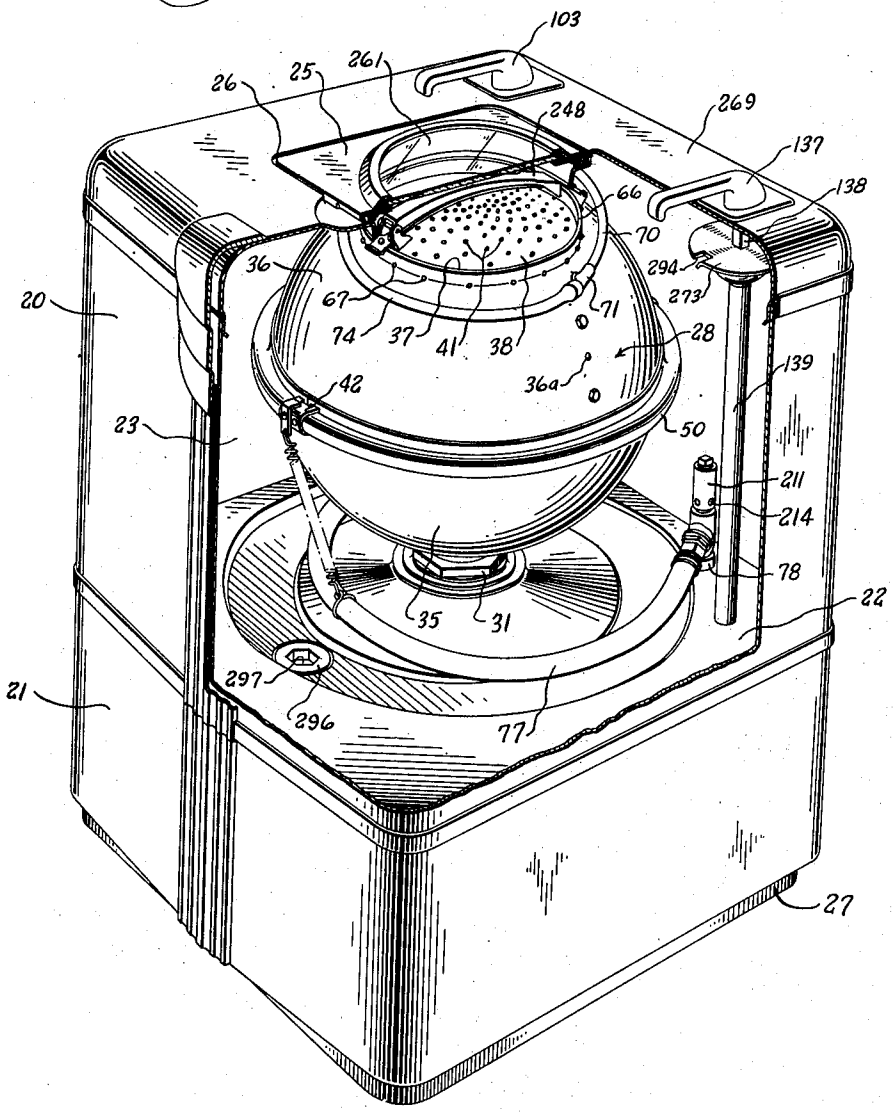
Sept. 8, 1953 J. F. HORVATH 2,651,190

CLEANING AND EXTRACTING APPARATUS

Filed Jan. 30, 1947

10 Sheets-Sheet 1

Fig. 1.



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CLEANING AND EXTRACTING APPARATUS

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10 Sheets-Sheet 2

Fig. 2.

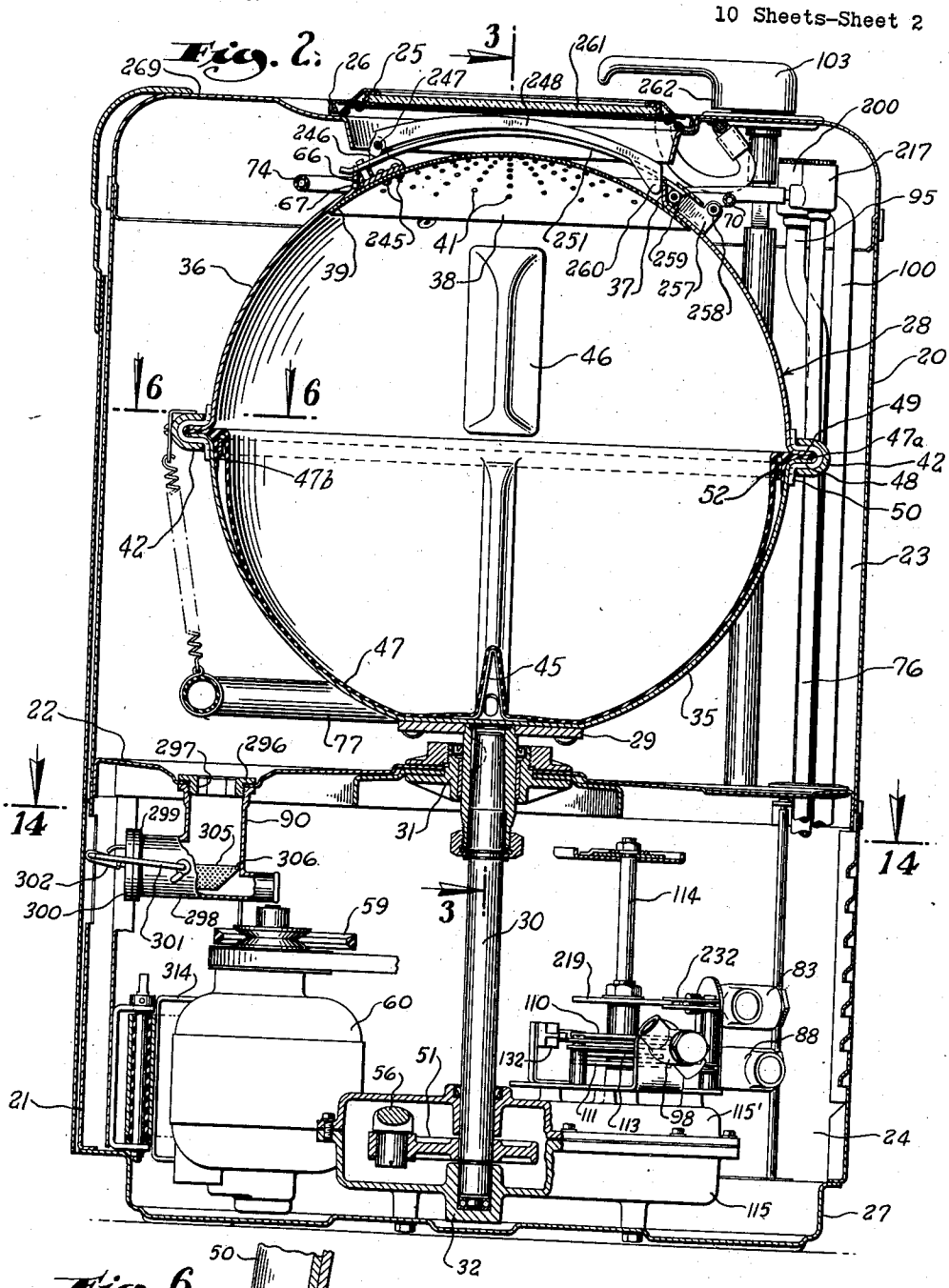
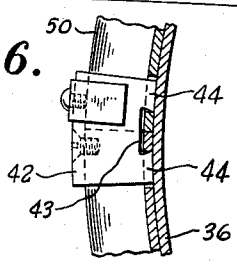


Fig. 6.



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CLEANING AND EXTRACTING APPARATUS

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10 Sheets-Sheet 3

Fig. 3.

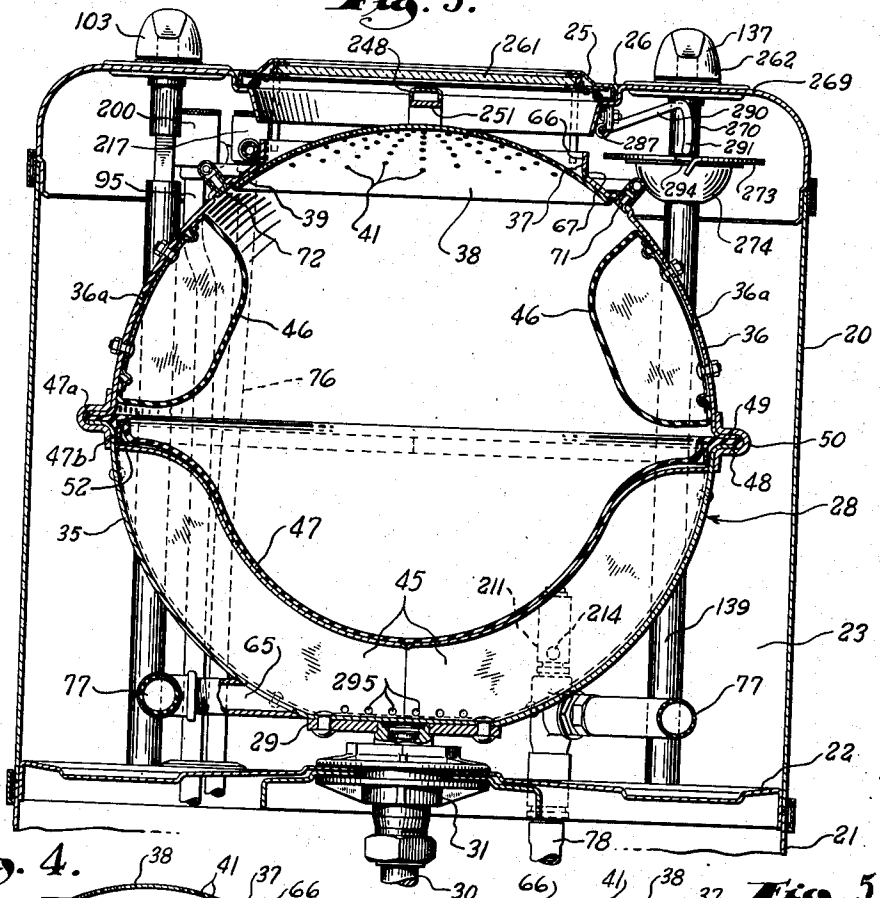


Fig. 4.

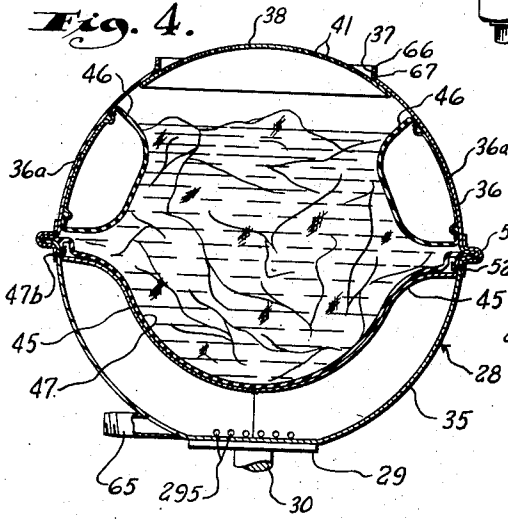
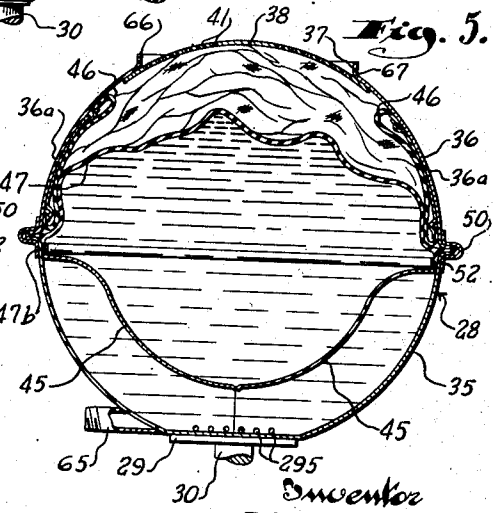


Fig. 5.



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CLEANING AND EXTRACTING APPARATUS

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Fig. 7.

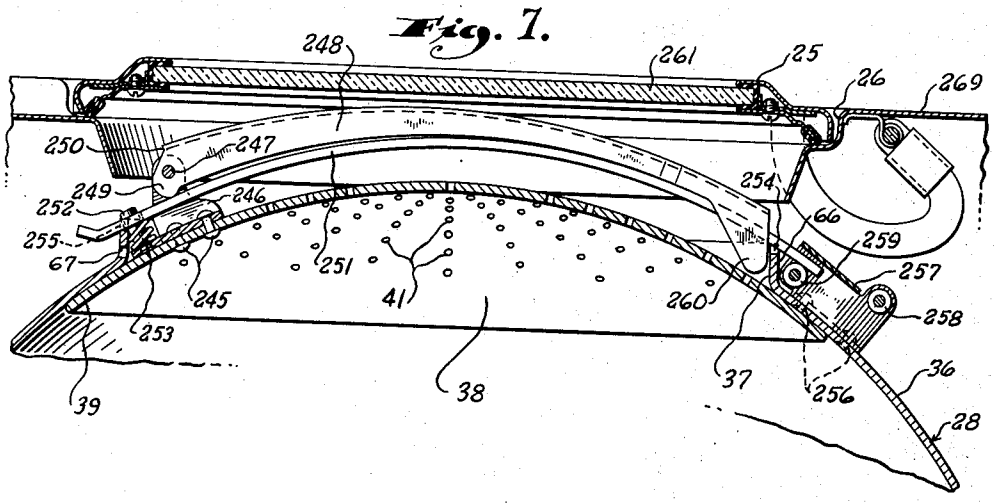
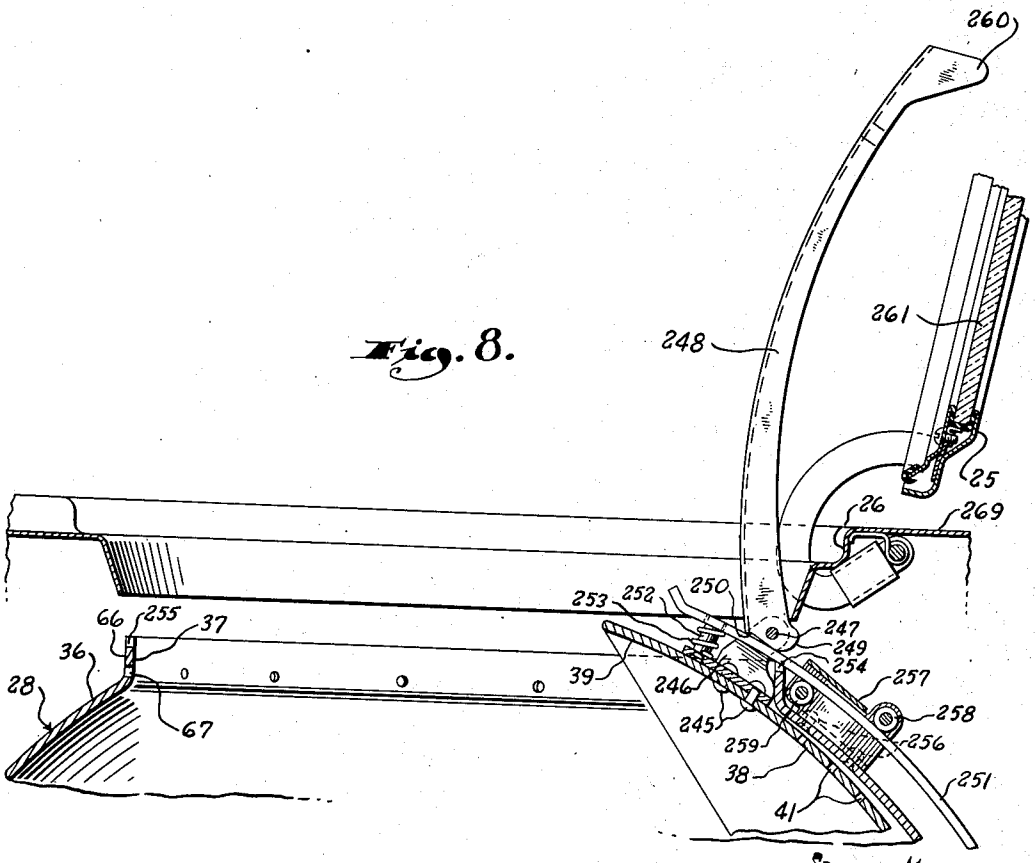


Fig. 8.



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CLEANING AND EXTRACTING APPARATUS

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Fig. 9.

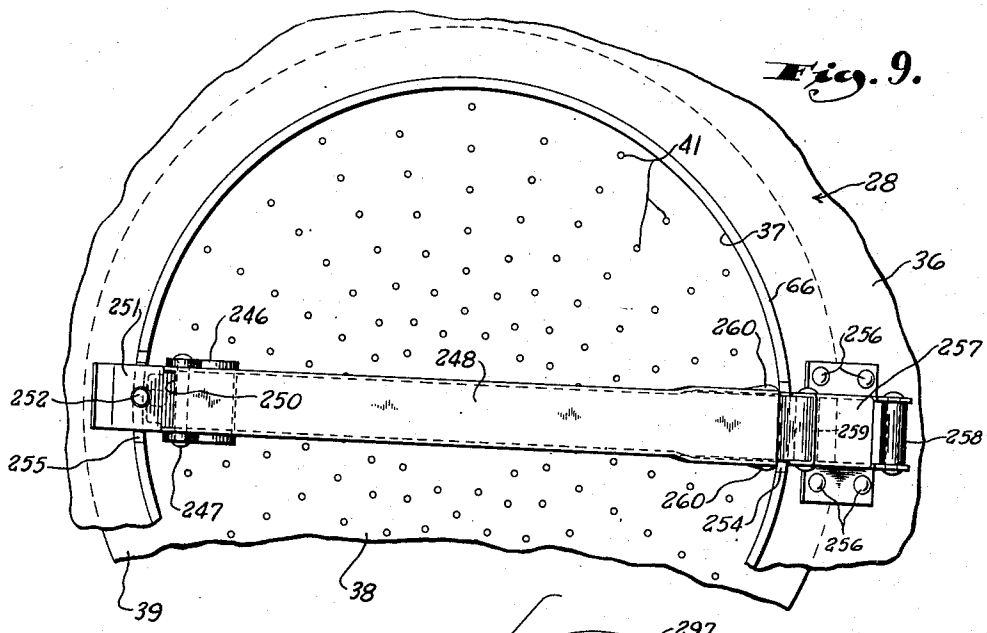
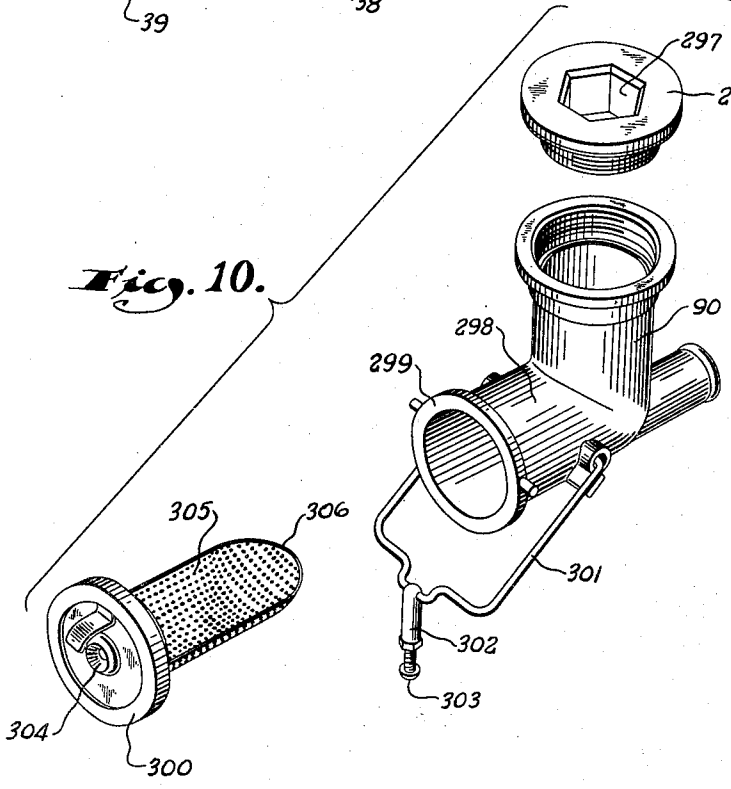


Fig. 10.



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CLEANING AND EXTRACTING APPARATUS

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10 Sheets-Sheet 6

Fig. 11.

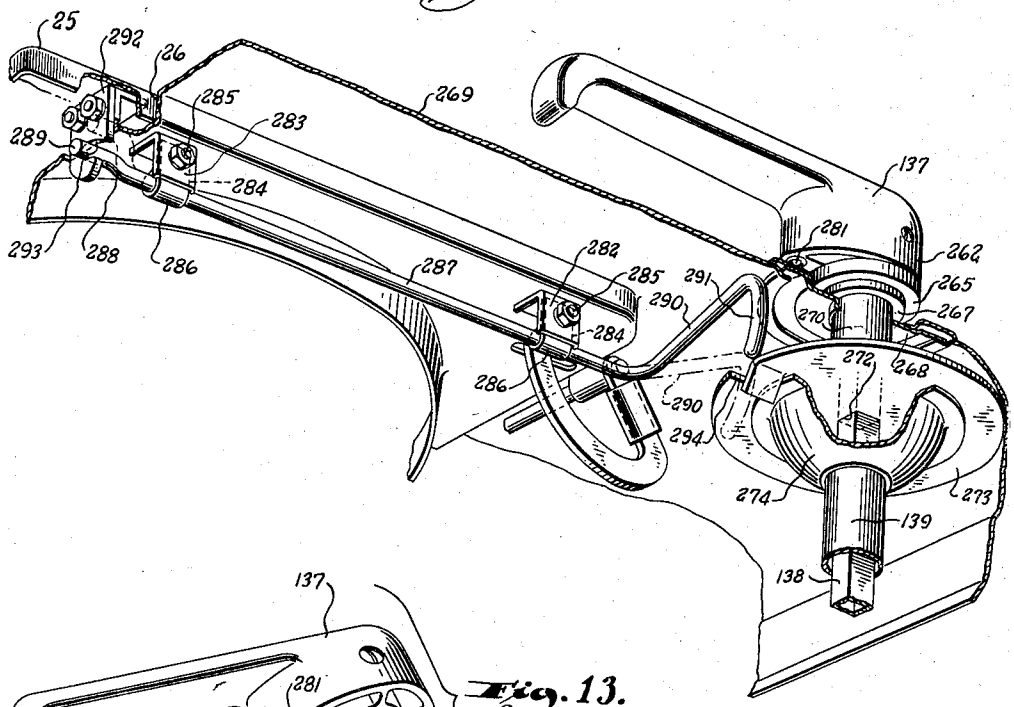


Fig. 13.

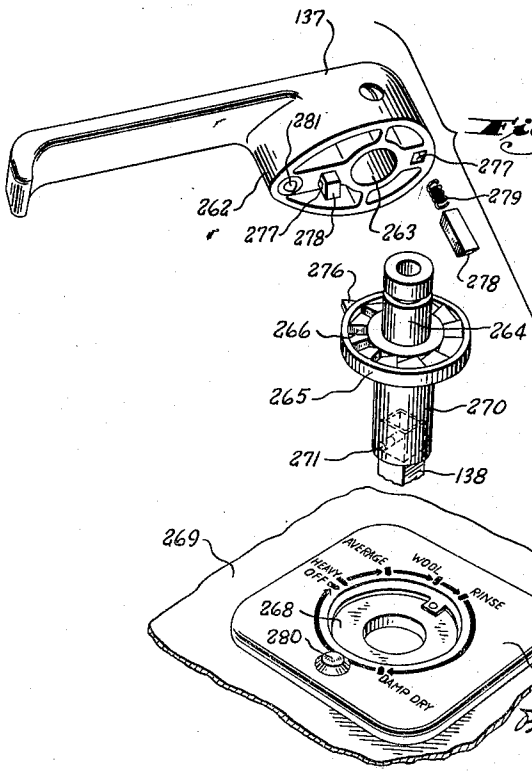
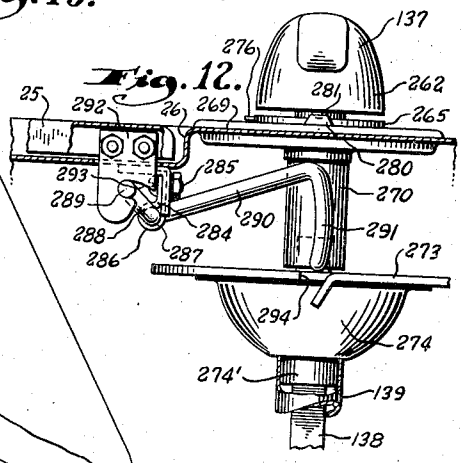


Fig. 12.



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CLEANING AND EXTRACTING APPARATUS

Filed Jan. 30, 1947

10 Sheets-Sheet 7

Fig. 14.

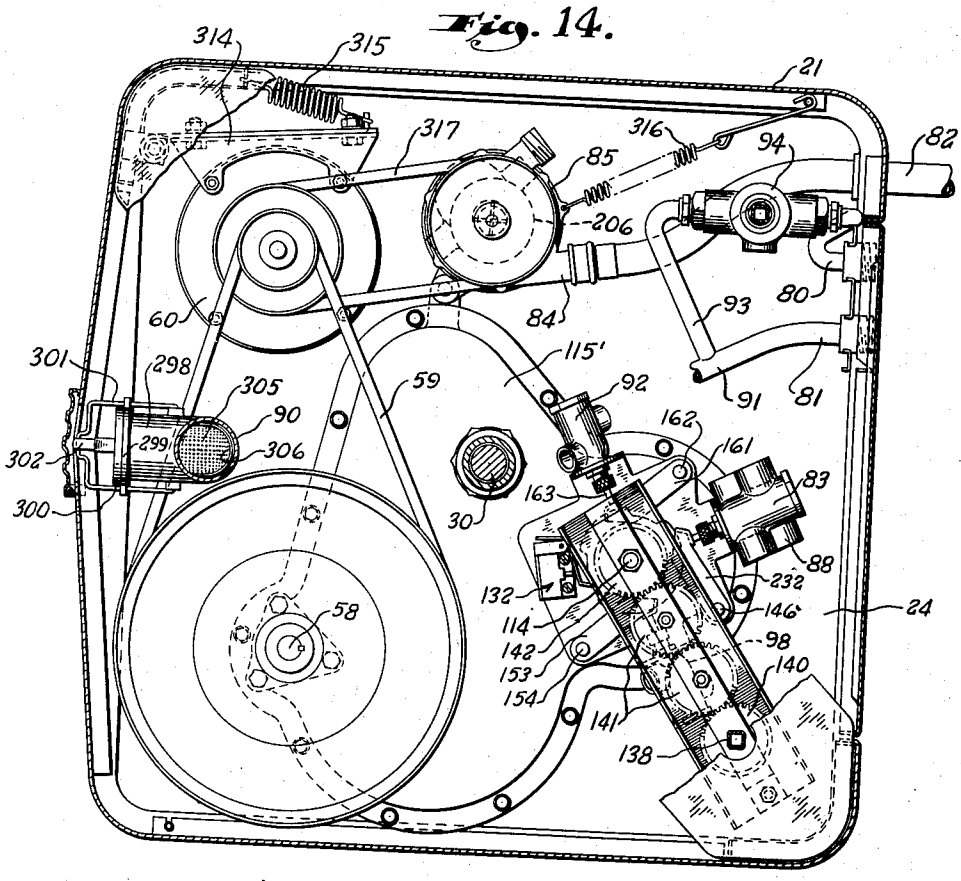


Fig. 15.

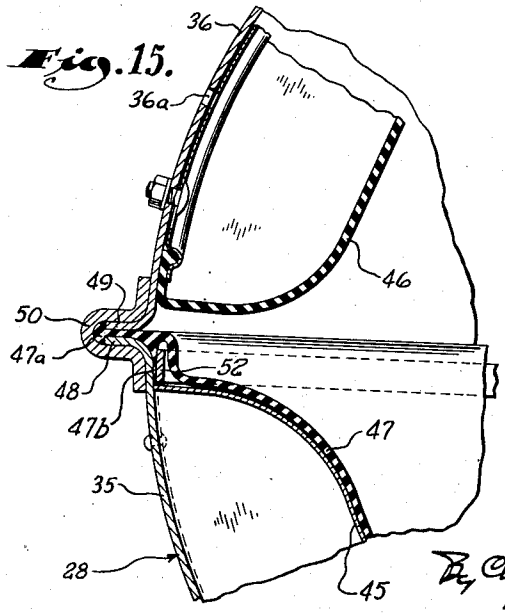
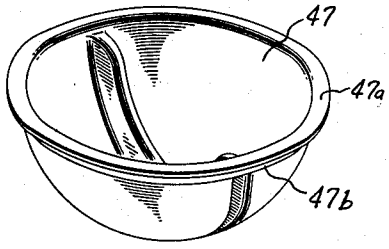


Fig. 16.



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2,651,190

CLEANING AND EXTRACTING APPARATUS

Filed Jan. 30, 1947

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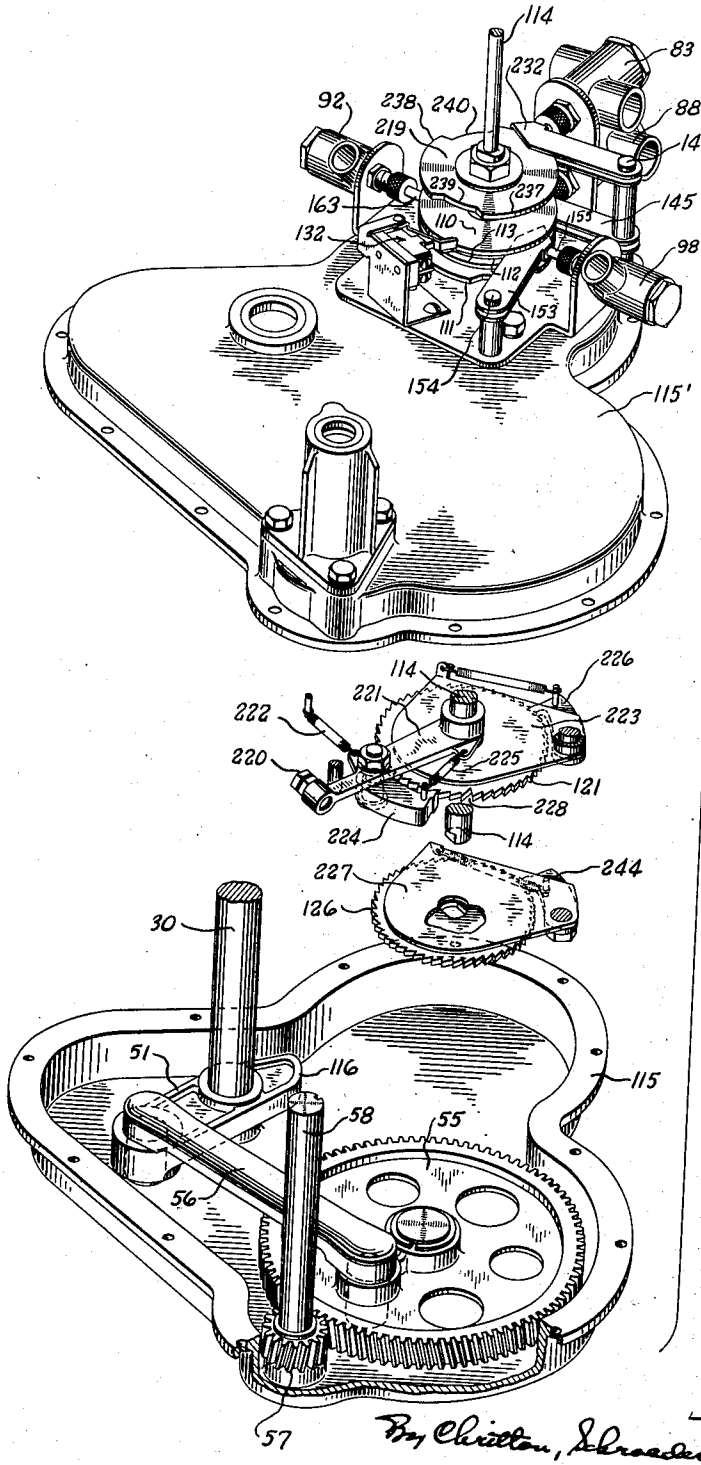

Fig. 17.

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CLEANING AND EXTRACTING APPARATUS

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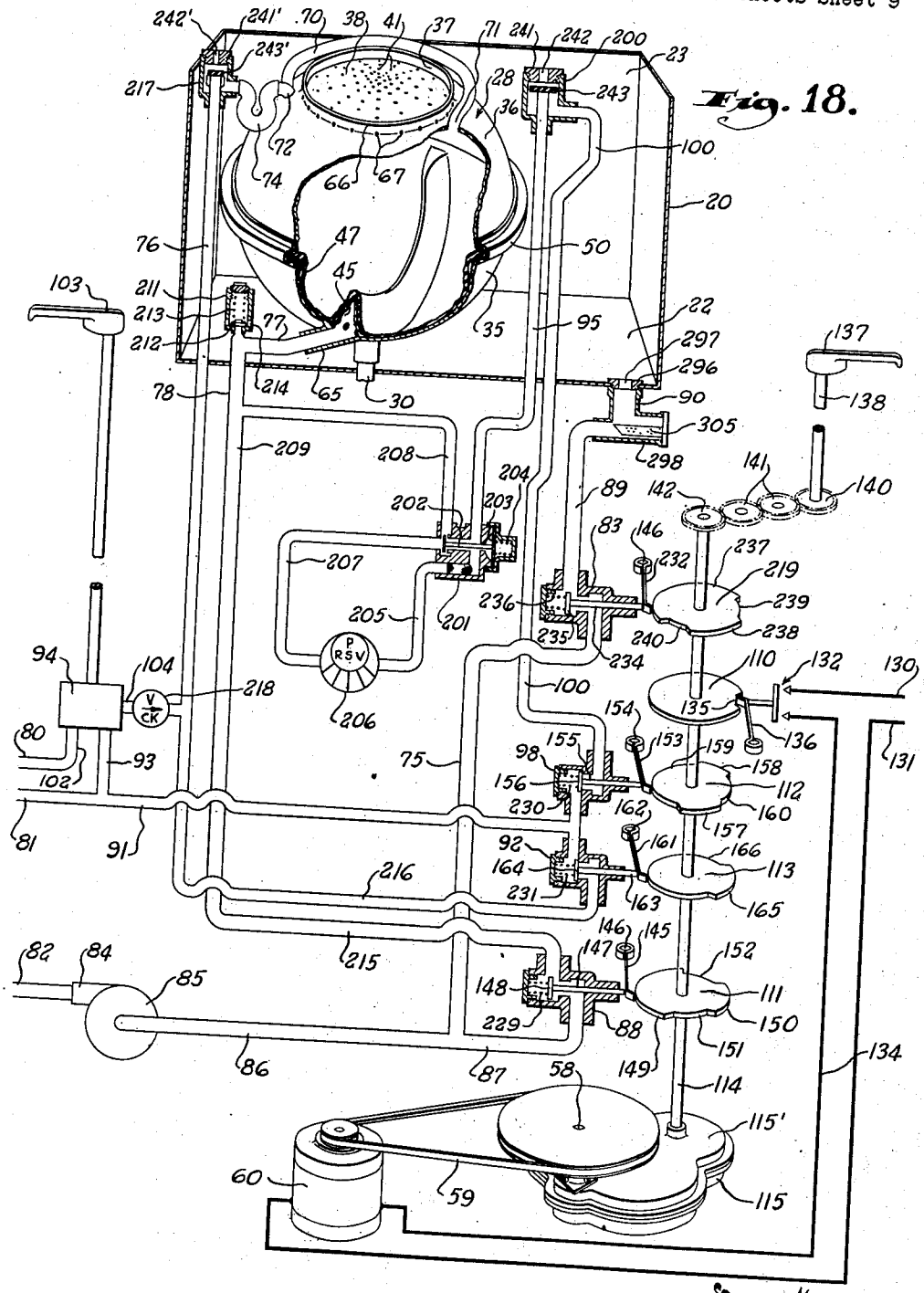
Fig. 18.



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CLEANING AND EXTRACTING APPARATUS

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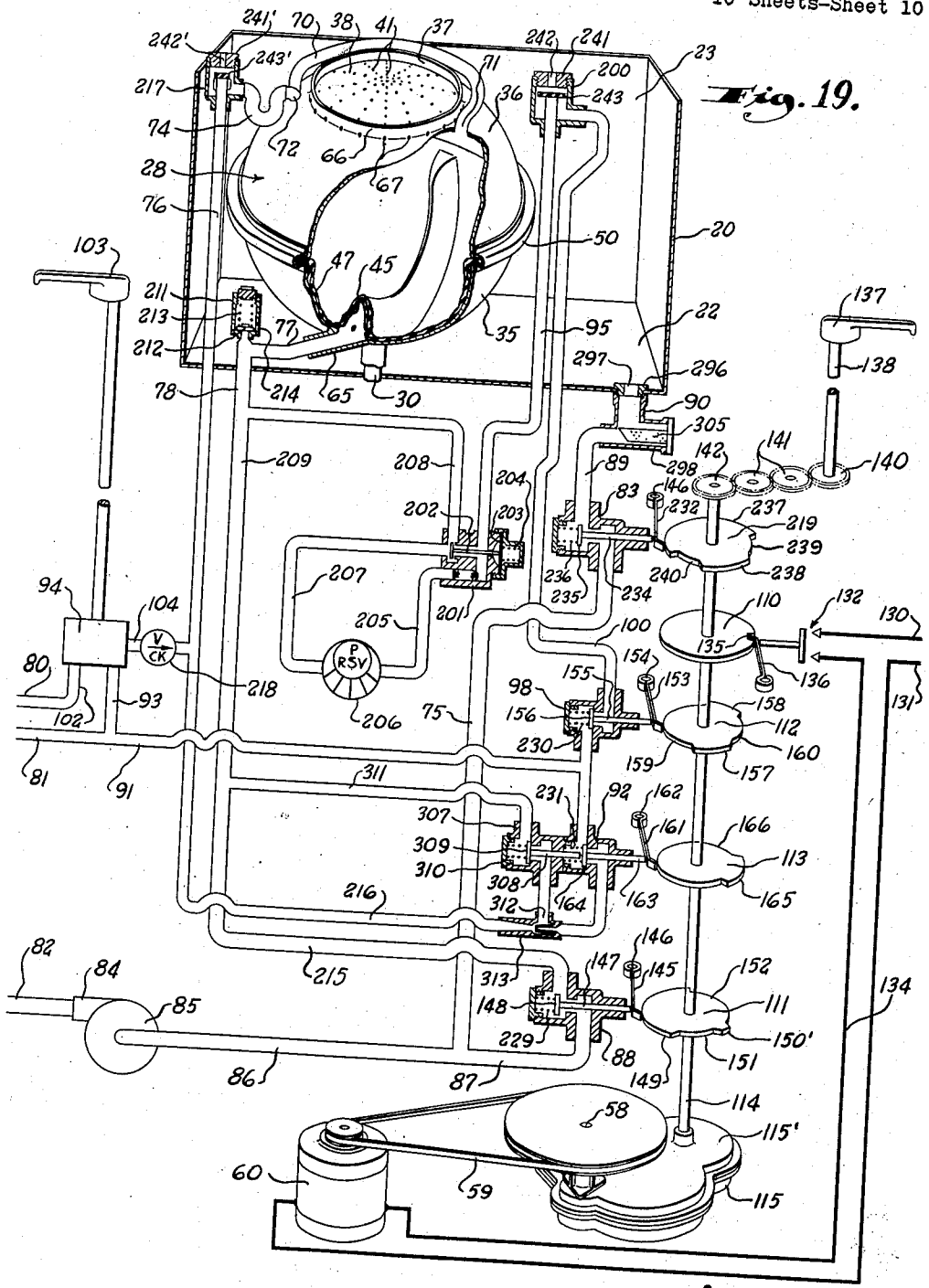
10 Sheets-Sheet 10

Fig. 19.



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Patented Sept. 8, 1953

2,651,190

UNITED STATES PATENT OFFICE

2,651,190

CLEANING AND EXTRACTING APPARATUS

John F. Horvath, Milwaukee, Wis., assignor to Appliance Corporation of America, Milwaukee, Wis., a corporation of Wisconsin

Application January 30, 1947, Serial No. 725,299

11 Claims. (Cl. 68—12)

1

This invention relates more particularly to an apparatus for cleaning, and extracting the cleaning liquid from materials and has for its general object the provision of a new and improved apparatus of this type.

Another object is to provide a new and improved combined cleaning and extracting apparatus of the type embodying means for squeezing the materials to extract the liquid therefrom.

Another object is to provide such an apparatus embodying a container for materials (as, for example, clothes) oscillatable about a generally upright axis and at a relatively low speed during both cleaning and extracting operations and having novel means for cleaning the materials and for extracting the liquid from the materials.

Another object is to provide such an apparatus embodying an oscillatable container having ribs or other projecting means on the interior thereof effective to produce a cleaning or washing action and a flexible member adapted to fit against the lower portion of the container to form a bottom wall thereof and for the liquid therein during a washing operation, and means operable to supply a fluid to the bottom of the container beneath said member operable during continued oscillation of the container to raise the materials while discharging the washing liquid through openings in the top of the container, and subsequently squeezing the materials against the top of the container to extract the liquid therefrom.

Another object is to provide a cleaning and extracting apparatus embodying a general spherical container mounted to oscillate on an upright axis and having ribs on the inner wall thereof effective to produce a washing action when materials and suitable liquid are placed therein, a flexible member having its edge anchored in water-tight relation with the wall of the container and normally arranged to fit against the lower portion of the container and said ribs and adapted alternatively to be pressed upwardly against the upper portion of the container to empty liquid from said portion, certain of said ribs located in the container above said flexible member being of yieldable material.

A further object is to provide means for introducing liquid under pressure behind a flexible liner for extracting cleansing liquid from the material being cleansed and means to introduce rinse water into an oscillatable container, and means enabling the transfer of the liquid under pressure back of the flexible liner into the container above the liner so as to use said liquid for rinsing purposes.

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A still further object is to provide in the high-pressure line a recirculating check valve which is so constructed and arranged as to permit the recirculation of water through a high-pressure pump when the pump is not delivering pressure behind the flexible liner, to eliminate wear and noise.

Further objects of the invention are: to provide a cleaning and extracting apparatus embodying a container mounted for oscillation about an upright axis and having a perforated cover at the upper end thereof, means for oscillating the container continuously during washing, extracting and rinsing operations, means for supplying hot water to the container for a cleaning and washing operation, and means for supplying cold water to the container during a rinsing operation; to provide such an apparatus with means for controlling the operation thereof, including a housing lid interlock which prevents starting the machine while the lid is open or partially open; to provide novel cover means for the oscillatable spherical container to enable sliding the cover bodily in a single plane and means for locking the cover closed with relation to the container to prevent the cover being opened during the operation of the machine; to provide an improved timer control handle and associated parts; to provide means for easily, quickly and positively holding the chime ring in position when assembling two halves of the spherical container; to provide novel motor mounting and drive connections for oscillating the spherical container; to provide a tub drain cam and valve whereby the water in the housing exterior of the spherical container may be drained away during a portion of the operation and hold said valve closed while the rinse water is being added to the interior of the spherical container and while the squeeze water is being drained from behind the flexible liner; to provide a lint trap assembly in the tub drain and having a removable perforated basket; to provide a pressure relief valve in the high-pressure line to maintain the pressure of the liquid behind the flexible liner at a desired amount and relief of excess pressure after it exceeds said amount; to provide such an apparatus embodying an automatic sequential timer for obtaining washing, extracting, rinsing and extracting operations in the order named; and to provide a combination cleaning and extracting apparatus of extremely simple construction which operates only at a relatively slow speed and without producing noticeable vibrations and is effective to wash

and rinse clothes and to extract the wash and rinse water therefrom in a manner removing substantially all of the foreign material from the clothes and leaving them substantially dry.

Important objects of the invention are: to provide a new apparatus for effectively rinsing washed materials with cold water; and to provide a new and improved apparatus for washing, extracting, rinsing and extracting materials in the sequence named and obtaining improved washing, rinsing and drying of the materials.

Other objects will become readily apparent from the following detailed description taken in connection with the accompanying drawings illustrating a preferred form of the invention wherein:

Fig. 1 is a perspective view of a cleaning and extracting apparatus embodying my invention, part of the housing being broken away to more clearly show the arrangement of the oscillatable container in the upper compartment of the housing.

Fig. 2 is a vertical central section.

Fig. 3 is a fragmentary vertical section at right angles to Fig. 2 and taken on the line 3—3 of Fig. 2.

Fig. 4 is a vertical central section through the container and somewhat similar to Fig. 3 (on a reduced scale) but showing liquid and materials in the container during a washing operation.

Fig. 5 is a view similar to Fig. 4 but showing the relative positions of the parts during an extracting operation.

Fig. 6 is a fragmentary horizontal section on the line 6—6 of Fig. 2.

Fig. 7 is a fragmentary vertical section through the upper portion of the container and the adjacent top portion of the housing showing the container cover and the housing lid in closed position.

Fig. 8 is a view similar to Fig. 7 but showing the housing lid and the container cover open.

Fig. 9 is a fragmentary top plan view of the container showing the container cover in closed and locked position.

Fig. 10 is a perspective exploded view of the drain fitting of the upper compartment, the cap therefor and the removable line removing screen.

Fig. 11 is a fragmentary perspective view of a portion of the top of the housing and portion of the lid and control means, showing the housing lid closed and the locking means released to permit operation of the control shaft.

Fig. 12 is a sectional elevation looking toward the left hand side of Fig. 11.

Fig. 13 is a perspective exploded view of the control handle, a portion of the control shaft and a portion of the housing top showing the setting starter dial, these parts being shown just prior to their being assembled together.

Fig. 14 is a horizontal section on the line 14—14 of Fig. 2.

Fig. 15 is an enlarged fragmentary vertical section through adjacent parts of the upper and lower sections of the container and showing how they, the flexible liner and the upper flexible ribs are mounted with relation to each other.

Fig. 16 is a perspective view (on a reduced scale) of the flexible liner or diaphragm to be mounted as shown in Fig. 15 within the container.

Fig. 17 is a perspective exploded view of the mechanism for oscillating the container and for reducing the speed of the control shaft.

Fig. 18 is a diagrammatic representation of the operative parts of the apparatus with its hydraulic and electrical circuits and its timing mechanism.

Fig. 19 is a view similar to Fig. 18 but showing a modification including mechanism to utilize the squeezing liquid underneath the flexible liner for rinsing.

While my invention further resides in the combination, construction and arrangement of parts illustrated in the accompanying drawings, I have shown therein, for illustrative purposes only, a preferred embodiment setting forth an exemplification of the principles of the invention and wish it understood that the same is susceptible of modification and change without departing from the spirit and scope of the appended claims.

The present application is a continuation in part of my copending application Serial No. 637,964, filed December 29, 1945, now abandoned.

In the drawings, and particularly in Figs. 1, 2 and 14, the invention is embodied in a household type washing and extracting apparatus or machine comprising a generally rectangular housing having a top part 20 and a bottom part 21, a partition 22 extending horizontally across the housing to divide it into an upper compartment 23 and a lower compartment 24, a lid 25 for an opening 26 in the top of the upper compartment and a base member 27 secured to the bottom of the housing. A generally spherical container 28 is positioned in the compartment 23 and is supported for oscillation about an upright axis by means of a member 29 secured to the upper end of a drive shaft 30 which is supported in a bearing 31 in the partition 22 and a bearing 32 secured to the base member 27.

The container 28, as illustrated herein, consists of a lower substantially hemi-spherical part 35 and an upper part 36, provided with an opening 37. A closure or cover 38 for the opening 37 has its peripheral edge 39 located within the part 36 and is movably supported thereon for sliding movement in a circular path. The cover 38 is perforated by a plurality of apertures 41 and is located immediately below the lid 25 of the housing. As shown in Figs. 7 and 8, the cover is slidable back and forth in a single path by means of a slide bar 251, slidable back and forth in a bracket 257 (as later more fully explained) so as to enable moving the cover to an open position, giving access to the container for the purpose of inserting and withdrawing clothes or other materials when the lid 25 is open.

Internally, the container 28 has a pair of ribs 45, which are in effect a continuation of each other, extending inwardly from the lower part 35, and a pair of ribs 46 extending inwardly from the upper part 36. Prefereably, these ribs are in a common vertical plane, as illustrated in Fig. 2, and function during a slow oscillatory movement of the container to produce a washing action of liquid on the clothes or other materials placed in the container. A flexible member 47 is arranged normally to fit against the inner surface of the lower part 35 and snugly over the ribs 45, as shown most clearly in Figs. 2, 3, 18 and 19. The flexible member or diaphragm 47 is substantially bowl shaped, may be of rubber or other suitable material, and is provided with an outwardly and laterally extending flange 47a which is secured intermediate radially extending flanges 48 and 49 on the container parts 35 and 36, respectively. This flange 47a is securely clamped between the flanges 48 and 49 by means

of an annular clamping ring 50 which is held together at its adjacent ends by a pair of clips 42, each provided in each of its legs with a slot 43 to provide undercut projections 44 engaging complemental notches in the flanges of the chime clamping ring 50. The connection between the container and diaphragm is made fluidtight by the provision of a downwardly extending lip 47b on the under side of the diaphragm or flexible liner adjacent the attaching flange 47a. An annular ring 52 presses this lip 47b against the inner wall of the container and provides an effective seal between the diaphragm and the container.

In the form of the invention disclosed herein, the container 28 is arranged to be oscillated at a relatively slow speed continuously throughout washing, extracting and rinsing operations. To this end, the shaft 30 has fixed to its lower end, a rocker arm 51 the free end of which is pivotally connected to a link 56, which at its other end is pivotally and eccentrically connected to a gear wheel 55 meshing with a pinion 57 fixed to rotate with the vertical drive shaft 58 driven by belt 59 passing over a belt pulley fixed to shaft 58 and a supplemental pulley fixed to the shaft of an electric motor 60. Thus, during rotation of the motor continuously in one direction, the gear 55 is rotated by pinion 57 and during such rotary movement operates through the link 56 and rocker arm 51 to oscillate the shaft 30 and container 28 through an angle of approximately 90° (see Figs. 14 and 17). The shaft 58, pinion 57, gear 55, link 56, rocker arm 51, the lower end of shaft 30, the upper ratchet wheel 121, the lower ratchet wheel 126 and the lower end of the automatic control shaft 114 are mounted in a two part casing 115 and 115' which is bolted to the top of the base member 27.

During a washing operation, the flexible member 47 is in the position illustrated in Figs. 2, 3, 18 and 19 and the container is partly filled with water, a detergent and the clothes or other materials to be washed. Upon completion of the washing operation and while the container continues to be oscillated, the flexible member 47 is forced upwardly by admitting water or other liquid under pressure to the space between the bottom of the container and the flexible member. Herein a connection 65 (Figs. 3, 18 and 19) is shown for admitting water to the bottom of the container and below the flexible member 47. As the member 47 moves upwardly, the washing liquid is discharged through the apertures 41 in the cover 38 until finally the clothes are pressed against the cover and top part of the container somewhat as shown in Fig. 5. As the pressure of the liquid in the bottom of the container is increased, the liquid in the clothes is extracted or expressed out of them and forced out through the apertures 41. To insure substantially complete drainage, the upwardly extending lip 66 around the opening 37 is provided with discharge apertures 67. The ribs 46, which are provided in the upper part of the container to produce a sufficient washing action when the container is filled above its midportion, are formed of flexible material, as for example rubber, so that during the extracting operation they will compress against the wall of the container and thereby avoid injury to the clothes which might occur if the flexible member 47 acted against rigid ribs and clamped portions of the clothes thereagainst, while other portions were forced upwardly more centrally of the container. The wall of the container part 36 is provided with one or more openings 36a behind each of the ribs 46 whereby the air and water which may be trapped between the ribs and the container wall may escape therethrough when these ribs are compressed.

In order to facilitate filling the container with water or other liquid, an arcuately bent pipe 70 (Figs. 2, 3, 18 and 19) is provided with a plurality of spaced connections 71 and 72 with the top part of the container. Pipe 70 is connected at one end with a sufficient length of flexible hose 74 (Figs. 1, 18 and 19) to permit oscillation of the tub as described above, and at the same time connect the interior of the container with a vertical supply pipe 76 for conducting wash liquid and rinse liquid to the interior of the container, as later more fully described. Similarly, a hose 77 extends from pipe 78 around the major portion of the housing (Figs. 1 and 3) to permit the container to be oscillated with a minimum amount of movement of the hose. The pipe 76 is arranged to conduct hot water to the hose 74, arcuate pipe 70 and to the interior of the container, for washing purposes, and cold water for rinsing. The pipe 78 is connected to provide water under pressure to the space beneath the flexible member 47 during an extracting operation and to drain water therefrom upon the completion of an extracting operation. The hydraulic system will be described in greater detail with particular reference to Figs. 2, 3, 18 and 19.

Referring particularly to Figs. 18 and 19, an external connection 80 is provided for hot water, a connection 81 for cold water and a connection 82 for a drain. The drain 82 is connected to the discharge port 84 of a drain pump 85 which is connected to be driven from the motor 60. The inlet to the drain pump is connected by a pipe 86, 87 to a high-pressure drain valve 88. Pipe 86, 87 is also connected by a pipe 75 to a low-pressure drain valve 83 which in turn is connected by pipe 89 to the drain outlet 90, having communication with the housing partition 22. Thus, any liquid spilling into the chamber 23 of the housing is pumped out through the pipes 89, 75 and 86 to the drain pump 85 and to the drain through pipe 82.

From the connection 81, cold water passes through a pipe 91 to a rinse valve 92. A pipe 93 branches from the pipe 91 to a mixing valve 94. Pipe 91 also branches from where it leads to the rinse valve 92 and extends into a valve 98, which may be referred to as the "squeeze valve." From squeeze valve 98, pipe 100 leads to a vacuum breaker 200, which in turn is connected to pipe 95 leading into the recirculating check valve 201 having therein a valve stem 202 connected to move with the diaphragm 203 which is normally positioned by a spring 204 to hold this valve open. From recirculating valve 201 extends a pipe 205 connected with the inlet port of the high-pressure water pump 206. From the outlet port of high-pressure pump 206, a pipe 207 extends back to the recirculating check valve at the left hand side of the valve connected to valve stem 202, as viewed in Figs. 18 and 19. From recirculating valve 201, at a point adjacent the valve on valve stem 202, extends a pipe 208 having connection with pipe 209. Pipe 209 above the adjacent end of pipe 208, extends upwardly into pipe 78 leading into the hose 77 and connection 65 in the bottom part of the spherical container 28. Located just above the pipe 78 and located within the upper compartment of the housing is a pres-

sure relief valve 211 which has in its interior a valve 212 normally held against its seat by a spring 213. The housing of the relief valve 211 is provided with any desired number of openings 214 to permit relief of the high-pressure water therein when the same exceeds 150 pounds per square inch, or any other predetermined pressure. In other words, the pressure relief valve 211 maintains the pressure in the high-pressure line at 150 pounds per square inch, or any other predetermined pressure.

As will be seen in Figs. 18 and 19, the passageway through pipe 78 and connection 65 leads into the space between the flexible diaphragm 47 and the inner surface of the bottom part of the spherical container. Pipe 209 below its connection with pipe 208 leads to pipe 215 which connects with the drain valve 88.

Cold water passes from pipe 91 through rinse valve 92 (when the latter is open) and thence through pipes 216 and 76 to the vacuum breaker 217, and thence through hose 74 to the interior of the spherical container for rinsing purposes, as later more fully explained. Hot water passes from the connection 80 through a pipe 102 to the mixing valve 94, this mixing valve being provided with a manual control handle 103, which is adjustable to determine the relative amount of hot and cold water issuing from the mixing valve to a pipe 104 within which is positioned a check valve 218 to permit flow of hot or warm water to the right, as viewed in Fig. 18, but prevent flow of the same in the opposite direction. This hot water (when the rinse valve 92 is closed) passes upwardly through pipe 76, vacuum breaker 217 and hose 74 to the interior of the spherical container for washing purposes, as later more fully explained.

A control mechanism is provided for governing automatically the operation of the machine after an initial manual starting operation. The automatic control includes a series of cams (Figs. 2, 17, 18 and 19) 110, 111, 112, 113 and 219, all mounted on a single shaft 114. The shaft is driven from the vertical shaft 30 by means including a pawl and ratchet speed reducing mechanism 121, 126, etc. (Fig. 17).

The rocker arm 51 extends to the right, as viewed in Fig. 17, beyond shaft 30 to form a cam 116, which during oscillation of rocker arm 51, contacts the adjustable projection 220 on arm 221 loosely mounted to oscillate about control shaft 114. Arm 221 is normally urged in a clockwise direction, as viewed in Fig. 17, by spring 222, except when forced in counterclockwise direction by cam 116. Also loosely mounted on shaft 114 is the ratchet wheel 121 rotatably mounted below the plate 223 so positioned with relation to the casing 115 so as to properly position ratchet 121 in a vertical direction. Pivotally mounted on arm 221 is a pawl 224 having at its free end a tooth engaging the teeth of ratchet wheel 121 and normally held in engagement with said teeth by spring 225. From this it is seen that oscillation of arm 221 will cause ratchet wheel 121 to loosely rotate on shaft 114 an amount equal to the throw of pawl 224 and arm 221. Pivotally mounted on plate 223 is a spring pressed dog 226 to hold ratchet wheel 121 against inadvertent rearward movement, but permitting forward movement by pawl 224. Fixed to the bottom end of control shaft 114 is a second ratchet 126 separated from ratchet 121 by a separating plate 227. Ratchet 121 has one of its teeth 228 of greater depth than the remainder of its teeth. Ratchet wheel 126 is of slightly smaller diameter than ratchet 121 so that during the normal operation of pawl 224, the latter does not have engagement with the teeth of ratchet 126. When, however, the tooth of pawl 224 enters the deeper tooth 228 of ratchet 121, it contacts the teeth of ratchet 126 for one oscillation of arm 221, after which it is free from the teeth of ratchet 126 until ratchet 121 has made a complete revolution. This means that the control shaft 114 is moved only one tooth of ratchet 126 for each revolution of ratchet 121, thus greatly reducing the speed of rotation of shaft 114. Pivotally mounted upon plate 227 is a spring pressed dog 244 having yieldable engagement with the teeth of ratchet 126 to prevent inadvertent rearward movement thereof.

The electrical connections consist of supply leads 130 and 131, the former of which leads to a switch device 132. Lead 131 is connected to one terminal of the motor 66. The other terminal of the motor 60 is connected by a lead 134 to the switch device 132. It will be apparent that the motor may be started by closing the switch 132.

Switch 132 is arranged to be closed by the cam 110. This cam has a notch 135 therein into which a follower 136 extends when the machine is stopped. The follower is connected to actuate the switch 132 when the cam 110 is rotated in a counterclockwise direction from the position shown in Fig. 18. Means is provided for moving the cam 110 manually for starting purposes. This means consists of a starter handle 137 (shown more clearly in Figs. 11–13) mounted by ratchet means, more clearly described later herein, upon a square shaft 138 which extends through and is rotatable within a supporting pipe 139, which has its lower end fixed to the partition 22. Fixed at the bottom of shaft 138 is a pinion 140, which rotates the series of pinions 141, which in turn rotate the pinion 142 fixed to the control shaft 114. Thus, by manually rotating the starter handle 137 in a clockwise direction, the pinion 142 and starter shaft 114 are rotated in a counterclockwise direction sufficiently to force the follower 136 out of the notch 135, thereby closing the switch 132. The motor 60 is thereby started and the machine placed in operation.

As will be apparent from Fig. 18, cam 111 controls the high-pressure drain valve 88, cam 112 controls the squeeze valve 98, cam 113 controls the rinse valve 92, and cam 219 controls the low-pressure drain valve 83. Cam 111 is provided with a follower 145 supported on a pivot 146 and engageable with a stem 147 of a valve member 148, normally urged into closed position by a coil spring 229. Cam 111, has raised peripheral portions 149 and 150 and depressed portions 151 and 152 therebetween.

Cam 112 has a follower 153 supported on a pivot 154 and is engageable with a stem 155 of a valve member 156, which is normally held in closed position by a coil spring 230. The cam 112 has raised peripheral portions 157 and 158 and intermediate depressed portions 159 and 160.

Cam 113 has a follower 161 supported on a pivot 162 and engageable with a stem 163 of a valve member 164, normally held in closed position by a coil spring 231. Cam 113 has a single raised peripheral portion 165 and a depressed portion 166.

The low-pressure drain cam 219 has a follower 232 supported on a pivot 146 and engageable with a stem 234 of a valve member 235, normally held

in closed position by a coil spring 236. Cam 219 has two raised peripheral portions 237 and 238 and intermediate depressed portions 239 and 240.

The control cams described above are so arranged that during a single complete revolution of the shaft 114 on which they are mounted, the machine goes through a complete operating cycle consisting of washing, extracting, rinsing and extracting, in the order named.

The vacuum breakers 200 and 217 function to prevent any of the liquid within the spherical container from being sucked back into the city mains and consist of a housing or casing shown in Figs. 18 and 19, within which casing of vacuum breaker 200 extends the upper end of the pipe line 95 which terminates a short distance below the cover 241 which cover is formed with an opening 242 to provide entry of atmospheric air to the interior of the housing when the sealing disc 243 is not being held by pressure against the inner end of opening 242. This sealing disc, when pressure from pipe line 100 is being exerted against the under face of the sealing disc, will move upwardly under such pressure and seal opening 242, thus leaving the top of pipe 95 open for the passage of cold water from pipe 100 into pipe 95 during the inverting of the flexible diaphragm in the spherical container. Any vacuum or suction that would tend to draw water from within the spherical container into the city mains, would be prevented, when the pressure against the under side of the sealing disc is released, at which time the sealing disc seats upon the upper end of the tube 95, and air may pass through opening 242, around the edges of disc 243 into pipe 100.

Vacuum breaker 217 operates in a manner similar to that described above for vacuum breaker 200 in which similar reference numerals have been applied excepting for the addition of a prime (').

Fixed by rivets or the like 245 to the cover 38 is a U-shaped member 246 having laterally spaced apart arms between which is mounted on pivot 247 a cover locking member 248, as will be best understood in Figs. 7 and 8. Locking arm 248 at its left hand end, as viewed in Fig. 7, is formed with a cam 249 and has a shoulder 250. Positioned between locking arm 248 and container cover 38 is a slide bar 251 loosely mounted upon the upper end of pin 252 which is fixed at its lower end to the base portion of the U-shaped member 246. A coil spring 253 is mounted between the base of U-shaped member 246 and the under face of the slide bar 251 to normally urge the latter outwardly from cover 38 except when held against its outward movement by cam 249. When the cover 38 is locked in closed position on the spherical container, the opposite ends of slide bar 251 seat in recesses 254 and 255 formed in the upstanding flange 66 of the container. Fixed by rivets, bolts, screws or the like 256 to the outer face of the container at one side of the container opening is a bracket 257 carrying a pair of spaced apart rollers 258 and 259 between which the slide bar will move while the container cover is being moved from closed to open position.

The locking arm 248 has inwardly extending projections or ears 260 which are adapted to engage over the side edges of the slide bar 251 to prevent lateral movement of the locking arm while the machine is in operation. In Figure 7, the container cover is shown in closed and locked position at which time the inwardly extending projections or ears 260 embrace the side edges of the slide bar and extend inwardly of the flange 66, surrounding the container opening 37 to prevent accidental movement of the cover assembly toward unlocked position. When the locking arm 248 is in closed position, cam 249 will have pressed slide bar 251 against the bottom edges of recesses 254 and 255, and raised the cover 38 by pulling upwardly on the bracket 246 to which the cover is fixed, and forced the marginal edges of cover 38 against the inner face of the container. In this locked position, it will be noted, that the coil spring 253 is compressed between the slide bar 251 and the base of the U-shaped member 246. To unlock the container cover, the locking arm 248 is swung in a counterclockwise direction, as viewed in Fig. 7, into the open position shown in Fig. 8, with the container cover having been slidably moved to the right, as viewed in Figs. 7 and 8. In this position, it will be noted that the stop shoulder 250 of locking arm 248 will strike against the upper surface of slide bar 251 when locking arm 248 is in its fully open position, and the coil spring 253 yieldingly urges the cover assembly away from the inner face of the container to avoid abrasion therebetween during movement of cover from closed to open position and vice versa. It will also be noted that locking arm 248 can not be moved to open position until after the tub lid 25 has been opened. After the tub lid 25 has been opened and the locking arm 248 moved to open position and the container cover slid into the open position shown in Fig. 8, it will be noted that it will be impossible to close the tub lid 25 until after the container cover has been closed and locked in the position shown in Fig. 7. This prevents the tub lid 25 from being closed until after the container cover has been closed and locked. The tub lid 25 is hingedly mounted by any desirable form of hinge construction, as for example, as shown in Figs. 7 and 8, and this lid is provided with a glass panel 261 to enable observation of the interior of the tub when the lid is closed. From the foregoing it will be understood that when the locking arm 248 (which serves as a handle for the container cover) is in the position shown in Fig. 7, the container cover will be prevented from sliding movement while the machine is in operation, and that when the container cover is open, the tub lid 25 cannot be closed, thus providing, as later more fully explained, a safety feature to preclude starting the machine until both the container cover and the tub lid are closed.

The starter handle 137 is constructed to permit it to be rotated any desired amount to correspondingly rotate the control shaft 114 and yet permit the starter handle to be returned to the neutral position. This construction is best seen in Fig. 13, in which the starter handle is provided with a hub 262 having a central bore 263 for rotatably receiving the cylindrical stem 264, which stem has fixed thereto the flange 265 formed at its upper surface with ratchet teeth 266. As seen in Fig. 11, flange 265 is provided with a downwardly extending cylindrical projection 267 rotatably seated in a depression 268 formed in an adjacent portion of the top 269 of the housing. Depending from cylindrical projection 267 is tubular portion 270 within which is fixed by pin 271 the upper end of the square shaft 138 which extends downwardly within tube 139 and has fixed at its lower end the pinion

140. The upper portion of square shaft 138 passes through a square opening 272 in a disc 273 which disc has fixed thereto a downwardly extending cup shaped portion 274 having an extension 274' adapted to be freely rotatable within tube 139. The bottom surface of the cup 274 rests upon the upper edge of tube 139 which locates the disc 273 and cup 274 at a predetermined height. By this construction the disc 273 rotates with the shaft 138. Just above the top panel 269 is fixed a plate 275 constituting a dial on which is marked indication points for the various operations, such as "Off," "Heavy," "Average," "Wool," "Rinse" and "Damp dry." As seen in Fig. 13, an indicator 276 is fixed to, and projects laterally from, the flange 265 so that rotation of this flange by the starter handle will enable the operator to position the indicator at the desired point of operation indicated in the dial 275.

Resiliently and slidably mounted in diametrically opposite non-circular holes 277 are a pair of dogs 278 each normally urged outwardly by coil springs 279. The lower end of each of dogs 278 are inclined and the ratchet teeth 266 so formed that when the starter handle 137 is rotated in a clockwise direction when viewed from above, the starter handle will rotate the shaft 138 in the same direction until the indicator 276 is positioned at the point on the dial indicating the desired operation. The starter handle may then be returned to the neutral point which is its initial position while the indicator or pointer continues with the timer control to indicate in which portion of the cycle the machine is operating. The starter handle is releasably held in its initial position in the concavity 280 by a ball detent 281. When the starter handle is thus moved in a clockwise direction from its initial position any desired amount, it will be understood from the foregoing description that the follower 136 will move from the depression 135 in cam 110 up onto the raised periphery, thus closing the switch 132 and the machine will then continue to operate throughout the entire cycle until the indicator or pointer 276 has finished its path around the circle and again returns to the "off" position on the dial, which will return the follower 136 to a position where its end will again be seated in the depression 135 to open the switch 132 and stop the motor.

Associated with the tub lid 25 is door interlock means for preventing starting the machine while the lid 25 is open, to provide a safety feature to preclude starting the machine until both the container cover and the lid 25 are closed. This door interlock means comprises a pair of brackets 282 and 283 bolted or otherwise secured to the lower face of that portion of the housing cover which is pressed downwardly to form a seat for reception of the lid 25. These brackets each have a bearing member 284 which is fastened thereto by a bolt 285. The lower end 286 of the bearing member is formed to provide a bearing in which a shaft 287 is rotatably mounted. At its left hand end, as viewed in Fig. 11, shaft 287 is laterally bent at 288 (see also Fig. 12) to provide a crank portion 289 which will rotate in the arc of a circle upon rotation of shaft 287. The opposite end of shaft 287 is provided with a laterally extending arm 290 which at its free end is bent downwardly to provide a slightly curved locking projection 291. Fixed to the lower face of lid 25 is a bracket 292 having in its lower end portion an arcuate slot 293 within which the crank arm 289 is positioned and the arm 290 is swung upwardly when the lid is closed, and from which it is removed and the arm 290 swung downwardly when the lid is opened. This means that when the crank arm 289 is positioned within the slot 293, the arm 290 is swung upwardly and the lid is locked against opening.

It is also to be noted that disc 273 of shaft 138 is provided at one point in its periphery with a slot 294 for receiving the curved projection 291 of arm 290 when these parts are in registry. It will be understood that while the machine is in operation, the disc 273 is being slowly rotated by means of the control shaft 114 and the speed reducing ratchets shown in Fig. 17. Projection 291 of arm 290 and the slot 294 of disc 273 are so positioned that when the slot registers with projection 291 the latter may be moved downwardly into this slot and prevent further operation of the machine. This slot and projection are so positioned that when arm 291 passes downwardly into slot 294 the machine will be in "off" position and the motor stopped, thus making it impossible to start the motor until the projection 291 of arm 290 is again raised from slot 294. Arcuate slot 293 of bracket 292 is so formed that the lower edge of this slot acts as a cam so that when lid 25 is raised, this cam slot will force crank arm 289 thereoutof to enable raising of the lid. As stated above, the disc 273 at this time is standing at "off" position, thus enabling projection 291 to enter slot 294. At any other than "off" position of disc 273, it would be impossible to open lid 25 for the reason that the bottom end of projection 291 of arm 290 would be held upwardly by contact with the upper surface of disc 272 and could not enter slot 294 until the washing cycle had been completed. In other words, the lid can not be raised until projection 291 is in registry with slot 294 at which point the motor is not in operation. The top edge of the arcuate slot 293 extends farther laterally than the bottom edge, as seen in Fig. 11, so that when the lid is closed after having been opened, the top edge of this slot will act as a cam upon the crank arm 289 and force it farther inwardly into this slot to lock the lid closed and similarly withdraw projection 291 from slot 294.

The ribs 45 in the bottom of the lower part of the sphere or container are provided with a number of apertures 295 to permit entry of squeezing liquid from connection 65 to the space underneath the flexible diaphragm 47. The relative arrangement of the motor, the speed reducing ratchet mechanism, the timer shaft and cams, drain pump, and other associated parts, will be readily understood from inspection of Fig. 14.

The drain connection 90 for draining water from the upper compartment of the housing is attached to the partition 22 by screwing the top member 296 into the upstanding neck of the drain member 90 to clamp these parts onto partition 22. The cover or plug 296 is formed with a drain opening 297 leading into the hollow interior of the drain member 90 which latter extends laterally at 298, which extension has formed at its free end a flange 299 for receiving the cover plate 300 of the screen carrying member which is clamped against flange 299 by a swingable spring yoke 301 and a toggle lever 302 provided with an adjusting screw 303 adapted to be seated in the seat 304 of the cover 300 and clamped thereagainst by the force of the spring yoke. Fixed to cover 300 and extending inwardly of the hollow interior of the

drain 90 is a preferably concave screen member 305 which at its inner end is curved in the form of a semi-circle at 306 to tightly contact with the semi-circular interior of the adjacent side of the upstanding neck of the drain member 90. This provides a lint trap to catch any lint or other extraneous matter deposited on the screen 305, which screen may be easily removed for removal of said lint or other extraneous matter, and the screen then replaced, as described above.

The recirculating check valve 201 in the high-pressure line (see Fig. 18) functions to permit the recirculation of water through the high-pressure pump 206 when the pump is not delivering pressure behind the flexible diaphragm, whereby to eliminate wear and noise. It is to be noted that the recirculating check valve is so located, with respect to the pump and the rest of the high-pressure line, that when the supply valve 98 for the pump is closed, a column of water is trapped on each side of this recirculating check valve, that is, a column of water remains behind the vacuum breaker of the recirculating check valve on one side, and a column of water is trapped between the recirculating check valve and the inlet to the main high-pressure pipe line 209.

When the pressure supply valve 98 is opened, the water passes directly to the vacuum breaker through the side of the housing thereof and causes the sealing valve 243 to be lifted off its seat on the vertical tube 95 and moved upwardly to seal the port in the cap 241. The water then passes down through this vertical tube 95 to the recirculating valve 201 and high-pressure pump 206. The water passes through all the passages of the recirculating valve until the pressure in the high-pressure line equals that of the city main pressure. At this time, the discharge from the pressure pump 206 will begin to raise the pressure in the line leading to the left hand side of the valve on stem 202, as viewed in Fig. 18. This increase in pressure will cause this valve to move to the right, as viewed in Fig. 18, and close the port which previously permitted direct communication between the supply line and the high-pressure line. The water must then pass through the high-pressure pump to the space behind the flexible diaphragm 47.

A modification of the control diagram shown in Fig. 18 has been illustrated in Fig. 19 to incorporate the use of the water underneath the flexible diaphragm 47, after the first squeeze operation, for rinsing. This is accomplished by providing a double valve operated by the rinse cam. In Fig. 19, a second valve 307 is mounted upon the housing of the rinse valve 92 and has mounted therein a valve stem 308 carrying the valve member 309 normally urged to closed position by the coil spring 310. From this second rinse valve 307 a pipe line 311 extends to, and is connected with, the pipe line 209 from which high-pressure water is coming from the space between the flexible diaphragm and the bottom of the spherical container. The other valve 92 operates the same as described above in connection with Fig. 18. It is to be noted that the valve member 309 of the second rinse valve 307 is simultaneously moved to open position when the valve of the rinse valve moves to open position, thus connecting the high-pressure line 209 with the rinse water line 216. The outlet of the second rinse valve 307 connects with an inlet port 312 of an injector 313, while the outlet of the rinse valve 92 is connected with the Venturi inlet of the injector, so that the water from the rinse valve 92 is used to draw the water from underneath the flexible diaphragm after the same has been reduced in pressure to that below the pressure in the city main, and carry the same to the tub through the rinse line and the rinse connection with the container. As will be understood when the high-pressure line is at a pressure above that of the city mains, the queeze water will be easily passed through the second rinse valve 307. It is to be noted that the high-pressure drain valve 88 in the high-pressure line is held closed during a portion of this rinse cycle, but is opened just before the end of the rinse cycle to assure complete evacuation of the water in the chamber underneath the flexible diaphragm. This is accomplished by forming the raised peripheral portion 150' of cam 111 of less length than the raised portion 150 of Fig. 18. While the high-pressure pump 206 has been indicated diagrammatically as a rotary sliding vane pump, it will be understood that any other form of high-pressure pump may be used as desired.

In operating the invention, the housing lid 25 is first opened and the container cover 38 is slid to the position indicated in Fig. 8. As described earlier herein, opening of the lid 25 causes projection 291 of shaft 287 to move downwardly into the slot 294 to prevent starting of the motor and operation of the machine. The clothes or other materials are inserted into the container through the opening 37 and hot water is supplied to the container by turning the handle 103 of the mixing valve 94 to a position supplying water at the desired temperature through pipes 104 and 76, hose 74 and pipe 70 until the container is filled to the desired level. Soap or other detergent will be added to the water in the container as desired. The mixing valve 94 is then shut off by moving the handle 103 to its closed position. After supplying to the container the wash water, clothes or other material and detergent, the container cover 38 is slid to its closed position and the lid 25 closed, as shown in Fig. 7. This closing of lid 25 moves the projection 291 upwardly out of slot 294 after which the motor will be started by rotation of the starter handle 137.

Thereafter, upon rotating the starter handle 137 in a clockwise direction, as viewed from above, the starter cam 110 is rotated with the control shaft 114 to move the follower 136 out of depression 135, closing switch 132 and starting the motor and parts driven thereby. As explained above, rotation of the control shaft and cams is in a counterclockwise direction. The motor 60 then starts and oscillates the container 28, and at the same time drives the drain pump 85 and the high-pressure water pump 206. This starts the washing operation.

With the parts in the position illustrated in Fig. 18 (except for the cams having been rotated counterclockwise a sufficient distance to start the motor and as much farther as may be desired for a shorter washing operation) the high-pressure drain valve 88 is open so as continuously to conduct any output of the high-pressure pump 206 through the pipes 209 and 215 to the drain pump 85 through which it is discharged to the drain pipe 82. At the same time, the low-pressure drain valve 83 is open so as to drain any liquid in the upper compartment of the housing through the drain member 90, low-pressure drain valve 83, and pipes 75 and 86 to the drain pump 85 to discharge it to the drain pipe 82. At this time, the squeeze valve 98 is closed to prevent the supply of water from the cold inlet 81 from

reaching the bottom of the container. The rinse valve 92 is also closed.

The washing operation continues as long as the follower 145 rides on the raised peripheral portion 149 of the high-pressure cam 111. At the end of the washing operation, the follower 145 rides off the end of the raised portion 149 of cam 111 and effects the closing of the drain valve 88. At substantially the same time, the follower 153 of the squeeze cam 112 rides up on the raised portion 158 of that cam and opens the squeeze valve 98. The opening of the squeeze valve 98 permits cold water under inlet line pressure to flow through the pipe 91, valve 98, pipe 100, vacuum breaker 200, pipe 95, through recirculating check valve 201, pipe 208, hose 77 and connection 65 to the bottom of the container and beneath the flexible diaphragm 47 to push the same upwardly. As soon as the pressure from the city mains entering through the path just described above is equalized in the pipes passing to and from the recirculating check valve, the pressure from the high-pressure pump 206 builds up to close this recirculating check valve and exert higher pressure in the pipe line 207, 208, hose 77 and connection 65 to the space between the flexible diaphragm and the container until this pressure reaches 150 pounds per square inch, or such other predetermined pressure as may be determined by the pressure relief valve 211. The water at line pressure introduced to the space underneath the flexible diaphragm is admitted in a relatively large volume so as to obtain rather rapid upward movement of the flexible diaphragm from the position shown in Fig. 4 to the position shown in Fig. 5. This upward movement of the flexible diaphragm forces the washing liquid in the container upwardly through the holes 41 in the container cover from which it overflows into the upper compartment of the housing.

The high-pressure pump 206 has a relatively small output, which does not add measurably to the rapid rise of the flexible diaphragm, but is intended to become effective when the line pressure from the city mains is not sufficiently great to complete a proper extracting operation. After the rapid rise of the flexible diaphragm by the cold water from the city mains, continued operation of the high-pressure pump closes the recirculating check valve 201 and raises the pressure of the liquid beneath the flexible diaphragm to the maximum of that provided for by the relief valve 211, which as stated above, is preferably about 150 pounds per square inch. Flow of water from the high-pressure pump reversely through the pipes 95 and 100 is prevented by the recirculating check valve 201, which nevertheless provides for flow of water from the city mains through the recirculating check valve to the high-pressure pump.

During the extracting operation, the container continues to oscillate with the result that the clothes are in continual agitation and the foreign matter or dirt therefrom is retained in suspension in the liquid until the flexible diaphragm or member 47 forces the clothes against the top of the container and the liquid is extracted. Furthermore, the continued oscillation causes the suds and a substantial amount of the dirt to be retained on the surface of the liquid so that it is forced outwardly through the apertures 41 in the cover 38 early in the extracting movement of the flexible member 47. Also during the extracting operation, the continued agitation of the materials and liquid causes the materials to rise in suspension in the liquid so that they reach the upper portion of the container relatively early in the extracting operation. The pressure of the line supply of cold water is generally sufficient to force out through the cover 38 all of the free liquid in the container, but not all of that retained in the clothes. The high-pressure pump thereupon functions during the final portion of the operation to force out substantially all of the liquid from the clothes. The discharged liquid, as stated above, empties into the upper compartment 23 and is drained out through the opening 297, pipe 89, low-pressure drain valve 83, and pipes 75 and 86 to the drain pump 85 and drain pipe 82.

In the form herein illustrated, the length of the extracting operation is determined by the length of the raised portion 158 of the squeeze cam 112. When the follower 153 rides down off the raised portion 158 of this cam and onto the depressed portion 160 thereof, the squeeze valve 98 is again closed to cut off the supply of water from the line connection to the bottom of the container. This at the same time cuts off the supply of water from the line connection to the high-pressure pump and prevents further addition of high-pressure water to the space below the flexible member 47. At the same time, the follower 145 of the high-pressure drain cam 111 rides up on the raised portion 150 of that cam and again opens the high-pressure drain valve 88 to permit drainage of all of the water from the container underneath the flexible member 47, thereby permitting the flexible member to descend to its normal or washing position, as shown in Figs. 2, 3 and 4. The release of this high-pressure water underneath the flexible member again opens the valve on stem 202 in the recirculating check valve and permits the water from the high-pressure pump 206 to be idly recirculated through the recirculating check valve and back to the high-pressure pump through pipes 207 and 205. At the same time that the valves 88 and 98 are operated upon the completion of the extracting or squeeze operation, the follower 161 of the rinse cam 113 rides up on the raised portion 165 of said cam to open the rinse valve 92 and admit cold water to the container through the pipe 91, valve 92, pipes 216 and 76, vacuum breaker 217, hose 74 and pipe 70. It should be kept in mind that the check valve 216 prevents back flow of this rinse water from pipe 76 to the mixing valve 94. The rinse water is discharged into the upper portion of the container and over the clothes in sufficiently large volume and aids in returning the flexible member 47 to its normal position. Here again, the oscillating motion of the container continues, with the result that the clothes are agitated in the rinse water. To effect a highly improved rinsing of the clothes and at the same time permit the use of cold water therefor, the rinse water continues to flow into the container until the entire container is filled and thereafter continues flowing into the container during the agitated rinsing operation while surplus rinse water overflows through apertures 41 in the cover 38 of the container and carries away additional foreign matter, principally soap, which remained in the clothes after the extracting operation. As a result, substantially all of the soap is removed from the clothes and carried away with the overflow rinse water before the extracting operation commences when the follower 153 of the squeeze cam

112 rides up on the raised portion 157 thereof and simultaneously followers 145 and 161 of cams 111 and 113 ride down from the raised portions 150 and 165 thereof. At this stage in the operation, the drain valve 88 is again closed and the squeeze valve 98 is again opened to produce a second extracting operation. It should be here noted that the low-pressure drain cam 219 has its raised portions 237 and 238, and its depressed portions 239 and 240, so arranged around the circumference of this cam that this low-pressure drain valve 83 is open at all times except to be closed during evacuation of the water from under the flexible member 47 to facilitate the evacuation of this chamber between the bottom of the flexible member and the bottom of the container. This extracting operation for extracting the rinse water from the clothes is accomplished in the same manner as the previous one by filling the lower part of the container below the flexible member with water and continuing the oscillation of the container and the agitation of the clothes therein while the rinse water is first discharged from the container through the apertures in the cover and then the rinse water is expressed from the clothes. This extracting operation also continues for a sufficient length of time to permit the full pressure of the high-pressure pump at the pressure provided for by the relief valve 211 to function in the extracting of the rinse water for an appreciable portion of the extracting period.

The extraction of the rinse water is completed when the follower 145 rides up onto the raised portion 149 of cam 111 and at the same time follower 153 rides down from the raised portion 157 of the cam 112. The valves are then in the position shown in Fig. 18 whereupon the water under the flexible member 47 is drained off through the high-pressure drain valve 88 and the flexible member descends in the container to its normal position overlying the bottom and lower ribs thereof. The notch 135 in cam 110 returns to the position shown in Fig. 18 and the follower 136 enters the notch 135 and opens the switch 132, thereby shutting down the drive motor 60. As the slot 294 of disc 273 is now moved into registry with the projection 291 of arm 290, the lid 25 may now be raised (which prevents further operation of the motor and parts driven thereby) and the cover 38 slid to its open position to permit removal of the washed and dried clothes from the container.

While the container oscillates at exactly the same speed during both the washing and rinsing operations, nevertheless the action of the fluid on the material being cleansed is quite different during the two operations. This results from the difference in the amount of liquid in the container during these operations. For the washing operation less than sufficient water to float the material freely should be introduced into the container. Approximately one and one-half gallons of washing fluid to each pound of material has been found to be satisfactory for this purpose, the material being rather loosely massed in this proportion of cleaning fluid. When the container oscillates with this load of washing fluid and material, a violent action occurs in the container; the material and fluid at the end of each oscillation strike the ribs and are tossed upwardly in the container. This causes considerable rubbing or flexing of the mass of material against the ribs and when the material drops down against the wall of the container, hence all the material is given a washing action each time the mass strikes the ribs. The material, however, is not wadded together so as to become entangled and, inasmuch as the material is forced upwardly and then falls downwardly, a different portion of the mass will strike the ribs at the end of the next oscillation.

When, however, the rinsing action commences, the rinse water completely fills the tub and causes the material to float loosely in the water. As a result, there is very little rubbing action, but the soapy water is floated out of the material by the agitation of the water, forming a scum on the top of the water which flows out of the opening in the top of the container. Moreover, the water and material are circulated sufficiently in the container so that different pieces of the material gradually move from the top to the bottom of the container and back again. As a result, no scum or soap suds will be caught or trapped underneath any of the material and all of this soap will flow out of the container by the time the rinsing period is concluded and none will be deposited on the material.

With a spherical container approximately nineteen inches in diameter, I have found that the best washing action occurs when the container is oscillated at approximately seventy-two times per minute. When the number of oscillations is decreased a relatively small amount, such as 15%, the tossing action referred to above does not occur and the washing action decreases as much as 25 to 30%. Also, to give the best results, the upper ribs should extend above the level of a full load in the container, preferably about 80 to 85% of its capacity.

Referring to the modification in Fig. 19, it will be understood from the foregoing description that the addition of the additional rinse valve 307, the high-pressure water underneath the flexible member 47 will be used for rinsing because of the two rinse valves 92 and 307 being both open simultaneously during the rinse interval. At this time, the high-pressure drain cam 88 is closed, so that the high-pressure liquid underneath the flexible member is forced through pipe 311, open valve 307 and through the pipes 216 and 76, hose 74 and pipe 70 to the interior of the container. When this pressure has been reduced to below the line pressure through pipes 81 and 91 and rinse valve 92, the line pressure through the injector 313 will draw out any further water underneath the flexible member 47 and force it with the line water into the container for rinsing. Otherwise, Fig. 19 is similar to Fig. 18 and, except for the changes referred to, the same reference numerals have been used on the other corresponding parts.

It is also to be noted that the motor is mounted upon a pivoted supporting member 314 and the motor and this member are urged by spring 315 in a direction to keep the belt 59 taut at all times. Also, a similar spring 316 is mounted on the housing to keep taut at all times the belt 317 from the motor to the drain pump 85.

I claim:

1. A washing and extracting machine provided with a container mounted on a shaft and means for oscillating said container comprising, a motor, a shaft driven thereby, a pinion on said motor driven shaft, a gear driven by said pinion, an arm fixed to said container shaft, a link eccentrically pivoted to said gear and connected to the container shaft arm to oscillate the container a predetermined number of degrees continuous-

ly from said motor during the operation of the machine, a slowly rotatable control shaft having means for effecting sequential operation of the machine to obtain a cycle comprising washing, extracting, rinsing and extracting in the order named, and connections between said container shaft arm and said control shaft for slowly rotating the latter for effecting said sequential operation.

2. A laundry machine comprising an oscillatable container, a rigid fluid agitating rib on the interior of said container, a flexible member adapted to divide said container into a washing compartment and a compression compartment and arranged snugly to overlie said rib, a hollow collapsible rubber rib fixed around its marginal edges to the interior of the upper portion of said container so that said edges are immovable with relation to said upper portion of the container to travel therewith during its oscillation, means for supplying cleaning and rinsing fluid to said washing compartment, means for supplying fluid under pressure to said compression compartment whereby to force said member against said material and the wall of said container to extract fluid from said material exteriorly of said container and to collapse said hollow rib, power means, and means continuously driven thereby for oscillating said container, said rubber rib being separate from the flexible member and projecting outwardly into the upper portion of the washing compartment during the washing operation and being collapsed against the container wall by the pressure of the flexible member during the extracting operation.

3. A washing and extracting machine having in combination a clothes container supported for oscillation about an upright axis extending through the vertical center line of the container, means for oscillating said container, control means for effecting sequential operation of the machine to obtain a cycle comprising washing, extracting, rinsing and extracting in the order named and to stop the machine some time after the completion of the second extracting operation, said means for oscillating the container comprising a motor driven shaft having a pinion, a gear driven by said pinion, a container supporting shaft having fixed thereto a rocker arm, and a link connecting the gear and rocker arm, whereby rotation of the motor driven shaft will oscillate the container continuously while the motor is running, said control means including a slowly rotatable control shaft, and connections between said container shaft rocker arm and said control shaft for slowly rotating the latter for effecting said sequential operation.

4. A machine as claimed in claim 3, in which the rocker arm at the end opposite the link connected end extends beyond the container shaft, and said connections include speed reduction mechanism operatively connected between the control shaft and the extended end of the rocker arm for rotating the control shaft at a slow speed while the container is oscillating at a considerably faster speed.

5. A washing and extracting machine having in combination a clothes container having agitating means in the lower portion thereof and having a flexible liner therein and an apertured cover, means for introducing high-pressure liquid behind the liner for pushing the liner forwardly for extracting purposes, means for introducing rinse liquid in the container in front of the liner, and means for transferring the liquid

behind the liner into the container in front of the liner to be used for rinse purposes and then discharged through said apertured cover to drain, a motor, a vertical shaft oscillated by said motor, and said container being fixed to said shaft to oscillate therewith in horizontal planes about an axis of rotation which is an extension of the axis of rotation of said shaft.

6. A washing and extracting machine, comprising, a container for textile materials and liquid, said container having agitating means in the lower portion thereof and having a flexible liner therein and an apertured closure, a pump and pipe line for introducing high-pressure liquid behind the liner for pushing the liner forwardly for extracting purposes, a conduit connecting a rinse liquid supply with the interior of the container in front of the liner, a valve in said conduit, a further pipe leading from said pipe line, a pipe connection between said further pipe and said conduit for conducting liquid from behind the liner to in front of the liner for rinse purposes, and a valve in said pipe connection for controlling said last mentioned passage of liquid to in front of the liner.

7. A machine as claimed in claim 6, including a drain pipe connected with said further pipe, and a valve in said drain pipe.

8. A machine as claimed in claim 7, including cams for operating said valves, said cams being formed so that during the rinsing operation the liner may be again pushed forwardly for extracting the rinse liquid from in front thereof and from the materials, and the liquid behind the liner may be conducted to a drain by opening the valve in the drain pipe shortly before the end of the rinsing operation.

9. A washing and extracting machine, comprising, an oscillatable container for textile materials and liquid, said container having a flexible liner therein and an apertured wall opposite said liner, hollow collapsible rubber ribs fixed to the inner surface of the container independently of the flexible liner for agitating the materials in the liquid during movement of the container, and means for introducing high-pressure liquid behind the liner for pushing the liner forwardly for extracting the liquid from the container and the materials, said rubber ribs collapsing against the container wall when the liner is extracting liquid from the materials, each of said hollow collapsible rubber ribs being fixed around its marginal edges to the interior of the upper portion of said container so that said edges are immovable with relation to said upper portion of the container to travel therewith as the container is oscillated.

10. A machine as claimed in claim 9 in which the container wall back of each of said ribs is formed with an aperture connecting the hollow of the rib with the outside air exterior of the container for venting the ribs during collapsing.

11. A washing and extracting machine, comprising an oscillatable container for textile materials and liquid, a flexible liner anchored in said container so as to divide it into a washing compartment on one side of the liner and a compression compartment on the other side of the liner, a hollow collapsible rubber rib fixed independently of the flexible liner to the inner surface of the container wall in the washing compartment, and means for introducing liquid under high pressure behind the liner to push the liner forwardly for extracting purposes, said

rib being collapsed against the container wall when the liner is pushed forwardly, said hollow collapsible rubber rib being fixed around its marginal edges to the surface of the interior of the upper portion of said container so that said edges are immovable with relation to said upper portion of the container to travel therewith as the container is oscillated.

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