

Nov. 30, 1943.

N. CRANE

2,335,560

LAUNDRY APPARATUS

Filed Nov. 26, 1940

3 Sheets-Sheet 1

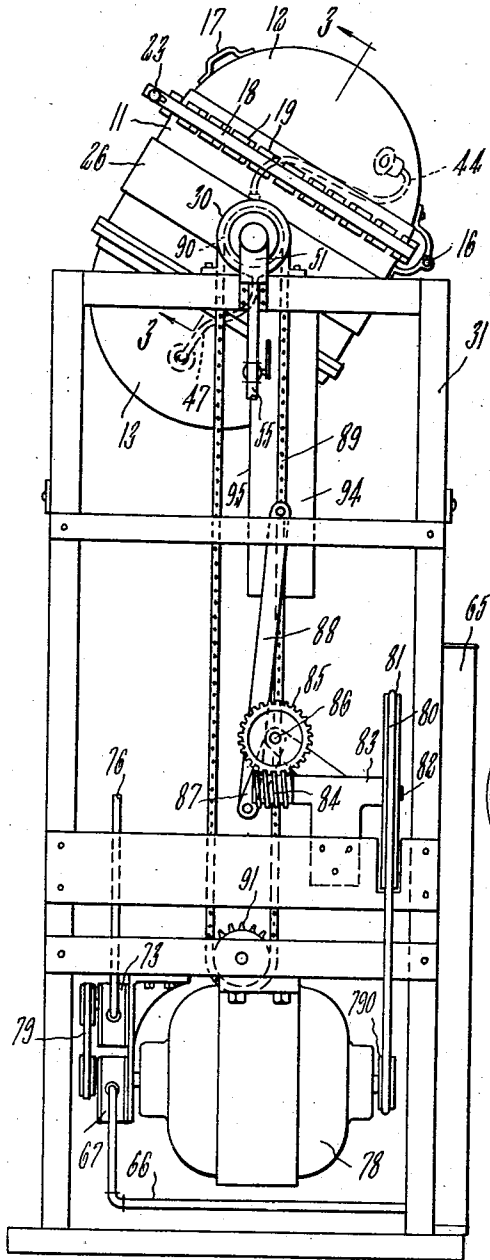


Fig. 1.

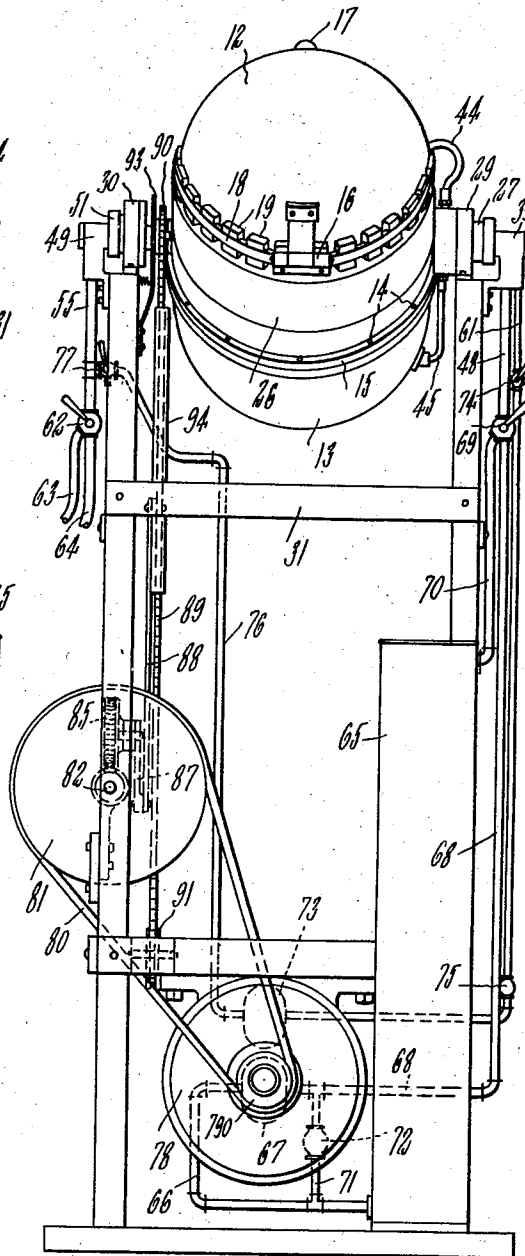


Fig. 2.

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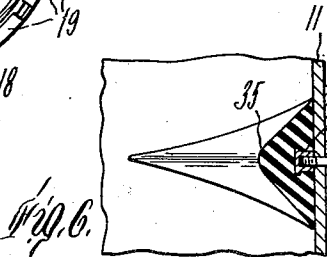
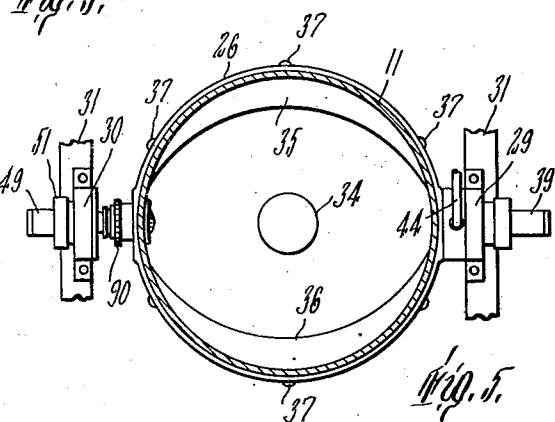
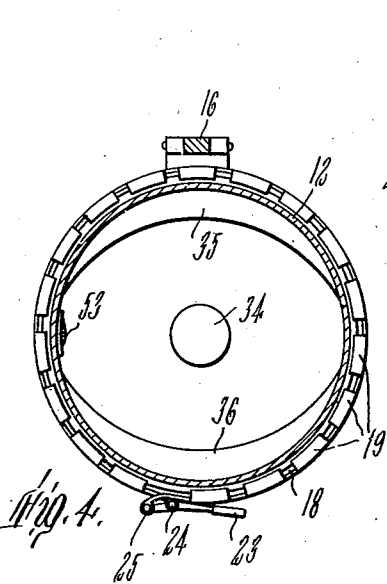
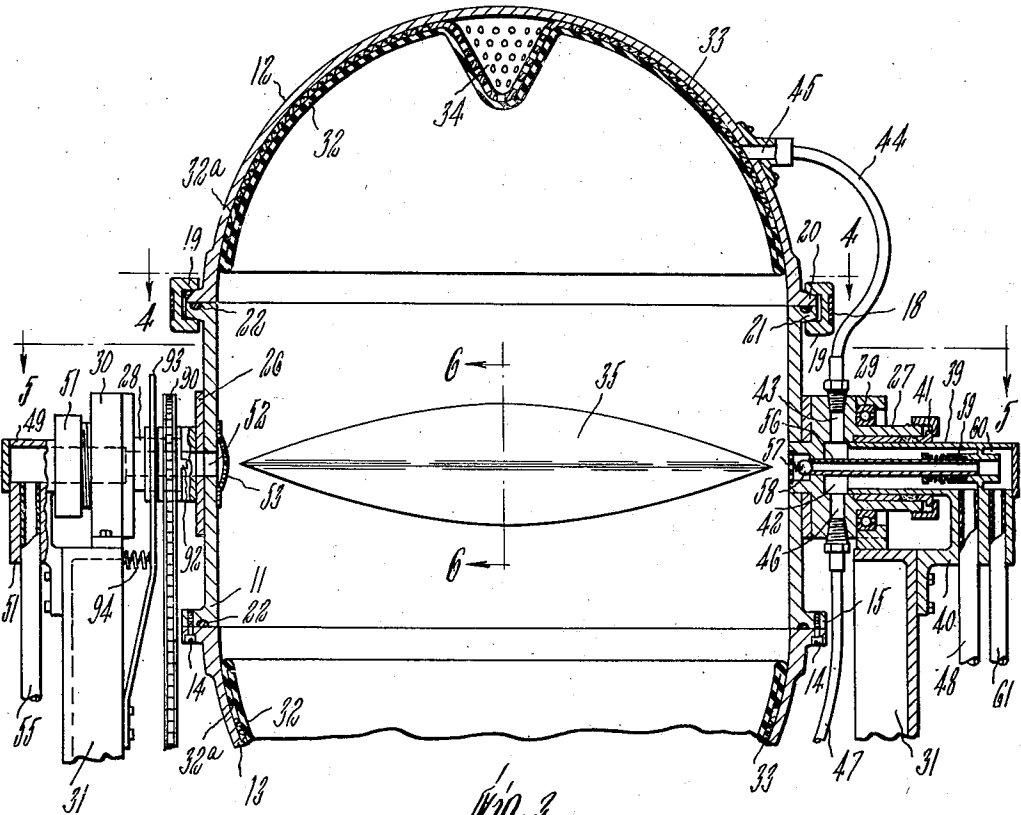
N. CRANE

2,335,560

LAUNDRY APPARATUS

Filed Nov. 26, 1940

3 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,335,560

LAUNDRY APPARATUS

Newton Crane, Needham, Mass.; Brayton Morton, Westport, Mass., and James H. Perkins, Westwood, Mass., executors of said Newton Crane, deceased

Application November 26, 1940, Serial No. 367,190

10 Claims. (Cl. 68—21)

This invention is concerned with machines for washing clothing and other textile fabrics. Its object is to provide an improved machine of this type having a better cleansing action by causing a more effective tumbling of the clothes and passage of washing water through them, and including means for extracting the water used for washing and rinsing from the clothes without injury to the fabrics, even those of the thinnest and most delicate character, and without setting up vibrations in the machine.

The principles of the invention may be embodied in apparatus of convenient sizes for domestic use, and in larger dimensions for the uses of commercial laundries. Differences in construction and mode of operation may be incorporated in machines equipped with relatively large or relatively small clothes containers.

In the drawings furnished herewith I have shown two preferred forms in which the invention may be embodied commercially, but without intent to indicate any limitations in the scope for which I claim protection.

Fig. 1 is a side elevation of one embodiment of the invention;

Fig. 2 is an elevation of the same embodiment as viewed from the right hand side of Fig. 1;

Fig. 3 is a sectional view, enlarged, of the clothes container, taken on line 3—3 of Fig. 1;

Figs. 4 and 5 are cross sections taken on lines 4—4 and 5—5 respectively of Fig. 3 and represented on the same scale as Figs. 1 and 2;

Fig. 6 is a detail section taken on line 6—6 of Fig. 3;

Fig. 7 is a view similar to Fig. 1 of a modified form of machine;

Fig. 8 is a sectional view similar to Fig. 3 of the clothes container shown in Fig. 7;

Fig. 9 is a cross section taken on line 9—9 of Fig. 8;

Fig. 10 is a detail sectional view taken on line 10—10 of Fig. 8.

Like reference characters represent the same parts wherever they appear in all the figures.

The machine includes a clothes container of novel construction and character. Salient features of this container are, a cylindrical central section 11 and spherical or dome shaped end sections or heads 12 and 13. Such end sections are preferably hemispheres, but may be polar segments, less than complete hemispheres, of hollow spheres or spheroids, or the complete halves of spheroids. All such forms, and equivalents, are included within the meaning of the terms "spherical" and "dome shaped," as used

in this specification. In the form shown in Figs. 1—6, the spherical head 13 is permanently secured to the cylindrical central section by means of bolts 14 passing through adjacent flanges 15 of the contiguous sections. The head 12 is displaceable from the central section to permit insertion and removal of the clothes and other fabrics to be washed. It is connected to the central section by a hinge 16 and provided with a handle 17 for convenience in opening and closing it.

This head constitutes a cover. When closed, it is locked and retained in leakage tight engagement with the body by clamping means which embody a secondary feature of the invention. Such clamping means consists of a flexible inextensible band 18, which may be made of spring steel or other resilient metal, and a series of wedge blocks 19 separately welded or riveted to the band near to one another. These wedge blocks, as shown in Fig. 3, are located between the band and the clothes container and are recessed at the side next to the container so as to pass over external flanges 20 and 21 on the abutting edges of the cover and body respectively. Such flanges and clamp blocks are complementally tapered or wedge shaped so that when the band is tightened around the container the clamp blocks will crowd the flanges together. A packing ring or washer 22 is inserted between the flanges to make a leakage tight joint when they are thus crowded together. The hinge 16 is offset so as to lie outside of the band. The latter may be attached or not, as desired, to one member of the container. The free ends of the band may be connected and drawn together to perform the clamping function by a clasp 23 of any suitable character. The form of clasp here shown (Fig. 4) is a toggle lever of known character connected by pivots 24 and 25 with the opposite ends of the band. It is possible, of course, to provide two bands and connect them to one part of the hinge in an arrangement permitting their free ends to pass around opposite sides of the container and to be joined in the manner described.

The cylindrical section of the clothes container is surrounded in its mid length by a reinforcing ring 26 to which are secured trunnions 27 and 28 projecting outwardly from opposite ends of a diameter of the ring. These trunnions are mounted in bearings 29 and 30 respectively on a supporting frame 31. An important feature of the invention is that this manner of mounting of the container allows it to be rotated about an

axis transverse to its length dimension and symmetrically located with respect to the bounding walls of the container. In other words, the axis of rotation intersects the longitudinal axis of the container at right angles thereto and midway between the ends of the container. The trunnions contain passageways for water, as presently described.

A flexible, distensible and water-impervious diaphragm 32 is located in each dome-shaped head of the clothes container. These diaphragms may be made of vulcanized rubber composition or other materials, including those which are not injuriously affected by cleaning agents which attack natural rubber, shaped or molded to fit the interior of the spherical or dome-shaped heads and to provide a turned back lip 32a which is cemented to the inner surface of the head near the junction thereof with the cylindrical central section. The diaphragms are thereby enabled to lie close to the heads, as shown in Fig. 3, and also to be displaced therefrom toward the middle transverse plane of the container by water or air forced between the diaphragms and the head walls. A screen 33 is situated between each head and the adjacent diaphragm to provide channels through which water may flow freely when the diaphragms are situated in the position shown. Such screens prevent the possibility of the diaphragms sticking to the heads, or being held by a partial vacuum or other force in such close contact therewith as to prevent free passage of water from a single inlet to all parts of the area of the diaphragm. Woven wire screening is adequate to serve this purpose, which is essentially that of a separator, but other separators of different constructions, provided they furnish adequate water channels, may be used equally well.

A perforated, hollow, conical boss 34 is secured to the inner surface of each head in the polar region thereof for the purpose of tumbling and turning the mass of fabrics being washed when the container is rotated. The diaphragms are molded to embrace and conform to these bosses without being stretched in order both that the bosses may apply the desired tumbling effect to the clothes and avoid overstressing the diaphragm by internal fluid pressure. Other protuberances 35 and 36 are secured to the inner walls of the central section 11 at opposite sides of the axis of rotation, to assist in tumbling the clothes. The latter protuberances are lune shaped in elevation and triangular in cross section, with cylindrical external curvature to fit the cylindrical portion of the container. They are preferably made of resilient vulcanized rubber and may be secured in place by bolts 37 passing through the walls of the container into embedded nuts 38, as shown by Fig. 6.

A tube 39 for conveyance of water to the spaces between the end walls and diaphragms is supported by a bracket 40 on the frame in coaxial relation to the tubular trunnion 27, and enters the trunnion, being made leakage tight therein by a stuffing box 41 of any suitable character. Tube 39 opens into a chamber 42 in the trunnion from which a radial passage 43 extends and is joined by a flexible tube 44 with an inlet 45 in the head 12. A similar passage 46 is connected by a tube 47 with a like inlet in the head 13. An external pipe 48 is connected to a passage in the bracket 40 which opens to the interior of tube 39, for supply and exhaust of

water to and from the spaces between the heads of the container and the diaphragms.

A tube 49 enters the tubular trunnion 28 through a stuffing box 50 and is mounted on a bracket 51 secured to the frame at the opposite side of the container from the bracket 40. The connection of tube 49 with trunnion 28 is essentially similar to the connection between tube 39 and trunnion 27. But the bore or passageway through the trunnion 28 opens directly into the interior of the container through a port 52 which is covered by a strainer 53 to exclude the fabrics from the port. An external pipe 55 connected with tube 49 serves for supplying and exhausting water for washing and rinsing.

An inner tube 56 is coaxially secured within the trunnion 27 and tube 39 and opens to the interior of the clothes container through a strainer 57, being closely fitted in a passage through the inner bounding wall of chamber 42. It is equipped with a spring pressed check valve 58 to prevent outward flow of water. The outer end of this inner tube passes through a stuffing box 59 within the stationary tube 39 into a chamber 60 within the bracket 40, which is closed off by a partition from said tube and is connected with an external air tube 61. The tube 61, chamber 60 and inner tube 56 serve to admit air for retracting the diaphragms, after the clothes have been squeezed thereby, and for then aerating and partially drying the clothes after water has been expressed from them.

The wash water tube 55 is connected under control of a valve 62 with tubes 63 and 64, one of which tubes may be coupled with a supply of water, such as the hot and cold water faucets commonly provided in domestic laundries, and the other may be connected to the sewer or led to any receptacle which has a waste outlet. Valve 62 may be a three way valve of well known character shiftable so as to connect either tube 63 or 64 exclusively with the tube 55, or to close off the tube 55 entirely. Any suitable connections may be made between the tube 63 and the hot and cold water supply faucets or a mixing valve to which hot and cold water may be supplied.

Pipe 48 for supplying water to actuate the diaphragms may receive water from any source and exhaust the water to any outlet under control of a shiftable valve, but I prefer, to avoid wastage of water, to provide a body of water which can be used repeatedly for this purpose. In this illustration, a tank 65 of holding capacity substantially equal to that of the container is mounted on the frame. A pipe 66 leads from a low level in the tank to a pump 67, and a pipe 68 leads from the pump to pipe 48 through a three way valve 69. A return pipe 70 passes from valve 69 to the tank. Said valve may be set to connect either pipe 68 or pipe 70 with pipe 48 or to close off all communications. A bypass connection 71 is made between the pipes 66 and 68, in which a relief valve 72 is located.

The air pipe 61 is connected to one side of an air pump 73 and contains a shut off valve 74, having a vent to atmosphere, and a relief valve 75. The other side of the air pump is connected by a pipe 76, through a shut off valve 77, having a vent to atmosphere, with the pipe 55. Valve 74 is adapted to be set for either making a continuous passage through pipe 61, closing the vent, or to close such passage and open the lower section of the pipe to atmosphere. Valve 77 may be set to connect pipes 76 and 55, closing the vent,

or to close such connection and open pipe 76 to atmosphere. Both valves are assumed to be three-way valves of common character, so well known as to require no specific description or illustration.

The pumps 67 and 73 may be, and are here represented as, gear pumps of known character with inlet and outlet ports to and from which the pipes lead as above described. One of the gears of pump 67 is mounted on a shaft connected with a driving motor 78, and is coupled by means of a pulley and belt drive 79 with the shaft of one of the gears of pump 73. The motor here shown is an electric motor. Both pumps are thus driven in unison.

The same motor also oscillates the clothes container about the axis of trunnions 27 and 28. It is connected by a pulley 79 and belt 80 with a pulley 81 on a shaft 82 mounted to rotate in a bearing 83 secured to one of the structural members of the frame. Shaft 82 carries a worm 84 in mesh with a worm gear 85 on a shaft 86. A crank 87 is secured to shaft 86 and is connected by a connecting rod 88 with a chain 89 which passes around a sprocket 90 loosely mounted on the trunnion 28 and around a sprocket 91 supported on the frame. Sprocket 90 is slidable endwise on the trunnion 28 and carries a clutch member 92 adapted to be engaged with and disengaged from a complementary clutch member on the trunnion. A clutch shifter 93 is engaged with the hub of sprocket 90 and operable to withdraw it from clutched engagement with the clothes container. A spring 94 acts on the clutch shifter and tends constantly to connect the clutch. The portion of the chain adjacent to the point where the connecting rod is attached to it is embraced by guides 94 and 95 to prevent deflection under the thrust of the connecting rod.

This mechanism is designed to give an oscillative movement to the clothes container, turning it through an angle of more than 180°, preferably in the order of 270°, and the clutch is situated so that when the crank is at either dead point the longitudinal axis of the container is at an inclination to the vertical. With the clutch disconnected, the container may be brought to vertical position from any inclination at which it may be left when the motor is stopped.

In the modification shown in Fig. 7, the drive for the clothes container is designed to rotate the container in the same direction continuously. Therefore the shaft 86 carries a sprocket or pulley instead of the crank 87, which sprocket or pulley is connected by a chain or belt 96 with a sprocket or pulley on the trunnion 28 corresponding to the sprocket 90 previously described and adapted to be connected with and disconnected from the sprocket in the same manner.

The container here shown is different from that first described, in that its interior is divided into two chambers by a screen 97 and that both dome-shaped heads 12 and 13 are adapted to be opened. The screen permits water to pass freely from one chamber to the other but prevents the clothes from falling from either end beyond the mid plane when the container is reversed.

Preferably the screen is made of two rings 98 and 99 between which parallel rods, to which the numeral 97 is applied, are confined and secured, suitably by welding. The circumference of the screen is secured in the container by pairs of oppositely inclined screws 100 and 101 passing through the shell of the container, as illustrated in Fig. 10, and located at a sufficient number of

points around the circumference to give adequate support to the screen. Foraminous strainers 102 and 103 are located at opposite sides of the screen across the port 52. In this form of container the head 13, as well as the head 12, is hinged to the central section and is clamped thereto when closed, in the same manner and by identical means as previously described with respect to the head 12. This enables masses of clothing and fabric to be placed separately in either chamber. The connections for water and air are the same here as previously described, and each head contains a perforated hollow boss 34 in its polar region.

It is not essential that the alternative features just described be associated together exclusively. On the contrary, the two-chamber construction with a partition screen midway of the length of the container may be combined with the reversing, or oscillative, drive first described; and the continuous one-way drive may be applied to the single chamber shown in Figs. 1-6. These various combinations may be organized to serve various purposes. For example, for the uses of commercial laundries in which large quantities of goods are washed at the same time in a large container, of which the height may be six feet or more, it is preferable to provide the dividing screen in order that the mass of clothes resting on the screen may partially balance the weight of clothes resting on the lower head, and to limit the distance through which the clothes may fall when the container is turned end for end. But with smaller machines, such as those provided for domestic use, where the height of the container may be two feet or less, it is preferable to omit the screen in order to permit a sufficient movement of the clothes to effect a desired rapidity of flow through them of the washing water. The continuous one-way drive is preferable with machines of the smaller sizes, where a moderately rapid continuous rotation may be carried on without causing the clothes to be held by centrifugal force against either head when passing through the topmost part of its orbit.

It is to be understood that when the machine is set up for use, the axis of rotation of the container is horizontal, or substantially so, whereby rotation of the container in either of the ways herein described causes each head alternately to be placed vertically above the other. The timing of the drive gearing is such that the inversion of the container occurs gradually.

When clothes to be washed are put in the container, the pressure diaphragms are retracted as indicated in the drawings and the container is emptied of water. A quantity of clothes to be washed is placed in the container and the cover then closed and made leakage tight by the wedge clamps. In the case of the single chamber container, the entire batch may be put in it at once upon opening one head only. With the two-chamber container, half the batch (as nearly as feasible) is put in each chamber, the driving clutch being disconnected to permit inversion of the container by hand. In either case the quantity of clothes put into the container at one time is such as will leave room for free movement of the clothes through a considerable distance when the container is inverted. Water for washing or rinsing is then admitted from a source of hot or cold water through pipe 63, valve 62 and pipe 55 to a height less than sufficient to fill the container. If necessary to admit a sufficient quantity of water impelled from a low pressure source,

the air in the container may be partially exhausted by the air pump 73 through pipes 55 and 76 in communication by means of valve 77, the exhausted air being discharged to the atmosphere through the vent of valve 74. But where water is supplied under pressure, as from a city water supply system, the air entrapped in the container may be permitted to remain and be compressed by the entering water.

The driving motor is then started and the transmission gearing is clutched to the container. The container is thereby inverted repeatedly and continuously for as long as the motor is allowed to run or the clutch is left connected. With each inversion the clothes and water in the lower end of the container are lifted. In the first part of their movement from the lowest point of the orbit, the clothes lie quiet against the bottom head and adjacent side walls, and the water runs through them. The clothes begin to slide when the length dimension of the container has passed the horizontal and continue to fall with increasing velocity as the formerly lower end approaches the topmost position. In thus sliding and falling, the clothes are soured into the water and are turned by the baffles 35 or 36. The bosses 34 also stir and assist to turn the clothes. Thus, during each inversion of the container, there is a constant and progressive movement of water through the clothes and of clothes through the water with stirring and agitation of all of the clothes all of the time; the movements which best dislodge dirt from clothes.

With the single chamber container, the clothes thus fall from the upper to the lower end. In the two-chamber container the falling movements are limited from the rising end to the screen in the middle, and from the screen to the descending end. In the latter case, however, the water has free course from end to end and flows through the clothes which rest on the screen.

The speed of swashing of the clothes and water depends on the speed of rotation or oscillation of the container and the influence of centrifugal force. Without attempting to give limiting values, and without indicating any limitation in the scope of the protection which I seek, I may say that in one machine which I have made and operated, in which the container has a length of about 21 inches and diameter of about 11 inches, and is rotated continuously in the same direction, I have obtained excellent results in washing clothes rapidly to cleanness with speeds of from 35 to 40 revolutions per minute. At these speeds the clothes begin to fall when the rising end reaches an elevation of about 30° and dislodgment is complete at about 60° elevation.

To expel the water used for washing and rinsing, the valve 69 is set to connect pipes 68 and 48, valve 62 is set to connect pipe 55 with the waste outlet 64, and the air valves 74 and 77 are set to admit air to the container. The water pump then delivers water through connections 44 and 47 to the spaces between the heads of the container and the diaphragms 32, displacing the diaphragms toward the mass of clothes from opposite sides of the mass and expelling the wash water from the container. The clothes are then squeezed between the diaphragms, whereby much of the water contained between the strands and fibers of the fabrics is expressed. Very heavy pressures, greater than necessary for my purpose, may be developed by pumps of various known designs, including gear pumps. I have found that a pressure in the order of 150 pounds

per square inch will force out enough of the water contained in the clothes so that the latter can be ironed at once, without need of preliminary air drying. The relief valve 72 is set to sustain this pressure (or may be set to maintain a higher or lower pressure if desired). The excess of water delivered by the pump flows past the relief valve through bypass 71 to the pump intake.

The rotation or oscillation of the container is maintained throughout the expressing phase of the cycle in order to dislodge the clothes from the sides of the container and avoid liability of their being pinched between the container walls and the advancing diaphragms and of being stretched or torn.

Air from the air pump 73 continues to flow into the container while water is being expelled and after the final squeezing effect occurs, blowing the exhaust water out through the drain pipe. Then the outlet valve 62 is closed to prevent outflow of air, and the valve 69 is shifted to disconnect pipe 48 from the water delivery pipe 69 and connect it with the return pipe 70 to the tank. The air pump then builds up a pneumatic pressure in the container which retracts or collapses the diaphragms to their normal position adjacent to the heads, forcing the water, previously used to distend them, back to the supply tank 65. After they have been thus retracted, the valve may be set to release the confined air pressure and, if desired, cause a circulation of air through the chamber for aeration of the clothes and to carry away additional moisture by evaporation.

In the combination here shown, the water and air pumps are continuously driven while the motor is in operation to turn the clothes container. At such times the water delivered from the pump is returned to the intake through the bypass connection 71, and air is taken from the atmospheric vent of valve 77 and discharged to atmosphere from the vent of valve 74. But it is within the contemplation of this invention to provide a clutch of well known character between the pump 67 and the motor, so that the pumps may remain idle during the washing period.

The showing of means in the form of manually operated valves for controlling the admission and exhaust of water to and from the washing chamber and the spaces back of the diaphragms, and the admission and exhaust of air, are illustrative merely of suitable means for effecting such controls. Other means, more or less different from those thus illustrated, and including automatic means for carrying out a complete cycle of washing, rinsing and drying, are within the scope of this invention and of the protection which I claim.

No inferences are to be drawn from the foregoing description to the effect that the apparatus here described is to be used for washing and rinsing clothes with water only. On the contrary, any cleansing fluids, solutions and compounds whatever may be used, including those employed for the so called dry cleaning of garments, etc., as well as water, with and without soap or other detergent, bluing, etc.

It is apparent from the foregoing description, in connection with the drawings, that the lateral walls of the container are symmetrically disposed with respect to a longitudinal axis intersecting, and perpendicular to, the axis of rotation, and that the length of the container along such axis is greater than the width dimensions of the container both along the axis of rotation and in directions perpendicular to both said axes. The

dimensions of the container in directions perpendicular to the axis of rotation and to each other are unequal, being greater in the direction of length, (the longitudinal axis above referred to), than in the direction at right angles to said longitudinal axis and to the axis of rotation.

What I claim and desire to secure by Letters Patent is:

1. A laundry machine comprising a substantially cylindrical container having dome-shaped heads, pivot means supporting said container rotatably on an axis midway between the summits of said heads and lying in a diameter of the mid zone of the container, flexible diaphragms normally lying adjacent to the inner surfaces of said heads, means for forcing fluid under pressure between said diaphragms and the heads in which they are respectively contained, whereby the diaphragms are forced toward one another, the container having provisions for egress of cleaning fluid at a point between the heads.

2. A laundry apparatus comprising a container for goods to be washed and washing fluid having a cylindrical central portion and dome-shaped ends, the distance between the summits of said dome-shaped ends being greater than the diameter of the central section, trunnions projecting from the midlength of the central section at opposite ends of a diameter thereof, bearings supporting said trunnions rotatably on a horizontal axis, flexible, fluid-impervious diaphragms substantially conforming to the inner walls of the respective heads and secured to said walls in fluid tight connection in a manner to permit displacement of the diaphragms toward the middle transverse plane of the container, means including a channel in one of said trunnions for admitting fluid under pressure between the respective diaphragms and the contiguous head walls, means for permitting ingress and egress of cleaning fluid through the other trunnion, and means for turning the container about the axis of said trunnions through distances and in directions sufficient to bring either end vertically over the other end.

3. A laundry apparatus comprising a container for goods to be washed and for cleaning fluid pivotally supported to rotate about a horizontal axis, said container having a length in one direction perpendicular to the axis of rotation which is greater than the width in a direction perpendicular to said axis and to said length dimension, and having end walls at the opposite ends of the longer dimension, said end walls being substantially equidistant from the axis of rotation, flexible, fluid-impervious diaphragms situated adjacent to the respective end walls and connected to the container in a manner permitting them to be displaced from the end walls toward the middle transverse plane of the container, means for rotating the container so as to cause gravity displacement of the contained goods and washing fluid from either end toward the other, and means for introducing fluid under pressure between the ends of the diaphragms respectively adjacent thereto, whereby to cause squeezing force to be exerted by said diaphragms on the goods in the container; there being provisions for discharge of cleaning fluid while such squeezing pressure is exerted.

4. A laundry apparatus comprising a container for goods to be washed and for cleaning fluid having a length dimension greater than its width dimensions at any location between its ends, a partition mounted across the interior

of the container substantially midway between the ends thereof, said partition having openings for free passage of the cleaning fluid while being adapted to prevent passage of textile fabrics and the like, pivots supporting said container with provision for rotation about a substantially horizontal axis substantially perpendicular to, and midway of, the length dimension of the container, diaphragms mounted adjacent to the end walls of the container adapted to be displaced toward said partition, and means for introducing pressure fluid between said end walls and the respectively adjacent diaphragms for displacing said diaphragms toward said partition and exerting pressure against the fabrics in the spaces between the diaphragms and partition.

5. In a laundry apparatus, a container having a central section and dome-shaped ends adjoining said central section, said dome-shaped ends having inward protuberances at their summits, an impervious flexible diaphragm mounted in each dome-shaped end conforming in shape to the interior of said end and the protuberance thereof and being united in liquid tight connection with the walls of the container.

6. In a laundry apparatus, a clothes container having a spherical portion, a flexible diaphragm shaped to conform closely with the interior of said spherical portion and being secured in fluid tight connection at its rim with said portion, a separator having intercommunicating spaces for free flow of liquid located between the diaphragm and adjacent spherical wall, and means for admitting liquid into said spaces between the diaphragm and adjacent spherical wall.

7. In a laundry apparatus, a clothes container having a spherical portion, a flexible diaphragm shaped to conform closely with the interior of said spherical portion and being secured in fluid tight connection at its rim therewith, means for admitting fluid between the diaphragm and adjacent wall of the container, and a separator of open wire screening located between the diaphragm and said wall to provide channels through which liquid may flow freely to various parts of the contiguous areas of the diaphragm and spherical wall.

8. A laundry apparatus comprising a clothes container, pivots supporting said container for rotation about a substantially horizontal axis, a flexible, distensible diaphragm adjacent to a wall of the container at one side of such axis, means including a passage through one of said pivots for permitting flow of water into and out of the container, means comprising a passage through the other pivot for forcing water between the diaphragm and adjacent wall of the container to distend the diaphragm and exert a squeezing pressure on the contents of the container, and to permit exhaust of water from such space, and means for delivering air under pressure into the container to retract the diaphragm and expel the water from between the same and the adjacent container wall.

9. A laundry apparatus comprising a container for goods to be washed and for cleaning fluid, pivots supporting said container rotatably to turn about a substantially horizontal axis, means including passages through said pivots to the interior of the container for admission and exhaust of cleaning fluid and air, a distensible and retractable diaphragm mounted in the container adjacent to a wall thereof eccentric to the axis, and means for delivering fluid under pressure through one of said pivots to a delivery point be-

tween the diaphragm and adjacent container wall, whereby to distend the diaphragm and exert pressure through the same against the contents of the container.

10. A laundry apparatus comprising a container for goods to be washed and for cleaning fluid, pivots supporting said container rotatably to turn about a substantially horizontal axis, means including passages through said pivots to the interior of the container for admission and exhaust of cleaning fluid and air, a distensible and retractable diaphragm mounted in the container adjacent to a wall thereof eccentric to the axis,

and means for delivering fluid under pressure through one of said pivots to a delivery point between the diaphragm and adjacent container wall, whereby to distend the diaphragm and exert pressure through the same against the contents of the container, combined with motive means, mechanism driven by said motive means for turning the container about said axis, a water pump and an air pump driven by said motive means, and connections between said pump and certain of the before-named passages.

NEWTON CRANE.

NEWTON CRANE.

CERTIFICATE OF CORRECTION.

Patent No. 2,335,560.

November 30, 1943.

NEWTON CRANE.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 5, first column, line 65, claim 3, for "of" read --and--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 18th day of January, A. D. 1944.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.