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MOLTEN MATERIAL SPRAYING APPARATUS

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Fig. 1.

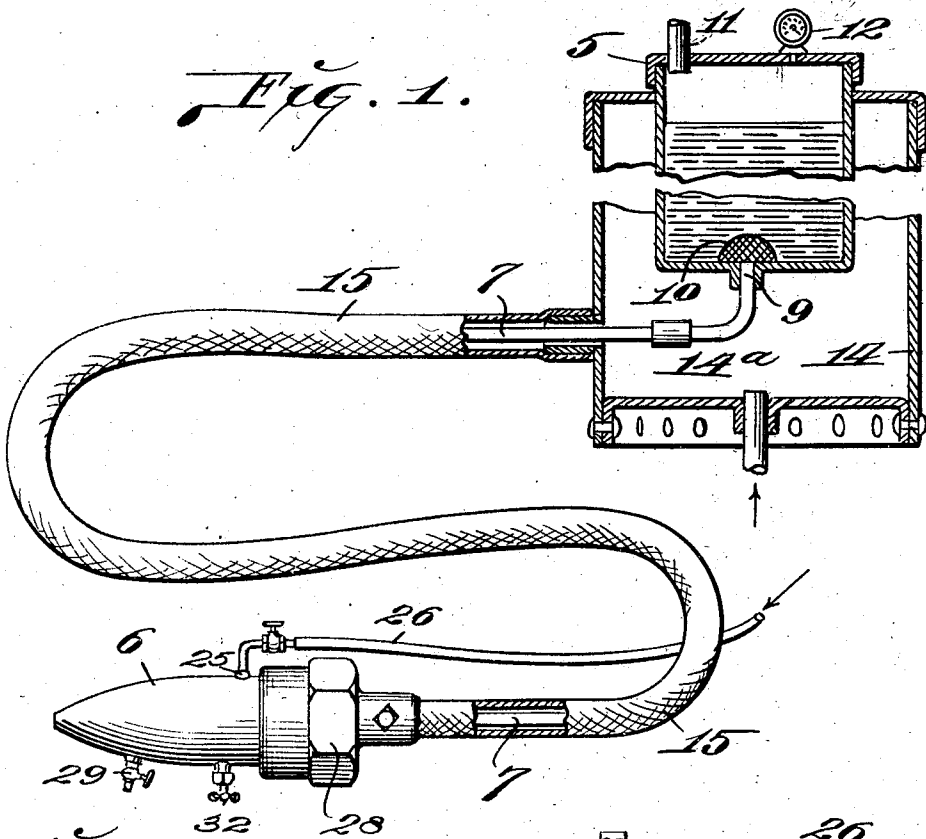
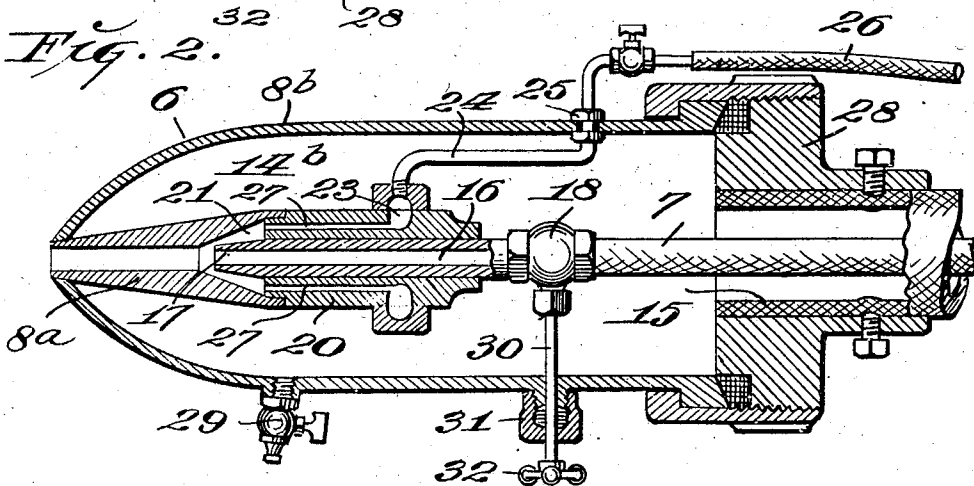


Fig. 2.



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MOLTEN-MATERIAL-SPRAYING APPARATUS.

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The present invention relates to apparatus and methods for spraying or otherwise applying materials which must be applied when in a heated state to form protective or other coatings for various surfaces or structures, such as tanks, sewers, walls, floors, pipes, columns, statuary and the like.

The invention has for its principal object, the provision of apparatus for properly applying coatings of the requisite thickness, of various materials and compounds which can only be properly applied in a heated condition.

Another object of the invention is to provide apparatus for so applying compounds of sulphur in one or more coatings of the desired thickness.

Another object of the invention is to provide apparatus for applying a variety of materials such as tars, asphaltums, waxes, pitches, sulphur and compounds of sulphur, as well as other materials and compounds which must be applied in a heated condition.

Another object of the invention is to provide improved air-spray apparatus for any of the above mentioned materials, which apparatus is capable of keeping all of the material throughout the apparatus, at a practically constant predetermined temperature in order to provide the proper fluidity.

Still another object of the invention is to provide an apparatus of the air-spray type, which will handle the above mentioned materials continuously without clogging the ports, valves, nozzles, etc., such as are required in apparatus of the character described.

We have found that the materials mentioned, especially sulphur compounds, are best applied when sprayed upon a surface in a globular state, rather than in a finely nebulized state, and it is another object of our invention to provide apparatus to forcibly deliver the materials in the correct state of subdivision.

Still other objects and advantages of our invention will appear hereinafter.

We have illustrated, by the accompanying drawings, one practical embodiment of our invention which is adapted for carrying out of our improved methods of applying materials of the character mentioned.

In the said drawing:

Fig. 1 is a view partially in section and

partially in elevation, of said embodiment of our invention.

Fig. 2 is an enlarged detail cross section of that part of the apparatus hereinafter known as the nozzle.

In carrying out our invention, by the use of the embodiment illustrated, or by any other embodiment, we provide for maintaining a heated reservoir of the material so that a dependable source of supply is had.

The material in the reservoir is maintained at a predetermined or regulable temperature so that the material which is about to be applied to a surface or the like is in the desired state of fluidity. We also provide a suitable nozzle. Air spray nozzles of the force feed or gravity feed type may be employed, or any other type of nozzle, such as a single or multiple jet, or single or multiple slot, nozzle or any other suitable distributing or material applying means.

Other means for throwing the materials forcibly against a surface in a properly subdivided state may also be used, including those employing centrifugal force. Such devices are preferably portable, but in any case, are usually situated a suitable distance from the reservoir and are connected by suitable pipes, conduits, hose or the like, in which control valve or valves may be installed.

In conformance with a salient feature of our invention, we maintain a hot fluid envelope over all parts including the reservoir, hose, valves, nozzle and even the extreme outlet end of the nozzle, if desired. The fluid envelope may be steam, hot oil or the like in circulation, hot air, or an electrically or otherwise heated atmosphere which is isolated, or insulated from the extraneous atmosphere.

In the specific embodiment illustrated, the reservoir is indicated at 5, the nozzle 6, and the hose 7, which conveys the material to the nozzle, at 7. Hose 7 in this instance is employed so that reservoir may be stationary at times while the nozzle is freely moved. The reservoir holds a large supply of the material, and the hose enters the bottom of the reservoir as at 9. A screen 10, where the nature of the material requires it, is placed over the inlet end of the hose. The reservoir is fitted with a pressure pipe 11 which keeps the contents under a given air pressure, as

indicated by the pressure gauge 12. Such air pressure will force the material steadily through the hose, although in some instances gravity may be depended upon. The reservoir is maintained in a heated atmosphere by being practically enclosed in a steam jacket 14 having an interior steam filled space 14^a. The hose 7 leads directly from the reservoir to nozzle, but is not insulated from the steam. In fact, the entire length of the hose is caused to be enveloped by steam by placing a jacketing hose 15 over the material-conveying hose. Said jacketing hose is in fluid communication with the steam space of the steam jacket.

The nozzle includes a spray nozzle body 8^a and a steam jacket 8^b. The steam jacket provides a steam space 14^b which is in communication with the space 14^a at all times by means of the jacketing hose. The nozzle jacket is extended forward to the discharge orifice of the nozzle so that the material forced from the reservoir and out of the discharge orifice is subjected to the heat of the steam throughout its entire course and all material-containing, and material-conveying parts are kept at the desired temperature.

The nozzle body includes a tube 16 that ends in an orifice 17 and said tube is connected directly to the inner hose, as by the valve 18. Said valve may be of any suitable type and is intended primarily to provide for shutting off, or throttling the flow of material.

The air pressure in the reservoir will force the now fluid material out of the tube 16, at a constant rate. The forward end of the tube is inserted in an air-conveying body 20 having a conical bore 21 from which the discharge orifice continues outwardly. The discharge end of the tube extends into the conical bore 21 and is set back suitably from the discharge orifice. The body 20 is provided with an annular cavity 23. Air under suitable pressure is supplied to the cavity by a line 24 which passes directly through the space in the nozzle jacket, and through a bushing 25 to connect with an air hose 26 externally of the nozzle. Even the air passing to the nozzle becomes heated by flowing through the line 24 and the heated nozzle body.

From cavity 23 small ducts 27 lead into the conical cavity. The jacketing hose is held to the nozzle jacket by means of a coupling 28 and the jacket may be drained of condensation by a plug 29.

The valve which controls flow through the inner hose includes a stem 30 which passes out of the jacket through a stuffing box 31 to terminate in a disc 32 operable externally of the nozzle so that the operator has control over the flow of material.

In the operation of the apparatus, steam

is admitted to the steam jacket and surrounds all material containing parts, as described. Air under pressure is admitted to the reservoir. When the material has attained fluidity, the valves are manipulated to give the correct amount of air and material. As the material is extruded into the conical bore, it is picked up by the air stream flowing from the ducts out through the discharge orifice. The arrangement of the nozzle parts is such, that when the valves are properly set, the material is broken up into a comparatively coarse spray, the material emerging from the discharge orifice in the form of globules of a size that we have found to be well suited, particularly for causing sulphur compounds to distribute rapidly and evenly over the surfaces requiring protection.

It will be apparent now that our invention provides methods and apparatus for applying protective, and other coatings, of the character described, to surfaces requiring such coatings, and while we have mentioned certain specific steps in carrying out our invention and have specified certain constructions and arrangements of parts, as well as having specified certain pressure-inducing and heating mediums, such as air and steam, we do not limit ourselves to any specific construction or arrangements of parts, and may alter same and employ any heating and pressure means without enlarging the scope of our invention, within the appended claims.

We claim as our invention:

1. In a molten material spraying apparatus, a reservoir adapted to contain molten material, a nozzle, a molten material-conveying line connecting said reservoir and nozzle, and connected heating jackets surrounding said reservoir, line and nozzle respectively.

2. In a molten material spraying apparatus, a reservoir adapted to contain molten material, a nozzle, a molten material-conveying line connecting said reservoir and nozzle, and steam jackets surrounding said reservoir, line and nozzle respectively; said jackets being connected to provide a continuous jacketing space.

3. In a molten material spraying apparatus, a reservoir adapted to contain molten material, a conduit leading from said reservoir, a nozzle connected to said conduit, a heating jacket for said reservoir, a heating jacket for said nozzle, and a conduit jacketing member leading from the first mentioned jacket to the second mentioned jacket.

4. In a molten material spraying apparatus, a reservoir adapted to contain molten material, a conduit leading from said reservoir, a nozzle connected to said conduit, a heating jacket for said reservoir, a heating jacket for said nozzle, and a jacketing member leading from the first mentioned jacket to the second mentioned jacket; said conduit

being disposed within said jacketing member.

5 In apparatus of the class described, a reservoir adapted to contain molten material, a steam jacket for said reservoir, a flexible conduit leading from said reservoir through said steam jacket, a tube at the end of said flexible conduit, said tube having a discharge end, an air-conveying body providing an air space around the discharge end of said tube, and further, having a discharge orifice leading outwardly from said space, a jacket providing a space surrounding said tube and body, the space and orifice of said body being isolated from said jacket space, a jacketing member enveloping the first named conduit and leading from the steam jacket to the space surrounding said tube and body, and an air fluid pressure line leading from points externally of the nozzle

jacket, through the nozzle jacket to said air space.

6. In a molten material handling and applying apparatus, a source of molten material supply, a duct leading therefrom, a nozzle connected to said duct and a heating jacket enclosing said duct, nozzle and source of supply. 25

7. In a molten material handling and spraying apparatus, a source of molten material supply, a duct leading therefrom, a nozzle connected to said duct, a heating jacket enclosing said duct, nozzle and source of supply and fluid pressure means leading to said nozzle. 30 35

In testimony whereof we affix our signatures.

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