

- [54] ENVELOPE FLAP MOISTENING APPARATUS

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- [52] **U.S. Cl.** ..... **118/7; 118/313; 118/2**

- [51] **Int. Cl.<sup>2</sup>**..... **B05C 11/00**

- [58] **Field of Search** ..... 118/2, 7, 32, 313, 314;  
156/441.5

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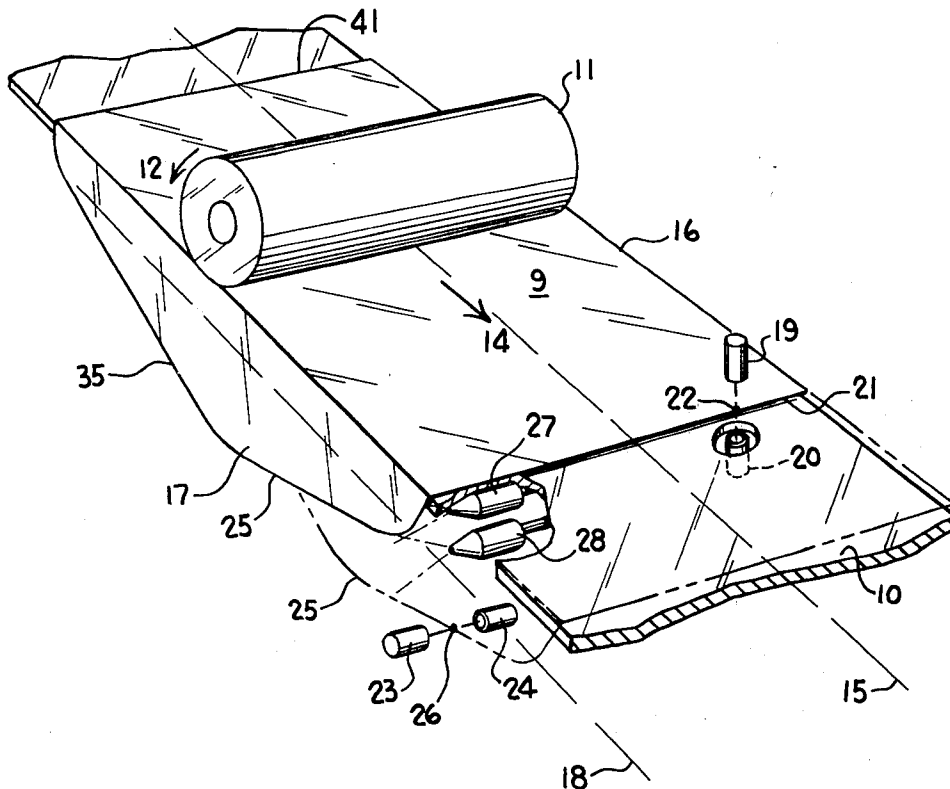
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[57] **ABSTRACT**

An envelope flap moistening apparatus having a jet or nozzle which sprays a moistening fluid upon the glue of the envelope flap. The spray is applied as the envelope moves past the jet. A photocell sensor controls the application of the spray by sensing the passage of the envelope and/or its flap. The spray is applied in a tiered segmented fashion to the flap in order to moisten substantially the entire gummed surface of the flap. The segmented spray is achieved in one of two ways: (1) by moving the nozzle, or (2) by providing a selective spraying using a pair of closely spaced nozzles.

**9 Claims, 8 Drawing Figures**



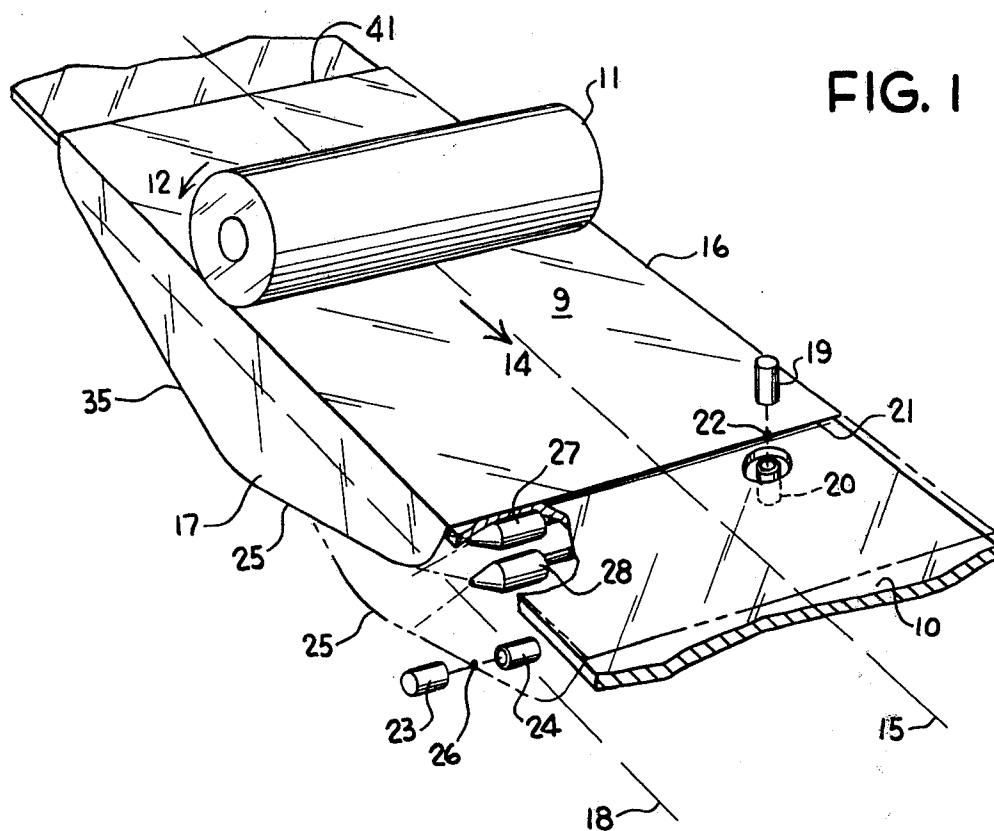


FIG. 1

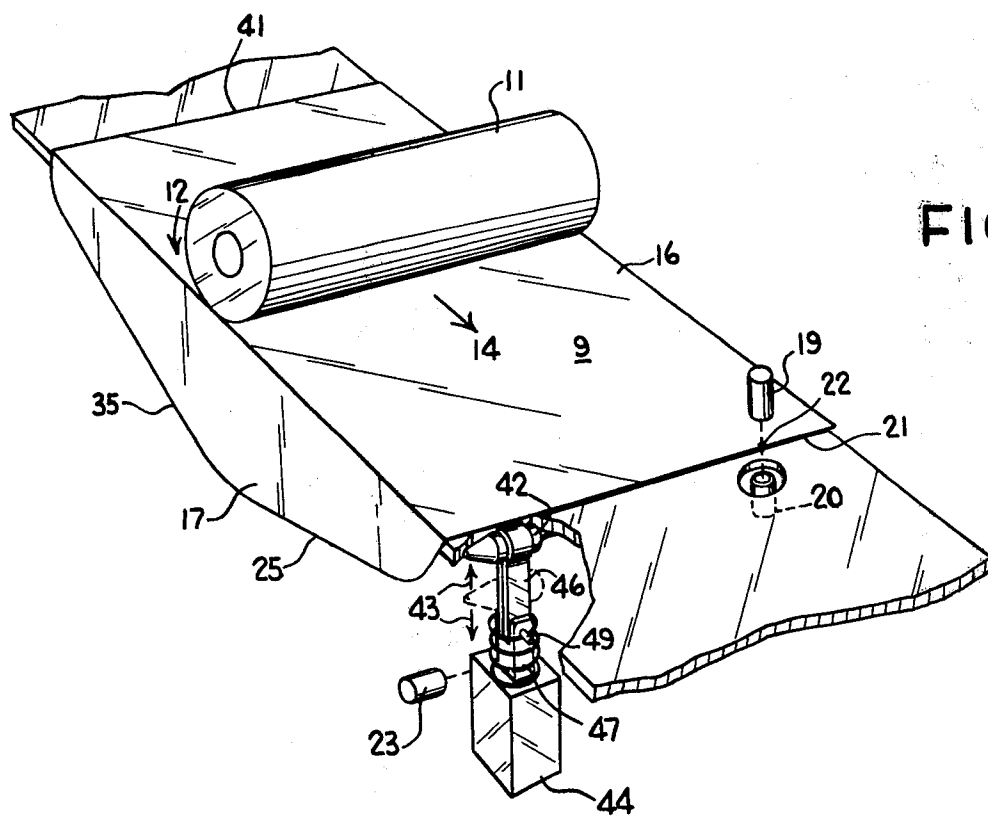


FIG. 2

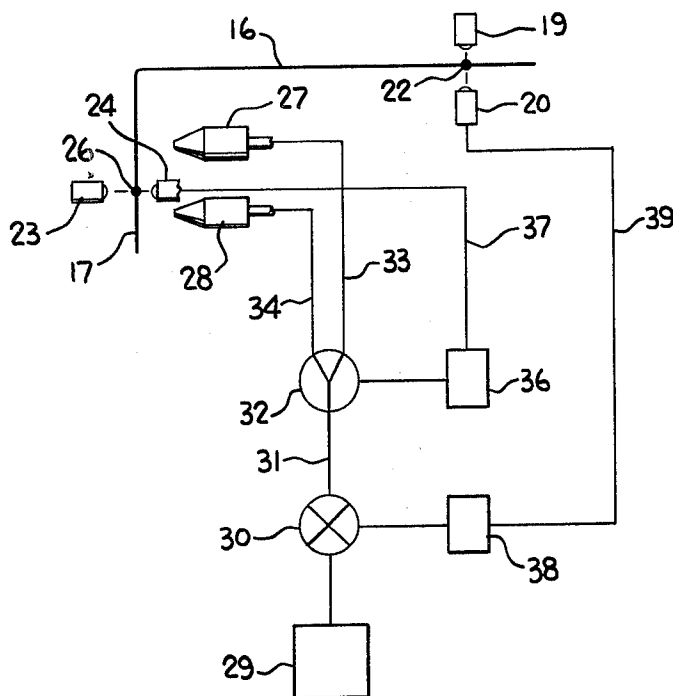


FIG. 1a

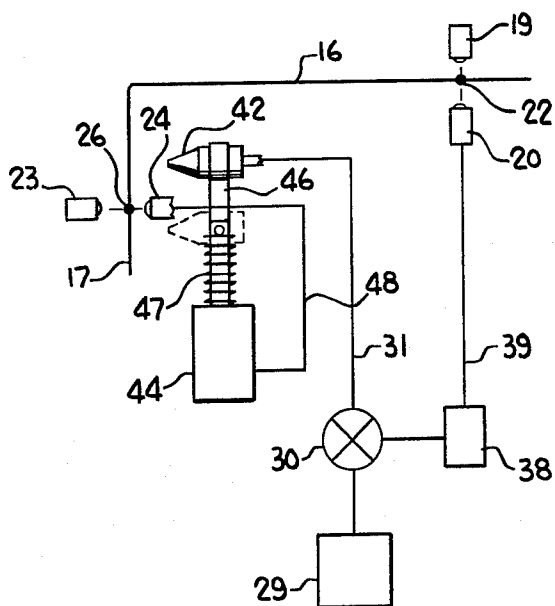


FIG. 2a

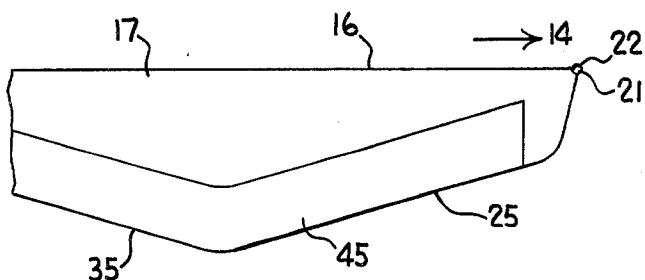


FIG. 3a

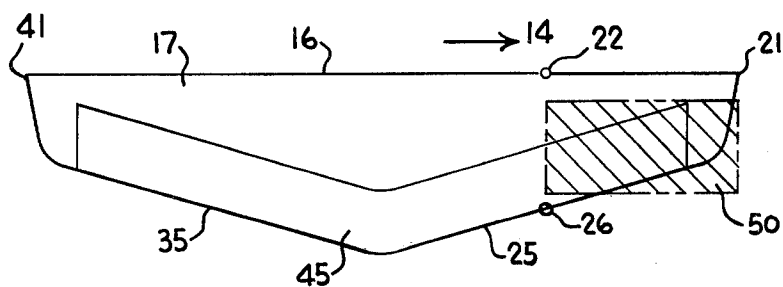


FIG. 3b

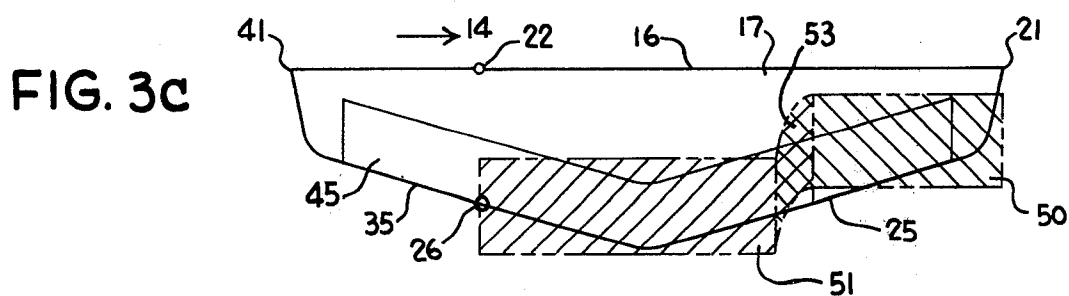


FIG. 3c

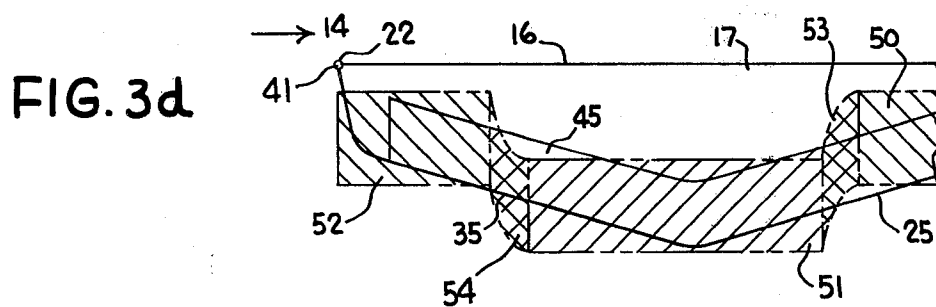


FIG. 3d

## ENVELOPE FLAP MOISTENING APPARATUS

The invention pertains to envelope flap moistening apparatuses and more particularly to moistening apparatuses that wet the gum of the flap of an envelope in a segmented fashion.

### BACKGROUND OF THE INVENTION

Heretofore, envelope flap moisteners usually comprised a wetted sponge-like material, which was brought in contact with the gummed surface of the envelope flap. These apparatuses had numerous drawbacks, to wit:

1. they limited high speed transportation of mail through the mailing machine;
2. the sponge wiper removed glue from the flap, thus weakening the ultimate holding strength of the moistened flap, and which caused messy gum residues to build up on the wiper parts. These residues would foul the wiper apparatus requiring frequent maintenance, and replacement of parts; and
3. the sponge wipers required positive contact with the envelope flap. This often required elaborate biasing and baffle arrangements.

The present invention is a new approach to the wetting of envelope flaps, that seeks to eliminate the above drawbacks. This invention seeks to provide a moistening system which will be compatible with high speed mail handling machinery, and which will not require contact with the gummed flap of the envelope.

### SUMMARY OF THE INVENTION

The invention is for spray moistening apparatuses that apply a fine mist spray to the gummed surface of an envelope flap. As an envelope is speedily moved along a mail-handling feed path, the flap is separated from the body of the envelope in the usual manner. The flap is moved past a single or a series of nozzles or jet sprayers which apply a mist to the gummed surface in a strip-like manner. The spray is controlled by a pair of photocells which respectively sense the edge position of the envelope flap and the passage of the letter past the spray machinery.

The spray apparatuses feature two illustrative embodiments. Both embodiments each applying the spray in a segmented tier-like fashion to the envelope flap. The particular spray configuration is a result of the changing gum contour presented to the face of the nozzle as the envelope flap moves past.

The invention seeks to prevent intricate gimbaling and feed-back, which would be necessary if a nozzle would be required to follow the intricate contour of the gum surface. As a consequence, a tiered segmented spray strip pattern is developed which substantially covers the gummed surface. The tiered segments spray is accomplished in one embodiment by stacking a number of jets one above the other (tiers), and sequentially or selectively firing them. In another embodiment a single continuously fired nozzle is moved to alternated levels to provide a tier-like segmented spray.

It is an object of this invention to provide improved envelope flap moisteners;

It is another object of the invention to provide a new approach to letter flap moistening by applying a spray to the gummed surface;

It is still another object of this invention to provide a spray of moisture to an envelope flap which substantially covers most, if not all, of the gummed surface.

These and other objects of the invention will become more apparent and will be better understood with reference to the following detailed description taken in conjunction with the attached drawings, in which:

FIG. 1 is a perspective view of one embodiment of a moistening apparatus of this invention showing a phantom view of an envelope moving to a second position along an envelope feed path;

FIG. 1a is a schematic diagram of the embodiment shown in FIG. 1;

FIG. 2 is a perspective view of a second embodiment of a moistening apparatus of this invention;

FIG. 2a is a schematic diagram of the embodiment shown in FIG. 2;

FIG. 3a through FIG. 3d are sequential frontal views of an envelope flap as it moves past the sensing and moistening apparatus of the invention;

FIG. 3a depicting a sensing of the leading edge of the envelope;

FIG. 3b illustrating a second position for the envelope (shown in phantom in FIG. 1) relating to the sensing of the leading edge of the envelope flap, and the first stage of the spray pattern;

FIG. 3d showing a final position for the envelope, pertaining to the sensing of the trailing edge of the envelope, and the completed spray pattern.

### DETAILED DESCRIPTION

Generally speaking, the invention is for an envelope flap moistening apparatus comprising means to move said envelope flap along a feed path and past a spray moistening means. This spray moistening means is disposed adjacent the feed path. The spray moistener sprays moisture on the gummed surface of the flap in tiered segmented strips. This will substantially cover most of the gummed surface of the flap of the envelope with moisture, as the envelope flap moves past the sprayer.

Unless otherwise designated like elements will carry the same designation throughout all the figures.

Now referring to FIG. 1, an envelope 9 is shown disposed upon a mail-handling deck 10. A roller 11 in contact with the envelope 9, is caused to rotate as shown by arrow 12. This in turn forces the envelope to move upon the deck 10 in the direction shown by arrow 14. The body 16 of envelope 9 is caused to move along a feed path defined generally by axis line 15. The flap 17 of envelope 9 has been previously separated from the envelope body 16 and travels at approximately a right angle to the envelope feed path along a flap feed path defined generally by axis line 18 (also see FIGS. 1a and 2a).

A light emitting diode 19 and a photodetector (phototransistor) 20 are positioned on the righthand side of deck 10. The leading edge 21 of the moving envelope body 16 will be caused to intersect the light path between elements 19 and 20, generally at point 22.

A second pair of light elements (LED and phototransistor) 23 and 24, respectively, create an intersecting light path for the leading edge 25 of envelope flap 17. The leading edge 25 of the flap will intersect this light path generally at point 26 (see phantom envelope flap position of FIG. 1 and FIG. 3b).

In the first illustrative embodiment of this invention (FIGS. 1 and 1a), two spray nozzles 27 and 28, respectively, are disposed below deck 10 facing the oncoming flap 17. The nozzles are positioned one above the other (tiered) so that the spray emitted from each nozzle will contact a different level of the flap 17, as will be explained in more detail hereinafter, with reference to FIGS. 3c and 3d.

Referring to FIG. 1a, a schematic diagram of the spray system for the embodiment of FIG. 1 is shown. A reservoir 29 containing water, or another like moistening fluid, supplies the spray nozzles 27 and 28. The fluid is pumped from the reservoir 29 by pump 30 via conduit 31. A valve 32 disposed in the fluid line 31 directs the fluid into one of the two fluid lines 33 and 34, respectively supplying nozzles 27 and 28 as shown. The valve 32 is switched by an electrical control circuit 36, which can comprise a solenoid. The control circuit 36 is actuated and deactuated by the breaking and making of the light path between elements 23 and 24. When the light path is broken by the leading edge 25 of envelope flap 17, the photodetector 27 provides a signal via line 37 to actuate control circuit 36. When the trailing edge 35 (FIG. 1) of the envelope flap 17 moves past the detector 24, a signal is given to deactuate control circuit 36.

Pump 30 is controlled by control circuit 38, which can comprise a relay. The control circuit 38 is actuated and deactuated by the breaking and making of the light path between elements 19 and 20. When this light path is broken by the leading edge 21 of the envelope body 16, a signal is sent via line 39 to actuate the control circuit 38, which in turn causes pump 30 to start pumping fluid. When the trailing edge 41 (FIG. 1) of the envelope body 16 moves past detector 20, a signal is given to deactuate the control circuit 38, and thus cause pump 30 to stop pumping fluid from the reservoir 29.

### OPERATION OF THE SYSTEM

Operation of the system of FIGS. 1 and 1a will be described with further reference to FIGS. 3a through 3d.

FIG. 3a depicts a position for envelope 9 also shown in solid lines in FIG. 1. The leading edge 21 of the envelope body 16 has just intersected the light path between elements 19 and 20, at point 22 (FIG. 3a). This causes control circuit 38 to actuate, which in turn starts the pump 30 to pump fluid from reservoir 29. The valve 32 is directing the flow of fluid to line 33 feeding the upper nozzle 27. As the envelope flap 17 moves past nozzle 27 in direction 14, the spray from nozzle 27 causes a strip 50 of moisture (FIG. 3b) to be deposited on envelope flap 17.

Nozzle 27 continues to spray until such time as the leading edge 25 of the envelope flap 17 intersects the light path between elements 23 and 24, at point 26. When the flap 17 intersects this light path, detector 24 (FIG. 1a) sends a signal to actuate control circuit 36. This causes valve 32 to switch the fluid flow to line 34, feeding lower nozzle 28. Lower nozzle 28 provides a strip 51 of moisture (FIG. 3c) to be deposited on envelope flap 17, as the envelope continues to move past the nozzles (arrow 14).

Nozzle 28 continues to spray until the trailing edge 35 of flap 17 moves past point 26. At such time, the detector 24 again senses light, and causes control circuit 36 to deactuate. Valve 32, then switches the fluid flow back into line 33 feeding nozzle 27.

Nozzle 27 now deposits a moisture strip 52 (FIG. 3d) upon flap 17 as the envelope continues to move in direction 14.

As the trailing edge 41 of the envelope body 16 moves past point 22, detector 20 now senses light again. The control circuit 38 is deactuated, which in turn causes the pump 30 to stop pumping fluid from the reservoir.

It will be seen, with reference to FIGS. 3a through 3d, and particularly to FIG. 3d, that a spray pattern consisting of three spray strips 50, 51 and 52 has now been deposited on envelope flap 17.

Envelope flap 17 has a gummed surface 45 which is now substantially covered by the moisture stripping 50, 51 and 52.

The reason that two levels of moisture strips are needed is evident from the changing contour of the gummed strip 45. The moisture stripping can only be deposited in a flat (horizontal) strip, and cannot follow the changing gum strip contour, hence the need for a third sequence of strips.

The change-over between spray strips 50 and 51 is depicted in FIG. 3c by a curved intermediate spray strip 53. This curved change-over strip 53 is a result of changing the level of the spray while the envelope is still moving. Similarly, there is an arcuate change-over spray strip 54 (FIG. 3d) between strips 51 and 52 for the same reason of envelope movement.

Of course, it must be realized that more than two nozzles may be required with larger envelopes, or ones having a sharper (deeper) contour. In such a case, the system of FIG. 1a can be easily modified to accommodate these larger envelopes by employing an extra nozzle; an extra light sensing means positioned at a lower level of flap intersection; and a three-way valve in place of valve 32.

Now referring to FIGS. 2 and 2a, an alternate embodiment of the invention is shown. This embodiment will provide the same spray configuration as the embodiment of FIGS. 1 and 1a. In place of alternating nozzles 27 and 28, the second embodiment features a single nozzle 42, which is mounted for vertical movement as shown by arrows 43 (FIG. 2). The nozzle 42 is caused to move by means of the solenoid 44, the solenoid rod 46, and the biasing compression spring 47.

The nozzle 42 is initially in a first position corresponding to the position occupied by the upper nozzle 27 of FIG. 1. When the leading edge 21 of moving envelope body 16 intersects point 22 (FIG. 3a), detector 20 sends a signal via line 29 to pump control circuit 38. Circuit 38 is actuated, causing pump 30 to send fluid to nozzle 42 via conduit 31. Nozzle 42 will provide a spraying strip 50 (FIG. 3b) until the leading edge 25 of the envelope flap 17 intersects point 26. When this happens, detector 24 sends a signal via line 48 (FIG. 2a) to actuate solenoid 44. When the solenoid 44 is actuated, it pulls upon the rod 46, causing the nozzle to assume a second position shown in phantom in FIGS. 2 and 2a. This second position corresponds to the position occupied by nozzle 28 of FIG. 1.

Nozzle 42, now provides the wetting strip 51 to the envelope flap, as shown in FIG. 3c. When the trailing edge 35 of the flap 17 moves past point 26, detector 24 senses light again, and causes the solenoid 44 to deactuate. The nozzle 42 now returns to its first position under the biasing force provided by the compression spring 47. The spring 47 is disposed about the rod 46,

and is put in compression by means of pin 49 when the solenoid is actuated. When deactuated, the solenoid rod 46 is forced upward by the compression in spring 47, as aforementioned.

The envelope flap 17 will now receive a spray corresponding to strip 52 (FIG. 3d). When the trailing edge 41 of the envelope body 16 passes point 22, the pump 30 is deactuated via a signal from detector 20 to control circuit 38.

It will be apparent from the foregoing discussion, that the embodiment of FIGS. 2 and 2a provides a practically identical spray pattern result as provided by the embodiment of FIG. 1.

Many modifications can of course be made in the invention, e.g. the nozzle 42 may be mounted for angular movement instead of vertical movement. By means of a feedback control of a contoured template, a nozzle 42 may be made to follow the contour of the gummed surface 45.

The embodiments shown in the drawings are merely deemed to be illustrative only of the invention, which is presented in its full scope and spirit by the appended claims.

What is claimed is:

1. An envelope flap moistening apparatus, comprising:

a reservoir containing an envelope flap moistening fluid;

means defining an envelope flap feed path;

a fluid nozzle for discharging moistening fluid received from said reservoir, said nozzle being disposed adjacent said envelope flap feed path so that an envelope flap passing in proximity to the nozzle will be moistened by said discharged fluid;

fluid supply means operatively connected between said reservoir and said nozzle for supplying the moistening fluid from the reservoir to the nozzle; and

sensing means disposed adjacent said feed path for sensing an edge of an envelope moving past said sensing means, said sensing means operatively connected to said fluid supply means for actuating said fluid means to supply the nozzle with moistening fluid from the reservoir in response to the sensing of said envelope edge.

2. The envelope flap moistening apparatus of claim 1, wherein said fluid supply means comprises a conduit connecting said nozzle to the reservoir and a fluid pump connected to said conduit for pumping fluid through the conduit from said reservoir to the nozzle.

3. The envelope flap moistening apparatus of claim 1, wherein said sensing means comprises a photocell and a juxtaposed light source adjacent said envelope feed path, the envelope feed path intersecting a light path formed by said photocell and said light source.

4. An envelope flap moistening apparatus, comprising:

a reservoir containing an envelope flap moistening fluid;

means defining an envelope flap feed path;

a fluid nozzle operatively connected to said reservoir for discharging moistening fluid received from the reservoir, said nozzle being disposed adjacent said envelope flap feed path so that an envelope flap passing in proximity to the nozzle will be moistened by said discharged fluid, said nozzle being movable from a first flap moistening position to a second

flap moistening position, so that different areas of the envelope flap will be moistened;

means connected to the nozzle for moving the nozzle from said first flap moistening position to said second flap moistening position; and

flap sensing means disposed adjacent said envelope flap feed path, and operatively connected to said means for moving the nozzle, said flap sensing means sensing an edge portion of an envelope flap, and in response thereto, actuating said means to move the nozzle.

5. The envelope flap moistening apparatus of claim 4, wherein said means for moving said nozzle from said first flap moistening position to said second flap moistening position comprises a solenoid connected to said nozzle, said solenoid being operative to move said nozzle to one of said two positions, and a spring operatively biasing said nozzle towards the other of said two positions.

6. The envelope flap moistening apparatus of claim 4, wherein said flap sensing means comprises a photocell and a juxtaposed light source adjacent said envelope flap feed path, the envelope flap feed path, a light path formed by said photocell and said light source intersecting said envelope flap feed path.

7. An envelope flap moistening apparatus, comprising:

a reservoir containing an envelope flap moistening fluid;

means defining an envelope flap feed path;

at least two fluid nozzles operatively connected to said reservoir for discharging moistening fluid received from the reservoir, said nozzles being disposed adjacent said envelope flap feed path and adjacent each other, so that an envelope flap passing in proximity to the nozzles will be moistened by said discharged fluid, each of the nozzles being operative to moisten a different portion of the envelope flap;

valve means connected between said nozzles and the reservoir for selectively supplying each of the nozzles with moistening fluid from said reservoir; and flap sensing means disposed adjacent said envelope flap feed path for sensing an edge portion of an envelope flap, and operatively connected to said valve means for supplying a signal for switching the valve means to a different valve supply position, whereby each nozzle is selectively supplied moistening fluid in response to the sensing of the edge portion of said envelope flap.

8. The envelope flap moistening apparatus of claim 7, wherein said flap sensing means comprises a photocell and a juxtaposed light source adjacent said envelope flap feed path, a light path formed by said photocell and said light source intersecting said envelope flap feed path.

9. An envelope flap moistening apparatus, comprising:

means defining an envelope flap feed path;

means to move said envelope flap along said feed path and past a spray moistening means; and

spray moistening means disposed adjacent said envelope flap feed path for spraying moisture in strip segments to a gummed surface of said flap as the flap moves past the moistening means, said moistening means applying moisture to said flap in tiered segmented strips so as to substantially cover most of the gummed surface of the flap with moisture, as the envelope flap moves past.

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