Feb. 14, 1967 E. A. LAURING 3,303,816

APPARATUS FOR CURTAIN COATING

Filed June 3, 1963

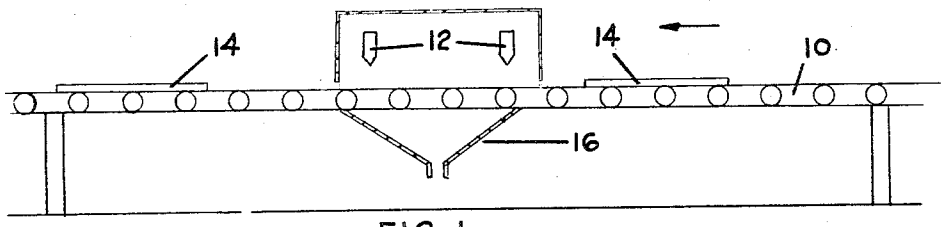


FIG. 1

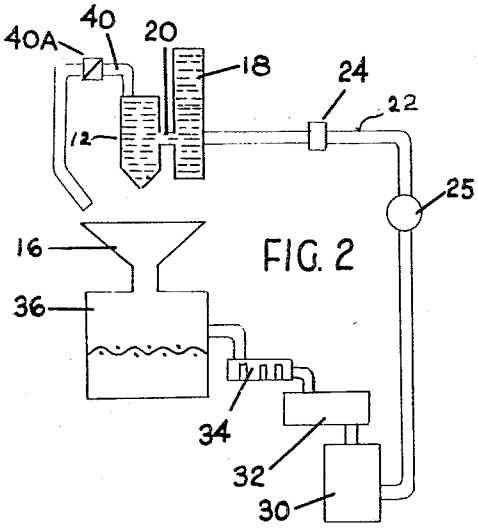


FIG. 2

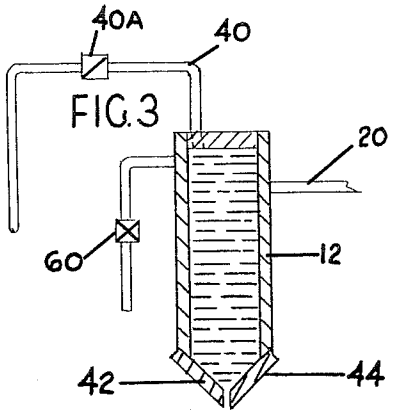


FIG. 3

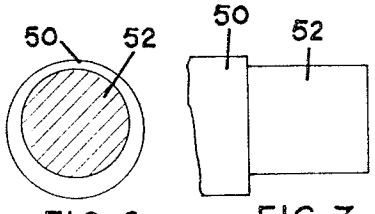


FIG. 6

FIG. 7

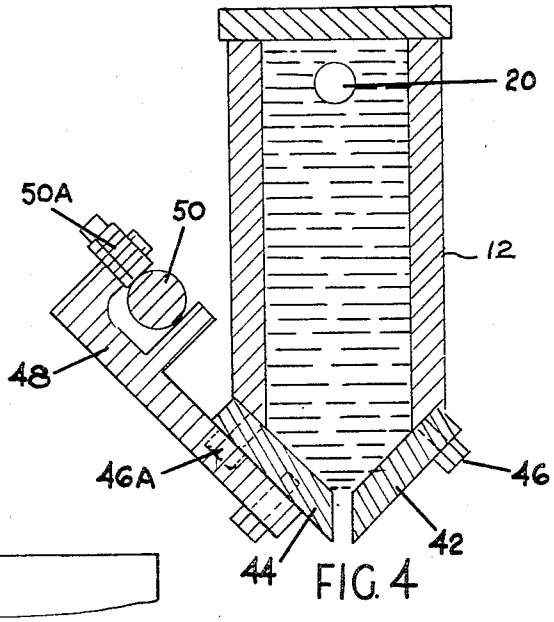


FIG. 4

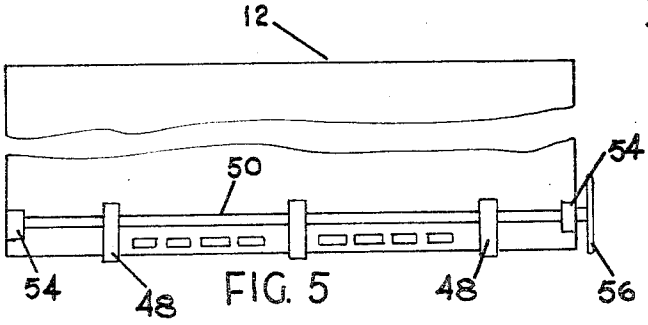


FIG. 5

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APPARATUS FOR CURTAIN COATING

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1 Claim. (Cl. 118—603)

This invention relates to improvements in coating apparatus and methods particularly for coating with paint compositions, resins and the like and more particularly to a curtain coater.

In coating of objects with paints, resins and lacquers the coatings are usually propelled against the object to be coated. The coating composition usually contains gas bubbles, some of which remain in the coating film.

An object of the invention is to provide a method of curtain coating from which the gas bubbles are eliminated.

Another object of the invention is to provide an improved curtain coating apparatus in which heavier coatings than heretofore possible may be economically applied.

Various other objects and advantages of the invention will be apparent in the following description:

Referring to the drawings which illustrate an embodiment of the invention—

FIGURE 1 is a diagrammatic longitudinal view of one form of coating apparatus showing arrangement of conveyor, curtain coater, etc.;

FIGURE 2 is an illustration of the pumping system for coating composition;

FIGURE 3 is a section view of a modified coating head;

FIGURE 4 is a sectional view of the coating head through a preferred form;

FIGURE 5 is a side view of the coating head with parts broken away;

FIGURE 6 is a section view of coating head lip retractor shaft taken through shaft bearings; and

FIGURE 7 is a detail of the end of the coating head lip retractor shaft.

As illustrated in FIGURE 1 an embodiment of a coating apparatus includes a frame 10 carrying a suitable conveyor such as a roller type. There are shown two spaced apart curtain coaters 12 for applying coating to objects 14 carried by the conveyor. Positioned below the conveyor is collection and return member 16. The conveyor is driven by any suitable means (not shown).

The coating is supplied to the system through screen 36. The variable speed pump 30 pumps the material to the column 18 which supplies the coating head 12 through conduit 20. The coating material flows from the head 12 in an unbroken stream or curtain to deposit the desired amount on the object 14 passing under the curtain.

The speed of the object 14 is controlled by the speed at which the conveyor is driven. The head 12 may be provided with means (not shown) for adjusting the distance it is positioned above object to be coated. Any surplus of coating from the objects to be coated passes into the pan 16 which returns the coating to container 32.

As shown in FIGURE 2 the pumping system for the coating includes a variable speed pump 30 which receives the coating from the container 32. The container receives coating from foam braker 34. The foam braker may be of any suitable construction. The coating from pan 16 passes to vibratory screen 36 and then to the foam braker. The pump forces the coating material through filter 25 for removing any foreign matter from the coating composition. A valve 24 may be positioned in the conduit 22 if desired. The connection 20 between

column 18 and head 12 may be flexible hose which permits pouring head to be adjusted upward or downwardly without disturbing the connection of the head and column 18. The inlet 20 to the head 12 may be near to or adjacent the top thereof. The coating is pumped into the column 18 above the bottom thereof but considerable distance from the top thereof. Any gas contained in the coating material will pass upward in the column and out to atmosphere through a suitable opening in the top. Column 18 is the height of the head and is sufficient to provide the necessary negative pressure.

The level of the coating material in the head is adjacent the top without any air cushion. The coating material without air bubbles discharges from the coating head in a continuous unbroken curtain and onto the object to be coated.

The coating head shown in FIGURE 3 is provided with outlet 40 having a suitable check valve 40A therein. Any air in the head escapes through the valve 40A.

In FIGURE 4 the coating head 12 is provided with pouring lips 42 and 44 which are closed until the head 12 is filled. When the coating is begun the lips 44 are adjusted to give the proper lip opening. The lip 44 is adjusted by means of hand wheel 56 to obtain a uniform opening between lips 42 and 44. The lip 42 is stationary and is fastened to the side wall of head by means of bolts 46. Lip 44 is movable and is fastened to bearing slides 48 as shown in FIGURE 5. The lip 44 is attached to head 12 by bolts 46A extending through elongated slots in lip 44. These bolts 46A are not so tight as to prevent movement of the lip 44.

A shaft 50 extends the entire length of the head 12 and fits into slots in bearing slides 48. Set screws 54A hold the bearing slides and shaft 50 to a close fit. The shaft 50 is provided with an eccentric center 52 at both ends. By this arrangement the shaft 50 becomes a cam arrangement to open and close lip 44. Each end of shaft 50 is fitted into bearings 54 which are secured to head 12. The adjusting wheel 56 is secured to one end of shaft 50. When wheel 56 is moved shaft 50 also turns. As shaft 50 turns and presses against bearings 48 and because of the cam movement, the lip 44 is moved thereby decreasing or increasing the width of the slot between lips 42 and 44.

In the arrangement illustrated, FIGURES 4 and 5, lips 42 and 44 are adjustable between 0 and about .225 inch. The edges of lips 42 and 44 are in any adjustment in a vertical position with the edge of leg 44 parallel to edge of lip 42.

When using head of the type shown in FIGURE 3, the lips are closed and the coating material is pumped into the head 12 through conduit 20. Air escapes through 40 and the check valve 40A. The head may be completely filled with coating material until the material goes into pipe 40 or it may be filled only partially. For the best operation it is desirable to completely fill the head 12. The lips are opened until the overflow, if any, through 40 stops. When overflow stops there is a slight negative pressure at the top of the coating head. The lips may be opened considerably more in this arrangement than when an air cushion is employed in the head. The larger lip opening can be employed up to 0.22 before air goes up through the lips and disturbs the negative pressure in the head. Since the volume of coating material going through the lips opening depends upon the speed or volume output of the pump 30 changing the lips opening has little or no effect on the amount of coating material applied as long as there is no overflow through conduit 40. If it is desired to empty the head 12 the valve 60 in conduit 58 is opened and the material flows out through the lips opening.

Some of the advantages of the present invention over a positive pressure system are:

(1) Operation with a larger lip opening is possible to achieve a reduction of interference from dirt particles, whereby cross machine curtain variations are materially reduced.

(2) The overflow line and check valve eliminates possible damage or deflecting of sides of head **12** since pressure cannot build up should the lips opening be left closed with the pump operating.

(3) Negative head pressure operation makes possible the lowest curtain velocity suitable for coating at less than about 100 feet per minute.

(4) Eliminates or substantially eliminates entrapped air and foam in the coating material to be applied.

(5) Elimination of liquid pulses or throbs from the pump.

What is claimed:

Apparatus for forming a vertical uniform liquid curtain through which an object to be coated is passed, comprising a coating head containing an elongated horizontal chamber the upper portion of which is closed, an inlet communicating with said chamber adjacent but spaced from the top thereof, and a discharge slot communicating with the bottom of said chamber and extending longitudinally substantially the length thereof, said head including also an outlet vent conduit communicating at one end with the top of said chamber, and one-way check valve means connected in said conduit to permit fluid flow in the direction away from said chamber;

normally closed adjustable lip means for controlling the flow of fluid through said discharge slot;

means for establishing a pressure head in said coating head and for removing gas bubbles from the coating fluid, comprising an open-topped housing defining a vertical column, said housing including opposed inlet and outlet openings at an elevation below the upper end of said vertical column;

flexible conduit means connecting the outlet of said vertical column housing with the inlet of said coating head;

means including a pump for supplying liquid to the inlet opening of said vertical column housing to fill said vertical column and the chamber of said coating head means, thereby causing discharge of the fluid from said coating head through said vent conduit and said check valve means;

means for opening said lip means to permit the gravity discharge of a curtain of uniform predetermined thickness of the coating fluid from said coating head; and

means for conveying an article to be coated through said uniform curtain.

References Cited by the Examiner

UNITED STATES PATENTS

2,963,002	12/1960	Glaus	118—324
3,067,060	12/1962	Glaus	118—324 X
3,074,374	1/1963	Burkle	118—324
3,132,968	5/1964	Wandtke	118—324 X

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