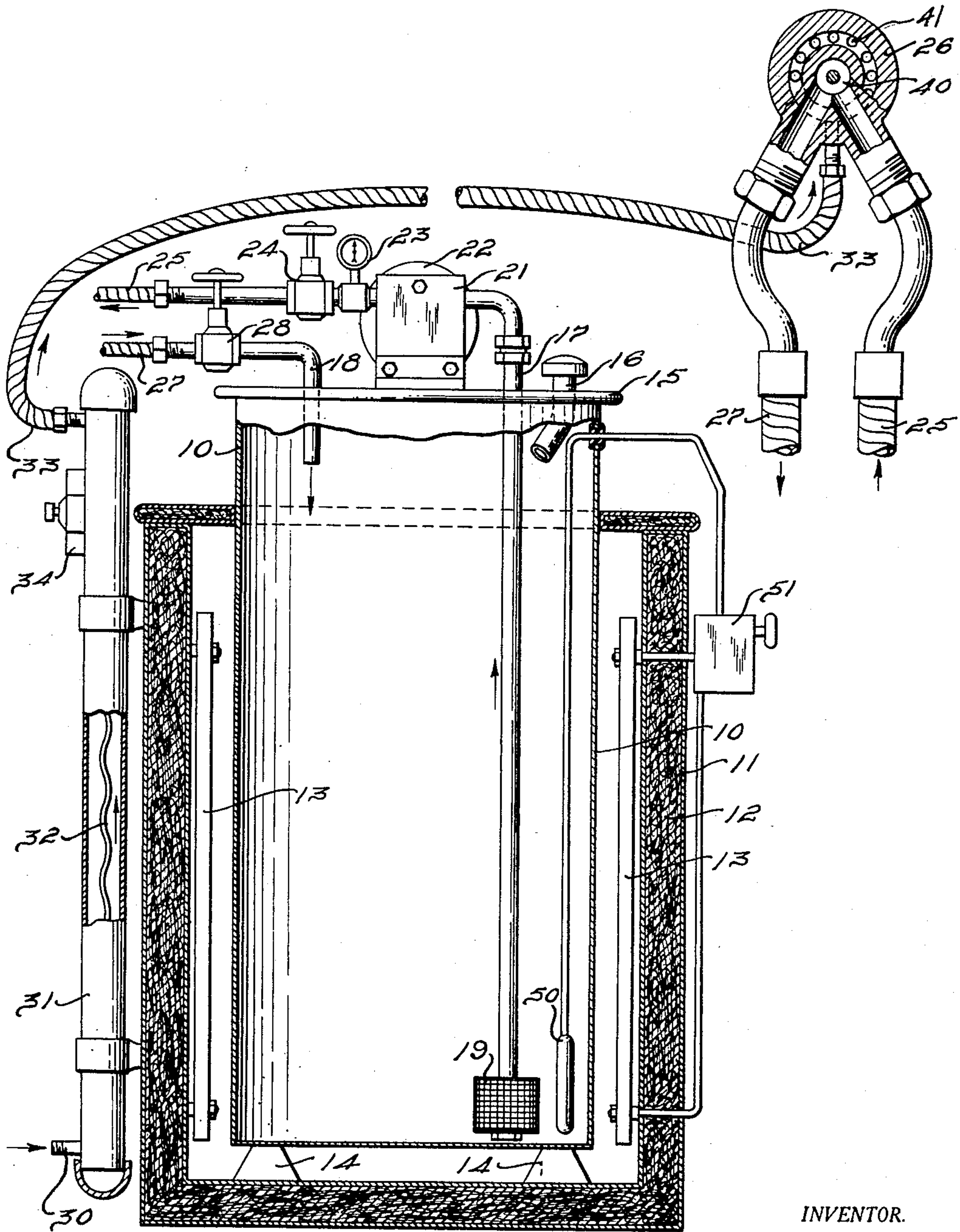


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APPARATUS FOR DISTRIBUTING AND SPRAYING LIQUID
OR PLASTIC COATING COMPOSITIONS
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APPARATUS FOR DISTRIBUTING AND
SPRAYING LIQUID OR PLASTIC COATING
COMPOSITIONS

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5 Claims. (Cl. 91—45)

The present invention relates to an apparatus for distributing and spraying liquid or plastic coating compositions of the type of synthetic enamels or the like, where it is desirable to spray the composition on the surface to be coated while the composition is maintained at a substantially constant temperature.

It has been found that for satisfactory application of coating compositions of the type of synthetic enamels or other resinous bodies, such compositions must be applied, while in a fluid condition, to the surface to be coated, and preferably at a temperature somewhat above room temperature. It is desirable also to avoid variations in the temperature of the composition as it leaves the nozzle of the spray gun, as otherwise undesirable variations will occur in the finish on the surface. These undesirable variations in the finish can be avoided by maintaining the composition at a substantially constant heat as it is sprayed from the nozzle of the spray gun.

In addition to maintaining this substantially constant heat, it is desirable that an apparatus for handling such compositions should prevent the settling of the suspended solids such as pigments, fillers or the like which are incorporated in the coating composition. Such solids may settle out either in the supply tank or in the material hoses connected with the supply tank or in the hose connecting the spray gun with the supply line.

The apparatus of the present invention assures the maintenance of a substantially uniform suspension of the suspended solids in the coating composition until discharged through to the spray gun.

It is, therefore, an object of the present invention to provide an apparatus for handling and distributing liquid or plastic coating compositions in which a substantially constant heat is maintained on such composition until it is discharged from the spray gun.

It is a further object of the present invention to provide an apparatus for handling and distributing liquid or plastic coating compositions in which the suspended solids in such compositions are maintained in suspension during the handling and distributing thereof.

A further object of the present invention is to provide an apparatus for handling and distributing liquid or plastic coating compositions which is such as to produce surface finishes superior to the finishes produced by the methods and apparatus heretofore employed for similar purposes.

Other objects of this invention will appear in the following description and appended claims,

reference being had to the accompanying drawing forming a part of this specification.

The single figure is an elevation, partially in section, showing an apparatus embodying the invention and showing, by broken views, the attachment between the spraying gun and the supply tank and a section through a spray gun connected therewith.

Before explaining in detail the present invention it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawing, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation, and it is not intended to limit the invention claimed herein beyond the requirements of the prior art.

Referring more in detail to the drawing, I provide a container 10 which acts as the supply reservoir for the liquid or plastic coating composition which is to be employed in finishing the surface to be coated. The container 10 is placed inside a thermally insulated receptacle 11 having spaced inner and outer walls and heat insulating material 12 disposed therebetween. Heating means such as electrically actuated heating elements 13 are placed inside the receptacle 11 and are positioned adjacent the container 10. The container 10 is supported in spaced relation to the bottom of the receptacle 11 by means of supports 14 secured therein. This permits the flow of heated air around all parts of the container in the receptacle.

A removable cover 15 is placed on the top of the container 10 and there is secured to the cover for removal therewith a vent plug 16, a feed line 17 and a return line 18. The feed line 17 extends through the cover 15 to a point adjacent the bottom of the container 10 and is provided with a screened inlet 19 which screens the materials as they go into the feed line. The feed line 17 connects with a constant pressure pump 21, or other suitable means, for raising the material from the lower level of the container 10 and deliver it to the spray gun.

In the embodiment of my invention here shown, I prefer to use a constant pressure feed pump 21 driven by an electric motor 22. Material passing from the pump 21 passes through a pressure gauge 23 and a globe valve 24 which controls the flow of the material to the material supply line 25.

The material supply line 25 is preferably a flexible connection with suitable means for applying the composition to a surface, such for example as a pressure spray gun 26. A return line 5 27 leads from the spray gun 26 to the material return pipe 18 which extends through the cover 15 and discharges the material returning therefrom into the body of material contained within the container 10. The return flow of material is 10 controlled by a globe valve 28 which connects the return line 27 with the material return pipe 18. The valve 28 is provided with an opening (not shown) in the gate so that a constant return of material is possible even though the valve is in 15 closed position. This opening acts as a by-pass and prevents building up damaging pressures in the lines and the spray gun in the event the equipment is operated when the valve 28 is closed.

20 The materials in the spray gun 26 are subjected upon discharge to a flow of heated air under pressure which is conveyed through an airline 30 to an air heating chamber 31 in which a staggered electrically actuated heating element 32 is 25 provided. Air passing through the chamber contacts the heating element 32 and is heated to a predetermined degree before passing from the chamber to the air supply line 33 which connects with the spray gun 26. The heating of the air 30 in this manner increases its velocity as well as insures that no chilling of the materials will occur when the materials are discharged from the spray gun 26. The temperature of the heating elements 32 may be controlled by a suitable 35 switch 34 which is electrically connected therewith.

Any desired type of spray gun 26 may be employed in connection with an apparatus embodying the present invention. It is necessary, however, that it be adapted for use in connection 40 with this apparatus by providing therein a chamber 40 which communicates with the material supply line 25 to receive material therefrom and communicates with the material return line 27 to discharge material thereto. In one such spray 45 gun the heated air from the air line 33 is discharged through a plurality of ports 41, which surround the chamber 40 and discharge at a point adjacent the point where material is discharged from the chamber 40. The use of the 50 chamber 40 and the material return line 27 thus insures a constant flow of heated materials from the tank 10 to the gun 26 and prevents settling of materials either in the gun or in the lines leading thereto. 55

The materials in the container 10 may be maintained at relatively constant temperatures within predetermined limits by any suitable type of temperature control apparatus, one type of 60 which is here shown by way of example and comprises a thermocouple having thermally responsive elements 50 depending in the receptacle 10 at a point adjacent the bottom thereof and adjacent the point of withdrawal of the liquid from 35 the tank. The element 50 is electrically connected with a control switch 51 which in turn is electrically connected with the heating elements 13 and a source of electrical energy (not shown). The control switch 51 may be set to 70 maintain predetermined but substantially constant temperatures within the tank 10.

An apparatus for conveying liquid or plastic coating compositions which embodies the present invention as above described may be used with 75 the method of conveying and distributing such

compositions which embodies my invention, it being apparent, however, that the method now to be described is not necessarily limited to the above-described apparatus.

By the use of my invention I propose to provide a body of liquid or plastic coating composition which is maintained as a fluid at a substantially constant temperature, preferably above room temperatures. This heated material is constantly withdrawn from a central supply 10 reservoir and is conveyed through pipe lines to the point of discharge to the surface to be covered. The required amount of such heated material is drawn through the discharge means and sprayed on the surface to be covered. The excess heated material which is not discharged 15 through the discharge means is returned through the discharge means to the central supply reservoir. Thus there is a constant circulation of the materials both in the reservoir and in the feed 20 line, the discharge means and the return line.

In order to avoid chilling the composition at the point of discharge from the discharge means, the air which is utilized to carry the composition, from the discharge means is heated and 25 maintained at a substantially constant temperature by suitably controlled air heating means.

The operation of the apparatus embodying the present invention is substantially as follows:

The heat control means 51 is adjusted to provide a suitable substantially constant temperature 30 in the electric heating coils 13 which heats the materials in the tank 10 to a temperature preferably slightly in excess of 90° F. After the material in the tank 10 is heated to some suitable 35 predetermined temperature, the pump 21 or other suitable conveying means is turned on and a supply of the material is withdrawn from the container 10 through the screened inlet 19 of the feed line 17. In a suitable embodiment I 40 have provided, by way of example, a capacity of ten gallons in the tank 10 and a capacity of approximately two gallons per minute in the pump 21. With this arrangement, the materials in the tank are completely circulated at least 45 every five minutes, and oftener as the amount of material is decreased. By varying the relative sizes of the container and the amounts of materials therein and the capacity of the pump, any desired rate of circulation of the materials may 50 be provided. Pressures in the line 25 are controlled by the valve 24 and the return valve 28. Thus, a constant circulation of the material from the tank is insured throughout the length of the supply line 25. When the valve in the 55 discharge means such as the gun 26, is closed, none of this material may be discharged onto the surface to be coated, but the material passes from the chamber 40 into the return line 27 and is returned to the container 10. By the provision 60 of this return line it will be observed that the body of liquid or plastic coating composition which is in the chamber 40 of the discharge means 26 at any time, is permitted to remain in that chamber but an instant before it is returned to the supply tank. Also, any excess of 65 materials flowing to the chamber 40 is returned in a similar manner, so that the temperature of the material in the discharge means is carefully regulated and maintained at all times. 70

The provision of the heated air maintained at a temperature higher than the temperature of the liquid or plastic coating composition at the point of discharge, permits the discharge of the material from the discharge means 26 at a pre- 75

determined temperature, which may be regulated and uniformly maintained. The constant return of the excess liquid or plastic coating composition from the chamber 40 to the tank 10 insures a constant agitation of the composition and this facilitates the maintenance of the pigment or filler particles in the suspension without substantial settling thereof.

I claim:

10 1. An apparatus for spraying liquid or plastic coating compositions, including in combination a supply reservoir adapted to hold a quantity of such liquid or composition, an air bath around said reservoir, heating means in said bath enabling the same to heat the liquid or composition contained in said reservoir to a predetermined temperature and to maintain said temperature substantially constant throughout the entire time of operation, an enclosed hydraulic circuit connected with said reservoir, a spray gun included in said hydraulic circuit, a constant pressure pump for circulating constantly and repeatedly said heated liquid or composition in said circuit and for producing a predetermined pressure therein, the rate of said circulation being in excess of the maximum discharge rate of said spray gun and being sufficient to insure a substantially uniform temperature of said heated liquid or composition throughout the entire circuit.

2. An apparatus for spraying liquid or plastic coating compositions, including in combination a closed supply reservoir adapted to hold a quantity of such liquid or composition, a fluid bath around said reservoir, said bath being thermally insulated from the outside, electric heating means in said bath to heat the liquid or composition contained in said reservoir to a predetermined temperature and to maintain said temperature substantially constant throughout the time of operation, an enclosed hydraulic circuit connected with said reservoir, a spray gun included in said hydraulic circuit, a constant pressure pump for circulating constantly and repeatedly said heated liquid or composition in said circuit and for producing a predetermined pressure therein, the rate of said circulation being in excess of the maximum discharge rate of said spray gun and being sufficient to insure a substantially uniform temperature of said heated liquid or composition throughout the entire circuit.

3. An apparatus for spraying liquid or plastic coating compositions, including in combination a closed supply reservoir adapted to hold a quantity of such liquid or composition, an enclosed air bath around said reservoir, said bath being thermally insulated from the outside, heating means in said bath adapted to heat the air thereof and thus the contents of said reservoir, a thermocouple in said reservoir, an electrical control device electrically connected with said thermocouple and adapted to control said heating means, in response to the operation of said ther-

mocouple, to maintain the contents of the reservoir at a substantially uniform temperature throughout the period of operation, an enclosed hydraulic circuit connected with said reservoir, a spray gun included in said circuit, a constant pressure pump for circulating constantly and repeatedly said heated liquid or composition in said circuit and for producing a predetermined pressure therein, the rate of said circulation being in excess of the maximum discharge rate of said spray gun and being sufficient to insure a substantially uniform temperature of said heated liquid or composition throughout the entire circuit.

4. An apparatus for spraying liquid or plastic coating compositions, including in combination a closed supply reservoir adapted to hold a quantity of such liquid or composition, an enclosed air bath around said reservoir, said bath being thermally insulated from the outside, heating means in said bath adapted to heat the air thereof and thus the contents of said reservoir, a thermocouple in said reservoir, an adjustable electrical control device electrically connected with said thermocouple and adapted to control said heating means, in response to the operation of said thermocouple, to maintain the contents of the reservoir at a substantially uniform predetermined temperature throughout the cycle of operation, an enclosed hydraulic circuit connected with said reservoir, a spray gun included in said circuit, a constant pressure pump for circulating constantly and repeatedly said heated liquid or composition in said circuit and for producing a predetermined pressure therein, the rate of said circulation being sufficient to maintain the temperature of the heated liquid or composition at said gun substantially equal to that at the reservoir in spite of the heat losses in said circuit, and means delivering heated air to said spray gun.

5. An apparatus for spraying liquid or plastic coating compositions, including in combination a closed supply reservoir adapted to hold a quantity of such liquid or composition, a fluid bath around said reservoir, said bath being thermally insulated from the outside, electric heating means in said bath to heat the liquid or composition contained in said reservoir to a predetermined temperature and to maintain said temperature substantially constant throughout the time of operation, an enclosed hydraulic circuit connected with said reservoir, a spray gun included in said hydraulic circuit, a constant pressure pump for circulating constantly and repeatedly said heated liquid or composition in said circuit and for producing a predetermined pressure therein, the rate of said circulation being in excess of the maximum discharge rate of said spray gun and being sufficient to insure a substantially uniform temperature of said heated liquid or composition throughout the entire circuit, and means for supplying heated air under pressure to said spray gun.

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