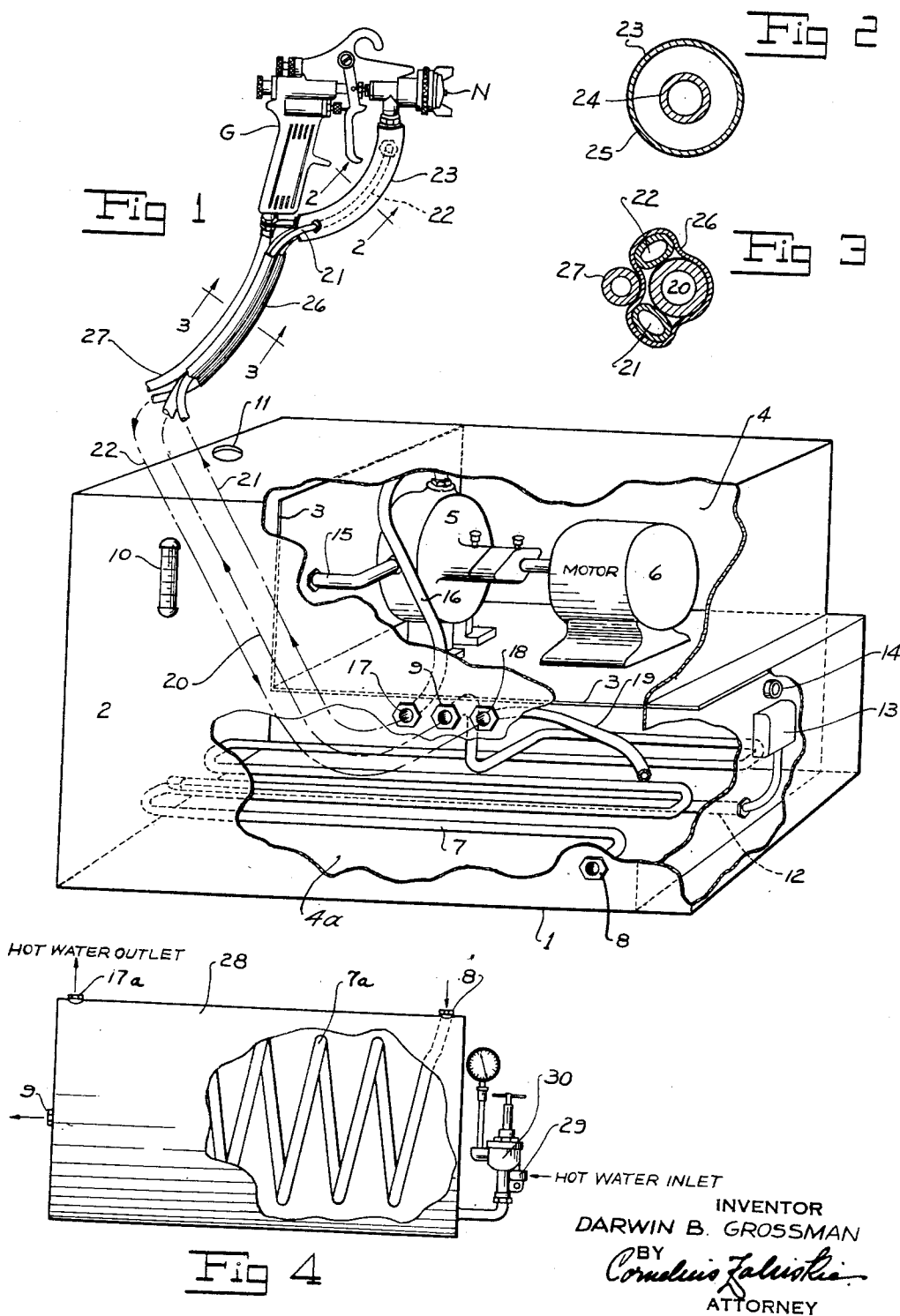


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 APPARATUS FOR SPRAYING HOT DOPE, LACQUERS
 AND OTHER THERMALLY THINNED MATERIAL
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APPARATUS FOR SPRAYING HOT DOPE,
LACQUERS, AND OTHER THERMALLY
THINNED MATERIAL

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1 Claim. (Cl. 91—45)

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This invention relates to apparatus for spraying lacquers, and more particularly dopes of the kind which can be more efficiently applied while in heated condition.

According to prior practice in the spraying of hot materials two systems have been generally used. According to the first system the heated dope, lacquer or the like is circulated by means of a pump from an interchanger to the point of spraying and returned to the interchanger which has a storage or supply tank in advance of the pumps or in the system. The other system, known as the dead-end system, heats the material by the same method and then forces it through the system to the point of spraying by pressure.

Most materials sprayed hot are very adhesive due to pigments and much difficulty is experienced in maintaining gaskets, pumps, etc. due to friction of the material as well as by the incident heat and solvents.

When the operator is spraying, a small amount of fluid is re-circulated and the pressure of the gun can be adjusted to normal, but when the operator "triggers" his gun at the end of the stroke or while re-arranging new work, the pressure builds up so that when spraying is again started this built-up pressure results in a heavy surge of material causing runs and sags due to an excessive amount of the material which is then applied. Furthermore, lacquer and hot dopes are highly viscous and it is necessary to have large delivery and return hoses to the gun which makes the gun heavy and cumbersome for the operator to handle. In the dead-end system any momentary stoppage of spraying discontinues the flow of the heated material and the material cools in the hose and its viscosity increases. This necessitates either draining the hose until the hot material reaches the gun or spraying with a very viscous material which will not atomize sufficiently to give the desired results.

A good spray finish job not only requires considerable skill on the part of the operator, but it also requires that there be a constant viscosity of the spray material and a constant pressure of fluid and air. Any change in any one of these will result in uneven rough finish or sags.

The object of the present invention is to overcome the disadvantages to which I have referred and others and to provide for the uniform or constant temperature, pressure and viscosity of the material at the gun at all times that my system is in operation, these factors being so con-

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trolled as to maintain thoroughly satisfactory spray conditions at all times at the nozzle and this without rendering the delivery hose or tube so heavy or unwieldy that it is cumbersome or inconvenient for the operator to use.

In the preferred form of the present invention, dope is fed from any suitable source of supply (e. g., a pressure pot) through a coil immersed in hot water or other liquid, contained in a suitable housing between the pressure pot and the gun. The water in the housing is heated by steam or electricity to a temperature necessary to maintain the dope at a proper spraying consistency. The dope is fed from the outlet of the coil through a tube leading to a heat exchanger on the gun and directly adjacent the nozzle of the latter, while the hot water within the housing is fed to the heat exchanger through feed and return tubes and is circulated by means of an appropriate pump or impeller. The dope feed tube, as well as the water feed and return tubes, are enclosed for their full length for the entire distance between the housing and the heat exchanger. This envelope binds all three tubes in contact with one another and is of such material as to minimize radiation of heat there-through. This close proximity or contact between the hot water tubes and the dope feed tube serves to keep the dope hot during its passage from the housing to the heat exchanger and the heat exchanger not only keeps the nozzle of the gun up to temperature, but assures that the dope passing from said exchanger to the nozzle is at the proper temperature.

With this arrangement the dope is kept in sprayable condition by the use of a single dope feed tube. When the gun is to be laid aside for a period of idleness, this tube can be readily drained back to its source of supply by venting said source and raising the gun and tubes so that the dope can readily flow back before it has the opportunity of chilling in the tube.

Features of the invention, other than those adverted to, will be apparent from the hereinafter detailed description and claim, when read in conjunction with the accompanying drawings.

The accompanying drawings illustrate different practical embodiments of the invention, but the constructions therein shown, are to be understood as illustrative, only, and not as defining the limits of the invention.

Figure 1 shows in more or less schematic form a spray system embodying the present invention.

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Figure 2 is a section on the line 2—2 of Figure 1.

Figure 3 is a section on the line 3—3 of Figure 1.

Figure 4 shows a modified form of invention.

Referring to the drawings and more particularly to Figures 1-3, 1 designates a primary heating unit shown in the form of a housing 2 which, in practice, may be made so small and compact that it is readily portable and does not take much more room than a suitcase. This housing is partitioned off by walls 3 to divide the interior thereof into two main compartments 4 and 4a. In the compartment 4 is positioned a centrifugal pump 5 and an electric or air motor 6 by which the pump may be driven. The motor is of the explosion proof type and the compartment 4 may be completely closed.

Within the compartment 4a of the housing are positioned dope heating coils 7, adapted to be supplied from a pressure pot containing dope through an inlet 8. One terminal of the coils 7 is connected to the inlet 8, while the other end is connected to a hot dope outlet 9. The compartment 4a is adapted to be supplied, through a filling opening 11, with water to a point near its top and the level of this water may be determined by an appropriate gauge 10.

This water is adapted to be heated by any suitable means such as one or more electrical heating units 12, controlled by a relay 13 and a mercoide switch 14. When the heating unit 12 is energized, it heats the water in the compartment 4a to the desired temperature and maintains the water at this temperature. Hot water is drawn from the upper portion of the housing to the pump 5 through a tube 15 and fed from said pump through a line 16 to a water outlet 17. Returning water is received at the inlet 18 and fed through the tube 19 back into the housing. The hot water in the housing serves to heat the coils 7, so that dope fed under pressure through these coils from the inlet 8 to the outlet 9 is heated to the desired temperature.

The dope outlet 9 and the water feed 17 and water return 18 are connected by tubes 20, 21 and 22, respectively, to a water jacketed heat exchanger 23 carried by the gun G. This heat exchanger may be of various forms, but for the purpose of illustration, it is shown as comprising inner and outer concentric tubes 24 and 25 preferably of metal. The dope feed tube 20 is connected to the inner or straight through tube 24 which leads to the gun directly adjacent the nozzle N and to which it is connected by a metal fitting. The water feed tube 21 and the water return tube 22 are connected to the jacket between the inner tube 24 and the outer tube 25 of the heat exchanger and adjacent the opposite ends thereof, so that hot water pumped from the housing through the pump 5 is passed to the heat exchanger, circulates therethrough and is returned through the pipe 22 to the housing.

All of the tubes 20, 21 and 22 are sheathed from the wall of the housing 2 to the heat exchanger 23 by enclosing them collectively within an envelope 26, of vulcanized rubber or other material well adapted to bind them closely together and act as an insulation against undue radiation of heat. Inasmuch as the hot dope leaving the reservoir is carried in the tube directly adjacent the hot water tubes and enclosed with these latter tubes within a heat insulating casing, the dope will be kept hot throughout its entire travel from the housing to the heat ex-

changer. As it passes through the heat exchanger 23, it will be further heated, i. e., its temperature will be boosted, because of the conductivity of the intervening metal wall of the tube 24, so that its temperature when it enters the gun will be substantially that which it attained during passage through the coils 7. Furthermore, as the heat exchanger is positioned very close to the nozzle and is connected thereto by a metal fitting, the heat from said exchanger will be transmitted to the nozzle by conductivity of the metallic parts of the metal fitting and the gun, so as to keep the nozzle itself at the necessary temperature for the most efficient operation. As a result the gun will operate with maximum efficiency at all times and there will be no undue cooling of the dope from the point of its initial heating to the point of its discharge from the nozzle.

Compressed air for operating the gun may be supplied through the usual air tube 27 which is preferably outside of the envelope 26, although it may be included in the envelope if so desired.

In Figure 1, I have shown what may well be employed as a portable system if so desired. In some cases, however, where hot water or steam is available as a by product of other plant operations, the provision of an independent water heating unit is unnecessary and in such instances a housing, such as shown in Figure 4 may be employed. Here the housing is in the form of an ordinary hot water tank to which hot water from a suitable supply may be fed from an inlet 29 to fill the tank. The feed of water to the tank is controlled by an appropriate regulator 30 which maintains this water at the desired temperature. The hot water outlet is designated 17a and to it is connected the tube 21 which leads to the gun.

Within the tank is positioned a coil 7a corresponding to the coil 7. It has an inlet 8 and an outlet 9, to which latter the tube 20 to feed the dope to the gun is connected. The hot water return from the gun through the tube 22 leads back to the hot water supply and between the tank and the gun all three tubes are preferably housed within an envelope 26, as hereinbefore described. However, in the structure of Figure 4, where plenty of hot water is available, the hot water return 22 may lead back to the supply outside of the envelope if desired, although in the structure of Figure 1, it is preferable that the return be also enclosed in the envelope, so as to economize in current consumption for supplying the heating element 12.

When a system embodying the present invention is in use, the dope will be maintained at a good working temperature throughout all periods of use. If it is desired to discontinue the operation of the gun, pressure in the dope supply pressure pot may be vented and, if the gun and tubes are then raised above the level of the pressure pot, the dope will drain back through the tube 20 from the gun to the pot. The water circulation may be then discontinued and the system will be left ready for future operation.

In the invention, as thus far described, the use of a single feed line for the dope has been disclosed and this is the preferred form of the invention. However, I am aware that there are very definite advantages in providing a heat exchanger in the dope line directly adjacent the nozzle of the gun and while this is particularly desirable in a one way feed of dope, it also has advantages in a circulatory feed, i. e., in a system wherein

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dope is circulated to the gun and back to a reservoir, as illustrated, e. g., in Patent No. 2,378,184, issued June 12, 1945, but which patent is lacking in the heat exchanger of this invention. I therefore wish it understood that, as an alternative form of this invention, I may use the heat exchanger in connection with a dope circulatory system of the character referred to.

The foregoing detailed description sets forth the invention in its preferred practical forms and the invention is to be understood as fully commensurate with the appended claim.

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

A heater for hot dope spraying systems, comprising: a housing having therein different compartments one of which is a wet compartment adapted to contain water having an inlet and an outlet through the exterior wall of the housing for a circulatory system and another of which is a dry compartment in which is positioned a pump and a motor for driving the pump, ducts

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connecting the inlet and outlet of the pump to the interior of the wet compartment, a dope heating coil in the wet compartment having a dope inlet and a dope outlet through the exterior wall of the housing, an electric heating element in the wet compartment for heating the water therein to the desired temperature, and means for automatically controlling said heating element to keep the water at the desired temperature.

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