

- [54] **GROOVE COATER**
[75] Inventor: **William H. Dupke**, Seattle, Wash.
[73] Assignee: **U. S. Plywood-Champion Papers
Inc.**, New York, N.Y.
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Primary Examiner—Morris Kaplan

Assistant Examiner—Leo Millstein

Attorney—James M. Heilman and Heilman & Heilman

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[51] Int. Cl. B05c 11/02
[58] Field of Search 117/43, 95-97;
 118/105, 214, 254, 315, 408, DIG. 9, 215

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[57]

ABSTRACT

Groove coating apparatus includes a block-like device adapted to ride within a groove. The device has a coating material receiving chamber, a dispensing aperture at a forward portion of the block within the groove. The following portion of the block is configured to dispense the dispersed coating material onto the side walls of the groove. Means bias the dispersing means onto the bottom wall of the groove.

6 Claims, 4 Drawing Figures

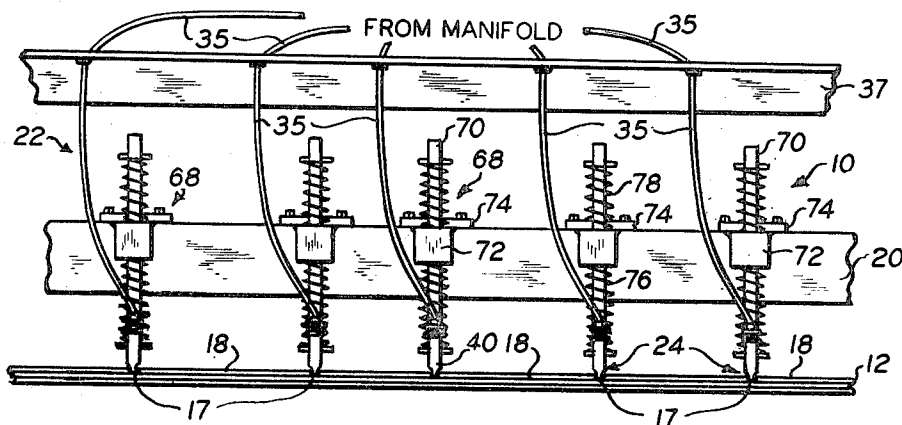
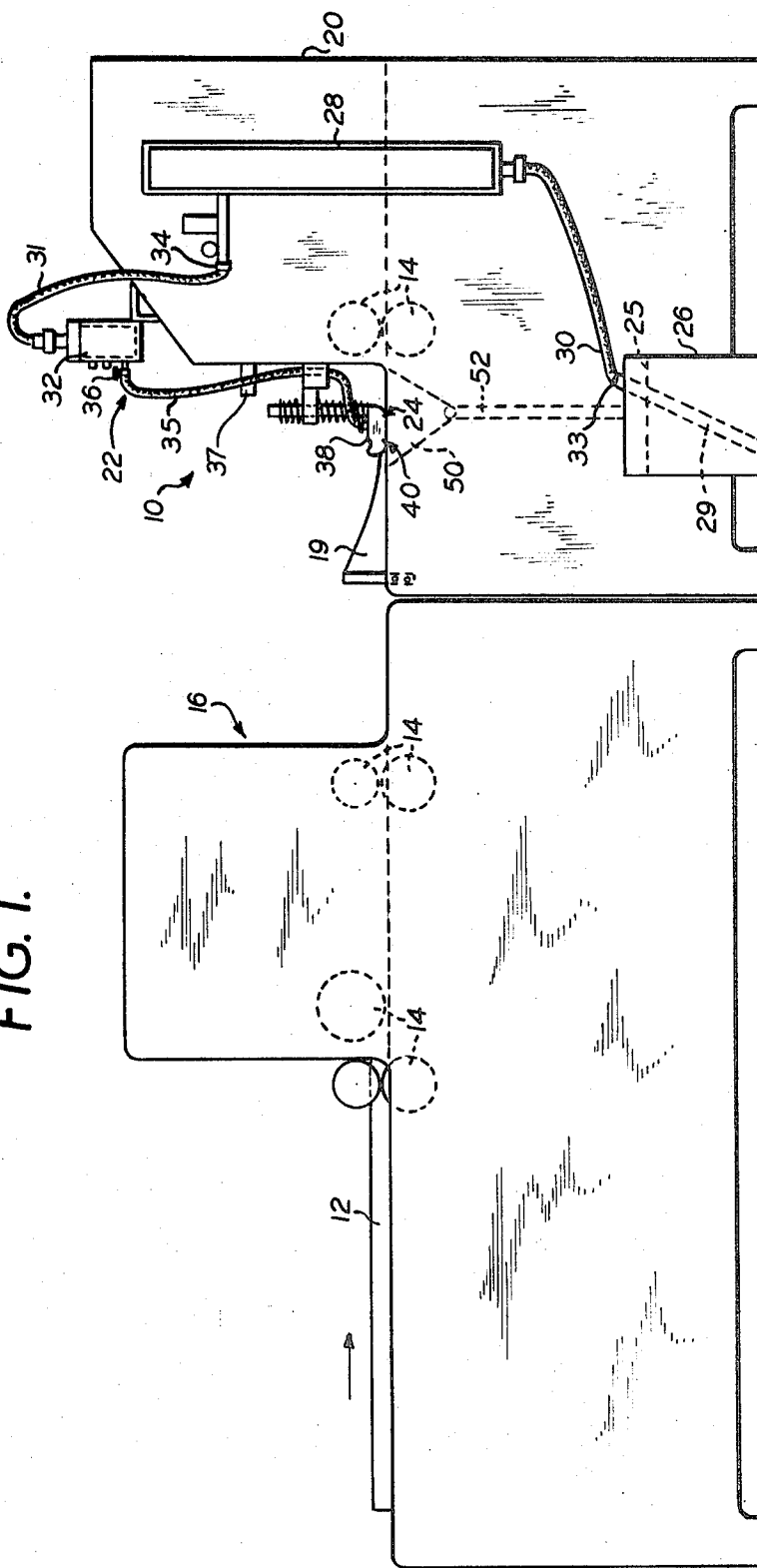


FIG. 1.



INVENTOR
WILLIAM H. DUPKE

BY

James M. Heilman

ATTORNEY.

FIG. 2.

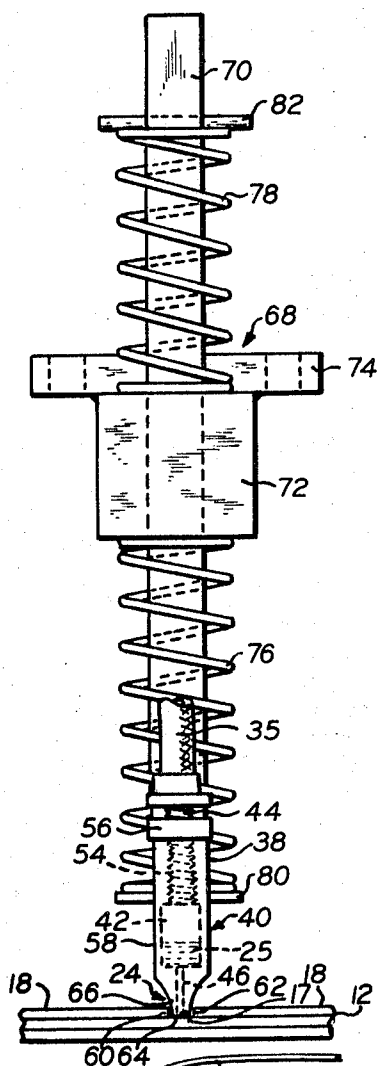


FIG. 3.

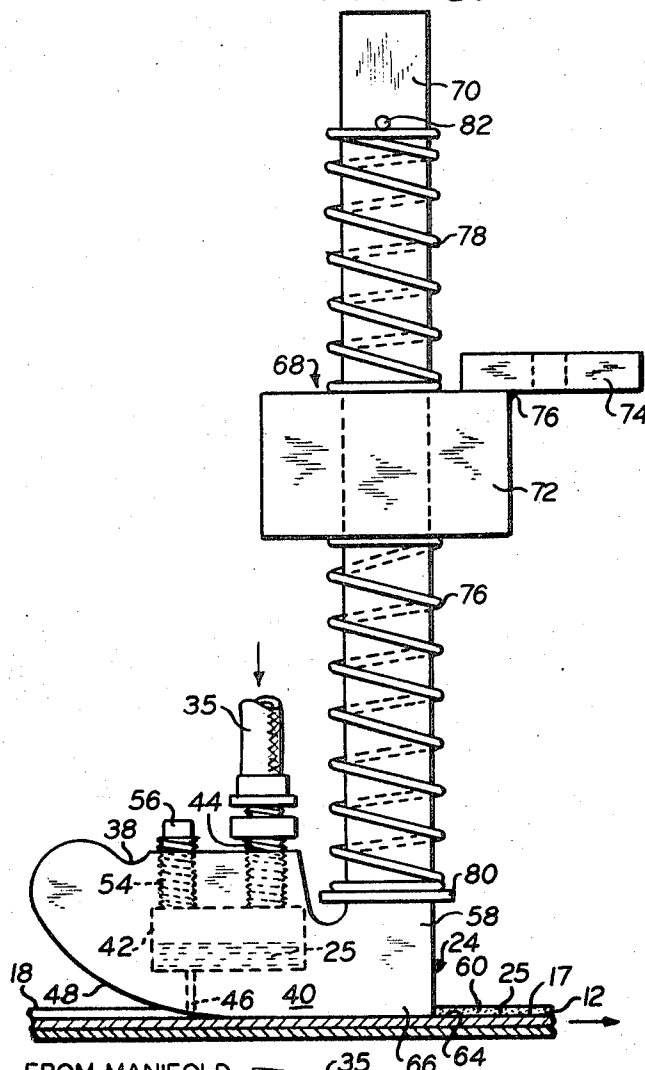
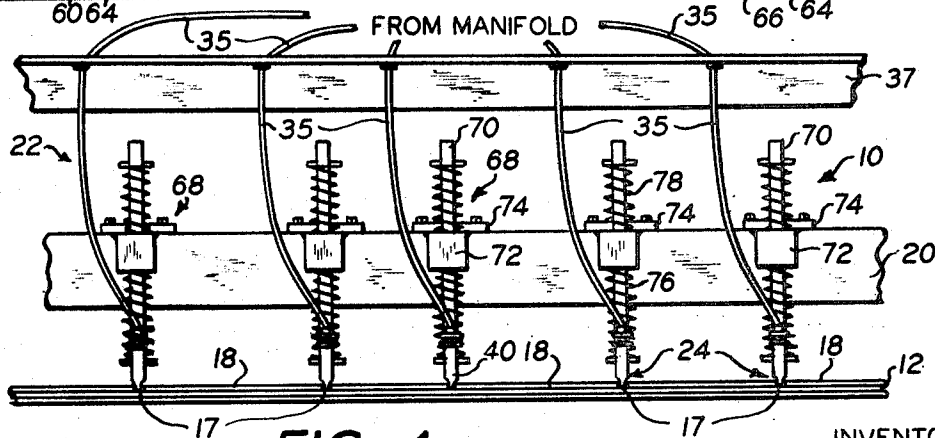


FIG. 4.



INVENTOR
WILLIAM H. DUPKE

BY

James M. Heilman
ATTORNEY

GROOVE COATER

This invention relates to an apparatus for applying a coating material to the surfaces of a groove in a sheet material, and more specifically, in a wall panel composed of wood or a similar material.

By far the most attractive and decorative wall finish is that provided by wall panels composed of wood or a synthetic material which is intended to simulate a wooden appearance. This type of panel is generally characterized by a number of vertically oriented sections of various widths. These sections are formed by simply cutting a plurality of spaced, vertically extending, narrow grooves into the wood. Thereafter the surfaces of the grooves are coated with a coating material of a suitable color, usually darker than the color of the wood. The resulting panel, although provided with a smooth exterior finish, maintains a natural wooden appearance and vastly improves the decor of any room in which it is placed.

The proper application of a coating material such as paint, dye or the like to the surfaces of the panel grooves is not a simple task. For example, the coating must be uniformly applied to every part of the groove surfaces since any area not coated will be prominently contrasted with the coated areas. Furthermore, the coating must be confined to the groove or it will ruin the panel appearance if it is allowed to spill onto the adjacent, differently colored sections. In addition, for the coating process to be economical, it must be continuous. In a continuous process manual application of the coating material is not practical since too many hands would be required to ensure an even and continuous coating. An automatic process such as by means of currently used applicator brushes is also somewhat uneconomical since frequent wear of the applicator parts as well as expensive auxiliary equipment needed to provide a continuous supply of coating material are just two of the expense factors which must be absorbed. Of course, delays in production due to shut down of the system during the period that the worn parts are replaced is also a primary cost factor.

There is therefore an important need in the wall paneling industry for an apparatus which is capable of applying a coating material to the groove surfaces economically, accurately and continuously. It is the primary object of this invention to provide such an apparatus.

Coating of the surfaces of a groove in a wall panel is easily accomplished by the method of the invention. This method broadly comprises passing a flowable coating material into the groove while simultaneously moving the wall panel in the direction of longitudinal extension of the groove. The coating material is forced through a constricted opening so that it is formed into a fluid stream. This facilitates an accurate and uniform deposit of the material into the groove. The movement of the panel enables the coating material to flow into successive sections of the groove, thereby rendering the process continuous. After the coating material is deposited in the groove it is dispersed within the groove so that it covers all of the exposed inner surfaces of the groove. The dispersion is accomplished generally by stirring or agitating the material with a force sufficient to spread the material over all of the surface area. The coating material adheres to whatever surface it con-

tacts and in this manner complete coverage of the surfaces is accomplished.

The apparatus of the invention which may be employed in the above-described method broadly comprises a flow means which is effective to cause a suitable coating material to flow into the groove of the wall panel and a dispersing means adapted to extend into the groove and disperse the coating material so that it covers all of the surfaces of the groove. The flow means is connected to a support structure so that at least part of it is positioned above the groove. This part is provided with a small opening at its lower surface and it is through this opening that the coating material is passed, preferably under pressure provided by a pump. A driving means imparts relative motion between the wall panel and this overhanging part so that the coating material flows into the adjacent sections of the groove. By a suitable selection of the size of the opening in the flow means and the rate of speed of the panel relative to the flow means, the quantity and deposit rate of the coating material are regulated so that no overflow of the material from the groove occurs.

The dispersing means comprises a member having a size and shape designed to enable it to project downwardly between the upwardly extending side walls of the groove. This member rides along the bottom wall of the groove or slightly above it as the panel is moving. To accomplish this, the member is provided with a thickness dimension at its lower section less than the distance between the side walls of the groove, but large enough to provide a substantial obstruction in the grooves. Since the dispersing member is positioned downstream relative to the flow means, the moving panel groove already contains coating material when it reaches it. The coating material must flow through the narrow paths at the sides of the member since the solids central portion acts as a baffle. In effect then, the member cuts through the coating material in a manner similar to the rudder of a boat cutting through water, and thereby causes the coating material to swirl about it and adhere to the side walls of the groove. The size and shape of the projecting member may readily be designed to provide a proper degree of fluid movement according to the quantity of fluid, material which is deposited at the flow means, and the rate of movement of the panel.

In the preferred embodiment, that portion of the flow means in which the opening is placed and the dispersing member are a part of a unitary structure. The forward or upstream section of this structure defines a chamber having two openings, one for intake of the coating material and one for outflow or deposit thereof into the groove. The structure is configured so that the latter opening is raised slightly above the groove when the apparatus is in operation. The rearward or downstream section of the structure is lower than the forward section so that it fits down into the groove as above explained. The differential in position of these sections may be provided by sloping, curving or otherwise altering the shape of the lower portion of the structure.

The unitary structure is suspended over the groove by its connection to a supporting structure such as a base or a frame. Such a connection is advantageously made by spring means which resiliently join the unitary structure to a projecting part of the support. The resilient attachment may be accomplished with a strong coil

spring wound around an upwardly extending extension of the unitary structure and tied at one end to this extension and at the other end to the projection support part. This construction enables the dispersing member at the rearward section of the unitary structure to rise and fall with the change in contour of the lower groove surface, as it rides on that surface.

The apparatus of the invention may be readily modified to include as many of the unitary structures above described as their are grooves in the panel being processed. These unitary structures, each suspended over a separate panel groove, may be connected to a common supply source of coating material such as by parallel conduits. With this arrangement, an entire wall panel may be processed in a very short period, thereby materially reducing the expense of such processing. Such an arrangement is economically practical because of the simplicity of the overall apparatus and the total elimination of the need for replacing applicator parts.

To the accomplishment of the foregoing and to such other objects as may hereinafter appear, the present invention relates to an apparatus as hereinafter further described and as shown in the accompanying drawings, in which;

FIG. 1 is a side elevational view of the coating apparatus of the invention combined with a groove cutting machine;

FIG. 2 is a front elevational view of a unitary structure which is a part of the apparatus of FIG. 1 shown positioned over a wall panel;

FIG. 3 is a side elevational view of the unitary structure of FIG. 2 with the wall panel partially in cross section; and

FIG. 4 is a front elevational view of a portion of the coating apparatus of FIG. 1 and illustrates a plurality of unitary structures of the type shown in FIGS. 2 and 3.

Referring to FIG. 1, the coating apparatus is illustrated on the right side of the drawing and is generally designated by the numeral 10. A wall panel 12 is carried by driving rollers 14 in the direction of the arrow toward the apparatus 10. The panel first passes through a grooving machine generally designated 16, which as its name suggests, cuts grooves 17 (FIG. 4) into the panel 12 and thereby defines the vertical sections 18 which are common to this type of panel. This machine 16 may be any conventional device currently used in the industry. After the panel 12 is grooved by the machine 16, it is guided by guide means 19 to the coating apparatus 10 where the inner surfaces of the grooves 17 are coated with a suitable coating material.

The coating apparatus 10 comprises a support structure 20, a flow means 22 and a dispersing means 24. The flow means 22 is effective to deliver a coating material in the form of a fluid stream to the grooves 17 from a reservoir of material 25 such as that stored in container 26. For this purpose, a pump 28 draws the material 25 from the container 26 by means of a partially submerged pipe 29 and delivers it through conduit 30 out of the pump and through conduit 31 to a distributing manifold 32. Filters 33 and 34, such as fine mesh screens, may be positioned in conduits 30 and 31 to clear the material 25 of coarse particles. The coating material 25 is distributed by the manifold 32 to the several lines 35 which are partially supported by guide structure 37 (FIG. 4). Each of these lines 35 is connected to a valve 36 (FIG. 1) which when open, permits continued passage of the coating material to the

member 38. This member 38 is at the forward part of the unitary structure 40 which is here shown in a form resembling a shoe.

Referring to FIGS. 2 and 3, the member 38 defines a chamber 42 (shown by the dashed lines) into which the coating material is delivered through an upper opening 44. The coating material 25 in the chamber 42 then flows out of the smaller opening 46 in the lower surface 48 of the member 38 and into the groove 17. This opening 46 is positioned over and vertically above the groove 17 so that the fluid coating material 25 may drop evenly into the groove as the panel 12 continues to move from left to right as viewed in FIG. 3. To properly position the opening 46 above the groove 17, the lower surface 48 of the member 38 is curved upwardly as shown best in FIG. 3 and the opening 46 is cut through this surface 48 at the raised part of this upwardly sloping section.

The flow means 22 is capable of delivering the coating material 25 from the container 26 to the grooves 17 continuously, evenly, and with no overflow onto the sections 18 of panel 12. If lower opening 46 in flow member 38 is smaller than upper opening 44, some accumulation of coating material may occur in chamber 42. This may result in a continued flow after the panel has passed below the opening 46, and so the collection bin 50 (FIG. 1) is provided in the support structure 20 below the shoe-like structure 40. This bin 50 communicates with container 26 by means of the vertical channel 52 and the residual coating material in chamber 42 is therefore gravity fed back to container 26 during the period immediately after the panel is processed. Once the chamber is drained it may be cleaned through the access hole 54 which is shown closed by a cap 56 in FIG. 3.

For the coating operation to be complete, both side walls as well as the lower wall of each groove must be covered with the adherent coating material. The mere flow of coating material into the groove is generally not sufficient to accomplish this result. Therefore, the coating apparatus 10, and more specifically, the shoe-like structure 40 includes the dispersing means 24 which is effective to force the material 25 against the side walls of the groove. As shown best in FIGS. 2 and 3, the dispersing means 24 comprises a member 58 which extends downwardly below the side walls 60, 62 of the groove 17. In the embodiment shown, the member 58 engages the bottom wall 64 of the groove 17 and rides along that wall as the panel 12 is driven through the apparatus 10. The lower section of member 58 is provided with inwardly tapered side walls (FIG. 2) so that the lower most portion 66 fits within the groove, i.e. has a thickness dimension which is less than the distance between groove sidewalls 60 and 62. With this structure, the portion 66 provides a substantial obstruction in the groove but does not completely block the groove; there remains a passage at each side adjacent the side walls 60, 62. It is through these passages that the coating material must pass as it is carried in the groove past portion 66 after being deposited from opening 46. Because these passages are small, the fluid rises as it moves through and then adheres to the upper parts of side walls 60 and 62. In this manner, the coating material is spread outwardly and upwardly after it is deposited in the groove and coverage of all of the inner wall surfaces of the groove is accomplished simply and inexpensively.

Both the upstream flow member 38 and the downstream dispersing member 58 must be properly positioned relative to the groove 17. To accomplish this, both members are integrally formed together and the resultant structure 40 is connected to the support structure 20 by a single connecting mechanism generally designated by the numeral 68. This mechanism comprises a rod 70 which is secured to the member 58 at its lower end and passes loosely through a block 72 at its middle section. The block 72 is secured to a laterally extending part 74 of the support structure 20 such as at the joint 76. The rod 70 and the unitary structure 40 are supported by the block 72 and part 74 through upper and lower coil springs 76 and 78. Lower spring 76 rests on a flange 80 at its lower end and engages the block 72 at its upper end. The upper spring 78 engages the upper surface of block 72 at one end and is connected to rod 70 by a pin 82 at its other end. The rod 70 is therefore resiliently suspended over the groove 17 by the springs 76 and 78. This suspension enables the structure 40 to rise and fall according to the contour of the lower wall 64 as the portion 66 rides over this wall. Thus if the lower portion is caused to move upwardly because of a swell or rise in the groove wall 66, it will force the rod 70 upwardly against springs 76 and 78. These springs are placed under tension by block 72 and pin 82 respectively, and when the portion 66 passes the lower wall obstruction, they force the rod 70 and portion 66 downwardly again to their original position.

FIG. 4 illustrates a plurality of such mechanisms 68 each working a separate structure 40. These structures 40 are unequally spaced laterally of each other to conform to the unequal spacing of grooves 17 in panel 12. The coating action of each device is controlled in part by the single pump 28 operating through the distribution manifold 32 as explained above with reference to FIG. 1. The simultaneous coating of these grooves in this manner enables a wall panel to be processed rapidly in the apparatus of the invention. In one such structural arrangement, the wall panels were fed through the apparatus at a feed rate of 175 feet per minute and all surfaces of each groove were evenly and fully coated.

It will be appreciated that the method and apparatus of the invention provide an important solution to difficult problem. The apparatus requires little or no maintenance and can be operated for extended periods without interruption. It is inexpensive to construct and its efficient operation enhances its economic value. The panels processed by the method and in the apparatus of the invention are characterized by their excellent quality and appearance, particularly in the contrasting groove areas which are provided with a smooth and complete coating and thereby add to the decorative value of the panel.

While only one embodiment of the invention has been illustrated and described, it will be apparent to those skilled in the art that many modifications may be made without departing from the scope of the invention as defined in the appended claims.

Exhibits A, B, and C attached hereto are made a part hereof.

What is claimed is:

1. An apparatus for coating the walls of a groove in a wall panel with a coating material comprising; a support structure; flow means connected to said support structure and effective to cause said coating material to flow into said groove, said flow means comprising a

first member defining a chamber for containing said coating material and having an opening adapted to be positioned over said groove, and pump means connected to said member and effective to deliver said coating material to said chamber and out of said opening; dispersing means adapted to extend into said groove and effective to disperse the coating material within said groove after it is caused to flow thereinto, said dispersing means comprising a second member positioned adjacent said first member and having a part adapted to extend below the side walls of said groove, and engage the lower wall of said groove, said part having a width dimension less than the distance between said side walls and; spring means connected to said support structure and to said first member and said second member and adapted to resiliently support said first member and said second member over said groove whereby the position of said dispersing part of said second member is adjusted to the height of the lower wall of said groove during the operation of said apparatus.

2. An apparatus for coating the walls of a groove in a wall panel with a coating material comprising; a support structure; a block-like means depending from said support structure and extending into said groove; said means including a chamber adapted to receive said coating material and a dispensing aperture located at a forward portion of said means which is elevated with respect to the slot bottom; flow means connected to said chamber and effective to cause said coating material to flow into said groove; a rear portion of said block like means comprising dispersing means adapted to extend into said groove and effective to disperse the coating material within said groove after it is caused to flow thereto, said dispersing means having a part adapted to extend below the side walls and engage the lower surface of said groove, said part having a width dimension less than the distance between said side wall; and spring means connected to said support structure and said block-like means and adapted to resiliently support said block-like means over said groove whereby the position of said dispersing means is adjusted to the height of the lower surface of said groove during the operation of said apparatus.

3. In the apparatus of claim 2, driving means for imparting relative movement between said panel and said flow means in the direction of the longitudinal extension of said groove, said flow means being effective to provide a continuous flow of coating material into said groove during said relative movement.

4. In the apparatus of claim 2, a plurality of said block-like means connected to said support structure and to said flow means so as to be spaced from each other and adapted to be positioned over a plurality of grooves whereby said apparatus is adapted to coat said grooves simultaneously.

5. Apparatus as defined by claim 2 wherein the width dimension of said part is of a magnitude to provide slot passageways between said part and the side walls of said groove.

6. An apparatus for coating the walls of a groove in a wall panel with a coating material comprising; a support structure; flow means connected to said support structure and effective to cause said coating material to flow into said groove; dispersing means having a rigid part adapted to extend into said groove and effective to disperse the coating material within said groove after it is caused to flow thereinto, said rigid part engaging the lower wall of said groove, and spring means connected to said support structure and to said dispersing means and adapted to resiliently support said dispersing means in a manner that said rigid part is adjusted to the height of the lower wall of said groove.

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