

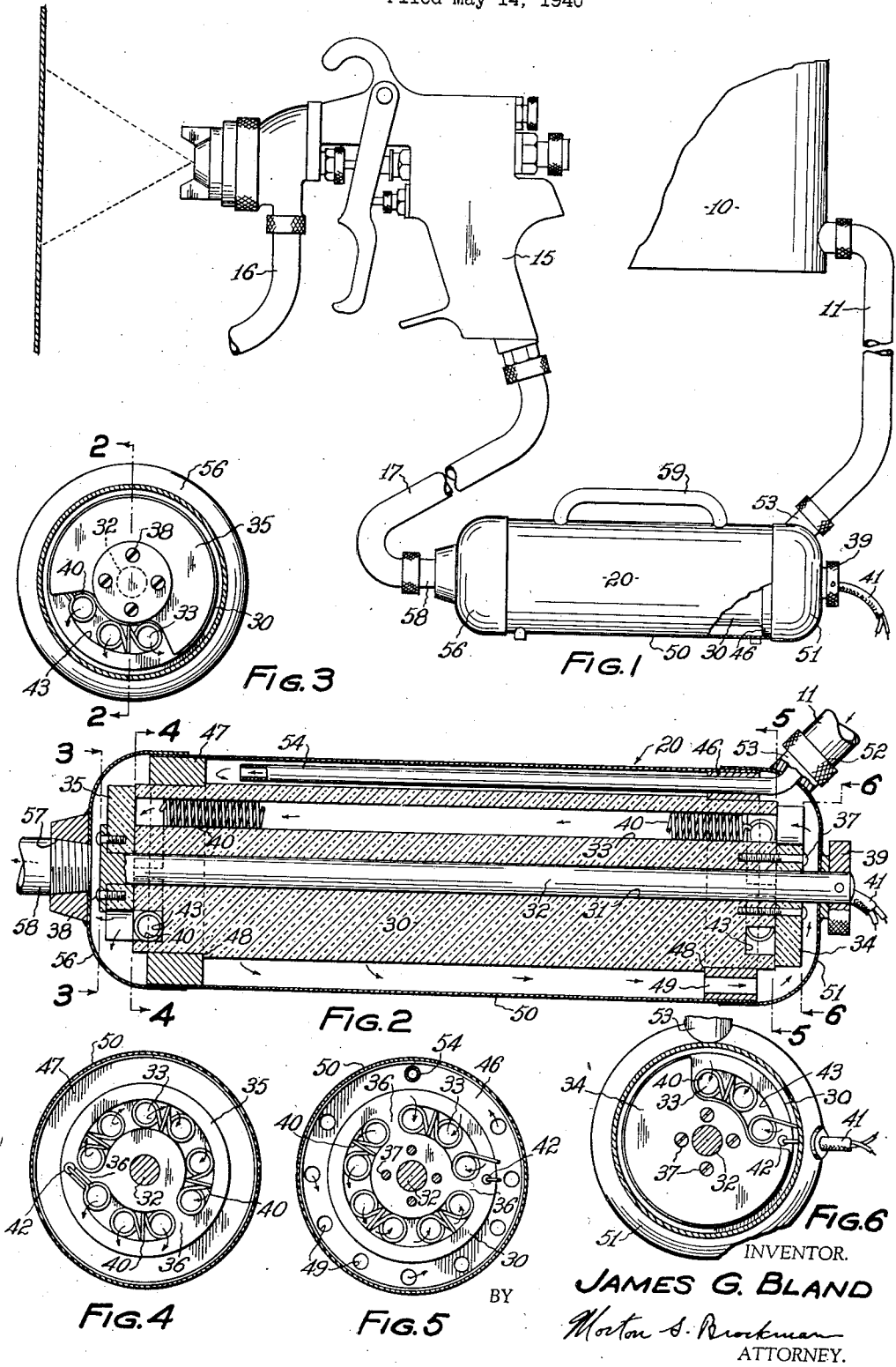
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AIR CONDUIT HEATER

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AIR CONDUIT HEATER

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7 Claims. (Cl. 219—39)

This invention relates to heating devices and particularly to electric heaters of the class used for conditioning a stream of air which is used to operate an aspirating type of spray gun.

As conducive to a clearer understanding of this invention, it may be well to point out that in the process of pneumatically applying paints, varnishes and lacquers to bases such as automobile bodies or other surfaces where a smooth even finish is desired, the operator often experiences difficulty because of atmospheric conditions. Humid air has a tendency to materially affect the aspirated and suspended pigment particles so that when finally dry on the surface, the resulting finish appears to be off-color. Temperature also has a marked effect on the finish. For example, if the air used to spray the pigment liquid is too cold, the finish becomes streaked and has an uneven thickness. If, on the other hand, the air is too hot and the liquid has a normal viscosity, the finish becomes blotched and spotted and forms a rough surface resembling an orange peel.

It has been found from experience that for the most efficient application of lacquer a current of air which has been pre-heated to approximately 200° F. is the most desirable. Similarly it has been found that synthetic enamels and varnishes are best applied when the air current has been pre-heated to approximately 300° F. For the spraying of lacquers a pressure of from forty to sixty pounds is satisfactory and for the spraying of varnishes a lower pressure of from twenty to thirty pounds is better suited.

It is therefore the primary object of the invention to provide a device of the character mentioned which warms a current of air to a temperature degree which is conducive to a maximum efficiency and effectiveness of the liquid atomized and sprayed thereby; which speeds the spraying operation and which prevents paint or lacquer sprayed therewith from running or streaking unnecessarily.

Another object is to provide a simple electric heating device which may be inserted in our coupled with a conventional paint spray gun outfit.

A further object is to provide a heater of the type mentioned with a controller which conditions the air uniformly at a temperature best suited for the particular liquid used.

Still another object is to construct such a device economically and efficiently out of standard, readily obtainable parts and to further construct it in a manner that it may be used and operated

by comparatively untrained or inexperienced persons.

A still further object is to provide a drying means for removing undesirable moisture from a spray gun air supply which moisture removal prevents the tainting of paints, varnishes or lacquers to cause disfigurements known to the art as blushing and orange-peel.

These and other objects and features of the invention will become apparent from a study of the following description and claims together with the accompanying drawing in which like parts are designated by like reference characters and wherein:

15 Figure 1 is a comprehensive view showing how the heater constituting this invention is connected to a spray gun outfit;

Figure 2 is a longitudinal section of the air heating unit alone;

20 Figure 3 is a cross-section of the unit taken along the line 3—3 of Figure 2;

Figure 4 is a cross-section of the unit taken along the lines 4—4 of the Figure 2;

25 Figure 5 is a cross-section of the unit taken along the lines 5—5 of the Figure 2; and

Figure 6 is a cross-section of the unit taken along the lines 6—6 of the Figure 2.

The comprehensive view of Figure 1 shows an air supply 10, which may be a conventional mechanical compressor or a tank of air under pressure; an aspirating nozzle or spray gun 15; and the heater 20 which constitutes the basis of this invention. The jar or fluid container which is ordinarily attached to the gun 15 when in use, is not shown. However, a part of the suction tube 16 which extends into the container is shown in the drawing. Suitable flexible air hoses connecting the heater 20 to the compressor 10 and the gun 15 to the heater 20 are shown in the Figure 1. 40 The hose which carries normal air from the compressor to the heater is indicated by the character 11 and may be of any suitable length. The hose 17 which carries the conditioned air from the heater 20 to the gun 15 may be of almost any length, so long as the temperature or condition of the air therein is not materially affected by the length thereof. The practical length of the hose 17 is dependent upon the amount of heat imparted to the air, to the speed at which the current of air travels through the hose and also to the pressure behind it. These, however, are variable factors which the instant invention is able to provide for.

The heater 20 consists primarily of three parts. 55 There is first the baffle member 30, the heating

element 40 and the case member 50. Each of these parts will be described in detail and in the order just set forth.

The baffle member 30 consists of a piece of heat resisting material such as porcelain which is preferably cylindrical in shape and is about nine inches long and about two inches in diameter. A long axial hole 31 extends through the porcelain member from end to end. This hole 31 may have a diameter of approximately one-quarter of an inch and is large enough to permit the metal rod 32 to fit easily therein. Evenly spaced around the axial hole 31 are nine parallel channels 33 which also extend through the full length of the baffle member 30. These channels 33 have an inside diameter of about one-quarter of an inch and form, together with certain cap members, a circuitous passage for the air to pass through. A group of three of the channels permits a current of air to pass through in one direction. The next adjacent group of three channels permits the same current of air, after being deflected by the cap members, to pass back through the baffle member 30 in the opposite direction; and then similarly, the last group of three channels permits the air to pass through again in the original direction.

In order to deflect the respective currents of air at the ends of the baffle member 30, suitable caps are provided for both ends and also the three groups of channels are partitioned off so that the air is directed into the proper next adjacent group of channels. In the drawing the cap on the right end of the porcelain cylinder 30 is designated by the character 34 and the cap on the left end of the cylinder is designated by the character 35 and the partitions between the respective groups of channels are designated by the character 36. The cap members may be made of the same type of refractory material as the cylinder 30.

The cap 34 covers the right end of the porcelain cylinder 30. However, a segment of cap is cut away which exposes the adits or openings to the first group of three parallel channels. The cap 34 and the baffle member 30 are suitably drilled and tapped so that conventional metal screws 37 may be used to hold the cap rigidly in place. The Figure 6 clearly shows the cap 34 with a segment thereof cut away showing the openings to the channels 33. The Figure 2 shows how the cap is rigidly attached to the cylinder.

The cap 35 is practically of the same shape as the cap 34. It, however, is attached by means of similar screws 38 to the flange 39 on the end of the rod 32 as is clearly shown in the Figures 2 and 3, instead of directly onto the cylinder 30. The cap 35 is thereby permitted to rotate with respect to the cylinder 30 by the simple manipulation of the knob 39 on the right or rear end of the rod 32.

The heating element 40 is simply a length of conventional coiled resistance wire which is connected in a suitable manner to the electric line 41. Although not shown in the drawing, a suitable switch may be mounted on the unit 20 so that the heat may be turned on or off as desired.

The wire coil 40 has an outside diameter large enough for it to fit fairly snug in the nine air channels 33 with the periphery of the coil contacting the inner surface of the channels. The current of air passing through the channels 33 thus is urged to pass longitudinally through the coil 40.

The coil 40 is threaded or strung through the

baffle member 30; the coil passing first through one of the channels and then back and forth alternately through each adjacent channel and the straight end of the wire coil being returned to the place of beginning, or to the right end, through the small longitudinal hole 42 in the porcelain cylinder, to complete the circuit.

In order to permit the heating coil 40 to pass back and forth through the cylinder and without interfering with the cap members 34 and 35, portions of the cylinder ends are cut away so as to allow the wire coil to pass and turn without the obstruction of the caps. The cut away portions are indicated by the character 43 in the Figures 2, 3, 4, 5 and 6. The portion or walls of porcelain remaining between the cut away portions 43 are the partitions 36 heretofore referred to.

The case member 50 consists of a section of metal tube which is closed at both ends by metal caps. The caps may be welded to the tube or securely fastened thereto by means well known to the art. The right or rear cap 51 has a central or axial hole therein which accommodates the rod and knob 32 and 39 respectively. It also has an orifice 52 which is sometimes referred to herein as an adit, for the admission of air into the case member. Adjacent to the orifice 52 there is a nipple member 53 which is provided with means for attaching the hose 11. The cap 51 is also provided with an opening through which the electric wires 41 may extend.

The left or front cap 56 is similar to the rear cap 51 except that it has only one orifice 57 which is for the passage of the heated air. It has no openings for electric wires or for the control rod 32. The front end of the cap 56 is threaded so as to accommodate a second nipple member 58 which in turn is provided with means for connecting the hose 17.

In order to rigidly mount the heating element 40 within the case member 50, there is provided a pair of spaced rings 46 and 47. The rings 46 and 47 may be made of metal or other suitable material. Their outer circumferential surfaces are attached to and inside of the case member 50 adjacent to the ends thereof, and about where the caps 51 and 56 are attached. The inside circumferential surfaces of the rings firmly engage the outside surface of the porcelain baffle member 30. The baffle member 30 is provided with small shoulders 48 which engage the inner edges of the rings 46 and 47 so as to prevent longitudinal movement of the cylinder 30 within the case 50. The rear ring 46 is drilled or otherwise made with several longitudinal holes 49 which holes permit the unconditioned air to pass through from one side of the ring to the other.

In operation, unconditioned air enters the case 50 at the adit 52 and passes through the pipe 54 to almost the front ring 47. The fresh cold air circulates around the cylinder 30 and in the space between it and the case member 50. The air then passes through the longitudinal openings 49 and then through the first group of channels in a direction toward the front end. The air, upon reaching the front end, is then deflected rearward through the second group of channels by the cap 35 and the front partitions 36. The partially heated air, upon reaching the rear of the baffle member, is again deflected, but in a forward direction, through the third group of channels by the rear cap 34 and the rear partitions 36. The conditioned air then passes

through the orifice 57, the hose 17 and to the gun 15.

Upon each trip through a group of channels, the air is heated by the coil 40. If maximum heat is desired for the air, such for example, as when spraying certain synthetic lacquers, the forward cap 35 is in the position as shown in the drawing and the air travels through the heater in the manner just described. If less heat is desired for the air, then the forward cap 35 is turned 120° to the left, or so that the cut away portion of the cap is adjacent to the first group of channels, by means of the knob 39 and the rod 32 so that the second and third passages are blocked entirely and the air permitted to pass directly from the first group of channels to the hose 17. The drawing does not show this alternate assembly as this rotation of the cap 35 may be clearly visualized by referring to the Figures 2, 3 and 4.

It has been found from experience that air heaters, if used for any length of time, heat up to a point where they are difficult to move and handle. One of the outstanding advantages of this device over the prior art devices is that the fresh cold air is permitted to circulate around the porcelain cylinder before it contacts the heating element. The added circulation of air caused by the mere extension of the tube 53 keeps the case member down to a comfortable temperature.

Another advantage obtained by the use of this device is that it permits a thinner liquid to be sprayed from the gun without the usual streaking or running. The added heat causes the thinner pigment fluid to set quicker and with a much higher gloss than is ordinarily obtainable with a more viscous liquid. It also causes the liquid enamel to harden in a much shorter time than would otherwise be necessary. In general it enables a comparatively inexperienced or untrained person to obtain a highly satisfactory finish without the necessity of special air conditioned rooms and without the use of relatively more expensive lacquers, enamels and varnishes.

It will now be clear that there is provided by this invention an air conduit heater which accomplishes the objects herein set forth. While the invention has been illustrated in its preferred form and while it has been described in certain specific terms and language, it is to be understood that the embodiment of the invention as illustrated and described is suggestive only and is not to be considered in a limiting sense. It should be further understood that there may be other forms or adaptations of the invention, and those modifications are also considered to be within the broad scope of this invention as no limitations upon it are intended

other than those imposed thereon by the breadth of the appended claims.

I claim:

1. An air heater of the class described, comprising in combination, a case member, a baffle member mounted within the case member, the said baffle member having a plurality of air channels therethrough, a controllable means mounted on the said members for directing air through either some or all of the said channels, and a heating means mounted on the said baffle member conditioning the air passing therethrough.

2. An air heater of the class described, comprising in combination, a case member, a baffle member mounted within the case member and having a circuitous air channel therethrough, and a controllable means mounted on the said members for guiding air through either all or part of the said channel.

3. An air heater of the class described, comprising in combination, a case member having an air adit and an air vent, a baffle member mounted within the case member, the said baffle member having a plurality of parallel circuitous air channels therethrough and connecting with the said case member openings, and a controllable means mounted on the said members for guiding air through either some or all of the said channels.

4. An air heater of the class described, comprising in combination, a case member having an air adit and an air vent, a baffle member mounted within the case member, the said baffle member having a plurality of parallel circuitous air channels therethrough and connecting with the said case member openings, and a controllable means mounted on the said members for directing air through either all or part of the parallel channels.

5. In a heater of the class described, a baffle member, comprising in combination, a cylindrical member having a plurality of longitudinal channels therethrough, and a cap means mounted on the cylindrical member obstructing some of the said channels.

6. In a heater of the class described, a baffle member, comprising in combination, a solid member having ends and a plurality of longitudinal channels therethrough opening at the said ends, and a rotatable cap means mounted on the said ends and obstructing either some or all of the said channels.

7. A baffle member of the type described in the claim 6 and further characterized by having a means thereon for rotating the said cap means.

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