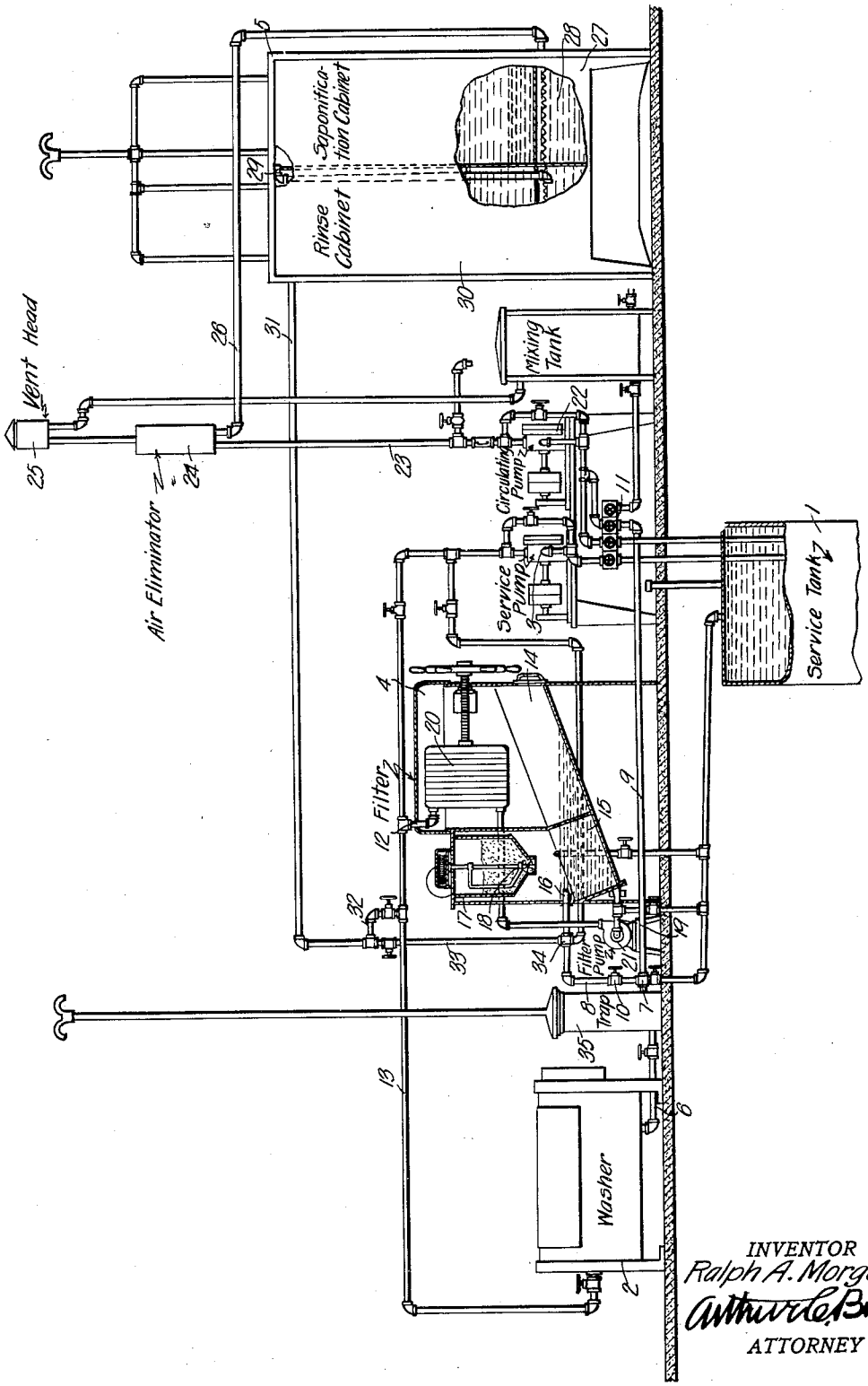
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METHOD OF TREATING DRY CLEANING FLUID

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METHOD OF TREATING DRY CLEANING FLUID

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My invention relates to methods and apparatus employing a stream of fluid for dry cleaning and like purposes, and has for its principal objects to treat a dry cleaning solvent while the same is being circulated through a dry cleaning system, and to purify the solvent and free the same of foreign matter originally contained thereby or picked up by the solvent in the cleaning process.

In dry cleaning systems, a stream of solvent is circulated continuously while the cleaning process is being carried on, and purifying treatment is applied at points in the circuit.

The rate of movement of the body of solvent depends on the rate at which the body can pass through the treating process.

Relatively large conduits and containers, and relatively large masses of treating materials must therefore be provided to enable the stream of solvent to receive the treatment with sufficient rapidity to provide an adequate supply for the dry cleaning elements of the system. When a chemical treatment step or distillation is included in a treating process, the flow of solvent is greatly retarded, and a relatively large volume of solvent must be supplied to permit the solvent to remain a sufficient length of time in contact with chemicals to bring about the desired effects.

Further objects of my invention therefore are to reduce the amount of solvent required for operating a dry cleaning system in which the solvent is treated while being circulated, and to increase the rate of flow of the solvent through such a system.

I have found that when a relatively small percentage of a circulating stream of solvent is bypassed and treated, and returned to the stream, the entire body of solvent may be maintained in a condition whereby it is adapted to perform its function efficiently. A particular object of my invention therefore is to subject portions of a stream of solvent to chemical treatment in such a manner that the rate of flow of the solvent may be increased for enabling a smaller quantity of solvent to serve efficiently in the system.

A process including my improved steps may provide for chemical treatment of the solvent by passing it through an alkaline solution to remove saponifiable greases, oils, free acids, unsaponified soap, and the like, and then passing the solvent so treated through a rinse adapted to dilute and/or neutralize the alkali carried by the solvent. Such a process may further include a filtering step adapted to remove colored compounds, moisture, dirt, and suspended foreign matter. My improved steps include passing the major portion of the stream of solvent through the filtering elements of a system, and bypassing a minor portion of the stream through the chemically treating elements, so that substantially all the solvent will have been subjected to the chemical treatment when the stream has been circulated over a number of cycles.

In accomplishing the above and other objects of the invention, I utilize a fluid treating apparatus, the preferred form of which is illustrated in the accompanying drawing, in which the figure represents a side elevation of a dry cleaning system including solvent treating apparatus adapted for operation according to my process, parts of the apparatus being broken away to better illustrate steps of the process.

Referring in detail to the drawing:

1 designates a service tank, 2 a washer, 3 a service pump for initially charging the system, 4 a filter cabinet, and 5 a chemical treating unit, the connections and operations of which will be presently described.

A stream of dirty solvent moves from the washer through a pipe 6, and is divided by a fitting 7 in the pipe, a portion of the stream moving through a pipe 8 toward the filter and a portion moving through a pipe 9 toward the chemical unit 5. Proportionate flow of the stream portions is controlled chiefly by valves 10 and 11 in the pipes 8 and 9 respectively.

My process contemplates moving one portion of the stream at a relatively fast rate through the filter and through a filter outlet 12 and washer inlet pipe 13 back to the washer, while moving the other portion of the stream at a slower rate through the chemical unit, the filter and chemical unit being adapted to function efficiently when the streams of

fluid supplied thereto are moving at differential and predetermined rates.

The filter unit includes a tank 14 having a reservoir 15 for receiving a portion of the stream from a horizontal branch 16 connected with the division pipe 8. Supported in the tank 14 above the reservoir is a tank 17 for containing a filter aid material which is fed into the solvent contained in the reservoir in amounts preferably in proportion to the flow of solvent by a screw feeder 18. The filter aid may comprise a decomposed silicious limestone, diatomaceous earth, or a mixture of the two ingredients, to which a decolorizing agent and a dehydrating agent may be added.

The solvent containing the filter aid is pumped from the reservoir through a line pipe 19 into a filter press 20 by a pump 21 in the line 19. The filter press may be of the plate and frame type for removing the filter aid and treating material.

The portion of the stream of solvent, thus treated by the filter aid and substantially free of suspended foreign matter that might interfere with its cleansing properties, is returned to the washer through said pipes 12 and 13.

The other divided portion of the stream of solvent moves through said pipe 9 to a circulating pump 22 which elevates the stream portion through a pipe 23 to an air eliminator 24 located above the chemical unit 5. Air separated from the fluid flows out through a vent head 25 and the solvent flows by gravity through a pipe 26 into the lower end of a saponification cabinet 27 comprising one element of the chemical unit.

A body or bed of alkaline material or solution designated 28 of heavier specific gravity than the solvent is contained in the lower portion of the cabinet 27, and the lighter solvent rises therethrough and a chemical reaction takes place between the alkaline material and the foreign matter entrained in the solvent, whereby the solvent is freed of saponifiable greases, oils, free acids and the like. A soap bed may be formed above the alkaline material and act as a coalescing medium for retaining small particles of dirt and the like.

A quiescent body of solvent is provided for into which the divided portion of the stream moves toward an outlet pipe 29 at the top of the cabinet, to afford maximum opportunity for suspended matter to settle out of the treated solvent.

The pipe 29 discharges the solvent into the lower end of a rinse cabinet 30 comprising a portion of the chemical unit, and containing a body of rinse liquid such as water provided with chemicals adapted to continue the chemical treatment of the solvent stream, and particularly to neutralize the alkalinity conferred on the solvent by the treatment in the saponification cabinet, for example on acid or material which hydrolizes to give an acid reaction.

As the solvent flows upwardly through the water rinse, some of the dirt which has been carried over from the saponification cabinet is rinsed out, and any portion of the alkaline solution carried with the solvent is diluted by the water and is neutralized by the acid or the material which hydrolizes to give an acid reaction.

A floculating agent such as aluminum sulphate, alum, zinc chloride or the like, may be added to the material in the rinse cabinet to aid in settling out material from the stream of solvent, including material carried over from the alkaline bath.

The chemically treated solvent rises through a quiescent body of relatively pure solvent to an outlet pipe 31 at the upper end of the rinse cabinet, and is conducted thereby toward the filter or the washer.

The pipe 31 may be connected by a valved branch 32 with the pipe 13 for uniting the chemically treated portion of the stream of solvent with the filtered portion for flow to the washer, and is also provided with a valved connecting pipe 33 whereby the chemically treated solvent may be reunited with the other portion of the divided stream at the point 34 in the branch 16 leading to the filter.

A trap 35 may be inserted in the line 6 between the washer and the stream-dividing fitting 7 for receiving large pieces of solid matter, and articles such as buttons from the stream of solvent.

The apparatus may be arranged for gravity flow of solvent from the washer to the filter reservoir and the circulating pump. Both the pump 21 and the pump 22 serve as circulating members, the former moving one portion of the solvent stream as fast as received by the reservoir back to the washer, and the pump 22 moving the other portion of the stream to an elevation from which it may flow by gravity through the cabinets 27 and 30 and thence toward the washer.

The valves 10 and 11, and the pump 22, are preferably adjusted to effect division of the stream into unequal portions, and to provide for moving the larger portion through the filter.

The filter is adapted to permit movement of the solvent therethrough at a much faster rate than it can move through the chemical unit. A relatively large volume of the solvent will thus be circulated through the filter and washer, while a relatively small volume is moving through the chemical unit.

A relatively large proportion of the entire amount of solvent that passes from the washer is therefore relieved of suspended matter and otherwise improved by passage through the filter, while a relatively small proportion of the stream is chemically treated and may also be passed through the filter, the continu-

ous division of the stream ultimately subjecting substantially all of the solvent in the system to the chemical treatment.

I have found that when part of the stream of solvent from a washer is diverted through a chemical unit, the part which passes only through the filter is sufficiently cleansed to serve relatively efficiently as a cleansing agent, and the removal of greases and the like from the part of the stream that is chemically treated greatly enhances the cleansing ability of the filtered solvent. When the chemically treated solvent is also passed through the filter, the beneficial effect is further enhanced due to removal of traces of chemicals and moisture from the chemically treated portion of the stream.

Whereas in ordinary practice an amount of solvent equal to the flow capacity of the chemical unit would be required for operating a system can be operated with substantially one-fourth of such amount by employing my process. The chemical unit, for example must permit flow of 1200 gallons per hour, when such flow is required for the system. With my process, the chemical unit may permit flow of 300 gallons per hour, and the portion of the stream moving through the filter may be adapted to flow at such a rate that 1200 gallons per hour of relatively efficiently cleansed solvent would be supplied to the washer. Little more than 300 gallons would therefore be required in the system, namely, for example, 50 gallons in the washer, 20 gallons in the trap, 20 gallons in the filter, and 236 gallons in the cabinets of the chemical unit.

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

The process of treating a continuously circulating stream of fluid, comprising dividing the stream, controlling the divided portions of the stream to effect flow thereof at different rate, subjecting the portion flowing at the slower rate to chemical treatment to remove dissolved material, reuniting the portions, and passing the reunited portions through a filter to remove suspended matter.

In testimony whereof I affix my signature.

RALPH A. MORGEN.