

March 5, 1940.

J. P. NISSEN, JR

2,192,479

IMPLEMENT FOR APPLYING FLUID AND SEMIPASTE MATERIALS

Filed Aug. 4, 1938

2 Sheets-Sheet 1

Fig. 1.

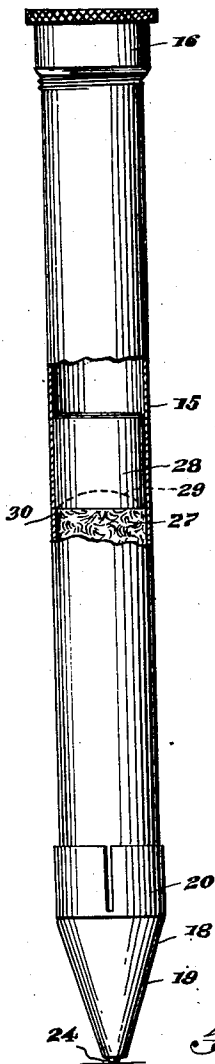


Fig. 2.

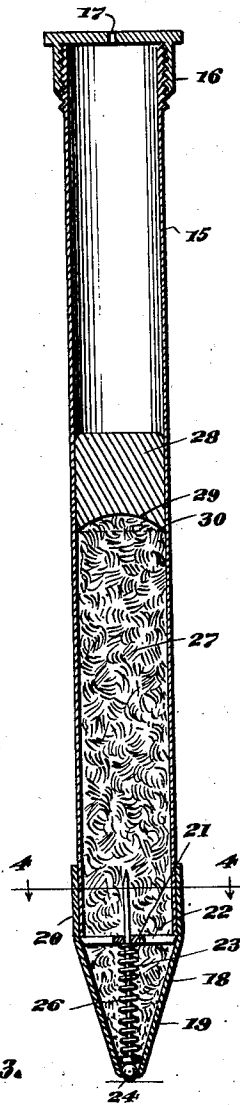


Fig. 4.

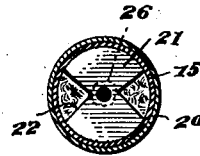


Fig. 5.

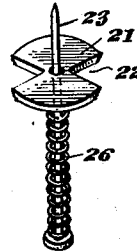


Fig. 6.

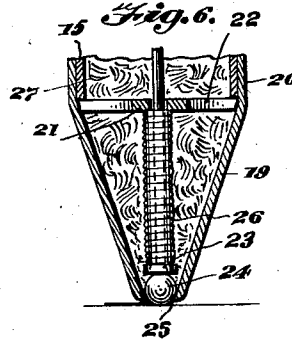
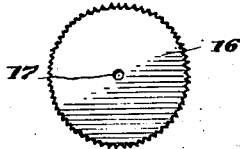


Fig. 3.



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IMPLEMENT FOR APPLYING FLUID AND SEMIPASTE MATERIALS

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2 Sheets-Sheet 2

Fig. 7.

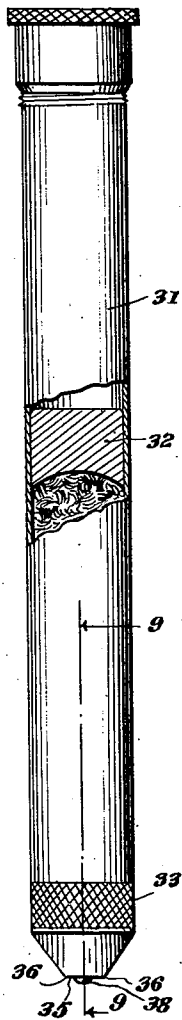


Fig. 8.

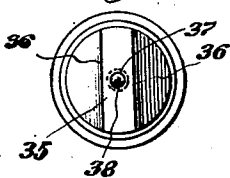


Fig. 9.

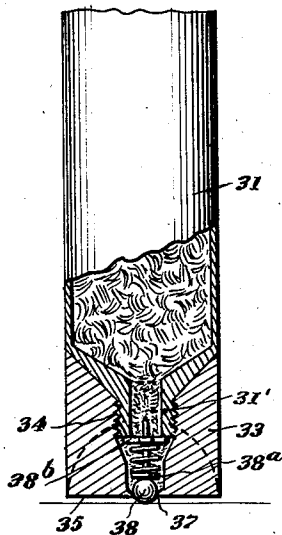


Fig. 12.

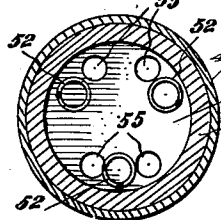


Fig. 13.

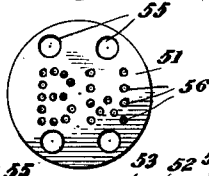


Fig. 14.

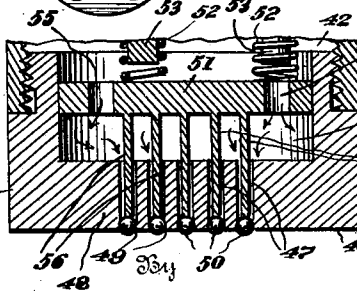


Fig. 10.

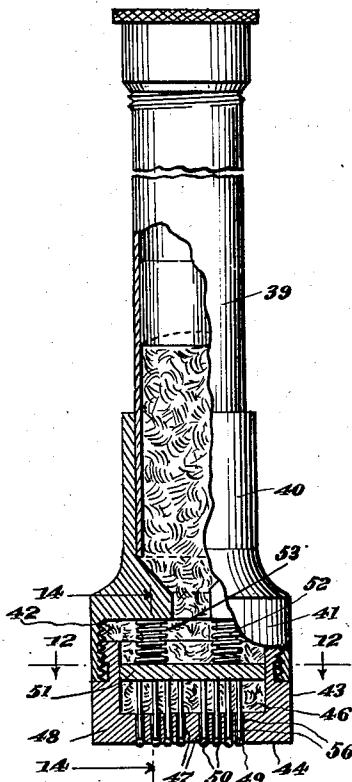
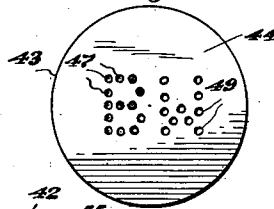


Fig. 11.



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UNITED STATES PATENT OFFICE

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IMPLEMENT FOR APPLYING FLUID AND SEMIPASTE MATERIALS

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Application August 4, 1938, Serial No. 223,111

5 Claims. (Cl. 91—67.4)

The present invention relates to implements for applying fluids or semipastes to underlying, substantially horizontal surfaces. The implement of the invention may be used wherever a fluid or pasty material of a reasonable degree of fluidity is to be applied to a surface in a relatively small area, such as a strip or a line, as in marking with paint, ink or the like, or in applying spots, lines or other areas of materials such as adhesives. By using specialized types of implements, the invention may also be utilized for the coating of relatively large areas, as for example, the inking of a stamping ink pad, or the stamping of definite characters upon surfaces.

Many attempts have been made in the past to provide applicators for fluid materials such as inks of varying degrees of fluidity, mucilage and other materials of similar physical characteristics, and some such implements have comprised valved applicator tips and rigid reservoir barrels that contain the fluid to be applied, the reservoir barrels being intended to serve as handles for the operator to grasp in using the implements. Some of these devices have been equipped with automatic valves having operating means extending beyond the ends of the tips, by means of which the valves were to be opened when the tip was applied to the surface to be treated. Long experiment with such devices has revealed that they are not satisfactory for the reason that there has been no effective means for feeding the coating material from the reservoir to the applicator, and from the applicator to the surface upon which it is to be applied.

While many expedients have been tried in an attempt to provide a satisfactory means of feeding a fluid, semifluid or pasty material through an applicator tip from a rigid reservoir, no such implement has come into common use, and, so far as I am aware, no satisfactory method of feeding in such an implement has been developed.

The problem encountered in such devices is that of subjecting the body of material in the reservoir to a constant and controlled pressure to cause it to flow through the tip, and the prior devices have failed to accomplish this result. Another problem that is encountered is the protection of the coating material from contact with the air, since most coating materials of the kind ordinarily used in implements of this type are air-drying, and the contact of the air with the material in the reservoir results in spoiling it.

One type of implement that has been attempted has endeavored to make use of spring pressure to feed the material, but spring devices have not proved satisfactory for the reason that a spring will not deliver an even and constant pressure from the time it is tensioned during release of its tension. When a spring is applied to a device of this kind, it will cause a free feed when it is first tensioned, due to the high pressure that it exerts at first, but as the tension diminishes, the pressure diminishes also, and the feed will diminish with the pressure, resulting in non-uniform operation of the implement.

Hand operated followers for the body of coating material have also been proposed, but these are not satisfactory since they require operation by the user, and it is very difficult to so control such a device as to deliver an even and constant pressure upon the material within the reservoir.

It has also been proposed to admit air to the interior of the reservoir directly in the rear of the body of fluid, and to rely upon the weight of the fluid to feed itself to the tip. This is manifestly unsatisfactory in the case of air-drying or volatile fluid since the air at the rear of the body will cause the fluid to evaporate and harden or dry in the reservoir, not only spoiling the coating material, but also often ruining the implement. Obviously a system of this kind will also be inoperative when the coating material is of such viscosity that its weight will not cause it to flow through the passage to the mouth of the applicator tip.

One object of the present invention is to provide novel feeding means for an implement comprising a rigid, barrel-like reservoir containing a body of fluid or semipaste that is to be applied to a surface as a coating, and such implement being adapted to be held in a substantially vertical position during the application.

Another object is to provide a novel feeding means that will, when the implement is in operative position, exert an even and constant pressure upon the coating material within the reservoir from the time that the use of the material is started until the reservoir is exhausted.

Still another object is to provide novel feeding means for an implement of this type that will permit entry of air at the rear of the coating material, yet that will protect the material from direct contact with the air.

A further object is to provide a novel feeding means having the desirable features mentioned above that is inexpensive to manufacture

and install in the implements, and one that is capable of easy adjustment to suit materials of different degrees of fluidity, or to give different rates of feed according to the purpose to which the implement is to be put.

The invention is based upon the discovery that a weighted follower, slidable in a rigid tubular reservoir at the rear and in contact with a body of fluid or semipaste material will, when the implement is placed in substantially vertical position, and the tip opened, feed the material from the implement evenly and effectively, and at the same time will protect the material from contact with air sufficiently to render it satisfactory even with materials of considerable volatility. When such a follower, of a weight selected according to the viscosity of the material with which it is to be used, and also in accordance with the desired rate of feed, is placed upon the upper surface of a body of the material in a rigid tubular reservoir, it will exert a constant and even pressure upon the body and the material will be fed from the implement in a most desirable manner. The pressure so exerted will be constant from the beginning of the use of the material until the reservoir is exhausted, and therefore the feed remains constant.

Such a follower, if closely engaged with the inner surfaces of the reservoir walls, has a remarkable effect in protecting the material from contact with air for long periods of time. By the use of the invention, even such materials as cements containing large proportions of volatile acetone solvents have been used in implements of this type, and the contents have remained in good condition during long periods of disuse between periods of using the implement. Implements provided with automatic valved tips have proved satisfactory for use with these volatile cements when followers constructed in accordance with this invention have been inserted in the reservoirs of such implements.

In order to describe the invention and to illustrate practical embodiments thereof, reference is made to the accompanying drawings, wherein:

Figure 1 is a broken elevation of one embodiment of the invention.

Figure 2 is a sectional view of the same.

Figure 3 is a top plan view.

Figure 4 is a sectional view on line 4-4 of Figure 2.

Figure 5 is a detail perspective view of a valve that may be used with the implement.

Figure 6 is an enlarged sectional view of the tip of the implement, showing the manner of operation of the valve.

Figure 7 is a broken elevation of an implement having a specialized form of coating tip.

Figure 8 is a plan view of the end of the tip shown in Figure 7.

Figure 9 is a sectional view on line 9-9 of Figure 7.

Figure 10 is a broken elevation of an implement provided with another form of specialized tip.

Figure 11 is a plan view of the end of the tip shown in Figure 10.

Figure 12 is a sectional view on line 12-12 of Figure 10.

Figure 13 is a bottom plan view of the valve backing plate of the embodiment of Figure 10.

Figure 14 is an enlarged sectional view on line 14-14 of Figure 10.

Describing the drawings more particularly, the embodiment of Figures 1 to 6 comprises a rigid

tubular reservoir 15, that for practical reasons is preferably round in cross section. The upper or rear end of the reservoir 15 is closed by a cap 16 suitably connected therewith, as by threads or other suitable fastening, and which is provided with a small vent 17 for admission of air to the interior of the reservoir as the coating material is withdrawn. The forward or delivery end, which is the lower end when the implement is in use, has a delivery tip mounted thereon, such tip being designated generally 18, and here shown as comprising a conical shell 19 and a skirt 20 that is attached to the reservoir 15, as by frictional contact with its wall.

Within the tip 18, and conveniently engaged between the end of the reservoir and the inner surface of the conical portion 19, is a spider 21 that is provided with openings 22 for the passage of the coating material, and supporting a plunger 23, the stem of which passes through its central portion. The plunger 23 is headed at its outer end and bears upon a ball 24 that is of proper size to close a delivery opening or mouth 25 in the end of the tip, the ball 24 being movable inwardly to open the mouth 25 for the passage of the material, as shown in Figure 6. A spring 26 is coiled about the plunger its ends bearing respectively against the spider and the head of the plunger to urge the latter outwardly, whereby the ball is pressed to closing position in the mouth 25. The inward motion of the ball is limited, as shown in Figure 6 by the configuration of the coils of the spring 26, or otherwise, so that the ball protrudes slightly from the mouth 25 when the latter is open. The protruding ball provides a bearing upon the surface that is being treated and prevents the tip from catching when its end is pressed upon a rough surface as a textile. As shown in Figure 2, the wall surrounding the mouth 25 forms a seat for the ball 24 when the latter is in its closed position, and the mouth is of such size that the ball protrudes to a considerable extent when closing the mouth, so that when the tip is pressed upon a surface, as shown in Figure 6, the ball 24 is moved inwardly against the pressure of the spring 26, and the tip is automatically placed in condition to permit delivery of the coating material from the reservoir.

A body of coating material is indicated at 27 within the reservoir. In order to apply pressure to the material to feed it through the tip and from the mouth 25 when the latter is open, and to protect the upper or rear surface of the body of material from contact by air even though the material may be sufficiently fluid to be capable of flowing to the tip and through the mouth under its own weight, a follower 28 is positioned within the reservoir in contact with the said upper surface of the body of material.

The follower 28 is of proper cross sectional size and shape to slidably engage the inner surface of the wall of the reservoir 15 throughout its periphery, the fit being of sufficient closeness to just allow the follower to slide in the reservoir when the latter is empty, and in order to insure that it does not turn axially and jam it is preferably made greater in length than its diameter. The weight of the follower is selected in accordance with the fluidity of the material to be applied by the implement, the size of the outlet passage and the desired rate of feed. It is a matter of simple experiment to determine the weight of follower that is suitable for use with any particular fluid in any specific type of im-

plement, and the weight of the follower may be fixed either by selecting the material of which it is made, or by modifying the size or structure of the body, it being remembered, however, that a body that is shorter than its diameter may turn in the reservoir and jam against its wall.

A follower constructed as above described will fit the wall of the reservoir with sufficient closeness to prevent fluids or paste-like materials such as are ordinarily applied to surfaces from seeping past it. To aid in preventing seepage of the coating material, and to clean the surface of the wall as the follower travels downward, the bottom surface of the follower advantageously is hollowed, as at 29, and the lower edge thereof is made sharp, to operate as a scraper. It has been found that a follower constructed in this manner will exert sufficient pressure to feed the material from the reservoir, and will clean the inner surface of the reservoir in the manner that a doctor on a printing press operates, with sufficient thoroughness to prevent sticking of the follower due to seepage of the coating material past it.

In Figures 7 to 9, an implement having a tip specially adapted for the application of ink to a stamping pad is illustrated. This implement comprises a rigid tubular reservoir 31 having a forward end that is reduced and terminates in a threaded nipple 31'. The reservoir contains a body of viscous stamping ink, and a follower 32 is slidably mounted in the reservoir, its sides being in contact with the inner surface of the reservoir and its under surface being in contact with the upper surface of the body of ink.

The tip for applying the ink to the surface of the pad is mounted upon the forward end of the reservoir 31 and comprises a body 33 having a threaded bore 34 for engagement with the threaded nipple 31'. The body 33 tapers forwardly upon two opposite sides to form a relatively narrow and flat end surface 35 that extends transversely of the implement and that has a sharp edge 36 upon each of its longitudinal sides. In the center of the flat end surface 35 is the mouth 37 through which the ink is delivered, this mouth being relatively large to permit a feed of sufficient volume for the intended purpose of applying ink to stamping pads. A ball 38 for closing the mouth 37 is urged outwardly by a spring-pressed plunger 38^a supported in a spider 38^b, that is in turn seated upon the end of the nipple 31'.

In use, the reservoir of this implement is grasped as a handle, and the flat surface 36 is pressed upon the surface of the pad to be inked, whereby the ball 38 is pressed in and the mouth 37 opened. The ink is fed from the reservoir and from the mouth by the pressure exerted upon the body of ink by the follower 32. The implement is moved over the surface of the pad, the flat surface 35 acting as a spreader and wiper by means of which the ink is applied evenly. During this wiping operation, the sharp edges 36 upon opposite sides of the flat surface 35 act as scrapers and clean the surface of dust, dried ink or other foreign matter.

Figures 10 to 14 illustrate an implement adapted for stamping definite characters upon surfaces. This implement comprises a rigid tubular reservoir 39 that serves as a handle, and a specialized tip mounted upon the forward end of the reservoir for delivering the fluid to the surface to be stamped in the form of a plurality of spaced dots arranged in the desired characters.

The tip comprises a sleeve 40 that is engaged with the wall of the reservoir 39, and that has an

enlarged forward end 41 provided with an internally threaded bore 42, the bore 42 being in communication with the interior of the reservoir 39. Threaded into the bore 42 is a head 43 having a flat front surface 44 and an inner bore 46 that forms a continuation of the bore 42. A plurality of passages 47, arranged to form the characters to be applied by the implement, pass through the front wall 48 of the head, these passages each having a restricted mouth 49 at its forward end for the delivery of the fluid and for the reception of a ball 50 that operates as a closure for the passage mouth in which it is positioned. The mouths of the passages, and the balls, are so related in size that the latter project from the former when in their closed positions.

A plate 51 is slidable in the bore 46, such plate being urged forwardly in the direction of the end wall 48 by coil springs 52 that respectively surround pins 53 carried by the plate, the springs 52 engaging the end wall of the bore 42 at their inner ends. The plate 51 has openings 55 for the passage of the coating material.

In order to yieldingly press the balls 50 to their closing positions in the mouths 49, a pin 56 extends into each of the passages 47, the pins being mounted upon the spring-pressed plate 51. The pins bear respectively upon the balls 50 and under the pressure exerted by the springs 52, urge the balls to their seated positions in the mouths of the passages. The pins are sufficiently less in cross sectional area than are the passages 47 in which they are positioned to permit the fluid to pass between them and the walls of the passages.

It will be noted that a peculiar cooperation takes place between the weighted follower and the end of the tip in an instrument of this character. The openings of the various forms of tips, from which the material emerges, are inwardly spaced from the outer edges of the tips (see Figures 6, 8, and 11), by sufficient distance to require that the implements be brought to substantially vertical position in order to bring the openings in the faces of the tips into proximity to the surfaces to be treated, with the edges surrounding such openings in contact with the surfaces. Similarly, the small balls 24, 38, and 50 project such small distances beyond the tips, and are so spaced inwardly from the outer edges thereof as to require substantially vertical arrangement of the implements before the valves can be opened. Since the tubular reservoir of an implement that is provided with a slidable follower must be in a position approaching the vertical to permit sliding of the follower, it follows that placing the tips of these implements in operating contact with the surfaces to be treated results in the reservoirs being placed in proper position for sliding of the followers. Similarly, to open the valve of an implement of this type, the reservoir must be placed in a position that will permit the follower to slide.

In order to give an idea of the range of fluidity of materials with which followers of the type described are effective, it may be stated that experiments have been performed with materials ranging from a fluid cement comprising a two percent solution of gum in an acetone solvent to a highly viscous material of the approximate fluidity of cold molasses. In the case of the fluid cement, it was found that a follower of extremely light material, such as wood or aluminum of a length just sufficient to prevent it from jamming in the tube should be used, since a material of such a degree of fluidity will feed itself

from the implement. If preferred, a hollow follower of greater length may be used.

For the material at the other end of the range it was found that a follower of heavy material such as lead or bronze, equal in length to the height of the material in the reservoir at the beginning of its use should be used. A follower of such weight will feed a material of the consistency of cold molasses in a manner entirely suitable for marking or applying other small areas to a surface.

Between these extremes, dye-resistant ink of the type commonly used in marking batches of textiles before dyeing, may be mentioned. An implement having a tubular reservoir of approximately five-eighths inch diameter, provided with a lead follower about three quarters of an inch in length will feed this viscous marking ink in an entirely satisfactory manner. The follower in such an implement weighs about an ounce and a half, and it will be readily understood that as the diameter varies, the weight of the follower will vary in proportion if such follower is made of the same material. The length of the follower will vary with the material used in order to provide the correct weight.

The use of a follower in the type of implement under discussion supplies a long sought for method of feeding coating materials in a satisfactory manner. The feed is positive and the material is delivered at a uniform rate during the entire time that a body of fluid is being used. The device is also capable of ready adjustment to suit materials of various degrees of fluidity, this being accomplished simply by selecting the weight of the follower.

One important advantage of the device is that the follower adequately protects the material in the reservoir from contact with the air at the rear of the body of material, and therefore it prevents evaporation and deterioration of the material within the reservoir.

In this connection it is to be noted that the follower, being in contact with the rear surface of the coating material, will be held in contact with such surface by the pressure of the air upon its own rear surface, even though the implement should be turned upside down and subjected to violent jarring. Similarly, the material in the reservoir is prevented from rearward motion by the valved tip that prevents entry of air if the implement is inverted. Consequently the material is always maintained at the most forward point of the tubular reservoir where it is always ready for use upon pressing the tip of the implement upon a surface to be treated, and the material is also always protected from air that might enter through the tip were it not for the valve.

From the foregoing it is thought that the construction, operation and many advantages of the herein described invention will be apparent to those skilled in the art without further description, and it will be readily apparent that changes in the size, shape and minor details may be resorted to without departing from the spirit of the invention as set forth in the accompanying claims.

What I claim is:

1. In an implement for applying fluent material to an underlying, substantially horizontal surface, said implement including a rigid tubular reservoir for the fluent material, the combination with a weighted follower having surfaces parallel to, and in extended sliding contact with the inner surfaces of the tubular reservoir, of a tip

mounted on the forward end of the reservoir and including a surface for contact with the surface to be treated, said surface of the tip having an opening connected with the interior of the reservoir, and the tip being so arranged relative to the said surface as to require the reservoir to be held in a position sufficiently near the vertical to permit the follower to slide when the surface of the tip is placed in contact with an underlying surface.

2. In an implement for applying fluent material to a substantially horizontal underlying surface, said implement including a rigid tubular reservoir, the combination with a weighted follower having surfaces parallel to and in extended slidable contact with the inner surfaces of the reservoir, of a tip mounted on the forward end of the reservoir and having a substantially flat surface for engagement with the surface to be treated, said surface of the tip having an opening connected with the interior of the reservoir, and the edges of said opening being sufficiently spaced inwardly from the edges of the surface to require the reservoir to be placed in a position sufficiently near the vertical to permit the follower to slide when an edge of the opening is brought into contact with the underlying horizontal surface to be treated.

3. An implement for applying fluent material to a surface, said implement comprising a rigid tubular reservoir, a weighted follower within the reservoir and having surfaces parallel to and in extended sliding contact with the inner surfaces of the reservoir, a tip mounted on the forward end of the reservoir and having a surface for engagement with a surface to be treated, said surface of the tip having an opening connected with the interior of the reservoir, the edges of the said opening being spaced inwardly from the outer edges of the surface of the tip, and a spring-closed valve for controlling the passage of fluent material from the reservoir through the opening, a plunger for opening said valve extending beyond the surface of the tip for operation by engagement with the surface to be treated, the plunger being so arranged and related to the edges of the surface of the tip as to require the reservoir to be held sufficiently near the vertical to permit the follower to slide when the plunger is operated by engagement with the surface to be treated.

4. In an implement for applying fluent material to an underlying surface and including a rigid tubular reservoir and a tip having a passage therethrough communicating with the interior of the reservoir and terminating in a mouth for delivery of the fluent material, the combination of a weighted follower having surfaces parallel to and in extended sliding contact with the inner surfaces of the reservoir, and a valve for controlling the passage, means for requiring that the tubular reservoir, when in operating relation to a surface to be treated, be held sufficiently near the vertical to permit the follower to slide, means for opening the valve when the implement is placed in operating relation with a surface to be treated, and means for closing the valve when the implement is removed from operating position.

5. In an implement for applying fluent material to an underlying surface, said implement including a tip having a discharge orifice for applying the material, and a rigid tubular reservoir for the material to be applied, said reservoir being arranged with relation to the tip for sub-

stantially vertical disposition when the tip is applied in operative relation to a surface, and being connected with the orifice of the tip for supplying material thereto; a weighted follower within the reservoir, said follower having longitudinally extended surfaces in slidable contact with the surrounding inner surfaces of the reservoir, said follower being adapted to engage and exert pressure upon the rear surface of a body of fluent material within the reservoir when the reservoir is in substantially vertical disposition, the extended surfaces of the follower being in sufficiently close engagement with the surrounding surfaces of the reservoir to prevent flow of fluent material of the viscosity of the material to be applied by the implement past the follower. 5

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