July 25, 1939. F. J. ROUAN ET AL 2,167,252

MOISTENING DEVICE

Filed April 10, 1937 4 Sheets-Sheet 1

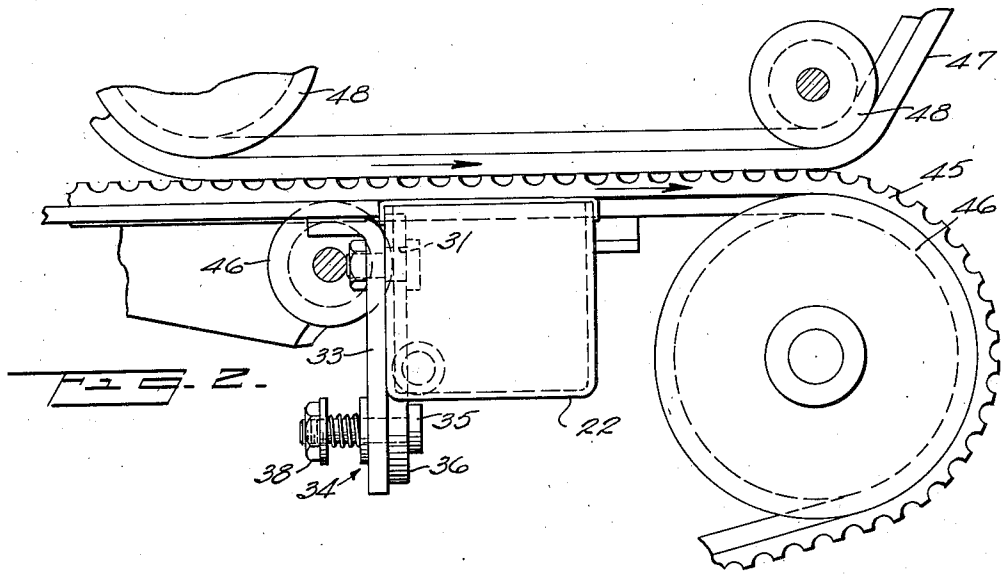

FIG. 2.

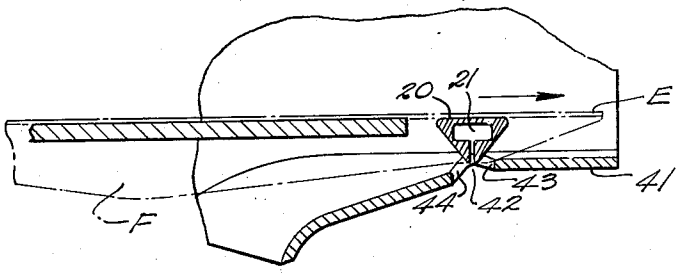

FIG. 5.

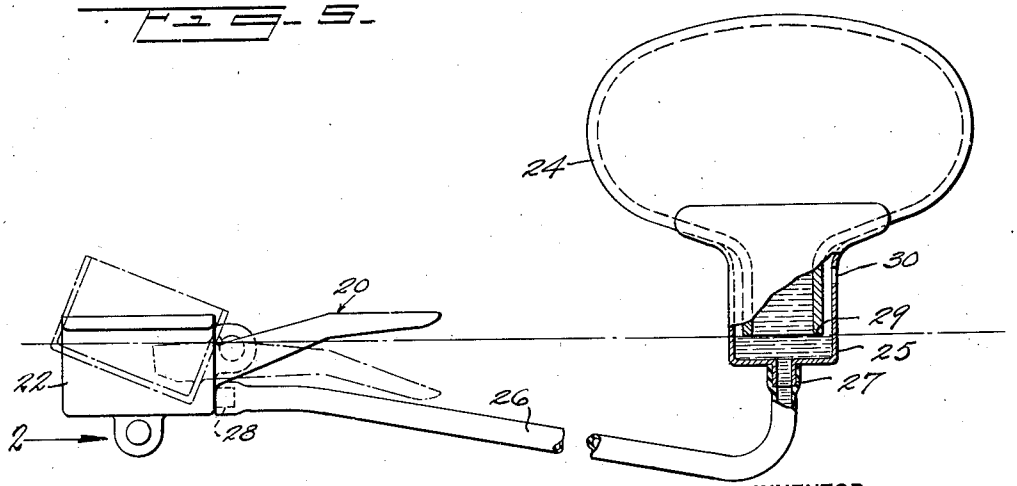

FIG. 1.

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MOISTENING DEVICE

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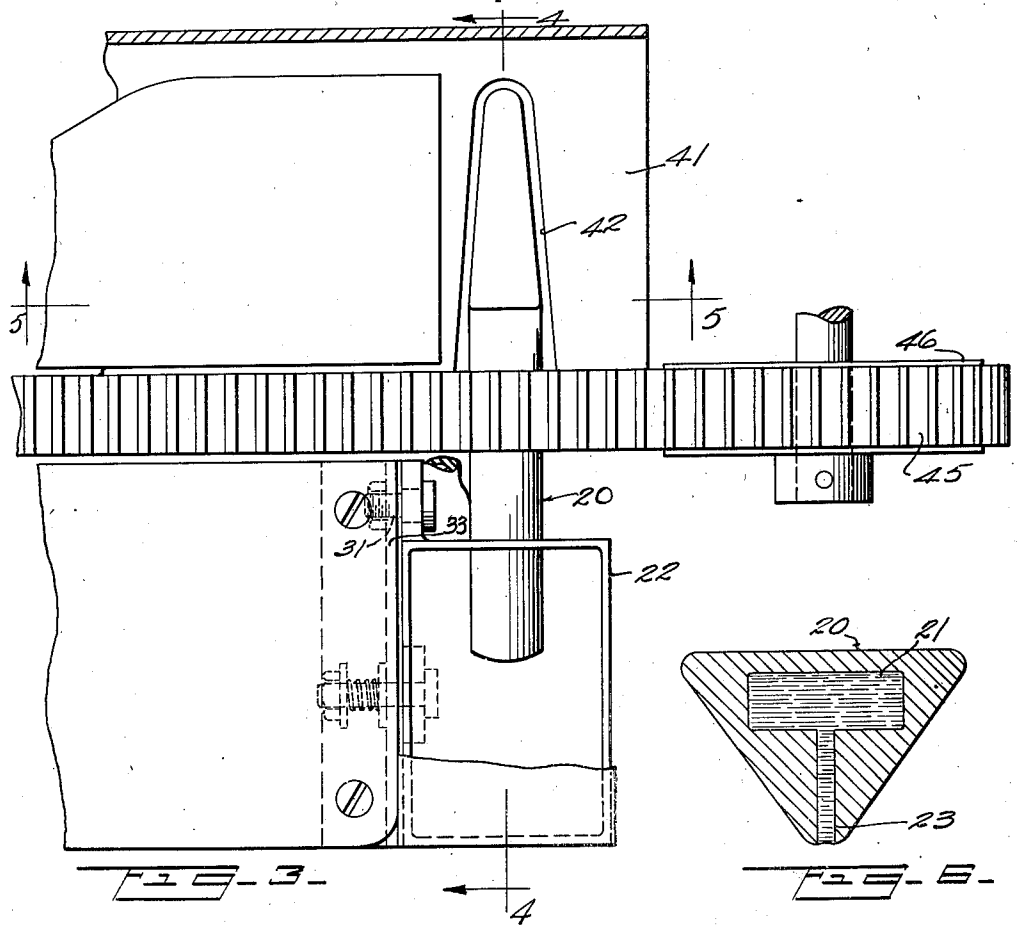

FIG. 3.

FIG. 6.

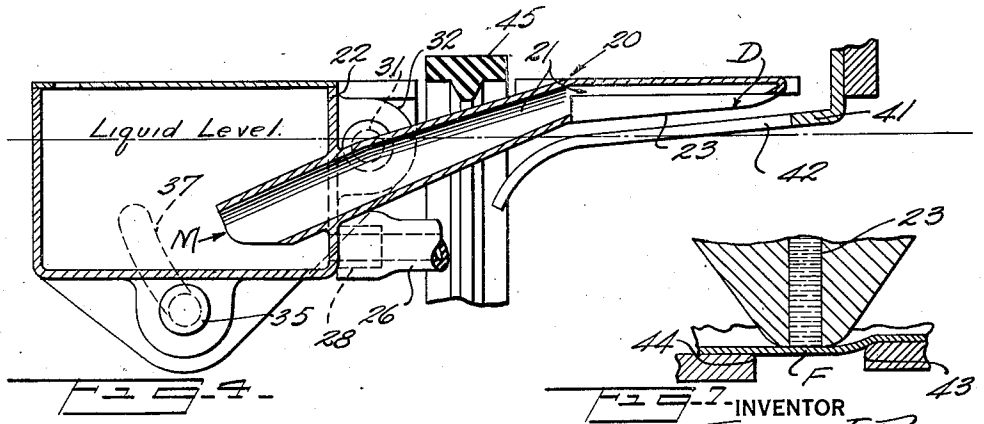

FIG. 4.

FIG. 7.

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MOISTENING DEVICE

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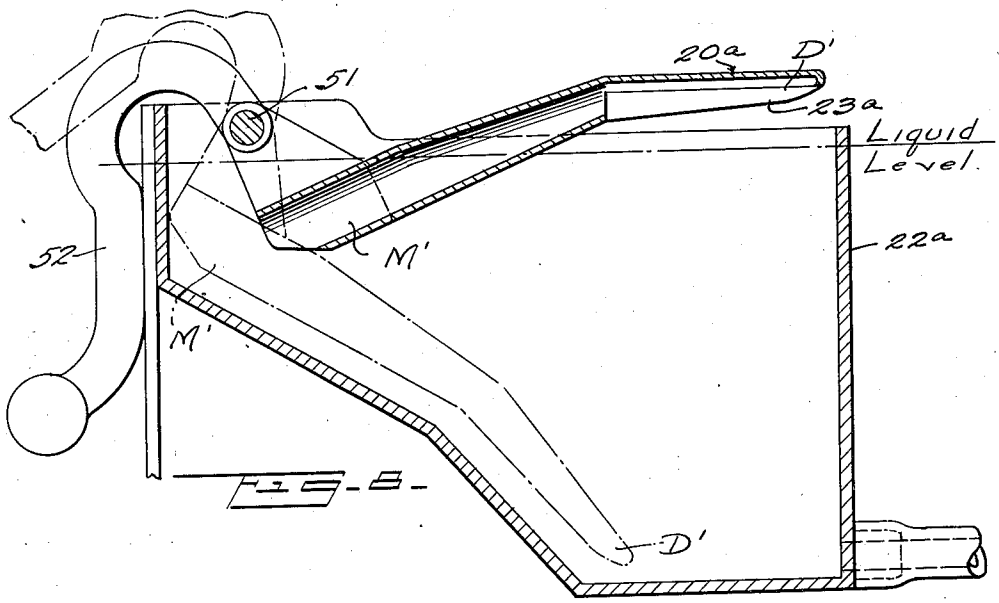

FIG-8-

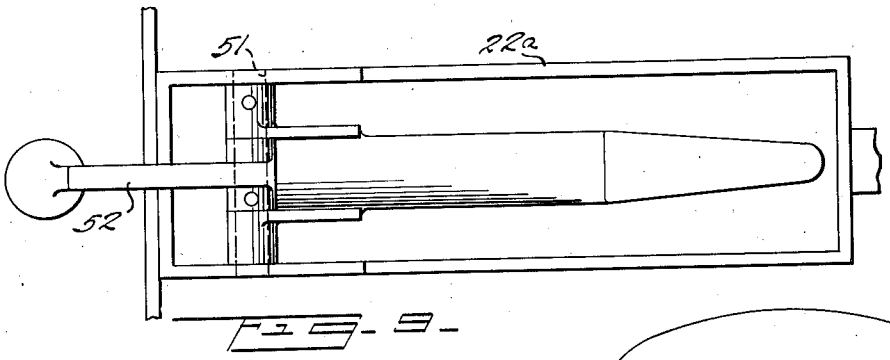

FIG-9-

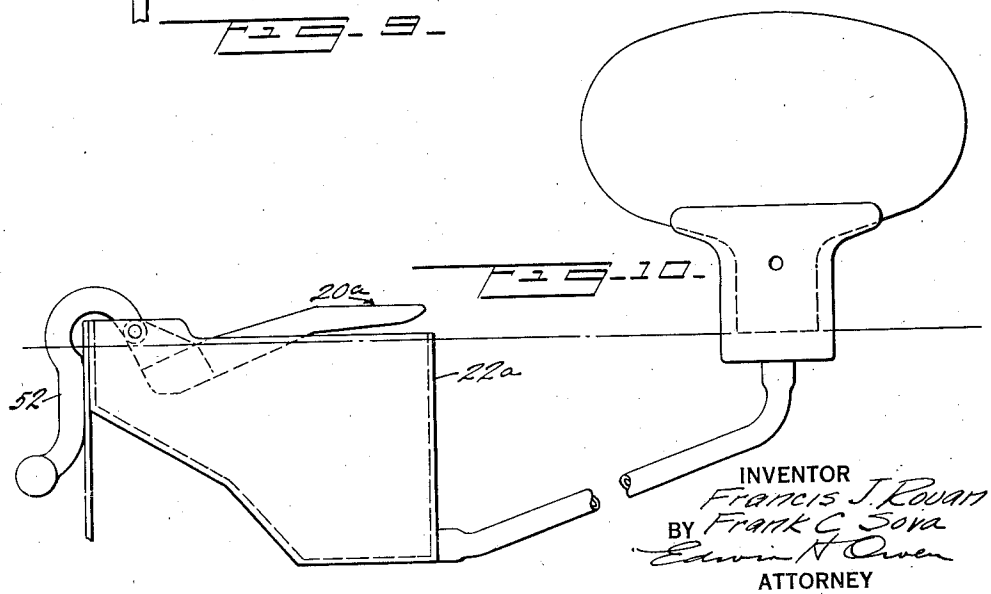

FIG-10-

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MOISTENING DEVICE

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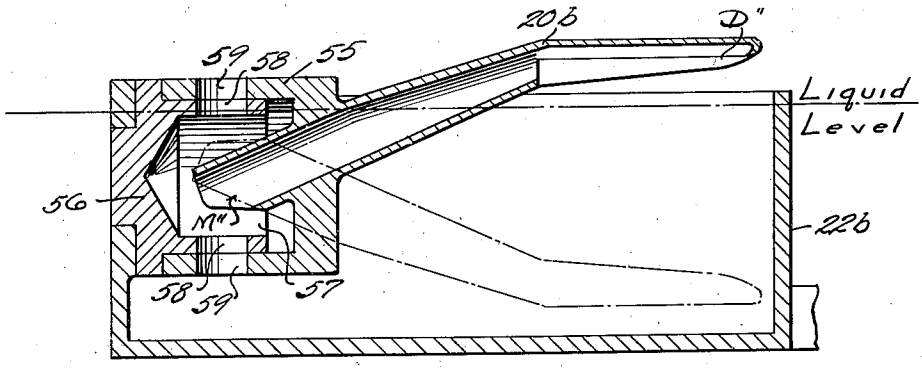

FIG. 11.

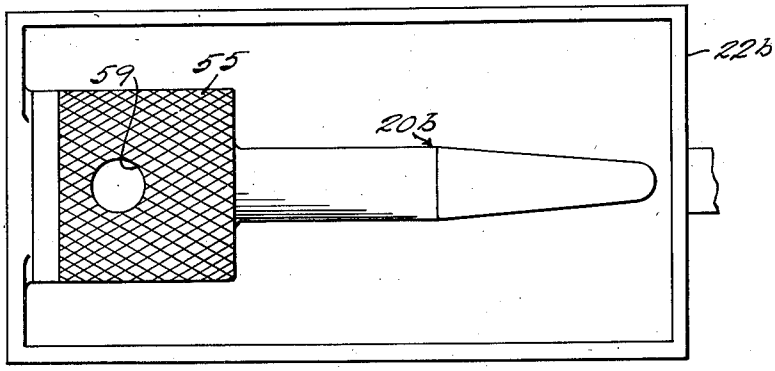

FIG. 12.

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UNITED STATES PATENT OFFICE

2,167,252

MOISTENING DEVICE

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Application April 10, 1937, Serial No. 136,062

10 Claims. (Cl. 91—43)

This invention relates to a moistening device of the type which employs a restricted moistening slot, and which is particularly useful for the moistening of gummed flaps of envelopes.

The device generally comprises a moistening arm or blade which has a liquid chamber within it and a restricted slot along preferably the lower surface thereof, which slot receives its liquid supply directly from the liquid chamber. A liquid supply to the liquid chamber may be provided from any convenient source of supply.

While a moistening blade of this type is generally old, the means employed for controlling the feed of the liquid to the blade, as disclosed by this invention, is new.

In the control of said liquid feed, means is provided for normally maintaining a liquid level below the surface of the moistening slot, and means whereby, after an initial priming of the liquid chamber is effected, a supply of liquid may be continuously withdrawn when the gummed surfaces of envelope flaps or the like are wiped across the surface of the moistening slot.

By said means of control, a constant subatmospheric pressure is maintained within the liquid chamber of the moistening blade, which produces a slightly retracted and concave meniscus at the moistening surface of the blade instead of a convex shaped meniscus as provided when the liquid level is maintained above the moistening slot. With a slightly concave meniscus a minimum of moisture is presented to the gummed surface which is conducive to good moistening, whereas with a convex meniscus an excess of liquid is presented which will continue to build up and finally cause a drip to occur.

It is the principal object of this invention therefore, to provide in a moistening device of the restricted slot type, means whereby the pressure of the liquid within the moistening blade is maintained at less than atmospheric pressure.

It is a further object to provide a simple and rapid means for effectively priming the moistening blade.

With the above and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts, and in the details of construction hereinafter described.

In the drawings:

Fig. 1 is a diagrammatic view showing a moistening device and a liquid feed means for controlling the level of the liquid supply with relation to the moistening device, also showing said moistening device in a priming position in dot and dash lines;

Fig. 2 is a fragmentary front elevation of the device looking in the direction of the arrow 2 of Fig. 1, and includes a portion of an automatic envelope feeds mechanism;

Fig. 3 is a plan view of the structure shown in Fig. 2;

Fig. 4 is a longitudinal section through the moistening device taken on the line 4—4 of Fig. 3;

Fig. 5 is a cross-sectional view taken along the line 5—5 of Fig. 3;

Fig. 6 is an enlarged cross-sectional view through the moistening blade showing the liquid within the blade and the normal shape of the meniscus along the surface of the moistening slot;

Fig. 7 is a further enlarged view of the moistening end of the moistening blade showing a letter flap in a position it would take when it is wiped across the moistening slot;

Fig. 8 is a longitudinal vertical sectional view through a modified form of moistening device showing means for submerging the moistening member to prime same;

Fig. 9 is a plan view of Fig. 8;

Fig. 10 is a view similar to Fig. 1, showing a liquid supply for the modified form of moistening device shown in Fig. 8;

Fig. 11 is a longitudinal vertical sectional view through another arrangement of a moistening device, showing a modified means of priming same; and

Fig. 12 is a plan view of Fig. 11.

Referring to Fig. 4, the moistening device comprises a moistening blade generally indicated by the reference character 20, which blade has a liquid passage 21 therein and projects outward from a liquid supply container or reservoir 22. The forward or moistening end of the blade has a restricted capillary slot 23 cut through the lower surface thereof to the liquid passage 21, while the rearward end of said blade, which is of substantially tubular form, is disposed angularly downward and extends through the container 22 to a point near the bottom of the container. The portion indicated at M which extends within the container, forms the mouth or liquid intake end of the moistener element while the outwardly extending end D, which contains the slot 23, forms the discharge portion of the element. If desired, the portion of the tubular member which extends within the container 22, may be cut off flush with the inner wall of the container.

Liquid may be supplied to the container 22 from a main source of supply in any convenient manner, such as by means of a liquid supply bottle 24, which is suitably supported within a cup shaped support 25. Said cup support is provided with a suitable vent 30 and has one end of a hose or pipe 26 connected to a nipple 27 at the bottom of the cup while the opposite end is connected with a nipple 28 on the container 22. The position of the end of the neck 29 of the bottle 24, within the cup support 25, determines the level at which the liquid will be maintained, which level, as shown in Fig. 1, is maintained at a position below the moistener slot 23 of the moistener blade 20. Obviously this level will be constantly maintained so long as there is water within the supply bottle 24.

Since the normal level of the liquid is maintained at a position below the moistening slot, means is provided to initially prime that portion of the moistener blade which lies above the liquid level. One means for conveniently priming the blade, comprises the mounting of the container 22 upon a fulcrum, pin 31 which pin is provided within an ear 32 at the forward end of the container 22, and extends through a bracket 33 forming a part of the machine frame on which the moistening unit is to be used. By tipping the moistener unit about the fulcrum from the position shown in full lines, Fig. 1, to the dot and dash line position, it will be noted that the entire moistening blade, including the tubular end within the container, is below the water level. Upon reaching this position, the liquid within the container will flow through the mouth M of the moistener blade, first forcing the air within the liquid passage 21 out through the slot 23, then entirely filling said passage and slot. After priming is effected, the device is moved back to the normal or full line position of Fig. 1 and is ready for the continuous moistening of any articles which are wiped across the moistening slot 23.

When the gummed surface of an envelope flap is wiped across the moistening slot, the gum, through the adhesive force between itself and the water, will withdraw the desired amount of moisture to moisten same and will thereby maintain a low enough pressure at the surface of the slot to cause a flow of water from the container during the particular period that the moisture is being withdrawn from the blade 20. Thus, the liquid that is withdrawn is immediately replaced by liquid from the supply container 22. While standing idle the supply of liquid will be retained within the liquid chamber 21 even though the slot 23 is above the liquid level, by reason of the fact that the slot 23 is of such a restricted width. The surface tension of the water at the surface of the slot, together with the adhesion of the water to the walls of the slot, prevents the return of the water to the container.

It is to be noted, that due to the fact that the moistener slot 23 is maintained above the normal liquid level, the liquid within the passage 21 and slot 23 above this level is maintained at a constant pressure which is less than atmospheric pressure. Consequently, the liquid across the surface of the slot will be drawn within the slot to form a slightly concave meniscus, substantially as shown in Fig. 6. By maintaining a sub-atmospheric pressure within the liquid passage 21 and slot 23, a distinct advantage is had over moistening devices in which the water level is maintained above the moistening slot, in that there is no tendency for a drip to occur from the moistening slot, and further, it results in a restricted but uniform quantity of moisture which as previously stated is most desirable for sealing.

Friction means for retaining the container in a moistening or a priming position is indicated at 34 Fig. 2, which comprises a bolt 35 positioned in a lug 36 depending from the container 22, said bolt passing through an arcuate slot 37 and having a spring and nut structure at its opposite end, as at 38. Upon rocking the container about its fulcrum, the bolt 35 will move through the arcuate slot 37 and the moistening device may be maintained in any position of adjustment by the frictional pressure of the spring structure 38. By means of this arrangement, an operator may rock the moistener to a priming position and leave it there until the blade is primed.

In Figs. 3, 4 and 5, a guide plate 41 is shown which has a slot 42 therethrough, positioned immediately adjacent the moistener blade, and is arranged to guide the envelope flap so that it will be brought into direct contact with the lower surface of the blade and tightly against the moistening slot 23. For example, on referring to Fig. 5, it will be seen that the envelope E, which is indicated in dot and dash lines and which is moving in the direction of the arrow, will have its flap portion F brought into engagement with the lower surface of the moistening slot to effect the result indicated in Fig. 7. The guide plate 41 may be secured to any portion of the machine frame.

In Figs. 2 and 3, an envelope feed means is shown which comprises a driven belt 45, suitably supported on pulleys 46, and a pressure belt 47, suitably supported on pulleys 48.

In operation, the letters are received from a source of supply and conveyed by the belt 45 with their flap portions F faced downward, and upon passing between the belt 45 and belt 47 said envelopes are conveyed past the moistener device, the flap portion engaging the moistener blade and being supported tightly against the moistener slot 23, to cause moisture to be withdrawn from said slot by the gummed surface of the flap as the flap is drawn thereacross. This process is continued at high speed, one envelope following the other, with each flap drawing off an equal quantity of moisture.

In Fig. 8, a modified form of moistening device is shown in which the moistening blade is moved relative to the container when priming is to be effected.

In said device, a moistening blade 20*a*, which is similar to the blade 20, is fulcrumed at 51 and is provided with a manipulating handle 52 which projects outside of the container 22*a*. The liquid level is maintained below the moistener slot 23*a* as disclosed in Fig. 10 by means of the bottle and hose connection in a manner typical of that disclosed in Fig. 1.

When an initial priming is to be effected the moistening blade is rocked about the fulcrum point 51 to the position indicated in dot and dash lines, Fig. 8, thus entirely submerging the blade in the container. The slotted or discharge end D' will preferably be dipped considerably lower than the intake end or mouth M' to thereby cause any air in the blade to be forced upward through the tubular end and out to the atmosphere. Upon returning the blade to its normal operating position the tubular end of the blade

will remain submerged in the liquid, hence the prime will be maintained.

A further modification for priming the moistening blade is shown in Figs. 11 and 12, wherein the blade is adapted to be rotated on a longitudinal axis to become submerged in the liquid within a moistening container **22b**.

Said modification comprises a blade **20b** which is similar to the blade **20** and has a sleeve **55** thereon which is rotatably mounted on a bearing **56**. The bearing **56** is fixed within one wall of a liquid container **22b** and has a hollow interior **57** to receive the mouth M'' of the blade **20b**. Two openings **58—58** are provided in the bearing **56**, and two openings **59—59** are provided in the sleeve **55**.

In the full line position of Fig. 11, the lower openings **58, 59** provide a direct passage for the liquid to the mouth of the blade. When the blade **20b** is rotated to the dot and dash line or submerged position, the upper openings **58, 59** provide a direct passage for the escape of air bubbles from the blade during the priming thereof.

From the foregoing it will be seen that a moistening device has been provided which will provide a continuous supply of liquid at the moistening slot in the blade and will be controlled within the blade by a pressure which is less than atmospheric pressure, to thereby present a restricted but consistent quantity of moisture to the gummed surfaces of articles wiped thereacross.

It will be understood that the invention may be embodied in other specific forms without departing from the spirit thereof and it is therefore desired that the present embodiment be considered as illustrative and not restrictive, reference being had to the appended claims rather than to the foregoing description to indicate the scope of the invention.

What is claimed is:

1. In a device for moistening gummed surfaces, a moistening blade having a liquid chamber therein and a discharge opening of capillary size along the lower surface thereof, a liquid supply having its level normally maintained below the discharge opening both during and after a moistening operation, a downwardly disposed tubular extension on said blade having a direct passage with the liquid chamber in the blade and with the liquid supply, and means to prime that portion of the blade which is positioned above the normal liquid level.

2. In a moistening device, a moistening blade normally arranged in a moistening position and having a liquid chamber therein and a discharge slot of capillary size along the lower surface thereof, a liquid supply for said moistening blade having its level normally maintained below the discharge slot both during and after a moistening operation, a downwardly disposed tubular extension on said blade having a direct passage with the liquid chamber in the blade and with the liquid supply, and means for moving the blade below the level of the liquid to prime same and thereby cause a supply of liquid to reach the discharge slot, which supply will be maintained therein after returning the blade to its normal moistening position.

3. In a moistening device, a moistening blade having a liquid chamber therein and a discharge slot of capillary size along the lower surface thereof, a liquid supply reservoir having its level normally maintained below the discharge slot, a downwardly disposed tubular extension on said blade having a direct passage with the liquid chamber in the blade and extending into said reservoir with its intake end submerged in the liquid, and means whereby the reservoir and blade may be rocked to position the blade below the water level and thereby prime said blade which prime will be maintained upon returning the reservoir and blade to its original position.

4. In a moistening device, a moistening blade having a liquid chamber therein and a discharge opening of capillary size along the lower surface thereof, a liquid supply having its level maintained below the surface of the discharge opening, means for directing the liquid upward from the liquid supply to the liquid chamber, and means for priming the entire liquid passage including the directing means, chamber and discharge opening, said prime being adapted to be maintained in said liquid passage indefinitely through resistance afforded by the discharge opening.

5. In a moistening device, a moistening blade having a liquid chamber therein and a discharge slot of capillary size along the lower surface thereof, a liquid supply having its level maintained below the surface of the discharge slot, a tubular member joined with said moistening blade for directing the liquid upward from the liquid supply to the liquid chamber, means for priming the entire liquid passage including the directing means, chamber and slot, the said prime being adapted to be maintained in said liquid passage indefinitely through resistance afforded by the capillary slot.

6. In an apparatus of the character described a liquid supply including a tank having a fixed normal liquid level, a moistening element extending outward from the tank and having a liquid passage therethrough including an intake portion and a discharge portion along the lower surface thereof and arranged in such manner that the discharge portion is above the normal liquid level, means for priming that portion of the liquid passage of said moistening element which lies above the normal liquid level, and means including a slot of capillary size for said discharge portion to retain the liquid supply in said liquid passage which lies above the liquid level to thereby provide a continuous supply at the point of discharge for the withdrawal therefrom when a member to be moistened is moved across said discharge portion.

7. In combination, a moistening blade having a slot of capillary size along the lower surface thereof and a passage for directing liquid to a point above said slot, a liquid supply container positioned adjacent and substantially below said blade with the liquid level maintained below the surface of the capillary slot, a tubular portion extending downward from said blade into the liquid within the container, and means whereby the tubular portion and blade may be primed to fill the passage within the blade and said capillary slot with liquid.

8. In an apparatus of the character described, a liquid supply reservoir having a fixed normal liquid level, a moistening element having a liquid passage for the uninterrupted flow of liquid therethrough when moistening is effected, said element including an intake portion and a discharge portion, said discharge portion comprising a restricted slot of capillary dimension and said intake portion including a passage of non-capillary dimension and leading upward and sideward beyond the reservoir to a position above the normal liquid level of the supply, and means for priming

that portion of the liquid passage which lies above the liquid level including said restricted slot, said prime being retained within said liquid passage and slot by a capillary attraction resulting from said restricted slot.

9. In a moistening device, a reservoir including means to maintain a constant liquid level, a blade projecting from said reservoir having a discharge slot of restricted capillary width therein and positioned above the normal liquid level, said blade further having a liquid passage of non-restricted width and continuing in an upward direction from the reservoir to the restricted slot to direct the liquid upward to the slotted portion of the blade and thereby establish a pressure which is less than atmospheric pressure at the discharge slot, and means to initially prime the restricted slot and that portion of the blade which normally lies above the restricted slot.

10. In a moistening device, a reservoir including means to maintain a constant liquid level, a blade projecting from said reservoir having a restricted capillary discharge slot along the lower surface thereof and positioned above the normal liquid level, said blade further including an enlarged liquid passage having no effective capillary attraction and continuing in an upward direction from the reservoir to the capillary slot to direct the liquid upward from the normal liquid level, and means to initially prime the said liquid passage and discharge slot, which prime although lying above the level of the liquid in the reservoir within a passage devoid of capillary attraction, is prevented from returning to said reservoir by the adhesion of the liquid to the walls of the restricted discharge slot.

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