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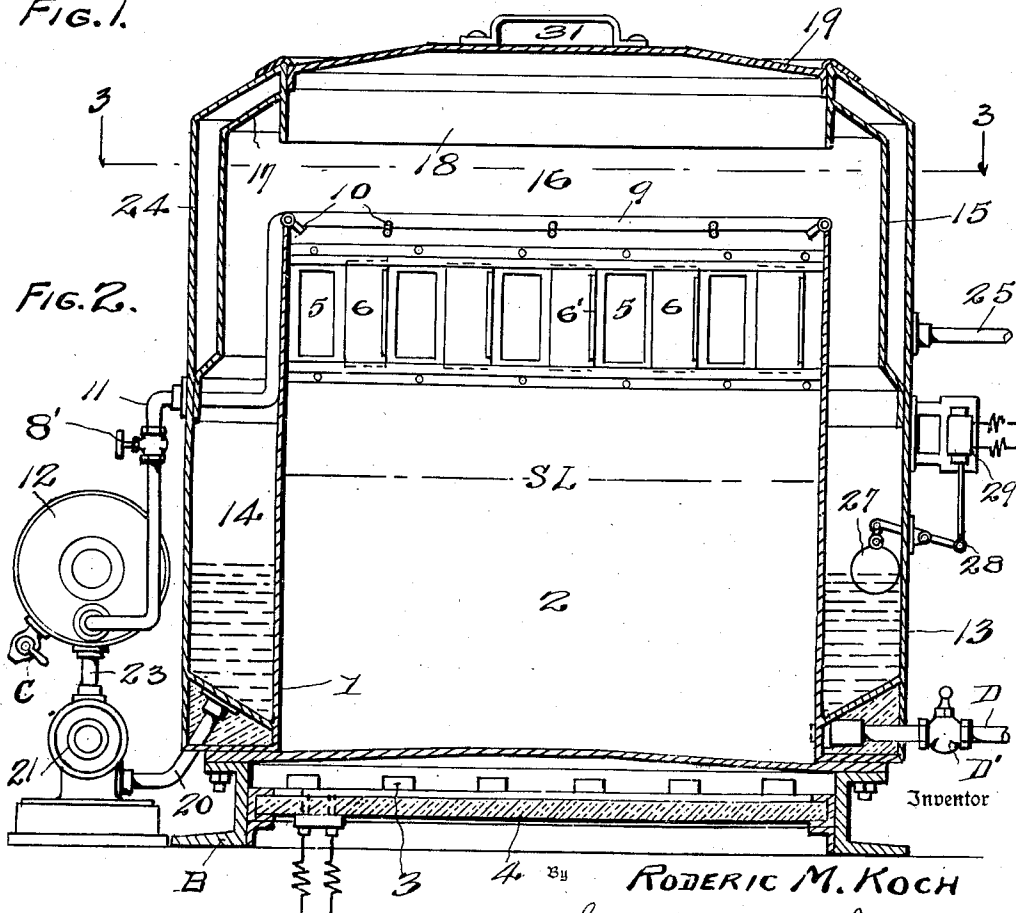
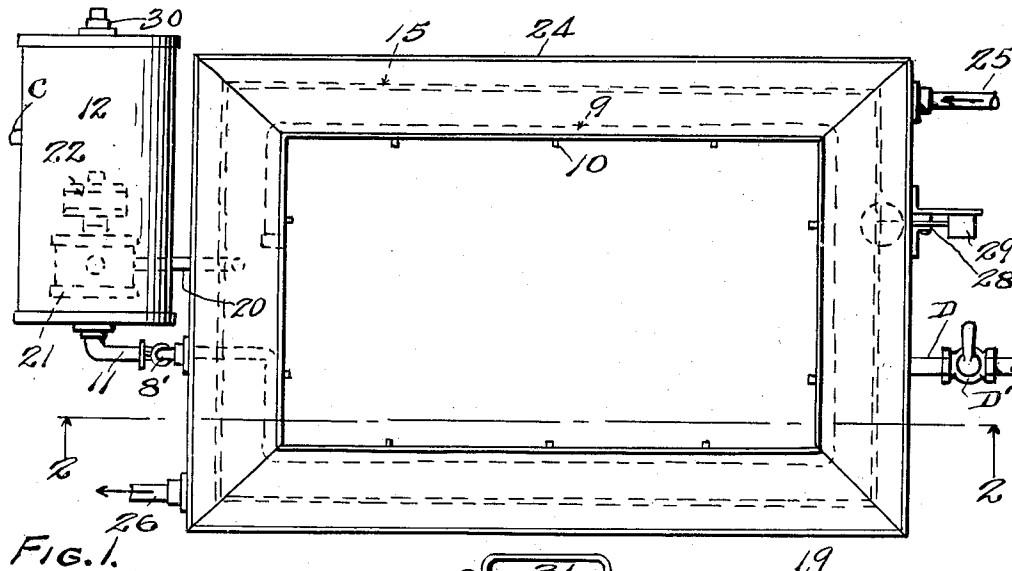
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2,305,166

DEGREASING APPARATUS

Filed June 6, 1940

2 Sheets-Sheet 1



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FIG. 3.

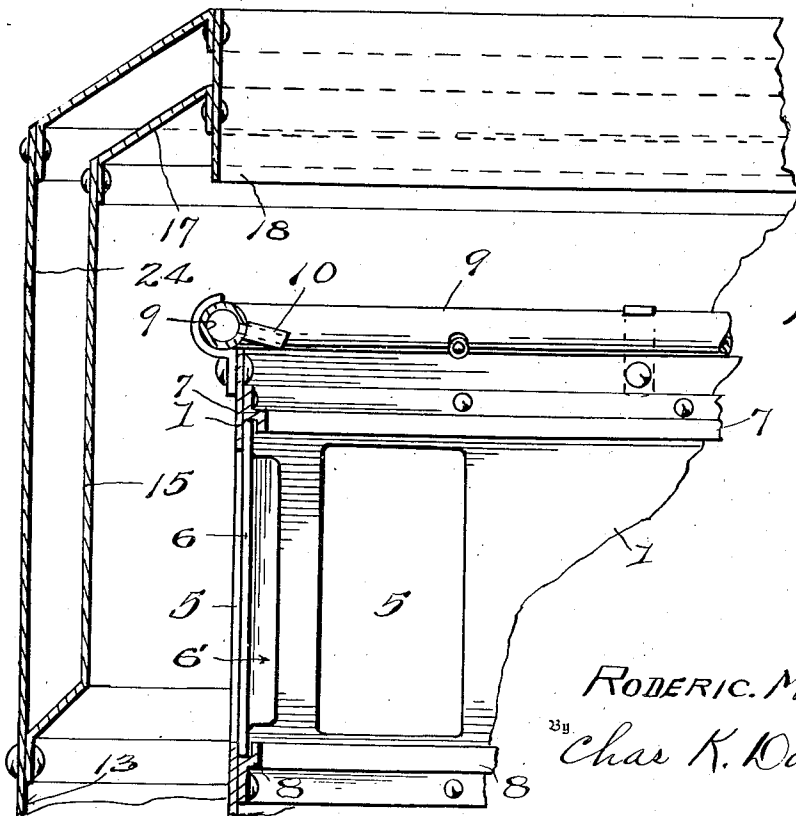
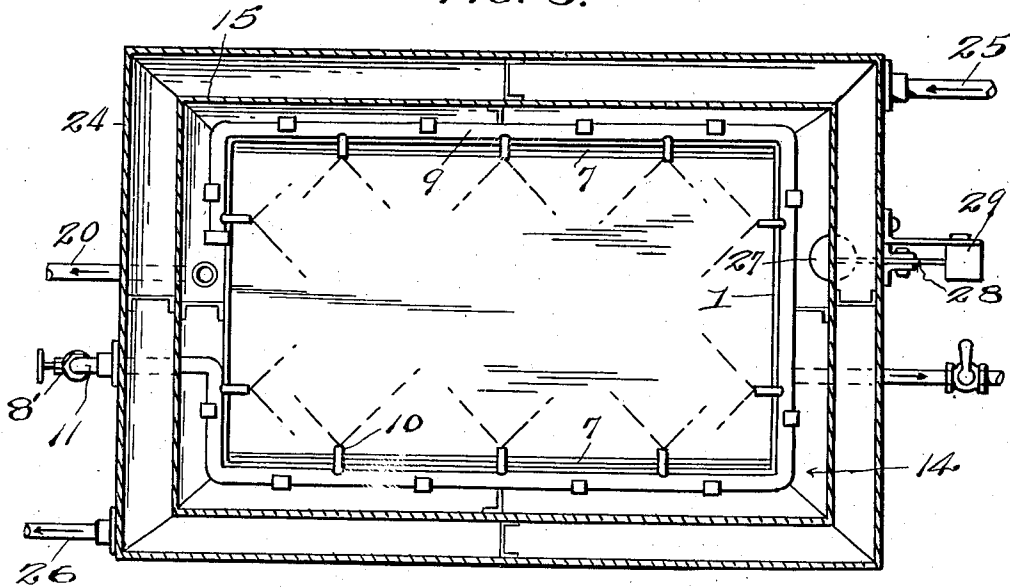


FIG. 4.

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UNITED STATES PATENT OFFICE

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DEGREASING APPARATUS

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Application June 6, 1940, Serial No. 339,190

4 Claims. (Cl. 202—170)

As is well known in the art, castings, stamped parts, and other forms of various metals, for machines, tools, and other devices or appliances, acquire a surface coating or film of oil grease, wax, dirt, and other undesirable extraneous materials or substances, that must be removed preparatory to the finishing processes such as painting, enameling, electro-plating etc. For this purpose, the "work" is subjected to a bath in a volatile liquid solvent, or to a vapor bath of the solvent, which dissolves and removes the undesirable coating or film, leaving a cleansed surface for treatment in the finishing process of the "work."

For convenience of illustration and description of the utility of my degreasing apparatus, I shall refer to the "work" to be degreased as a casting or castings, but it will be understood that the "work" to be cleansed in the degreasing apparatus may include stamped and pressed articles of metal, non-metallic articles, fabrics such as rags, or other greasy articles that require cleansing.

According to my invention, a volatile liquid solvent in the degreasing chamber of the apparatus, in which the casting or castings are deposited, is heated to the boiling point and vaporized, then the vapor is distilled or condensed to clarify the used solvent, and finally the clarified, distilled, liquid solvent is again utilized for the performance of its functions.

In carrying out my invention I employ a compactly arranged apparatus, which is comparatively inexpensive in cost of construction and maintenance, which is efficient in operation, and which is economical in the use of the volatile solvent employed.

The invention consists essentially in certain novel combinations and arrangements of parts in the degreasing apparatus involving an interior open-top tank or degreasing chamber or heating chamber, an exterior condensate chamber which also forms a heat insulation for the interior degreasing chamber, and an upper vapor chamber open to both of said chambers and in which the vaporized solvent is distilled, together with a circulating system or circuit that may provide either a constant supply of the cleansing solvent, or in some instances the volatile solvent may be supplied in intermittent charges. A lid or other closure may be employed for the degreasing chamber and vapor chamber to provide a pressure process of cleansing, or the closure may be removed when an open process of cleansing is desired.

In the accompanying drawings I have illus-

trated one complete example of the physical embodiment of my invention wherein the parts are combined and arranged in accord with one mode I have thus far devised for the practical application of the principles of my invention, but it will be understood that changes and alterations may be made in these exemplifying structures within the scope of my claims, without departing from the principles of my invention.

Figure 1 is a top plan view, with the lid removed, of a degreasing apparatus embodying my invention.

Figure 2 is a vertical sectional view, with the lid in place, as at line 2—2 of Figure 1.

Figure 3 is a horizontal sectional view, as at line 3—3 of Figure 2.

Figure 4 is an enlarged, fragmentary sectional view, showing part of the ported tank, the spray pipe and nozzles, the upper vapor chamber, and cooling jacket for the vapor chamber, together with the condensing or distilling wall-surfaces.

In the conventional form of the invention disclosed in the drawings I preferably utilize a base B upon which is mounted an open-top tank 1, here shown as rectangular in shape, and of appropriate dimensions to accommodate a single large casting or a large number of small castings, which are deposited in usual manner within the degreasing chamber 2 formed by the tank.

A supply of the liquid solvent is contained in the tank to provide a bath for the immersed or submerged casting, the level of the liquid solvent being indicated by the solvent line SL in Figure 2. For heating the liquid solvent to the boiling point and vaporizing the liquid, suitable means are provided at the bottom of the tank 1, and for this purpose I have indicated several electrical heating units as 3 that are connected to a source of supply, and the heaters enclosed within the base B are insulated as at 4 to prevent loss of heat. Any of the volatile solvents suitable for the purpose, and any convenient heating means may be employed to raise the temperature of the liquid solvent to the boiling point thereby causing a turbulence that insures movement or circulation of eddies and currents in contact with all of the exposed surfaces of the castings for dissolving and removing the film or coating therefrom. The solvent level SL may vary under different conditions and depends upon the quantity of volatile solvent required in the degreasing chamber, but a maximum level of the turbulent liquid may be preserved by the use of ports 5 in the walls of the tank 1. These ports are shown as openings which may be provided in some or in all of the

walls of the tank 1, and the size or areas of the port openings are governed by suitable adjustable means, such as slide gates 6, which are horizontally movable between the upper and lower flanged metal guide rails 7 and 8 which are fixed in suitable manner to the inner faces of the walls of the degreasing chamber. Any suitable operating means may be employed for moving or adjusting these gates, as for instance the flanges 6' may be used in pushing or pulling the gates to closed and open positions.

These ports 5 open, at opposite sides, to the degreasing chamber and to the condensing chamber 14, and the gates of the ports are adjustable to vary the size of the openings of the ports to provide movement of vapor currents from the degreasing chamber to the condensing chamber which is desirable when certain types of solvent are being used. These ports also provide for an overflow of excess liquid solvent that may in an emergency pass from the condensing chamber to the degreasing chamber, or vice versa.

During the degreasing or cleansing process, the liquid solvent is introduced to the chamber 2 from the upper edge of the open top tank upon which is mounted in suitable manner a spray pipe 9 that extends substantially around the upper edge of the tank, and the pipe is provided with spaced spray nozzles 10 all pointing inwardly of the tank to provide a uniformly distributed shower of the liquid to the interior of the degreasing chamber or tank 1. The solvent is furnished to the spray pipe, under pressure, from a supply pipe 11 and this supply pipe is connected with an insulated pressure tank 12 located at a convenient point exterior of the apparatus in order that the liquid solvent may be sprayed in uniform jets from the nozzles.

When a constant and continuous supply of liquid solvent is being circulated, a cut-off valve 8' in the supply pipe 11 and readily accessible to an attendant, is left open or partially open to control the quantity of solvent employed. If the liquid solvent is to be supplied intermittently, or at intervals in charges, the control valve 8' is of course employed for this purpose, and the charges are furnished from the pressure tank 12.

The degreasing apparatus involves the use of a double wall structure including the walls of the tank 1 together with an exterior, spaced, jacket which is fashioned with lower straight walls 13. These spaced walls form the condensate chamber 14 in which is collected the clarified and distilled liquid solvent after the latter has been used in the degreasing chamber, and as before stated the degreasing chamber and the condensate chamber communicate through the ports 5 when the latter are open.

Above the condensate chamber 14 the walls of the exterior jacket 13 are preferably inset, as at 15, and these inset walls as shown project a substantial distance both above and below the top edge of the open-top tank or degreasing chamber to form an upper vapor chamber 16 that includes the upper part of the condensate chamber and extends over the open top of the tank, thus providing an open space for expansion of the vapor arising from the boiling liquid solvent. As best seen in Figure 4 at the top of the exterior jacket, its walls 15 are turned inwardly as at 17 for the purpose of increasing the area of the condensing surfaces for the vapors, and also to minimize the turbulence of the vapor currents or eddies. In addition, a flange or baffle wall 18 that projects downwardly at the upper opening of the exterior

jacket, may be provided to aid in quieting the eddies, and also to increase the vapor-condensing surfaces or area. By thus quieting the vapor currents or eddies they are more readily condensed on the several condensing surfaces, and the distilled and clarified solvent in liquid form is returned to the condensate chamber 14.

While the apparatus is in operation as a closed, pressure, process, the upper vapor chamber 16 is closed by the presence of the lid or closure 19 in Figure 2, which, if necessary may be equipped with quick detachable fasteners in order to resist the internal pressure of the enclosed vapor.

From the bottom of the condensate chamber or collection chamber 14 the distilled and clarified liquid solvent flows by gravity through an outlet pipe 20 to the intake side of a suitable pump 21 that is here shown as located beneath the pressure tank and is operated by power transmitted from an electric motor designated 22 and connected to a suitable source of electrical energy. From the outlet side of the pump the liquid solvent is forced through a short pipe 23 into the pressure tank 12. A closed circuit or circulating system for the solvent is provided, and the solvent may be utilized, without substantial waste, as long as the efficiency of the solvent remains unimpaired, necessary replenishments being made when required. As before stated the liquid solvent from the pressure tank may intermittently be controlled and supplied in charges, through manipulation of the control valve or cut-off valve 8' of the pipe 11.

The step of condensing and distilling the vaporized solvent rising to the vapor chamber from the turbulent surface of the boiling liquid solvent in the degreasing chamber, is enhanced by cooling the walls 15, 17 and part of the flange 18 of the vapor chamber, and this function may be performed by employing an exterior cooling jacket 24 which is spaced a suitable distance from the surrounding walls 15 and 17. Cold air, water, or other fluid refrigerant may be introduced under pressure into the interior of the cooling jacket by way of an inlet pipe 25, and after circulating within the cooling jacket the heat-laden refrigerant passes out through an outlet pipe 26, suitable means being employed for maintaining the circulation of the refrigerant.

The supply of liquid solvent from the pressure tank 12 may be automatically indicated and controlled as a safety measure in suitable manner, as by the use of a float 28 in the condensate chamber 14, which through linkage 23 operates an electric circuit breaker at 29 that is included in the operating circuit for the motor 22. This control switch or circuit breaker may also be utilized in the heating circuit to govern the electric heating units 3, and of course the equipment includes a manually controlled cut-out switch for the circuit or circuits.

A drain pipe D with its valve D' may be located at or near the bottom of the degreasing chamber for cleaning-out purposes; the pressure tank 12 may be equipped with a drain cock as C in Figs. 1 and 2, and a normally closed inlet at 30 in Fig. 1; the lid or cover is provided with a usual handle or hoisting loop 31 for use in placing and removing the lid; and other necessary accessories form part of the equipment of the degreasing apparatus.

Any of the well known volatile liquid solvents and preferably non-inflammable, may be employed as the cleansing agent, and circulated as above described, and it will be understood that in addition to the boiling liquid solvent heated

within the degreasing chamber, the condensate or distilled solvent in the collecting chamber 14 is also maintained at a high degree of temperature from heat radiated through the walls of the interior tank. The pressure tank 12 may also be insulated for the purpose of maintaining a high temperature in the confined solvent, so that the solvent supplied to the spray nozzles and falling into the degreasing chamber possesses a high degree of temperature before being subjected to heat from the units indicated at 3.

Inasmuch as the vapor rising in currents from the turbulent surface or level of the boiling liquid solvent is heavier than air, the vapor is confined to the vapor chamber above the degreasing or boiling chamber, and by lateral expansion over the upper open-top of the tank 1 these vapors condense as they contact with the various condensing surfaces. The solvent is thus distilled apart from the boiling or degreasing chamber, and the clarified liquid solvent flows downwardly, by gravity, and is collected in the condensate chamber 14 as heretofore described.

After the castings have been subjected to this cleansing treatment for a suitable period of time, they are withdrawn from or removed from the degreasing chamber in appropriate manner, and lifted through the shower or sheet of spray from the nozzles. The cleansed casting is thus drenched and the dissolved extraneous substances washed therefrom, after which the casting is quickly dried due to its heated condition resulting from the boiling process in the degreasing chamber.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination with an inner tank forming a degreasing chamber having a closed bottom-portion and open top, of a jacket forming a condensate chamber out of communication with but surrounding the lower portion of the degreasing chamber and its upper walls forming a vapor chamber above and open to both of said chambers, means for vaporizing a volatile liquid solvent in the degreasing chamber whereby the upper walls of the vapor chamber form interior condensing

surfaces located directly above the condensate chamber, and a closed circulating system adapted to transfer and return clarified liquid solvent under pressure from the distillate chamber to the degreasing chamber.

2. The combination with an open top tank forming an inner degreasing chamber, and means for vaporizing a liquid solvent therein, of an exterior jacket forming a distillate chamber closed to but surrounding the lower portion of the degreasing chamber and said jacket also forming a vapor chamber above and open to both said chambers, said vapor chamber having its walls inset between the tank and the walls of the degreasing chamber to form upper condensing surfaces.

3. The combination with an open-top closed-bottom tank forming an inner degreasing chamber, means for introducing a volatile liquid solvent to the tank, and heating means for vaporizing the liquid solvent, of an exterior spaced jacket forming a distillate-collecting chamber separate from but surrounding the lower portion of the degreasing chamber, said jacket also forming a vapor chamber located above and open to both of said chambers and the walls of the vapor chamber forming upper condensing surfaces, said tank having ports near its open-top opening laterally into the distillate chamber, and adjustable closures for varying the area of said ports.

4. The combination in a decreasing apparatus, of double spaced side walls forming an open-top closed-bottom degreasing chamber an outer distillate chamber separate from but surrounding the lower portion of the degreasing chamber and a vapor chamber located above and open to both said chambers, heating means for vaporizing liquid solvent in the degreasing chamber, said vapor chamber having walls inset to a plane between the outer and inner walls of the distillate chamber, and a baffle wall projecting downwardly from the upper terminus of the inset walls, whereby vapors are condensed on the inner surface of the upper inset walls and thence collected in the distillate chamber.

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