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Levine

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[54] **NON-OVERLAPPING COATING DEVICE**

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[51] **Int. Cl.** **B05c 5/02**

[58] **Field of Search** 118/3, 413; 401/5, 139, 401/45, 145, 264

[56] **References Cited**

UNITED STATES PATENTS

470,164	3/1892	Newell	118/3
1,589,669	6/1926	Van de Sandt	401/5
2,678,557	5/1954	Black	401/5
2,984,857	5/1961	Ames	401/5 X
3,319,283	5/1967	Delligatti	401/5

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[57] **ABSTRACT**

A coating device is provided with a feed reservoir, a rectangular opening in the front wall of the reservoir, and a hinged plate biased into a position closing the opening. The hinged plate carries adjustable contact means on its outside face, which means when contacted by the work surface to be coated forces the plate to a desired open position to permit the coating material to flow out from the reservoir onto the work surface. The coating device is further provided with a projected or raised planar guiding surface on its front wall for accurately spacing the device relative to the work surface. The guiding surface is narrower than the width of the front wall to form offset spaces on either side of the guiding surface. The narrower projected or raised guide surface when moved over the work surface permits successive parallel coating strokes by the device without the edges of the front wall overlapping or contacting the coating material already applied to the work surface by the previous strokes.

8 Claims, 6 Drawing Figures

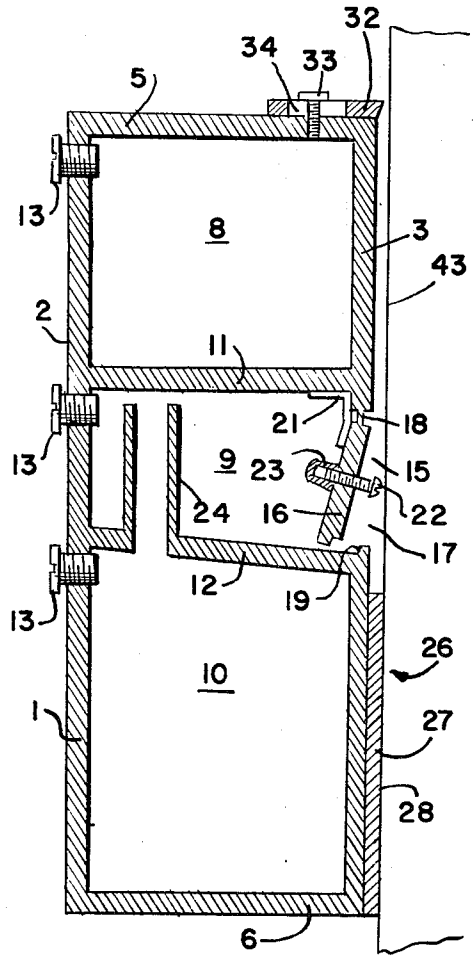


FIG. 1

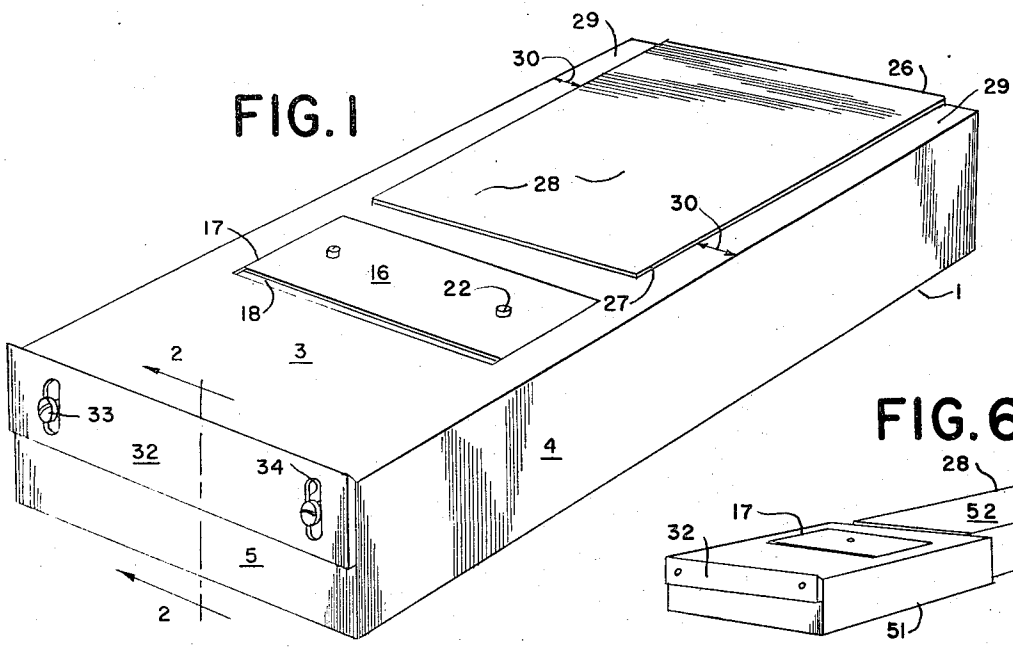


FIG. 6

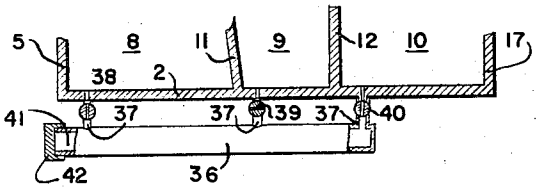
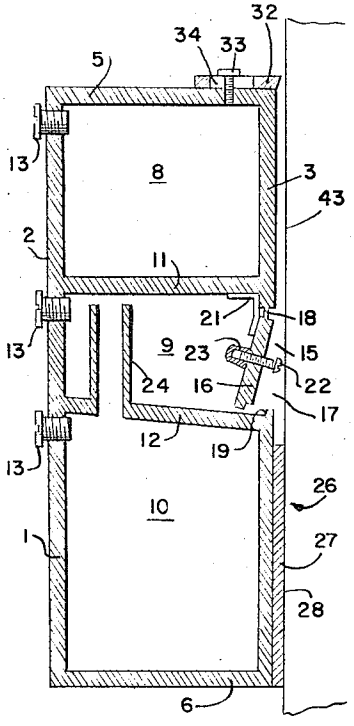


FIG. 3

FIG. 2



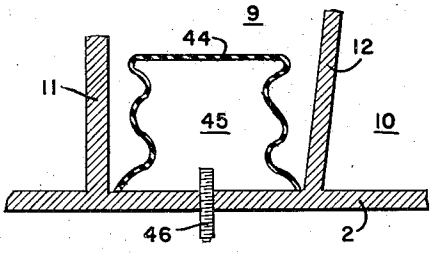
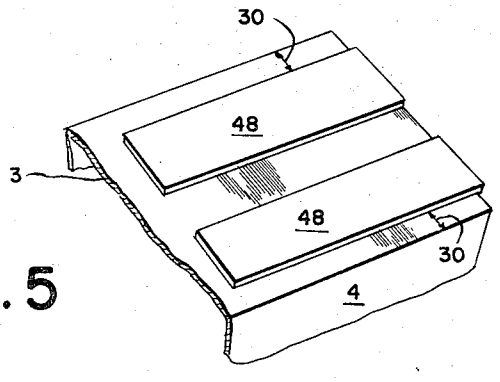


FIG. 4

FIG. 5



NON-OVERLAPPING COATING DEVICE

This invention relates to coating devices, particularly to devices for coating large vertical work surfaces with photographic emulsion.

The prior art coating devices usually have a body, a coating material reservoir in the body and a valve device in the reservoir to control the flow of coating material onto the work surface to be coated. In practice the device is placed on the work surface with the entire width of the front wall of the device contacting the work surface and acting as a guide and support. The device is moved along the work surface to apply a series of parallel coating strokes. However, each stroke is as wide as the front wall guiding surface and it is difficult to prevent overlapping and contact of the edges of the front wall with the material already applied to the work surface in the previous stroke.

An object of this invention is to provide the front wall of the coating device with a guiding and support surface means which will prevent overlapping and contact of the edges of the front wall with the material already applied to the surface to be coated.

A further object is to provide a coating device having a body containing a feed reservoir, a doctor blade on the body above the reservoir extending lengthwise across the width of the body, and a guiding and support surface means located on the body below the reservoir for spacing the doctor blade relative to the surface to be coated, with the dimension of the surface means measured along the width of said body being less than the length of the doctor blade extending across the body.

Another object is to provide a guiding surface for the coating device, which surface projects from the front wall and is narrower than the wall, thus raising the surface of the edge portions of the front wall above the coated material already applied, and spacing the edges of the projected guide surface away from the edges of the material applied by the previous coating stroke.

Another object is to maintain the reservoir valve closed until the device contacts the work surface, at which time the valve will be automatically opened.

A further object is to provide means regulating the extent of the valve opening and thereby controlling the flow of coating material from the reservoir.

A further object is to provide a photogenic emulsion coating device for coating large work areas by successive parallel coating strokes, which device coats the work area with a uniform and smooth layer of emulsion with no overlapping of marks or other flow disturbances.

Further objects and advantages will be apparent from the following description and accompanying drawings wherein:

FIG. 1 is a perspective view of the device;

FIG. 2 is a sectional view of the device taken on line 2—2 of FIG. 1 and illustrating the application of the device to the work surface;

FIG. 3 is a part sectional view of a portion of a modified device;

FIG. 4 is a sectional view of a portion of the device illustrating another modification;

FIG. 5 is a partial perspective view of a portion of the device illustrating a modification of the guiding means; and

FIG. 6 is a perspective view of the device showing a further modification of the guide means.

The coating device comprises a body **1** providing a series or reservoirs. While it may be made of various suitable materials, plastic is preferred. As illustrates in FIGS. **1** and **2**, the body comprises a rear wall **2**, front wall **3**, side walls **4**, top **5**, and bottom **6**. The several reservoirs **8, 9**, and **10** are formed by providing partitions **11** and **12** between the several walls. While body **1** is herein illustrated as an integral structure, it is so illustrated for disclosure purposes only. For example, walls and partitions **2, 4, 5, 6, 11**, and **12** may be cast in one unit and front wall **3** may then be bonded thereto by any conventional bonding means. In another method of fabrication, walls and partitions **2, 4, 11** and **12** would be cast integrally and thereafter the various tubes and other elements, described herebelow, would be added. The body would be then completed by bonding top **6**, bottom **5** and front wall **3**, which may form an integral casting to the unit to form body **1** and reservoirs **8, 9** and **10** therein.

Filler caps **13** are provided for filling and venting the several reservoirs **8, 9** and **10.**

Reservoir **9** may be termed the feeder reservoir, since it feeds the coating material onto the surface to be coated. Reservoirs **8** and **10** are for selectively storing a supply of coating material or a heating or cooling fluid in processes wherein it is necessary to either cool or heat the coating material relative to the ambient temperature.

Front wall **3** in the region of feeder reservoir **9** is provided with a feed control valve **15.** Valve **15** is in the form of a hinged plate **16** fitting into opening **17** of the feeder reservoir **9.** As shown in FIG. **2,** plate **16** is hinged to wall **3** by means of a thin portion **18**; the wall, thin portion and plate being formed integrally by conventional means. Plate **16** may also be secured to wall **3** by conventional leaf hinges bonded thereto or plate **16** may be a resilient plastic or metal plate bonded at its upper edge to wall **3.** In the latter case, the resiliency of the plate would be the closing force, since the opening movement is rather small and within the resiliency of a plate. Opening **17** is formed with a seal surface **19** cooperating with plate **16** to normally maintain the opening closed. The necessary closing force is normally furnished by initially forming the plate in its closing position and utilizing the normal resiliency or memory of the plastic material to bias the plate to its closing position when forced open, the position illustrated in FIG. **2.** If desired, plate **16** may be further biased to closing position by a spring means such as leaf spring **21** bonded to partition **11** and wall **3.**

Plate **16** is activated to the desired open position by contact of the device with the surface to be coated by the following means. Plate **16** is provided with two adjustable means, each comprising a Teflon spherically headed screw **22** threaded in a socket **23** formed in the plate. Teflon screws are used so that the device may be moved along a surface with little friction. Two means are used to better balance the opening force. If desired, a single centrally located means **22–23** may be used.

In FIG. **2** reservoir **10** stores the coating material which is poured into it through its filler plug **13.** A tube **24** extends between it and feeder reservoir **9.** Tube **24** extends almost to partition **11.** To fill or refill reservoir **9,** the device is inverted. The coating material from supply reservoir **10** flows through tube **24** into feeder

reservoir 9. The air in reservoir 9 would normally vent through valve 15 due to leakage past plate 16, since normal manufacturing tolerance would provide an air leakage path past seal surface 19 but prevent coating flow. If necessary, valve 15 may be slightly opened or a cap 13 may be opened to allow the air to vent from reservoir 9.

An essential part of this invention, which prevents or greatly reduces undesirable overlapping of the coating material as the device is operated in strokes to cover the surface to be coated, lies in guide means 26.

The guide means comprises a raised panel 27 projecting from front wall 3 slightly below opening 17. Panel 27 is provided with a planar surface 28. As shown in FIG. 1, panel 27 does not extend the full width of front wall 3 but is narrower than the wall forming two offset spaces 29 which may be equally spaced on each side of the panel. Guide means 26 may form an integral part of wall 3 or may be added thereto by bonding a panel of plastic to the wall to form panel 27. Since the device is slidable on the surface to be coated, it is preferred that panel 28 be made of or faced with Teflon to reduce friction and be secured to wall 3 by any conventional adhesive.

The thickness of panel 27 will depend upon the coating material, its desired thickness, and other factors. Spaces 29 should be of sufficient width designated by dimensional arrows 30 in FIG. 1 so that the operator moving the device will easily guide the device parallel to the previous stroke or pass without touching the coating already placed on the surface, thus avoiding overlaps of coating material due to the body of the coating device inadvertently contacting and smearing the coating material of the previous stroke. Spaces 29 keeps the device's projected guiding surface 28 away from the previously applied stroke of coating. Overlaps of the coating strokes at the region of opening 17 is smoothed out by the usual action of doctor blade 32 which is adjustably fastened to top 5 by means of screws 33 passing through slots 34 in the blade and threaded into top 5, as shown in FIG. 2.

While the guide panel 27–28 is described as narrower than the front wall 3, its actual width is related to the length or span of doctor blade 32 which determines the actual width of the ribbon of coating material deposited during a work stroke. It is essential that the guide surface 28 be narrower than the length of the doctor blade rather than the width of the front wall.

The guide means comprising the projected and narrower panel 27 with the spaces 29 on either side thereof is in contract with the prior art devices wherein the entire width of the front walls of the devices rest on the surface to be coated and thereby easily come in contact with the previously applied coating.

Top reservoir 8 may be filled with hot water to reduce or maintain the viscosity of the coating material. This is especially desirable when coating large surfaces with photographic emulsions or other chemicals.

At times it is desired to continuously supply feeder reservoir 9. For this purpose top reservoir 8 may be used as the supply reservoir and be connected to feeder reservoir by means of an opening in portion 11. Reservoir 10 would then receive the temperature controlling fluid with the obvious omission or closure of tube 24.

Instead of the interconnection between the reservoirs by means of openings and tubes passing through the partitions, a different form of reservoir intercommunications may be used. FIG. 3 shows a manifold 36 having branches 37 connected to reservoirs 8, 9 and 10 at wall 2. The branches 37 are provided with two-way valves 38, 39 and 40 to open or close communication between the manifold and the respective reservoirs. The valves are shown schematically as plug valves. The device may be filled through manifold 36 at opening 41 which is normally closed by closure means 42.

Thus, valves 39 and 40 may be opened and valve 38 closed to fill reservoirs 9 and 10 with coating material. Then valves 39 and 40 may be closed and valve 38 opened to fill reservoir 9 with hot water. To supply the feeder reservoir from, say, reservoir 10, valves 39 and 40 are opened and valve 38 is closed and the device inverted until feeder reservoir 9 is filled, as described above.

In operation the device is filled in any manner described above so that feeder reservoir 9 and either supply reservoirs 8 and 10 are filled with a photographic emulsion to be applied to a relatively large vertical surface 43. The device is placed upon and pressed against the surface at one corner thereof. Upon contact of means 22 and the surface 43, as illustrated in FIG. 2, plate 16 will be moved to form a slot of the desired height to permit a desired flow of emulsion past seal 19 onto surface 43. The operator moves the device downwardly with guide surface 27 fully contacting the surface 43. Thus, a pool of emulsion is formed at opening 17, which pool is applied to the surface by doctor blade 32 to form a uniform layer in a manner well known in the art. The operator continues the vertical movements until the end of the coating stroke or pass is reached.

Then the operator removes the device from surface 43, brings it back to the top and aligns the device to make another coating stroke parallel to the first one. In view of the spaces 29 there is no contact between the coating material applied in the first stroke and body 1. No great care is necessary to place and guide the device in its second and subsequent strokes. Any slight overlap of strokes at the end of the valve slot at opening 17 will be smoothed out by the doctor blade.

Thus, large surfaces may be coated quickly and smoothly by the device. In view of its construction, overlapping and contact of the applied emulsion at the edges of the body of the devices are eliminated and a uniform layer of emulsion is applied to surface 43. This uniform layer is of utmost importance in applying photographic emulsion because non-uniform application of the emulsion would ruin the final photograph when developed.

In coating surfaces such as ceilings or other type surfaces wherein no gravity force is present on the coating material in the feeder reservoir, it is necessary to provide a positive feed force. This may be provided by means illustrated in FIG. 4. A bellows or similar shaped member 44 is bonded at its open end to a wall, such as wall 2, of the feeder reservoir 9, thus forming an expansible chamber 45 with the wall. A valve 46 such as a conventional tire valve communicates with chamber 45. If a positive feeding force on the coating material in reservoir 9 is desired, pressure fluid, such as slightly compressed air, is applied through valve 46. The air moves bellows 44 to exert a pressure on the coating material to expell it through opening 17 onto the ceil-

ing or similar planar surface. To vent chamber **45** the stem in tire valve **46** is depressed.

The pressure fluid on bellows **44** may be replaced by a spring acting thereon, which spring would be pulled back by a manually operated rod to render it non-biasing when a positive force is not desired.

While FIG. **1** illustrates guiding means **26** as formed by an integral panel having a surface **28,** the guide means may also comprise strips of Teflon **48** bonded to wall **3** as illustrated in FIG. **5.** Rectangular strips are of sufficient area to form a firm support when the device is applied to work surface **43** and act as a guide as the device is moved relative to the previous applied material.

FIG. **6** illustrates a further modification of the guide means. As explained above, an essential feature of the invention is in making the guide means narrower than the span or length of the doctor blade. In this modification the configuration of the body is modified so that portion **50** of the body occupied by reservoir means **10** in FIGS. **1–2** is made narrower than the upper portion **51** of the body and, consequently, less than the length of doctor blade **32** located on portion **51.** Portion **50** has its front wall **52** projecting out in front of portion **51** below opening **17** in the same relation as panel **27** assumes with opening **17** in FIGS. **1–2.** The surface of wall **52** is designated as **28,** since it has the same guiding and spacing functions as surface **28** of panel **27.** The device of FIG. **6** is operated like that of FIGS. **1–2** and functions in the same manner. The device or FIG. **6** may be equipped with all the elements of the device of FIGS. **1** and **2** since it is the same device except for a change in its body configuration.

While there has been disclosed certain preferred embodiments of the invention, those skilled in the art will appreciate that changes and modifications may be made therein without departing from the scope and spirit of the invention as defined in the appended claims.

What is claimed as the invention is:

1. A liquid coating device comprising a body having a front wall and additional wall means forming a feeder reservoir, an opening means in the front wall communicating with the reservoir, a closure for the opening means normally closing the same, operating means to variably open said closure to permit flow of coating material onto the work surface to be coated, a doctor blade located on one side of said opening means and extending lengthwise across the width of the body, and a planar guiding and support means on and projecting from said body on a direction normal to said front wall and located entirely on the other side of said opening means, the dimension of said guide support means measured along the width of said body being less than the length of the doctor blade extending across the body.

2. The coating device of claim **1,** wherein the opening means is of generally rectangular configuration, the closure is a plate in the reservoir normally biased to a closing position, and the operating means comprise adjustable control means projecting from the outer side of the plate through the opening means and adapted to move the plate to open position by contact with the work surface upon placement of the guiding and support means against the work surface.

3. The coating device of claim **1,** wherein the guiding and support means comprise a planar surface means on the front wall projecting in front of and on said other side of said opening means.

4. The coating device of claim **3,** wherein the planar surface means is provided by a panel of the desired thickness bonded to the front wall.

5. The coating device of claim **3,** wherein the planar surface means is provided by strips of material bonded to the front wall and presenting sufficient guiding and support surface.

6. The coating device of claim **1,** wherein the body of the device comprises two sections, one housing the feeder reservoir and the doctor blade, and the other section being narrower than the top section, the front wall of the other section projecting below and past the opening means to thereby provide the planar, guiding and support means.

7. The coating device of claim **1,** wherein the wall means provide additional reservoirs, and means for selectively interconnecting said additional reservoirs to the feeder reservoir.

8. The coating device of claim **7,** wherein the means for selectively interconnecting the reservoirs comprises a manifold, a branch connecting said manifold to the interior of each reservoir, and a two-way valve in each branch to control communication between the manifold and the interior of each reservoir.

* * * * *