

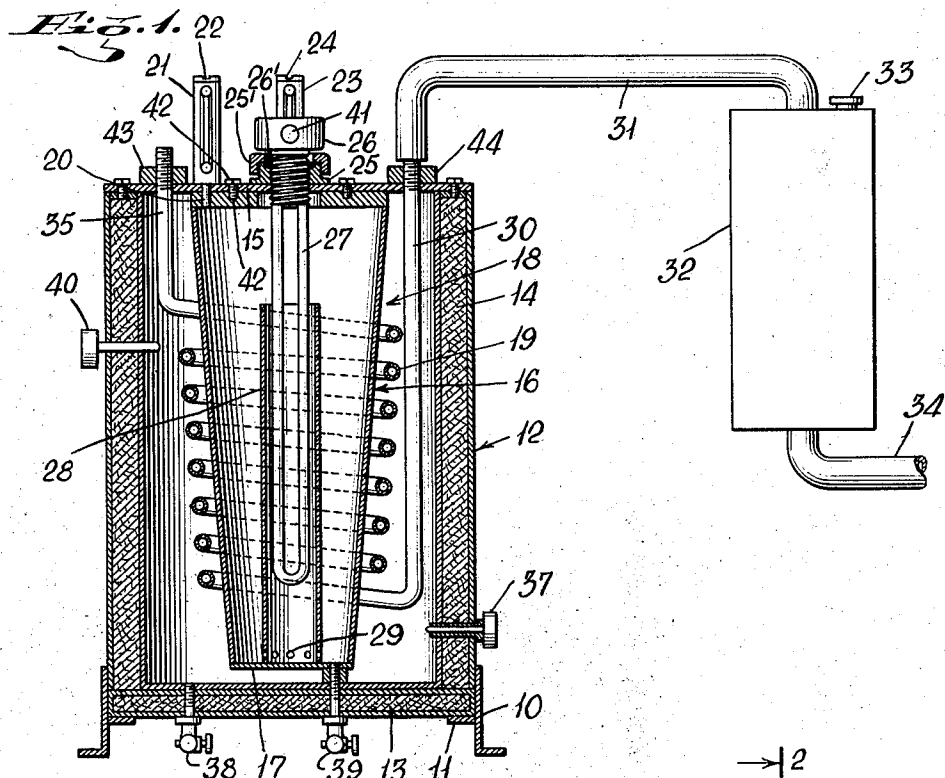
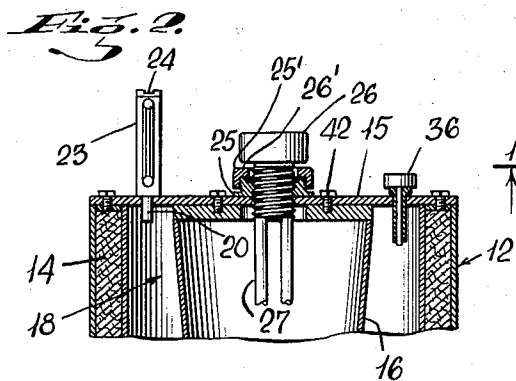
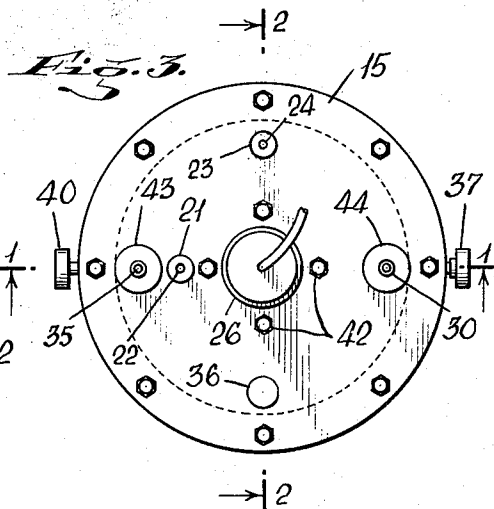
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PAINT PREHEATER

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PAINT PREHEATER

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This invention relates to apparatus for heating fluids of various kinds and classes. More particularly, the invention deals with apparatus of the kind under consideration for heating or pre-heating paints and similar liquids which have a tendency to congeal or thicken, when standing, so that the same will be rendered more fluid and capable for use in conjunction with spraying apparatus for spraying paint or a solution on a suitable surface. Still more particularly, the invention deals with an apparatus of the character described having means for providing a substantial instantaneous, as well as efficient heat generator for transmitting heat units from the generated source, to the fluid contained in a coil and in disposing the coil in a chamber outwardly of the primary heat chamber of the apparatus. Still more particularly, the invention deals with apparatus of the type and kind having means for encouraging a quick circulation of heating medium in the primary heater chamber of the apparatus.

The novel features of the invention will be best understood from the following description when taken together with the accompanying drawing, in which certain embodiments of the invention are disclosed, and in which the separate parts are designated by suitable reference characters in each of the views; and in which:

Fig. 1 is a sectional view through the apparatus diagrammatically illustrating the method of introducing heavy or congealed fluid to the circulating coils of the apparatus.

Fig. 2 is a view of the upper portion of the apparatus taken at right angles to Fig. 1; and

Fig. 3 is a plan view of the upper portion of the apparatus.

In Fig. 1 of the drawing, shown at 10, is a suitable annular ring-like base of L-shaped cross-sectional form, and having an inner annular flange 11 upon which the tank or casing 12 of the apparatus is mounted. The tank or casing 12 comprises a double insulated wall bottom 13, and a double insulated boundary wall 14, having at its upper end a detachable cover 15.

Supported upon the inner surface of the cover is an inverted conical cylinder 16 having a bottom wall 17 supported in spaced relation from the bottom 13 of the casing so as to provide completely around the sides and bottom of the cylinder 16, a chamber 18 in which water or other fluid is adapted to be placed and utilized to conduct heat to a pipe, coil, or other tube 19 arranged in the chamber 18. The coil 19 is also preferably conical in its formation to conform with and be

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disposed in close proximity to the conical formation of the cylinder 16.

The cylinder 16 may be said to comprise a heating unit or chamber of the apparatus into which water or other fluid is adapted to be passed through an intake pipe 20 entering the chamber 18 through the top or cover 15. Coupled with the pipe 20 above the cover 15 is a water gage unit 21, the top of which has a vent, as at 22. A similar water gage unit 23 is mounted in connection with the cover 15 and is exposed to the chamber 18, the unit 23 having a vent, as at 24. The cover 15 has centrally, an enlarged threaded portion 25 with which is detachably mounted, an upper plug unit end 26 of an electric heating unit 27. This unit extends downwardly into the cylinder 16, to a point well above the bottom of said cylinder, the unit 27 being arranged in an instantaneous heater tube 28.

The tube 28 is mounted in connection with the bottom of the cylinder 16 and extends upwardly into the cylinder to a point slightly above the uppermost winding of the coil 19. The lower end of the tube 28 has one or more small circulating passages 29 arranged above the bottom of the tube 28, providing for circulation of water upwardly through the tube 28, around the heating element 27 for discharge into the cylinder 16. In starting the apparatus, it will be apparent that the water in the tube 28 will be quickly heated by the element 27 and caused to rise to the top of the tube, thus producing the quick circulation and distribution of the heated water for transfer to the water in the chamber 18 through the wall of the cylinder 16, and thus to the coil 19 to heat the heavy fluid material which is to be circulated therethrough to reduce the same to a more fluid state.

Mounted on the enlargement 25 is a gland nut 25' for securing a packing gland 26' around the fitting 26, to effect a seal of the fitting in the cover of the apparatus.

Passed through the top or cover 15 of the apparatus is an intake side 30 of the coil 19. With this is coupled a pipe or tube 31, which leads to a pressure tank 32 into which the heavy fluid, such as heavy paint, enamels, lacquers, varnishes and the like, or heavy chemicals of any type and kind are adapted to be placed thereon through an admission cap 33. The tank 32 has suitable means for introducing a pressure medium or to operate a pressure element to pressure discharge the material for transmission to the coil 19. For example, suitable pressure means may be introduced through the pipe or tube 34 at the bottom

of the tank 32 to actuate a plunger or cylinder in the tank, as in other apparatus of this type and kind. The incoming heavy paint or chemical is brought out to the lowermost winding of the coil 19 and after being heated, is discharged through the discharge or exhaust pipe 35, which may extend to any suitable apparatus, such for example, as a spraying apparatus for spraying the same onto a surface, particularly when paints, lacquers, enamels, varnishes and the like are used, or for delivery of any type of pre-heated chemical to a predetermined station for utilization, treatment or the like.

Two thermostatic switches are also preferably employed, one switch 36 being coupled with the cover 15 to extend into the upper end of the chamber 18, and the other 37, mounted in the wall of the casing 12 to communicate with the lower end of the chamber 18. These switches will be suitably hooked-up with the electric supply to the element 27 to automatically shut off the electric supply should the temperature of the water or other fluid in the chamber 18 go beyond any predetermined fixed temperature. In this way, any danger of over-heating will be prevented. Furthermore, desirable temperatures can be maintained consistent with different types and kinds of materials which are pre-heated with the improved apparatus. The switches 36 and 37 will be set to operate, or in other words, break the circuit at slightly different temperatures, so that if one switch should fail for any reason, the other switch would operate to produce the desired result.

Mounted in the bottom 13 of the container 12, are two drains 38 and 39, the drain 38 being adapted to drain the water or other fluid from the chamber 18, whereas the drain 39 is detachable with respect to the bottom 17 of the cylinder 16 and is adapted to drain said cylinder. Also mounted in the wall 14 of the casing 12 to extend into the chamber 18, is a thermometer 40 to indicate to an operator the temperature of the water in the chamber 18 near the discharge end of the coil 19, the thermometer being stationed closely adjacent the discharge tube 35.

The plug unit 26, which supports the electric heating element 27 also supports a pilot light, diagrammatically illustrated at 41, the light being in circuit with the element 27, so that when the element 27 is in operation, the light 41 will be illuminated, thus indicating to the operator that the apparatus is in operation.

It will be understood that the apparatus can be constructed in sizes suitable for the intended uses. In some instances, relatively small apparatus can be employed with a minimum amount of piping or tubing in the coil 19, whereas in other cases, the diameter and length of the coil may be increased and the general size of the apparatus proportionately increased. By mounting the coil in the manner defined, no possible discharge can be experienced from the standpoint of leakage or breakage in the coil, in having the fluid medium circulated therethrough, come into contact with the heating element to cause accidents which might prevail, if such exposure were possible. Furthermore, the double chamber structure lends itself to utilizing different fluids as heat transmitting mediums in the respective chambers.

The inverted conical cylinder 16 will effectively stimulate circulation and provide at the discharge end portion of the coil 19, a relatively large area of heat conductive fluid where this fluid is at its greatest or highest temperature,

thereby insuring a positive control of the paint or chemical discharged through the tube 35, particularly by gaging the reading of the thermometer 40, or in otherwise testing the material at its point of delivery.

It will also be apparent that by detaching the drain 39 from the cylinder 16, and detaching the cap 15 from the casing 12, the entire unit comprising the cylinder 16, tube 28 and coil 19 and other associate parts, can be detached from the casing as and when it may be desired, to clean the casing or in any way repair the unit. While the cylinder 16 may be welded to the cover 15, it is preferred that the same be detached from the cover 15 by removing the coupling screws 42 for cleaning or repair to the interior of the cylinder. In this event, however, the coil 19 must also be removed through the medium of suitable couplings 43 and 44 provided on the cover through which the tubes 35 and 30 respectively pass.

No attempt has been made to show the electric wire employed as this is well known to those skilled in the art. It is sufficient to say that the two switches, as well as the pilot light, are in circuit to the heating unit 27 to control operation thereof and to indicate its operation. In initially starting the apparatus, the heating unit will be put into operation shortly before pressure is introduced through the pipe 34 to pressure discharge the material from the tank 32. By the time the heavy fluid or chemical is brought to the coil, the water or other fluid in the cylinder 16 and chamber 18 will be heated sufficiently to pre-heat this fluid to the desired temperature at the discharge end 35. In some instances, the feed will be relatively slow, depending upon the relative limit consumption at the discharge end, which is with the tube 35.

Having fully described our invention, what we claim as new and desire to secure by Letters Patent is:

1. A paint pre-heater comprising a main insulated wall casing, a frusto-conical heating unit arranged within the chamber of the casing and spaced from the inner walls thereof to form around said unit an annular chamber in which a fluid is adapted to be arranged, means gaging the level of fluid in said chamber, a coil in the chamber surrounding said heating unit and in spaced relation thereto, the casing having a cover in connection with which the cylinder is mounted, intake and discharge pipes for the coil being mounted in said cover, an electric heating element supported in connection with the cover and extending into said heating unit, an elongated tube mounted in the heating unit and surrounding the greater portion of said heating element and arranged in close proximity thereto, and the lower end of the tube having circulating passages whereby a fluid arranged in the heating unit may circulate upwardly through said tube and downwardly in said heating unit.

2. A paint pre-heater comprising a main insulated wall casing, a frusto-conical heating unit arranged within the chamber of the casing and spaced from the inner walls thereof to form around said unit an annular chamber in which a fluid is adapted to be arranged, means gaging the level of fluid in said chamber, a coil in the chamber surrounding said heating unit and in spaced relation thereto, the casing having a cover in connection with which the cylinder is mounted, intake and discharge pipes for the coil being mounted in said cover, an electric heating element supported in connection with the cover and extend-

ing into said heating unit, an elongated tube mounted in the heating unit and surrounding the greater portion of said heating element and arranged in close proximity thereto, the lower end of the tube having circulating passages whereby a fluid arranged in the heating unit may circulate upwardly through said tube and downwardly in said heating unit and means coupled with the intake pipe of said coil for pressure feeding the paint through said coil.

3. A paint pre-heater comprising a main insulated wall casing, a frusto-conical heating unit arranged within the chamber of the casing and spaced from the inner walls thereof to form around said unit an annular chamber in which a fluid is adapted to be arranged, means gaging the level of fluid in said chamber, a coil in the chamber surrounding said heating unit and in spaced relation thereto, the casing having a cover in connection with which the cylinder is mounted, intake and discharge pipes for the coil being mounted in said cover, an electric heating element supported in connection with the cover and extending into said heating unit, an elongated tube mounted in the heating unit and surrounding the greater portion of said heating element and arranged in close proximity thereto, the lower end of the tube having circulating passages whereby a fluid arranged in the heating unit may circulate upwardly through said tube and downwardly in said heating unit, means coupled with the intake pipe of said coil for pressure feeding the paint through said coil, means for gaging a level of fluid in said heating unit, a thermostatic switch mounted in said cover and exposed to said annular chamber, and said switch being in circuit with and controlling operation of said heating element.

4. A paint pre-heater comprising a main insulated wall casing, a frusto-conical heating unit arranged within the chamber of the casing and spaced from the inner walls thereof to form around said unit an annular chamber in which a fluid is adapted to be arranged, means gaging the level of fluid in said chamber, a coil in the chamber surrounding said heating unit and in spaced relation thereto, the casing having a cover in connection with which the cylinder is mounted, intake and discharge pipes for the coil being mounted in said cover, an electric heating element supported in connection with the cover and extending into said heating unit, an elongated tube mounted in the heating unit and surrounding the greater portion of said heating element and arranged in close proximity thereto, the lower end of the tube having circulating passages whereby a fluid arranged in the heating unit may circulate upwardly through said tube and downwardly in said heating unit, means coupled with the intake pipe of said coil for pressure feeding the paint through said coil, means for gaging a level of fluid in said heating unit, a thermostatic switch mounted in said cover and exposed to said annular chamber, said switch being in circuit with and controlling operation of said heating element, and another similar thermostatic switch mounted in the casing and exposed to the lower portion of said annular chamber.

5. A paint pre-heater comprising a main insulated wall casing, a frusto-conical heating unit arranged within the chamber of the casing and spaced from the inner walls thereof to form around said unit an annular chamber in which a fluid is adapted to be arranged, means gaging the level of fluid in said chamber, a coil in the

chamber surrounding said heating unit and in spaced relation thereto, the casing having a cover in connection with which the cylinder is mounted, intake and discharge pipes for the coil being mounted in said cover, an electric heating element supported in connection with the cover and extending into said heating unit, an elongated tube mounted in the heating unit and surrounding the greater portion of said heating element and arranged in close proximity thereto, the lower end of the tube having circulating passages whereby a fluid arranged in the heating unit may circulate upwardly through said tube and downwardly in said heating unit, means coupled with the intake pipe of said coil for pressure feeding the paint through said coil, means for gaging a level of fluid in said heating unit, a thermostatic switch mounted in said cover and exposed to said annular chamber, said switch being in circuit with and controlling operation of said heating element, another similar thermostatic switch mounted in the casing and exposed to the lower portion of said annular chamber, and a thermometer exposed to the annular chamber of the heating unit adjacent the discharge end of said coil.

6. A paint pre-heater comprising a main insulated wall casing, a frusto-conical heating unit arranged within the chamber of the casing and spaced from the inner walls thereof to form around said unit an annular chamber in which a fluid is adapted to be arranged, means gaging the level of fluid in said chamber, a coil in the chamber surrounding said heating unit and in spaced relation thereto, the casing having a cover in connection with which the cylinder is mounted, intake and discharge pipes for the coil being mounted in said cover, an electric heating element supported in connection with the cover and extending into said heating unit, an elongated tube mounted in the heating unit and surrounding the greater portion of said heating element and arranged in close proximity thereto, the lower end of the tube having circulating passages whereby a fluid arranged in the heating unit may circulate upwardly through said tube and downwardly in said heating unit, means coupled with the intake pipe of said coil for pressure feeding the paint through said coil, means for gaging a level of fluid in said heating unit, a thermostatic switch mounted in said cover and exposed to said annular chamber, said switch being in circuit with and controlling operation of said heating element, another similar thermostatic switch mounted in the casing and exposed to the lower portion of said annular chamber, a thermometer exposed to the annular chamber of the heating unit adjacent the discharge end of said coil, and means for draining said heating unit.

7. A paint pre-heater comprising a main insulated wall casing, a frusto-conical heating unit arranged within the chamber of the casing and spaced from the inner walls thereof to form around said unit an annular chamber in which a fluid is adapted to be arranged, means gaging the level of fluid in said chamber, a coil in the chamber surrounding said heating unit and in spaced relation thereto, the casing having a cover in connection with which the cylinder is mounted, intake and discharge pipes for the coil being mounted in said cover, an electric heating element supported in connection with the cover and extending into said heating unit, an elongated tube mounted in the heating unit and surrounding the greater portion of said heating element

and arranged in close proximity thereto, the lower end of the tube having circulating passages whereby a fluid arranged in the heating unit may circulate upwardly through said tube and downwardly in said heating unit, means coupled with the intake pipe of said coil for pressure feeding the paint through said coil, means for gaging a level of fluid in said heating unit, a thermostatic switch mounted in said cover and exposed to said annular chamber, said switch being in circuit with and controlling operation of said heating element, another similar thermostatic switch mounted in the casing and exposed to the lower portion of said annular chamber, a thermometer exposed to the annular chamber of the heating unit adjacent the discharge end of said coil, means for draining said heating unit, and means for draining the chamber of said casing.

8. In apparatus for reducing heavy substances to fluid state, a casing, a circulating coil in the chamber of said casing, means for pressure feeding a heavy substance into and through the coil, a heating unit within the chamber of said casing and inwardly of said coil, the chamber of said casing being adapted to contain a heat transfer means disposed around said coil, said heating unit comprising a cylinder sealed within the chamber of said casing, a fluid heat transfer medium adapted to be arranged in the cylinder, an electric heating element arranged in said cylinder for heating the fluid therein, and automatically actuated means exposed to the chamber of said casing for controlling operation of said heating element.

9. In apparatus for reducing heavy substances to fluid state, a casing, a circulating coil in the chamber of said casing, means for pressure feeding a heavy substance into and through the coil, a heating unit within the chamber of said casing and inwardly of said coil, the chamber of said casing being adapted to contain a heat transfer means disposed around said coil, said heating unit comprising a cylinder sealed within the chamber of said casing, a fluid heat transfer medium adapted to be arranged in the cylinder, an electric heating element arranged in said cylinder for heating the fluid therein, automatically actuated means exposed to the chamber of said casing for controlling operation of said heating element, and means within said cylinder and arranged in close proximity to said electric heating element for providing substantially instantaneous heating of the fluid in the cylinder.

10. In apparatus for reducing heavy substances to fluid state, a casing, a circulating coil in the chamber of said casing, means for pressure feeding a heavy substance into and through the coil, a heating unit within the chamber of said casing and inwardly of said coil, the chamber of said casing being adapted to contain a heat transfer means disposed around said coil, said heating unit comprising a cylinder sealed within the chamber of said casing, a fluid heat transfer medium adapted to be arranged in the cylinder, an electric heating element arranged in said cylinder for heating the fluid therein, automatically actuated means exposed to the chamber of said casing for controlling operation of said heating element, means within said cylinder and arranged in close proximity to said electric heating element for providing substantially instantaneous heating of the fluid in the cylinder, and said last named means encouraging circulation of the fluid heating medium upwardly and downwardly in said cylinder.

11. In apparatus for reducing heavy substances to fluid state, a casing, a circulating coil in the chamber of said casing, means for pressure feeding a heavy substance into and through the coil, a heating unit within the chamber of said casing and inwardly of said coil, the chamber of said casing being adapted to contain a heat transfer means disposed around said coil, said heating unit comprising a cylinder sealed within the chamber of said casing, a fluid heat transfer medium adapted to be arranged in the cylinder, an electric heating element arranged in said cylinder for heating the fluid therein, automatically actuated means exposed to the chamber of said casing for controlling operation of said heating element, means within said cylinder and arranged in close proximity to said electric heating element for providing substantially instantaneous heating of the fluid in the cylinder, said last named means encouraging circulation of the fluid heating medium upwardly and downwardly in said cylinder, and means for gaging the level of fluid in said cylinder.

12. In apparatus of the character described, an insulated wall casing open at the top, a cover closing the open end of the casing and detachable with respect thereto, a tapered wall cylinder mounted in connection with the cover and arranged in the chamber of said casing and spaced with respect to the walls thereof to form a heat transfer chamber in said casing, a coil arranged in said chamber in spaced relation to said cylinder, said coil having intake and discharge means for circulating a medium therethrough, an electric heating element mounted in the cover and extending into said cylinder for a greater portion of the length thereof, an elongated tube in the cylinder and arranged in close proximity to said heating element, said cylinder being adapted to contain a fluid heat transfer medium, and means whereby circulation of the fluid medium of said cylinder will take place upwardly through the tube of said cylinder and downwardly in the cylinder.

13. In apparatus of the character described, an insulated wall casing open at the top, a cover closing the open end of the casing and detachable with respect thereto, a tapered wall cylinder mounted in connection with the cover and arranged in the chamber of said casing and spaced with respect to the walls thereof to form a heat transfer chamber in said casing, a coil arranged in said chamber in spaced relation to said cylinder, said coil having intake and discharge means for circulating a medium therethrough, an electric heating element mounted in the cover and extending into said cylinder for a greater portion of the length thereof, an elongated tube in the cylinder and arranged in close proximity to said heating element, said cylinder being adapted to contain a fluid heat transfer medium, means whereby circulation of the fluid medium of said cylinder will take place upwardly through the tube of said cylinder and downwardly in the cylinder, and switch means exposed to the chamber of said casing and in circuit with said heating element to automatically control operation of said element in regulating temperatures in said casing.

14. In heat transfer apparatus of the character described, a heating unit for the apparatus, said unit comprising a closed end cylinder having means for admitting a fluid heat transfer medium to the cylinder, an elongated electric heating element supported at one end of the cylinder and extending into the cylinder for a major portion of the length thereof, a tube in said cylinder in

close proximity to said heating element and extending throughout the major portion of the length of said element, one end of the tube opening into said cylinder and the other end of the tube having a circulating passage at the lower extremity thereof whereby in the operation of said heating element the fluid within the cylinder will be circulated through said tube in one direction and through the cylinder in the opposed direction.

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