

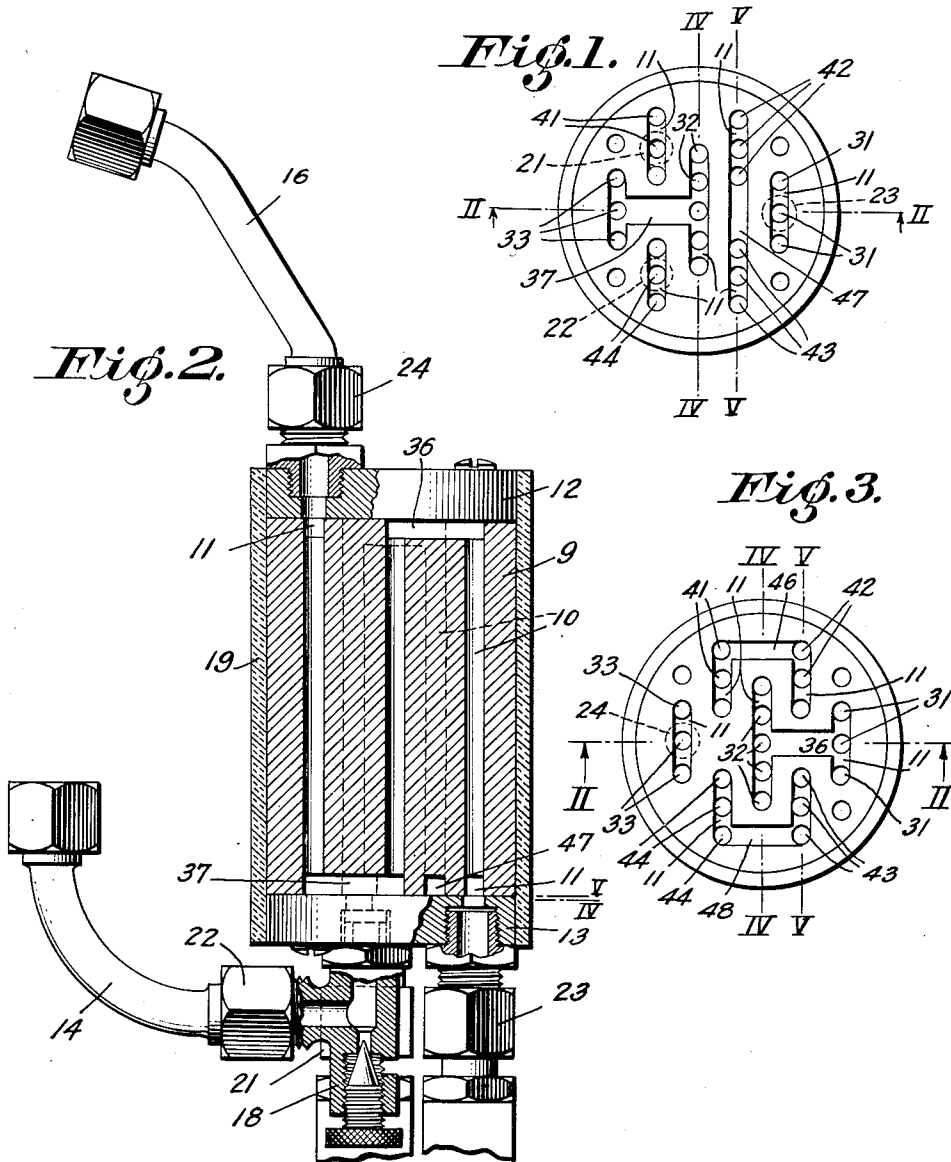
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E. A. A. AXELSON ET AL
HEAT EXCHANGER

2,499,448

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2 Sheets-Sheet 1



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Fig. 4.

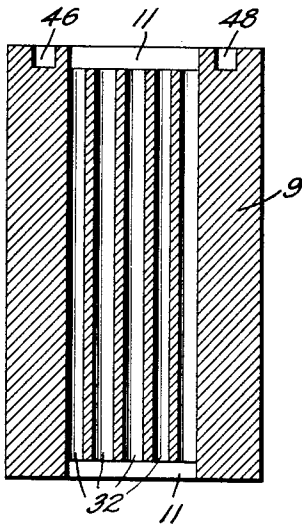


Fig. 5.

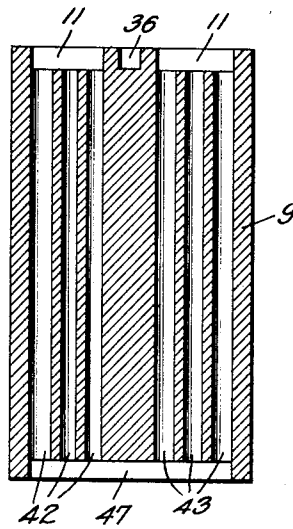
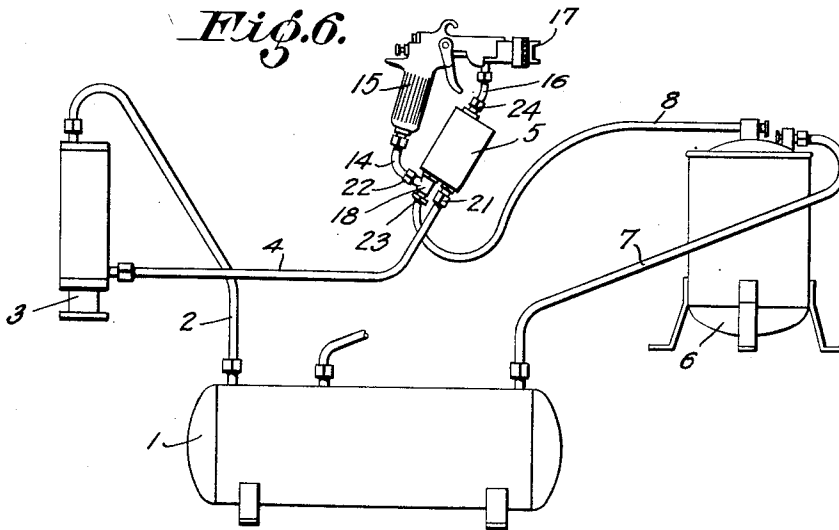


Fig. 6.



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HEAT EXCHANGER

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2 Claims. (Cl. 257-241)

1

The present invention relates to a device for heating liquids, particularly paints, by means of hot air, adapted to be applied in manually operated liquid spray pistols, the said heat exchanger consisting of a metal body with good heat conductivity, the said body being provided with parallel channels which at the ends are connected with one another to form two channel systems.

The primary object of the invention is a development of such a heat exchanger which makes it easily adaptable to a manually operated liquid spray gun.

It is thus an object of the invention to arrange the channel system for hot air and liquid or paint in such mutual relationship that a highly effective heat exchange within a small space is obtained, and to dispose this arrangement together with inlets and outlets for hot air and liquid so that the heat exchanger by means of the outlet for hot air and the outlet for paint, may easily and readily be mounted directly by means of short connections to a spray gun of any convenient or conventional type.

In accordance with the invention, a heater exchanger for heating liquids, particularly paints, by means of hot air is employed which comprises a portable small-sized body of, preferably light, metal of good conductivity, provided with the two channel systems, one for the passage of hot air, the other for the passage of the liquid or paint. Each system consists of a number of channels arranged in groups. All channels of both systems are parallel and are extended longitudinally through the body from face to face thereof. Recesses are provided at the faces of the body, covered by end plates, some of the recesses for connecting in parallel the channels of each of the groups and other recesses for connecting in series the groups of each system in a sinuous path.

The connections of the channels in both systems may thus be made with a very few recesses which may easily be disposed in a single plane at each face of the body, in contrast with arrangements in which all channels of the systems are connected in series and where overcrossing connections thus lying in several planes, cannot be avoided. Moreover, through the arrangement of the channels connected in parallel, the pressure head for driving the paint through the exchanger is greatly reduced.

By means of an appropriate arrangement of the conduit of the two fluids, hot air and liquid or paint, inlets and outlets for both may be so

2

disposed, as will be described in detail hereinafter, that the heat exchanger may be easily mounted by means of the outlet for hot air and the outlet for paint and short connection pieces to the handle and the barrel, respectively, of a spray gun or pistol.

For further illustration, the invention will now be more specifically described with reference to the accompanying drawings.

In the drawings, an embodiment of a heat exchanger is shown in Figs. 1 to 5.

Fig. 1 is a plan view of the underside of the body of the heat exchanger;

Fig. 2 is an elevational section along line II—II of Figs. 1 and 3 of this heat exchanger;

Fig. 3 is a plan view of the top side of the body of this heat exchanger;

Fig. 4 and Fig. 5 are elevational sections along lines IV—IV and V—V, respectively, of Figs. 1, 2 and 3;

Fig. 6 illustrates schematically the adaption of the heat exchanger of the invention for a spray gun.

Referring first to Fig. 6, following the path of the two fluids, hot air and liquid, the air is led from the container 1 or other source of compressed air through the hose 2 to the electric compressed air heater 3 which heats the air to a temperature suitable for the later heating of the paint.

Through the hose 4 the heated air passes through nipple 21, the paint heater 5, nipple 22 and the connection pipe 14 to the spray pistol 15.

Compressed air is led from the container 1 through the hose 7 to the paint pressure container 6. By the air pressure in the paint container the paint is pressed through the hose 8, nipple 23, paint heater 5 and further through nipple 24 and connection pipe 16 to the pistol 15.

The paint heater consists of a heat exchange body 9 of light material with good heat conductivity. In the body there is a plurality of longitudinal channels 10 arranged in groups 31, 32, 33 and 41, 42, 43, 44, respectively.

Recesses 11 are provided at both faces which connect in parallel the channels of each group. Other recesses are provided for connecting in series the various groups of each system.

The system or conduit for hot air is thus composed as follows:

Starting from the inlet 21 indicated in broken lines in Fig. 1, the hot air passes through channel group 41, traverses through recess 46, Fig. 3, through channel group 42, through recess 47, at

the bottom (Fig. 1), channel group 43, recess 48 at the top (Fig. 3), through channel group 44 at outlet 22.

The paint enters through inlet 23, at the foot of the body (Fig. 1), passes channel group 31, recess 36 (Fig. 3), channel group 32, recess 37 at the bottom face (Fig. 1), channel group 33 and leaves at outlet 24 at the top of the body. Thus the paint and the air can pass up and down through the heat exchange body several times, the air giving off a certain amount of its heat to the paint. Since the number of the channel groups 41, 42, 43, 44 for hot air is even and that 31, 32, 33 for the paint is odd it will easily be seen that inlet and outlet for air are at the same face of the body whereas inlet and outlet for the paint are on opposite faces of the body. The heat exchanger may thus be readily adapted to a spray gun so that for the supplying of air and paint to handle and barrel, respectively, the exchanger is in its correct position and the supply lines or hoses 4 for hot air and 8 for paint are as to their weight suspended from the handle of the spray gun thus do not disadvantageously affect the handling of the spray gun.

The recesses may preferably have a considerably smaller flow area than the corresponding group, whereby an effective mixing of the paint is obtained at each turning point.

Flat covers at end plates 12 and 13 are screwed on to the ends, the said covers being easily removable if the heat exchange body is to be cleaned. The lower cover is provided with connecting nipples 21, 22 for supplying the air to, and leading it off from, the heat exchange body, and with a connecting nipple 23 for supplying the paint to the heat exchange body. The cover 12 is provided with a connecting nipple 24 for leading the paint off from the heat exchange body. The covers 12 and 13 are mounted in such a way that the nipples 21, 22 communicate with the channel groups 41, 42, 43, 44 for the air and the nipples 23, 24 communicate with the channel groups 31, 32, 33 for the paint.

At spraying the hot paint is mixed with the still hot air in the nozzle 17, whereby also thick paints can be sprayed without addition of thinning agents and without use of earlier known heavy paint heaters.

As most nozzles used for paint spray pistols require a relatively small air quantity, the nipple 22 is provided with a regulatable exhaust valve 18 through which some hot air can be let out directly into the free air. By thus regulating the quantity and velocity of the hot air passing through the exchanger the paint temperature can easily be controlled, but this part of our invention is more particularly described and claimed in our co-pending application Serial No. 140,792, filed January 27, 1950.

The paint heater can be provided with an insulating sleeve 19 of suitable material which diminishes the heat losses and at the same time serves as a protection against contact.

The invention is particularly suitable for use in shipyards in which painting often must be made from scaffolds. In this case the air heater can be provided with a device so that it can be comfortably carried on the back or be dragged.

Having now described our invention, what we claim as new and desire to secure by Letters Patent is:

1. A heat exchanger for heating paints, lacquers and the like by means of hot air, wherein the air to heat the paints, lacquers and the like

is used thereafter as a means for atomizing the heated paints, lacquers and the like in an air spray gun comprising a portable small-sized metal body of good heat conductivity having two channel systems therein, one system for the passage of the heating hot air, the other system for the passage of paints, lacquers and the like to be heated, each system consisting of a plurality of channels, which channels are arranged in a plurality of groups, all of said channels and groups being arranged in substantially parallel relationship with each other and extending longitudinally in said body from face to face thereof, recesses provided in said body at each face thereof, some of said recesses being constructed to act as a single conduit for the passage of paints, lacquers and the like from one group of paint channels to another group of paint channels, while other recesses being arranged and constructed to act as a single conduit from one group of air channels to another group of air channels, the cross-sectional area of each of said recesses being smaller than the combined cross-sectional area of any one of said groups of channels so that the paint, lacquer or the like will flow at a faster speed through said recesses than through said channels of a group to effect mixing and agitation of the paint, lacquer and the like, and the air will also flow at a faster speed through said recesses for mixing and agitation thereof, and a single cover plate positioned at each end of said body, inlets and outlets for said hot air and paint, lacquer or the like extending through at least one of said cover plates.

2. A heat exchanger for heating paints, lacquers and the like by means of hot air, wherein the air to heat the paints, lacquers and the like is used thereafter as a means for atomizing the heated paints, lacquers and the like in an air spray gun comprising a portable small-sized metal body of good heat conductivity having two channel systems therein, one system for the passage of the heating hot air, the other system for the passage of paints, lacquers and the like to be heated, each system consisting of a plurality of channels, which channels are arranged in a plurality of groups, all of said channels and groups being arranged in substantially parallel relationship with each other and extending longitudinally in said body from face to face thereof, recesses provided in said body at each face thereof, some of said recesses being constructed to act as a single conduit for the passage of paints, lacquers and the like from one group of paint channels to another group of paint channels, while other recesses being arranged and constructed to act as a single conduit from one group of air channels to another group of air channels, the cross-sectional area of each of said recesses being smaller than the combined cross-sectional area of any one of said groups of channels so that the paint, lacquer or the like will flow at a faster speed through said recesses than through said channels of a group to effect mixing and agitation of the paint, lacquer and the like, and the air will also flow at a faster speed through said recesses for mixing and agitation thereof; a single cover plate positioned at each end of said body, inlets and outlets for said hot air and paint, lacquer or the like extending through said cover plates, said inlets for hot air and paint to be heated and said outlet for air being positioned through one cover plate at one face of said body, said outlet

5

for heated paint, lacquer or the like being positioned in the other cover plate at the other face of said body; said heat exchanger being arranged and constructed to be mounted by means of said outlet for hot air and said outlet for heated paint, lacquer or the like through short connection conduits to the handle and barrel of a spray gun.

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