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CLOSED DRY CLEANING SYSTEM

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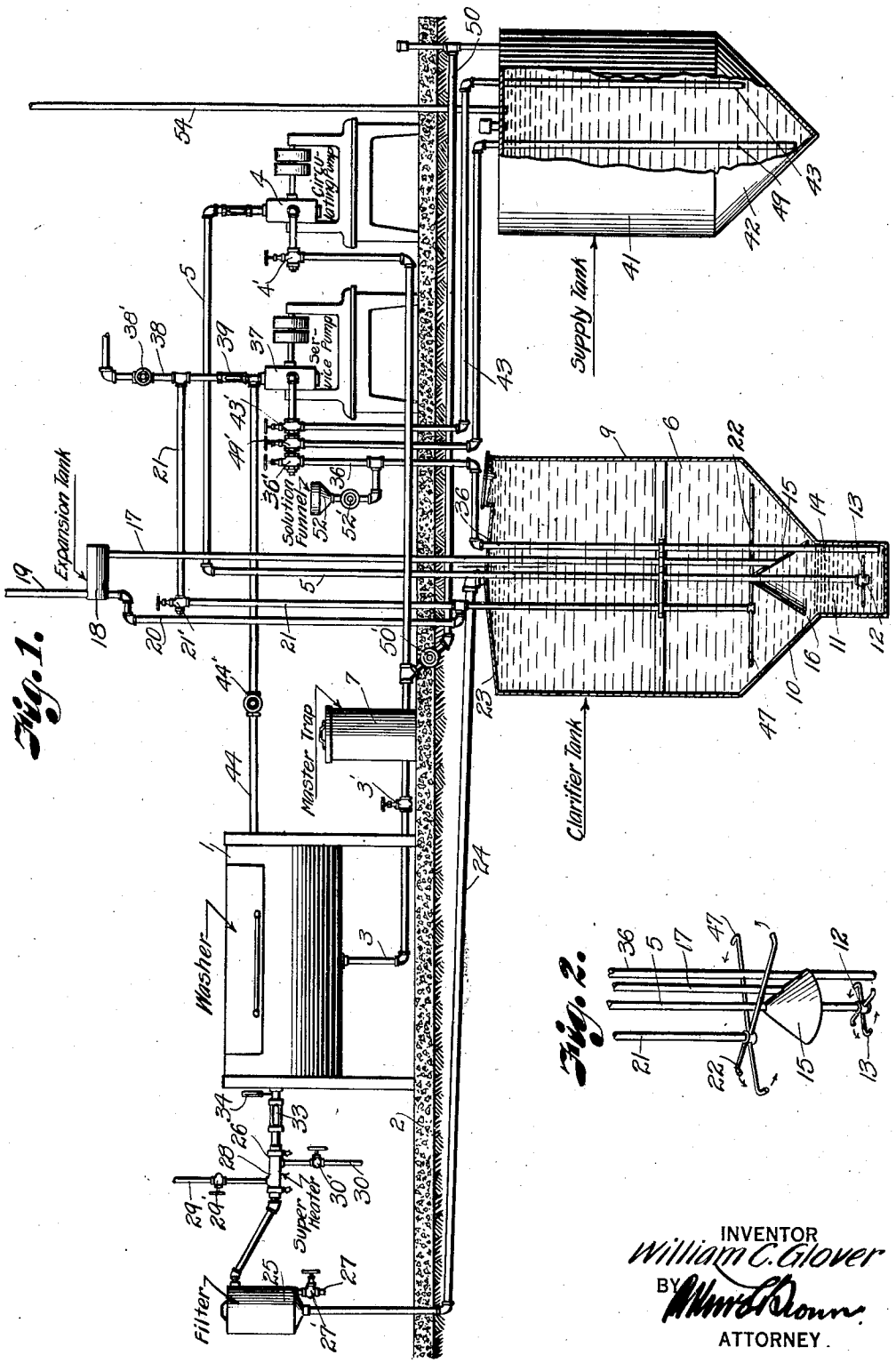


Fig. 1.

Fig. 2.

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CLOSED DRY CLEANING SYSTEM

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My invention relates to closed dry cleaning systems and more particularly to one of that class wherein cleaning liquid, such as gasoline, is passed continuously through a washer containing the articles to be cleaned and through clarifying means whereby dirt and other impurities taken up by the liquid in the washer and chemical or other sediment accumulated during travel of the liquid through the system, are removed before return of the cleaned liquid to the washer; the principal objects of the invention being the saving of time and material and improvement in quality, volume and availability of supply of the circulating cleaning medium in operation of the system.

In accomplishing these and other objects of the invention I employ improved details of mechanical structure, the preferred forms of which are illustrated in the accompanying drawings wherein:—

Fig. 1 is a longitudinal view of a continuous flow circulating system embodying my improvements, the clarifier tank being in vertical section to illustrate the interior arrangement of mechanical elements.

Fig. 2 is a detail perspective view of the portions of the supply, outflow and cleanout pipes and associated elements within the clarifier tank.

Referring more in detail to the drawings, 1 designates a washer of any conventional form, mounted upon and spaced from a floor 2. Leading from the bottom of the washer 1 is a pipe 3 through which gasoline, carrying impurities accumulated in the washer, is drawn by a circulating pump 4 and forced back through a pipe 5 into the bottom of a clarifier tank 6, a trap 7 being preferably interposed in the pipe 3 between the washer and pump to catch any articles of clothing, buttons or other foreign matter passing out of the washer through the pipe 3 before they reach the pump, flow through the pipe 3 being controlled by hand valves 3′ and 4′.

The tank is preferably located below the washer 1, usually underground beneath the floor 2, and is of peculiar construction in that it comprises a cylindrical body 9 having an inverted, frustro-conical bottom 10 tapered to near the vertical center of the tank and there extended to form a well 11. The pipe 5 extends through the top of the tank 6 and through the body of the tank into the well 11 and terminates near the bottom of the well in an agitating distributor 12, here shown to consist of a plurality of nozzles 13 directed outwardly and having curved delivery ends whereby contents of the well are swirled to mix the incoming dirty liquid with a chemical solution indicated at 14 as filling the well 11. The chemical usually employed for this purpose is an alkaline solution, composed of caustic soda and water in about the proportions of one pound of soda to one and one-half gallons of water. Obviously, other alkalis may be employed to make a solution of proper strength, or any material having the properties of cutting soap and grease from the cleaning liquid may be used.

Located within the tapered bottom of the tank 6 and preferably supported by the pipe 5, is an inverted cone 15, the rim of which is spaced slightly from the wall of the tapered bottom 10 to form a restricted, annular outlet 16 from the well 11 into the body of the tank, and whereby liquid rising through the well is diverted laterally to insure spreading of the liquid throughout a substantial area in the tank and avoid channeling of the liquid vertically in the tank. With this arrangement I diffuse the incoming liquid and retard its travel in a thin layer through the body of the liquid in the tank in order to avoid agitation and facilitate a settling action as the liquid rises. The cone serves the additional function of trapping gases delivered into the tank from the pump and which would otherwise bubble through the body of liquid, carrying sediment with them and agitating the liquid at the top of the tank, to interfere with the settling effect.

The gases trapped in the cone are eliminated through a pipe 17 leading from the side of the cone near its apex, up through the tank, through the roof of the tank and into an expansion tank 18 communicating with a vent pipe 19 through which the gases and air may escape to atmosphere. Leading back from

the expansion tank to the clarifier tank is a pipe 20 through which liquid passes into the expansion tank with the gas and air and separated therefrom within the tank, may flow back into the clarifier tank, the pipe 20 preferably communicating with a pipe 21 exteriorly of the tank 6 and through which the liquid is delivered to near the bottom of the tank 6 and emptied thereinto through the agitator nozzles 22 which will be hereinafter described.

The roof 23 of the tank 6 is preferably of conical shape, and opening from the apex of the roof is a pipe 24 which leads back to the washer through a filter 25 and a super-heater 26. The filter may be of any suitable construction and provided with a clean-out pipe 27 provided with a valve 27′. The superheater preferably comprises a collar 28 surrounding the pipe and having intake and outlet steam pipes 29 and 30 controlled by the valves 29′ and 30′. I preferably provide the pipe 24, near its connection with the washer, with a sight glass 33 through which condition of the cleaning liquid may be observed at all times, and with a temperature indicator 34.

Accumulation of sediment in the well 11 is removed through a pipe 36 connected with a service pump 37 whereby the sediment is removed and delivered from the pump through a pipe 38 to a receptacle provided for that purpose, the pipe 36 being provided with a valve 36′ whereby flow to the pump may be controlled. The pipe 38 is provided with a sight glass 39 whereby condition of the dirty liquid may be observed, and with a valve 38′ whereby flow through the pipe 38 may be controlled.

While the mechanical elements heretofore described constitute all the essential features of the system I prefer to employ in connection therewith a tank 41 within which an auxiliary supply of gasoline may be carried and through which the washer may be drained when operation of the system is discontinued, particularly at night and when the tanks 6 and 41 are located underground; thereby eliminating fire hazard and providing a supply of fresh cleaning liquid to compensate for losses due to evaporation or other losses or withdrawals. The tank 41 has a conical bottom 42 and opening to near the bottom of the tank is a pipe 43 leading to the service pump 37, whereby cleaning liquid may be removed from the bottom of the tank 41 by the pump and delivered through pipes 38 and 21 into the agitator 22, the agitator having laterally turned nozzles 47 for delivering the liquid tangentially against the sides of the cone bottom of the tank 6 to wash off any sediment which has accumulated on the inclined bottom of the tank, down into the well for removal when the well is cleaned or into a pipe 44 connecting the washer to the pump, so that the washer may be initially filled from the tank 41.

The pipe 43 is provided with a control valve 43′ and the pipe 44 with a valve 44′ whereby flow therethrough may be controlled.

The washer 1 may be drained into the tank 41 through pipe 3 and through a branch 50 connected with the pipe 3 and provided with a control valve 50′. The tank 41 may be drained or sediment removed from the bottom thereof through a pipe 49 extending to the bottom of the tank and connected to the line 36, the flow being controlled by the valve 49′ so that when valve 36′ is closed and the service pump operated liquid will be pumped from the bottom of the tank.

Clarifying solution such as the alkaline mixture may be delivered to the well 11 through a funnel 52 opening to the pipe 36 and controlled by a valve 52′. 54 designates a vent pipe leading from the top of the tank 41 to atmosphere, through which air may be relieved from the top of the tank to permit the liquid to flow thereinto.

Assuming the parts to be constructed and assembled as described, operation is as follows:

When the system is first installed the clarifier tank 6 is filled with cleansing liquid and an auxiliary supply provided in the tank 41. When the system is to be operated, the washer 1 is filled to the desired level by pumping from the tank 41 through pipe 43, service pump 37 and pipe 44. When the washer is filled the valve 44′ is closed, the circulating pump 4 started and the article container within the washer rotated, carrying the articles to be cleansed about within the washer and through the cleaning liquid, cleansing them in the usual way. While the washer is in operation, the circulating pump is constantly drawing cleaning liquid from the bottom of the washer, through the pipe 3 by the pump 4 and forcing it through the pipe 5 into the solution in the well 11 at the bottom of the tank 6, the liquid pumped into the bottom of the tank forcing the liquid thereabove out through the top of the tank through the pipe 24, filter 25, pre-heater 26 and sight glass 33 back into the washer, thereby maintaining a continuous supply of the cleaning liquid to the washer.

The dirty cleaning liquid passes through the chemical solution where the grease and dirt is separated from the liquid by the chemical. Some of the solution from the well is diverted laterally by the cone 15 so that it is dispersed through a substantial area within the tank instead of rising through a narrow channel as it would if the cone were not present, thereby thinning the up flow to facilitate precipitation of the heavy particles of chemicals back into the well and permitting the purer liquid to rise tranquilly through the tank to the washer, any gases entering the tank with the dirty liquid being trapped in the cone to prevent their bubbling up through

the liquid in the tank and escaping through the pipe 17 into the expansion tank where any liquid carried along with the gases is separated therefrom, the gases venting through the pipe 19 and the liquid flowing back into tank 6 through pipe 20.

The tank 6 is of substantial capacity, containing a volume of cleaning liquid much in excess of that carried in the washer and retarding flow of the incoming liquid so that sufficient time elapses between entrance of the liquid into the bottom of the tank and its elevation to the top, to permit all foreign matter to separate and be precipitated to the well at the bottom of the tank, from which the impurities may be withdrawn at suitable intervals, thereby insuring the flow of clean cleaning fluid from the top of the tank to the washer.

With my system the separation of greases from the cleaning fluid is effected by the chemical solution and the separation of solid impurities and of the chemicals taken up by the liquid during its passage through the well are separated by precipitation, all occurring in the same tank 6 and eliminating the necessity for separate filters or mechanical clarifiers.

It is a well known fact that it is difficult to secure pure gasoline, free from moisture, and that a small amount of moisture in the gasoline will seriously interfere with its cleaning properties and that if a sufficient amount of moisture is present in the gasoline it will damage the garments. In order to eliminate any possibility of such disadvantage I provide the filter 25 which is of a type to separate moisture from the gasoline during its flow therethrough.

Operation of the system for draining the washer to the supply tank, returning the cleaning liquid from the supply tank to the washer, and for compensating for losses has been described during the description of the washer and will not be repeated.

It is apparent, therefore, that I have provided a continuous system of cleaning, simple in construction and operation and comprising advantages whereby a better quality of cleaning may be secured at a lesser cost and more quickly than is possible with systems of this general character heretofore in use.

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

1. In a continuous dry cleaning system, a clarifying tank, a washer, a conduit leading from the top of the tank to the washer, a circulating pump, a second conduit leading from the washer to the pump, a third conduit leading from the pump to the bottom of the clarifying tank whereby liquid passing through the second conduit rises through the clarifying tank and is returned to the washer in a continuous flow, a separate supply tank, a service pump connected with said supply tank, a discharge line connected with the service pump terminating in an agitator in the lower portion of the clarifying tank for flushing the clarifying tank, and connections with the service pump for withdrawing fluid from the clarifying tank.

2. In a continuous dry cleaning system in combination with a washer, a clarifying tank and a supply tank, a circulating pump, a drawoff conduit for the washer connected to the circulating pump, a conduit for discharging the fluid from the circulating pump into the clarifying tank and a return pipe for the clarifying tank to the washer, a second service pump, clean-out lines connected to the suction side of the service pump and communicating with the clarifying tank and supply tank, valves in said lines, and connections with the service pump discharge communicating with the washer, the clarifying tank and a system drawoff pipe.

In testimony whereof I affix my signature.

WILLIAM C. GLOVER.