June 9, 1953 S. A. W. JEURLING 2,641,676

APPARATUS FOR MELTING WAXY COMPOUNDS FOR SPRAYING PURPOSES

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Fig. 1.

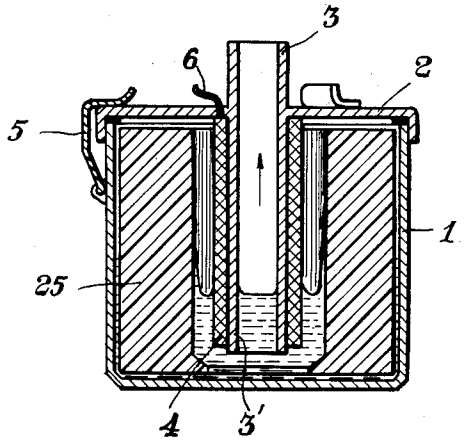


Fig. 3.

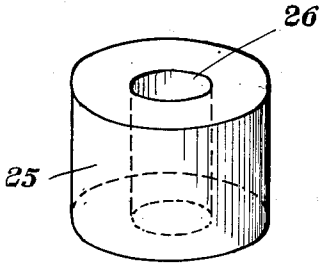
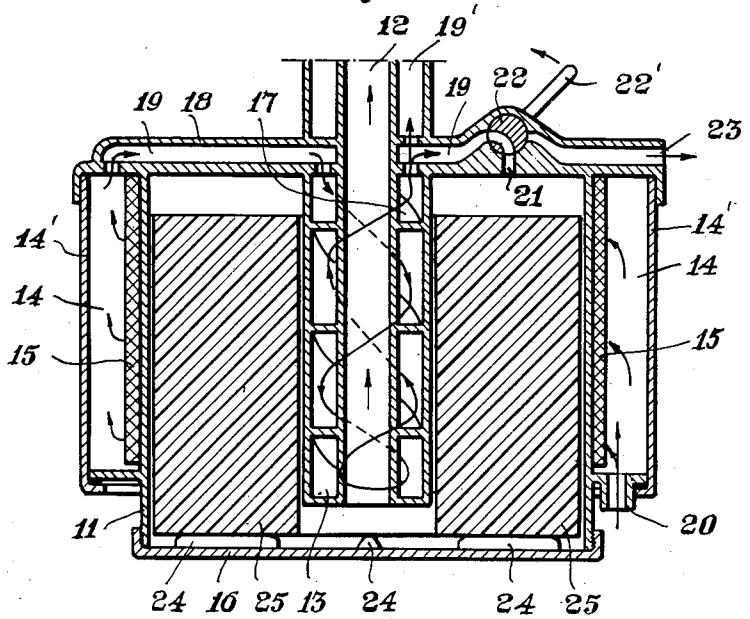


Fig. 2.



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APPARATUS FOR MELTING WAXY COMPOUNDS FOR SPRAYING PURPOSES

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3 Claims. (Cl. 219—19)

1

This invention relates to an apparatus for melting waxy compounds, such as waxy paints sprayed on iron structures as a protection against corrosion, which at room temperature take a solid, plastic or viscous form, and which are intended to be melted and to be rendered liquid by heating and after that to be fed to a spraying gun or the like in order to be sprayed on surfaces, which are to be protected against rust or the like. Heated containers for such purposes are previously known in the so-called hot-paint spraying art, but in these known containers the compounds are heated rather slowly and in a direction inwardly from the periphery, since the heat emitting means are arranged around the container. This means that the compound adjacent the discharge opening of the container communicating with the spraying gun, which opening for practical reasons is commonly located centrally in the container, will be melted or influenced by the heat last of all, the contents of the container thus tending to cause clogging in the discharge line.

The slow heating and melting of the compounds to be sprayed involves a reduction of the capacity of the spraying plant and to increase this capacity it has been suggested, therefore, to connect the spraying gun by a flexible tube, which is heated preferably by electrical means, with a large-sized pressure receptacle, which also may be electrically heated, so that the supply of fresh unheated compound to the plant would be necessary only at long intervals. In spite of considerable advantages this system is not very practical because of the difficulty of attaining flexible tubes of a suitable nature which are capable of withstanding the high temperatures and pressures involved, also the parts incorporated in the spraying plant become difficult to manage when moved about.

In accordance with this invention it has been found that a surprisingly good melting result is obtained by locating a heating element substantially centrally in the container and preferably about or adjacent the tube or tubes, through which the molten compound is discharged to the spraying gun. In addition to the fact that the compound itself serves at least partially as heat insulation about the heat emitting element, the compound is primarily melted down in that portion, which is first discharged from the container, so that clogging or the formation of plugs thereof are avoided and the discharge of the compound takes place already before the whole quantity thereof has been melted down or liquefied. During the time necessary for discharging the liquefied portion of the compound, further portions thereof are melted down or rendered liquid until the whole quantity of the mass has been consumed.

2

The invention may be put into effect in various ways. Thus the heating element may be an electric heater, or a heat exchanger for a medium having a suitable temperature, as will clearly appear from the following description of certain embodiments of the invention which are illustrated in the accompanying drawing.

In the drawing, Fig. 1 shows an axial section through an apparatus according to the invention, where the heat-yielding element is constituted by an electric heating element, while Fig. 2 shows an axial section through a more developed arrangement, which is also capable of delivering hot air to be used in the spraying process. Fig. 3 shows a compound or paint cartridge intended to be used in an apparatus according to the invention.

Referring to Fig. 1, the device according to the invention consists of a container 1, which is provided with a removable lid 2 provided with a central discharge tube 3 which projects into the receptacle 1 to a suitable depth, and which carries a sleeve-shaped electrical heating element 4 about the projecting portion 3'. The lid 2 may be rigidly secured to a spraying gun adapted to discharge the compound heated in the container, said compound being fed out to the spraying gun through the tube 3. The container 1 is capable of being connected to the lid 2 in a suitable manner from underneath, as by means of claws 5. The heating element 4 is connected to a suitable source of current through conductors 6, and is of course insulated from the melting mass.

The apparatus shown in Fig. 2 may in principle be divided into three main parts, i. e. a receptacle 11 for the compound, from which the latter is to be discharged in a molten state through a central tube 12 projecting into the receptacle, a heat yielding element in the form of a heat exchanger 13 arranged about the portion of the tube 12 entering the receptacle 11, said heat exchanger having hot air flowing therethrough, and an annular air heating chamber 14 arranged around the receptacle, through which chamber air under pressure is passed and heated to a high temperature with the aid of an electrical heating element 15 arranged about the inner wall of the chamber 14 adjacent to the receptacle 11, said heated air being then fed to said heat exchanger. Thus the compound is here heated in the recep-

tacle 11 both from the outside by the electrical heating elements 15 and centrally by the heat exchanger 13 adjacent the discharge tube 12, to secure an exceedingly rapid and thorough heating of the compound in the receptacle.

It has been found best to invert the compound receptacle 11 and provide a lid 16 at the lower end thereof. The peripheral wall of the receptacle constitutes the inner wall of the air heating chamber 14 around which the electrical heating element 15 is wound within said air heating chamber 14, which has an outer wall 14'. The heat exchanger 13 about the discharge tube 12 is located centrally within the receptacle 11. The heat exchanger 13 may be arranged in a number of ways to cause the hot air to circulate and to flow down to the lowermost end portion of the heat exchanger. In the arrangement illustrated in the drawing, this is achieved by means of helically shaped partitions 17. Preferably, the air heating chamber 14 and the heat exchanger 13 are rigidly connected to one another through a top structure 18 containing suitable channels 19 for the passage of the hot air from the air heating chamber 14 to the heat exchanger 13 and thence further outwardly so as to permit the hot air to be readily conveyed to any desired location. The top structure 18 may be advantageously connected rigidly to the spraying gun, if the dimensions of the apparatus permit such an arrangement. Cold air is supplied into the air heating chamber 14 through an inlet 20 from a compressor, and the electrical heating elements 15 are supplied with electric energy in any suitable manner through extensions, not shown, affording a tight pressure-resistant fit.

Some of the air leaving the heat exchanger 13 enters the receptacle 11 through an aperture 21 in the top structure 18 to form an internal pressure therein facilitating the discharge of the liquefied compound in the receptacle. A valve 22 with adjusting lever 22' is provided to close the communication between the heat exchanger 13 and the receptacle 11 and to open said receptacle to the open air at 23 so that the internal pressure may be reduced before removal of the lid 16 of the receptacle. The lid 16 is on its inside provided with flanges or projections 24 to establish communication under a solid compound body inserted in the receptacle between the outer and inner side thereof during melting.

It is not necessary to generate the hot air in an air heating chamber arranged about the receptacle 11, as shown in Fig. 2, inasmuch as the hot air can be conveyed into the heat exchanger 13 from an arbitrary source, but the arrangement shown in Fig. 2 offers great advantages not only with respect to the requirement of space and manageableness but also in regard to heat losses within the system. The hot air may be conveyed from the heat exchanger 13 into the spraying gun through an annular pipe 19' surrounding the extension of tube 12, and further utilized in the spraying process in any desired manner.

The use of hot air as a source of heat for melting the compound in the receptacle 11 also offers the advantage that if the compound threatens to become overheated, for instance in pauses during the work, it can be cooled immediately by cutting off the current supplied to the electrical heating element 15 while the air entering the system will then serve as a cooling medium as it continues to flow through the heat exchanger, as supplied for instance from a compressor.

The apparatus according to the invention may obviously be used for the heating of any viscous compound, such as paints, but where the melting of solid or plastic compound is involved, the arrangement involves the problem of facilitating the introduction of the solid or plastic compounds into the receptacle. Pre-cast cylindrical compounds or paint cartridges are known, of a size to fit the receptacle and be readily introduced into it, but these cartridges are unserviceable in the arrangement according to the present invention because of the location of the heat-yielding element. According to the invention, the compound or paint cartridges intended for the apparatus are therefore made with a central hole, into which the discharge tube and the heat-yielding element of the apparatus may be introduced. As indicated in Fig. 3, which shows a perspective view of a paint cartridge 25, the hole 26 may advantageously extend through the whole of the cartridge, so that the location of the cartridge in the receptacle is fixed. If the apparatus for the melting of the cartridge is provided with a plurality of discharge tubes and heat-yielding elements, the cartridge will obviously have to be made with a corresponding number of holes.

As will appear from Fig. 1, the cartridge or filler body is melted down, on being introduced into the apparatus, from the inside out so that the molten and liquid mass collects about the discharge tube and can be delivered immediately to the spraying gun, although the entire cartridge may not be molten. Through radiation, fresh portions of the cartridge are then melted down successively, and these liquefied portions are also collected within the central space in the cartridge. The cartridge may in part thus be sprayed at the same time as it is being melted, the loss of time in the filling of the receptacle becoming consequently very slight. In the apparatus shown in Fig. 2 the cartridge is rapidly melted down both from the inside and the outside by means of heat exchanger 13 and electrical element 15 respectively and all the liquid collects near the lid 16 for further discharge through the tube 12, the projections 24 forming a flowing space under the cartridge.

When a cartridge which has been inserted in the apparatus shown in Fig. 2 is substantially consumed the air pressure within the receptacle is reduced by adjustment of the valve 22, the apparatus is then inverted and the lid 16 removed. The liquid compound remaining in the receptacle, upon insertion of a new cartridge, replacement of the lid and re-inverting of the apparatus forms an initial dischargeable volume allowing immediate use of the spray gun.

A number of modifications of the apparatus and of the cartridge intended for the same are obviously conceivable within the scope of the invention, and the embodiments shown are only to be regarded as examples to illustrate the inventive idea.

I claim:

1. A combined heater for melting and liquefying waxy compounds for spray gun discharge and for heating air to be used in the spraying process, comprising in combination a receptacle for the compound to be heated, an air heating chamber arranged around and on the outside of said receptacle, an electric heating element located within said air heating chamber adjacent the wall of said receptacle and means for passing air through said air heating chamber to said spray gun.

2. A combined heater for melting and liquefy-

ing waxy compounds for spray gun discharge and for heating air to be used for positively spraying the melted compound; said combined heater comprising a closed receptacle for the compound to be heated, said receptacle having an upwardly projecting discharge tube for the melted compound, an air heating chamber arranged around and on the outside of said receptacle, an electric heating element located within said air heating chamber adjacent the wall of said receptacle, means for passing air under pressure through said air heating chamber to said spray gun and valve means for admitting heated air under pressure into said receptacle for discharging said compound.

3. A combined heater according to claim 2, further comprising a heat exchanger chamber disposed around said discharge tube within said receptacle and communicating with said air heating chamber so that heated air under pressure passes through said heat exchanger chamber for heating the compound during travel of the latter through said discharge tube, and helical guide means in said heat exchanger chamber to effect swirling of the heated air.

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