

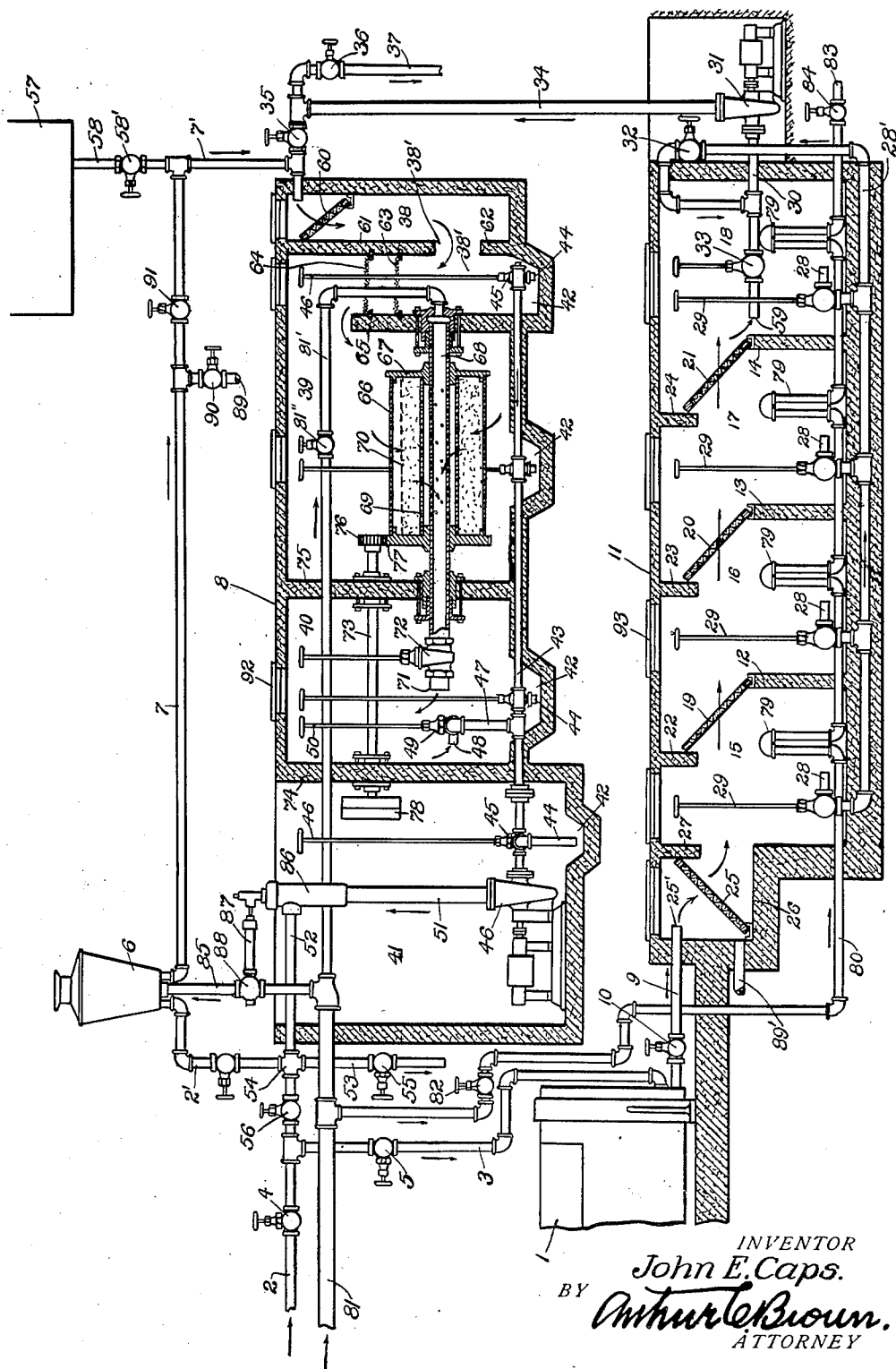
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J. E. CAPS

APPARATUS FOR CONSERVING SOAP

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JOHN EDWARD CAPS, OF WILMETTE, ILLINOIS.

APPARATUS FOR CONSERVING SOAP.

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To all whom it may concern:

Be it known that I, JOHN EDWARD CAPS, citizen of the United States, residing at Wilmette, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Apparatus for Conserving Soap; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

This application is a continuation in part of an application filed by me on or about February 28, 1919, Serial No. 279,754 on "Method and apparatus for conserving soap" and relates to the purification of liquids. The main object of the invention is to provide means whereby the insoluble materials contained in the liquid may be disassociated therefrom in a simple and efficient manner.

The invention is primarily intended for use in conserving the detergent content of the wash water in laundries.

After the wash water has been used for an appreciable length of time, the so-called suds holds a considerable amount of dirt in suspension, which renders the suds unfit as a cleansing fluid so it has usually been the custom to discard the suds when it reaches such a condition by passing it into a sewer. The result has been that there has been an unnecessary loss of the detergent content of the liquid which I aim to recover and conserve for further use.

I accomplish this by maintaining the liquid hot so that the saponifying agent will remain in solution in the water, the dirt and heavier particles being separated therefrom so that a clear liquid may be recovered with an appreciable percentage of the original saponifying agent.

Of course, some of the saponifying agent will be lost along with the dirt but in actual practice I have found that if the water is maintained at a high enough temperature, a very large percentage of the detergent content can be recovered. It is important that during the recovery stage the liquid be maintained at a relatively high temperature, at least high enough to prevent the saponifying agent from congealing or reaching the colloidal stage.

I have provided means whereby the liquid

being treated can be maintained at a proper temperature and this means is controlled by a thermostat in response to variations in temperature of the liquid being treated.

I have also provided means whereby the treated liquid can be re-introduced into the washer from which it originally discharged with the difference that the objectionable dirt and other extraneous matter will have been removed. Therefore, instead of introducing clean water each time with an additional detergent or additional saponifying agents, the water can be used over and over again with such additions of water and saponifying agents as represent the losses due in the process of recovering the detergent.

The novel features of the invention as well as the details of construction of the device will be specifically referred to herein-after, reference being had to the accompanying drawings, in which—

The figure is a view in section, more or less diagrammatically illustrating the system incorporated in my invention.

Referring now to the drawings by numerals of reference:

1 designates a washing machine adapted to receive water from the main through a pipe 2, which has a branch 3 connected to the washer 1. The service pipe 2 is provided with a valve 4, by means of which the city water may be cut off when desired. The branch pipe 3 is also provided with a valve 5 whereby communication between the service pipe 2 and the washer 1 may be cut off while permitting the water through the service pipe 2 to pass into the heater casing 6 to be heated and then pass through the pipe 7 to the tank 8, as will be explained herein-after.

The washer 1 is provided with a discharge pipe 9, in which is a valve 10 adapted to close the pipe port in the usual manner. The pipe 9 discharges into a compartmental tank 11, provided with upstanding partitions or baffles 12, 13 and 14 to provide compartments 15, 16, 17 and 18, the number of compartments, however, depending upon the capacity of the system and the character of the material from which the precipitates are to be separated.

It will be observed that the partitions 12, 13 and 14 in the tank 11 extend only part way toward the top and that their upper edges constitute seats for inclined separating screens or walls 19, 20 and 21, the upper

edges of which rest against the depending beams 22, 23 and 24, the beams being preferably formed with the tank, which may be constructed of concrete or similar material.

5 The compartment 15 is provided with a screen 25, covering its inlet 25', which is supported by the offset portion 26 and the beam 27. The screens 25, 19, 20 and 21 in the order
10 named are arranged progressively with finer meshes so that the first screens will take out the heavier particles, the next screen the finer particles and the last screen the finest particles before the water enters the pump.

15 The tank, it should be noted, is a settling tank, the water flowing therethrough and allowing the solids or a large portion of them to precipitate to the floors of the various compartments.

20 Each compartment is provided with a sludge offtake 28, each operated by a valve controlled from a stem 29 accessible near the top of the compartment in which the stem is located and each offtake is connected to an offtake pipe 28' below the floor of the tank.
25 The offtake pipe 28' communicates with the intake pipe 30 of the pump 31 and it may be caused to communicate and be cut off therefrom through the medium of the valve 32. The intake of the pump communicates
30 with the last chamber 18 and it is provided with a controlling valve 33 which, when opened, will allow water to be drawn from the compartment 18 into the pump 31, to be forced through the discharge pipe 34 into
35 the filtering and separating tank 8. If the valve 35 is opened or if the valve 35 is closed and the valve 36 in pipe 37 is unseated, the water from the pump 31 will be discharged into the sewer.

40 The settling and filtering tank 8 is provided with a plurality of compartments designated 38, 39, 40 and 41, the compartments 38, 39 and 40 being liquid containing compartments and the compartment 41 being a
45 pump container.

50 All of the compartments are provided with sumps 42, adapted to receive sludge and the like, which may be subsequently removed through the pipe 43 having receiving nozzles 44 adapted to be opened and closed by the
55 valves 45 actuated by the stems 46 accessible from the tops of the compartments.

60 The sludge pipe 43 is connected to the inlet of the pump 46 and connected to the sludge pipe 43 is a clear water pipe 47 having an inlet 48 adapted to be opened and closed by the valve 49 through the medium of the
65 stem 50.

70 The outlet pipe 51 for the pump 46 extends upwardly and is provided with a branch 52, which communicates with the sewer pipe 53 by the four-way connection 54. The four-way connection, it will be observed,
75 connects the service pipe 2, the pipe 52, the sewer pipe 53 and the pipe 2' which serves

as a connection between the pipe 2 and the heater 6 when the valve 55 in pipe 53 is closed and the valve 5 in pipe 3 is closed.

80 The pipe 2 is provided with a valve 56, which may be closed when water is being introduced into the washer 1, the valve 56 preventing the water from passing into the heater 6 or into the pipe 51, which is the outlet pipe for the pump 46. The pipe 7 is provided with a branch 7', which leads into the
85 chamber 38 in the tank 8 and the pipe 7' is connected to a soft water storage tank 57 by a pipe 58 so that soft water may be introduced into the tank 8, if desired.

90 When the water has passed through the settling tank 11 and it is sucked into the pump 31 through the inlet end 59 of the pipe 30, it may be discharged through 34 into the tank 8 as shown. It will pass through the inclined screen 60 in the upper portion of the compartment 38, which is subdivided into a complementary compartment 38' by the partitions 61 and 62.
95 The water passes through the part 38' of the compartment 38, through the screens 63 and 64, over the vertical baffle 65 into the compartment 39 and through the perforate shells 66 of a rotary filter 67. The rotary filter rotates about a fixed pipe 68 and its inner wall 69 may be perforated
100 to allow the water which is passed through the cylindrical filter bed 70 to enter the perforate pipe 68 and flow out through the discharge end 71 in the chamber 40. The discharge end of the pipe 68 is adapted to be closed by a valve 72, which, when open, will allow the filtered water to pass
105 into the compartment 40 where it may be drawn into the pump 46 through the inlet port 48 and delivered through the pipes 51 and 52 to the pipe 2' to pass through the heater 6 and be returned to the tank 8, or if hot enough, it may pass through a pipe 52 to pipe 3 provided the valve 56 is open, and be delivered to the washer for further
110 use. The reclaimed suds in that event will contain a considerable quantity of the detergent or saponifying agent, the precipitates having been deposited in the several setting compartments in the tanks 8 and 11.

115 It should be borne in mind that it is essential that the water be kept at a high enough temperature to prevent colloidal action of the saponifying agent so that it will not coagulate to the extent of clogging the
120 perforate walls of the filter or adhere to the filtering material.

125 The filter is preferably rotatable about the tubular shaft or pipe 68 and in order to provide for its rotative movement I may mount a shaft 73 in the partition walls 74 and 75 carrying a pinion 76 which meshes with a gear 77 on the end of the filter shell, the shaft 73 being adapted to be driven
130 by any suitable means, there being a pul-

ley 78 provided by means of which power may be communicated to the shaft.

If the suds water passing from the washer 1 to the compartmental tank 11 is not hot enough or in the event that it is desired to maintain the temperature even higher than that provided in the washer 1, I may utilize heaters 79, which are in the form of radiator coils and are continuations of a steam pipe 80 connected to a main steam pipe 81, which may be supplied with steam from any suitable source as, for example, by boiler or exhaust steam from an industrial plant.

The steam will pass from 81 into the pipe 80, provided the valve 82 is open, and it will pass through the radiator coils 79, which will normally be submerged in the liquid to be treated and finally exhaust through the end 83 of the pipe when the valve 84 is open.

The steam pipe 81 also supplies the heater 6 with steam through the pipe 85 and the amount of steam passed through 85 will depend upon the temperature of the water passing through the upper portion of the pipe 51, in which there is a thermostat 86 which controls the valve stem 87 of the valve 88 so that if the water passing from pump 46 through the casing or pipe portion 86 is cold, the thermostat therein will open the valve 88 and allow additional steam to pass through the heater 6 to heat it but if the temperature is high, the thermostat 86 will close the valve more or less to conserve the steam passing through 81.

Sometimes it may be considered desirable to pass the heated water which has been discharged from pump 46 through pipe 51, through the pipe 52, through pipe 2' to the heater 6 and through pipe 7 directly to the settling tank 11. In that event the tank 8 will be by-passed. In order to do this I have provided a branch pipe 89, connected to the pipe 7 and provided with a valve 90. The pipe 89 leads into the inlet end of the settling tank 11, as indicated at 89', the intermediate portion of the pipe being broken away to avoid confusion, it being understood, however, that the discharge end of the pipe 89 is at the inlet end 89' of the settling tank 11. Therefore, if it is desired to let all of the heated water from the heater 6 pass from pipe 7 directly into the settling tank 11, the valve 90 will be opened and the valve 91 between pipe 89 and pipe 7' will be closed.

Of course, when the valve 90 is closed and the valve 91 is open, the water may pass from pipe 7 to pipe 7' to the inlet of the tank 8. Therefore, the water may be passed from the washer to the settling tank to the filtering tank back to the washer, or it may be passed from the settling tank to the filtering tank through the heater and

back to the filtering tank to be re-filtered and then to the washer, or it may be passed from the settling tank to the filtering tank through the heater and back to the settling tank to again settle before passing into the filtering tank again and then to the washer.

It will be apparent that additional water can be added and, of course, additional detergent can be introduced into the washer whenever desired. The temperature of the water will be maintained constant by the constant temperature valve controlled from 86.

Attention is called to the fact that the tanks 8 and 11 may be provided with man-holes 92 and 93 respectively, which may be properly closed when the system is operating, it being apparent that it is desirable to maintain the tanks 8 and 11 closed during the operation of the system so that steam and vapor will be retained therein and dust, dirt and other extraneous matter prevented from entering the tanks.

Attention is also called to the fact that by successively introducing the water into separate settling basins or compartments and passing it through screens of progressively increasing finenesses, the precipitates, which are the dirt, lint, buttons and the like, can be removed so that by the time the water reaches the filter, it is devoid of the greater proportion of extraneous matter and when the water has passed through the filter, the resultant product will be the liquid with the soluble saponifying agent, and it is for this reason that it is important that the temperature of the water be maintained high enough to prevent coagulation of the soap.

Attention is called to the fact that the filter casing is not entirely filled with the filtering material. The material is more or less loose within the same so that it is constantly agitated and tumbled about, in the casing. When the steam is admitted from the steam pipe 81, to the central shaft 68, it will agitate the sand during the rotation of the filter and since the hot water and the steam will be combined to effect agitation of the sand, the filter can be cleaned; that is, it will be freed of all lint, dirt and the like, which would clog the openings in the walls or adhere to the filtering material.

It will, therefore, be apparent that the device is well adapted to conserve the saponifying content of the wash water and thereby decrease the cost of operating laundries because the cost of the detergent in the wash water is a very important factor in laundry operation.

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

1. In a device of the class described a settling tank divided into a series of compartments by transverse partitions which terminate below the top of the tank, heaters

in the compartments, a pump for exhausting the liquid from the last compartment, a filter tank, means for introducing the liquid from the pump to the filter tank, a compartment in the filter tank, a hollow shaft communicating the filter tank with the compartment so that water may flow from the filter tank into the compartment through the hollow shaft, a heater, a pump communicating with said compartment and with the heater and means for circulating the liquid from the heater back into the filter tank.

2. In a device of the class described comprising two tanks, one of which is a settling tank to receive the suds water from a laundry, screens in the settling tank between the compartments so that the water will pass through the screens during its passage through the tank, heaters in the compartments, the second tank comprising a filter tank and a pump having its inlet communicating with the settling tank and its outlet communicating with the filter tank.

In testimony whereof I affix my signature.

JOHN EDWARD CAPS.