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Von Roeschlaub

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[54] **HOT MELT APPLICATOR AND METHOD**

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[52] **U.S. Cl.** .... **222/146 H,** 222/176
[51] **Int. Cl.** **B67d 5/62**
[58] **Field of Search** .... 222/146 H, 146 HE, 318, 222/1, 255, 135, 176, 178, 113, 265, 130, 131; 55/189, 200, 40, 175, 182, 708; 239/130, 135; 118/603, 610

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Assistant Examiner—James M. Slattery
Attorney, Agent, or Firm—Hall & Myers

[57] **ABSTRACT**

A hot melt applicator heats and maintains a joint sealing material within a precise temperature range by first flowing the material through coils located in a heat exchange bath where the material is brought to the intended temperature and viscosity. The coils convey the material to a storage tank maintained at this precise temperature range wherein the material resides for a period of time sufficient to remove certain entrapped gases such as air. Thereafter the material is dispensed to its intended area of use. The dispensing means may comprise a hose arrangement maintained within the prescribed temperature range by heat exchange coils which use as its heat exchange medium, fluid from the heat exchange bath.

18 Claims, 7 Drawing Figures

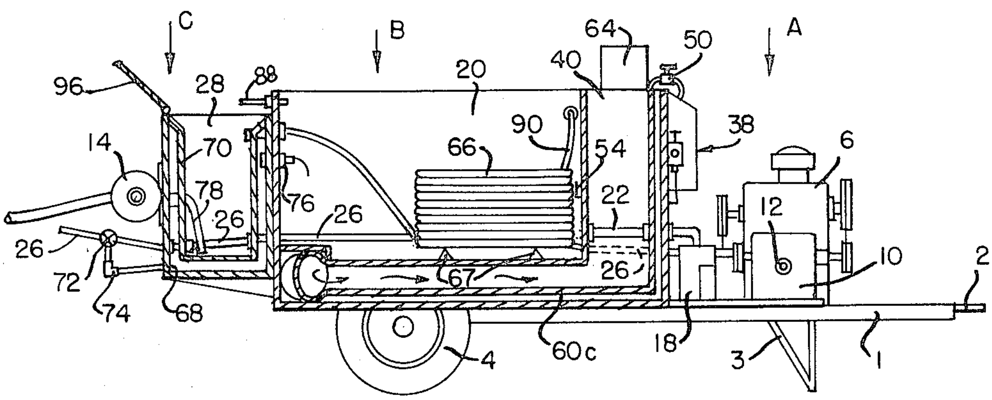

FIG. 1.

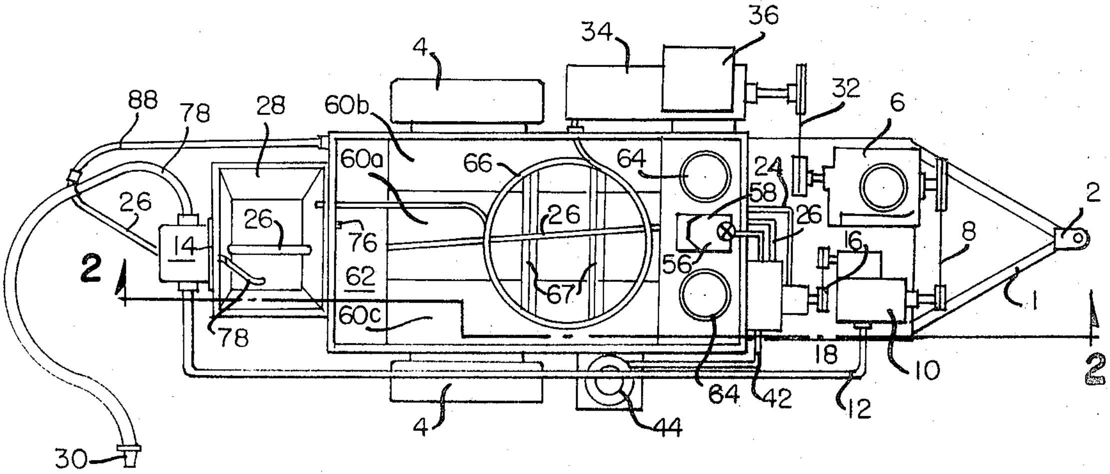

FIG. 2.

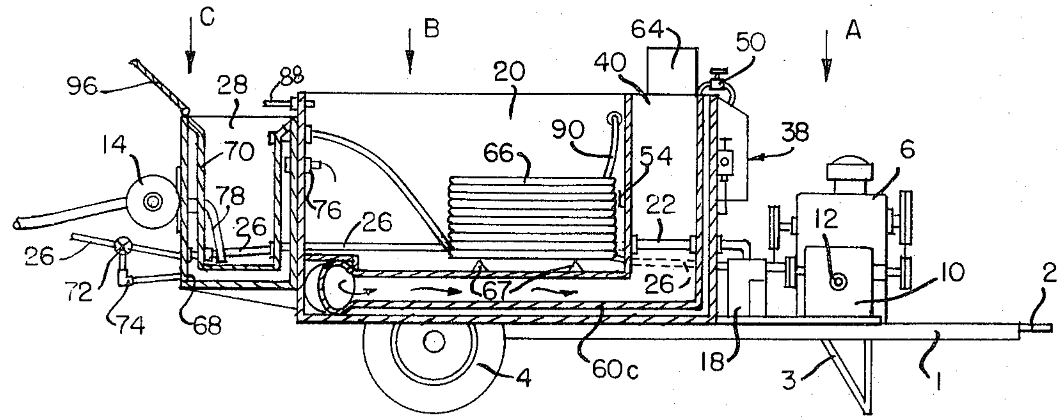

FIG. 3.

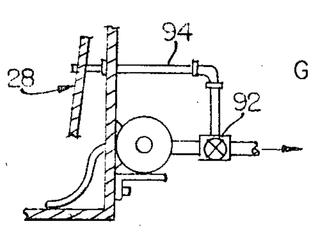

FIG. 4.

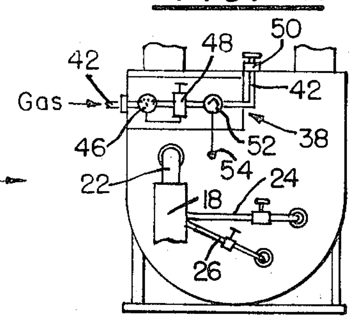

FIG. 5.

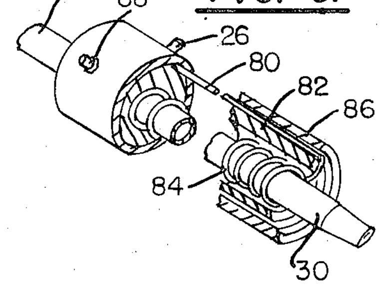

FIG. 6.

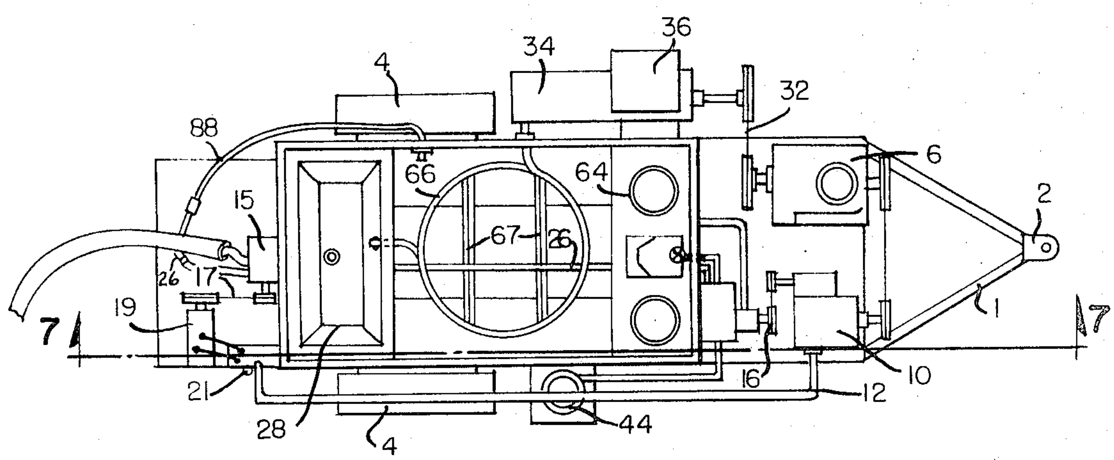
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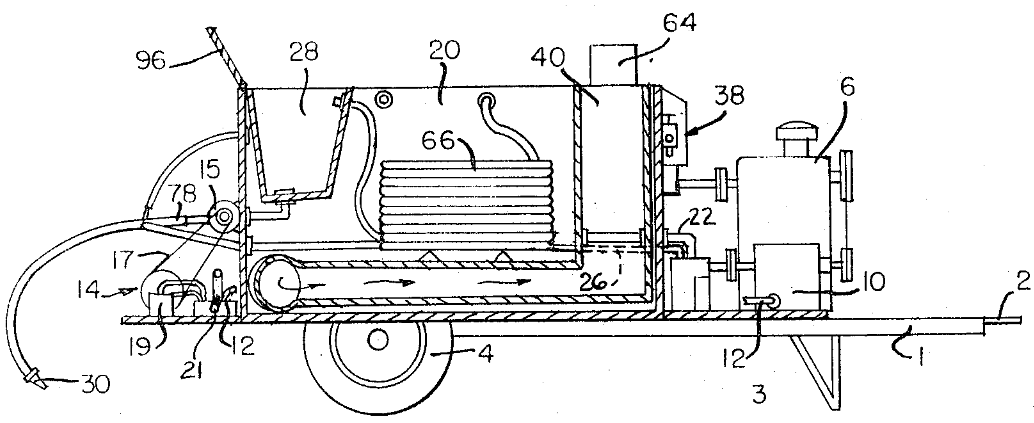
FIG. 7.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HOT MELT APPLICATOR AND METHOD

This invention relates to hot melt applicators and methods connected therewith. More particularly, this invention relates to hot melt applicators and methods capable of maintaining an organic sealing material within a precise temperature range while sufficient time is allowed for removing entrapped gases therefrom and thereafter dispensing the material at its most advantageous temperature and viscosity for sealing purposes.

Sealants have found wide use in various industries and areas of technology. Many of these sealants are comprised of a rubber-like or tar-like material which, prior to application must be heated to a specific temperature or temperature range in order to obtain the necessary low viscosity from which it may be applied to its area of use. Such areas of use have characteristically included joints between slabs of concrete that form aircraft runways, taxiways, aprons, highways, city streets, parking areas, and in wider applications such as membrane water proofing and the like.

Generally speaking, such sealants have suffered from at least one of three problems. Many sealants, for example, do not exhibit the requisite viscosity despite being heated to relatively high temperatures, so as to be readily flowable and thus form a good expansion seal between the joint or other area of use. Other sealants, as another example, while capable of achieving the requisite viscosity, and exhibiting good sealing characteristics, must be held within a relatively narrow and precise temperature range in order to achieve this viscosity and prevent gelling or cross-linking at a relatively low and high temperature respectively. Other sealants, it has been found, exhibit serious shrinkage problems when flowed into a joint and thereafter left to set or harden. Of course, many sealants exhibit a combination of two or more of the above-described problems.

One recently developed sealant composition, which exhibits excellent viscosity and sealing characteristics, thus making it especially useful as a joint sealant, is disclosed in U.S. Pat. No. 3,549,575. Generally speaking, such a sealant comprises a single component liquid hot pour composition comprising about 2–25 percent vinyl chloride resin, and a liquid coal tar pitch component consisting essentially of a pitch fraction having a boiling point of between about 355°–455° C. The composition is rendered effective by selecting a particularly type of plasticizing agent, limiting the amount of compounds of the multi-ring aromatic type to not more than about 14 percent of the pitch or pitch fraction, and by selecting a pitch fraction having a boiling point falling within the above-described temperature range.

While in theory this sealant is an excellent one, it presents many practical problems when attempting to apply it. Firstly, it exhibits serious shrinkage problems when heated under certain conditions. Secondly, it has been found that this material must be heated to, and held within, a precise temperature range (about 200°–350° F.) in order to maintain it at its proper viscosity in preparation for field application. Below this temperature range, the material is a viscous semi-gel (semi-liquid) not readily dispensed as a joint sealant (although it is pumpable as a semi-liquid). Above this temperature range, cross-linking or other chemical reaction takes place which causes the material to set up as a hard nondispensable semi-solid thus clogging the equipment and rendering the compound useless.

From the above it is evident that there exists a need in the art for an apparatus and technique capable of dispensing a wide variety of sealants which may be characterized by containing one or more of the above-described problems but which are capable, inherently, of achieving a dispensable viscosity and chemical reaction by heating. It is also evident that there exists a need in the art for an apparatus and technique capable of dispensing the unique composition of U.S. Pat. No. 3,549,575 in a way in which the problems of clogging either at a low or high temperature and shrinkage will be mitigated or eliminated.

It is a purpose of this invention to fulfill this need in the art as well as other needs which will become more apparent to the skilled artisan once given the following disclosure.

SUMMARY OF THE INVENTION

This invention fulfills the above-described needs in the art by providing a hot melt applicator which heats and maintains a sealing material within a precise temperature range by first flowing the material through coils located in a heat exchange bath wherein the material is brought to the intended temperature and viscosity. The coils are connected to a storage tank maintained within the temperature range such that conveying of the material to said storage tank permits the material to reside at its prescribed temperature therein for a period of time sufficient to eliminate certain entrapped gases, such as air, which have been found by this invention to be the major source of the shrinkage problem. Thus in this respect, the material may be considered to be "preshrunk" while still in its viscous state and before dispensing. When then finally dispensed to its area of use from said storage area, the material will act with its normally effective and excellent characteristics, but at the same time not exhibit the shrinkage problem.

In carrying out this invention, the dispensing means usually must also be maintained within this prescribed temperature range. For example, when using the composition of U.S. Pat. No. 3,549,575 (the disclosure of which is incorporated herein by reference) a serious problem of clogging would occur if the material cooled to its clogging point in the equipment before it could be dispensed. Thus, the dispensing means of this invention contemplate the employment of a hose arrangement which is brought into heat exchange relationship with exchange coils wrapped therearound which coils draw their heat exchange fluid from the aforesaid heat exchange bath in which the primary heating coils are located.

This invention will now be described with respect to certain embodiments presented by way of illustration rather than limitation and in which:

IN THE DRAWINGS

FIG. 1 is a top plan view of a field applicator in accordance with this invention,

FIG. 2 is a side partially sectionalized plan view of the embodiment of FIG. 1 taken along section line 2—2 therein,

FIG. 3 is a side diagrammatic view of a recirculating means employable in this invention,

FIG. 4 is a rear schematized view of the tank means of FIGS. 1 – 2,

FIG. 5 is a partially sectionalized perspective view of an embodiment of the dispensing means contemplated by this invention,

FIG. 6 is a top plan view of a further embodiment contemplated by this invention, and

FIG. 7 is a side plan partially sectionalized view along line 2—2 of FIG. 6.

Referring now to FIGS. 1 and 2, there is illustrated an embodiment in which the storage facility means for eliminating entrapped gases from the hot melt system is located external to the heat exchange bath. In these figures there is provided a carriage 1 having at its forward end a trailer hitch 2. Trailer hitch 2 is provided for connecting the carriage to a power-driven vehicle so that the system may be drawn to any desired location. Carriage 1 is further provided with a stand 3 for supporting the vehicle during dispensing and a set of wheels 4 for pulling the device during transportation.

The system carried on carriage 1 is generally segmentable for purposes of discussion into three separate areas of operation. Referring to FIG. 2, area A may be designated as the motor force area, area B as the heating area, and area C, as the "shrink-proofing" and dispensing area.

In motor area A there is located a drive motor 6 which may be of any type such as multi-horse powered gasoline engine. At one end, motor 6 is connected in gear driving relationship by chain 32 with pump dispensing means 34 (hereinafter more fully discussed). At its other end, motor 6 is connected in gear driving relationship by way of belt 8 to hydraulic motor and pump 10. Hydraulic motor and pump 10 may be of any conventional type and serves to provide hydraulic fluid via line 12 to hydraulic dispensing means 14 located in area C.

Hydraulic motor and pump 10 is connected in gear driving relationship by way of belt 16 to recirculation pump 18. Recirculation pump 18 may be of any conventional type and is employed for two purposes. The first purpose as illustrated best in FIG. 4, is to withdraw heat exchange fluid from heat exchange tank 20 via line 22 and recirculate it back into tank 20 via line 24. Simultaneously, some of the fluid withdrawn via line 22 by pump 18 is diverted into line 26, which line is caused to pass through tank 20, storage tank 28, and into the heat exchange coils surrounding dispensing wand 30 (more fully discussed hereinafter).

As stated, drive motor 6 operates (usually by way of a conventional manual crank shaft connection not shown for convenience) pump dispensing means 34. Pump dispensing means 34 (preferably located in zone B forward of wheels 4 but adjacent tank 20) may be of any conventional type and is usually provided with a hopper 36 which holds the nondispensed "raw" unheated sealing material. In this respect, it may be desirable in certain instances to provide preheating means within hopper 36 so as to preheat the material for better pumping via pump 34. Such preheating means may take many forms such as, for example, providing heating coils surrounding the hopper, either electrically provided by way of a generator or by way of pumping heating fluid from tank 20. Such heating means for preheating the material in hopper 36 are unnecessary when using the sealing material of U.S. Pat. No. 3,549,575 and pump means 34 is capable of pumping a semi-liquid (semi-solid). An example of one such pump means is the Moyno pump produced by Robbins and Myers, Inc. of Springfield, Ohio.

Also located within area A and usually provided on the rear wall of tank 20 is thermostatic control means generally designated at 38 and best illustrated in FIG. 4. Thermostatic control means 38 are provided so as to control the temperature of the heat exchange fluid (conventional heat exchange oil or the like) in tank 20 within a predetermined and precise temperature range. While any conventional thermostatic control means 38 capable of performing this function may be employed, it is preferred for the purposes of this invention to employ thermostatic control means which regulate burners 56 located at the bottom of tank 20 and between stack means 40. In this respect, and as best illustrated in FIG. 4, propane or other burnable gas enters line 42 from gas tank 44 conveniently located in zone B adjacent to tank 20. The pressure of the entering gas is conveniently indicated by pressure gauge 46 and regulated by conventional pressure regulator 48. Located in series with pressure regulator 48 is a conventional thermostatic control valve 52 which is capable of controlling the amount of gas provided via valve 50 through line 42 to burner 56. Thermostatic control valve 52 senses by way of probe 54, the temperature of the heat exchange fluid in tank 20 and regulates burners 56 (i.e., modulates the flame thereof) between stacks 40 so as to control heat output and thereby maintain the heat exchange fluid within a precisely predetermined temperature range. The device illustrated is somewhat simplified, and if desired, a pilot light for the burner may be employed in the circuit, such as by way of the secondary line between gauge 46 and regulator 48 (gauge 46 not being directly connected to line 42). One example of a commercially available control means 38 generally constructed as described is produced by pertlow Corporation, New Hartford, N.Y.

Heating area B generally comprises a heat exchange tank 20 of any conventional type. For the purposes of this invention, it has been found convenient to employ as tank 20, a modified version of the general construction as illustrated in U.S. Pat. No. 3,252,655 otherwise available as an Aeroil Heat-Master Kettle. The entire disclosure of this patent is incorporated herein by reference. Such a construction generally comprises in addition to tank 20, dual stacks 40 which exhaust the burner fumes. As illustrated in FIG. 1, burner 56 is located between stacks 40 and at the bottom of orifice 58. Burner 56, as described in U.S. Pat. No. 3,252,655 blows hot gaseous fumes and flame through central conduit 60*a* which terminates under plate 62 in pipe connecting fashion with return conduits 60*b* and 60*c*, which in turn, return the gases for venting through stack 40 and chimneys 64. Since conduits 60*a*, *b* and *c* are formed of a conductive metal, they are presented in heat exchange relationship with fluid (not shown) provided in tank 20.

Also provided in tank 20 and in heat exchange relationship with the heat exchange fluid therein, are heat exchange coils 66. Such coils may be made of any conventional conductive material, copper being preferred. In addition, such coils may be in any conventional shape or configuration, the only criteria being that, from an engineering point of view, sufficient heat be imparted to the material flowing through these coils to heat the material to within the prescribed temperature range for purposes of dispensing as hereinabove discussed. In order to assure uniform heating, coils **66** are preferably not in direct contact with conduits **60***a*, *b* and *c*. Rather, they are held from contact for example, by relatively thin, and if need be, nonconductive, supports **67**, to insure full surrounding emersion in the heat exchange fluid. As illustrated in FIGS. **1** and **2**, the most preferred form of these coils is circular with a number of banks (e.g., about 6–20). Coils **66** are connected, as illustrated, to pump dispensing means **34** through one of the walls of tank **20** and dispense the heat sealing material to storage or preshrinking tank **28** through a wall of tank **20**.

Area C includes a storage tank **28** which is capable of retaining the sealing material previously heated in area B for a sufficient period of time to eliminate sufficient entrapped gases therefrom to at least mitigate the shrinkage problem upon dispensing as hereinabove described. Since in many instances, and particularly when dealing with the unique sealing compositions of U.S. Pat. No. 3,549,575, a significant residence time must be provided in storage tank **28** to eliminate entrapped gases and thus prevent shrinking, it is necessary to maintain tank **28** at substantially the same temperature as tank **20** in order to prevent cooling which could cause clogging, interfere with dispensing, and causes a change in viscosity. In other instances, of course, such as where a material only has small or minor shrinkage problems, and thus where storage will be small, or minimal in time, this storage tank may be eliminated, or in any event not overtly maintained at the temperature of tank **2C**. Referring, however, to the usual situation wherein, for example, in dealing with the compositions of the aforementioned U.S. Pat. No. 3,549,575, it is necessary to maintain tank **28** at substantially the same temperature as tank **20**, there may be provided heat exchange means with tank **28** to achieve this result.

While any known and conventional way of heating tank **28** may be provided, a convenient way of achieving this result is to provide a double-chambered tank as best illustrated in FIG. **2**. Such a double-chambered storage tank **28** generally comprises outer walls **68** and inner walls **70** in such a configuration that the chamber or area defined therebetween does not communicate with the storage chamber **28**. In this way, a portion of the heat exchange fluid passing via line **26** to wand **30** may be diverted by a conventional valve construction **72** through line **74** into the heat exchange area between walls **68** and **70**, and recirculated back into tank **20** via orifice **76**.

Another manner of achieving this result, and a preferred technique for the purposes of this invention because of its simplicity of design, and efficient heat exchange relationship, is to locate storage tank **28** within tank **20**. Not only does this shorten the length of the system of this invention, but it also provides a tank immediately within tank **20** thus eliminating much of the elaborate heat exchange equipment as illustrated in FIGS. **1** and **2**. Such an arrangement is best illustrated in FIGS. **6** and **7** in which parts similar to FIGS. **1** and **2** are similarly numbered. As can be seen from these figures, tank **28** is located adjacent coils **66** but within tank **20**. In this arrangement, the walls of tank **28** are formed of relatively thin steel or other good conductive metal such that the material presented in storage tank **28** is held at substantially the same temperature as the material exiting from coils **66**.

Adjacent tank **28**, and regardless of whether it is located internally or externally of tank **20**, there is conveniently provided a pump dispensing means **14** for dispensing the "preshrunk" hot melt material to wand **30** via line **78**. FIGS. **6–7** illustrate a slightly different dispensing means **14** than is illustrated in FIGS. **1–2**. In FIGS. **6–7**, dispensing means **14** is a reversible system comprised of a pump **15** which is driven by a belt linkage **17** through reversible hydraulic motor **19**. By activating lever **21** in the appropriate direction, material can be dispensed to wand **30** or withdrawn from it and returned to tank **28**. Such a reversible arrangement is advantageous in numerous instances, since it allows for emptying of wand **30** when not being used.

Line **78** need not be heated if it is relatively short and/or the material being dispensed is not sensitive to heat or cold. On the other hand, and particularly when dealing with the compositions of U.S. Pat. No. 3,549,575, it is important that line **78** be maintained at a temperature sufficient such that the material passing therethrough does not fall below, or rise above, the prescribed temperature range thus to clog wand **30**. While this may be achieved by any conventional heat exchange means including electrical coils and the like, it is quite convenient to employ the heat exchange fluid existing in line **20** for this purpose.

As best illustrated in FIG. **5**, line **26** may provide heat exchange fluid to one end of line **80** which is located on the outward end of an internal insulation wrapping **82** which separates line **80** from heat exchange coils **84**. Then, in order to maintain the temperature of the fluid passing through line **80**, another layer of insulation **86** is provided. Coils **84** run in counter-current flow with wand **30** and line **78** to exit via line **88** for return to tank **20** and reheating therein. In this way, the material flowing through line **78** and wand **30** is maintained within a precise temperature and viscosity range right up until the time it is dispensed. Uniformity of sealing characteristics and excellent reproducability are thereby achieved.

During field operation there will be significant periods of time when the apparatus will not be dispensing material. At such times a significant amount of sealing material will reside in the coils and tubes. In certain instances it is undesirable to have the material rest too long in any one place particularly in area C, since localized cooling or heating might unduly affect the characteristics of the material and thereby clog the system. Thus, it is sometimes desirable to provide a recirculating means to maintain the material flowing through the system.

In most apparatus contemplated by this invention, it is usually not necessary to provide constant circulation in the coils **66**. This is because tank **20** is usually sufficiently large, etc., to maintain a substantially uniform heat profile to prevent localized heating, etc. On the other hand, if tank **20** were relatively small, and/or used in severe cold, and/or used with an unreliable thermostatic control means, then it might be advantageous to provide a recirculation in coils **66**. As will be explained hereinafter this is easily accomplished.

In those situations where recirculation is employed, it is usually only necessary that the material be recycled through storage tank **28** and wand **30**. This may be accomplished in its simplest configuration by merely dipping the end of wand **30** into storage tank **28** and maintaining the operation of pump means **14**. On the other hand, it may be desirable at times to empty wand **30** when it is not to be used for a relatively long period of time, and recycle in tank **28** so as to avoid the need to empty the entire system. This is best accomplished by the embodiment illustrated in FIG. **3**. In this figure, there is provided a valve means **92** for diverting a portion or all of the dispensing sealing material back into tank **28** via line **94**. Such a system would also be employed where it was found, upon initially dispensing the material into a sealing joint, etc., that insufficient residence time had been allowed in the storage tank to remove enough entrapped gases for preshrinkage purposes. In such a situation, valve means **92** would be adjusted to divert all or some of the material back into tank **28** so as to provide a further period of time in the storage tank for removal of the gases. As alluded to hereinabove, in those situations where recirculation is desired in coils **66** as well as tank **28** and wand **30**, such is easily accomplished by connecting line **94** to entrance line **90**, rather than tank **28**.

In preferred embodiments, areas B and C have loosely fitting covers **96**, (partially illustrated) so as to prevent splattering of the material and prevent local surface cooling. The cover provided in zone C (tank **28**) will never be so tight as to inhibit the elimination of the volatiles from the materials stored in the tank.

From the above, it can be seen that a unique apparatus and method of treating asphalt-like, rubber-like, or tar-like materials for purposes of providing hot melts to their dispensing area at their optimum viscosities has been achieved. In this respect, it is understood that all areas of use for these materials are contemplated and that, for example, wand **30** will be adapted to such end use. For instance, wand **30** may be a "pinched" tube nozzle for joint sealing and a spray nozzle for membrane sealing, etc.

By way of illustration as to one example of the uniqueness of this invention, reference will now be made to certain operating parameters for dispensing certain compositions as set forth in the aforementioned U.S. Pat. No. 3,549,575. Such compositions are generally illustrated in the examples of this patent. It has been found that when forming sealing joints of such compositions, they must be maintained, for nonclogging purposes, within a temperature range of about 275°–350° F. Such a temperature range in the laboratory may not be considered narrow, but in actual operation, when one is working in the colder climates of the world, particularly on airport runways, it is extremely narrow from the point of view of practicality, particularly in the winter months. It has been found however, that such a temperature range is easily achieved by using the apparatus of this invention.

A typical heat exchange oil found convenient for the purposes of this invention is Cylesso 300 produced by Humble Oil Corporation, which oil has a flash point of about 600° F. With such an oil, it is possible to maintain under some of the most rigorous conditions, the sealing material between about 290° – 300° F. (This is usually accomplished by thermometers located in the kettles and initially adjusting the thermostatic control means **38** to maintain such temperatures via its probe **54**). This can be done despite the fact that tank **20** is capable of retaining, even with storage tank **28** therein, approximately 120 gallons of heating oil (with tank **28** capable of holding about 20–30 gallons). The coils **66** are usually about 160–180 feet in length and are of three-fourths inch copper or steel tubing. Under usual dispensing conditions such sizes provide a residence time without recycle as by way of FIG. **3**, of about 5–10 minutes in storage tank **28**, which is sufficient with the aforesaid material to "preshrink" it to an acceptable level. Obviously sizes may differ to meet the various needs and contingencies experienced and/or recycle as by way of FIG. **3** may be provided to increase storage time when found necessary.

While the above invention has been described with respect to several preferred embodiments, many other features might be added thereto. For example, clutch means may be located in a known way on pumps **14** and **10** (not shown) as well as on pump means **34** (not shown) in order that the operator may actuate as desired, the apparatus. In addition the apparatus of this invention may be readily cleaned by use of a solvent which may be pumped through pump **34** and out through dispensing nozzle **33** (with or without recycling as the need may exist) so as to clean out the material to make room for, for example, the use of another sealing material, or if for some reason clogging should take place.

Once given the above, many other features, modifications and improvements will become apparent to the skilled artisan. Such features, modifications and improvements are therefore considered a part of this invention the scope of which is to be determined by the following claims:

I claim:

1. An apparatus for heating and dispensing a sealing material comprising:

a heating tank,

a material storage tank, and

a heat exchange tube bank located within said heating tank,

said tube bank being connected at one end to a source of sealing material and at the other end to the storage tank, said heating tank being capable of retaining a heat exchange fluid in heat exchange contact with said tube bank, and said storage tank being open to the atmosphere and of a size sufficient to provide a residence time of said sealing material in said storage tank;

means for heating said heat exchange fluid;

means for dispensing said sealing material to an area of use;

pump means for moving said sealing material from said source of supply through said tube bank in said heating tank into said storage tank and from said storage tank to and through said dispensing means; and

means for maintaining said sealing material within a prescribed, predetermined temperature range when the material resides in said tube bank located in said heating tank and when said material resides in said storage tank.

2. An apparatus according to claim **1** wherein said apparatus is capable of dispensing a sealing material at its sealing viscosity, which material must be heated within a precise temperature range to achieve such a sealing viscosity and held within said storage tank for a period of time sufficient to allow entrapped gases to escape therefrom, and wherein said means for maintaining said sealing material with said predetermined temperature range includes means for maintaining said heat exchange fluid within a substantially constant temperature range.

3. An apparatus according to claim 1 wherein said means for maintaining said sealing material within a predetermined temperature range includes means for maintaining said sealing material within the temperature range when the material resides in said dispensing means.

4. An apparatus according to claim 3 wherein said maintenance means further includes means for delivering said fluid into heat exchange relationship with said dispensing means, and said tube bank includes a bank of tube coils.

5. An apparatus according to claim 1 which further includes means for recirculating said fluid in the heating tank.

6. An apparatus according to claim 1 wherein said storage tank is in heat exchange relationship with said fluid.

7. An apparatus according to claim 6 wherein said storage tank is located within said heating tank.

8. An apparatus according to claim 6 wherein said storage tank is located outside of said heating, and which further includes means for delivering said fluid from said heating tank into heat exchange relationship with said storage tank and returning said fluid to said heating tank.

9. An apparatus according to claim 6 wherein said heating means includes a burner means for heating said fluid to within a prescribed temperature range and said maintenance means includes thermostatically responsive burner control means for sensing the temperature of said fluid in said heating tank and controlling the heat output of said burner means in response thereto thereby maintaining said fluid within its prescribed temperature range and thereby maintaining said sealing material within its predetermined temperature range.

10. An apparatus according to claim 9 which further includes means for recycling at least a portion of said material from said dispensing means at least to said storage tank.

11. An apparatus according to claim 9 wherein said pump means includes a pump for delivering raw material to said tube bank and a pump for dispensing said material from said storage tank.

12. An apparatus according to claim 11 wherein said dispensing pump is a two way pump capable of dispensing material through said dispensing means and withdrawing material therefrom and returning it to said storage tank.

13. An apparatus according to claim 4 wherein said dispensing means includes an elongated hollow tube, and said means for delivering fluid into heat exchange relationship therewith includes heat exchange coils extending about the outer periphery of said tube.

14. An apparatus according to claim 2 wherein said material consists essentially of a single component liquid hot pour composition comprising about 2–25 percent vinyl chloride resin, and a liquid coal-tar pitch component consisting essentially of a pitch fraction having a boiling point of between about 355° C. and about 450° C., said material being at its sealing viscosity between about 200°–350° F. and being apparatus clogging if not between about 200°–350° F., said maintenance means being capable of maintaining said material within this temperature range, whereby said apparatus is capable of dispensing said material at its proper sealing viscosity without clogging the apparatus.

15. An apparatus according to claim 14 wherein said maintenance means is capable of maintaining said material between about 290°–300° F.

16. A method of heating and dispensing a sealing material which must be applied as a sealant at a temperature within a prescribed, predetermined temperature range, said material initially containing entrapped gases at least a portion of which must be eliminated, the method comprising, conveying said material through a tube bank in heat exchange relationship with a heat exchange fluid, heating said heat exchange fluid and maintaining said fluid within a substantially constant temperature range thereby to heat and maintain said material while in said tube bank within said predetermined temperature range, thereafter conveying the heated material to a storage zone open to the atmosphere and allowing said material to reside in said zone for a period to time sufficient to remove at least a portion of said entrapped gases while at the same time maintaining said material in said storage zone at a temperature within said predetermined temperature range and thereafter dispensing said material as a sealant at a temperature within said predetermined temperature range.

17. A method according to claim 16 wherein said material consists essentially of a single component liquid hot pour composition comprising about 2–25 percent vinyl chloride resin, and a liquid coal-tar pitch component consisting essentially of a pitch fraction having a boiling point of between about 355° C. and about 450° C., and said predetermined temperature range is about 200°–350° F.

18. A method according to claim 17 wherein said predetermined temperature range is about 290°–300° F.

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