United States Patent [19]

French

[11] **3,888,725**

[45] **June 10, 1975**

[54] **AIR MANIFOLD WITH MASK AND LABEL APPLICATOR UTILIZING THE SAME**

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[22] Filed: **Mar. 16, 1973**

[21] Appl. No.: **342,283**

[52] **U.S. Cl.** **156/556;** 156/344; 156/541; 156/566; 156/584; 156/DIG. 31; 156/DIG. 38; 221/211; 221/278; 239/523; 239/563; 239/600

[51] **Int. Cl.** **B65h 29/24**

[58] **Field of Search** ..... 156/556, 584, 497, 285, 156/540, 356, 541, 358, 542, 363, DIG. 31, 444, DIG. 38, 566; 239/523, 563, 562, DIG. 21, 518, 600; 221/211, 278; 269/21, 321 A; 271/90, 194, 195; 425/DIG. 60, DIG. 102; 294/64, 65

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Assistant Examiner—J. Gallagher
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[57] **ABSTRACT**

A label applicator for applying a label to an article comprising a supporting structure, a station at which the label is releasably retained, a manifold on the supporting structure defining an air chamber adapted to receive gas under pressure, aperture means for allowing the gas in the chamber to escape and move toward the station to remove the label and apply it to the article, and a mask having opening means therein mounted with the opening means and the aperture means in partial registry and with the mask masking off part of the aperture means.

15 Claims, 5 Drawing Figures

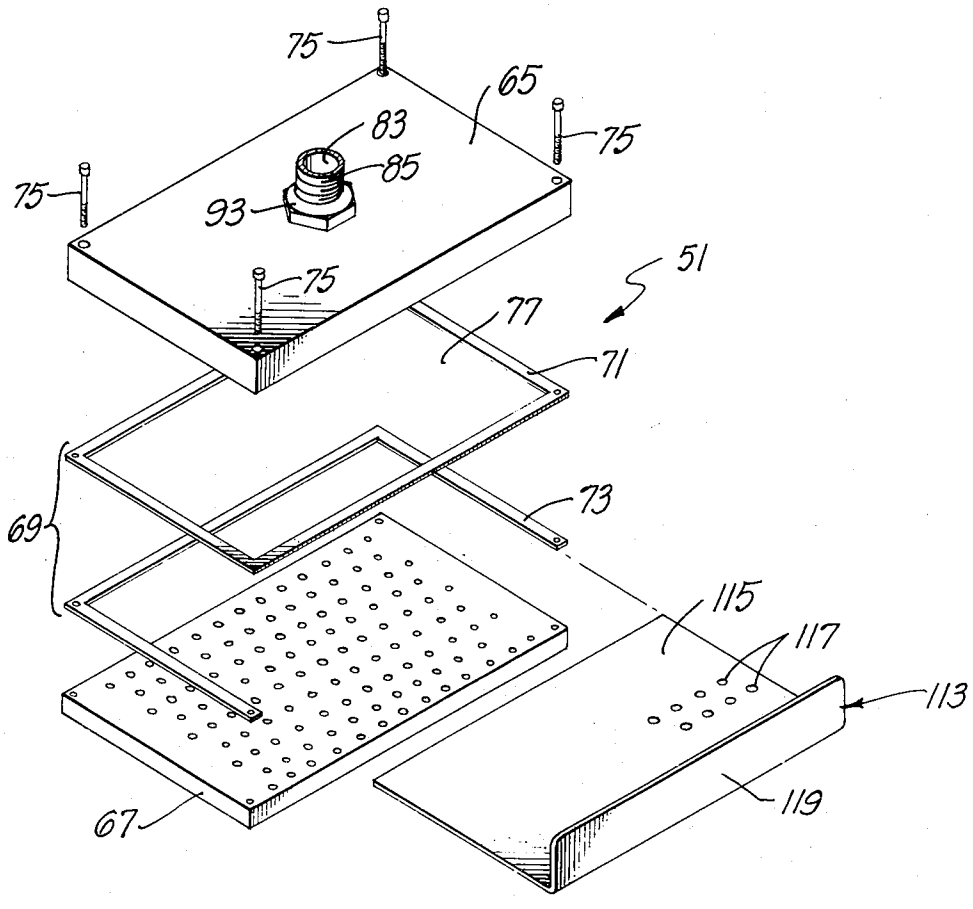


FIG. 1.

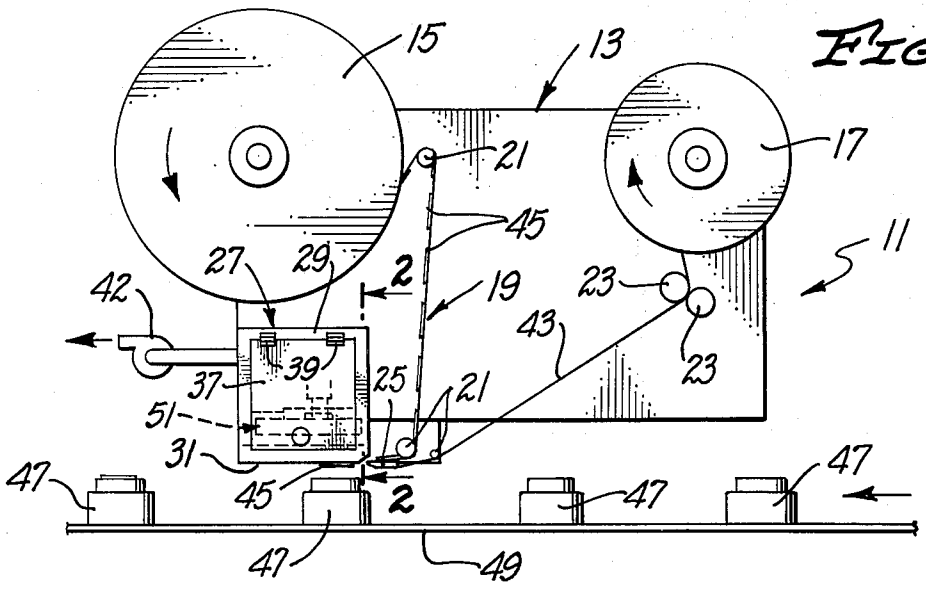


FIG. 2.

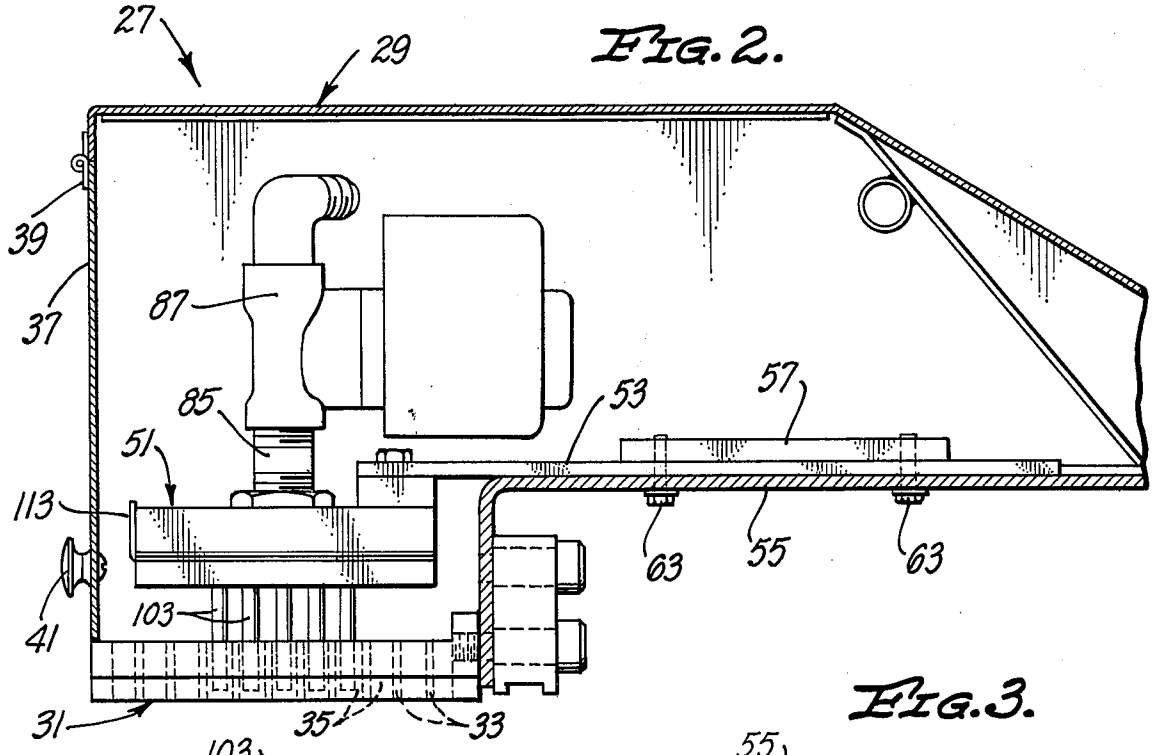


FIG. 3.

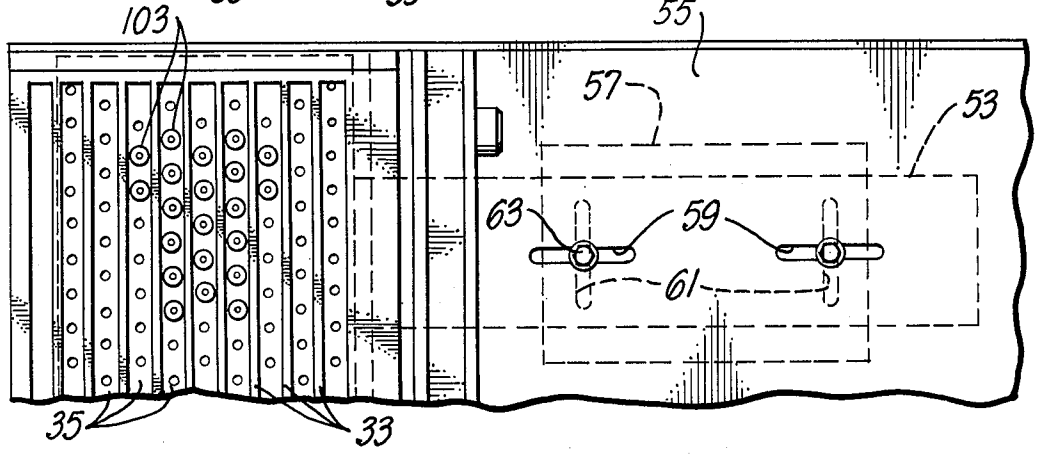
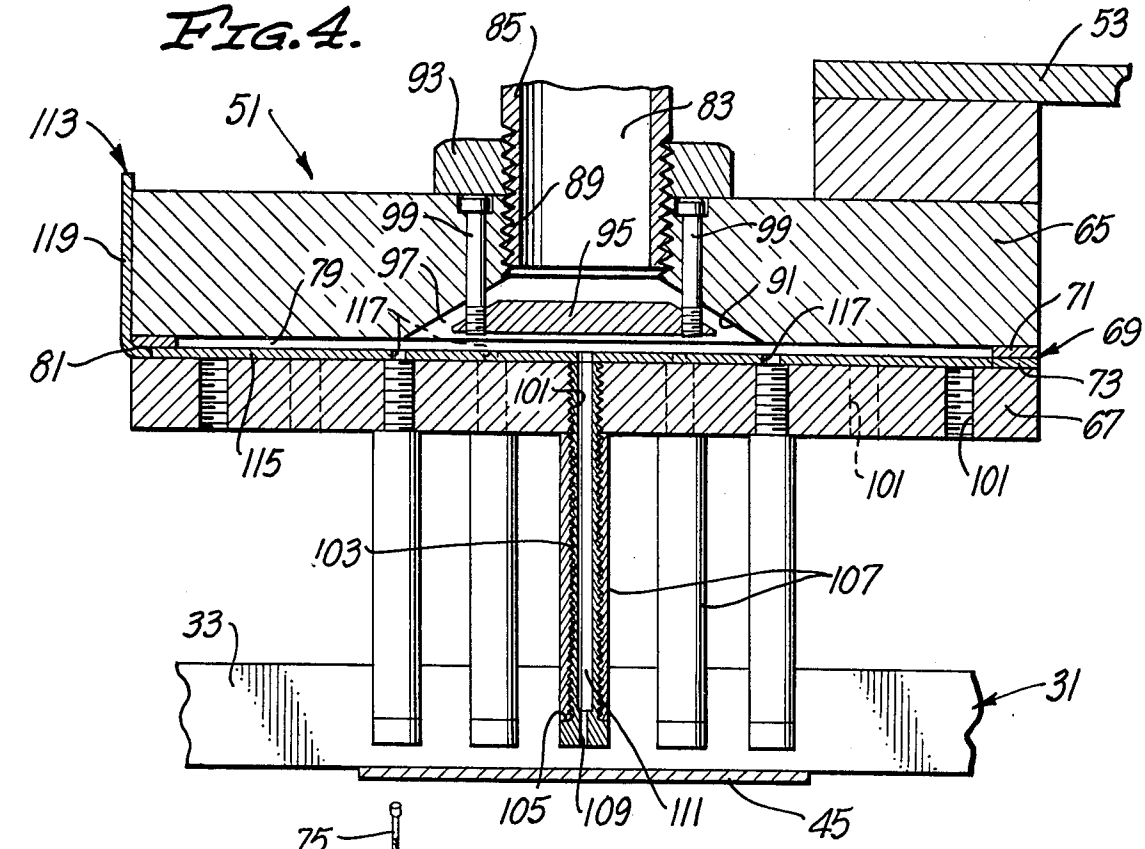


FIG. 4.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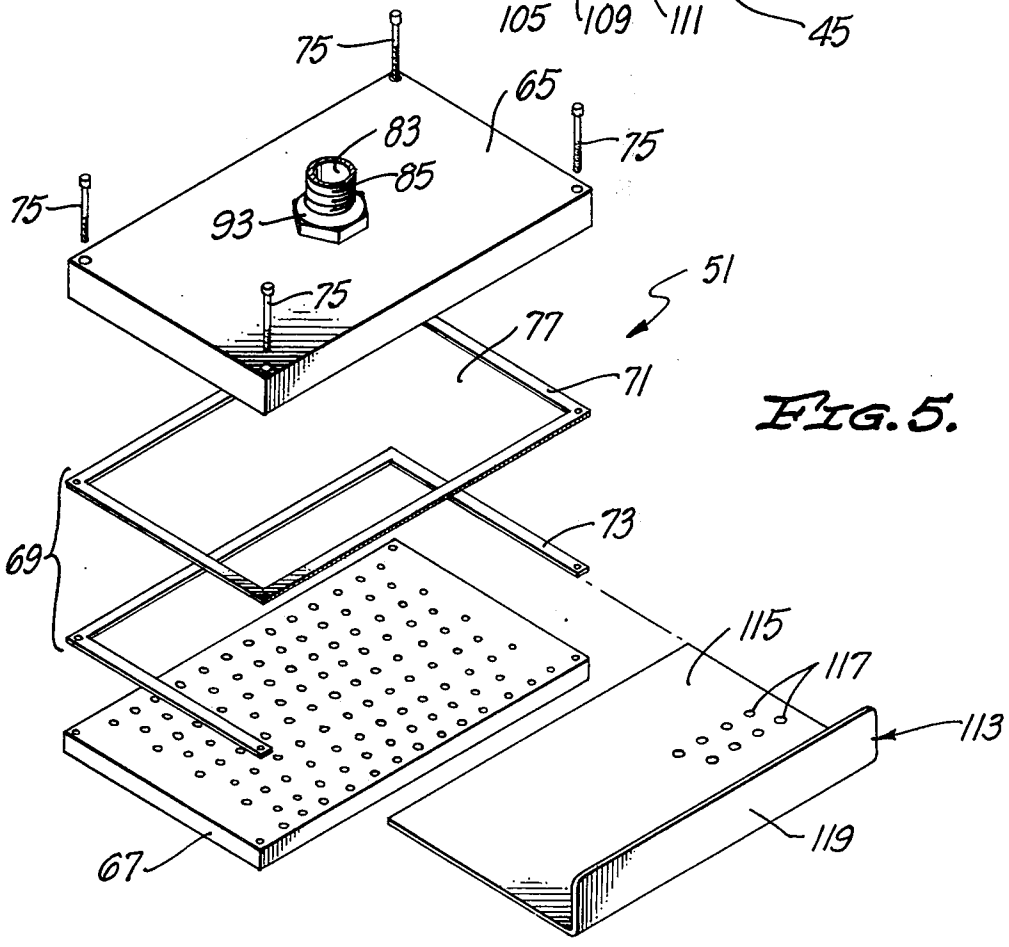
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FIG. 5.

AIR MANIFOLD WITH MASK AND LABEL APPLICATOR UTILIZING THE SAME

BACKGROUND OF THE INVENTION

Many articles such as containers for products and/or the products themselves must bear label providing pricing information, product identification, etc. The labels are typically supplied on an elongated backing strip with the labels being adhesively secured to the backing strip. The labeling function is carried out by a label applicator which removes the labels and applies them to the articles as the articles are conveyed past the applicator.

In one type of label applicator, the labels are sequentially removed from the backing strip and releasably retained at a preselected location. For example, the removed labels may be held against a grid by vacuum pressure. The labels are removed from the grid and applied to the article to be labeled by a blast of air from an air manifold.

The air blast must be relatively forceful. For example, the air blast must have sufficient force to (i) overcome the vacuum pressure which tends to hold the label against the grid, (ii) transfer the label from the grid to the article, and (iii) apply the label to the article. The air blast must also be fast acting so that the label applicator can apply labels as rapidly as possible. Accordingly, it is important that the force of the air blast be used efficiently.

The specific embodiment shown in common assignee's copending application Ser. No. 289,349 filed on Sept. 15, 1972, and entitled Label Applicator, uses an air blast most efficiently by tailoring the air pattern, i.e., cross-sectional configuration of the air stream, in accordance with the shape of the label so that a maximum amount of the air blast will impinge directly against the label. For example, if the label to be applied is long and thin, an air pattern having a long and thin cross section is used. While this is a highly effective concept, one problem to which the present invention is directed is increasing the speed with which the configuration of the air pattern can be changed.

Another problem to which the present invention is directed is the distribution of air within the manifold. The air manifold has a chamber and a plurality of spaced apertures which define an outlet for the chamber. The air passes through the outlet and is directed against the label held against the grid. The chamber must be sufficiently broad to provide communication from the air inlet to all of the apertures; however, to make the label applicator fast acting, the chamber should be of small volume. This means that the chamber may have relatively broad end walls and an axially short peripheral wall. It is important that air be distributed to all of the apertures at about the same time and in sufficient quantities so that the air blast can accurately and efficiently perform the intended functions.

SUMMARY OF THE INVENTION

The present invention substantially increases the speed with which the cross-sectional configuration of the air blast can be changed. This is accomplished by using a mask having opening means therein of an appropriate configuration to produce the desired cross sectional configuration of the air blast. The mask is arranged so that the opening means and the aperture means are in partial registry and so that the mask masks off part of the aperture means. This allows the mask to control the cross-sectional configuration of the air pattern emanating from the air manifold.

The mask can be mounted in such a way so that it can be easily removed and replaced with another mask having opening means of a different configuration to thereby provide an air pattern of a different cross-sectional configuration. In a preferred form of this invention, the mask can be simply slid into and slid out of the air manifold and no fastening devices are necessary to retain the mask in position. This provides for very rapid changing of the configuration of the air pattern.

The present invention also assures that all portions of the opening means of the mask will be supplied with air under pressure. This is accomplished by employing a diffuser in the air inlet to the chamber. The diffuser distributes the air under pressure to all portions of the opening means. Thus, no portion of the opening means is "starved" for air.

The portion of the air manifold forming the chamber can advantageously include first and second outer plates with spacer means sandwiched between the outer plates. The plates and the spacer means cooperate to define the chamber. A slot can advantageously be formed in the spacer means. The mask is at least partially insertable into the chamber through the slot and is slidably receivable therein to facilitate installation and removal of the mask.

The aperture means in the manifold can include a plurality of apertures and the opening means in the mask can include a plurality of openings. With this arrangement, the mask masks off some of the openings and the apertures are in substantial registry with other of the openings to thereby provide the desired opening pattern. The mask substantially closes off the slot in the manifold to minimize air loss from the chamber through the slot.

The end wall opposite the end wall containing the apertures has an inlet for the admission of air under pressure into the chamber. The diffuser can advantageously include a diffuser member mounted across the inlet in the path of the incoming air. The diffuser spreads the incoming air laterally in the chamber. To further assist the spreading action, the inlet includes a bore and a counterbore with the counterbore being flared and opening into the chamber. The peripheral surface of the diffuser member is flared outwardly so that it is parallel in cross section to the surface defining the counterbore. This provides an annular passage which extends radially outwardly as it extends axially into the chamber.

The invention can best be understood by reference to the following description taken in connection with the accompanying illustrative drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partially schematic side elevational view of a label applicator constructed in accordance with the teachings of this invention.

FIG. 2 is an enlarged, fragmentary, sectional view taken generally along line 2—2 of FIG. 1 and showing the air manifold and the adjacent structure of other portions of the label applicator.

FIG. 3 is a fragmentary, bottom view of the construction shown in FIG. 2.

FIG. 4 is a fragmentary sectional view through an air manifold constructed in accordance with the teachings of this invention.

FIG. 5 is an exploded perspective view of the air manifold.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 shows a label applicator 11 which includes a supporting structure 13. A storage reel 15 and a takeup reel 17 are suitably rotatably mounted on the supporting structure 13. An elongated strip 19 of labels is wound on the storage reel 15 and extends over a plurality of guide rollers 21 and in between a pair of drive rollers 23 to the takeup reel 17. The takeup reel 17 is caused to rotate in accordance with the amount of the strip 19 which is supplied thereto, all of which can be accomplished in a manner well known in the art. The strip 19 is also caused to pass over a peeling bar 25 in moving between the reels 15 and 17.

The label applicator 11 also includes an applicator section 27 (FIGS. 1 and 2). The applicator section 27 includes a housing 29 which is substantially sealed except for the lower end thereof which is covered by a grid 31. In the embodiment illustrated, the grid 31 includes a plurality of longitudinally extending, spaced, parallel slats 33 defining slots 35 therebetween (FIGS. 2 and 3).

The housing 27 also includes a door 37 hingedly mounted on a fixed portion of the housing 29 by a pair of hinges 39. The hinges 39 are spring loaded to normally bias the door 37 to the closed position shown in FIGS. 1 and 2. The door 37 can be manually pivoted to an open position about the hinges 39 by pulling outwardly on a knob 41 affixed to the door.

The housing 29 is evacuated to less than atmospheric pressure by a motor driven fan 42, and accordingly, there is a vacuum or slight negative air pressure at the grid 31. This negative air pressure can advantageously be continuously maintained during the operation of the label applicator 11.

The strip 19 includes a backing strip 43 and a plurality of adhesive labels 45 adhered to the backing strip. When the strip 19 passes over the peeling bar 25, the strip is forced to undergo a reverse bend with the result that the label 45 at the peeling bar is removed from the backing strip 43 at a location immediately beneath, and adjacent one end of, the grid 31. The negative air pressure at the grid 31 causes the label 45 to be retained against the lower face of the grid with the adhesive side of the label facing downwardly.

A plurality of articles or containers 47 are positioned on a conveyor 49 and passed beneath the grid 31. The conveyor 49 moves one of the containers 47 directly beneath the label 45 which is retained on the grid 31. A header or air manifold 51 (FIGS. 1, 2, 4 and 5) is mounted on the housing 29 and blows the label 45 from the grid 31 onto the upper surface of the container 47 therebelow. The blast of air is provided automatically by the air manifold 51 in response to the presence of the container 47 beneath the label 45 on the grid 31. Although the labels 45 are shown as being applied to the upper surface of the containers 47, it should be understood that the label applicator 11 can be used to apply labels of different sizes and shapes to various surfaces of different configurations. Also, gases other than air may be employed, if desired, by the manifold 51.

The manifold 51 is mounted on the housing 29 so that its position in a plane parallel to the grid 31 can be adjusted. This in turn adjusts the position in the air blast discharged by the air manifold. With this kind of adjustment, the label applicator is better suited to apply labels of different sizes and configurations. In addition, the adjustability of the air manifold allows it to be used regardless of the location on the grid 31 at which the label is located.

In the embodiment illustrated, the manifold 51 is adjustably mounted by a bracket 53 (FIGS. 2 and 3) which is affixed at one end to the manifold 51. The other end of the bracket 53 is sandwiched between a wall 55 of the housing 29 and a nut plate 57. The wall 55 has slots 59, the longitudinal axes of which are aligned. The bracket 53 has slots 61, the longitudinal axes of which are parallel and extend transversely to the longitudinal axes of the slots 59. Screws 63 extend through the slots 59 and 61 and are received in the nut plate 57 to thereby fixedly mount the air manifold 51. By loosening of the screws 63, the screws, the bracket 53, the nut plate 57, and the manifold 51 can be moved right or left (as viewed in FIGS. 2 and 3) as permitted by the slots 59. In addition, with the screws 63 loosened, the bracket 53 and the air manifold 51 can be moved up or down as viewed in FIG. 3 as permitted by the slots 61. This permits the air manifold 51 to be located in any position (within the limits of the slots 59 and 61) in a plane parallel to the grid 31.

A preferred construction of the air manifold 51 is shown in FIGS. 2–5. The manifold 51 includes an upper end plate 65, a lower end plate 67, and spacer means 69 sandwiched between the plates 65 and 67. For convenience and in order to correspond with the orientation shown in FIGS. 4 and 5, the plates 65 and 67 are referred to herein as upper and lower plates; however, these words are not intended to limit the orientations in which the air manifold 51 can be used as it can be used in virtually any orientation. Although the spacer means 69 could take different forms, in the embodiment illustrated, it includes a tubular plate 71 and a generally U-shaped plate 73. The plates 65, 67, 71 and 73 are held together at their corners by screws 75.

In the embodiment illustrated, the plates 65 and 67 are rectangular and the plate 71 has a rectangular outer periphery and a rectangular opening 77 therein. The U-shaped plate 73 has an outer periphery which is substantially co-extensive with the outer peripheries of the plates 65, 67 and 71 along three sides of these plates and an inner periphery which is co-extensive with three sides of the rim of the opening 77. One side of the U-shaped plate 73 is open.

With the plates 65, 67, 71 and 73 assembled, they define a chamber 79. The plates 65 and 67 form relatively broad end walls for the chamber and the plates 71 and 73 form an axially short peripheral wall for the chamber. Thus, the chamber 79 has relatively broad dimensions in a plane parallel to the plates 65 and 67 and a small dimension in a direction transverse to the plates 65 and 67. The volume of the chamber 79 is small so that it can completely fill with air in a minimum period of time. The open side of the U-shaped plate 73 forms a lateral opening or an elongated slot 81 (FIG. 4) which provides communication between the interior and the exterior of the chamber 79. Except for the slot 81, the chamber 79 is substantially airtight.

The upper plate 65 has a central opening therein defining an air inlet 83. A conduit 85 connects the inlet 83 to a source of air under pressure (not shown). A valve such as a solenoid valve 87 (FIG. 2) can be opened and closed so that the conduit 85 can supply bursts of air under pressure to the chamber 79 in accordance with the requirements for label application.

More specifically, the inlet 83 includes a threaded cylindrical bore 89 and a frustoconical counterbore 91 (FIG. 4). The counterbore 91 opens into the chamber 79 and is of progressively increasing diameter as it extends axially inwardly. The end of the conduit 85 is threadedly connected to the threaded bore 89 and a lock nut 93 locks the conduit against the inadvertent separation from the manifold 51.

An air diffuser in the form of a diffuser member 95 is located within the counterbore 91. Although the diffuser member 95 could be of different constructions, in the embodiment illustrated, it is in the form of a solid plug or a deflector of frustoconical configuration. The diffuser member 95 is concentric with the counterbore 91 and defines therewith an annular passage 97 which extends radially outwardly as it projects axially inwardly.

The diffuser member 95 could be mounted in different ways. However, in the embodiment illustrated, the diffuser member 95 is mounted on the plate 65 by a pair of screws 99 which extend through the plate 65 and are threadedly attached to the diffuser member. As shown in FIG. 4, the heads of the screws 99 are countersunk and covered by the lock nut 93.

The lower plate 67 has a plurality of threaded apertures 101 therein. Tubes 103 having external screw threads are threaded into some of the apertures 101 as shown in FIG. 4 and other of the apertures 101 are left open. Each of the tubes 103 has an annular shoulder 105 at the outer end thereof. A sleeve-like spacer 107 surrounds each of the tubes 103 and is retained between the shoulder 105 and the lower face of the plate 67. The spacer 107 is sized so as to prevent the tube 103 from entering the air chamber 79 and to keep the tube flush with the inner face of the plate 67.

Each of the tubes 103 cooperates with the associated aperture 101 to define a passage or aperture leading from the chamber 79 and projecting toward the label 45 on the grid 31. The tube 103 defines an outlet section 109 of this aperture which is of lesser diameter than the adjacent section 111 of the aperture and of lesser diameter than the aperture 101. Preferably the tubes 103 extend into the slots 35 to a position closely adjacent the label 45. In the embodiment illustrated, the tubes terminate slightly upwardly of the lower plane of the grid 31.

The air manifold 51 also includes a mask 113 which includes a plate-like section 115 having a plurality of openings 117 therein and a flange 119. The number and location of the openings 117 are selected in accordance with the desired air pattern configuration. For example, the peripheral row of apertures may lie just inside the periphery of the label 45.

The plate-like section 115 is slidably receivable in the slot 81. With the plate-like section 115 inserted into the air chamber 79, the slot 81 is substantially closed by the mask 113 in that the cross sectional size and shape of the plate-like section 115 is substantially identical to the cross sectional size and shape of the slot 81. The plate-like section 115 rests on the lower plate 67 and the flange 119 abuts the periphery of the upper plate 65 and projects slightly thereabove to facilitate removal of the mask 113 from the air manifold 51. The plate-like section 115 is shaped and dimensioned so as to engage all three sides of the U-shaped plate 73 when the mask is in the chamber 79.

With the mask inserted into the air manifold 51, some of the openings 117 are in registry with some of the apertures 101. Other of the apertures 101 are closed or masked off by the plate-like section 115. All of the apertures 101 for which no tube 103 is provided are masked off by the mask 113. Thus, the pattern of the openings 117 controls the cross-sectional configuration of the air pattern which is discharged from the chamber 79. The presence of the plate-like section 115 in the chamber 79 reduces the volume of the chamber in that the axial dimension of the chamber is reduced.

In use of the label applicator 111, the strip 19 is moved from the storage reel 15 to the takeup reel 17, and this results in one of the labels 45 being removed from the backing strip 43 and retained against the lower face of the grid 31 by the vacuum within the housing 29. The conveyor 49 moves one of the containers 47 to a location immediately beneath the label 45 on the grid 31. When this has occurred, the valve 87 is automatically open in any conventional manner to provide a blast or pulse of air to the chamber 79.

The diffuser member 95 deflects and distributes the air from the conduit 85 as the air enters the chamber 79. This assures that all of the openings 117 of the mask 113 will be supplied with an adequate volume of air at substantially the same time. The air in the chamber 79 passes through the openings 117 and through the tubes 103 in registry with such openings. The air passes out through the outlet sections 109 and is discharged against the upper face of the label 45. Although the slight vacuum pressure is maintained within the housing 29, the air blast is sufficient to remove the label 45 from the lower face of the grid 31, transfer the label 45 to the container 47 immediately therebelow and apply the label to the container with sufficient force to cause the label to be adhered to the container. The mask 113 tailors the configuration of the air blast from the manifold 51 to a cross sectional configuration which approaches the configuration in plan of the label 45. This assures that the air blast will be used most efficiently, and that the label will be properly applied to the container 47.

No fasteners are used to retain the mask 113 in the chamber 79. To the extent, if any, that the air pressure within the chamber 79 tends to remove the mask 113 from the manifold 51, the friction between the mask and the remainder of the manifold is sufficient to prevent such removal.

If labels of a different size and/or configuration are to be utilized, the door 37 is manually opened and the mask 113 is manually removed from the manifold 51. The mask 113 is then replaced in the manifold 51 with a mask having a pattern of the openings 117 which is compatible with the new label. This change over can be accomplished in a matter of seconds.

In the embodiment illustrated, the passage section 109 is reduced in cross sectional area. This provides further assurance that all of the tubes 103 will transmit air in meaningful quantities toward the label 45. However, because the present invention employs the diffuser member 95, the passage through the tubes 103

can be of constant diameter if desired, and each of the tubes will still be supplied with air in adequate quantities to perform the label application function.

All or some of the apertures **103** may be provided with the tubes **103.** If desired, the tubes **103** may be eliminated entirely; however, one advantage of the tubes is that they can extend into the slots **35** of the grid **31** to reduce the length of the gap through which the air blast must travel prior to contacting the label **45** on the grid. If desired, one or more of the apertures **101** can be plugged with a threaded plug as described in common assignee's copending application entitled Label Applicator filed on Sept. 15, 1972.

From the foregoing, it can be seen that the apertures **101** and the passages through the tubes **103** define aperture means and the openings **117** constitute opening means. To the extent that the opening means are in registry with the aperture means, an outlet is provided for the air blast from the chamber **79.** The shape of this outlet and hence of the air blast emanating therefrom is controlled by the opening means provided in the mask **113.**

Although an exemplary embodiment of the invention has been shown and described, many changes, modifications and substitutions may be made by one having ordinary skill in the art without necessarily departing from the spirit and scope of this invention.

I claim:

1. A label applicator for applying a label to an article comprising:

a supporting structure;

means on the supporting structure for releasably retaining the label;

a manifold on the supporting structure;

said manifold defining a chamber adapted to receive gas under pressure and having a slot leading from the exterior of said chamber to the interior of said chamber;

said manifold having aperture means for directing gas from the chamber to apply the label to the article;

a mask having opening means therein, said mask being insertable through said slot into said chamber; and

said manifold including means for mounting said mask in said chamber with said opening means and said aperture means being in at least partial registry and with said mask masking off part of said aperture means whereby said mask influences the configuration of the air pattern which moves from said chamber toward said preselected location.

2. A label applicator as defined in claim **1** wherein said mounting means releasably mounts the mask on the mainfold so that the mask can be slidably removed to permit variation in the configuration of the air pattern.

3. A label applicator as defined in claim **1** wherein said manifold includes first and second outer plates and spacer means for cooperating with said plates to at least partially define said chamber, said spacer means being sandwiched between said plates and defining said slot therein, said mask having a plate-like section which is insertable through said slot and into said chamber, said aperture means extending through said first plate and said opening means being in said plate-like section of said mask.

4. A label applicator as defined in claim **3** wherein said plate-like section is contiguous said first plate at said aperture means, said mask substantially closing said slot to thereby minimize leakage of gas from said chamber through said slot.

5. A label applicator as defined in claim **4** wherein said aperture means includes a plurality of apertures in said first plate, said second plate being generally opposite said first plate and having an inlet port therein, a diffuser, and means for mounting said diffuser on said second plate with said diffuser being at least partially in said inlet, said diffuser distributing the air entering said chamber through said inlet.

6. A label applicator as defined in claim **1** wherein said manifold has an inlet to allow gas under pressure to be supplied to said chamber and said label applicator includes diffuser means in the path of the gas in the inlet for distributing such gas in said chamber.

7. A label applicator as defined in claim **1** wherein said manifold includes a plurality of sections and means for holding said sections together without retaining said mask in said chamber.

8. A label applicator as defined in claim **1** including tube means attached to said manifold in communication with said aperture means.

9. A label applicator as defined in claim **1** wherein said retaining means includes a housing having a gas pervious wall and means for reducing the pressure in said housing to less than atmospheric pressure, said manifold being at least partially within said housing.

10. A label applicator for applying a label to an article comprising:

a supporting structure;

means on the supporting structure for releasably retaining the label;

an enclosure defining a chamber;

said enclosure including relatively broad first and second end walls and an axially short peripheral wall;

said first end wall having an inlet for admitting gas under pressure to said chamber;

said second endwall having a plurality of apertures therein through which gas can be discharged from the chamber to remove the label and apply the label to the article;

a diffuser member; and

means for mounting said diffuser member in the path of gas flow from said inlet, said diffuser member assisting in the distribution of the gas under pressure to all of the apertures in said second wall whereby gas can flow through all of such apertures.

11. A label applicator as defined in claim **10** wherein said mounting means includes means for mounting said diffuser member on said first end wall with said diffuser member being at least partially in said inlet.

12. A label applicator as defined in claim **10** wherein said diffuser member defines a gas admission pattern to said chamber which substantially circumscribes said diffuser member.

13. A label applicator as defined in claim **10** wherein said inlet includes a bore and a counterbore with the counterbore opening into said chamber, said mounting means mounting said diffuser member on said first end wall with at least a substantial portion of said diffuser member being in said counterbore, said counterbore being flared radially outwardly as it extends axially inwardly.

14. A label applicator for applying a label to an article comprising:

a supporting structure;
means on the supporting structure for releasably retaining the label,
a manifold on the supporting structure;
said manifold defining a chamber adapted to receive gas under pressure;
said manifold having aperture means for directing gas from the chamber to apply the label to the article;
a mask having opening means therein;
means for mounting said mask with said opening means and said aperture means being in at least partial registry and with said mask masking off part of said aperture means whereby said mask influences the configuration of the air pattern which moves from said chamber to apply the label to the article, and
said mounting means having a lateral opening through which said mask is receivable by said mounting means whereby replacement of said mask is facilitated.

15. A label applicator for applying a label to an article comprising:
a supporting structure;
means for releasably retaining the label;
a manifold on the supporting structure;
said manifold defining a chamber adapted to receive gas under pressure;
said manifold having aperture means for directing gas from the chamber to apply the label to the article;
a mask having opening means therein;
means for mounting said mask with said opening means and said aperture means being in at least partial registry and with said mask masking off part of said aperture means whereby said mask influences the configuration of the air pattern which moves from said chamber to apply the apply the label to the article; and
said manifold including a plurality of plates and means for interconnecting said plates without locking said mask to said manifold.

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