Aug. 25, 1931. J. WIESMAN 1,820,334

PURIFYING SYSTEM FOR DRY CLEANING SOLUTIONS

Filed Aug. 22, 1928 3 Sheets-Sheet 1

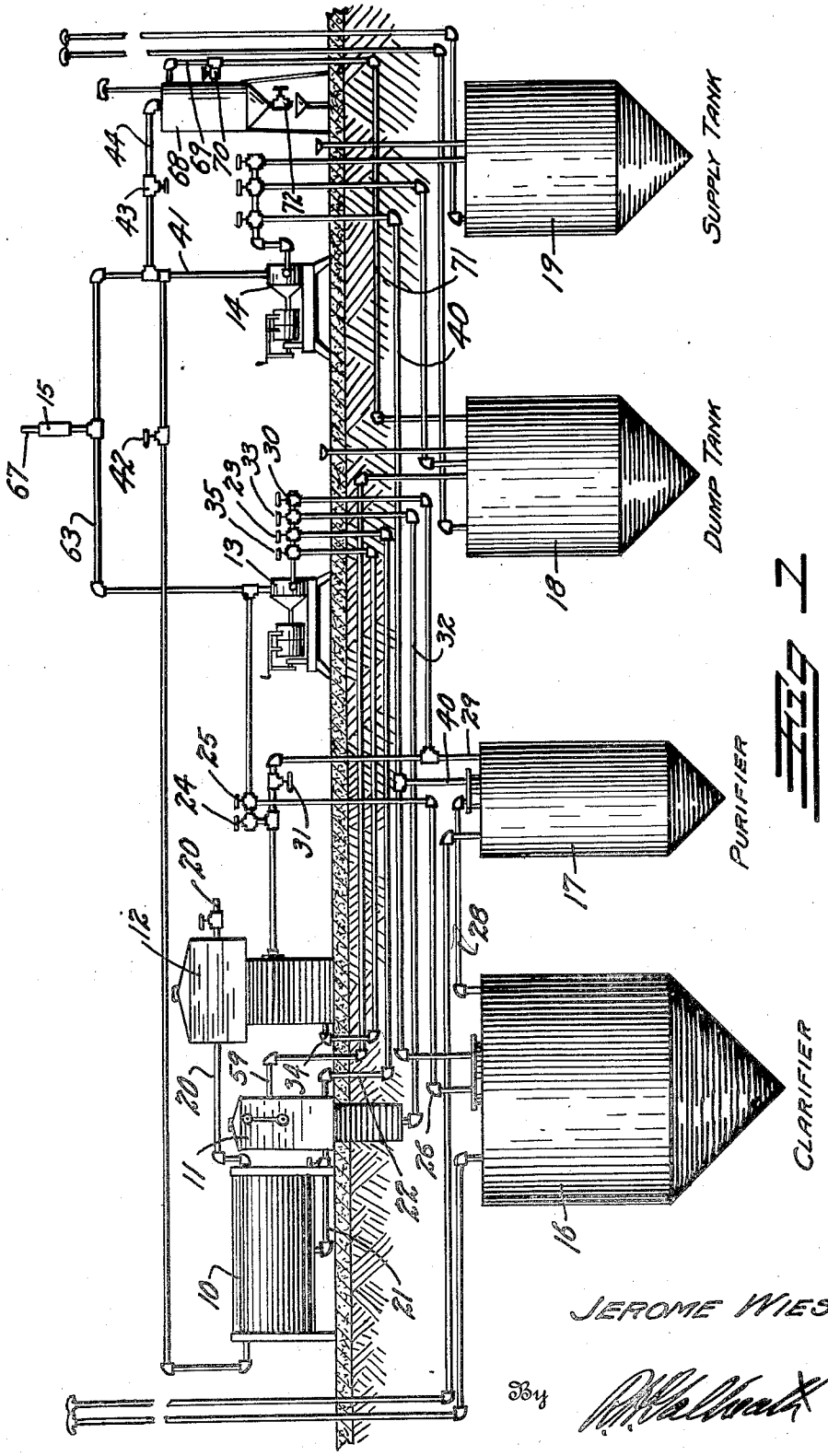



Fig. 1

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PURIFYING SYSTEM FOR DRY CLEANING SOLUTIONS

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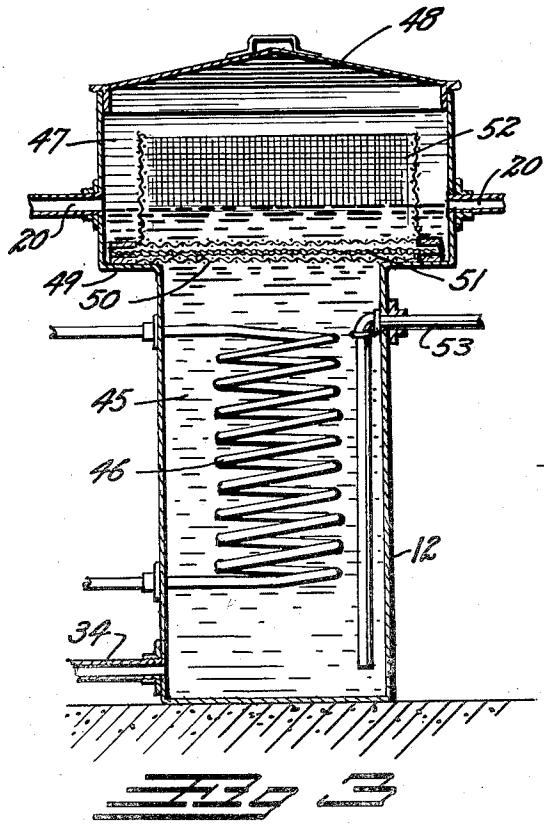



Fig. 3

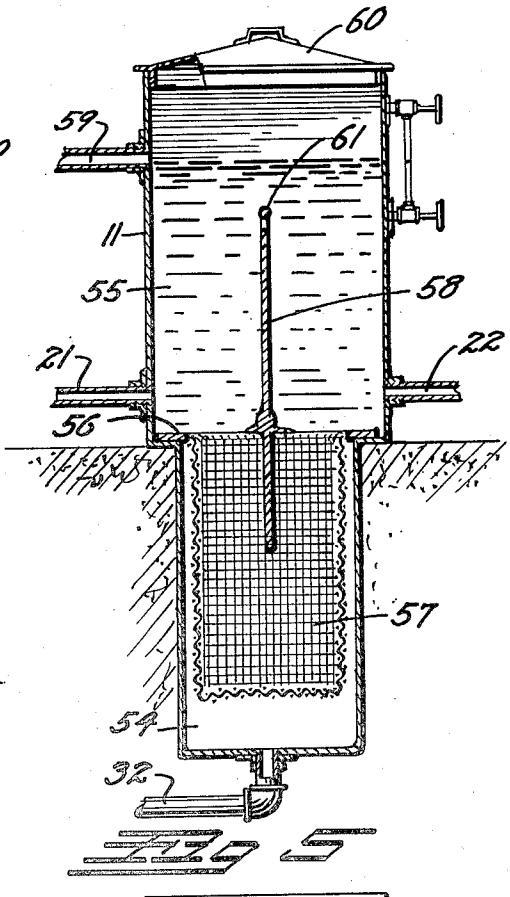



Fig. 5

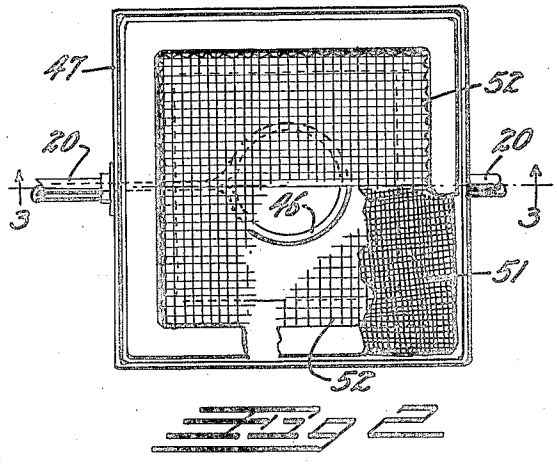



Fig. 2

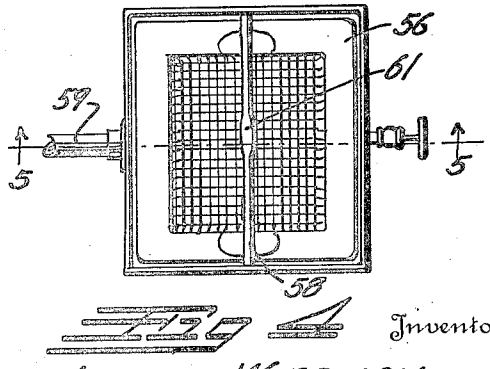



Fig. 4

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PURIFYING SYSTEM FOR DRY CLEANING SOLUTIONS

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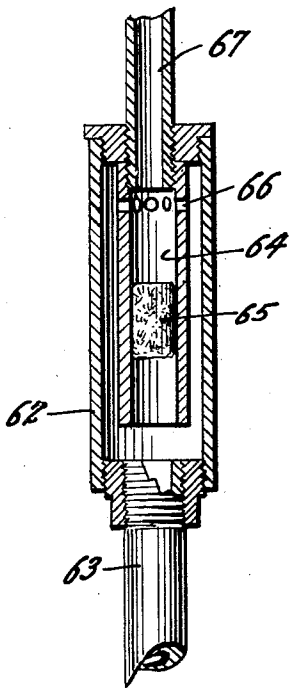



Fig 7

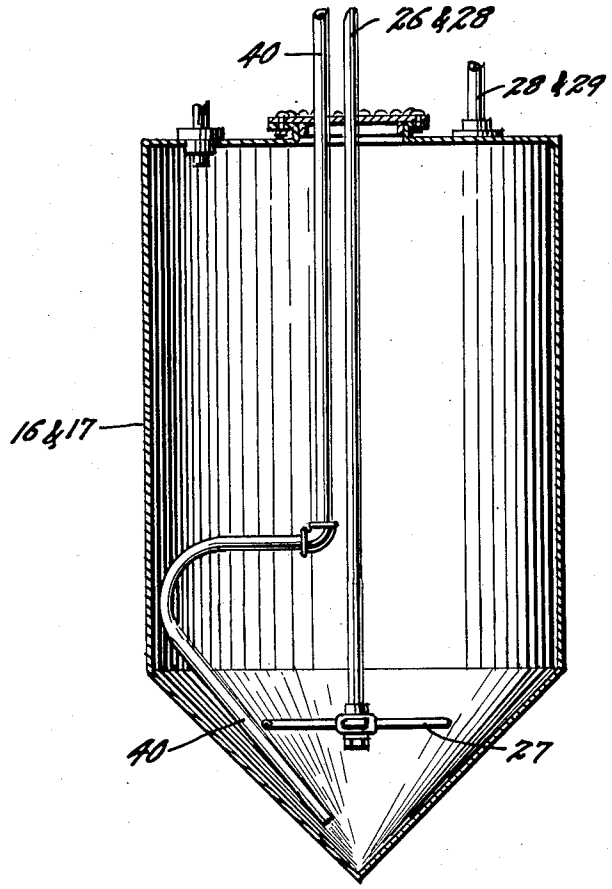



Fig 6

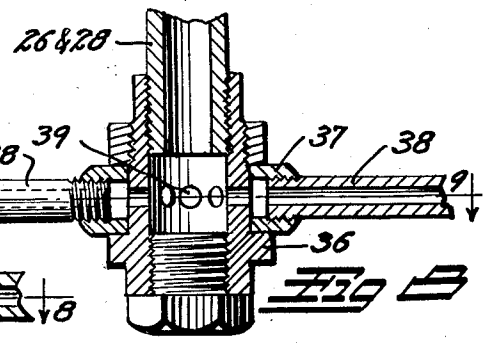



Fig 8

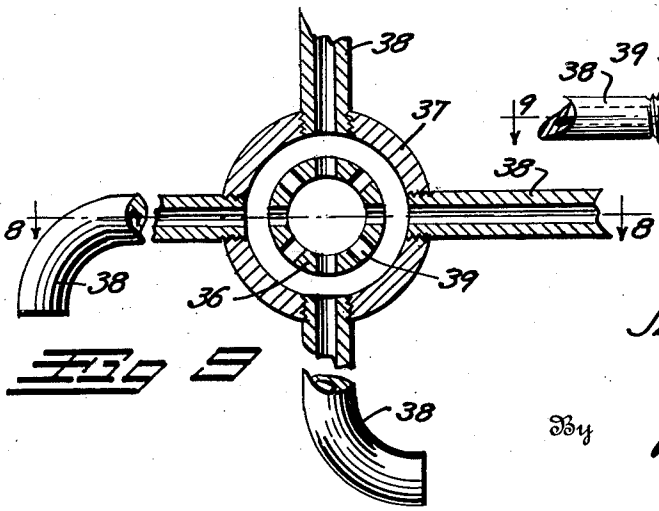



Fig 9

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# UNITED STATES PATENT OFFICE

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## PURIFYING SYSTEM FOR DRY CLEANING SOLUTIONS

Application filed August 22, 1928. Serial No. 301,213.

This invention relates to dry cleaning equipment, and has for its principal object the provision of a simple and efficient system and apparatus which will effectively clarify and purify the solvent used for cleaning, so that it can be continuously re-used.

Another object of the invention is to so construct the apparatus and system that its several parts can be examined, renewed, changed, cleaned, etc., without it being necessary to shut down the washers or system.

Another object of the invention is to provide positive means for discharging all air from the system so as to eliminate possibilities of explosion.

Another object is to provide automatic agitating means in the chemical cleaner so as to bring the solvent into immediate and intimate contact with chemicals.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy, and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention reference is had to the accompanying drawings which form a part hereof. Like numerals refer to like parts in all views of the drawings and throughout the description.

In the drawings:

Fig. 1 is an elevation diagram of the complete system.

Fig. 2 is a plan view of the filter tank employed in the system with its cover removed.

Fig. 3 is a vertical section through the filter tank taken on the line 3—3, Fig. 2.

Fig. 4 is a plan view of the trap employed in the system with its cover removed.

Fig. 5 is a vertical section through the trap taken on the line 5—5, Fig. 4.

Fig. 6 is a vertical section illustrating the construction of both the clarifier and purifier tanks, the construction of both these tanks being similar.

Fig. 7 is a detail section through the air relief valve.

Figures 8 and 9 are detail views illustrating the construction of the whirler or agitator employed in the clarifier and purifier tanks for bringing the solvent into intimate contact with the chemicals.

A washer of any of the types used in dry cleaning establishments is indicated at 10, and the other component parts of the system are designated in their entirety by numeral as follows: trap 11, filter 12, circulating pump 13, supply pump 14, air relief valve 15, clarifier tank 16, purifier tank 17, dump tank 18, and supply tank 19. The dump tank 18 and the supply tank 19 have no special significance in this invention and are employed as is usual in systems of this character. The supply tank being used to store clear gasoline or other solvent and the dump tank to store dirty solvent. The supply pump 14 is used for pumping fresh solvent into the system or discharging dirty solvent from the system. If desired, a separate pump could be employed to handle the dirty solvent.

Broadly speaking, the system operates as follows: solvent overflows through an overflow pipe 20 from the filter 12 into the washer 10. Any desired number of overflow pipes can be connected with the filter, or with a distributing tank in connection with the filter, depending upon the number of washers used. The system will be described as pertaining to a single machine.

The solvent gas flows from the washer through a discharge pipe 21 to the trap 11 where the heavy sediment is removed. From the trap 11 the solvent flows through a return pipe 22 controlled by means of a valve 23 to the intake of the pump 13. From the pump this solvent can, if still usable, be returned to the filter through a valve 24 or delivered to the clarifier tank 16 through a valve 25 and pipe 26.

Within the clarifier tank 16 the pipe 26 terminates in a whirler 27 rotated by the velocity of the incoming solution. This whirler is immersed in a solution of dry sodium phosphate and hydrated lime dissolved in alcohol which is contained in the bottom of the clarifier tank. This solution acts to clarify the solvent and remove all acids, greases, coloring matter, lint, suspended dirt, etc.

The clarified solvent rises in the clarifier tank, precipitating its foreign matter, as it rises, and is forced out of the top thereof through an overflow pipe 28 to a similar whirler 27 positioned within and at the bottom of the purifier tank 17.

In the purifier tank 17, the whirler is immersed in a solution of approximately 90% alcohol and 10% ammonia water which acts to remove all traces of the alkalies from the solvent.

The purified solvent rises in the purifier tank and flows out of an overflow pipe 29, from whence, it may be returned to the intake of the pump 13 through a valve 30 for recirculation through the tanks, or it may be discharged through a valve 31 direct to the filter 12. In the filter the solvent is filtered to remove any remaining suspended foreign matter from whence it overflows as clean fresh solvent through the overflow pipe 20 to the washer 10.

It is desired to call attention to the fact that by this arrangement the solvent can be passed through the trap and filter and back to the washer in a continuous cycle; or can be passed through the trap, filter, clarifier tank, purifier tank, and back to the washer in a continuous cycle; or can be passed in a closed circuit through the clarifier and purifier tanks without flowing to the washer. A single pump is all that is required to handle the various circuits.

The stained solvent from the bottom of the trap 11 can be withdrawn through a pipe 32 and valve 33 to the pump 13 from whence it can be passed in turn to the clarifier and purifier or to the filter 12. The filter can be drained through a pipe 34 and valve 35 by means of the pump 13. The drainings may be passed through the above described purifying system, if desired.

The construction of the purifier and clarifier tanks 16 and 17 is illustrated in detail in Fig. 6. They are preferably formed with cone shaped bottoms, as illustrated, for containing the chemical cleaning solutions. The whirlers 27 are positioned within this bottom. Each of the whirlers comprises hollow bearing 36, upon which, rides a rotatable fitting 37 carrying removable whirler arms 38. The arms 38 are bent so that the discharging solution will rotate the fitting 37 and create a violent agitation in the tank which intimately mixes the chemicals and solvent.

The cleaning chemicals can be taken from both the tanks 16 and 17 by means of suction pipes 40 which are projected around the whirlers 27 into the cone bottoms of the tanks. The suction pipes 40 of both the clarifier and the purifier pass to the intake of the pump 14. This pump discharges through a discharge pipe 41 which communicates through a valve 42 to the washer 10 for placing clear solvent therein and through a valve 43 and waste pipe 44 to any suitable waste tank or sewer.

The construction of the filter is illustrated in detail in Fig. 3 and comprises a settling chamber 45 in which is placed a heating coil 46 and an overflow chamber 47 covered by means of a removable lid 48. The overflow chamber is wider than the settling chamber so that a shelf 49 is provided entirely therearound. Upon this shelf a screen 50 is carried. The screen 50 supports a cloth filter pad 51, upon which, rests a screen box 52. The screen box 52 has a screen bottom and sides and is open at its top. The solvent flows into the filter from a pipe 53, which is bent downwardly within the settling chamber to discharge adjacent the bottom thereof, and rises in the settling chamber past the heating coil 46. The coil 46 heats the solvent to a suitable handling temperature and also reduces its viscosity so as to increase the precipitation in the settling chamber. The solvent then forces itself through the screens and the filter pad 51 into the overflow chamber and flows through the sides of the screen box 52 and out of the overflow pipes 20 to the washer.

It is desired to call attention to the fact that while the system is in operation and the solvent is circulating, the lid 40 of the filter can be removed, the screen box 52 lifted from place and a new pad 51 can be inserted while the old one is being removed to be cleaned without shutting down the system.

The trap is shown in detail in Figs. 4 and 5 and comprises a settling chamber 54 which is preferably imbedded below the floor of the plant. Above the settling chamber 54 is a trap compartment 55. The compartment 55 is larger than the settling chamber 54 so as to provide a shoulder upon which rests a screen frame 56. The screen frame 56 supports a screen box 57 within the settling chamber 54 and also supports a baffle plate 58 which extends upwardly into the trap chamber 55 and downwardly into the screen box 57. The solvent flows into the trap from the discharge pipe 21, strikes the baffle plate 58 and flows upwardly and downwardly therearound. In striking the baffle plate and entering the trap the velocity of the solvent is immediately reduced and a quiescent zone created. This causes the solvent to drop any foreign materials which it might be carrying in suspension, such as buttons, threads, heavy dirt, etc., the dropped materials falling into the screen box 57. The solvent then flows out of the pipe 22 to the pump 13. An overflow pipe 59 is provided to carry any overflow in the trap back to the dump tank 18. The height of this overflow should be at the point desired for the depth of the solvent in the

washer 10, so that it will control the amount of solvent in the machine.

A removable lid 60 covers the trap and allows easy access thereto. The baffle plate 58 is provided with a hand hold 61, by means of which, it and its attached screen box can be easily and quickly removed without shutting down the system for the discharge of the screened materials.

It is of course dangerous to have air carried with the solvent. I provide means for removing this air in the air relief valve 15 which is shown in detail in Fig. 7. This valve comprises an outer cylinder 62 which is carried on the extremity of an air relief pipe 63 and supports an air discharge pipe 67. Within the outer cylinder 63 an inner cylinder 64 is provided which acts to guide a float valve 65. When the pump 13 is started the gas and air are forced through the pipe 63 into the cylinder 62 and will flow through openings 66 into the cylinder 64, thence discharge to the atmosphere through the discharge pipe 67. When the air has left the system, the solvent will rise into the cylinders causing the float valve 65 to float upwardly until it closes the openings 66 and the extremity of the discharge pipe 67, thus effectively allowing the air to escape, but preventing the discharge of solvent.

While a specific form of the improvement has been described and illustrated herein, it is desired to be understood that the same may be varied, within the scope of the appended claims, without departing from the spirit of the invention.

Having thus described the invention, what I claim and desire secured by Letters Patent is:—

1. Means for purifying the solution from a washing machine comprising: a trap; a filter; a pump; a first closed circuit connecting said machine, said filter, said pump, and said trap; a clarifier; a purifier; a second circuit including said purifier and said clarifier; and means for placing said second circuit in circuit with said first circuit.

2. Means for purifying the solution from a washing machine comprising: a trap; a filter; a pump; a first closed circuit connecting said machine, said filter, said pump, and said trap; a clarifier; a purifier; a second circuit including said purifier and said clarifier; and means for placing said second circuit with said first circuit; and valving means arranged to place said first or second circuit independently in circuit with said pump.

3. Means for purifying the solution from a washing machine comprising: a trap; a filter; a pump; a first closed circuit connecting said machine, said filter, said pump, and said trap; a clarifier; a purifier; a second circuit including said purifier and said clarifier; means for placing said second circuit in circuit with said first circuit; a third circuit; a second pump in said third circuit, said second pump arranged to withdraw solution from said clarifier and purifier and return same to said first circuit.

4. Means for purifying the solution from a washing machine comprising: a trap; a filter; a pump; a first closed circuit connecting said machine, said filter, said pump, and said trap; a clarifier; a purifier; a second circuit including said purifier and said clarifier; means for placing said second circuit in circuit with said first circuit; a third circuit; a second pump in said third circuit, said second pump arranged to withdraw solution from said clarifier and purifier and return same to said first circuit; a dump tank arranged to receive the overflow of said first circuit, said dump tank being in circuit with said second pump so that overflow solution therefrom may be returned to said first circuit.

5. Means for purifying the solution from a washing machine comprising: a trap; a filter; a pump; a first closed circuit connecting said machine, said filter, said pump, and said trap; a clarifier; a purifier; a second circuit including said purifier and said clarifier; means for placing said second circuit in circuit with said first circuit; and a valve connection between the sump of said trap and said pump; and a valve for closing off both said first and second circuits so that said pump may be employed for discharging solution from said sump without it entering either of said circuits.

6. Means for purifying the solution from a washing machine comprising: a trap; a filter; a pump; a first closed circuit connecting said machine, said filter, said pump, and said trap; a clarifier; a purifier; a second circuit including said purifier and said clarifier; means for placing said second circuit in circuit with said first circuit; a valve connection between the settling chamber of said filter and said pump and a valve for closing off both said first and second circuits so that said pump may be employed for discharging solution from said settling chamber of said filter without it entering either of said circuits.

7. Means for purifying the solution from a washing machine comprising: a trap; a filter; a pump; a first closed circuit connecting said machine, said filter, said pump, and said trap; a clarifier; a purifier; a second circuit including said purifier and said clarifier; means for placing said second circuit in circuit with said first circuit; a third circuit; a second pump in said third circuit, said second pump arranged to withdraw solution from said clarifier and purifier and return same to said first circuit; a supply tank; and a valve connection between said supply

tank and said second pump so that said second pump may be used to supply solution to said first circuit either from said clarifier and purifier or from said supply tank.

8. Means for purifying the solution from a washing machine comprising: a trap; a filter; a pump; a first closed circuit connecting said machine, said filter, said pump, and said trap; a clarifier; a purifier; a second circuit including said purifier and said clarifier; means for placing said second circuit in circuit with said first circuit; a third circuit; a second pump in said third circuit, said second pump arranged to withdraw solution from said clarifier and purifier and return same to said first circuit; a dump tank arranged to receive the overflow of said first circuit, said dump tank being in circuit with said second pump so that overflow solution therefrom may be returned to said first circuit; a supply tank; independently valved connections between said second pump and said supply tank, said dump tank, and said clarifier and purifier so that said second pump may be used to supply solution to said first circuit from either of said supply tank, dump tank, or purifier and clarifier.

In testimony whereof, I affix my signature.

JEROME WIESMAN.