May 21, 1957 A. J. KAISER 2,793,279

HEATERS FOR PAINT SPRAY GUNS

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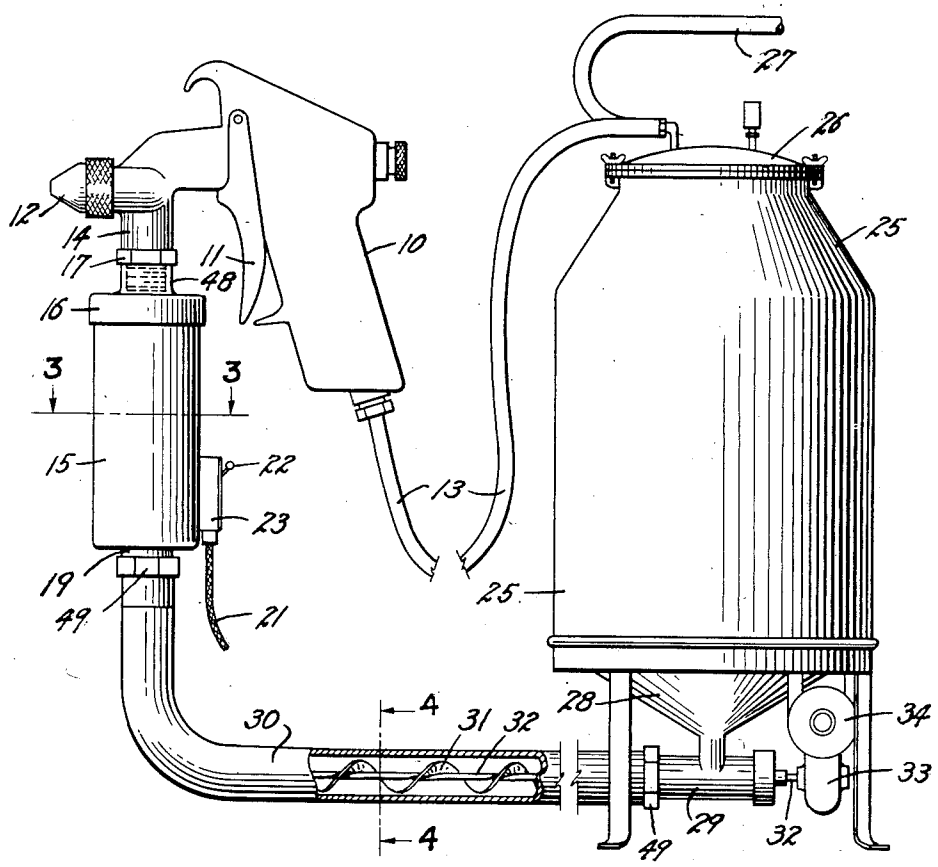

FIG 1

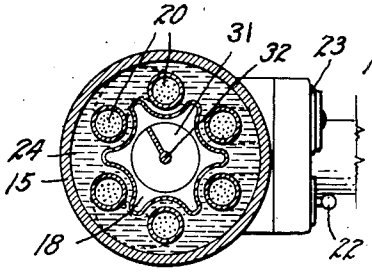

FIG 3

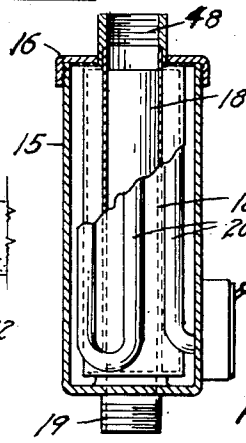

FIG 2

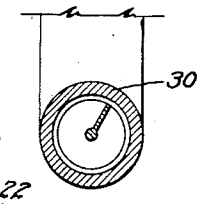

FIG 4

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HEATERS FOR PAINT SPRAY GUNS

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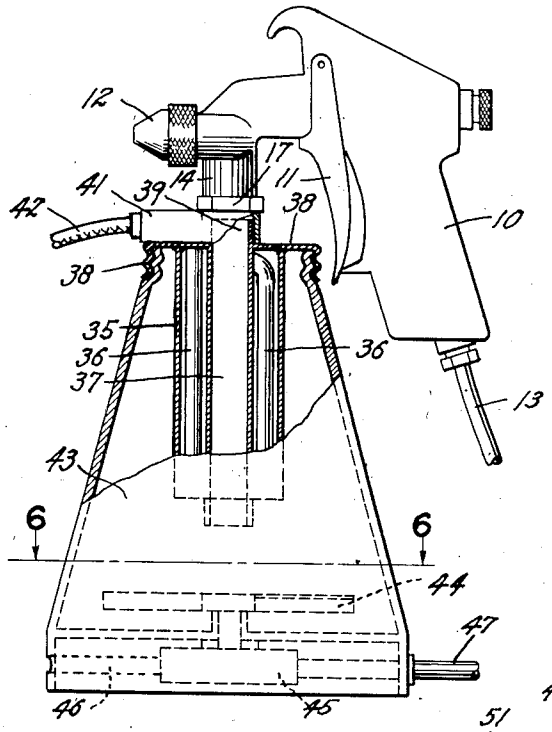

FIG 5

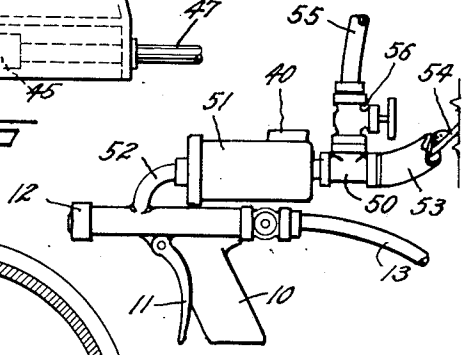

FIG 7

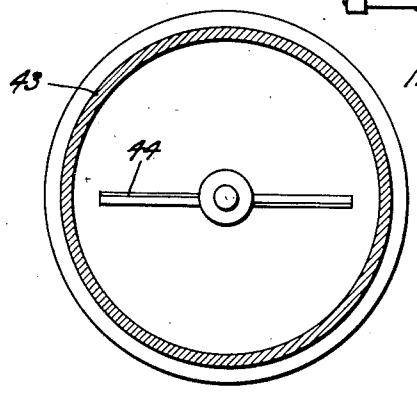

FIG 6

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HEATERS FOR PAINT SPRAY GUNS

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2 Claims. (Cl. 219—39)

This invention relates to air-operated spray guns for applying surface coating materials and more particularly to means for supplying heated surface coatings to the spray gun. Surface coating material must have a relatively light viscosity for proper spray application. This viscosity can be obtained by the use of thinners or solvents, with a resulting thinning of the applied coating. The preferred method, however, is to heat the coating material prior to spraying to reduce the viscosity to the proper spraying consistency.

The principal object of the invention is to provide a highly efficient, portable, electric heater which can be applied to any conventional spray gun and which will act to rapidly heat the surface coating material to reduce it to the proper application consistency immediately before it enters the spray gun and to provide a heater which will avoid injuring the materials or the colors thereof by overheating or burning.

Certain of the modern resin surface coatings are too viscous for spray gun application and have a tendency to settle or set with a resulting clogging of the conveying conduits, etc.

Another object of the invention is to provide efficient means for supplying these heavy surface coating materials to a conventional spray gun at a proper spraying consistency and which will maintain a constant, uniform supply to the gun without clogging the gun or the supply conduits.

A further object of the invention is to provide means for supplying a spray gun which can be used for conveying dry or powdered materials to a conventional spray gun and which will act to supply a solvent to the materials and agitate the materials and the solvent under the influence of heat to the proper spraying consistency immediately before its entrance into the gun so as to prevent setting or settling in the gun and its supply conduits.

A still further object is to provide highly efficient mixing and heating means for a conventional spray gun which can be attached to and supported on the gun in place of the usual paint canister used therewith.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy, and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention, reference is had to the accompanying drawing which forms a part hereof. Like numerals refer to like parts in all views of the drawing and throughout the description.

In the drawing:

Fig. 1 illustrates one arrangement of the improved apparatus for supplying heated surface coating materials to a conventional paint gun;

Fig. 2 is an enlarged, vertical, longitudinal section through a heating device employed in the arrangement of Fig. 1, with the interior structure partially broken away for illustrative purposes;

Fig. 3 is a still further enlarged, cross-section through the heating device, taken on the line 3—3, Fig. 1;

Fig. 4 is a similar, cross-section, taken on the line 4—4, Fig. 1;

Fig. 5 is a side view, partially broken away, of an alternate arrangement of the invention;

Fig. 6 is a horizontal section looking downwardly on the line 6—6, Fig. 5; and

Fig. 7 is a reduced scale side view of a third arrangement of the improved material supply apparatus for spray guns.

In all arrangements on the drawing, a conventional spray gun of any of the standard types is indicated by the numeral 10, with its actuating trigger at 11, its spray head at 12, and its air supply hose at 13. The gun, per se, forms no part of the present invention which relates to means for supplying the material to be sprayed to the gun. The supplying means can be connected with and attached to the gun in any desired manner. Usually, such guns are provided with a downwardly extending, tubular, threaded sleeve 14 to which either a paint supply hose or a paint-containing canister may be attached.

The arrangement of the invention shown in Fig. 1 employs a hollow cylindrical heater adapted to be connected to the sleeve 14 of the gun in any desired manner for heating the paint or other surface coating material being supplied to the gun 10. The heater comprises a cylindrical barrel 15 closed at its top by means of a threaded cap 16 and provided with a threaded coupling nipple 19 at its bottom. A vertical paint chamber 18 extends vertically from the nipple 19 throughout the length of the barrel 15 and terminates at its upper extremity above the cap 16 in a threaded coupling 48 for receiving a nipple 17 for attachment to the sleeve 14 of the gun 10. The paint chamber 18 is preferably formed from relatively thin metal of high heat conductivity, such as aluminum or copper, and is preferably corrugated vertically within the barrel 15 so as to increase the area of the heat transfer surface thereof.

An electrical heating element 20 of the immersion type, such as a "cal-rod" or the like, is convoluted about the paint chamber 18 to provide a plurality of vertical heating portions about the chamber 18 between the latter and the barrel wall. Electrical current is supplied to the heating element 20 in any desired manner, such as by means of a flexible cord 21, through a control switch 22 and a temperature control thermostat of any suitable type contained within a thermostat housing 23 which is secured on the side of the barrel 15.

The entire barrel 15, exteriorly of the chamber 18 and the heating element 20 is filled with a non-volatile heat-transfer fluid 24. This fluid should be of a type having an exceedingly high boiling point and an exceedingly low freezing point so that it may remain permanently sealed in the barrel 15. Such a fluid might be one of the ethylene glycol compounds or a recently discovered fluid known as "liquid heat" a tetracresylsilicate having a boiling temperature of approximately 817° F. and a freezing point below —75°.

It can be seen that the heating element 20 will rapidly heat the transfer fluid 24 to any desired temperature, depending upon the setting of the thermostat in the thermostat housing 23, and that if a surface coating liquid be passed upwardly through the paint chamber 18, it will become heated by contact with the heated walls of the chamber and will flow to the paint spray gun at the proper predetermined temperature for efficient hot spraying.

For all ordinary uses where it is desired to reduce viscosity by heat, the above described construction will be sufficient. However, for uses where it is desired to supply a heavy viscous material to the heater, a construction as shown in Fig. 1 may be employed comprising a central tank 25, closed by means of a suitable airtight lid 26,

is provided. Air under pressure is supplied to the tank through an air supply conduit 27 controlled by the usual control and pressure regulating valves, as is common in paint spray tanks.

This improved tank, however, is provided with a hopper bottom 28 which discharges into a screw conveyor cylinder 29. A flexible conduit or hose 30 is connected by means of terminal couplings 49 between the conveyor cylinder 29 and the lower nipple 19 of the heater. A flexible screw conveyor 31, formed, from rubber, neoprene, or one of the flexible resins about a flexible axis shaft 32, extends throughout the length of the hose 30 and extends upwardly through the paint chamber 18 in the heater. The axis shaft 32 of the conveyor 31 extends through the screw conveyor cylinder 29 to any desired speed reduction gear mechanism 33 driven from a suitable motor 34.

It can be seen that as the screw conveyor 31 rotates, it will tend to force the material discharging from the tank 25 through the hose 30 and upwardly through the paint chamber 18 to prevent stoppage or clogging until the material can be heated to the proper viscosity-reducing temperature for spraying.

In Fig. 5, a second arrangement of the invention is illustrated for use where it is desired to apply the fluid reservoir directly to the spray gun. This arrangement employs a heater similar to that previously described with reference to Fig. 1 comprising a heating barrel 35 filled with heat transfer fluid and containing a coiled electrical heating element 36 and provided with a central paint chamber 37, similar to the chamber 18 previously described. In this form, however, the barrel 35 is suspended from a container lid 38 from which a threaded nipple 39 projects upwardly for attachment to the attachment nipple 17 of the spray gun. The lid 38 carries an electrical control thermostat within a thermostat housing 41 through which electrical current is supplied from a cord 42 to the heating element 36.

Any suitable spray gun paint canister may be threaded into the lid 38 and filled with the fluid to be supplied to the gun 10. The paint or other surface coating material therein will be heated by heat exchange from the barrel 35 and will be drawn upwardly through the heated central paint chamber 37 of the heater where it will become still further heated before flowing to the spray gun for application.

For use with viscous materials or relatively heavy materials having a tendency to settle, a canister such as illustrated at 43, in Fig. 5, may be used. This canister is provided with an agitator 44 positioned adjacent its bottom and driven in any suitable manner, such as by means of a conventional, compressed air motor 45 contained within a canister base 46 and supplied with compressed air through a suitable supply hose 47. It can be seen that the air pressure usually available for paint spraying will act to actuate the motor 45 and constantly rotate the agitator 44 to keep the paint or other fluid within the canister 43 in proper fluid condition.

For the application of certain of the more recent fast-setting resin surface-coating compounds which are difficult to apply with a spray gun, an arrangement such as illustrated in Fig. 7 may be used. This arrangement positions a heater, exactly similar to the heater of Fig. 1 upon a conventional spray gun and connects the heater to the gun by means of a downwardly extending supply elbow 52 which is used for supplying the heated material to the gun. A heater 51 is controlled by a suitable thermostat 40 and is supplied with surface coating material through a T-fitting 50 from a flexible supply hose 53 which may contain a flexible screw conveyor 54 similar to the hose 30 and the conveyor 31 previously described. The hose 53 leads to an elevated material reservoir (not shown) so that material will flow to the heater 51 and the gun under the influence of gravity assisted by the conveyor 54. This construction is more particularly intended for feeding dry or paste plastic materials where pressure feeding is not practical, and is also intended for use with materials where a thinner or solvent must be applied to the dry or paste materials immediately prior to application so as to prevent setting of the material in the spray apparatus. Such a solvent or thinner can be supplied by gravity through a solvent conduit 55 to the side outlet of the T-fitting 52 through any suitable flow control valve 56.

It is desired to call attention to the fact that by substituting a hollow tube in the barrel 15 of Fig. 2 in place of the tubular heating element 20, the device may be used for chilling surface-coating-fluids before entry into the gun. This is rarely required, but becomes very important when spraying exceedingly low viscosity surface coatings, such as zinc chromate compounds and the like. To spray the latter compounds usually requires a reduction in the air trigger to prevent overapplication and running of the compound. By employing a cooling tube in place of the heater and connecting this tube with any suitable refrigerant source, the fluid can be chilled as it passes through the barrel 15 to a proper viscosity for application with a standard air pressure, thus avoiding all air pressure manipulation.

While a specific form of the improvement has been described and illustrated herein, it is desired to be understood that the same may be varied, within the scope of the appended claims, without departing from the spirit of the invention.

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

1. A heating device for surface-coating spray guns comprising: a cylindrical barrel; a vertical surface-coating-fluid chamber extending throughout the length of said barrel; means for connecting the upper extremity of said chamber to a spray gun; means for supplying surface-coating-fluid to the lower extremity of said chamber; an electrical heating element positioned in said barrel exteriorly of said chamber; and a tetracresylsilicate having a boiling temperature in excess of 500° F. positioned in the space in said barrel about said chamber.

2. A heating device for surface-coating spray guns comprising: a cylindrical barrel; a vertical surface-coating-fluid chamber extending throughout the length of said barrel; means for connecting the upper extremity of said chamber to a spray gun; means for supplying surface-coating-fluid to the lower extremity of said chamber; an electrical heating element positioned in said barrel exteriorly of said chamber; and a fluid having a boiling temperature in excess of that of water positioned in the space in said barrel about said chamber.

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