

Oct. 9, 1956

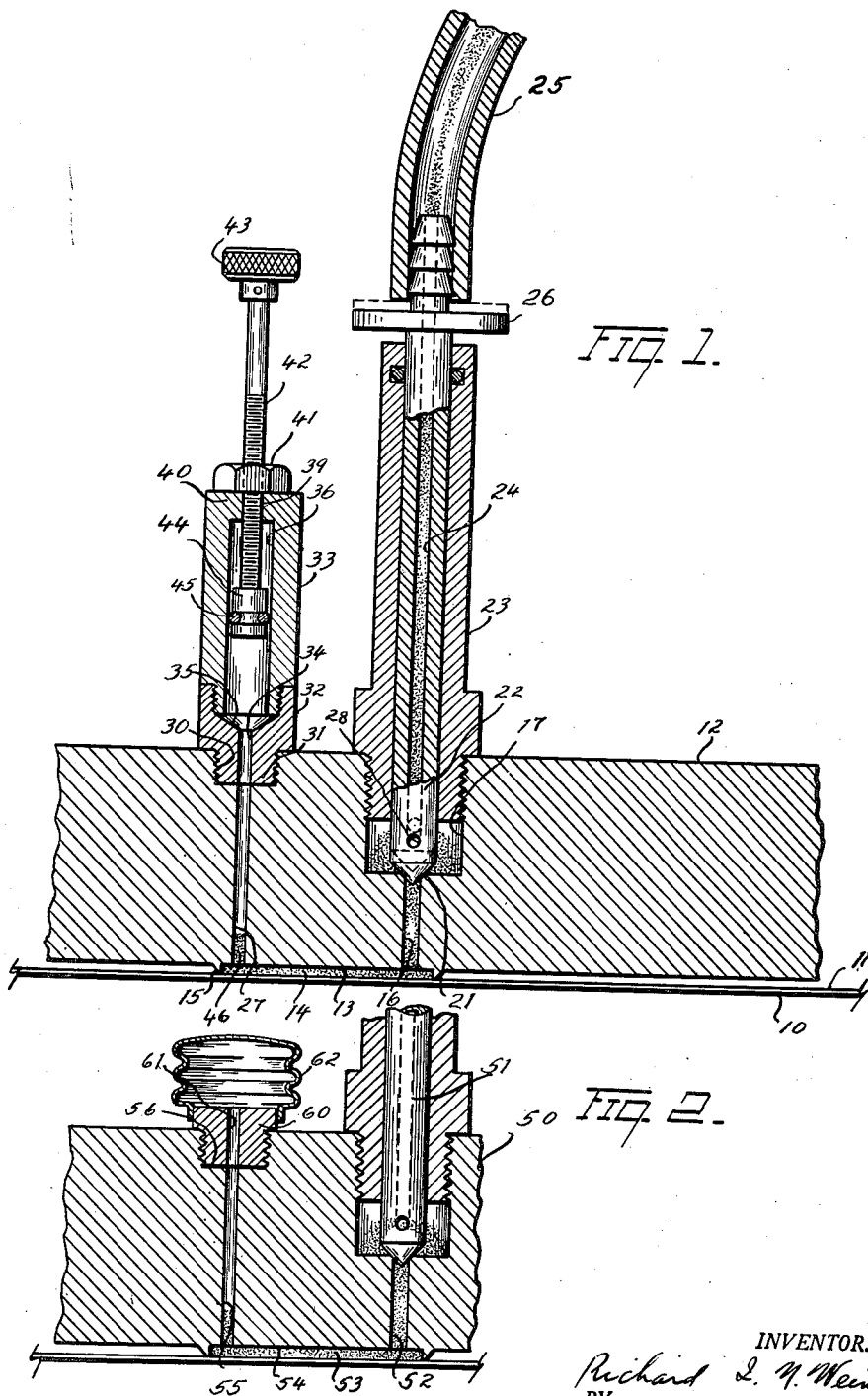
R. I. N. WEINGART

2,765,494

VENTING MEANS FOR PAINT DEPOSITING MACHINES

Filed May 25, 1951

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 3.

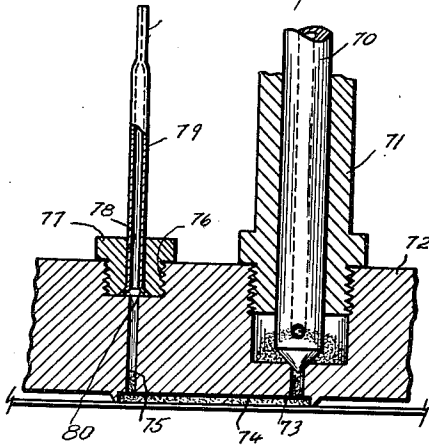


Fig. 5.

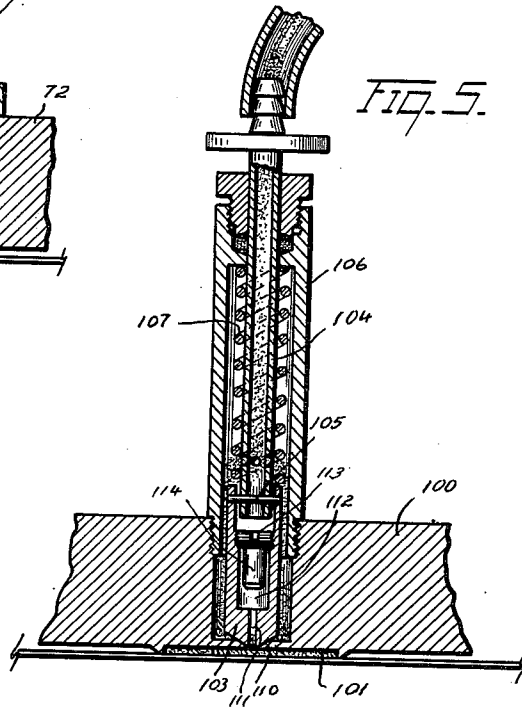
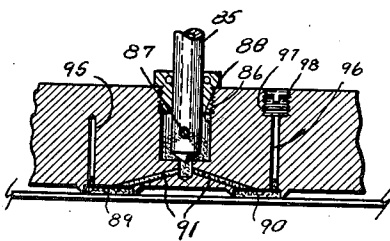


Fig. 4.



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VENTING MEANS FOR PAINT DEPOSITING MACHINES

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4 Claims. (Cl. 18—34)

This invention relates to the art of applying colors to surfaces and relates more particularly to an improvement in machines for depositing colored pigments on sheets within confined areas.

A machine for performing the general process is disclosed in Battey Patent No. 2,302,096 wherein color cards for paints are prepared, the colors being applied to the card itself instead of coating separate "chips" in the several colors and then adhesively applying the chips to the card. The machine includes a supporting platen with sheet-feeding means therefor and a vertically reciprocating matrix which engages the upper surface of the sheet. The matrix is formed with shallow cavities, usually of rectangular shape, and ports extend upwardly from the cavities leading to reservoirs for the fluid pigments which are fed to the cavities under pressure.

The depth of the cavities is generally from 10 to 20 thousandths of an inch and the deposit of the paint on the sheet is of a similar comparable thickness. Substantially the entire mass of the paint within the cavity is deposited in each cycle so that when the matrix descends upon the sheet in fluid tight engagement therewith in the succeeding operation, the matrix is again filled with paint which is again deposited. The air entrapped within the cavity escapes through the pores in the paper.

It will be apparent from the foregoing that printing of this character on relatively non-porous stock presents difficulties since there are no openings in the paper, or other sheet material such as plastic sheets, through which the air can escape.

It is therefore the principal object of the present invention to provide improved air venting means for the area defined by the cavity in the matrix whereby the air may escape without forcing the pigment to flow outside the area. The vent itself is of relatively small dimensions and it communicates with a closed pressure chamber into which the vented air from the cavity passes.

Another object of the invention is to provide means for varying the volume of the chamber so that uniformly good results may be obtained under varying conditions of temperature, moisture concentration and viscosity of the paint.

In the drawing,

Fig. 1 is a broken vertical section showing an embodiment of the present invention;

Fig. 2 is a similar section showing a modified form of air venting means employing a yieldable air chamber or bellows;

Fig. 3 shows a similar section employing another modified form of air vent;

Fig. 4 is a broken vertical section showing an arrangement which can be employed in cases where the coating composition from a single source is applied to plural cavities;

Fig. 5 is a broken vertical section showing an arrangement wherein the air vent is incorporated within the valve structure.

In Fig. 1 of the drawing there is shown at 10 the upper

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surface of the platen which supports the sheet 11. The matrix 12 has a cavity or recess 13 of any desired shape and the pigment is shown at 14 within the confines of the cavity.

In order to insure a well defined boundary for the application of the colors, the periphery of the recess is shown, in somewhat exaggerated form, as having a continuous knife edge 15. The matrix has a feed port 16 provided with a counter-bore 17 at its upper end and formed with a tapered annular seat 21 for a valve 22. The valve is mounted for reciprocating movement in a valve housing 23 and the valve has a bore 24 through which the pigment is fed from a conduit 25. A disc 26 secured at the upper end of the valve is suitably manipulated for the purpose of opening and closing the valve. The pigment passes down through longitudinal bore 24 and out through holes 28 into the valve chamber formed by counter-bore 17. All of the foregoing forms no part of the present invention.

In accordance with the present invention the matrix is provided with a vent opening 27 having a threaded counter-bore 30 at its upper end which receives the lower reduced portion 31 of a socket 32 forming the lower end of an air chamber whose upper end portion or housing 33 is received in the upper end of the socket.

The socket 32 has a bore 34 aligned with bore 27 and a tapered counter-bore 35 is formed at its upper end. Housing 33 has a central bore 36 of greater diameter than bore 34 and at its upper end a threaded opening 39 passes through upper wall 40.

A threaded rod 42 is received in opening 39 and is secured in an adjusted fixed position by means of a nut 41. At its upper end, rod 42 has a knurled cap 43. A piston-like element or plunger 44 is secured to the lower end of rod 42 and it is formed with an annular recess which receives a packing ring 45.

In most instances matrix 12 has plural cavities 13, each with a source of supply of the pigment. The sheet is fed by suitable means to the platen 10 and the matrix descends into firm engagement with the sheet. Substantially all of the pigment contained within cavity 13 during the previous cycle has been deposited on the sheet so that when the matrix contacts the sheet in the new cycle, and the knife-edge periphery 15 of the cavity closes the area, such cavity is empty except for the air entrapped therein. Valve 22 now opens and the pigment is forced under pressure into the cavity.

If the paper is porous the entrapped air escapes through the pores as the cavity fills with paint. When, however, the paper is coated or is otherwise of non-porous texture, the entrapped air escapes upwardly through vent opening 27 and a small quantity of the paint shown at 46 also passes upwardly into vent opening. The air in chamber 36 below the piston was previously at atmospheric pressure but as the entrapped air enters the chamber the pressure increases in direct proportion to the added volume and is retained under such pressure until the matrix leaves the sheet.

At this time the air within the chamber is vented to the atmosphere and this forces out the paint 46 at the lower end of the vent opening. The amount of paint forced out of the vent opening is relatively small but it produces no difficulty since the sheet is arranged to dwell in a fixed position momentarily below the matrix because of the tacky or viscous nature of the pigments. Thus, when the matrix departs upwardly from the sheet, strings of material are formed between the matrix and the paper and drops adhere to the matrix itself and then fall to the paper. Any residual deposit in the vent opening is blown out and descends to the sheet at the same time.

The effective volume of the air chamber is made adjustable because of the varying viscosities of the paint and

other conditions, the smaller the volume the higher the pressure and the greater the blowout force at the end of the cycle.

In the modified form of the invention shown in Fig. 2 the matrix 50 is provided with the same valve arrangement 51 and feed port 52 for the pigment 53 contained within the cavity 54. It also has the same vent port 55. In this instance however the counter-bore 56 at the upper end of the vent port has a bushing 60 having a vertical opening 61 aligned with vent port 55 and at the upper end of this bushing a bellows 62 is mounted.

The operation is the same as in the earlier embodiment except that the bellows opens slightly under the added pressure and returns to neutral position when the matrix raises from the sheet. This arrangement is not adjustable and different units may be inserted in the counter-bore when different viscosities are encountered.

In the modified arrangement of Fig. 3 the valve 70 is mounted in the same type of sleeve 71 in the matrix 72 and the paint is fed through the same feed port 73 into the cavity 74. The vent opening 75 at one side of the cavity is again provided with a threaded counter-bore 76 which receives a threaded bushing 77 having a central bore 78. Within this bore a tube 79 is positioned and the lower terminals of the tube are flared outwardly as shown at 80 to effect a seal. In this distance the tube is closed at its upper end by merely pinching the same as shown at 81. With this structure the air chamber can be reduced in effective size by continuing the flattened area downwardly although it could not be increased in size.

In the arrangement of Fig. 4 the valve 85 is seated within counter-bore 86 and the paint is delivered through opening 87 into the chamber 88 formed by the counter-bore. In this instance plural cavities 89 and 90 are shown and paint is fed to such cavities by means of diagonal bores 91. At one side of cavity 89 a blind hole or vent 95 is shown and at one side of cavity 90 a continuous air vent 96 is provided. This vent has a threaded counter-bore 97 receiving a plug 98 which can be removed for clean-out purposes. This arrangement is particularly useful for printing electrical circuits wherein only a single composition is employed and color is of no consequence.

In the final arrangement of Fig. 5 the air vent is incorporated into the valve structure per se. The matrix 100 has a cavity 101 on its lower surface and paint is fed to the cavity when valve 103 is opened. The valve is mounted at the lower end of a tube 104 by means of a cross pin 105 and both members are disposed in a housing 106. A spring 107 carried concentrically of the tube urges the valve to closed position. The lower end of the counter-bore has a tapered seat 110 for the valve and when in the closed position of Fig. 5 no paint can pass into the cavity. The valve is further formed with a central port 111 leading upwardly to an air chamber 112 which is closed at its upper end by means of a plug 113. The size of the air chamber can be varied by varying the size of the lower end portion 114 of the plug. When the matrix descends upon the sheet the valve is closed and when an air-tight seal has been effected the valve is opened, thus allowing the paint to pass into the cavity. The entrapped air within the cavity passes upwardly through the vent opening into chamber 112 and when the valve is thereafter closed and the matrix raised from the sheet, the air within the chamber is vented, thus causing the small accumulation of paint within the lower end of the vent opening to be blown out.

While five forms or embodiments of the invention have been shown and described herein for illustrative purposes, and the construction and arrangement incidental to five specific applications thereof have been disclosed and dis-

cussed in detail, it is to be understood that the invention is limited neither to the mere details or relative arrangement of parts, nor to its specific embodiments shown herein, but that extensive deviations from the illustrated forms or embodiments of the invention may be made without departing from the principles thereof.

I claim:

1. The combination with a matrix for printing fluid material on a sheet and having a cavity to receive the fluid material, and a vertical feed port, of means for venting air entrapped within the cavity as the fluid material is fed downwardly thereto, the cavity having a relatively small vent opening at a point spaced from the feed port and leading upwardly from the cavity, and a closed housing of larger dimensions than the vent opening communicating therewith.

2. The combination with a matrix for printing paint on a sheet within a defined area and having a cavity on its lower surface to receive the paint and a generally vertical feed port through which the paint is fed to the cavity under pressure, of means for venting air entrapped within the cavity when the matrix is in contact with the sheet disposed thereunder, the matrix having a relatively small vent opening leading upwardly from the cavity at a point spaced from the feed port, and a closed housing forming an air chamber communicating with the vent opening at its upper end and being of greater dimensions than the vent opening.

3. The combination with a matrix for printing paint on a sheet disposed thereunder and having a cavity to receive the paint, and a generally vertical feed port, of means for venting air entrapped within the cavity as the paint is fed downwardly thereto, the cavity having a relatively small vent opening leading upwardly at a point spaced from the feed port, and a tube mounted on the matrix at the upper end of the vent opening, such tube being of larger dimensions than the vent opening and communicating therewith, the tube being made from deformable material and being flattened at its outer end to close the same.

4. The combination with a matrix for printing paint on a sheet disposed thereunder and within a defined area and having a cavity on its lower surface to receive the paint and a generally vertical feed port through which the paint is fed to the cavity under pressure, of means for venting air entrapped within the cavity when the matrix is in contact with the sheet disposed thereunder, the matrix having a relatively small vent opening leading upwardly from the cavity at a point spaced from the feed port and forming a closed air chamber.

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