

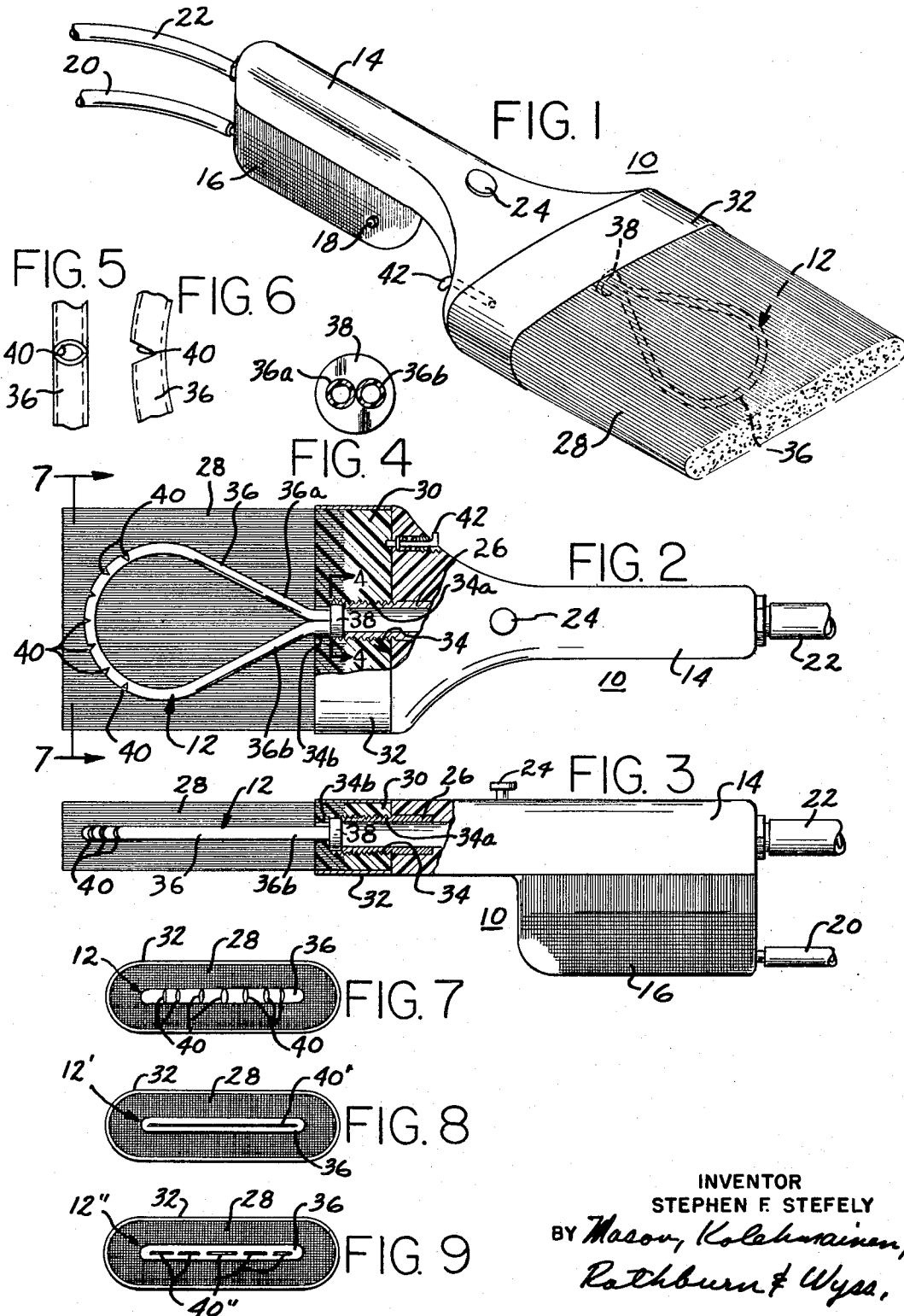
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LIQUID COATING MATERIAL APPLYING APPARATUS

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ABSTRACT OF THE DISCLOSURE

Liquid coating material applying apparatus includes a brush formed of a support block and bristles. A disperser introduces liquid coating material into the bristles and includes a continuous, apertured polyvinyl chloride tube having its ends joined to form a loop among the bristles. An enlarged portion is attached to the ends of the tube, and the loop is deformable so that it can be inserted into the brush through an opening in the support block. The enlarged portion engages the support block and holds the loop within the brush.

The present invention relates to liquid coating material applying apparatus and more particularly to improved apparatus for dispersing liquid coating material into the bristles of a brush.

The terms liquid coating material, or coating material, when used in this specification, are intended to encompass any liquid which might be spread on a surface in a thin layer or coating. Thus, the terms include, but are not necessarily limited to, paints, varnishes and enamels as well as glues or adhesives in liquid form.

Known apparatus for applying liquid coating material to a surface from a reservoir may include a handheld brush applicator to which the coating material is supplied from the reservoir. With such devices, the liquid coating material is fed to the brush bristles and is subsequently brushed onto the surface to be coated. The applicator may include a disperser for discharging the liquid coating material into the brush bristles. One example of this type of apparatus may be found in my copending application entitled Liquid Coating Equipment, Ser. No. 325,978, filed Nov. 26, 1963, now Patent No. 3,304,573.

In order for the brush applicator of liquid coating apparatus to operate satisfactorily, the disperser must be able to discharge coating material evenly and continuously into the brush. Known devices have proven unsatisfactory in this respect for many reasons. Some are not effective to supply liquid coating material evenly over a substantial portion of the width of the brush. Many known devices do not feed evenly in all positions of the brush, and with some devices the flow is interrupted when there is pressure on the brush. An additional disadvantage of known devices resides in the fact that they are difficult to clean, and thus become clogged or fouled after a period of use. Furthermore, known dispersers are either too stiff or rigid, thus interfering with the action of the brush, or they are not rigid enough and sag out of position, especially when loaded with coating material.

Accordingly, it is an object of the present invention to provide an improved disperser capable of overcoming the disadvantages of known devices.

It is another object to provide improved liquid coating material applying apparatus capable of continuously applying coating material evenly onto a surface regardless of the position of the brush and the pressure on the brush.

Yet another object of the invention is to provide improved apparatus including a disperser readily removable from the brush for cleaning or replacement.

Another object of the invention is to provide an im-

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proved disperser of simple construction which may be produced very economically.

A further object is to provide an improved disperser able to feed liquid coating material evenly onto the brush bristles in any position of the brush.

Yet another object of the invention is to provide an improved disperser characterized by the fact that flow into the brush is not interrupted by pressure on the brush.

Another object is to provide a disperser for a brush characterized in that it is easily flexed with the brush, but does not sag out of its proper position in the brush.

A further object of the invention is to provide an improved arrangement for mounting a disperser in a brush characterized in that the disperser can easily be mounted and removed, but does not come loose during use, and characterized in that leakage cannot occur at the region where the disperser is secured.

Briefly, liquid coating material applying apparatus embodying the features of the present invention may include a brush applicator having a handle releasably attached to a support to which are secured a plurality of bristles forming a brush. Liquid coating material is fed to the handle and enters a passageway in the support from which it is discharged into the brush. In accordance with a feature of the invention, there is provided a novel disperser including a tube of flexible material formed into a loop within the brush, and the loop is provided with one or more apertures for discharging the liquid coating material into the brush bristles. The loop shape provides an economical arrangement capable of evenly applying the coating material under all conditions over the working portion of the brush.

The looped flexible tube is provided with apertures for discharging the liquid coating material into the brush bristles. In one embodiment of the invention, the outside of the loop is provided with several small transverse slits that are held open due to the curvature of the loop. In the other illustrated embodiments, one or several axial slits are used. The apertures in the looped slitted tube remain open even when pressure is applied against the brush, and thus the disperser of the present invention is free from disadvantageous interruptions of the flow of coating material to which known devices are subject.

In order that the disperser may be conveniently cleaned or replaced if desired, a novel arrangement is provided for releasably mounting the disperser on the support. Thus, the support includes an opening through which the flexible tube may be inserted. The disperser includes a flexible enlarged end portion, communicating with the ends of the looped tube and engageable with the opening for holding the loop in the brush bristles. The disperser can be removed from the brush by moving it out from the rear of the support, but it cannot be removed in the other direction, and cannot come loose during use. Furthermore, an arrangement is provided whereby the flexible enlarged end is compressed and serves as a seal to prevent leakage of coating material.

The looped shape of the disperser tube provides a very stable spring-like action for holding the disperser in the proper position within the brush. Thus, the disperser does not tend to sag out of shape even when loaded with liquid coating material. Nevertheless, due to the use of flexible material for construction of the looped tube, the disperser is able easily to flex with the brush, particularly in a direction perpendicular to the width of the brush and perpendicular to the plane of the loop.

The above and further objects and advantages of the present invention will appear from the following description taken with the accompanying drawing, in which:

FIG. 1 is a perspective view of a liquid coating material

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applicator embodying the features of the present invention;

FIG. 2 is a top view, partly in section, of the apparatus of FIG. 1;

FIG. 3 is a side view, partly in section, of the apparatus of FIG. 1;

FIG. 4 is an enlarged sectional view of the disperser of the apparatus of FIG. 1 taken along the line 4—4 of FIG. 3;

FIG. 5 is an enlarged fragmentary view of a part of the disperser;

FIG. 6 is an enlarged fragmentary view of a part of the disperser;

FIG. 7 is a sectional view of the apparatus of FIG. 1, taken along the line 7—7 of FIG. 3;

FIG. 8 is a view similar to FIG. 7 of apparatus comprising an alternative embodiment of the invention; and

FIG. 9 is a view similar to FIG. 7 of apparatus comprising another alternative embodiment of the invention.

Having reference now to the drawing, and initially to FIG. 1, there is illustrated a handheld brush applicator embodying the features of the present invention and generally designated as 10. In accordance with an important feature of the present invention, the applicator 10 is provided with a new and improved disperser generally designed as 12 for discharging liquid coating material into the brush of the applicator 10.

Many details of construction and the operation of the applicator 10 are similar to the brush applicator described in my above mentioned copending application. Briefly, the applicator 10 includes a handle 14 upon which is mounted a compressible bulb air pump 16. By virtue of a check valve 18 on the pump 16 air pressure may be developed within the pump 16. This air pressure is supplied to a remote reservoir (not shown) through a flexible conduit 20. As a result of the air pressure within the remote reservoir, liquid coating material is forced out of the reservoir and through another flexible conduit 22 to the handle 14.

Within the handle 14, the liquid coating material travels along a passageway defined in the handle to a suitable valve, controlled by a valve operating member 24 conveniently positioned at the top of the handle 14. By manipulation of the valve operating member 24, the flow of liquid coating material from the reservoir to the brush may be controlled. From the flow controlling valve, the liquid coating material travels along a passageway defined at least in part by a rigid or substantially rigid tube 26 toward the brush. The tube 26 is securely fixed to the handle 14.

The applicator 10 includes a brush 28 formed in conventional manner of a plurality of brush bristles held in a resinous support block 30 surrounded by a ferrule 32. The support block 30 is detachably connected to the handle 14 and is provided with a central opening 34 receiving the tube 26 whereby the liquid coating material is fed through the support block 30 toward the brush 28.

The disperser 12 is mounted to the support block 30 and is positioned within the bristles of the brush 28. In accordance with a feature of the invention, the disperser 12 comprises a length of flexible tubing 36 formed into the shape of a loop. The two ends 36a and 36b of the tubing 36 are joined to an enlarged end portion 38 of the disperser 12. As described hereinafter, the end portion 38 is mounted in novel fashion to the support 30, whereby the looped tube 36 is firmly held by the support block 30 in the midst of the brush bristles.

In accordance with a feature of the invention, the looped tube 36 is provided with a series of apertures 40 comprising transverse slits spaced along the outer periphery of the loop. The apertures 40 are disposed along the part of the loop near the tip of the brush 28. Liquid coating material fed to the disperser 12 through the two ends 36a and 36b of the tube is discharged into the brush bristles through the apertures 40.

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The novel looped shape of the tube 36 provides several advantages in the operation of the disperser 12. The apertures 40 are conveniently spaced across a substantial portion of the width of the brush 28, whereby the liquid coating material is evenly fed across the working portion of the brush. Furthermore, during use of the brush, the pressure on the brush does not interrupt the flow of paint through the disperser.

The looped shape additionally provides a spring-like action to the disperser 12 which tends to hold the disperser in its proper position, even when loaded with coating material. The spring-like action provides a resistance to movement of the disperser in the plane of the loop of the tube 36. However, the resistance provided against movement in a direction normal to the plane of the loop is somewhat less, whereby the disperser does not interfere with the flexible action of the brush 28 during application of coating material.

Another advantageous feature of the disperser 12 constructed in accordance with the invention is that both ends of the loop are simultaneously supplied with liquid coating material. Accordingly, the pressure of the coating material throughout the disperser tends to be quite even and as a result an even flow of coating material is supplied to the brush across its entire width.

In accordance with yet another feature of the invention, the disperser is mounted in novel fashion within the applicator 10, and is easily removable therefrom, if desired, for cleaning or replacement. Thus the central opening 34 in the support block 30 includes an innermost segment 34a large enough to receive the enlarged end portion 38 of the disperser 12. An outermost segment 34b of the opening 34 is too small to receive the enlarged end portion 38, but is large enough to receive the tubing 36 which easily can be deformed from its looped shape and can then be inserted through both segments of the opening 34. Thus the disperser 12 is installed through the rear of support block 30 and into the brush 28 until the enlarged end portion 38 engages the segment 34b of the opening. Furthermore, after being installed, the disperser cannot accidentally be pulled out through the brush 28, and additionally cannot work loose during use of the applicator 10. However, if desired, the disperser can easily be removed from the support block 30 by pushing it out in a rearward direction through the opening 34. In this manner, if desired, the disperser may be removed after use and soaked or otherwise cleaned.

In accordance with another feature of the invention, the disperser itself acts as a seal to prevent the leakage of the liquid coating material before it reaches the apertures 40 in the tubing 36. Thus the enlarged portion 38 of the disperser is formed of a flexible material, which may be the same as the material of which the tubing 36 is formed. In addition, the enlarged portion 38 is sized to fit snugly within the segment 34a of the opening 34 in order to form a seal with the wall of the opening (FIGS. 4 and 5).

The segment 34a of the central opening 34 in the block 30 is internally threaded to receive external threads on the tube 26. Thus in order to mount the support block 30 and brush 28 onto the handle 14, the block 30 is conveniently threaded onto the tube 26. In order to hold the support block 30 and brush 28 in position on the handle, a spring latch 42 is engaged with a cooperating recess on the block 30. If desired, the tube may be long enough so that threading of the tube 26 tightly into the opening 34 causes the end of the tube 26 to compress the enlarged end portion 38 of the disperser 12 thereby assuring even a better seal between the enlarged portion 38 and the wall of the opening.

If desired, any other suitable arrangement may be used to attach the support 30 to the handle 14.

In a device constructed in accordance with the present invention, the tubing 36 was formed of a polyvinyl chloride material, but it is believed that any other elastomeric

material such as chlorinated rubber could be used. The material used had a durometer hardness, Shore A, of 60 measured by the A.S.T.M. method D676-58T. It is believed that at least any material in the approximate range of 35 to 95 would be suitable for the tubing 36. The tubing used had an inside diameter of $\frac{3}{16}$ inch and an outside diameter of $\frac{1}{4}$ inch, but it is believed that the inside diameter of the tubing could vary at least within the range of $\frac{1}{8}$ inch to $\frac{1}{4}$ inch.

Having reference now to FIGS. 8 and 9, there are illustrated two alternative embodiments of the present invention. The embodiments there illustrated are identical to the embodiments of FIGS. 1-7 except in the orientation of the apertures provided in the disperser 12, and the identical portions are given the same reference numerals.

The embodiment of FIG. 8 includes a disperser 12' provided with an aperture 40' comprising an elongated axial slit in the outer periphery of the looped tube. In FIG. 9 the disperser 12'' is provided with a series of axially disposed slits 40''. The advantages of the disperser 12 discussed above can also be obtained with the dispersers 12' and 12''. In particular, the resiliency and stiffness of the material used for the tubing prevents the disperser from being closed due to pressure on the brush. Thus even when the brush is bent over to a considerable extent, it has been found that the liquid coating material flows freely from the disperser into the brush through any of the illustrated apertures.

While the invention has been described in connection with particular embodiments thereof, it will be understood that those skilled in the art may make many changes and modifications without departing from the invention. Therefore it is intended in the appended claims to cover all changes and modifications which fall within the true spirit and scope of the invention.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. Liquid coating material applying apparatus comprising in combination a support, a plurality of bristles secured to said support to form a brush at one surface of said support, means defining an opening extending through said support between said one surface and another surface of said support, and a disperser releasably mounted on said support for introducing liquid coating material into said brush, said disperser including a hollow flexible apertured tube having first and second ends joined to form a loop and including an enlarged portion secured to said tube near said ends, said loop normally being larger than said opening and being deformable to a configuration wherein the loop may be inserted through said opening and into said brush, said enlarged portion being engageable with said opening for holding said loop portion within said brush.

2. Liquid coating material applying apparatus comprising in combination a support, a plurality of bristles secured to said support to form a brush at a first surface of said support, means defining an opening extending through said support between said first surface and a second surface of said support, said opening including a relatively smaller segment adjacent said first surface and a larger segment adjacent said second surface, and a disperser releasably mounted on said support for introducing liquid coating material into said brush, said disperser including a hollow flexible apertured tube having first

and second ends joined to form a loop and including an enlarged portion secured to said tube near said ends, said loop normally being larger than said opening and being deformable to a configuration wherein the loop may be inserted through said opening into said brush, said enlarged portion being receivable within said larger segment of said opening and engageable with said smaller segment for holding said loop portion within said brush.

3. The liquid coating material applying apparatus of claim 1, said opening having a diameter approximately twice as large as the diameter of said tube.

4. Liquid coating material applying apparatus comprising in combination:

a support block;

a plurality of bristles secured to one surface of said support block to form a brush;

a disperser among said bristles for introducing liquid coating material into said brush;

said disperser comprising an elongated, continuous tube having spaced ends;

said spaced ends both being supported on said support block so that said tube forms a loop extending into and among said bristles;

means for supplying liquid coating material into said tube;

and at least one aperture in said tube spaced from said ends for discharging liquid coating material into said brush;

said tube being constructed entirely of elastomeric material having a degree of flexibility such that said loop flexes easily with said brush and having a degree of resiliency and stiffness such that the tube remains unblocked when the brush is flexed.

5. The liquid coating material applying apparatus of claim 4 wherein said elastomeric material is polyvinyl chloride.

6. The liquid coating material applying apparatus of claim 4, said ends of said tube being supported adjacent one another so that said tube forms a closed loop.

7. The liquid coating material applying apparatus of claim 6, said disperser further including an enlarged portion attached to said tube ends and secured to said support block.

8. The liquid coating material applying apparatus of claim 7, an opening extending between said one surface and the opposite surface of the support block, said opening being smaller than said enlarged portion and smaller than said loop, said loop being deformable into a configuration such that it may be inserted into and withdrawn from said brush from said opposite surface of said support block.

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