

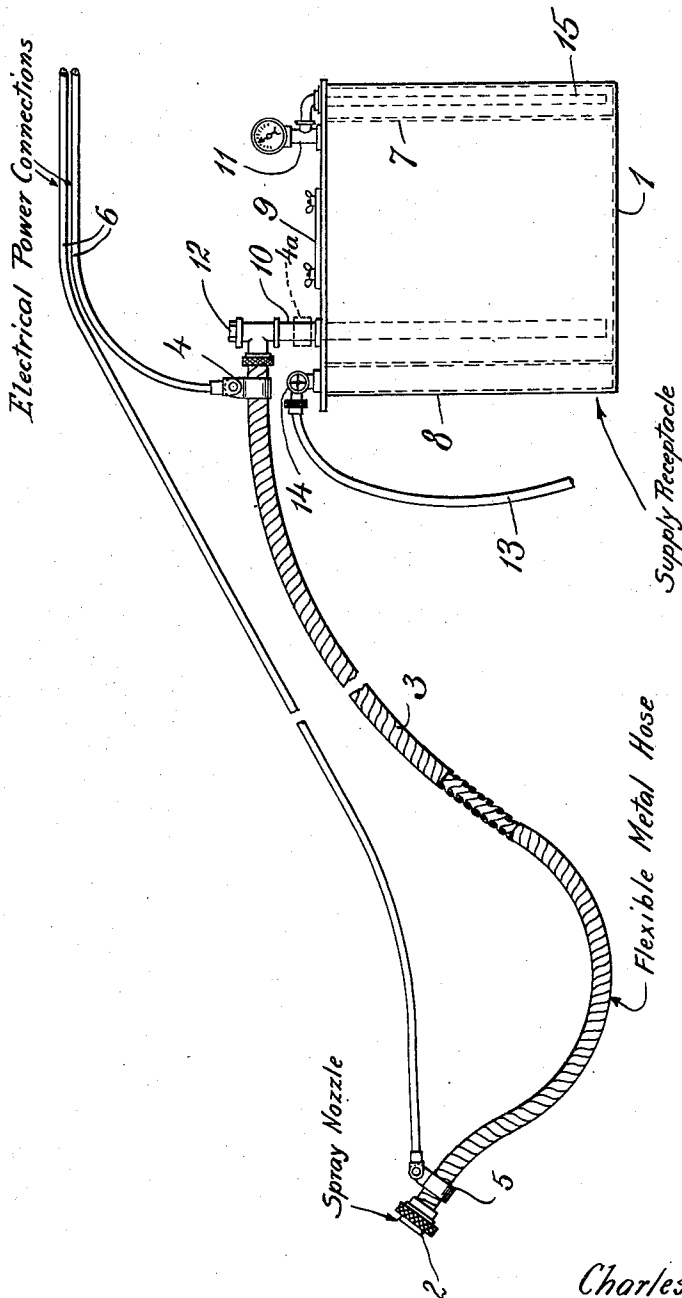
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C. DI BATTISTA

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SPRAY APPLICATION OF COATING COMPOSITIONS

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SPRAY APPLICATION OF COATING COMPOSITIONS.

Application filed May 22, 1925. Serial No. 32,035.

To all whom it may concern:

Be it known that I, CHARLES DI BATTISTA, a citizen of the United States, residing at Berwick, in the county of Columbia, State of Pennsylvania, have invented certain new and useful Improvements in Spray Application of Coating Compositions; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in the spray application of coating compositions and the like, and relates particularly to the spray application of such compositions which are solid or semi-solid or insufficiently fluid at ordinary temperatures for application in this manner.

It has hitherto been proposed to apply the ordinary types of paints, varnishes and enamels by spraying. Many bituminous, resinous and asphaltic compositions, and compositions containing sulphur, for example, however, are difficult to handle in this way because they are insufficiently fluid except at elevated temperatures. Attempts have been made to melt and then spray such materials while still molten, but usually they have been found to cool too quickly and subsequently to congeal too quickly to make this satisfactory. For commercial purposes it is usually desirable to melt such materials in batches larger than could conveniently be moved around any great number of times by a workman and this has involved the provision of some flexible connection between the supply receptacle containing the molten material and the spraying nozzle in order to give the workman sufficient freedom. One disadvantage of the attempts to which reference has just been made has been that this flexible connection had to be made very short in order to prevent choking and clogging due to congealing of the molten material before it reached the nozzle. Choking or clogging of the apparatus due to delays or interruption of the work have also made constant attention necessary to keep the apparatus in operation. The economies and advantages of the spray method of application diminish rapidly or disappear where such factors interfere with the continuity of operation and inhibit the facility of the workman. Likewise, in many cases, the result of the opera-

tion is unsatisfactory if the temperature falls too much before the material is actually sprayed. There have also been proposals to overcome this last mentioned difficulty by the application of heat in the nozzle itself but these proposals of course do not relate to the problem of uninterruptedly supplying the nozzle with the material to be sprayed through a sufficient length of flexible connection to give the workman the desired freedom. It is necessary for the material to reach the nozzle itself before such proposals can become useful.

This invention provides an improved apparatus for handling such materials as are insufficiently fluid at ordinary temperatures and delivering them continuously and uninterruptedly to spray nozzles through as great a length of flexible connection as it may be desirable to use. This invention, moreover, provides an apparatus of this character which is not cumbersome and which does not substantially differ in so far as ease of operation is concerned from the apparatus ordinarily employed for the spray application of the ordinary types of paints, varnishes and enamels.

According to the present invention, the spray nozzle and the supply receptacle are connected by a flexible hose and the material flowing through the hose is heated therein by heat generated along the length of the hose and immediately in the zone of application. As the heating may be applied throughout as much of the length of the hose as is desired, the hose also may be made as long as is desired without danger of choking or clogging due to congealing of the material flowing therethrough. This heating may with particular advantage be applied by employing a flexible metal hose and by using the metal hose itself as a resistance element in an electrical circuit, the heat generated in the metal of the hose heating the material flowing therethrough. The flexible metal hose may be insulated either electrically or thermally or both.

The invention will be further described in connection with the accompanying drawing which illustrates in a diagrammatic manner an apparatus embodying the invention and adapted for operation in accordance with the invention. It will be understood, however, that this more detailed description and illustration are for the purpose of exemplifica-

tion and that the invention is not limited thereto.

Referring to the drawing, the spray apparatus illustrated comprises a supply receptacle 1 connected to a spray nozzle 2 through a flexible metal hose 3. The spray nozzle may be of any desired or suitable design for use with the particular material being applied and as many types of these spray nozzles are well known, no particular description of any one need be given here. A connecting clamp 4 is arranged on the metal hose adjacent the supply receptacle and another connecting clamp 5 is arranged on the other end of the metal hose near the spray nozzle, and from these connecting clamps electrical connections 6 are provided to any suitable source of electrical power. When current is supplied to the power connections 6, it flows through the metal of the flexible hose itself as part of the electrical circuit and due to the resistance of the metal of the hose heat is generated throughout the length of the hose through which current is flowing. Any material flowing through the hose may thus be heated or maintained at a uniform temperature by the heat supplied electrically throughout the length of the hose connecting the spray nozzle with the supply receptacle. This heating may be easily regulated by controlling the potential at which the current is supplied with reference to the length and resistance of the particular hose employed. The hose may be of steel or of bronze or of other suitable metal. Flexible steel hose of usual construction is of appropriate resistance for the economical use of current. Other metals may be employed where the requirements as to the amount of heat to be supplied or the temperature to be used vary.

The supply receptacle illustrated comprises an inner vessel 7 arranged within an outer vessel 8, the inner vessel extending to the bottom of the receptacle. The material to be sprayed is supplied to the inner vessel through the removable cover 9 and is then forced to the spray nozzle through the connecting hose 3 and the outlet pipe 10 which extends almost to the bottom of the inner vessel by means of air pressure exerted through connection 11. A clean-out plug 12 is provided at the upper end of pipe 10. The air for forcing the material from the container through the connecting pipe hose to the spray nozzle is advantageously supplied as illustrated through the jacket about the inner vessel so that it is heated approximately to the temperature of the material in the supply receptacle before being brought in contact therewith. Air for this purpose is supplied through connection 13 and control valve 14 to the upper part of the jacket and escapes from the lower part of the jacket through pipe 15 leading to the con-

nection 11. It will be appreciated that steam or some other appropriate gas may be employed if for any reason the contact of air with the material in the supply receptacle at elevated temperature is not desired. It will be also understood that the material to be sprayed may be supplied to the supply receptacle in a molten condition or it may be melted therein by the application of heat to the lower part or bottom of the supply receptacle.

In operation of the apparatus illustrated, a batch of the material to be sprayed is introduced into the supply receptacle and unless sufficiently fluid as introduced is brought to the required degree of fluidity therein, and then while current is supplied to the electrical power connections 6 the valve 14 is opened and the material in the supply receptacle is forced out through the heated flexible hose 3 to the spray nozzle. The operation may be further illustrated by the following example: A spray tank of 18 gallons capacity was employed in conjunction with a standard $\frac{1}{2}$ " spray nozzle connected by 15 feet of $\frac{1}{2}$ " standard flexible steel hose weighing approximately 0.40 pounds per foot. The supply receptacle was kept at a temperature in the neighborhood of 300° to 350° F. by means of a burner or electrical resistance element and the hose was kept at a temperature between about 250° and 275° F. by current supplied to the ends of the hose at a potential between about 18 to 20 volts. The current flowing was about 56 amperes. This apparatus operated in this manner was employed for spraying a compound in which molten sulphur was the carrying agent, the compound also including various finely divided materials such as powdered asbestos, and the like.

It will be appreciated that the foregoing example is given simply by way of illustration. Either alternating or direct current may be employed for heating the hose. The heating effect in the hose is proportional to the square of the current and the current through any given hose is proportional to the applied potential. The heating within the hose and the temperature there maintained may be increased or decreased by increasing or decreasing the potential at which the current is supplied. With different lengths of hose the resistance of the hose of course varies and the potential at which current is supplied is correspondingly adjusted to secure the desired heating effect. The resistance of different materials also varies and here again where the hose is constructed of other conducting material the potential at which current is supplied will be correspondingly adjusted. Different temperatures may likewise be employed with different materials and in different operations. The connecting hose may also include one or

more sections of rigid piping, and may be made up, wholly or partly, of jointed or articulated piping.

Different materials have different characteristics as to the relation between fluidity and temperature, and, with materials that tend to congeal very rapidly or at relatively high temperatures, provision may be made to maintain at high temperature throughout their entire length the connections between the supply receptacle and the spray nozzle. Most metals have a high heat conductivity, and when using metal parts as in the apparatus illustrated a certain amount of heat is conveyed through the metal of the connections to parts of the connections beyond the portion through which current is actually flowing. The electrical connection 5, for example, may be moved closer to the nozzle 2, or the power connection may be made to the nozzle itself. Similarly, the other power connection may be made at 4^a instead of at 4 to prevent temperature drop through the connection 10 to the hose 3, or it may even be made to the metal of the supply receptacle itself.

It will be apparent from the foregoing description that the invention provides an apparatus for heating or maintaining the temperature of the material to be sprayed throughout as great a length of connecting hose as may be desired which is no more cumbersome than the ordinary spraying apparatus, the only additional element movable with the hose being the electrical connection adjacent the spray nozzle. By employing for this connection a flexible cable there is but very slight increase in the bulk and weight of that part of the apparatus which the workman has to handle. By generating heat along the hose or in the hose itself the use of extraneous heating means or of any cumbersome connections through extraneous heating means is avoided and the heat is usefully applied as it is generated. Clogging is prevented, even though there be accidental interruption or long delay of the operation as the heat generated in the hose or flexible connection maintains the material therein fluid whether it is flowing or not. The invention has been particularly described in connection with the use of materials necessary to be maintained at elevated temperatures to be sufficiently fluid for spraying application, but the invention is also useful in other cases where it is necessary or desirable to maintain the temperature or to heat the material supplied to the spray nozzle. In cases where it is not necessary to heat the material to be sprayed

in order to render it sufficiently fluid for spray application, the supply receptacle may be unheated and the entire heat input may be effected in the flexible hose connecting the supply receptacle and the spray nozzle.

I claim:

1. An improved spraying apparatus comprising a spray nozzle with a supply receptacle, a flexible metal hose connecting the nozzle to the receptacle and an electrical circuit for heating the flexible metal hose substantially throughout its length, said metal hose forming one portion of the heating circuit, whereby material passed through the hose from the supply receptacle will be maintained in a heated condition.

2. In spraying apparatus, a spray nozzle and a flexible hose connected thereto for supplying the nozzle, said hose being of metal and forming a resistance element in an electrical circuit for heating material flowing therethrough to the nozzle.

3. In spraying apparatus, a spray nozzle and a hose connected thereto for supplying the nozzle, said hose being flexible and provided with electrical heating means extending over a substantial portion of its length for heating material flowing through the hose to the nozzle.

4. An improved spraying apparatus, comprising a spray nozzle and a supply receptacle, a flexible metal hose connecting the nozzle and the receptacle, an electrical connection to the hose adjacent the receptacle and an electrical connection to the hose adjacent the nozzle, the metal of the hose between the said connections forming a resistance element in an electrical circuit for heating material flowing therethrough to the nozzle.

5. An apparatus for increasing and retaining fluidity of material and for spraying the same, which includes a container for the material, means for heating the material while in the container, a flexible conduit, having a discharge outlet, through which the material is adapted to flow, means for generating heat and for supplying the heat to the material in the conduit substantially throughout its length in order to maintain the material in a fluid condition while flowing therethrough, and means for causing the heated material to pass out of the discharge outlet so that it may be sprayed upon a surface.

In testimony whereof I affix my signature.

CHARLES DI BATTISTA.