

[54] LABEL APPLICATOR WITH RETENTION MEANS FOR FLEXIBLE AIR TUBES

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[22] Filed: **Mar. 12, 1974**

[21] Appl. No.: **450,314**

[52] U.S. Cl. **221/211**; 156/497; 156/541; 156/542; 221/73; 221/278; 248/363; 271/8 R; 294/65

[51] Int. Cl. **C09j 7/02**

[58] Field of Search 156/230, 285, 382, 540, 156/541, 542, 497, 293, 294; 248/363; 271/8 R, 8 A; 294/65; 221/73, 74, 211, 278

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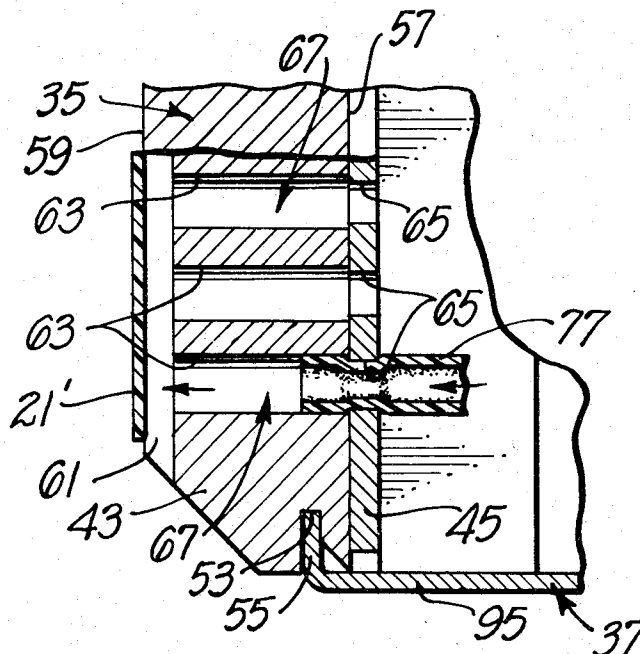
Attorney, Agent, or Firm—Gordon L. Peterson

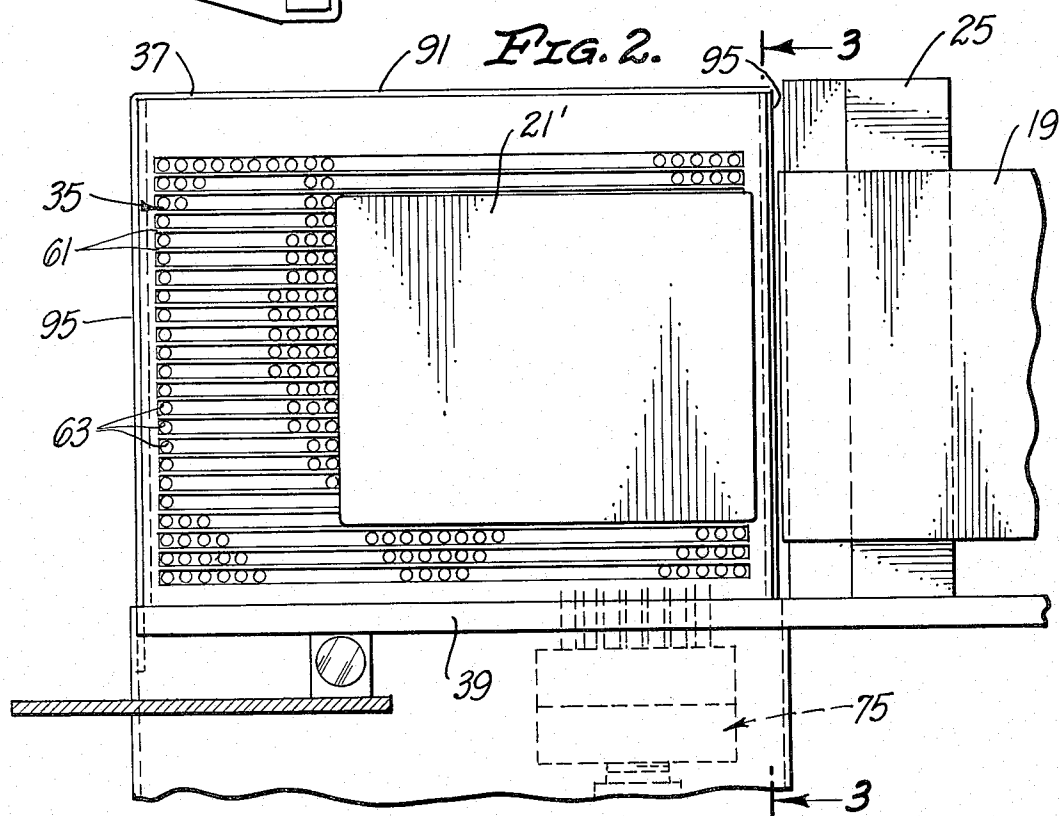
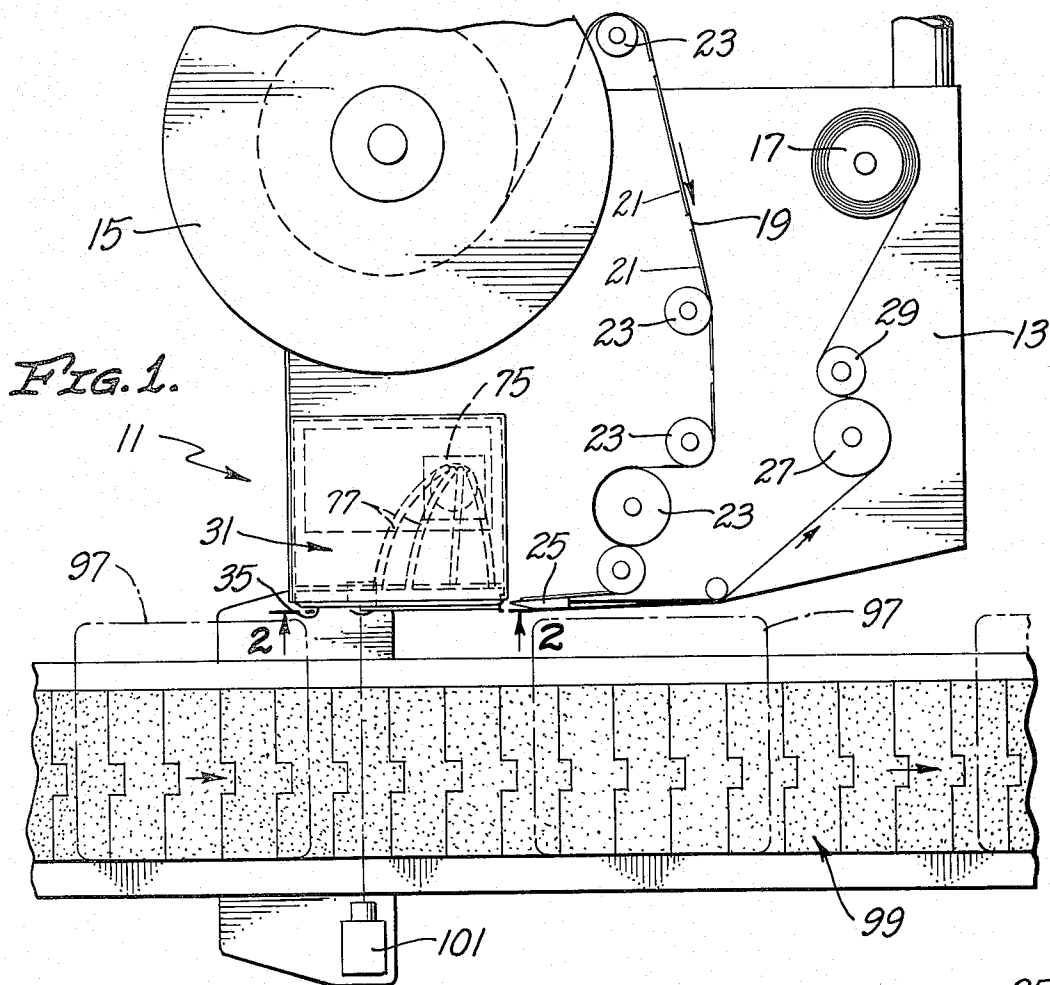
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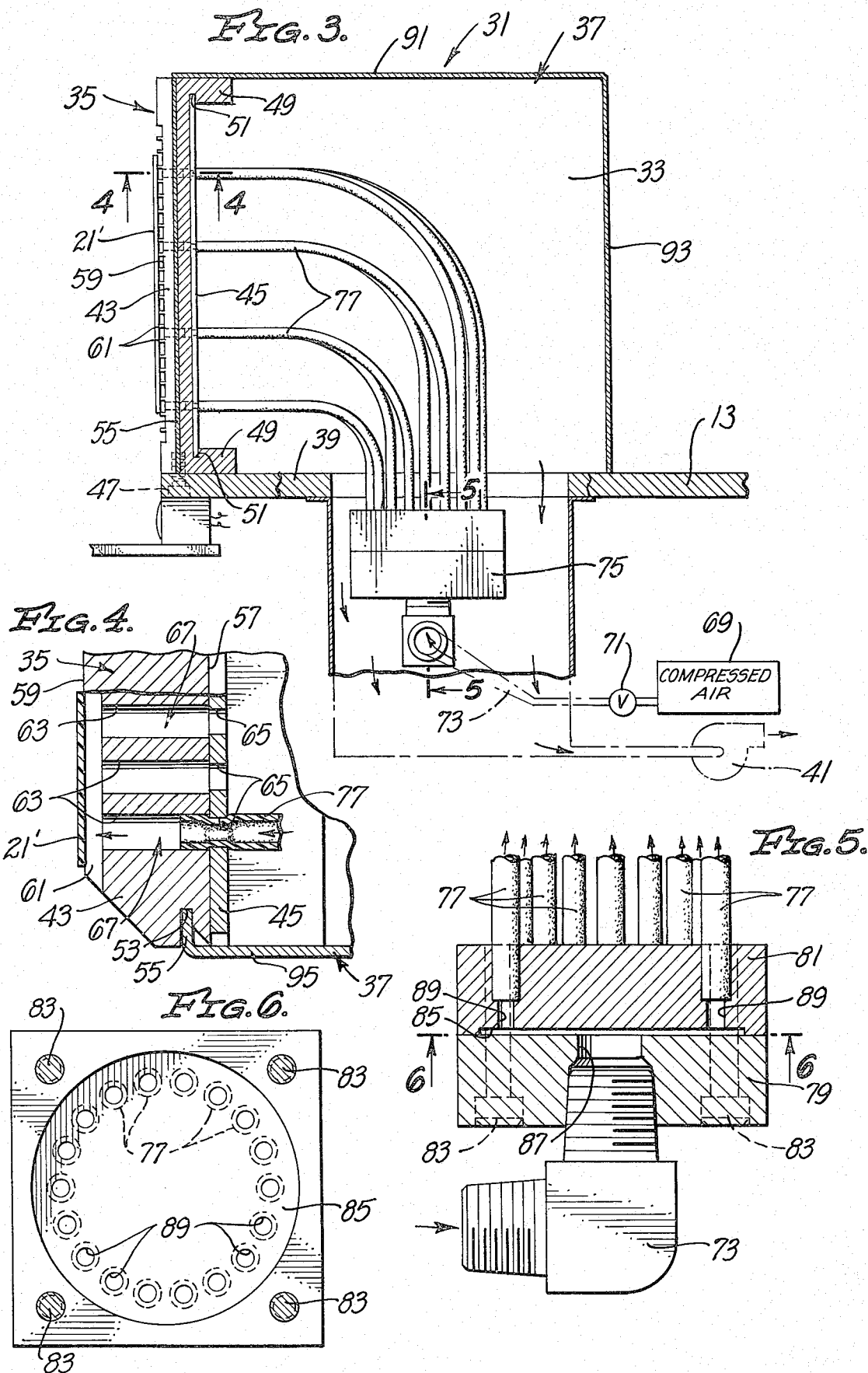
ABSTRACT

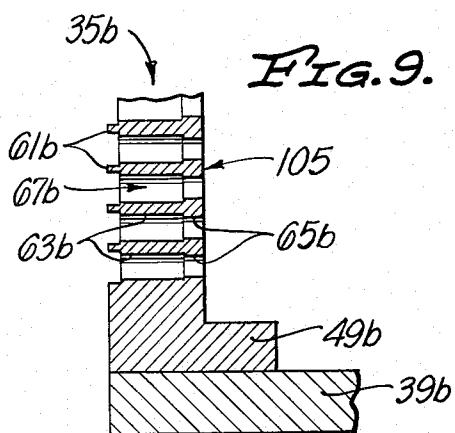
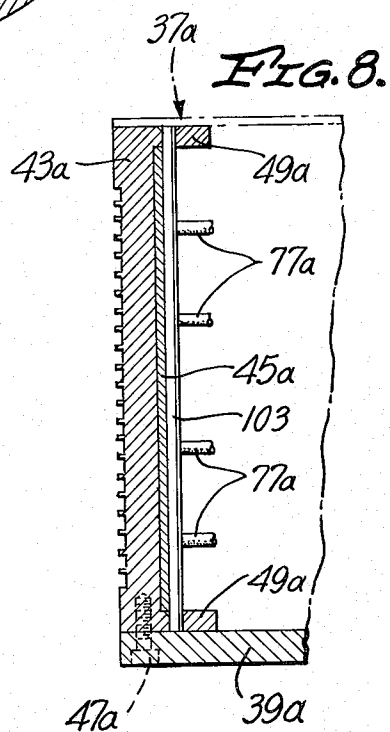
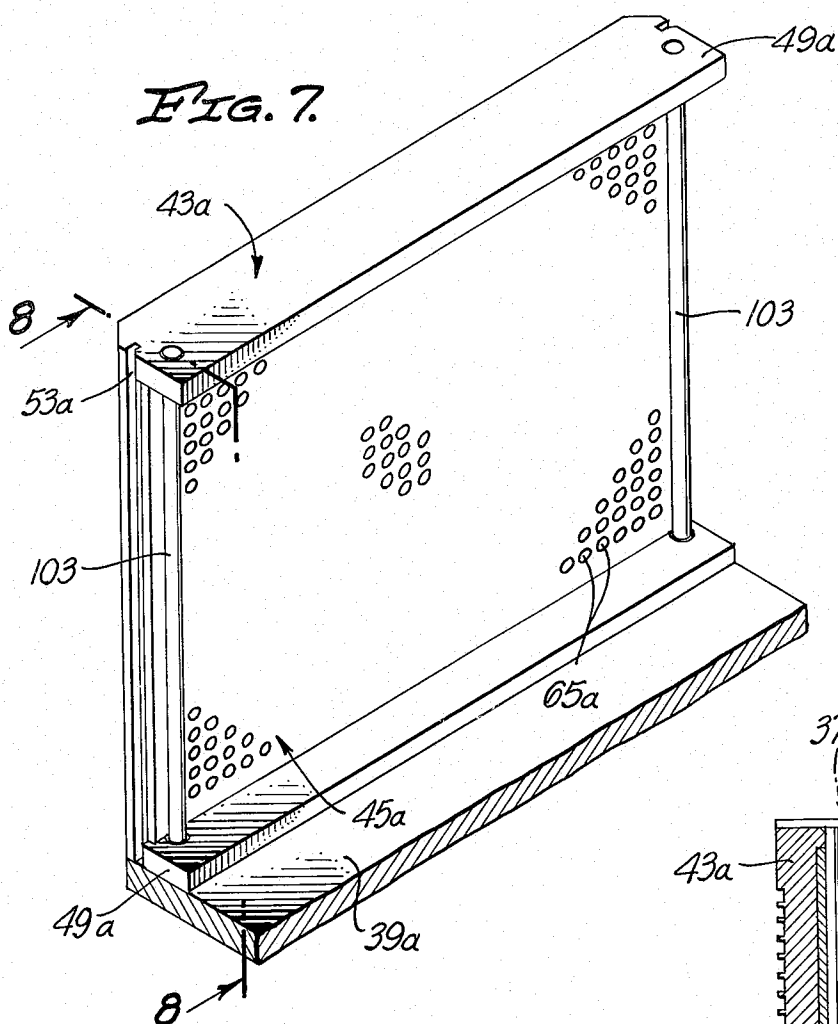
A label applicator including a housing defining a chamber adapted to be maintained at a pressure less than atmospheric. The housing includes a gas pervious wall section. The label applicator supplies a label to the outer face of the pervious wall section with the reduced pressure in the chamber releasably retaining the label against the pervious wall section. An air manifold which is in communication with a source of gas under a pressure greater than atmospheric is placed in communication with the previous wall section by a plurality of flexible tubes. The pervious wall section has a plurality of passages therethrough which was utilized to releasably attach the tubes to the pervious wall section. Each of the passages has an outer portion and an inner portion and each of the tubes are inserted into an associated passage. The inner portion grips the tube which extends therethrough to attach such tube to the pervious wall section and the outer portion guides the tube.

16 Claims, 9 Drawing Figures









LABEL APPLICATOR WITH RETENTION MEANS FOR FLEXIBLE AIR TUBES

BACKGROUND OF THE INVENTION

Labels bearing various information are typically supplied on an elongated backing strip with the labels being adhesively secured to the backing strip. A label applicator removes a label from the backing strip, and then releasably retains the removed label at a preselected location. Typically, the removed label is supplied to an air pervious section in the form of a grid and vacuum pressure holds the label against the grid. An article is then moved to a location adjacent the label, and an air blast blows the label from the grid onto the article.

The pattern or the cross sectional configuration of the air blast should be varied depending upon various factors including the size and shape of the label. One way to accomplish this is shown in U.S. Pat. No. 3,379,466. In the patented construction, a label is held against a grid by vacuum pressure, and the air blast is provided by a plurality of flexible tubes which extend from an air manifold to the grid. The tubes are releasably attachable to the grid so that the locations of the attachments of the tubes to the grid can be altered to change the air pattern.

In the patented construction, the tubes are attached to the grid either by nozzle members or by cutouts in the bars of the grid. The nozzle members are rigid tubes mounted on the grid, and the flexible tubes are slid over the ends of the rigid tubes, respectively. The rigid tubes are undesirable in that they inhibit masking off of the grid and they are costly. In addition, insertion of the rigid tubes into the flexible tubes restricts the diameter of the flow passage.

When cutouts in the bars of the grid are used, the flexible tubes are inserted into the cutouts. This construction does not provide as secure an attachment as desired. One reason is that the grid structure does not snugly completely surround the tube.

SUMMARY OF THE INVENTION

The present invention eliminates the problems discussed above and provides novel means for changing the air pattern provided by a label applicator. Although reference is made herein to the use of air as the fluid medium for blowing labels from the pervious wall section, it should be understood that many other nontoxic gases may be used for this purpose.

With the present invention, the pervious wall section has a plurality of passages which cooperate with the flexible tubes in a novel manner to releasably attach the tubes to the pervious wall section. Each of the tubes is inserted into an associated one of the passages. Each of the passages has an inner portion and an outer portion. One important function of the inner portion is that it grips the tube inserted therein to releasably attach the tube to the pervious wall section.

The outer portion serves to guide the tube inserted therein. In other words, the outer portion directs the tube and hence the air jet emanating from the tube. It is important to note that the outer portion exerts a lesser gripping force on the tube than does the inner portion. Preferably the outer portion exerts substantially no gripping force on the tube.

When the inner portion grips the flexible tube, it deforms the tube radially inwardly, and this is necessary

in order to provide a secure attachment of the tube to the pervious wall section. The diameter of the tube on opposite sides of the restricted portion is substantially the same as the unstressed diameter of the tube. The outer portion should be sized to accommodate the unstressed diameter of the tube. This can be accomplished, for example, by making the inner portion of smaller diameter than the outer portion.

To facilitate insertion of the flexible tube into the passage, the inner portion is preferably short in the axial direction. The outer portion should have sufficient length in the axial direction to properly guide the end portion of the flexible tube. In many cases this will mean that the inner portion should be shorter than the outer portion.

A passage of constant diameter would not provide the advantages noted above. For example, if the passages were of constant diameter sufficiently small to provide the necessary gripping action and were also sufficiently long to provide the necessary tube guiding function, it would be extremely difficult to insert the tube into the passage. On the other hand, if the diameter of the passage were larger, tube insertion would be facilitated, but the gripping action would be lost. The present invention, however, provides substantial gripping action, ease of insertion and proper tube guidance.

One way to obtain a change in the air pattern is to provide a larger number of passages than tubes. With this arrangement, the air pattern can be varied by attaching the tubes to the pervious wall section at different passages.

The region of the pervious wall section which defines the inner and outer portions of the passages may be integral or may be defined by inner and outer plates, respectively. Specifically, the inner plate has apertures which define the inner portions and the outer plate has openings which define the outer portions. If inner and outer plates are used, the inner plate is preferably removable. One advantage of a removable inner plate is that it provides an alternate method for changing the shape of the air pattern. Specifically, the entire inner plate, the flexible tubes, and the air manifold can be removed and replaced with another inner plate, tube, and manifold combination. The tubes of this new combination can be arranged differently to effect a change in the air pattern.

A second important advantage of the two-plate construction is that the inner plate can be used as a mask to block off certain openings in the outer plate. By masking off selected openings in the outer plate, the vacuum or suction requirements for label retention on the pervious wall section is minimized.

The present invention also facilitates changing of the location of the attachments of the tubes to the pervious wall section. This can be accomplished by mounting the pervious wall section on the supporting structure of the label applicator and by removably mounting a housing section which defines a major portion of the chamber. For example, the removably mounted housing section may define major portions of a plurality of sides of the chamber so that when it is removed, the inner surface of the pervious wall section, the tubes, and the air manifold are readily accessible.

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 plan view of a label applicator constructed in accordance with the teachings of this invention.

FIG. 2 is an enlarged fragmentary view taken generally along line 2—2 of FIG. 1 and showing the outer surface of the pervious wall section.

FIG. 3 is a sectional view taken generally along line 3—3 of FIG. 2.

FIG. 4 is an enlarged fragmentary sectional view taken generally along line 4—4 of FIG. 3.

FIG. 5 is an enlarged fragmentary sectional view taken generally along line 5—5 of FIG. 3 and showing the air manifold.

FIG. 6 is a sectional view taken generally along line 6—6 of FIG. 5.

FIG. 7 is a fragmentary perspective view of a modified form of pervious wall section.

FIG. 8 is a fragmentary sectional view taken generally along line 8—8 of FIG. 7.

FIG. 9 is a sectional view similar to FIG. 4 illustrating a second modified form of the pervious wall section in which the inner and outer plates are combined into a single integral plate.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 shows a label applicator 11 which includes a supporting structure 13, a supply reel 15, and a take-up reel 17. Both of the reels 15 and 17 are rotatably mounted on the supporting structure. A backing strip or carrier strip 19 is wound on the supply reel 15 and a plurality of labels 21 are adhesively secured to and carried by the backing strip. The backing strip 19 extends from the supply reel 15 over guide rollers 23 mounted on the supporting structure 13, over a peeling bar 25, and between a drive roller 27 and an idler roller 29 to the take-up reel 17.

The label applicator 11 also includes wall means or a housing 31 defining a chamber 33 (FIG. 3). The housing includes a pervious wall section 35, one end of which lies closely adjacent the peeling bar 25.

With reference to the construction shown in FIG. 1, the drive roller 27 is driven intermittently and for predetermined periods to draw the backing strip 19 across the peeling bar. This may be accomplished, for example, in the same manner described in U.S. Pat. No. 3,729,362. This causes the peeling bar 25 to function in a conventional manner to remove the labels 21 and supply them in sequence to the pervious wall section 35. As shown in FIGS. 2—4, a label 21' has been removed from the backing strip 19 and applied to the pervious wall section 35. The label 21' is retained on the pervious wall section 35 by the vacuum pressure within the chamber 33.

It should be understood that the function of supplying labels to the pervious wall section 35 could be performed in many different ways, and that the construction illustrated and described herein is merely illustrative. In other words, the present invention can be employed with virtually any system which is capable of providing labels to the pervious wall section 35.

With reference to FIGS. 1—4, the housing 31 includes the pervious wall section 35, a housing section 37, and a wall section 39 which forms a portion of the supporting structure 13. The chamber 33, except for the pervious wall section 35, is relatively air tight and is in com-

munication with a vacuum pump 41 (FIG. 3). The vacuum pump is adapted to maintain the chamber 33 at a pressure less than atmospheric.

The pervious wall section 35 includes an outer wall member or plate 43 and an inner wall member or plate 45. The outer plate 43 is in the form of a relatively thick plate and is attached in any suitable manner such as by screws 47 (FIG. 3) to the wall section 39. The outer plate 43 has inwardly extending flanges 49 with opposed grooves 51 therein for receiving and mounting the inner plate 45. The opposite vertical edges of the outer plate 43 are provided with grooves 53 as shown in FIG. 4 (only one set being shown in FIG. 4) for receiving mating flanges 55 formed on the housing section 37. The grooves 53 and the flanges 55 form tongue-in-groove connections which serve to removably mount the housing section 37.

The outer plate 43 has an inner face 57 and an outer face 59, a portion of which is defined by a plurality of vertically spaced horizontally extending ribs 61. A plurality of openings 63 extend from the inner face 57 to the outer face 59. Although the openings 63 could be of various configurations, in the embodiment illustrated, each of them is cylindrical and identical. Also, in the embodiment illustrated, each of the openings 63 is recessed relative to the ribs 61 and lies completely between an adjacent pair of the ribs.

When the label 21' is being removed from the backing strip 19, it is slid along the ribs 61. The ribs 61 provide a reduced area of contact between the pervious wall section 35 and the label 21' to thereby reduce friction. In addition, the ribs 61 space the label 21' from the edges of the openings 63. This prevents the edge of the label 21' from interlocking or hanging up on the edge of the openings 63.

The inner plate 45 has its upper and lower edges received within the grooves 51 of the outer plate 43 to thereby releasably mount the inner plate on the outer plate. The inner plate 45 is much thinner than the outer plate as shown by way of example in FIG. 4. The inner plate 45 has a plurality of apertures 65 (FIG. 4) in registry with the openings 63, respectively. One of the apertures 65 may be provided for each of the openings 63. Alternatively, more of the openings 63 may be provided than apertures 65 in which event the inner plate 45 would serve to mask off some of the openings 63. In the embodiment illustrated, each of the apertures 65 is identical, cylindrical, and coaxial with an associated one of the openings 67. The apertures 65 are of smaller diameter than the openings 63. One of the aligned openings 63 and apertures 65 defines a passage 67 which extends completely through the pervious wall section 35.

The label 21' is removed from the pervious wall section 35 by a blast of air from a source 69 of compressed air. The compressed air from the source 69 is transmitted through a valve 71, a conduit 73, an air manifold 75, a plurality of flexible tubes 77, and portions of the passages 67. The valve 71 is automatically opened and closed in accordance with conventional practice to provide properly timed air blasts of the requisite duration.

In the embodiment illustrated, the air manifold 75 includes a plate 79 affixed to a portion of the conduit 73 and a plate 81 removably attached to the plate 79 in any suitable manner such as by screws 83. The plate 81 has a circular recess therein to define a thin chamber

85. The plate 79 has a supply port 87 providing communication between the conduit 73 and the chamber 85. The plate 81 has a plurality of outlet ports 89 for providing communication between the chamber 85 and the flexible tubes 77, respectively. One end of each of the flexible tubes 77 is suitably attached to the plate 81.

The construction of the air manifold 75 is not critical and is purely illustrative. However, one advantage of the construction of the air manifold 75 shown in FIG. 5 is that the plate 81 can be quickly removed along with the tubes 77, if desired, by simply loosening the screws 83.

The flexible tubes 77 may be constructed of any flexible material suitable for conducting air or other gas under low pressure between the air manifold 75 and the pervious wall section 35. For example, rubber or flexible plastic may be utilized.

The tubes 77 are releasably attached to the pervious wall section 35 by virtue of their cooperation with the passages 67. Each of the apertures 65 is of smaller diameter than the tubes 77. Accordingly, when one of the tubes 77 is forced into one of the apertures 65, the tube is deformed radially inwardly as illustrated by way of example in FIG. 4. This tightly releasably attaches the tube 77 to the pervious wall section 35. The opening 63 is preferably of equal or slightly larger diameter than the unstressed diameter of the flexible tube 77. This allows the walls of the opening 63 to guide the end of the flexible tube 77 inserted therein without exerting any significant gripping force on the tube. With this construction, the tube 77 can be easily inserted into and removed from the passages 67.

The location of the attachments of the tubes 77 to the pervious wall section 35 controls the shape or profile of the air blast exerted against the label 21'. The number of apertures 65 should exceed the number of the tubes 77 so that the configuration of the air blast can be changed by changing the location of attachment of the tubes 77 to the pervious wall section 35.

It should be noted that the housing 31 is constructed to facilitate changing of the location of the attachments of the tube 77 to the pervious wall section 35. In this connection, the housing section 37 includes an upper wall 91, a back wall 93, and opposed side walls 95 (FIGS. 2 and 3). In other words, four of the six walls of the chamber 33 are defined by the housing section 37. The housing section 37 rests on the wall section 39 and is attached by the flanges 55 and the grooves 53 (FIG. 4) to the outer plate 43. Thus, the entire housing section 37 can be removed by sliding it upwardly with such movement being guided by the cooperation between the flanges 55 and the grooves 53. With the housing section 37 removed, the tubes 77 and the inner plate 45 are fully exposed to facilitate attachment of the tubes 77 to the pervious wall section 35.

The label applicator 11 can be used with any mechanism for sequentially providing articles 97 to be labelled. In the embodiment illustrated, this function is provided by a conveyor 99 (FIG. 1) which moves the articles 97 to be labelled into close proximity to the pervious wall section 35. The presence of an article 97 adjacent the pervious wall section 35 operates a switching device 101 which may be of the photoelectric type. This causes opening of the valve 71 (FIG. 3) in a conventional manner to provide a blast of air for removing the label 21a and applying it to the article 97. Actuation of the switching device 101 also causes the drive

roller 27 to index the backing strip 19 to supply a new label to the outer face of the pervious wall section 35 so that the process can be repeated. The vacuum pressure within the chamber 33 can be maintained continuously in which event the air blast from the manifold 75 must be sufficient to overcome this vacuum pressure.

To change the shape of the air pattern, the housing section 37 is removed by pulling it upwardly to expose the flexible tubes 77. Any or all of the tubes 77 can be manually withdrawn from their associated apertures 65 and manually reinserted into different apertures 65, as desired, to form the new pattern.

FIGS. 7 and 8 show an outer plate 43a and an inner plate 45a of alternate construction. The construction shown in FIGS. 7 and 8 may be employed in the label applicator 11. Portions of the construction shown in FIGS. 7 and 8 corresponding to portions of the construction shown in FIGS. 1-6 are designated by corresponding reference numerals followed by the letter *a*. Except as specifically shown or described herein, the construction of FIGS. 7 and 8 is identical to the construction of FIGS. 1-6.

The primary difference between the constructions of FIGS. 7 and 8 and 1-6 is in the manner of mounting and retaining the inner plate 45a. The outer plate 43a does not have the grooves 51, and the plate 45a is slidably receivable between the flanges 49a. The inner plate 45a is held in position against the plate 43a by a pair of removable rods 103 which extend between and are retained by the flanges 49a. Other devices such as spring clips could be used in lieu of the rods 103. By removing the rods 103, the inner plate 45a can be removed from the outer plate 43a.

The inner plate 45 (FIGS. 1-6) can only be removed from the outer plate 43 by sliding the inner plate 45 along the grooves 51. Before the sliding action can occur, it is obviously necessary to remove the flexible tubes 77 from the openings 63. With the construction shown in FIGS. 7 and 8, the housing section 37a is removed as described above and then the rods 103 are removed. With this having been done, the inner plate 45a can then be removed along the flexible tubes 77a and the plate 81 (not shown in FIGS. 7 and 8) of the air manifold 75. The removed members can then be replaced with another set of identical members which provide a different air pattern. Of course, with the construction of FIGS. 7 and 8, the air pattern can also be changed in the same manner discussed hereinabove with reference to FIGS. 1-6. In either event, the inner plate 45a can be utilized to mask off a number of the openings in the outer plate 43a to thereby prevent a needless loss of vacuum within the chamber 33.

FIG. 9 shows another form of pervious wall section 35b which can be utilized in the label applicator 11. Portions of the embodiment of FIG. 9 corresponding to portions of the embodiment of FIGS. 1-6 are designated by corresponding reference numerals followed by the letter *b*. The pervious wall section 35b is identical to the pervious wall section 35 except that it includes a single integral plate 105 which takes the place of the outer plate 43 and the inner plate 45. In other words, FIG. 9 shows an embodiment in which the outer plate 43 and the inner plate 45 have been made integral to form the plate 105. In the embodiment of FIG. 9, the number of the apertures 65b equals the number of openings 63b.

In the embodiment illustrated the label applicator 11 is oriented so that the pervious wall section 35 is in a vertical plane. This orientation is purely illustrative inasmuch as the label applicator may be mounted in many different spatial orientations.

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

I claim:

1. A label applicator comprising:

wall means defining a chamber, said chamber being adapted for connection to means for reducing the pressure in said chamber to less than atmospheric; a first portion of said wall means defining a gas pervious wall section, said pervious wall section having an outer face outside said chamber;

means for supplying a label to said outer face of said pervious wall section with the reduced pressure in the chamber releasably retaining the label against said outer face;

a manifold adapted for connection to a source of gas at a pressure greater than atmospheric;

a plurality of flexible tubes;

means for coupling the flexible tubes to said manifold;

said pervious wall section having a plurality of passages;

each of said passages having an outer portion and an inner portion with the inner portion being closer to the interior of said chamber than the outer portion; each of said tubes being extendible through the inner portion of one of the passages and into the outer portion of such passage, said inner portion gripping the tube which extends therethrough to attach such tube to said pervious wall section, said outer portion exerting a lesser gripping force on said tubes than the inner portion; and

said passages providing communication between the tubes received therein and said outer face whereby the gas under pressure in said manifold can be transmitted through said tubes to blow the label from the outer face of the pervious wall section.

2. A label applicator as defined in claim 1 wherein the inner portion of each of said passages locally deforms the associated tube to releasably attach the tubes to the pervious wall section, said outer portion of each of said passages having a cross sectional area at least as large as the associated tube in the unstressed condition of such tube.

3. A label applicator as defined in claim 1 wherein said inner portion of at least some of said passages releasably attaches the associated tube to the pervious wall section, said outer portion of at least some of said passages guiding the associated tube and exerting substantially no gripping force on the associated tube, the number of said passages being greater than the number of said tubes whereby the pattern of the gas discharged by said tubes can be varied.

4. A label applicator as defined in claim 1 wherein the length of said inner portion of at least some of said passages is less than the length of the outer portion of the associated passage.

5. A label applicator as defined in claim 4 wherein the inner portion of each of said passages releasably attaches the associated tube to the pervious wall section

and the outer portion of each of said passages guides the tube received therein, at least some of said outer portions being of greater cross sectional area than the associated inner portion, the number of said passages being greater than the number of said tubes whereby the pattern of the gas discharged by said tubes can be varied.

6. A label applicator as defined in claim 1 wherein said pervious wall section includes a plurality of elongated ribs defining at least a portion of said outer face, at least some of said outer portions of said passages are substantially cylindrical, and said cylindrical outer portions are recessed relative to said ribs.

7. A label applicator as defined in claim 1 wherein said pervious wall section includes an inner wall member defining said inner portions of said passages and an outer wall member defining said outer portions of said passages.

8. A label applicator as defined in claim 7 wherein said outer wall member has at least one opening therethrough which is masked off by said inner wall member.

9. A label applicator as defined in claim 1 wherein said pervious wall section includes inner and outer wall members having a plurality of apertures and openings, respectively, some of said apertures and openings being in registry to define said passages, other of said openings being blocked off by said inner wall member, said label applicator including means for releasably mounting said inner wall member within said chamber whereby said inner wall member can be replaced with another inner wall member.

10. A label applicator comprising:

wall means defining a chamber, said chamber being adapted to have the pressure therein reduced to less than atmospheric;

a first portion of said wall means defining a gas pervious wall section, said pervious wall section having an outer face outside said chamber;

means for supplying a label to said outer face of said pervious wall section with the reduced pressure in the chamber releasably retaining the label in said outer face;

an air manifold adapted for connection to a source of air at a pressure greater than atmospheric, a portion of said air manifold being removable;

said pervious wall section including inner and outer plates having a plurality of apertures and openings, respectively, at least some of said apertures and openings being in registry to define passages extending through said pervious wall section from the interior of the chamber to the exterior of the chamber;

conduit means coupled to the removable portion of said manifold and extending to said passages for conducting air under pressure from said manifold to said passages whereby the label can be blown by an air blast from the outer face to the pervious wall section; and

means for releasably mounting said inner plate within said chamber whereby said inner plate, said conduit means, and said removable portion of said manifold can be quickly replaced to provide an air blast of a different configuration.

11. A label applicator as defined in claim 10 wherein said inner plate blocks off other of said openings.

12. A label applicator as defined in claim 10 wherein said conduit means includes a plurality of tubes extend-

ing from said manifold to said pervious wall section, said tubes being receivable in said apertures, respectively, with a sufficiently close fit to couple the tubes to the inner plate.

13. A label applicator comprising:

wall means defining a chamber;

a first portion of said wall means defining a gas pervious wall section, said pervious wall section having an outer face outside said chamber;

means for supplying a label to said outer face of said pervious wall section;

means for releasably retaining the label against said outer face;

a manifold adapted for connection to a source of gas greater than atmospheric pressure;

a plurality of flexible tubes leading from the manifold;

said pervious wall section having a plurality of passages, each of said passages having an outer portion and an inner portion with the inner portion being closer to the interior of said chamber than said outer portion;

the inner portion of at least some of said passages being of lesser cross sectional area than the outer portion of such passage;

each of said tubes being extendible through the inner portion of one of said passages and into the outer portion of such passage, said inner portion gripping the tube which extends therethrough to releasably attach said tube to said peripheral wall section; and

each of said passages providing communication between the tube received therein and said outer face whereby the gas under pressure in said manifold can be transmitted through said tubes to blow the label from the outer face.

14. A label applicator comprising:

a supporting structure;

wall means defining a chamber, said chamber being adapted for connection to means for reducing the pressure in said chamber to less than atmospheric pressure;

said wall means including a pervious wall section mounted on said supporting structure and a hous-

ing section defining a major portion of a plurality of sides of said chamber, said pervious wall section having a plurality of passages extending therethrough, an outer face outside of said chamber, and an inner face within said chamber;

means for supplying a label to said outer face of said pervious wall section with the reduced pressure in the chamber releasably retaining the label against said outer face;

a manifold adapted for connection to a source of gas at a pressure greater than atmospheric;

a plurality of flexible tubes leading from said manifold;

the number of said passages in said pervious wall section being greater than the number of said tubes;

means for releasably coupling said tubes to said pervious wall section at selected ones of said passages whereby the tubes can transmit gas under pressure from the manifold to said selected passages to provide a predetermined gas removal pattern for removal of the label from said outer face, at least some of said tubes being releasably interconnectible to said pervious wall section at other of said passages to thereby change said predetermined pattern; and

means for releasably mounting said housing section on at least one of said pervious wall section and said supporting structure whereby said housing section can be removed from the pervious wall section and said supporting structure to expose said tubes and the inner face of said pervious wall section whereby changing of said predetermined pattern is facilitated.

15. A label applicator as defined in claim 14 wherein said means for releasably mounting includes a tongue-in-groove connection between said pervious wall section and said housing section whereby the housing section can be slid off of and on to the pervious wall section.

16. A label applicator as defined in claim 14 wherein said housing section defines a major portion of at least four sides of said chamber.

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