

Dec. 19, 1933.

J. S. JONES

1,940,549

LAUNDERING APPARATUS

Filed Dec. 19, 1931

3 Sheets-Sheet 1

Fig. 1

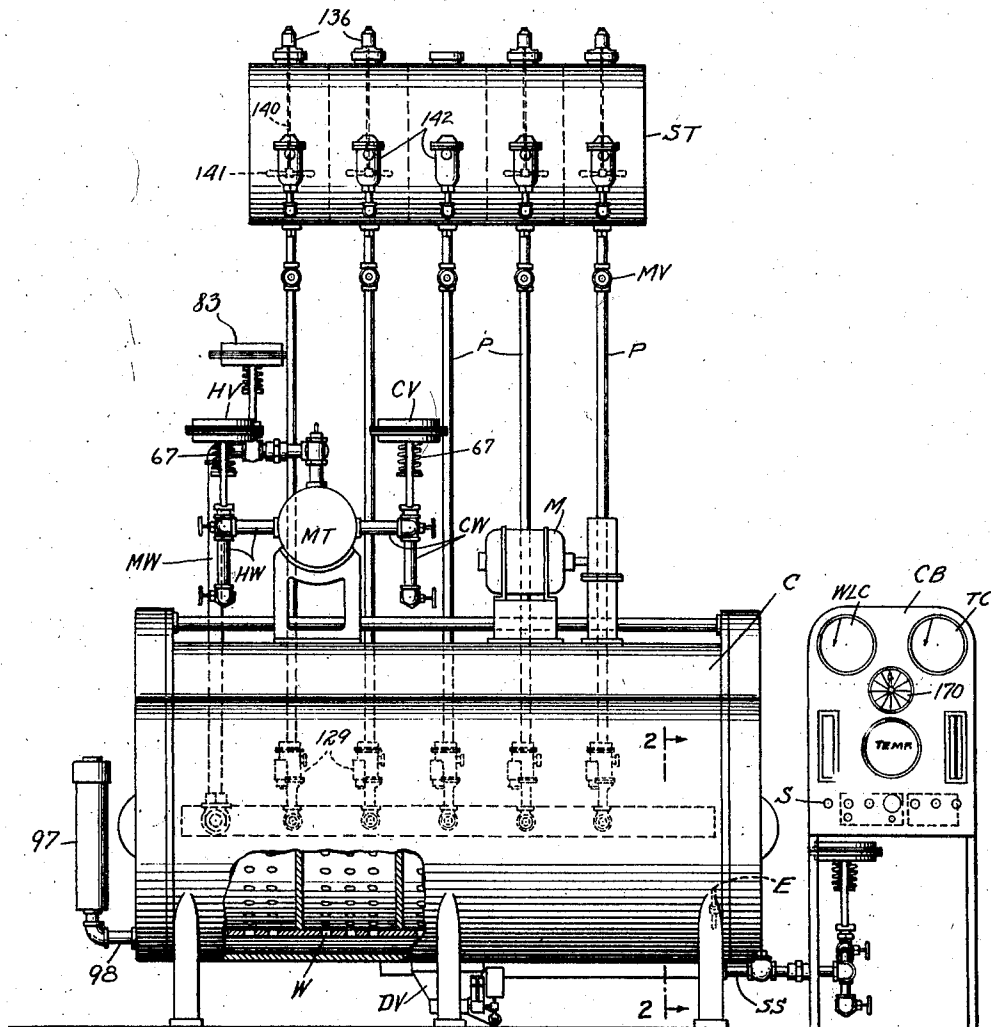
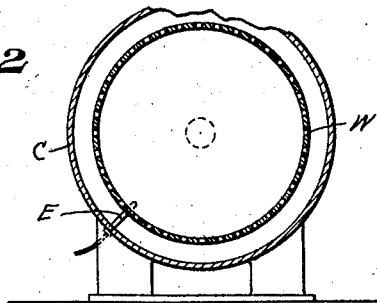


Fig. 2



INVENTOR.
JOSEPH S. JONES
BY *Francis C. Jones*
ATTORNEY

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3 Sheets-Sheet 2

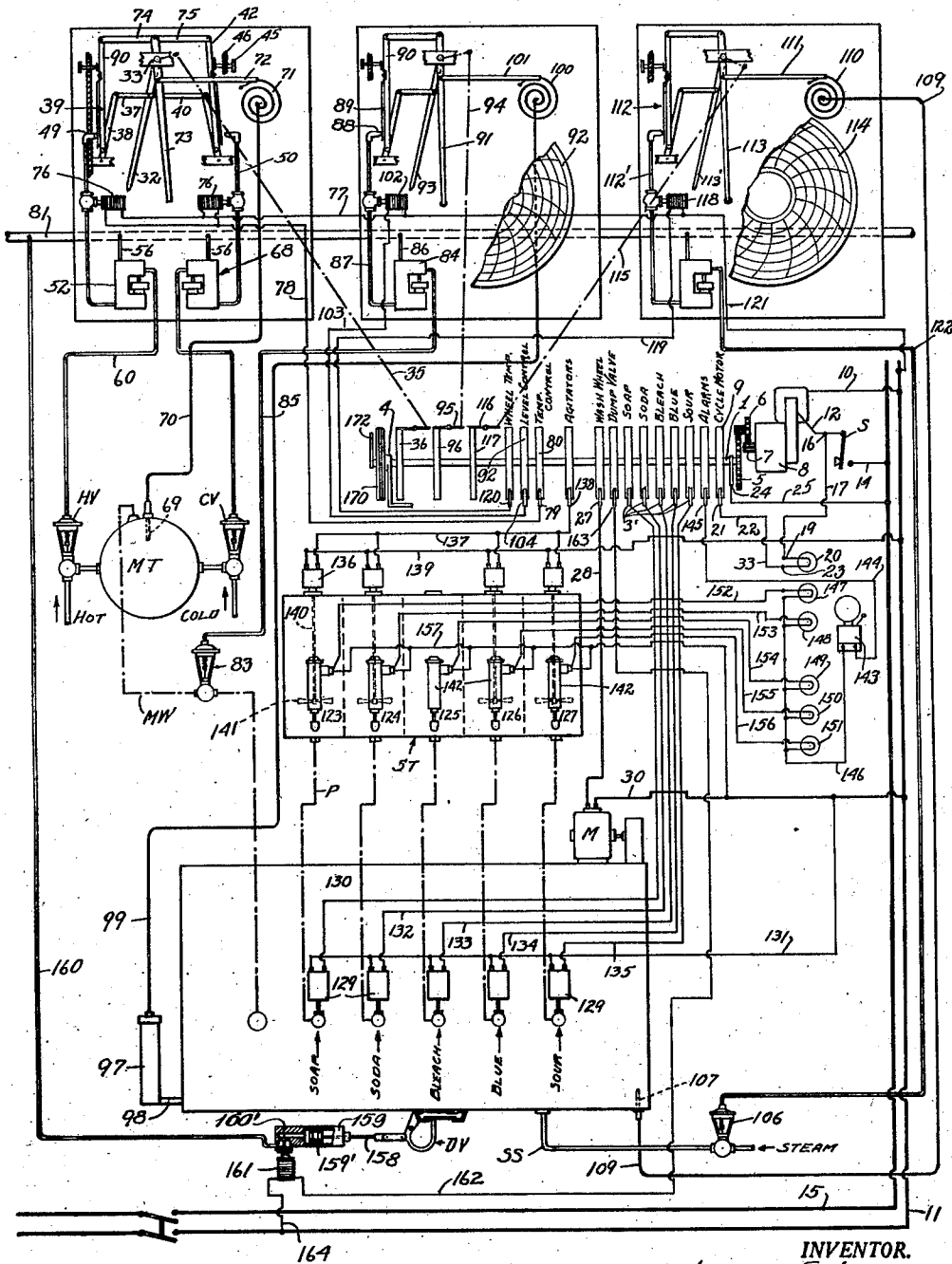


Fig. 3

INVENTOR.
JOSEPH S. JONES
BY *Joseph S. Jones*
ATTORNEY

Dec. 19, 1933.

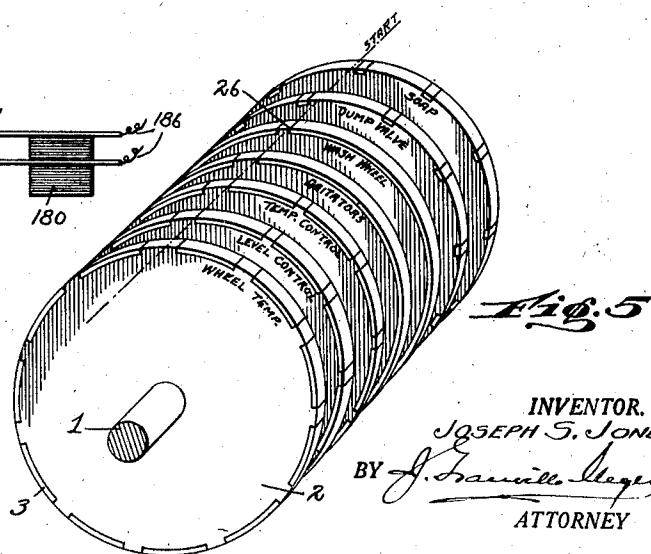
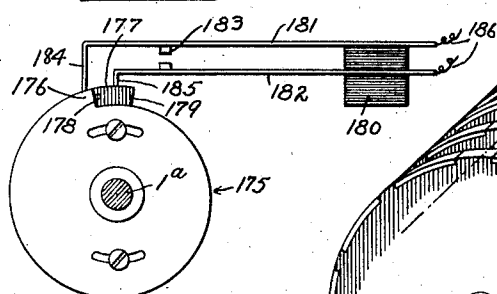
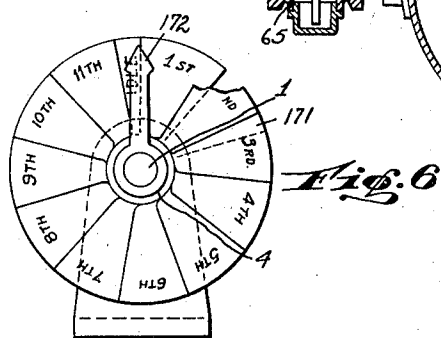
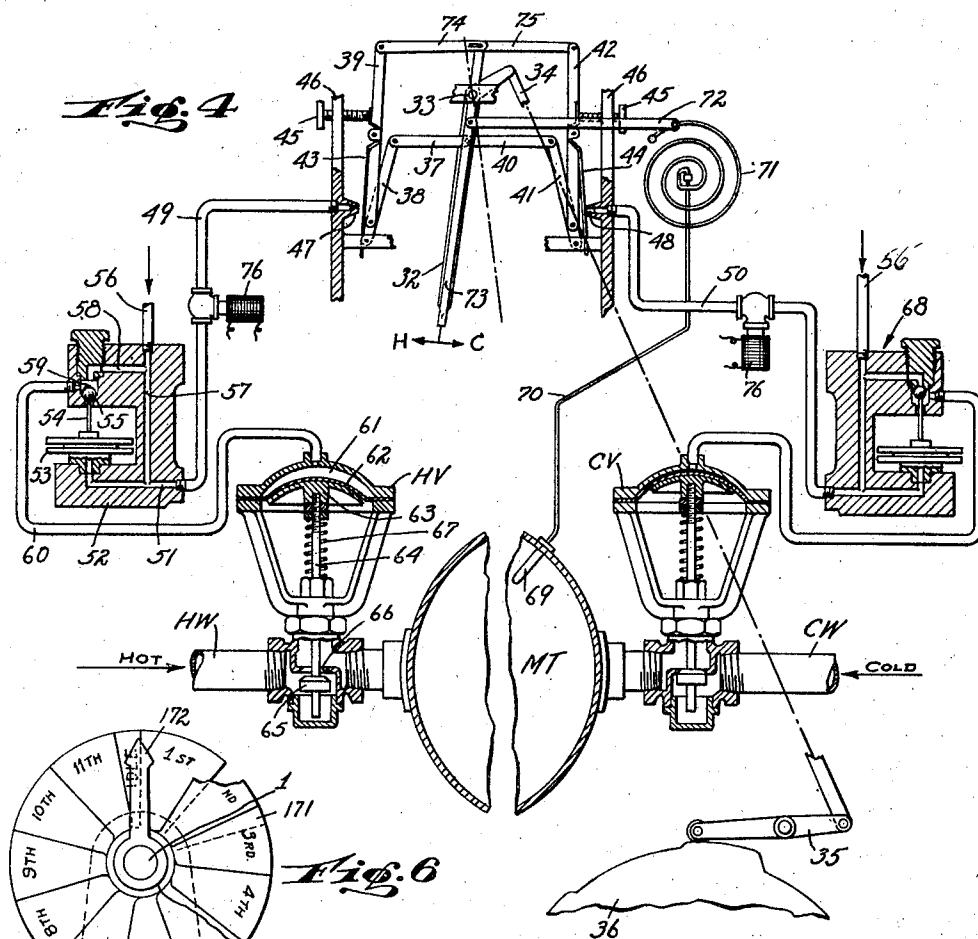
J. S. JONES

1,940,549

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Filed Dec. 19, 1931

3 Sheets-Sheet 3



INVENTOR.

JOSEPH S. JONES

BY J. Fawcett Rogers
ATTORNEY

ATTORNEY

UNITED STATES PATENT OFFICE

1,940,549

LAUNDERING APPARATUS

Joseph S. Jones, Oak Park, Ill., assignor to Consolidated Laundries Corporation, New York, N. Y., a corporation of New York

Application December 19, 1931

Serial No. 582,129

10 Claims. (Cl. 68—18)

My invention relates to laundries, and comprises generally the provision of apparatus for automatically effecting and controlling various predetermined operations for washing clothes in a washing receptacle, and maintaining proper washing conditions from the time the clothes are placed in the receptacle until the last step has been completed.

I believe that the best understanding of the nature and objects of the invention can be had by first setting forth a general description of the construction, arrangement, and operation of the mechanism employed. I have illustrated one embodiment of the invention in the accompanying drawings wherein

Fig. 1 is a front elevation of a wash wheel and tanks for the washing solutions and the control and indicating board;

Fig. 2 is a sectional view on the line 2—2 of Fig. 1;

Fig. 3 is a diagrammatic view of controlling mechanism and the electrical circuits for effecting operation thereof;

Fig. 4 is an enlarged sectional view of the apparatus for controlling the admission of water to a mixing tank;

Fig. 5 is a detail perspective view of the time cycle contactor for controlling the operation of various parts of the mechanism;

Fig. 6 is a front elevation of the visible indicator to show what step of the process is being effected; and

Fig. 7 is a side elevation of an alternate type of contactor affording variation in a particular controlled step of the washing process.

For the purpose of a general preliminary explanation reference is made to Fig. 1, in which the letter C designates the casing of the wash wheel in which the foraminous cylinder W is mounted in usual manner for oscillating movement under the action of mechanism, not shown, operated by the motor M. A tank MT may be conveniently mounted on the casing of the wash wheel to receive hot and cold water through the pipes HW and CW connected to suitable sources of supply. A pipe MW leads from the mixing tank into the wash wheel to carry the admixed hot and cold water thereto. All of said pipes may be provided with manually controlled valves and to accomplish the purposes of my invention are provided with automatic controlled valves, as will be hereinafter pointed out in detail. A tank ST having a plurality of partitions dividing it into a plurality of compartments, is mounted above or convenient to the wash wheel, and the

compartments, each of which contains a washing solution, are connected by pipes P to the wash wheel. Each of the pipes is provided with an automatic controlled valve for controlling the supply of the washing solutions to the wash wheel, as will be hereinafter particularly pointed out. The pipes leading from the supply tank ST to the wash wheel may also be provided with manually controlled valves MV. A temperature responsive bulb E is mounted through the lower portion of the casing C to be disposed in the water, which is contained in the wash wheel. A control board CB is located at any convenient point in the wash room and supports mechanism for controlling valves HV and CV in the pipes leading to the mixing tank MT, such mechanism being indicated generally by the word "Temp." on the control board. There are also located on the control board, mechanism for controlling and recording the water level indicated generally at WLC and for controlling and recording the temperature of the water within the wash wheel indicated generally at TC.

When the switch S on the control board is closed, the motor M is actuated through circuits hereinafter described, to oscillate the cylinder W. Valves HV and CV are operated to admit water to the mixing tank MT, and subsequently the water is admitted from the tank MT into the wash wheel until the proper level is reached after which selected automatic valves in the pipes P open to admit the proper amount of solutions from the compartments in tank ST either individually or two or more at once. The wash wheel W is oscillated with the clothes therein, and the temperature of the water within the casing C is properly maintained by the mechanism connected to bulb E, which mechanism will admit steam into the wash wheel through pipe SS if the temperature falls below the predetermined desired degree. After the clothes have been subjected to the action of the water containing the solutions for a predetermined time, the dump valve DV is opened to drain the water out, and after the water has been drained off and most of the mechanism is automatically shut off the proper amount of water from the mixing tank MT is again admitted to the casing and wash wheel, and the valve or valves from the proper compartments containing the washing solutions are again opened to admit a predetermined amount of washing solution or solutions to the wash wheel, and the operation is repeated until the clothes have been

subjected to all of the steps in the washing process or cycle.

It will thus be apparent that the principal general object of the invention is to provide laundering apparatus for automatically accomplishing a complete laundering cycle comprising a plurality of successive operations and during which no manual labor is involved from the time the clothes are placed in the washing receptacle until they are removed.

Some of the main specific objects of the invention are first, the provision of means for controlling and recording the level and temperature of the water in the wash wheel for different steps in the washing cycle; the provision of means for automatically varying the control of the quantity and temperature of the water in the washing receptacle for various steps in the cycle; the provision of a single operating medium for the means for controlling the admission of water and washing solutions and the means for varying the quantity and temperature of the water whereby a compact and cheaply operated unit is had.

Other objects and advantages of the invention will become apparent during the course of the following detailed description of the embodiment of the invention disclosed in the accompanying drawings.

For the purpose of operating all of the various parts at the proper time and in sequence, I provide a time contactor mechanism for opening and closing various electric circuits, and, in connection with such mechanism, means for automatically setting the temperature and water level controlling mechanism for various steps in the washing operation. As mentioned, such mechanism is preferably mounted on the control board CB and may comprise, as shown in Fig. 5, a shaft 1 on which are mounted for rotation therewith a plurality of discs 2 of insulating material having on their outer surfaces, conducting elements 3 from which conductors (not shown) lead through the discs 2 to the shaft 1. As shown in Fig. 3 the shaft 1 is rotatably mounted in a bearing 4 at one end and has a gear 5 on its other end, said gear meshing with other gears 6 which in turn mesh with the gear 7 driven by a motor 8.

The cycle motor disc 9 has its outer periphery covered almost entirely with a conducting material to control the motor 8 through the following circuits. A wire 10 is connected to one side of the motor and to one wire 11 of the main circuit, while a wire 12 is connected to the other side of the motor and to the push button switch S which is connected through the wire 14 to the other wire 15 of the main circuit. The wire 12 is connected at 16 to a wire 17 leading to one terminal 19 of a socket for a lamp 20. The fixed contact member 21, which engages the conducting surface on the disc 9, is connected by the wire 22 to the other terminal 23 of the socket for the lamp 20, so that when the push button switch S is closed current will flow from the wire 15 through the wire 14, push button switch, wire 12, motor, and wire 10 to the other wire 11 of the main circuit to initially start the motor to rotate the shaft 1 sufficiently to rotate the disc 9 until the conducting surface on the disc 9 is engaged by the contact 21, after which the push button is released and current flows through contact 21, wire 22, lamp 20, wires 17 and 12, the motor, and wire 10, the circuit being completed through the conducting surface of the disc 9, conductor in the disc leading to the shaft 1, shaft 1, contact 24,

wire 25 and main circuit wires 11 and 15. As long as the current continues to flow through said circuit, the shaft 1 will rotate until the disc 9 has completed a revolution at which time the non-conducting portion thereon is engaged by the contact 21, at which time the circuit will be broken and the motor 8 and parts operated thereby will stop.

Referring to Fig. 5, it will be noted that the conducting blocks 3 which form the movable contact members are of different lengths on different discs so that as they are rotated with the disc and engage fixed contacts such as indicated at 3' in Fig. 3, the current will flow therethrough and through circuits connected with the fixed contacts 3' for different intervals of time. In some instances the circuits will be established simultaneously and in others successively as hereinafter described.

The "wash wheel" disc is similar in construction to the cycle motor disc 9 having its outer periphery covered by a conducting band except for a slight space indicated at 26 in Fig. 5, so that as the shaft 1 rotates, the fixed contact 27, Fig. 3, will be in engagement with the conducting surface on the wash wheel disc to establish a circuit through wires 15, 25, contact 24, shaft 1, the conducting surface of the wash wheel disc, contact 27, wire 28, which is connected to the motor M, and through the motor and wire 30 to the wire 11 of the main circuit, so that the motor M will operate to effect oscillating movement of the cylinder W, as previously described, during the entire washing cycle.

The first step in the washing cycle is to admit water to the wash wheel up to the proper level for the initial washing, and to accomplish this, I have provided the arrangement shown in detail in Fig. 4, wherein each of the valves HV and CV which are connected into the hot water pipe HW and the cold water pipe CW respectively, which pipes lead into the mixing tank MT, are opened and closed by the temperature controlling mechanism comprising an arm 32 which is connected at 33 to one end of a link 34 which extends down to and is connected with one end of a lever 35 the other end of which rides on the outer surface of a cam wheel 36 mounted on the shaft 1 (Fig. 3) for rotation therewith. As the position of the lever 35 is changed by its engagement with the variations on the face of the cam 36, the link 34 turns the arm 32 to positions determined by the formation of the surface of the cam wheel 36. The arm 32 is connected by pivoted links 37, 38, to the pivoted baffle support 39, and by the links 40, 41 to another pivoted baffle support 42 at opposite sides of the arm 32. The members 39 and 42 each carry baffle plates 43 and 44 respectively which are pivotally secured to said members intermediate their ends, and adjusting screws are mounted through supports 46 to abut one end of the baffles for the purpose of adjusting the same relative to ports 47 and 48 of air conduits 49 and 50 of an air pressure valve operating system for the valves HV and CV respectively. The conduit 49 leads into a passage 51 in the block 52 which passage is in communication with an expansible chamber 53 on the top of which is mounted a stem 54 to engage with a ball valve 55. A conduit 56 leads from a source of air under pressure into a passage 57 in the block 52 communicating with the passage 51 and with another passage 58 leading to the chamber 59 in which the ball valve 55 is mounted. A conduit 60 leads from the chamber 59 in the block 52 to the

chamber 61 in the top of the valve HV, said chamber being formed by the flexible gasket 62 beneath which is the valve stem support 63 for the stem 64 to the lower end of which is secured the valve head 65 to cooperate with the seat 66. A spring 67 mounted around the stem 64 normally urges the valve stem 64 upwardly to bring the valve head 65 against the seat 66. The conduit 50 leads to an identical arrangement indicated generally at 68 for controlling the supply of cold water through the pipe CW, the cold water valve CV being shown in Fig. 4 in closed position. A temperature responsive bulb 69 is mounted through the wall of the mixing tank MT and is connected to a capillary tube 70 leading to a coil 71 which will contract and expand under the influence of temperatures communicated thereto from the temperature responsive bulb 69 through the tube 70. The free end of the coil 71 is connected by a link 72 to an arm 73 which is connected at its upper end to the links 74 and 75, which in turn are connected to the members 39 and 42 respectively. In each of the conduits 49 and 50 is interposed a valve operated by solenoids 76 which solenoids are connected with a wire 77, (see Fig. 3) leading to the main circuit wire 11 and to a wire 78 leading to a fixed contact 79 which is disposed on the hot and cold water disc 80, the conducting surface of which is electrically connected with the shaft 1 to complete a circuit therethrough and through the contact 24 and wire 25 to the wire 15 of the main circuit.

Obviously, when the shaft 1 rotates the disc 80 to bring the conducting surface against the contact 79, the solenoids will be energized to open the valves in the conduits 49 and 50, so that air from the main supply pipe 81, shown in Fig. 3, will flow through the conduits and through the passages in the blocks 52 and 68, shown in Figs. 3 and 4, while at the same time the cam disc 36 will be rotated to set the arm 32 through link 34 at predetermined points for regulating the baffles 43, 44, relative to the ports 47 and 48. Assuming that the adjustment is that shown in Fig. 4 with the port 48 closed, the main supply of compressed air enters the passages in the block 52 through the pipe 56 and passes through passage 58 in conduit 60 into the chamber 61, pressing the diaphragm 62 and the valve stem down to open the valve head 65 relative to the seat 66, so that hot water is being admitted to the mixing tank. When the temperature of the water is too high the bulb 69 will cause the coil 71 to expand, moving the arm 73 through link 72, and the arm 73 through the link 75 and member 42 moves the baffle 44 to uncover the port 48 so that the pressure in the block 68 which is sufficient to expand the chamber corresponding to chamber 53 operating the stem which engages the ball valve, will be relieved and the ball will drop and permit the air to flow directly to the top of the valve CV and to press the diaphragm to open the valve in the cold water pipe.

In order to admit the water from the tank MT to the wash wheel, there is provided a conduit MW, Fig. 3, communicating into the wash wheel from the mixing tank and in this conduit is mounted a valve 83 similar to the valves HV and CV in construction and operated by similar apparatus shown diagrammatically in Fig. 3 as comprising a block 84 identical to block 52 and having air passages therein, one of which communicates with a pipe 85 leading into the top of the valve 83, another of which communicates with a pipe 86 leading into the main air sup-

ply pipe 81 and the third of which communicates with a pipe 87 terminating in a port 88 adjacent the baffle 89. The support 90 for the baffle 89 is connected with a recording arm 91 which corresponds to the arm 73 described in connection with Fig. 4, but which carries a pen or marker to record on a chart 92. A setting arm 93 is connected by a link 94 with a lever 95 operated by a cam wheel 96 on the shaft 1 similar to the cam wheel 36 and which wheel automatically sets the arm 93 at predetermined points for different operations. This mechanism is to control the level of water in the wash wheel, and a tube 97 is connected by a pipe 98 into the bottom of the wash wheel, so that as water flows into the wash wheel, it will rise also in the tube 97, from the top of which a capillary tube 99 leads to an expansible coil 100 similar to the coil 71 and which is connected by link 101 with the recording arm 91. The coil is adjusted so that when the proper level has been reached the pressure communicated thereto through the tube 99 will cause it to move the arm 91 through the link 101 to close the baffle and through the air system controlled by the baffle to close the valve 83. Any variations in the level will be communicated from tube 97 through capillary 99 and the coil 100 to the arm 91 which will record the level for each step in the operation on a permanent chart 92 and operate baffle 89 to maintain the proper level in the wash wheel.

There is a solenoid 102 operating a valve in the pipe 87, the solenoid being connected to the wire 77 which leads to the wire 11 of the main circuit and to a wire 103 which leads to a contact 104 engaging the level control disc on the shaft 1 so that the circuit in which the solenoid is connected is completed through the wires 11, 77, 103, contact 104, contact surface of the fill valve disc, shaft 1, contact 24, and wires 25 and 15.

I provide in the steam pipe ST leading from a source of steam supply, not shown, into the wash wheel, a valve 106 similar to the valve 83. A temperature responsive bulb or element 107 is mounted in the lower part of the wash wheel and is connected by capillary tube 109 to a coil 110, which is connected by a link 111 with the temperature control and recording mechanism indicated generally at 112, identical in construction and operation with the level control and recording mechanism to which the link 101 connects the coil 100. The mechanism 112 includes the recording arm 113 which operates exactly in the manner that the arm 91 operates and which records on the disc 114, variations in the temperature of the water in the wash wheel as indicated through the capillary 109 from the element 107. A link 115 is connected to the setting arm 113', which is the same as arms 32 and 93, and to a lever 116 which contacts the cam disc 117 on the shaft 1 for the purpose of automatically setting the temperature control and recording mechanism at desired points to control the temperature of the water in the wash wheel for different operations, it being understood that the lever 116 and link 115 effect movements of the control mechanism in the same manner as the links 34 and 94, previously described. A solenoid 118 controls a valve in the air line 112' of the mechanism 112, in the same manner as the solenoid 102, being connected by wire 119 with the contact 120 which cooperates with the wheel temp. disc on the shaft 1 and by the wire 121 with the wire 11 of the main circuit, it being understood that the

circuit is completed through the shaft 1, contact 24 and wire 25 leading to the wire 15.

The water temperature control and recording mechanism operates in the following manner. When the disc 117 is rotated, the cam formations thereon move the lever 116 to effect setting of the mechanism 112 through the link 115, and of course at the same time a circuit is closed through the solenoid 118 so that the valve in the air line controlling the mechanism 112 is opened. The temperature of the water admitted to the wash wheel is communicated by the element 107 through the capillary 109 to operate the coil 110 to move the arm 113 through the link 111 to cause the valve 106 to be opened in the same manner described in connection with valve 83, it being noted that an air pipe 122 leads to the valve 106 from the temperature control and recording mechanism, and movements of the recording arm 113 relative to the arm which has been set by link 115 effect opening and closing of the valve 106 to admit steam to the wash wheel to raise the temperature of the water when necessary and to cut off admission of the steam to the wash wheel when the water is at the temperature corresponding to that called for by the setting of the recording mechanism through the cam disc 117 and link 115.

The compartments 123, 124, 125, 126 and 127 in the supply tank ST may contain soap, soda, bleach, blue, and sour, respectively, and each of the pipes P leading from said compartments into the wash wheel is provided with a motor operated valve 129, and that which is mounted in connection with the pipe leading from the soap compartment 123 is connected by a wire 130 with the contact 3' cooperating with the soap disc on the shaft 1 and by wire 131 with the wire 30 leading from the motor M to the wire 11 of the main circuit. Each of the other motor operated valves 129 is connected to the wire 131 and by wires 132, 133, 134, 135, to the soda, bleach, blue and sour discs, respectively, on the shaft 1. On top of the tank ST are four motors 136 each connected to the wire 137 leading to the contact 138 cooperating with the agitator disc on the shaft 1, and to wire 139 leading to the wire 11 of the main circuit. These motors drive shafts 140 on which are mounted agitators 141 which keep the soap, soda, blue and sour solutions well mixed.

Within each of the compartments 123, 124, 125, 126 and 127, are mounted low level alarms 142 which may be of any standard or suitable construction wherein a float or the equivalent will close an electric circuit to operate an alarm when the solutions have reached a predetermined low level. I prefer to provide both audible and visible signals in electrical circuits with the apparatus 142 so that the operator will be warned by the operation of the audible signal of a low level in one or more of the compartments and can determine in which the low level exists by a particular visible indicator in connection with each of the compartments. This is effected by connecting a bell or other electrically operated audible signalling device 143 through wire 144 with the contact 145 cooperating with the alarm disc on the shaft 1 and the wire 146 connected to one terminal of each of the lamps 147, 148, 149, 150 and 151 for the compartments 123, 124, 125, 126 and 127 respectively, the other terminals of the lamps being connected respectively through wires 152, 153, 154, 155 and 156 to one terminal of each of the float operated switches 142, the other terminals of each of said switches being connected

to a wire 157 leading to the wire 30 and thence to the wire 11 of the main circuit.

After each operation within the wash wheel, it is necessary to discharge the water therefrom, and this is effected through the medium of the dump valve DV which is controlled by rod 158 on the end of which is a piston 159' in the casing 159. An air pipe 160 leads from the supply pipe 81 into the casing 159 and the admission of air to operate the piston and rod 158 is controlled by the valve 160' located in casing 159, and operated by a solenoid 161 which is connected by the wire 162 to the contact 163 cooperating with the dump valve disc on the shaft 1, and by the wire 164 to the wire 11 of the main circuit.

Referring particularly to Fig. 5, wherein the discs shown are merely for the purpose of illustration and are not arranged in the same relative order as in Fig. 3, it will be noted that the contact blocks 3 on the various discs are of different lengths and arranged on the respective discs some in alinement with blocks on other discs, and some in staggered relation to blocks on other discs. For instance, the contacts 3 on the soap disc are relatively short and spaced apart a considerable distance. The same is true of the contacts on the dumping disc. The extent of the discs on the contacts on the soap disc is determined by the quantity of soap desired for each operation, as with the initial washing a considerable quantity of soap is to be admitted and as long as the contact on the soap disc is engaging the contact 3' connected with the wire 130, the valve operated by the motor 129 will be open to admit soap into the wash wheel. For the next washing a less amount of soap may be desired, and in that case the second contact 3 on the soap disc will be shorter than the first contact and so proportioned that the valve operating motor 129 will operate to hold the valve open a shorter length of time. Referring to the dumping disc, it will be noted that the contacts thereon are also relatively short and spaced apart a considerable distance. The spacing is sufficient to maintain the dump valve closed during a particular washing, bleaching, or other operation, and the contact is of sufficient extent to close the circuit in which the solenoid 161 is connected a sufficient time to hold the dump valve open until all of the fluid used in the wash wheel during a particular operation to drain from the wash wheel. It will also be noted that the contact on the wash wheel disc and the agitator disc covers practically the entire periphery of the disc, because the parts which are operated by the circuits controlled by these discs may operate throughout the entire washing cycle, which we may assume to be 90 minutes.

Referring to the temperature control disc, level control disc, and wash wheel temperature control discs, it will be noticed that the contacts thereon are of relatively long extent and spaced apart a relatively short distance and that the insulating portion between the contacts of these three discs are in alinement with the contacts on the dumping disc so that when the circuit is established through the dumping disc contacts the circuits in which the solenoids 76, 102, and 118, are interposed will be interrupted, it being understood that these circuits are controlled by the temperature control disc, level control disc and wash wheel temperature disc, as previously explained in connection with the temperature control, level control and recorder, and temperature control and recorder mechanisms. Thus, 150

when the water is being drained from the wash wheel, the valves HV, CV, 83 and 106, will all be positively closed.

It will be understood that when draining the wash wheel, the contacts on the soap, soda, bleach, blue and sour discs will also be out of alignment with the contacts on the dumping disc so that none of the solutions will be admitted to the wash wheel during dumping. It will also be understood that the construction of the soda, bleach, blue, and sour discs is substantially similar to the soap disc, and that the relative arrangement of the contacts thereon with respect to each other is such that it is possible to obtain collective or individual control of the admission of these solutions to the wash wheel. In other words, soap and soda may be admitted at the same time for a single operation or one may be admitted independently of the other according to the arrangement of the discs for the particular step in the cycle. The arrangement of the contacts on the discs controlling these solutions is made according to the formula employed in a complete cycle.

The operation of the apparatus is as follows: The push button S is depressed to establish a circuit from the wire 11, through wire 10, motor 8, and wires 12, 14 and 15, so that the cycle motor disc which is similar in construction to the wash wheel disc is initially moved until the contact 21 is on the conducting surface of said disc, at which time the lamp 20 lights as the circuit operating the motor 8 is established from wire 11, through wire 10, motor 8, wire 17, lamp 20, wire 22, contact 21, conducting surface and conductors on and in the cycle motor disc respectively, to shaft 1, contact 24, and through wire 25 to wire 15.

The push button is now released. We will assume that the gears 6 are calculated to rotate the discs and shaft 1 through one revolution over a period of 90 minutes.

As the shaft 1 rotates, the discs 36, 96 and 117 also rotate and the projections and detents thereon move the levers 35, 95 and 116 respectively to predetermined positions setting the arms 32, 93 and 113' at predetermined points for each step in the cycle to provide for a predetermined temperature of the water in the mixing tank, the level of the water in the wash wheel, and the temperature of the water in the wash wheel as previously explained. At the same time the discs indicated as wheel temp., level control, and temp. control are rotated and the conducting blocks therein come into contact with the contacts 120, 104 and 79 so that the circuits controlled thereby are established and the solenoids 76, 102 and 118 are energized to open the valves controlled thereby. Also at this time, the wash wheel disc, alarm disc and agitator disc, all of which have a substantially continuous conducting surface are rotated to close the circuits in which they are interposed and described in detail hereinbefore.

When the temperature control mechanism is thus operating the valves HV and CV, hot and cold water, either alternately or simultaneously, are being admitted to the mixing tank and the temperature thereof is affecting the bulb 69 which will control the operation of the baffles 43 and 44 as hereinbefore explained. When the mixing tank MT is filled, the water will pass through the pipe MW into the wash wheel as the lever control and recorder mechanism has functioned, when the solenoid 102 opened the valve

in the pipe 87, to open the valve 83. When the water has reached the proper level in the wash wheel as determined by the setting of arm 93 by the particular formation on the cam disc 96 for the first step in the cycle, the coil 100 will be operated through the capillary 99 as previously explained, to move the recording arm 91 over and in register with the said arm 93, at which time the valve 83 will be closed. As the disc 92 rotates, the arm 91 will record thereon the level for the first washing operation. As the water comes into the wash wheel, its temperature is communicated through bulb 107 and capillary 109 to coil 110 which moves the arm 113 through link 111 toward the set arm 123, and until the arm 113 is brought into register with the arm 113' the valve 106 is open and steam is being admitted into the wash wheel to raise the temperature of the water, and when the water reaches the proper temperature, the arm 113 will operate the mechanism 112 to close the valve 106. Obviously, if at any time the temperature of the water in the wash wheel falls below that which is called for, for the particular operation, the valve 106 will open to admit steam into the wash wheel.

As mentioned, shortly after the shaft started to rotate the contact 27 was brought into engagement with the conducting surface of the wash wheel disc so that the motor M was started to oscillate the perforated cylinder W. This operation may be continuous throughout the whole cycle.

Assuming that the first step in the washing cycle is to admit water to the wash wheel up to the proper level and at the proper temperature as previously explained and to admit soap and soda to the wash wheel either at the same time that the water is being admitted or thereafter according to the relative positions of the conducting blocks on the discs controlling the soda and soap valves 129, it should be apparent that as the shaft rotates, this condition is had under the construction and operation hereinabove given. When the proper amount of soap and soda and water has been admitted to the wash wheel, the valve 83 is closed and the conducting blocks on the soap and soda discs have moved out of contact with the contacts 3' in the respective circuits controlling the valve operating motors 129.

The clothes in the cylinder W are agitated in the solutions of water, soap and soda, as long as the contact 163 on the dumping valve disc is out of contact with the conducting blocks thereon. When, however, the contact 163 comes into contact with the conducting block a circuit in which the solenoid 161 is mounted is established so that the solenoid is energized and operates the valve in casing 159 to open the dumping valve to permit the water which has been admixed with the soap and soda in the first operation to drain from the wash wheel. At that same instant, the conducting blocks on the steam, fill valve, and HC water discs move from contact with the contacts 120, 134, and 79 respectively as previously explained, so that the solenoids 76, 102 and 118 close the valves in pipes 49, 50, 87 and 112' causing the temperature control mechanism to close valves HV and CV and causing the level control and recorder mechanism to close the valve 83 and causing the temperature control and recording mechanism to close the valve 106. It will be understood that the valves 129 are also closed while the dumping valve is open, and it seems unnecessary to state that the indicating lights

147, 148, 149, 150 and 151 and the agitators 141 are operating during the dumping as well as during the washing and other steps.

The next step in the cycle may call only for the admission of soap and water, and all of the parts previously described, in connection with step one will operate in exactly the same manner for step 2 except that the valve controlling the soda will not be opened. When the second step is completed the water is again drained and the various parts are operated by their respective discs in the manner described in connection with the dumping after the first step.

It may be desirable to indicate the stage of the particular step in the cycle at all times and to accomplish this I may provide on the end of shaft 1 and visible at the front of the control board, the indicator 170, which, as shown in Fig. 6, comprises a plurality of segmental sheets 171 mounted on the hub of the bearing 4 in overlapping relation and in front of which is a pointer 172 connected to the shaft 1 for rotation therewith. Each of the segments 171 may be adjusted with respect to the adjacent segments so that the amount of surface of each segment exposed will correspond to the movement of the shaft 1 and pointer 172 for the particular step which the segment represents.

Instead of providing one disc with a plurality of fixed contact blocks 3 each representing and effecting a particular movement at different times of a given part, I may provide an adjustable cam disc for each operation of a single part, that is to say there would be a cam disc such as shown in Fig. 7 and indicated by the numeral 175 composed of two plates 176 and 177 each having similar shoulders 178 and 179 facing in the same direction and movable toward or away from each other when the plates 176 and 177 or either of them is turned on the shaft 1A, which corresponds to shaft 1 of Fig. 5. Such a cam disc would operate the circuit maker and breaker comprising a block 180 to which is secured the resilient conducting arms 181 and 182 each carrying a contact point 183 in confronting aligned relation. The long arm 181 has at its end a depending portion 184, while the shorter arm has a similar portion 185 for engagement with the outer surfaces of the plates 176 and 177 respectively. As the disc rotates with the portion 184 resting on the surface of the plate 176 the contact points are spaced apart whereas when the portion 184 drops off of the shoulder 178 the contact points are brought together and the circuit is established from the shaft through the disc, contact points, and arms 181 and 182 to the wires 186 leading to the parts operated and to the main circuit. When, however, the disc 177 is rotated further the portion 185 will eventually drop off of the shoulder 179 and the circuit will be broken. Under such a construction and arrangement there would be a great number of discs on the shaft arranged in different relative positions but there would be a greater possibility of obtaining or varying different formulas.

An important feature of the provision of the recording mechanism is that there will be a permanent record for each laundering cycle so that reference may be had thereto at any time for comparison of different operations or to check up on the results obtained under one formula, as they will show the water level and temperature for the different steps throughout the entire cycle.

The invention may be applied to any type of

existing washers, or, of course, newly constructed washers of which they can be built as a part.

I wish it to be understood, and I think it is perfectly obvious, that instead of having the valves for the respective solution compartments operated by motors 129, such valves may also be operated by fluid pressure electrically controlled valves such as the valve 106, or they may be operated by solenoids such as the valve 161, so long as they are held open a predetermined period of time to permit a predetermined quantity of the respective solutions for each step to be admitted into the washing receptacle.

It will also be understood that while I have described the valves HV, CV, 83, and 106, as being operated by air, these valves may be operated by any other suitable fluids.

I wish it to also be understood that while I have described the invention as "laundrying apparatus" I deem such term to include dry cleaning, rug scouring and cleaning, and the like, for it is possible to omit some of the parts and just control the admission of a suitable fluid or fluids in a predetermined quantity or quantities and/or at predetermined temperature or temperatures, and I have claimed the invention to include dry cleaning, scouring, and other apparatus for like purposes.

I claim:

1. In laundering apparatus for effecting and controlling a succession of washing operations and including a washing receptacle, a plurality of receptacles containing washing solutions, conduits leading from said solution receptacles into the washing receptacles, an electrically controlled valve in each of said conduits, a pipe leading from a source of water supply into the receptacle, an electrically controlled valve in said pipe, a plurality of rotatable discs carrying electrical contact blocks for closing and opening electrical circuits controlling said valves for each operation, means for controlling and recording the amount of water in the washing receptacle during each operation, means for automatically setting said controlling means for each step in the washing cycle, means for rotating all of said discs, said last means also operating the means for setting the water controlling means.

2. The structure of claim 1 wherein the means for setting said controlling means comprise cam discs, and said cam discs and contact discs are carried by a common shaft.

3. In automatic laundering apparatus including a washing receptacle, a conduit leading into said receptacle from a water supply, means for controlling the level of the water in said washing receptacle for a plurality of successive steps in a laundering cycle, said means comprising a valve in the conduit, actuating mechanism for opening and closing said valve, a set arm in said mechanism, a cam member, a connection between said cam member and set arm for moving the arm to positions determined by said cam member, a second arm movable with respect to the first arm and connected to said valve actuating mechanism, and means responsive to rise of water in the receptacle for actuating said second arm.

4. In an automatic laundering apparatus including a washing receptacle to receive water, means for controlling the temperature of the water in said washing receptacle during a plurality of successive steps in a laundering cycle, said means comprising a conduit leading from a source of steam supply into the receptacle, a

valve in the conduit, actuating mechanism for opening and closing said valve, a set arm in said mechanism, a cam member, a connection between said cam member and said arm for moving the arm to positions determined by said cam member, a second arm movable with respect to the first arm and connected to said valve actuating mechanism, and means responsive to the temperature of the water in the receptacle for actuating said second arm.

5. In apparatus for effecting and controlling a plurality of successive laundering operations in a laundering cycle, a washing receptacle having a water inlet, a valve to control the flow of water into the receptacle, means operable throughout the cycle to open the said valve for predetermined intervals prior to each operation to admit water to the receptacle, means responsive to the level of water in the receptacle to open and close said valve, and means operable by said last means for recording the level of the water in the receptacle for each operation.

6. In apparatus for effecting and controlling a plurality of successive operations in a laundering cycle, a washing receptacle, means for admitting fluid thereto for each operation, means for imparting heat to the fluid in the receptacle, means operable throughout the cycle during each operation for controlling said second means for each operation, and means responsive to the temperature of the fluid in the receptacle during each operation for operating said second means.

7. In apparatus for effecting and controlling a plurality of successive operations in a laundering cycle, a washing receptacle, means for admitting fluid thereto for each operation, means for imparting heat to the fluid in the receptacle, means operable throughout the cycle during each operation for controlling said second means for each operation, means responsive to the temperature of the fluid in the receptacle during each operation for operating said second means, and means operable by said last means for recording the temperature of the fluid in the receptacle during each operation.

8. Apparatus for effecting and controlling a plurality of washing operations successively in a

laundering cycle, comprising a washing receptacle having a water inlet and a fluid outlet, a plurality of receptacles containing washing solutions, conduits leading from each of said solution receptacles into the washing receptacle, an electrically controlled valve for each conduit, a plurality of rotatable discs carrying electrical contacts for opening and closing said valves at predetermined intervals during the cycle, means for rotating said discs, means for admitting a predetermined amount of water to the washing receptacle for each operation, means for controlling the temperature of the water in the receptacle for each operation, said last two means being operable by said disc rotating means, and means also operable by said disc rotating means for discharging water through said outlet after each operation.

9. Apparatus of the character described comprising a receptacle to receive the articles to be cleaned, means for admitting fluid thereto, means for maintaining the fluid in the receptacle at a predetermined temperature, and means for discharging the fluid from the receptacle, all of said means being automatically operable, means for causing said first and second means to be inoperative when said third means functions to discharge the fluid from the wash wheel, and means to cause said second means to be operative simultaneous with and subsequent to the admission of fluid by said first means.

10. In a laundering apparatus for performing a succession of washing operations and including a washing receptacle having an inlet for water, a dumping valve in the receptacle, means for admitting a predetermined amount of water into the receptacle for each washing operation, a temperature responsive element in the receptacle, apparatus for automatically controlling the temperature of the water in the receptacle for different operations, means for causing said apparatus to be operable by said temperature responsive element during each operation, means for opening and closing said dump valve, and means for causing said water admitting means and temperature controlling means to be inoperative when the dump valve is opened.

JOSEPH S. JONES.

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