Aug. 15, 1967 B. B. JOHNSON 3,336,463

PORTABLE ELECTRIC AIR HEATER AND DEHUMIDIFIER FOR PAINT SPRAY GUNS

Filed Nov. 4, 1964 2 Sheets-Sheet 1

Fig. 1

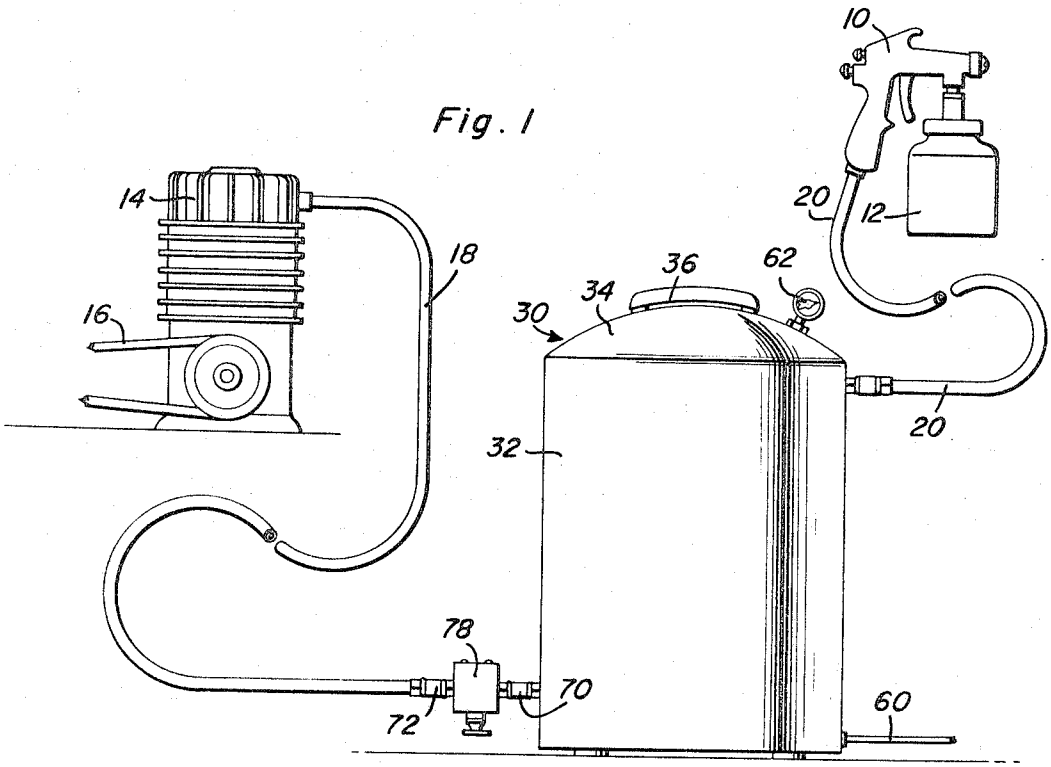
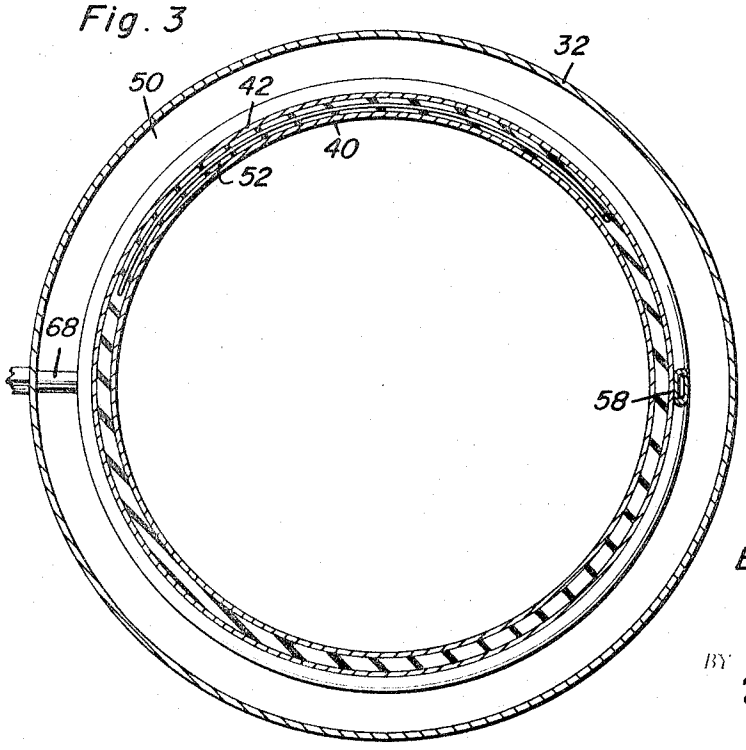


Fig. 3



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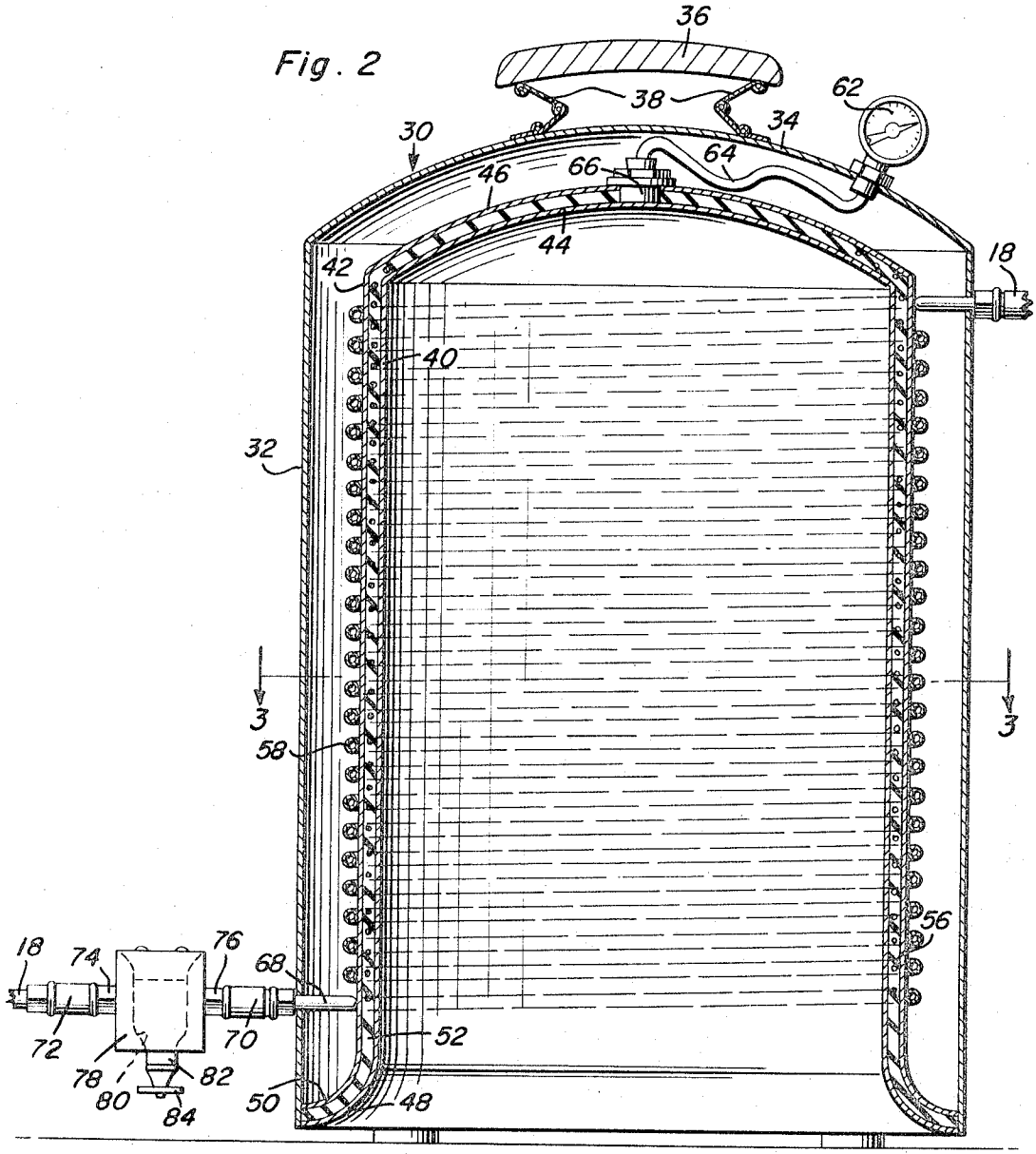
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PORTABLE ELECTRIC AIR HEATER AND DEHUMIDIFIER FOR PAINT SPRAY GUNS

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Fig. 2



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PORTABLE ELECTRIC AIR HEATER AND DEHUMIDIFIER FOR PAINT SPRAY GUNS

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5 Claims. (Cl. 219—366)

This invention comprises a novel and useful air dehumidifier for paint spray guns and more particularly pertains to a device adapted to be incorporated between a source of air such as an air compressor and any conventional type of paint spray gun for dehumidifying and if desired, heating the air supplied from the source to the spray gun.

The primary object of this invention is to remove moisture or dampness from the airstream entering a paint spray gun or other air spray device whereby the latter will deliver a paint or other spray free of water or water vapor as for example when applying paint to metallic or other surfaces.

An important feature and object of the invention resides in the provision of a device which will dehumidify and if desired, heat the air received from the air compressor or other source prior to its delivery to a paint spray gun or other air spray device by filtering and removing moisture and foreign matter from the air and then preheating the air in an improved heating means.

Another object of the invention is to provide a device for conditioning the air supplied to paint spray guns and the like which shall include an improved air preheater of the electrically heated and coiled tube type together with a condensate water drain in the lower end of the preheater coil.

Still another object of the invention in accordance with the preceding objects is to provide a device wherein the preheater shall have an adjustable automatic control of its temperature.

Yet another object of the invention subordinate to the above objects is to provide a hollow, bell-shaped preheater of the erect, portable type and which shall be lined with a thermally insulating material and wherein the heating element is coiled between inner and outer shells and is embedded in the heat insulating material, the inner coil being disposed upon the exterior of the outer shell and in direct heat exchange relation with the outer shell and the heating element together with a housing spaced from but enclosing the shells.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a view in side elevation showing an installation incorporating therein the present invention, parts being broken away;

FIGURE 2 is an enlarged view in vertical central section through the preheater of the invention; and,

FIGURE 3 is a horizontal sectional view taken substantially upon the plane indicated by the section line 3—3 of FIGURE 2.

The quality of the work performed by spray guns and the efficiency of their operation is frequently detrimentally affected by the presence of water or water vapor entering the spray gun through the airstream supplied thereto. Such a condition is particularly prevalent and undesirable when the spray gun is employed for the purpose of applying paint to a metallic or other surface. It is therefore the primary aim of this invention to provide a means for effectively overcoming this problem through the elimination of foreign matter such as particles which may be entrained with the airstream or moisture or water vapor which may be present in or condensed in the flow passage of the air which may produce obstructions or other undesirable conditions in the spray gun. It is a concomitant aim of the invention to provide such a means which may be readily incorporated into existing spray gun installations of various types.

Reference is made first to FIGURE 1 which shows a typical installation and environment in which the present invention may be desirably incorporated. Thus, there is shown a spray gun 10 of any conventional type such as that including a removable paint container 12 and in which gun air is supplied by an air supply means connected to a suitable source of air such as an air compressor 14 of any desired type and operated in any desired manner as by a driving belt 16 connected to a suitable source of power, not shown. The air supply means includes an air supply conduit 18 which is connected to the compressor 14 or any other suitable source of air and an air delivery conduit 20 which, after treatment of the air by a means to be subsequently described, delivers the treated, dehumidified and if desired preheated air to the air intake port of the spray gun 10. The present invention indicated generally by the numeral 30 constitutes a combined air cleaner and air preheater and is detachably connected in any desired manner to the air supply and air delivery conduits 18 and 20. It will be understood that heretofore the conduit 18 was directly connected to the spray gun 10 and the air delivered from the source of pressure such as the compressor 14 was directly delivered to the spray gun, carrying with it any foreign matter and moisture or moisture vapor which might be entrained with the air.

Reference is now made specifically to FIGURE 2 for an understanding of the construction and operation of the air treating device 30 in accordance with this invention. There is provided a generally cylindrical and bell-shaped housing or container 32 having an upwardly convex top wall 34 together with an open bottom. The container may be of any suitable material but is preferably of a light weight in order to effect ready portability thereof. A carrying handle 36 secured as by foldable hinged arms 38 is secured to the top wall 34 whereby the handle may be raised from the top wall into a carrying position as shown in FIGURE 2 or may be compactly retracted against the top wall when the device is in storage or use as shown in FIGURE 1.

Disposed within the housing or container 32 is a unitary assembly comprising an air preheater. This assembly preferably comprises a pair of inner and outer shells 40 and 42 respectively each having a domed, convex closed top wall as at 44 and 46, with the lower open ends of the shells having an outwardly flaring and flanged extremity as at 48 and 50. There is thus provided a space between the two shells which is of substantially uniform width and in which is received a mass of thermal insulating material 52 such as asbestos or any other suitable substance. If desired, the two shells may be rigidly connected in spaced relation by suitable members, not shown, extending therebetween so as to further rigidify the assembly.

The shells are of such size that they may be readily received within the hollow interior of the housing 32 and in a spaced relation to the internal wall thereof as shown in FIGURE 2. However, the lower flanged extremities 48 and 50 are preferably disposed against the lower edge of the interior of the side wall of the housing 32 and any desired means, not shown, may be provided for detachably or fixedly securing these flanges to the housing side wall in order to thus provide a means for mounting, either detachably or permanently, the unitary heating assembly within the housing.

Received within the annular space between the two shells 40 and 42 and embedded in the insulating material 52 therein is a heating element in the form of an electrical resistance filament or wire 56 and which is wound in the form of a helix or coil in such a manner as to effect a good heat exchange relation with the outer shell 42.

Mounted upon the exterior of the outer shell 42 is a tube 58 in the form of a heating coil of any suitable material and which is secured to the outer shell in any desired manner and is disposed in good heat exchange relation with the outer shell and thus with the heating coil 56. By way of example, the tube 58 may be 400 feet long so as to afford a rapid and adequate intake of heat and thus insure adequate heating of a stream of air passing through the tube at a relatively high rate of flow.

Indicated at 60 in FIGURE 1 is an electric cable by means of which current from any suitable source, not shown, is introduced through the housing 32 and connected to the heating element 56. However, there is provided an adjustable automatic thermostatic control to maintain an adjusted temperature of the air heated by the heating coil 58. For this purpose there is provided an adjustable thermostatic control means and indicator 62 which may conveniently be mounted upon the top wall 34 of the housing or container. A control conduit 64 is connected to the adjustable thermostatic control means 62 and by means of a suitable packing gland 66 passes through the top wall 46 of the outer shell and has its electric conductors, not shown, connected to the electric heating element 56 in a conventional manner. Thus, the operator is enabled to readily adjust the temperature of the air delivered by the treating device 30 to the air delivery conduit 20.

It will be noted that the air heater tube 58 is disposed about a vertical axis and is in nested relation to the heating coil 56 to obtain the maximum rate of heat exchange therewith. At its lowermost end, the air heating tube 58 has a laterally projecting terminal portion 68 which extends through the wall of the housing 32 and is provided with a detachable coupling or joint 70. The previously mentioned air supply conduit 18 likewise is provided with a similar coupling or joint 72 and the joints 70 and 72 are detachably connected to the oppositely extending nipples 74 and 76 projecting from an air cleaner 78.

This air cleaner may be of various types depending upon the operating conditions to be encountered, the condition of the air to be treated, the types and efficiency of the cleaning operations desired. Inasmuch as air cleaners are well known, a detailed description of the air cleaner is deemed to be unnecessary, it being understood that the diagrammatic representation of the cleaner 78 is intended to cover any suitable type and construction of air cleaner which may be provided. By way of example, the air cleaner may have a filter or screen therein for removing foreign particles from the air entering the device through the supply conduit 18 so that the air discharged from the air cleaner into the air tube 58 will be free of all foreign matter which might detrimentally affect the operation of the spray gun. Further, it is an important feature of this invention that the air cleaner shall have a condensate or water collection chamber therein indicated by dotted lines at 80 and from the low point of which there is provided a water or condensate drain spout 82 provided with a control valve 84.

In the preferred arrangement of this invention, the collection chamber 80 is disposed at a lower level than that of the terminal portion 68 of the air heater coil 58 so that any moisture which may be entrained in the air and which may condense therein, either from the coil 58 or from the supply conduit 18 will collect in the collection chamber 80 and from time to time may be drained therefrom by the drain valve 84.

The heating element serves to impart an elevated temperature to the air supply for the spray gun so as to lessen the possibility of water vapor in the air condensing in the spray gun at the mixing chamber or when the spray whether of air alone or air mixed with paint or other liquid is applied by the spray gun to a surface. Further, the air temperature may be so adjusted as to produce the most effective mixing of the paint or other liquid and thus obtain the most efficient action of the spraying operation regardless of the outside temperature under which the spraying operation is performed.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A portable air heater adapted to be operatively connected between a paint spray gun and a source of pressurized air by a suitable relatively cold air intake conduit from the source of air and a relatively hot air outlet conduit to the spray gun, said heater comprising a container having an air heating unit including a vertically extending air heating coil, an air cleaner including a liquid collection chamber connected to the lower end of said heating coil for the gravity discharge of liquid from said coil, said liquid collection chamber being provided with a drain valve, a heat input means in said container in good heat exchange relation with said heating coil throughout the length of the latter, said heating unit comprising a pair of hollow spaced inner and outer shells having spaced side walls and spaced top walls with insulating material disposed therebetween, an electrical heating coil embedded in said insulating material between said shells and said air heating coil being mounted upon and helically surrounding said outer shell in good heat exchange relation to the outer shell.

2. The combination of claim 1 including a foldable handle secured to the top of said container.

3. A portable air heater adapted to be operatively connected between a paint spray gun and a source of pressurized air by a suitable relatively cold air intake conduit from the source of air in a relatively hot air outlet conduit to the spray gun, said heater comprising a container having an air heating unit including a vertically extending air heating coil, an air cleaner including a liquid collection chamber operatively connected to the lower end of said heating coil for the gravity discharge of liquid from said coil, said liquid collection chamber being provided with a drain valve, a heat input means in said container in good heat exchange relation with said heating coil throughout the length of the latter, said container comprising a hollow vertically elongated body with a closed top, said heat input means comprising an electrical heating coil in nested relation to said air heating coil and constituting a heating unit extending vertically throughout substantially the full vertical height of said hollow body and spaced from the inner surface of said hollow body, said heating unit comprising a pair of hollow spaced inner and outer shells having spaced side walls, spaced

top walls with insulating material disposed therebetween, said electrical heating coil being embedded in said insulating material between said shells and said air heating coil being mounted upon and helically surrounding said outer shell in good heat exchange relation to the outer shell.

4. The combination of claim 3 including an adjustable thermostatic control on said container connected to and supplying electric current to said electric heating coil.

5. The combination of claim 4 wherein said shells are mounted upon and are supported solely by the interior lower surface of said container.

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