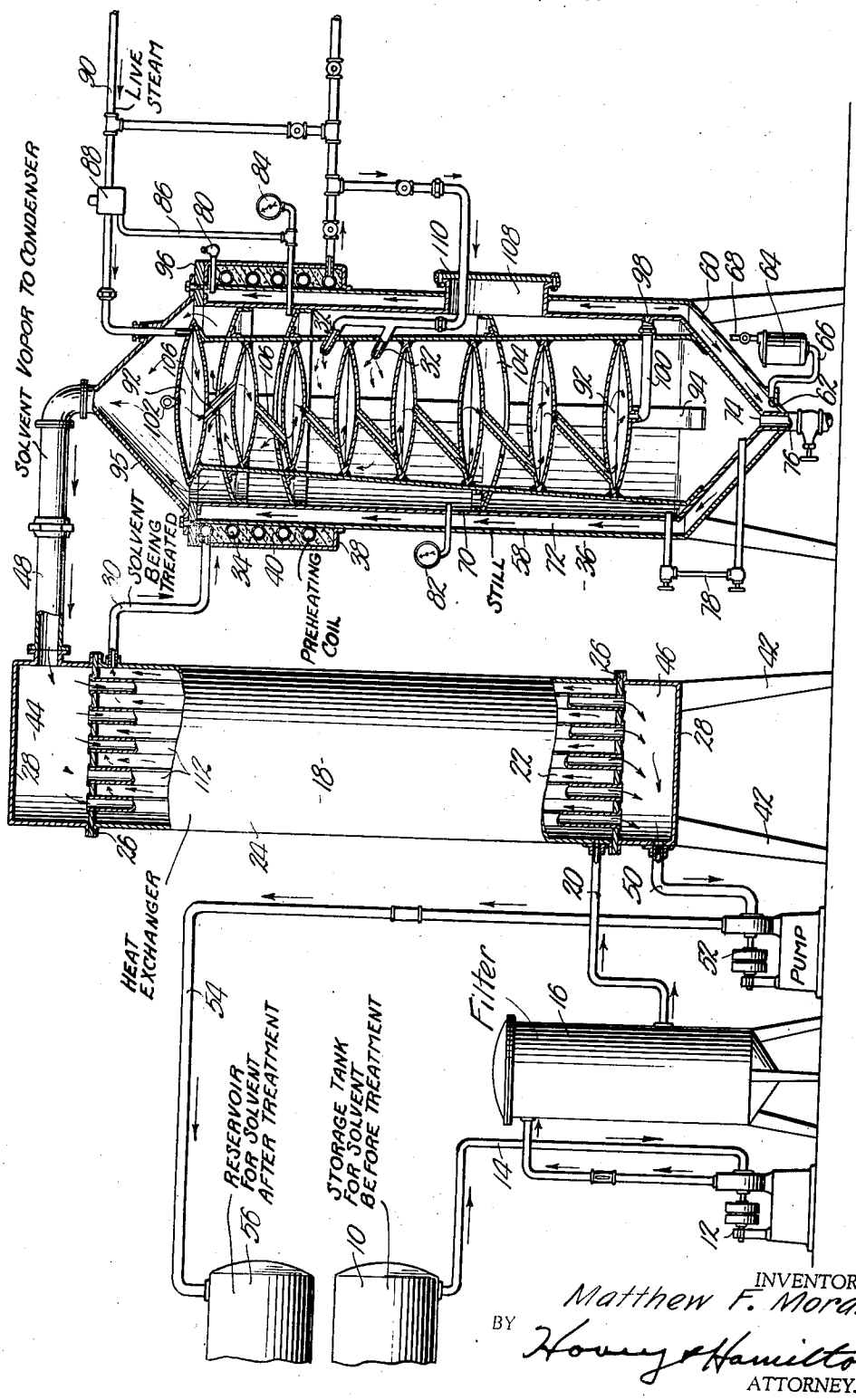
Dec. 31, 1940. M. F. MORAN 2,226,828

DISTILLING SYSTEM

Filed Jan. 19, 1939



INVENTOR.
Matthew F. Moran
BY
Howson & Hamilton
ATTORNEYS

Patented Dec. 31, 1940 2,226,828

UNITED STATES PATENT OFFICE

2,226,828

DISTILLING SYSTEM

Matthew F. Moran, Kansas City, Mo.

Application January 19, 1939, Serial No. 251,728

6 Claims. (Cl. 202—177)

This invention relates to cleaners' solvent treating systems and has for a primary object, the provision of a continuous distilling system for liquids customarily employed in garment cleaning plants and where such liquids may be effectively re-employed when the foreign matter collected thereby is removed.

It is well known in this art that systems of the aforementioned character, have been installed but found to be inefficient, expensive to operate, prohibitive as to installation cost, and therefore economically undesirable. The main object of this invention, therefore, is to provide a distilling system which may be employed as a continuous flow or batch treating equipment.

One of the important aims of this invention is to provide a distilling system wherein a heat exchanger is arranged for the purpose of cooling vapors evolved in the still as the same are passed to a storage reservoir, such exchanger being designed to form a part of the passageway for the solvent being treated, from a cooling tank to the vaporizer or still.

A still further aim of the invention is to provide a still wherein the cleaners' solvent is raised to the end-point and caused to vaporize and therefore eliminate therefrom, all of the foreign matters such as entrained solids, hydrocarbons of relatively low end-point, and moisture.

A still further object of this invention is to provide in a still or vaporizing unit, a group of radiators normally disposed within the still, yet removable therefrom as a unit for the purpose of cleaning the interior of the still from time to time, and also to allow maintenance and replacement of parts when such becomes necessary.

Another object of the invention is the provision of means for utilizing the heat generated within the still, to preheat the cleaners' solvent as it approaches the spray nozzles within the still from the heat exchanger wherein the relatively cool solvent has served to condense vapors evolved within the still and wherein the temperature of the solvent approaching the spray heads, has been slightly raised by virtue of the heat transfer established in the exchanger due to the simultaneous flow therethrough of condensable vapors and solvent to be treated.

Further objects of this invention include the utilization of specially disposed baffles; uniquely and specifically created radiators; particular ways of interconnecting the heat exchanger, preheating coil and still so as to efficiently employ all of the heat generated by the aforesaid radiators; and the specific manner of disposing a series of baffles and a group of radiators within the still so that solvent from the spray heads will be quickly vaporized and carried back to the reservoir where it may be re-employed.

All of the major and secondary objects of the invention set down hereinabove, will be made clear during the following specification, referring to the accompanying schematic drawing, wherein one illustrated embodiment is shown merely for the purpose of disclosing the manner in which the broad concepts of this invention might be built into a system susceptible of use by either large or small dry cleaners and where the amount of solvent to be treated varies to an appreciable degree.

Referring particularly to the system illustrated, the numeral 10 designates a cooling tank for the cleaners' solvent which may be disposed at a convenient location for the purpose of having the used solvent introduced thereto until desired to operate the system.

A pressure pump 12 interposed in a pipe line 14 leading to filter 16 draws the solvent from tank 10 to force the same through filter 16 into heat exchanger 18 by way of pipe 20. Filter 16 may or may not be used, the employment thereof being desirable when the solvent to be treated has collected a large amount of solids which should be removed by filtration so that the efficiency of the hereinafter mentioned still, will not be lowered.

Heat exchanger 18 is specially formed to the end that a cavity 22 is created in the shell 24 thereof which is outlined by the annular wall of shell 24 and the header partitions 26 disposed adjacent to and in spaced relation with the ends 28 of shell 24. Cavity 22 is in communication with pipe 20 and when pump 12 is operated, the liquid being treated is introduced into cavity 22 to fill the same to a point where it will pass therefrom through conduit 30, terminating at spray heads 32. That portion of conduit 30 between spray heads 32 and exchanger 18 is formed into a preheating coil 34 wound around the upper portion of still 36. Coil 34 is housed within a jacket 38 having a filling of insulating material 40 therein so as to preclude the undesirable cooling of the solvent as it passes through preheating coil 34.

Heat exchanger 18 may be supported by legs or the like 42 and the upper and lower hollow heads 44 and 46 respectively, are in communication with pipes 48 and 50 respectively. Pipe 48

interconnects upper head 44 with the interior of still 36, and pipe 50 interconnects vacuum pump 52 with lower hollow head 46. A pipe 54 leads from vacuum pump 52 to reservoir 56.

Alluding to still 36, the same is specially formed and arranged to be quickly assembled so that maintenance is rendered extremely easy.

The outer shell 58 of still 36 is provided with a conical bottom member 60 through which is provided an outlet port 62 in communication with steam trap 64 through the medium of pipe 66. Pipe 68 extending from steam trap 64 is the means for returning the condensate from still 36 to the point of steam generation.

Inner shell 70 of still 36 is of the same general contour as outer shell 58 but smaller to the extent of permitting the establishment of a space 72 between outer and inner shell 58 and 70 respectively. These two shells forming the major members of still 36 may be held together by spacers of conventional and ordinary construction, and the outlet port 74 in the conical bottom of inner shell 70 is in communication with a valved drain pipe 76.

A sight glass 78 arranged to disclose to the operator the level of matter deposited in the bottom of inner shell 70, may be conveniently arranged, and a pop-off valve 80 is at the top of still 36 and in operative relation with space 72.

A thermometer 82, or similar instrument for indicating temperatures within still 36, is contemplated, and a pressure gauge 84 is mounted on a branch of pipe 86 which leads to a heat controlled steam governor 88. The automatic steam valve and governor 88 is interposed in line 90 which interconnects a steam generator, not here shown, and one of the radiators 92 mounted on frame 94 within the inner shell 70 of still 36.

A cover 95, removably retained at the upper ends of inner and outer shells 70 and 58 respectively, may be secured to annulus 96 that closes the upper end of space 72 so as to complete the provision of a steam space 72 which is open only at its outlet port 62 and at an inlet port 98, which is in communication with pipe 100 leading to the lowermost radiator 92.

Radiators 92 progressively increase in diameter as the lowermost radiator is approached from the one immediately below uppermost radiator 92, which is in connection with steam pipe 90. Uppermost radiator 92 has an eye 102 thereon so that when cover 95 is removed and the necessary pipe connections loosened, all of radiators 92, together with frame 94 and baffle plates 104, may be removed from the still as a unit. Each radiator 92 is formed of a pair of bellied plates, the annular edges of which are welded together to form a closed compartment. The upper faces of radiators 92 are convex so that any moisture tending to cool thereon, will flow by gravity towards the bottom of still 36.

The relative sizes of radiators 92 with respect to their diameters, is important, for when liquid runs from one radiator 92 it will drop by gravity upon the upper convex face of the radiator next below.

Steam passing into upper radiator 92 flows therefrom to the radiator next therebelow through a coupling 106—in fact, all radiators 92 are joined by couplings 106 which have one end connected to the lowermost point of the bottom wall of each of said radiators. The point of juncture between couplings 106 and the upper walls of radiators 92 is not of particular importance, other than the connection should be made to one side of the center so that the steam will impinge upon the walls of the radiators and not pass in a straight channel therethrough. The reason for joining the upper ends of couplings 106 and the lower walls of radiators 92, as indicated, is to insure that any condensate cooling within radiators 92 will flow by gravity through coupling 106 to the radiator next below. Obviously, the arrangement of radiators 92, couplings 106, and pipe 100, is such as to maintain the same entirely free from condensate.

Under normal operation, steam entering through pipe 90 will quickly flow through all radiators 92 and the interconnecting couplings 106, and thence to space 72 by way of pipe 100. Space 72 will be completely filled with steam and as the same is reduced to vapor and condenses, the liquid will enter trap 64. If no condensation occurs, steam will pass out through pipe 66 to steam trap 64 where it will of necessity, be reduced to liquid for re-introduction into the steam generator, not illustrated.

Manhole 108 provided with a cover 110 permits access to the innermost chamber of still 36, and when it is necessary to lift the radiators 92 from within the still, spray heads 32 may be removed through this manhole.

Baffle plates 104 are open at their centers and arched as illustrated, so as to direct the finely divided condensate escaping from spray heads 32, toward radiators 92. They also tend to direct any solvent that may remain in a liquid form, toward the inner face of inner shell 70, which is maintained at a temperature above the end-point of the solvent being treated, and therefore a reduction to vapor is immediately effected and the vapor is drawn upwardly and out through pipe 48.

While the operation of the system will be at once obvious to one skilled in the art, through an understanding of the foregoing description of one physical embodiment of the invention, it will be advantageous to know that in actual operation, the temperature of the solvent or liquid being treated, will be raised about 100° F. as it passes through heat exchanger 18, and while the condensable vapors are passing downwardly from hollow head 44 to similar head 46 through a plurality of flues 112 held in spaced relation by partitions 26. When the still is in operation, the upper portion thereof is maintained at a very high temperature, and when the solvent passes through preheater coil 40, its temperature is raised to a point within 15° or 20° of that of its vaporization.

It is understood that the specific arrangement of parts, the relation between some of the aforementioned elements of the system, and the detailed manner of employing the apparatus, may be varied without departing from the spirit of the invention or scope of the appended claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a distilling system for cleaners' solvent; a still provided with a vaporizing chamber therein; a plurality of radiators within said chamber; means for supplying steam to the radiators; and spray heads within the still, said radiators being arranged with their axes on a vertical line, the diameters of the radiators progressively increasing as the lowermost radiator is approached whereby liquid dropping by gravity from one radiator will fall upon the radiator next below said

spray heads being disposed to direct solvent against the bottoms of the radiators.

2. In a distilling system for cleaners' solvent; a still provided with a vaporizing chamber therein; a plurality of radiators within said chamber; means for supplying steam to the radiators; and spray heads within the still, said radiators having upper and lower walls, bellied to present convex outer faces and concave inner faces, said radiators each being disposed horizontally one above the other, each radiator being connected to the one therebeneath by a coupling joined to the bellied lower wall thereof at the lowermost point thereof said couplings having their lower ends in connection with the respective radiators to one side of the connection between the lower walls of the radiators and the couplings.

3. In a still for systems of the character described, a double walled, hollow vaporizer provided with an outlet port at the top thereof; a plurality of spray heads through which to introduce the solvent being treated; a plurality of substantially disc shaped, hollow radiators within the vaporizer; couplings interconnecting the radiators; and a frame removably holding the radiators in assembled relation one above the other within the vaporizer, the uppermost radiator being connected with a source of steam, the lowermost radiator being in communication with the space between the walls of the vaporizer, said spray heads being disposed to direct solvent against the undersides of the radiators.

4. In a still for systems of the character described, a double walled, hollow vaporizer provided with an outlet port at the top thereof; a plurality of spray heads through which to introduce the solvent being treated; a plurality of substantially disc shaped, hollow radiators within the vaporizer; couplings interconnecting the radiators; and a frame removably holding the radiators in assembled relation one above the other within the vaporizer, the uppermost radiator being connected with a source of steam, the lowermost radiator being in communication with the space between the walls of the vaporizer, said spray heads being positioned to direct the solvent passing therethrough radially toward one of said radiators.

5. In a still for systems of the character described, a unitary radiator assembly adapted for quick removal and insertion to and from respectively the still, comprising a frame having a plurality of spaced apart standards; a series of hollow radiators with outwardly bellied walls carried in spaced apart relation by the standards; pipes extending at an angle downwardly and outwardly from each radiator to the radiator next below to interconnect the same; and arched baffles on the frame, certain of the baffles being formed with concave upper faces, certain of the baffles having convex upper faces, said radiators progressively decreasing in diameter as the upper end of the frame is approached, the uppermost baffle and the lowermost radiator having means for joining the radiator assembly to a source of steam the still being provided with spray heads directed at the radiators when the radiator assembly is in the operative position.

6. In a distilling system for cleaners' solvent, a still provided with a vaporizing chamber therein and arranged to be heated by a steam jacket; a plurality of disc-shaped radiators on a frame within said chamber and removable from the still as a unit; means for supplying steam to the radiators; spray heads within the still to spray the radiators with solvent; and a conduit for supplying solvent to the spray heads, said conduit having a portion thereof coiled in contact with the still jacket for preheating the solvent as it approaches the spray heads.

MATTHEW F. MORAN.