Jan. 20, 1942. C. R. EVANS 2,270,805

WASHING MACHINE

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Fig. 1.

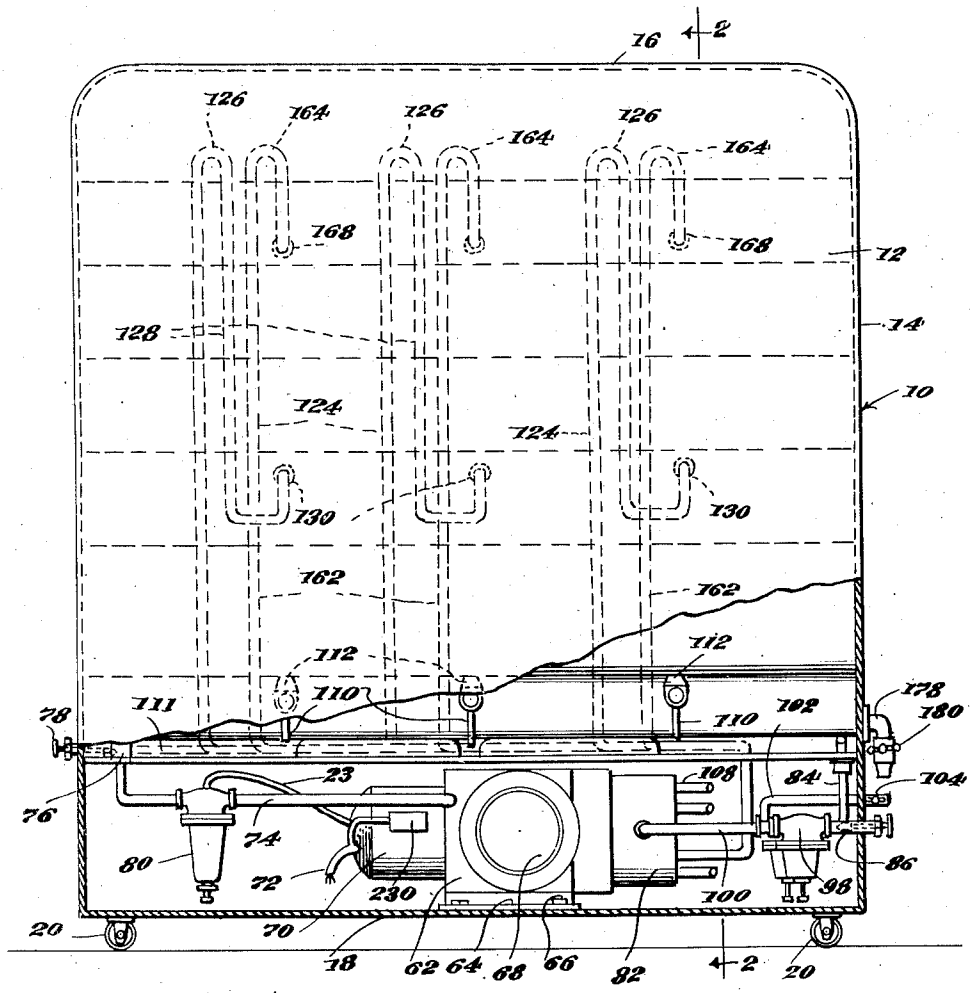
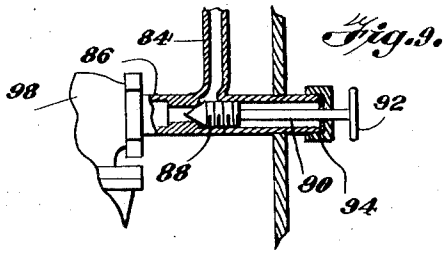


Fig. 9.



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Fig. 2.

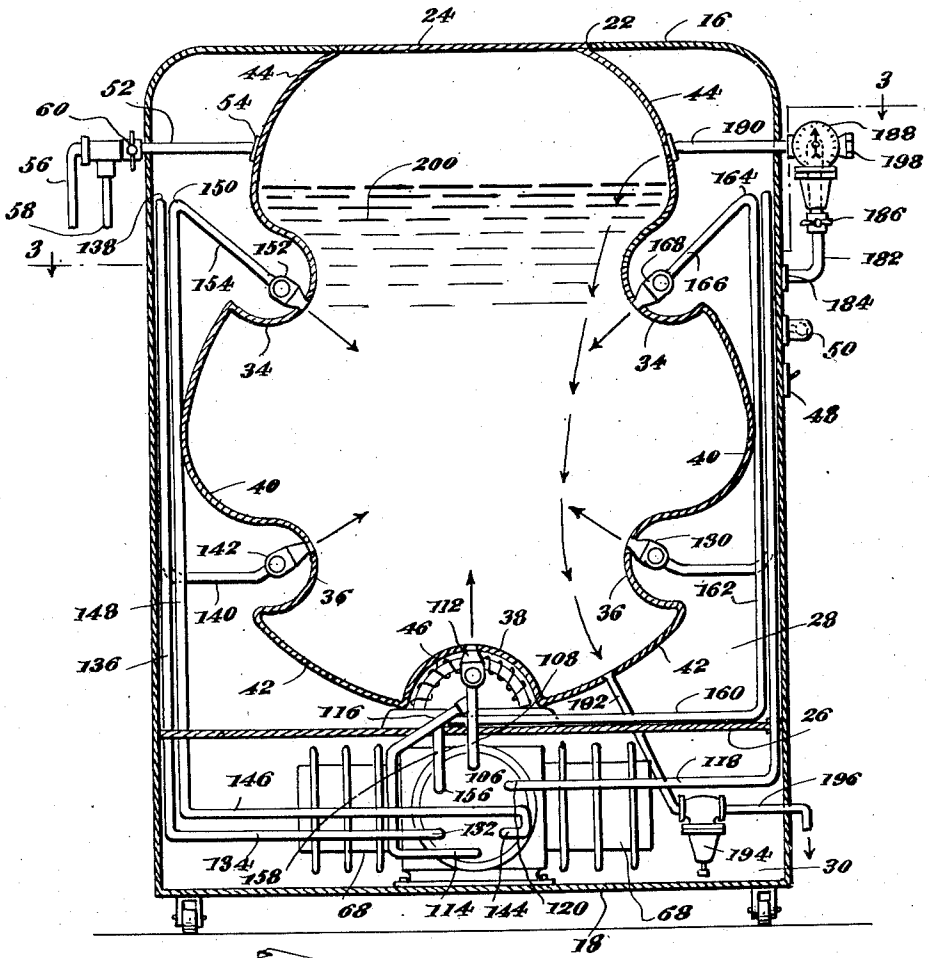
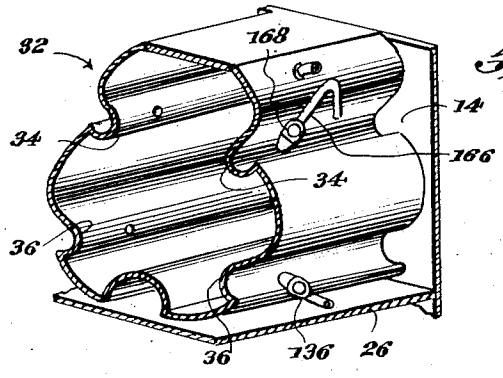


Fig. 4.



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WASHING MACHINE

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Fig. 3.

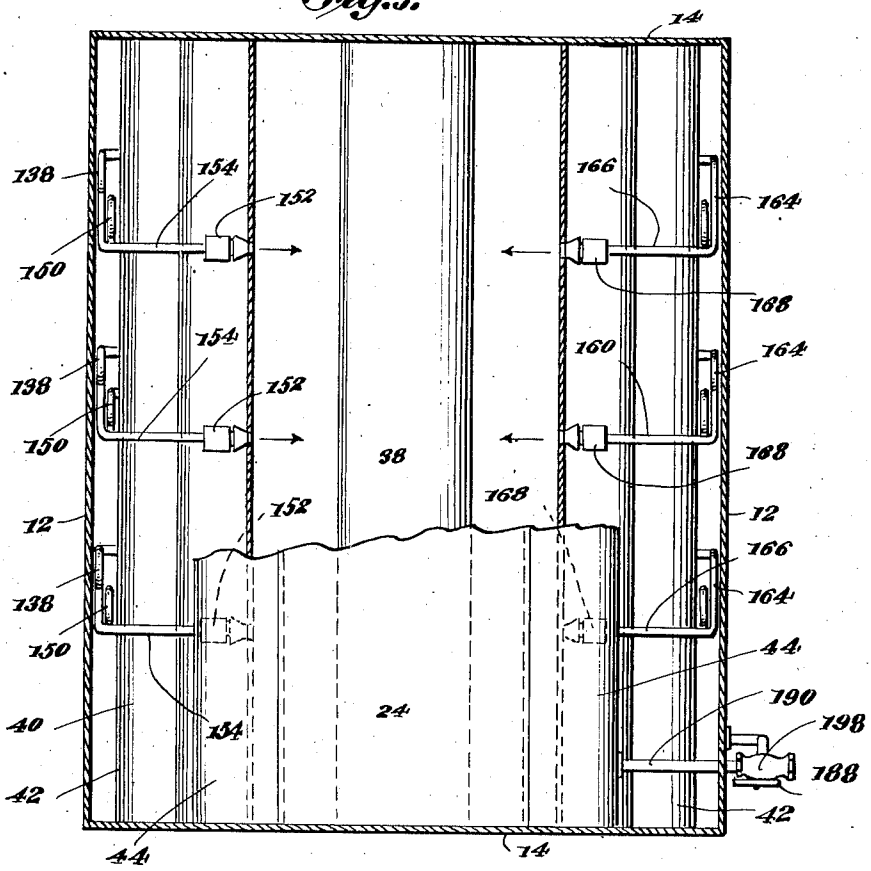
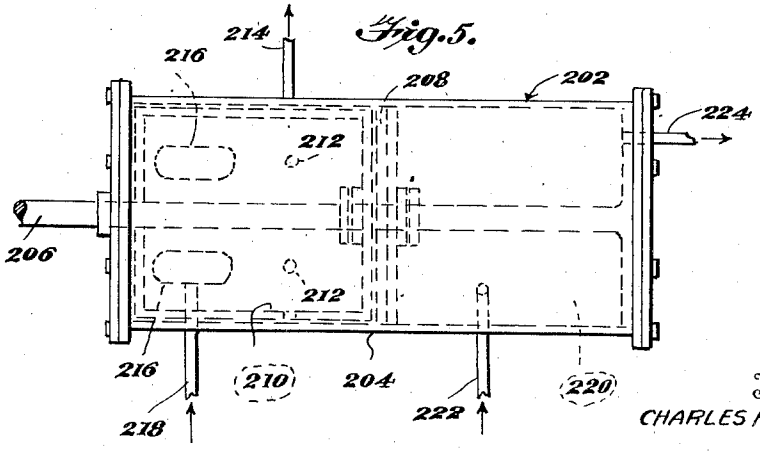


Fig. 5.



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Fig. 6.

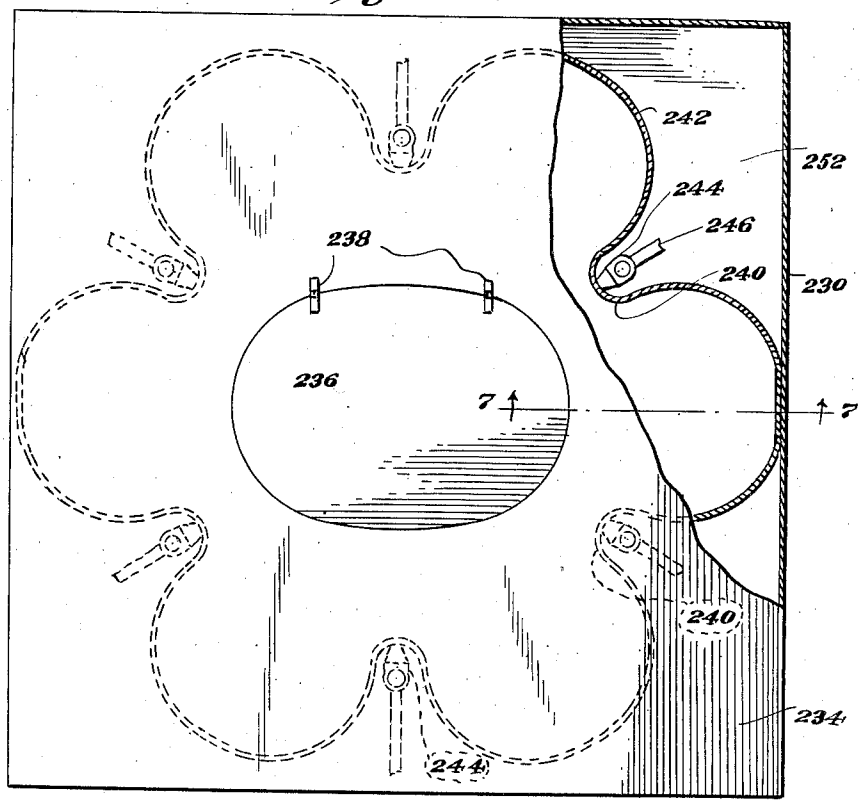


Fig. 7.

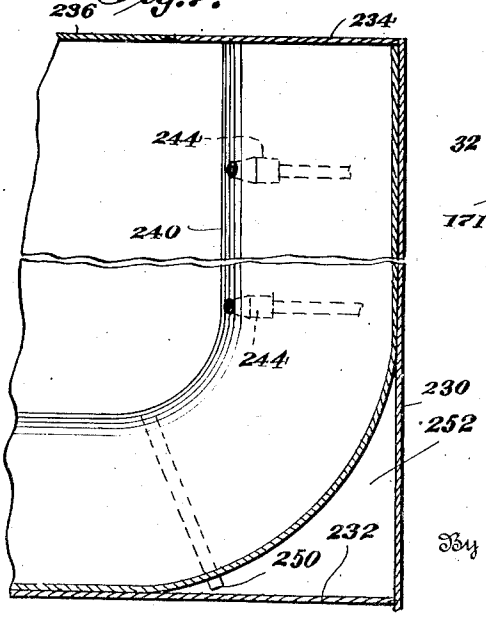
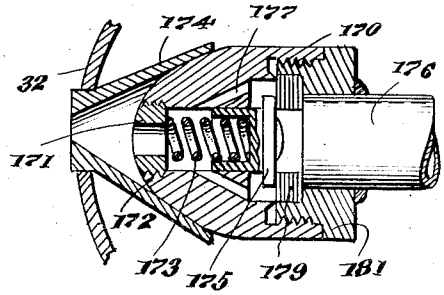


Fig. 8.



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WASHING MACHINE

Charles Roy Evans, Decatur, Ill.

Application February 21, 1940, Serial No. 320,186

10 Claims. (Cl. 68—183)

The present invention relates to an apparatus for washing, drying and dry cleaning clothing and the like.

The primary purpose of the invention is to provide an apparatus of the above character capable of being used in domestic and commercial laundries wherein circulation of the cleaning fluid is accomplished by compressed air passing therein through submerged blasts occurring intermittently at various angles.

A further object of the invention is to provide an apparatus for washing and cleaning articles of wearing apparel and fabrics in the same container without requiring the usual transfer of the articles being washed from a washing machine to a separate drying compartment.

Another object of the invention is to provide a washing and drying machine having a compressed air chamber between the walls thereof whereby compressed air may be stored for the purpose of agitating the articles being cleansed while held in a cleaning solution.

A still further object of the invention is to provide a heating element for heating the water or cleaning fluid in the washing and drying machine while at the same time, heating the compressed air in the walls of the machine so that the injection thereof will not reduce the temperature of the cleaning liquid.

A still further object of the invention is to provide a washing and drying apparatus of the above mentioned character in which a compressor is employed for supplying the compressed air chamber and a distributor operable by the compressor fed from the source of supply to direct intermittent blasts of air under pressure at different angles in the cleaning solution contained in the washing machine.

A still further object of the invention is to provide a washing and drying machine including inner and outer spaced receptacles and the former being of irregular shape to provide longitudinal ribs or inwardly extending projections for producing a scrubbing action as the articles being cleaned are moved thereover.

A still further object of the invention is to provide a washing and drying apparatus in which air blasts are alternately directed radially inwardly of the container whereby rotation of the articles will be effected in a clockwise and counterclockwise direction.

Other objects and advantages of the invention will become apparent during the course of the following description of the accompanying drawings wherein:

Figure 1 is a side elevational view of the washing and cleaning apparatus illustrating the lower portion of the casing broken away to show the compressor and distributor.

Figure 2 is a vertical cross-sectional view taken on line 2—2 of Figure 1 looking in the direction of the arrows and showing the irregular shape of the internal casing structure.

Figure 3 is a horizontal cross-sectional view taken on line 3—3 of Figure 2 looking in the direction of the arrows and showing the manner in which the compressed air jets are arranged with respect to the internal casing.

Figure 4 is a perspective view of the internal casing showing in detail the longitudinal ribs and the peculiar formation thereof.

Figure 5 is a top elevational view of a modified distributor which is used in machines requiring more than one set of air jets.

Figure 6 is a top elevational view of a modified form of the invention wherein the washing and drying casing is arranged vertically and the air blasts are directed inwardly toward a vertical axis.

Figure 7 is a vertical cross-sectional view taken on line 7—7 of Figure 6 looking in the direction of the arrow and showing the position of the air blast jets.

Figure 8 is a cross-sectional view of one of the air blast jets illustrating in detail the construction thereof and,

Figure 9 is a vertical cross-sectional view of the cut-off valve interposed between the source of air pressure supply and distributor.

In the drawings, wherein for the purpose of illustration and wherein like reference characters will be employed to designate like parts throughout the same, the reference character 10 will be employed to generally designate a washing machine in Figures 1 to 4 inclusive wherein is shown a preferred form of the invention.

The washing and cleaning machine comprises an outer casing including side walls 12 closed at the ends by vertical walls 14 and closed at its upper end by means of a top wall 16.

A bottom wall 18 completes a box-like casing supported by rollers 20 so that the casing may be easily moved to various locations.

Formed in the top wall 16 is an opening 22 closed by a lid 24 as shown in Figure 2. A longitudinal division plate 26 divides the casing 10 into upper and lower compartments 28 and 30 as is clearly shown in Figure 2.

Mounted in the chamber 28 is a container 32 adapted to receive the articles to be cleaned and

said receptacle or container is provided with a pair of inwardly projecting opposed ribs 34 and inwardly projecting opposed ribs 36 adjacent the lower portion of the receptacle. A lowermost rib 38 extends longitudinally along the bottom of the receptacle 32 and the spaces between the ribs 34 and 36 are bulged as at 40 while the spaces between the ribs 36 and lower rib 38 are slightly curved as at 42.

The longitudinal ribs 34 are connected to the top wall 16 by welding or the like, adjacent the opening 22 by means of curved sections 44.

Located on the partition 26 and extending upwardly in the lowermost rib 38 is an electric heating element 46 controlled by a switch 48 having an indicator 50 in circuit therewith so that the heater will be protected against accidental or prolonged use.

As above described, the compartment 28 is completely air tight and is adapted to be used as a compressed air storage receptacle for the agitating fluid employed in the receptacle 32. Extending through the upper portion of the casing 14 is a pipe 52 connected to the container 32 as at 44 so that the container may be fed with a supply of hot and cold water through the respective pipe lines 56 and 58. A control valve 60 is interposed between the pipe 52 and hot and cold water pipes 56 and 58 are provided with valves or faucets for individually controlling the hot and cold water supply.

Mounted on the floor 18 is a compressor 62 having its base 64 anchored in place by means of bolts or the like 66. The compressor is provided with oppositely disposed cylinders 68 arranged transversely in the casing 10 within the chamber 30. The compressor 62 is driven by an electric motor 70 supplied with current from a domestic electrical source through a cable 72 and a pipe 74 is connected to the discharge side of the compressor and extends upwardly through the partition 26 where it terminates in an outlet valve 76 controlled by a needle valve operating handle 78. In this manner, the chamber 28 is filled with compressed air and a fluid pressure control valve 80 is interposed in the supply pipe 74 to prevent back pressure effects and controlling the flow of compressed air to the chamber 28.

In opposed relation to the motor 70 and mounted on the armature shaft thereof or continuation of the compressor shaft is a distributor 82 the rotor of which is adapted to connect the storage chamber 28 to the compressed air nozzles in interrupted sequence to produce an agitation within the receptacle 32 as will be hereinafter more fully described.

The distributor 82 is in communication with the compressed air chamber 28 by means of a pipe 84 connected at one end thereof to casing 86 in which is threaded a needle valve 88 operable by a valve shaft 90 and hand wheel 92. A packing gland nut 94 is threaded on the valve casing 86 at one end thereof while the opposite end as at 96 is connected to a valve 98 of the safety pressure operated type. Connecting the valve 98 and the distributor 82 is a feed pipe 100 adapted to supply the distributor with a source of compressed air.

A branch pipe 102 is connected to the feed pipe 100 and is provided on its free end with a valved nipple 104 for connection to compressed air appliances in the laundry.

The distributor 82 is provided with a head 106 to the uppermost portion of which is connected a pipe 108 which extends upwardly through the partition 26 and along the bottom wall thereof for connection with branch pipes 110 having spray nozzles 112 projecting into the apex of the lowermost rib 38 so that a current of compressed air will be projected upwardly at spaced intervals as shown in Figures 1 and 2.

Diametrically opposite the distributor pipe 108 is a pipe line 114 which also connects with the compressed air nozzles 112 by means of a branch pipe 116 as shown in Figure 2, a feeder pipe 118 connects with the distributor head 106 as at 120 and extends through the partition 26 where it is connected to a series of vertical pipes 124 having branch offtakes and each of the feeder pipes 124 extends to a point adjacent the top wall of the casing 16 where they are return bent as at 126 to form legs 128 terminating at the lower ends in a series of horizontally arranged upwardly directed air nozzles 130 which are located in the lower horizontal rib 36.

Diametrically opposite the outlet 120 is an outlet 132 to which is attached a feeder pipe 134 which extends upwardly through the partition 26 for supplying a series of branch pipes 136 which also extend upwardly adjacent the top wall 16 and are return bent as at 138 so that the legs thereof may terminate in branch pipes 140 connected to horizontally arranged upwardly directed spray nozzles 142 in horizontal opposed relation to the spray nozzles 130.

Connected to the distributor head 106 as at 144 is a feeder pipe 146 projecting upwardly through the partition 126 for supplying compressed air to a series of upwardly extending branch feeder pipes 148 which are return bent as at 150 in close proximity to the top wall of the casing 16 for connection with compressed air jets 152 by means of diagonally arranged spray pipes 154. The compressed air jets 152 are in diametrically opposed relation to the compressed air jets 130 as is clearly shown in Figure 2.

In diametric opposed relation to the outlet 144 on the distributor head 106 is an outlet 156 to which is connected a pipe 158 extending upwardly through the partition 26 and extending along the top wall thereof as at 160 where it is connected to a series of upwardly extending feeder pipes as at 162. The feeder pipes 162 extend upwardly and are return bent as at 164 terminating in diagonal branch pipes 166 for connection with compressed air jets 168 which are connected in the upper longitudinal rib 34 in diametric opposed relation to the jets 142.

It will be noted that the air jets as shown in Figure 8 include a bulbous shaped member 170 having a tapered projection 172 nested within a frustro-conical receptor 174 carried by the casing receptacle 32. Each air jet is, provided with a threaded orifice thimble 171 through which an air blast is directed and the inner end of the thimble is adapted to engage one end of a coil spring 173, the opposite end of which engages a cup-shaped valve 175 slidably received in the bore of the jet 170. Bleed openings 177 by-pass the cup-shaped valve 175 for allowing the escape of air under pressure when the valve 175 is unseated from the valve seat 179 carried on the end of the pipe 176 and held in place by means of a gland nut 181 threaded in the open end of the bulbous shaped member 170.

The feed pipes 176 are connected to the bulbous shaped member 170 in direct alignment with the tapered jet 172.

On one end of the casing 10 and communicat-

ing with the clothes container 32 is a drain pipe 178 having a valve 180 for controlling the drain of fluid and suds from the container.

A pipe 182 is connected to the side wall 12 of the casing 10 as at 184 and extends upwardly for connection with a valve 186 connected to a pressure indicator as at 188. A pipe 190 connects the pressure indicator to the receptacle 32 whereby a current of compressed air will be directed downwardly in the direction of the arrows when the clothes or other articles are being dried. A discharge pipe 192 communicates with a relief valve 194 for venting the container 32 through a discharge pipe 196. Formed in the pressure indicator 188 is a relief valve 198 which will open to the atmosphere in the event that the chamber 28 is subjected to high pressures.

During the initial starting operation, the valve 76 is opened which immediately allows compressed air to pass from the chamber 28 to the lower air jets 112 through a pipe 111 connected to the valve 76 and to the juncture of the pipes 110. In doing so, the pressure in the valve 80 is reduced which closes a circuit through the starting switch 230 and starts the electric motor 70 operating the compressor 68 and distributor 82. After operation of the motor has begun and pressure built up in the chamber 28, the attendant may turn off the valve 76 thereby stopping the motor 70 upon an increase of pressure in the valve 80.

It will thus be seen, that when clothes or other articles are to be cleaned they are placed in the receptacle 32 which is filled with water 200 through the pipe 52. The heating element 46 is next turned on by the switch 48 for heating the water 200 and the compressed air stored in the chamber 28. By controlling the motor 70, rotation is imparted to the distributor so that the compressed air from the storage tank 28 will be fed to the receptacle 32 to the air jets in the following sequence: 112, 130, 152, 112, 142, and 168.

It will thus be noted that after an upwardly directed blast of air is injected into the receptacle 32 through the jet 112, a diagonal blast is injected through the jet 130 after which a blast of air is injected into the receptacle 32 through the nozzle 152 in diametrically opposite relation to the last blast of air. The next blast will be through 112. The next jet 142 will inject a diagonal blast of compressed air in opposition to the jet 168. The last air blast of the sequence is through the air jets 168 in diametrically opposed relation to the jet 142.

After the clothes or articles have been subjected to the above described cleansing action, the water or other cleaning fluid is drained from the container 32 through the valve 180 and the clothes may be dried by the same repeated operation. During the drying operation, the valve 186 is operated to allow direct communication between the compressed air chamber 28 and the receptacle 32 which compressed air is allowed to escape through the discharge pipe 196 by controlling the valve 194.

In the event that more air jet nozzle feed pipes are used, the compressor 62 will be provided with a double distributor 202 including a casing 204 in which is journaled a rotary shaft 206 driven by the compressor shaft similar to Figures 1 and 2. A partition 208 separates the distributors and mounted on the rotary shaft 206 on one side of the partition 208 is a sleeve 210 having openings 212 for communicating with discharge pipes 214. Also formed in the sleeve 210 are openings 216 which communicate with an intake pipe 218. The other sleeve of the distributor 220 is mounted on the opposite side of the partition 208 and is supplied with air under pressure through a feed pipe 222 while the discharge side of the compressor will be provided with a series of jet feed pipes 224.

When employing the double distributor 202, an additional control valve 86 such as shown in Figure 1 will be used and will have its inlet side connected to the storage chamber 28 while the discharge side will connect with the feed pipe 218 and the pipe 100 from the safety valve 98 will connect with the distributor feed pipe 222 in substantially the same manner as connected to the distributor 82.

For controlling the motor 70 there is provided an automatic cutout 230 operable by means of a pressure operated switch carried in the valve member 80 and connected to the cutout 230 by means of a cable 232 whereby pressure in the storage tank will automatically cut off the compressor and cease operation thereof.

In the modified form of the invention shown in Figures 6 and 7, the cleaning and drying machine is arranged in a vertical casing 230 having a bottom wall 232 and a top wall 234. A closure 236 is provided in the top wall and is hinged thereto as at 238.

Mounted within and spaced from the casing 230 is a receptacle having vertical spaced inwardly projecting ribs 240 connected by arcuately curved sections 242 so as to produce a series of projections extending inwardly to produce a cleaning action on the clothes or other articles when agitated by blasts of air projected inwardly through the air jets 244 which are located directly at the apex of the ribs 240. Air supply pipes 246 connect with a distributor in the same fashion as the form of the invention shown in Figures 1 to 5 inclusive.

Located in the bottom portion of the clothes containing receptacle is a pipe 250 for direct communication with the air storage space 252 so that by controlling a suitable valve compressed air will be directed into the clothes receptacle for drying purposes.

It is to be understood, that the forms of the invention herewith shown and described are to be taken as preferred embodiments of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described the invention, what I claim is:

1. A cleaning apparatus comprising a liquid holding receptacle, a spaced jacket surrounding the receptacle forming a compressed air chamber, means for supplying liquid to the receptacle and compressed air jets spacedly and oppositely disposed in the receptacle for injecting blasts of compressed air substantially centrally of the receptacle.

2. A cleaning apparatus, comprising a casing, a stationary liquid holding receptacle located in the casing, ribs formed on the receptacle projecting radially inwardly thereof, compressed air jets mounted in the receptacle adjacent the ribs and means for controlling the intermittent supply of compressed air to the jets.

3. A cleaning apparatus comprising a casing, a liquid holding receptacle mounted in spaced relation therefrom forming a compressed air

chamber therebetween, inwardly projecting ribs formed on the receptacle, compressed air jets located adjacent the ribs for directing blasts of air toward the axis of said receptacle, means for supplying the space between the casing and receptacle with air under pressure and means for intermittently connecting the compressed air chamber with the compressed air jets.

4. A cleaning apparatus comprising a casing, a liquid holding receptacle located therein in spaced relation therefrom, said spaced receptacles providing an intermediate compressed air chamber, air jets spacedly and oppositely disposed in the receptacle for directing air into the receptacle substantially centrally thereof, means for supplying the compressed air chamber with air under pressure and means communicating with the jets and the chamber for intermittently supplying air to the air jets.

5. A cleaning apparatus comprising a casing, a liquid holding receptacle located in the casing adapted to contain articles to be cleaned, a series of oppositely disposed spaced inwardly projecting horizontal ribs formed in the receptacle, air jets mounted on the ribs for projecting blasts of compressed air substantially centrally of the receptacle, said inner and outer receptacles forming a compressed air chamber for supplying the air jets, means for heating the compressed air chamber and receptacle, means for supplying the air chamber with compressed air and a distributor connected to the air chamber and communicating with the air jets.

6. A cleaning apparatus comprising a casing, a liquid holding receptacle mounted in the casing in spaced relation therefrom forming an intermediate compressed air chamber means for supplying the chamber with compressed air, a series of inwardly projecting ribs arranged in vertical spaced relation formed in the liquid holding receptacle and a series of compressed air jets adapted to be supplied from the compressed air chamber arranged in vertical series adjacent the inwardly projecting ribs.

7. A washing machine comprising a liquid holding receptacle, a casing surrounding the receptacle providing a pressure chamber, a compressor for supplying air under pressure to the pressure chamber, a series of radially disposed air jets in the receptacle for directing radial blasts of air inwardly of the receptacle, a distributor connected to the pressure chamber and controlled by the compressor and connections between the distributor and the air jets.

8. A washing machine comprising a liquid holding receptacle having a series of longitudinal ribs extending radially inwardly of the receptacle, air jets mounted in the ribs for directing blasts of air radially inwardly of the receptacle and means for controlling the blasts of air whereby opposed sets of jets will operate in unison.

9. A washing machine comprising a liquid holding receptacle, means for directing jets of air under pressure into the receptacle and an air distributor for controlling the operation of the jets, said distributor comprising a casing having an inlet port connected to a source of air pressure, a series of outlet pipes extending between the distributor and the air jets and a rotary member located in the distributor casing having a series of ports adapted to register with the outlet pipes in succession.

10. A washing machine comprising a liquid holding receptacle, a series of air jets mounted in the receptacle for inwardly directing blasts of air, a pressure chamber surrounding the receptacle, a compressor for supplying the pressure chamber and a distributor driven by the compressor having an inlet connected to the pressure chamber and a series of outlets connected to the air jets.

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