Dec. 4, 1934. E. H. McCATHRON 1,983,140

LIQUID AND AIR HEATING APPARATUS

Filed Nov. 14, 1931 3 Sheets-Sheet 1

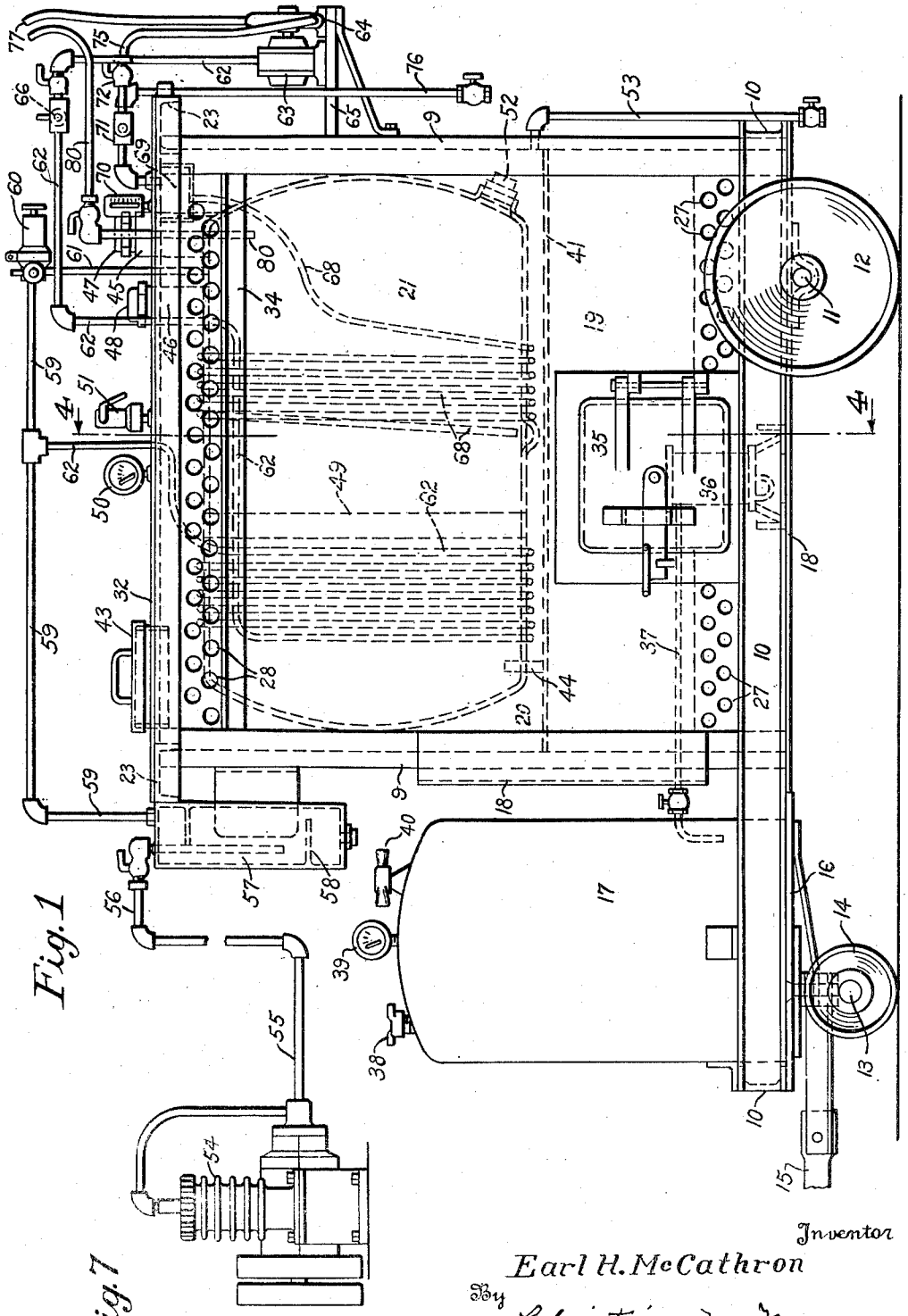


Fig. 1

Fig. 7

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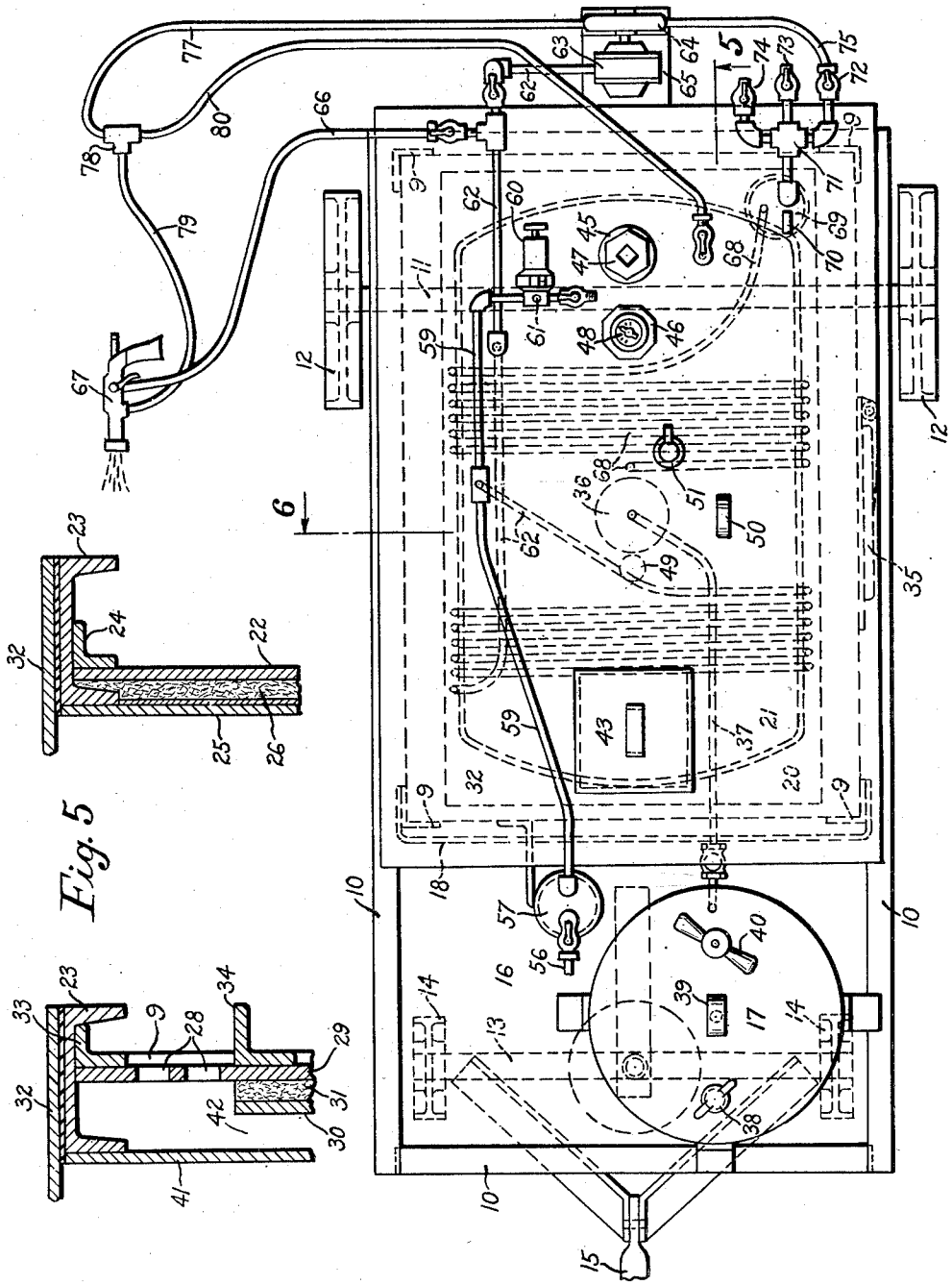


Fig. 2

Fig. 5

Fig. 6

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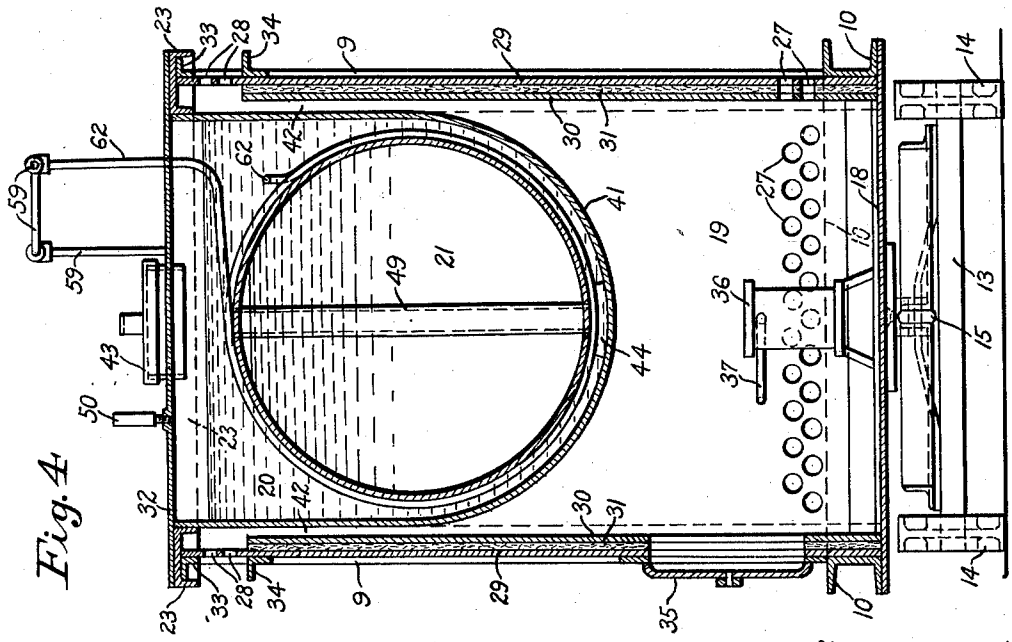


Fig. 4

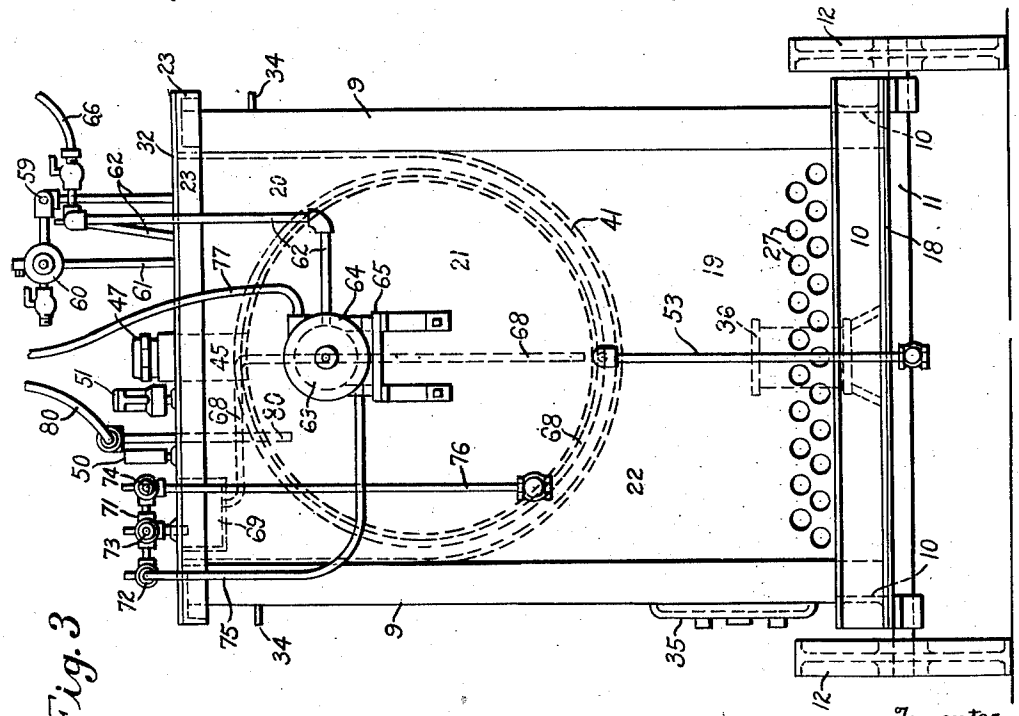


Fig. 3

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UNITED STATES PATENT OFFICE

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LIQUID AND AIR HEATING APPARATUS

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Application November 14, 1931, Serial No. 575,031

4 Claims. (Cl. 91—4)

This invention relates to new and useful improvements in liquid and air heating and spraying machines and is particularly adapted for heating and spraying any inflammable liquid fireproofing and wood-preserving material upon wood structures such as buildings, bridges, shingled roofs and the like.

Various methods have heretofore been used for applying wood preservatives of the above class, the method principally employed for railroad ties and the like being to submerge them in a tank of hot liquid preservative for a limited time, either under a vacuum or otherwise, whereas in the coating of wood structures including shingled roofs the material has been heated in a suitable receptacle, then dipped out while hot into pails and carried on to the buildings where it is applied while hot by means of brushes.

The latter brushing method takes considerable time and besides it is difficult to apply the material very hot as it necessarily cools rapidly after leaving the heating receptacle and especially during the brushing operations, with the result that the material does not penetrate the wood or cover it as thoroughly as if applied very hot.

It is therefore the object of my present invention to provide an apparatus for heating and applying inflammable or liquid wood preservatives in a more effective and economical manner than has heretofore been possible. This is assured by reason of the fact that the material is applied much hotter than has heretofore been possible and at a great saving of time and labor, and with less fire hazard in heating the same. My spraying apparatus includes a receptacle wherein a liquid wood preservative is heated to the desired degree not to exceed boiling, and by the use of compressed air is forced from this heating receptacle through suitable fixed and flexible piping to the wood structure to be treated.

A further object of the invention is to design the apparatus so that the preservative may be quickly conveyed and applied without being exposed to the atmosphere and becoming cold.

Another object of the invention is to provide means within the piping system whereby a continuous circulation of the liquid through the pipes up to the spraying gun is maintained so that a hot supply of liquid is at all times available ready for use close to the gun without any possibility of it becoming cold and sluggish.

Still another object of my invention is the safety with which inflammable liquid may be heated, due to the fact that the liquid is entirely submerged under water, making it impossible for any flame to come in contact with the same, or to heat the liquid to the point where there is danger of explosion.

My apparatus is further adapted to be mounted upon a small truck which cannot only be easily run onto a larger motor truck for transportation, but can itself be conveniently transported around a building and placed in advantageous positions for accomplishing the particular piece of work at hand. Upon the truck is mounted not only the heating apparatus proper but the fuel supply tank and the necessary fixed piping through which the preservative and the compressed air are fed through the flexible pipes to the gun. A compressed-air motor and pump are also included in the outfit whereby the circulation of spraying material intermediate the gun and heating tank is maintained. Any desired and suitable form of air compressor may be employed in connection with the machine and would be connected to supply pressure through a regulator valve to preservative tank, and through a coil where the air is heated preparatory to supply the spray gun, as will later be more fully described.

With these and other objects in view, the invention resides and consists in the construction and novel combination and arrangement of parts hereinafter more fully described, illustrated in the accompanying drawings, and pointed out in the claims hereto appended, it being understood that various changes in the form, proportion, size, and minor details of construction within the scope of the claims may be resorted to without departure from the spirit, or sacrificing any of the advantages of the invention.

Similar characters of reference denote like or corresponding parts throughout the several figures of the accompanying drawings forming a part of this specification and upon which

Fig. 1 shows a side elevation of my improved liquid heating and spraying apparatus mounted upon a simple form of truck which readily adapts the machine to be loaded on and unloaded from a motor truck, and to be moved around a building to be sprayed;

Fig. 2 shows a plan view of the apparatus illustrated in Fig. 1;

Fig. 3 shows an end view of the same machine;

Fig. 4 shows a central vertical cross section taken on line 4—4 of Fig. 1;

Fig. 5 shows an enlarged detailed vertical sectional view of the upper right hand corner portion of the rear end of the casing taken on line 5 of Fig. 2;

Fig. 6 shows a similar enlarged detailed ver-

tical cross section through the upper side portion of the casing taken on line 6 of Fig. 2; and

Fig. 7 shows a side view on a relatively small scale of an air compressor such as may be employed in connection with my spraying apparatus.

While my machine is shown mounted upon a simple form of truck, yet it will be understood of course that mounting it in this manner is not necessarily essential for its successful operation, as it can be supported on any form of fixed or portable base. It will also be obvious that while the machine is well adapted for heating and spraying wood preservative, it can also be used to advantage for heating and spraying other liquids, such as creosote, oils, paints, wax, and other solutions.

Referring in detail to the characters of reference marked upon the drawings 10 represents channel beams forming the frame of the truck, the rear portion of which is carried upon an axle 11 supported by wheels 12 while the front end is swivelly attached to an axle 13 upon which wheels 14 are journaled. A tongue 15 is pivotally connected to the front axle 13. The forward part of the frame is provided with a flooring 16 upon which the fuel tank 17 is positioned while the rear part forms the bottom of a combustion chamber 19, from which the fuel tank is protected by a metal shield 18.

The machine is constructed almost entirely of metal chiefly of structural steel plates, asbestos, copper pipes and brass fittings. The rectangular shaped frame, as shown, is made up of the before mentioned channel beams 10 upon which is built the steel structures forming the before mentioned combustion chamber 19, the water heating tank 20 and the liquid preservative tank 21. The ends of the combustion chamber, see Figs. 2 and 5, are made up of an outer steel plate 22 the bottom end of which is welded to the channel beams 10 and the upper end to an upper channel beam 23, there being an angle iron 24 between the upper edge of said plate 22 and the channel beam 23, these three parts, like all the other adjoining parts of the structure, being electrically welded together.

These ends also include an inner plate 25, the upper and lower edge portions of which are secured to the adjoining parts of the frame, and a filling of asbestos 26 is employed between the two said plates 22 and 25 so as to better retain the heat within the combustion chamber 19. These ends, as well as the sides, are provided with a series of holes 27 in the lower portion of the combustion chamber to admit fresh air thereto, while the upper portions of the sides are further provided with a series of similar holes 28 to allow the spent gases to escape. The sides of this structure are also made of an outer plate 29, an inner plate 30 and a filling of asbestos 31, the same being secured together and arranged somewhat like the ends except that the inner sheets of metal and asbestos do not extend all the way up to the top plate 32 as in the case of the end structures. These sides further include an angle iron 33 positioned along the top of each side against the underside of the channel beam 23. A second angle iron 34 is welded across the outside of each of the outer plates 29, and similar angle irons 9 are applied to the four outer corners of the heater casing, to strengthen the structure.

A suitable door 35, see Fig. 1, is provided in the lower portion of one side of the machine adjacent the oil burner 36 positioned on the center of the floor 18 within the combustion chamber 19. This oil or fuel burner is provided with a fuel supply pipe 37 that is connected to the beforementioned fuel tank 17, mounted on the flooring 16 of the machine, and provided with a filling cap 38, a pressure gauge 39 and hand pump 40, for maintaining a pressure in the fuel tank.

The water tank, see Figs. 1 and 4, is formed in part by a steel sheet 41 bent midway of its length to conform in part to the cylindrical shape of the preservative tank and extends through the length of the combustion chamber where it is connected to the end portions 25, its two upper edge portions being welded to and hung from the inner edges of the before mentioned channel beams 23. This plate thus constitutes the upper wall of the combustion chamber and forms two relatively narrow passages 42 between it and the sides 30 whereby the heat from the oil burner may further serve to heat the water within the water heating tank and to convey the gases from the burner out through the openings 28 before mentioned. This water tank is provided with a filling opening having a cover 43 for normally retaining it closed, and whereby the tank may be filled and refilled from time to time.

The cylindrical preservative tank 21 is submerged in the water tank, one end being supported on a block 44 carried upon the bottom of the water tank and the other end is hung in spaced relation to the cover by coupling pipes 45 and 46, the lower end portions of which are secured to the wall of the preservative tank while the other ends extend up through the cover 32 and are provided with closure caps 47 and 48. The pipe 45 serves to form a filling opening for the preservative tank while the cap 48, see Fig. 2, includes a depth gauge for determining the quantity of liquid in the said tank.

The preservative tank includes a vertical circulating tube 49, see Figs. 1 and 4, that is positioned substantially midway of the length of the tank to insure a more rapid circulation of the water. A pressure gauge 50 is also provided for this tank as is also a safety valve 51, both being mounted on the top of the water tank and having pipe connections that extend in to the preservative tank. This preservative tank is further provided in its lower portion with a removable inspection plug 52 which may be removed to drain it. A drain pipe 53 having a shut-off valve is also provided for the water tank 20.

In Fig. 7 I have shown, upon a reduced scale, a suitable type of air compressor 54 which may be connected to and used with my machine for generating the required air pressure to force the heated preservative out of its tank 21 through the pipes and spray gun. The air pipe line 55 from the air compressor would be connected to the intake 56 from whence the air is introduced into a cleaner chamber 57 attached to the front end of the machine. This cleaner includes a baffle plate 58 which prevents the air from disturbing any condensation that may have settled in the bottom of the cleaner chamber, and which better allows further condensation to settle, whereas the clean air is forced up and out through the main air pipe 59 leading a pressure regulating valve 60 that in turn is connected by a pipe 61 with the interior of the preservative tank, to supply pressure thereto.

A branch pipe 62 is taken off of the compressed-air pipe 59 and extended down through the cover

of the water tank and wrapped around and supported on the preservative tank so as to be submerged with the preservative tank in the hot water in the water tank. This branch compressed-air pipe 62 is then carried forward up again through the cover 32 and along over the top of the heater and connected with a compressed air motor 63 that drives a pump 64 mounted on a shelf 65 on the rear end of the machine. A branch pipe 66 is taken off of this hot air line 62, see Fig. 1, to connect with the spray gun 67. This branch pipe line 66 may be formed of rubber and of any desired length sufficient to reach a roof or other woodwork to be sprayed.

An open end pipe 68, see Figs. 1 and 3, extends up inside from the bottom portion of the preservative tank and out through the same, and like the coiled air pipe is wrapped around and supported on the cylindrical preservative tank in a manner to be submerged therewith in the hot water tank for the purpose of further heating the preservative as it comes from its tank. The end of this pipe coil is carried up and connected with a small hot chamber 69 formed under the cover and in the water tank, that is provided with a thermometer 70 to determine the temperature of the fluid passing through said chamber. Suitable pipe fittings 71 are connected with this chamber 69 to provide several branch pipe ends 72, 73 and 74. Two of these ends 72 and 73 may be used to provide two fluid lines to separate guns, if desired, there being but one of such lines 75 shown in the drawings, which is made with the pipe end 72. Each of these pipe ends are provided with a valve whereby the fluid may be turned on and off, as desired.

A depending pipe 76 is connected with the third pipe end 74 to provide a convenient means of drawing, if desired, one or more buckets of hot preservative from the machine should the same be required for any purpose.

The pipe connection 75 which as before stated forms a fluid connection for a single spray gun, runs to the before mentioned pump 64 mounted on a shelf attached to the rear end of the machine and whereby the fluid is drawn from the tank and forced up through the flexible liquid pipe 77 which, as shown in Fig. 1, connects with a T 78 from which one pipe line 79 is extended to the spray gun and a return 80 to the preservative tank. The effect of this hook-up is obviously to insure a free circulation of fluid from the tank 21 through the pipes 77 and 80 up adjacent to the gun and then back to the tank, if for any reason the gun is not in full operation, and thereby a hot active supply of fluid close to and readily available for use at the gun at all times.

The pipe lines 66, 77 and 78 would obviously be relatively long, as in the case of spraying a roof or bridge structure, whereas the hose 79 would be comparatively short.

In the operation of the apparatus, it would obviously first be necessary to fill the water tank, the oil tank, and the fluid tank, whereupon the oil burner could be lighted to heat the water in the water tank and the fluid in the fluid tank. This immediately warms up and starts a circulation to those of the pipe lines which are open and as soon as the apparatus is in position and ready for operation, the compressor is started in a way to force compressed air through the air lines into the preservative tank, thereby forcing liquid through the liquid circulating lines 77 and 80 so that the moment the gun is opened the hot preservative is released and sprayed therefrom on to the wood to be saturated and coated therewith.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a liquid and air heating apparatus, a compressed air supply, a water heating tank means for heating said tank, a liquid heating tank submerged within the water tank, a compressed air pipe line extending into the water heating tank, wrapped around the liquid tank and extending from the water tank to provide a heated compressed air supply, a second compressed air pipe line connected with the liquid tank, a liquid pipe line connected with the said liquid tank, wrapped around the same within the water tank and extending out therefrom and connected with the said heated compressed air pipe line.

2. In a liquid and air heating apparatus, a compressed air supply, a water heating tank means for heating said tank, a liquid heating tank supported within and in spaced relation to the walls of the water tank, a compressed air pipe line extending into the water heating tank, wrapped around one portion of the liquid tank and extending from the water tank to provide a heated compressed air supply, a second compressed air pipe line connected with the liquid tank, a liquid pipe line connected with said liquid tank, wrapped around another portion of the same within the water tank and extending out therefrom and connected with the said heated compressed air pipe line.

3. In a liquid and air heating apparatus, a compressed air supply, a water heating tank means for heating said tank, a liquid heating tank supported within and in spaced relation to the walls of the water tank and having a filling inlet and a depth gauge opening, a compressed air pipe line extending into the water heating tank, wrapped around the liquid tank and extending from the water tank to provide a heated compressed air supply, a second compressed air pipe line connected with the liquid tank, a liquid pipe line connected with said liquid tank, wrapped around the same within the water tank and extending out therefrom and connected with the said heated compressed air pipe line.

4. In a liquid and air heating apparatus, a liquid heating tank, a liquid pipe connected with and encircling the heating tank, a compressed air supply connected with the tank to force the liquid therefrom, a second compressed air supply pipe encircling another portion of the liquid heating tank to force the liquid therefrom and connected with the before mentioned liquid pipe coiled around and extending from the liquid heating tank, a water heating tank enclosing the said liquid heating tank and its pipe coils, and means for heating the said water tank.

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