lugs 52 formed on the walls of the housings 48. Longitudinal openings or slots 53 are provided in the wall of the cylinder 15 to communicate with the interiors of the housings 48 and the latches 50 project through these openings to cooperate with the outer ends of the doors 17. The latches 50 are supported on axes spaced outwardly beyond the doors 17 and the latches are formed and arranged to project outwardly and toward the ends of the doors. The outer ends of the latches 50 are flat to cooperate with the ends of the doors 17 and the angle members 38 of the doors. The angle of the latches 50 with respect to the plane occupied by the doors 17 is slight so that the latches are under endwise compression when in engagement with the doors to hold the doors closed. The relationship of parts is such that the inner edges of the doors and the angular members 37 thereon cooperate or abut when the latches 50 engage with the outer ends of the doors. Tails 54 on the latches 50 cooperate with stops 55 in the housings 48 to stop the outward pivoting of the latches and to hold the latches where they engage the ends of the doors 17. Springs 56 anchored in the housings 48 are connected with the latches 50 to urge the latches outwardly for latching or holding engagement with the doors. The outer edges of the latches 50 are provided with sloping surfaces 57 to facilitate the release of the latches as will be later described. The housings 48 and the openings 53 are formed

to fully receive the latches 50 when they are retracted.

The invention provides novel and effective means for releasing the latches 50. Each door 17 carries a pair of spaced guides 58 and 59 longitudinally aligned with the latches 50. The guides 58 and 59 are arranged adjacent the inner and outer ends of the doors 17 and may be angle members positioned in edge to edge engagement with the reenforcing members 37 and 38, respectively. Latch releasing rods 60 are slidably guided in openings in the guides 58 and 59 and the reenforcing angle member 38. The rods 60 extend outwardly beyond the guide members 38 and their outer ends are engageable with the sloping surfaces 57 of the latches 50. Handle means are provided on the inner ends of the rods 60. Handles 61, provided with internal grooves 62 for the reception of the rods 60, are fixed to the rods by screws or the like. The handles 61 are recessed at their inner sides to engage over the guides 58 and have inwardly projecting flanges or lugs 63 at their inner edges. The lugs 63 engage with the ends of the rods 60 and are adapted to cooperate with the outstanding flanges of the guides 58 to limit the outward movement of the handles and the rods 60. The outer sides of the lugs 63 are spaced a suitable distance from the outstanding flanges of the reenforcing members 37 and are easily manually engaged for the manual outward shifting of the rods 60. It will be observed that the rods 60, the handles 61, the latches 50 and the guide parts 58 and 59 all lie close to the surface of the cylinder 15 so that they cannot interfere with the shell S.

The handles 61 may be manually shifted in opposite directions or toward the ends of the cylinder 15 to release the latches 50 and to shift the doors 17 to their open positions. The initial portions of the outward movement of the handles 61 shift the rods 60 with respect to the doors 17 and the outer ends of the rods cooperate with the sloping surfaces 57 to swing or pivot the latches 50 inwardly out of engagement with the doors 17. The lugs 63 then come into engagement with the outstanding flanges of the guides 58 for the direct transmission of movement to the doors 17 and the doors are shifted outwardly or opened. As the doors 17 move outwardly they ride over the released latches 50 holding the latches retracted and covering the latches and the openings 53. The outward movement of the doors 17 may be limited by the outer ends of the doors engaging the rings 27. Suitable stops 65 may be provided in the rails of the guide means 18 to limit the inward movement of the individual doors 17 to stop the doors in their closed positions. When a door 17 is moved to its closed position it uncovers the opening 53 allowing the latch 50 to pivot outwardly under the action of its spring 56 so that the latches again engage with the end of the door to hold the door closed.

It is believed that the utility and practicability of the improved cylinder structure of the invention will be understood from the foregoing detailed description. The door supporting and guiding means 18 ties or connects the doors 17 in the cylinder 15 in such a way that the doors are fully operative as wall parts of the cylinder for the transmission of the forces to which the cylinder is subjected by reason of the clothes masses striking outwardly against the wall of the cylinder. The means 18 dependably supports the doors 17 to prevent them from buckling

and from being displaced and reenforces both the edge portions of the doors and the parts of the cylinder 15 adjacent the opening 16. The means 18 may hold the doors under tension to better resist flexing, bulging and displacement. The door latch means 19 are easily released by merely pressing outwardly on the handles 61 and this operation may serve to move the doors to their open positions. It will be observed that the latch means 19 do not embody spring, projecting parts or delicate parts on the doors which might be injured or which might foul the clothes being placed in and removed from the cylinder 15. The latches 50 are entirely covered and protected when the doors 17 are open and there is no possibility of injuring or fouling the latches. The latches 50 are automatically restored to their active positions upon closing of the doors and it is unnecessary to set or condition the latches.

Having described typical preferred forms and applications of my invention I do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to myself any variations or modifications that may appear to those skilled in the art or fall within the scope of the following claims.

Having described my invention, I claim:

1. In a washing machine, a hollow washing cylinder having an opening in its wall for admitting and removing the clothes, a door for the opening, and means for shiftably guiding the door for movement between open and closed positions comprising runner parts on the door extending substantially parallel with the longitudinal axis of the cylinder and presenting opposing surfaces, and elongate guide parts on the cylinder extending longitudinally of the cylinder at opposite sides of the opening and cooperating with said opposing surfaces to guide the door for said movement and transmit circumferential forces between the door and cylinder in both directions.

2. In a washing machine, a hollow washing cylinder having an opening in its wall for admitting and removing the clothes, a door for the opening, and means for guiding the door longitudinally of the cylinder for movement between the open and closed positions, said means comprising interlocking parts on the door and cylinder extending longitudinally of the cylinder at opposite sides of the opening capable of transmitting circumferentially directed forces in both directions between the cylinder and door whereby the door may be maintained under tension.

3. In a washing machine, a hollow washing cylinder having an opening in its wall for admitting and removing the clothes, a door for the opening, guide rails on the cylinder extending longitudinally of the cylinder, and runner parts on the door shiftably engaged in the guide rails for supporting the door for movement between its open and closed positions and for tying the door into the cylinder structure for the transmission of circumferentially directed compression and tensile forces between the parts of the cylinder at opposite sides of the opening.

4. In a washing machine, a hollow washing cylinder having an opening in its wall for admitting and removing the clothes, a door for the opening, and guide means for the opposite longitudinal edge portions of the door supporting the door for movement longitudinally of the cylinder between the open and closed positions, each guide means comprising two elements, one on the cylinder extending longitudinally thereof at one side of the opening, the other on the door

and extending along one longitudinal edge portion thereof, one element being a channel member having spaced opposing longitudinal walls, the other element being a runner received in the channel member and shiftably engaging said opposing walls.

5. In a washing machine, a hollow washing cylinder having an opening in its wall for admitting and removing the clothes, a door for the opening, and guide means for the opposite longitudinal edge portions of the door supporting the door for movement longitudinally of the cylinder between the open and closed positions, each guide means comprising a channel part on the cylinder presenting spaced opposing surfaces, and a runner on the door slidably operating in the channel and cooperating with said surfaces for the transmission of forces in both directions circumferentially of the cylinder.

6. In a washing machine, a hollow washing cylinder having an opening in its wall for admitting and removing the clothes, a door for the opening, the door slidably bearing on the external surface of the cylinder along the longitudinal margins of the opening, and means at each longitudinal edge of the door for guiding the door between the open and closed positions, each of said means comprising an element extending along a longitudinal edge portion of the door and an element on the cylinder and extending longitudinally along one margin of the opening, one element being a channel member having spaced opposing walls one of which is pitched with respect to a radial plane of the cylinder, the other element being a runner slidably received in the channel member and cooperating with said side walls to tie the door into the cylinder structure, the cooperation of the runner with the pitched wall holding the door against the cylinder.

7. A cylinder for a washing machine comprising a plurality of sections joined to form the cylinder wall, one of the sections having an opening for the admission and removal of the clothes, a part secured between the edges of said section and the adjacent section to extend longitudinally of the cylinder, a guide formed on said part to project from the exterior of the cylinder, a lifting rib formed on said part and projecting into the interior of the cylinder, a door for said opening, and means for guiding the door for movement between the open and closed positions including a runner on the door slidably cooperating with the guide.

8. In a washing machine, a hollow washing cylinder having an opening in its wall for admitting and removing the clothes, a slidable door for the opening, a latch recessed in the cylinder and projecting therefrom to engage the door for the purpose of holding the door closed and positioned to be covered by the door when the door is open, and means for releasing the latch, said means comprising a cam face on the latch and a shiftable member on the door for slidably cooperating with the cam face to depress the latch.

9. In a washing machine, a hollow washing cylinder having an opening in its wall, a door for the opening movable between the open and closed positions, a latch on the cylinder for holding the door closed, a slidable part on the door for releasing the latch, a handle for said part movable with respect to the door in the direction in which the door is moved when moved to the open position, and means for limiting said movement of the handle so that initial manual movement of said handle in said direction releases the latch and continued movement of the handle in said direction opens the door.

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