United States Patent [19]

Schultz

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[45] **July 31, 1973**

[54] **REMOISTENING APPARATUS**

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[21] Appl. No.: **105,488**

[52] **U.S. Cl.** **118/2,** 118/8, 118/257, 118/264

[51] **Int. Cl.** **B05c 11/00**

[58] **Field of Search** ..... 118/2, DIG. 23, 8, 118/221, 222, 257, 264, 7

[56] **References Cited**

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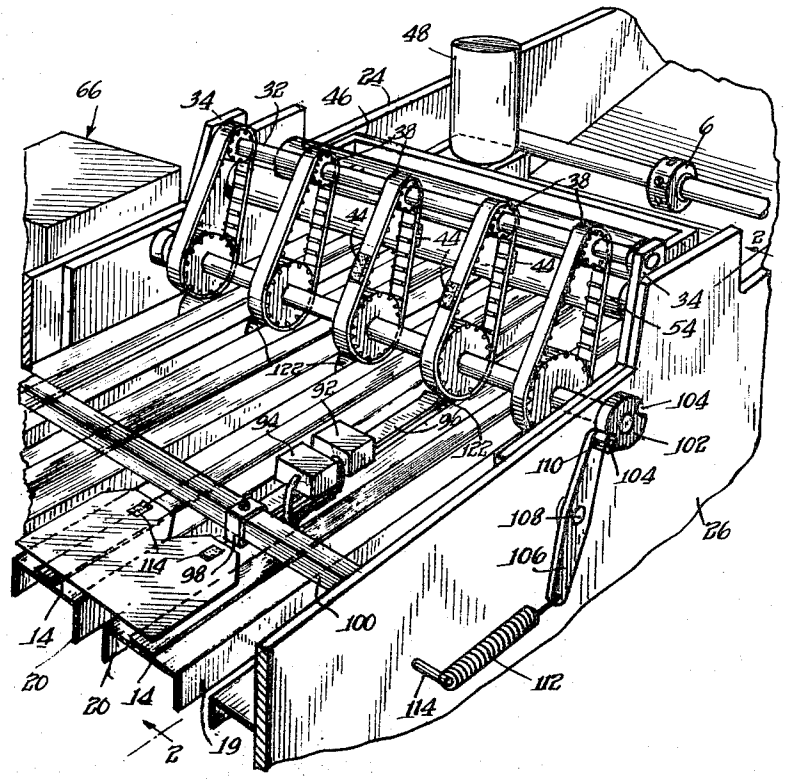
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[57] **ABSTRACT**

Remoistening apparatus for use in conjunction with paper folding comprises moisture applying members for wetting dry adhesive areas of a sheet prior to the sheet being fed to a machine in which the sheets are folded to provide envelopes or sheets with tear off envelopes attached thereto. The moisture applying members are cyclically operable to receive moisture from a supply and then to transfer the moisture to the dry adhesive areas of the sheet in synchronism with the sheets as they move through the apparatus so as to insure registry of the members with the adhesive areas. The members are on endless belts to facilitate their accurate positioning as well as replacement with different sizes of members for different sizes of dry adhesive areas to be moistened.

5 Claims, 13 Drawing Figures



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Fig. 1.

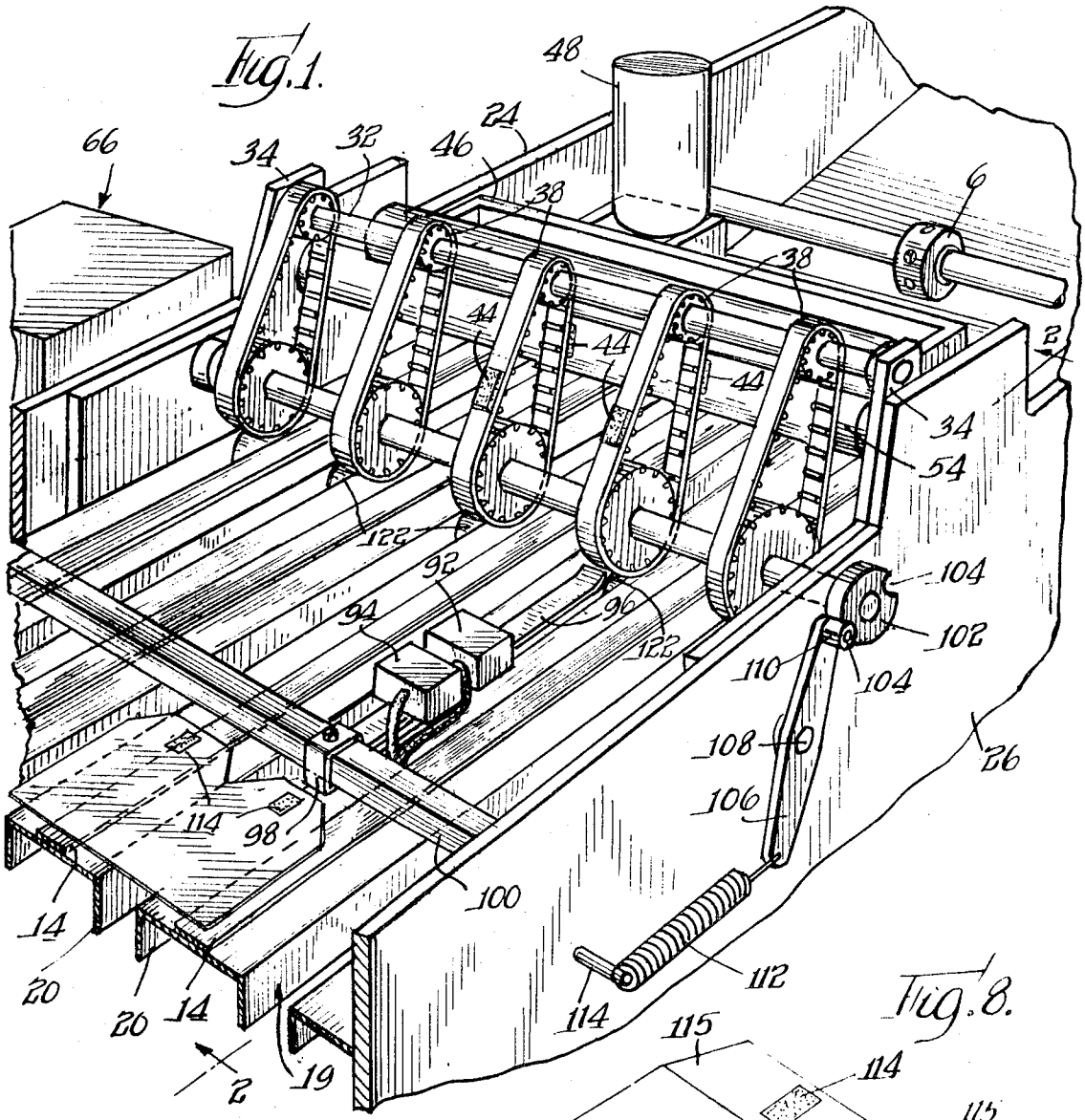


Fig. 8.

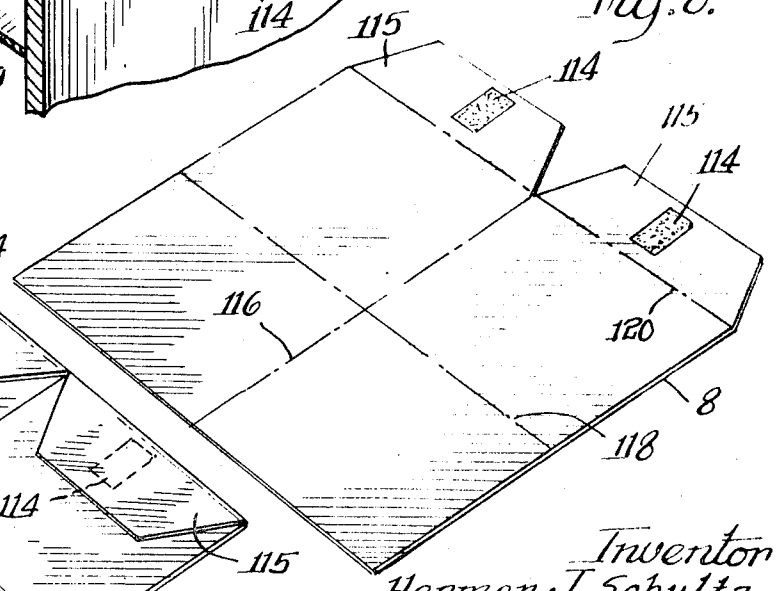
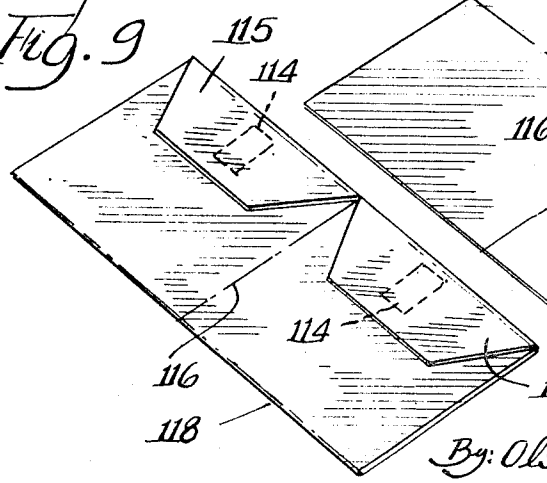


Fig. 9



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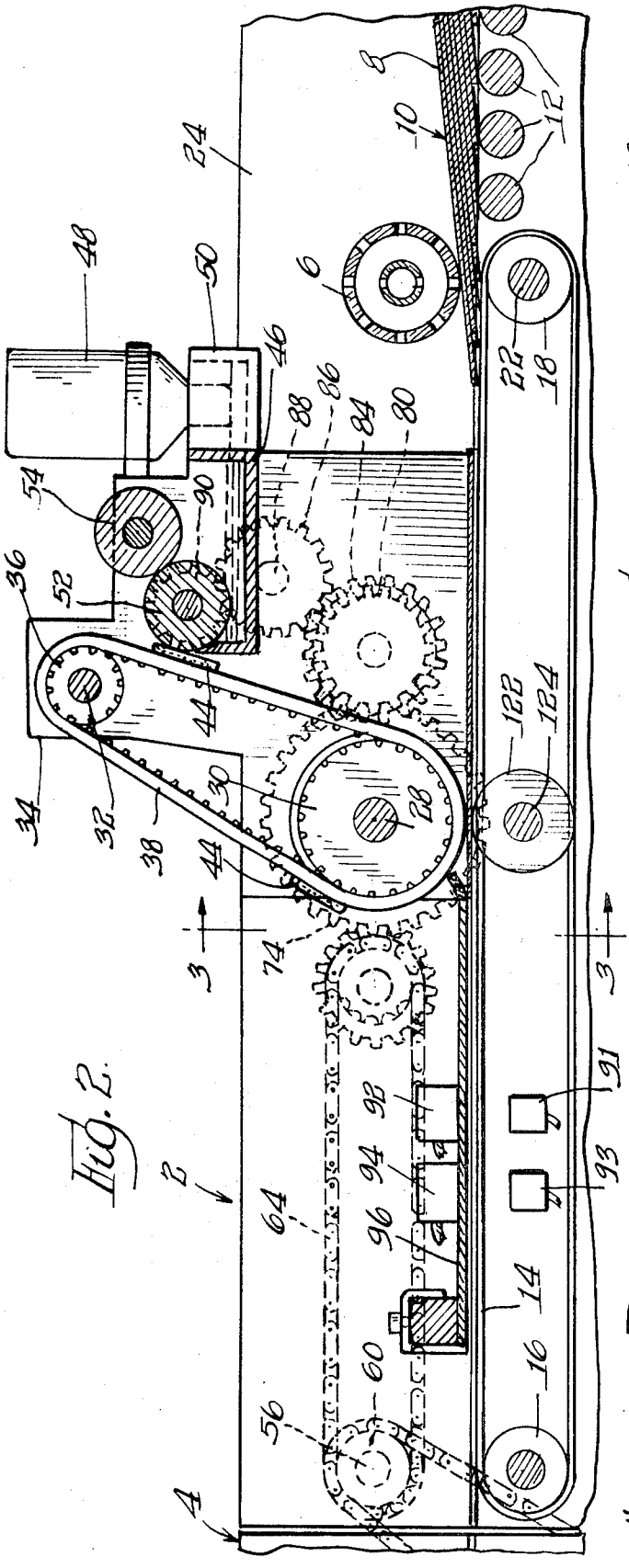


Fig. 2.

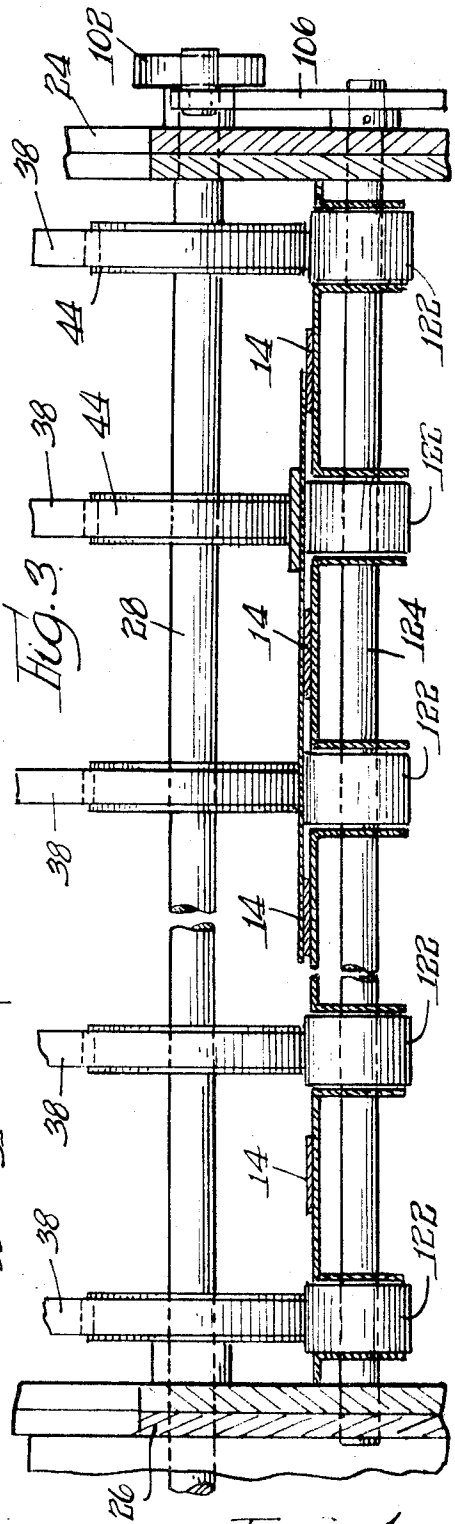


Fig. 3.

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SHEET 3 OF 5

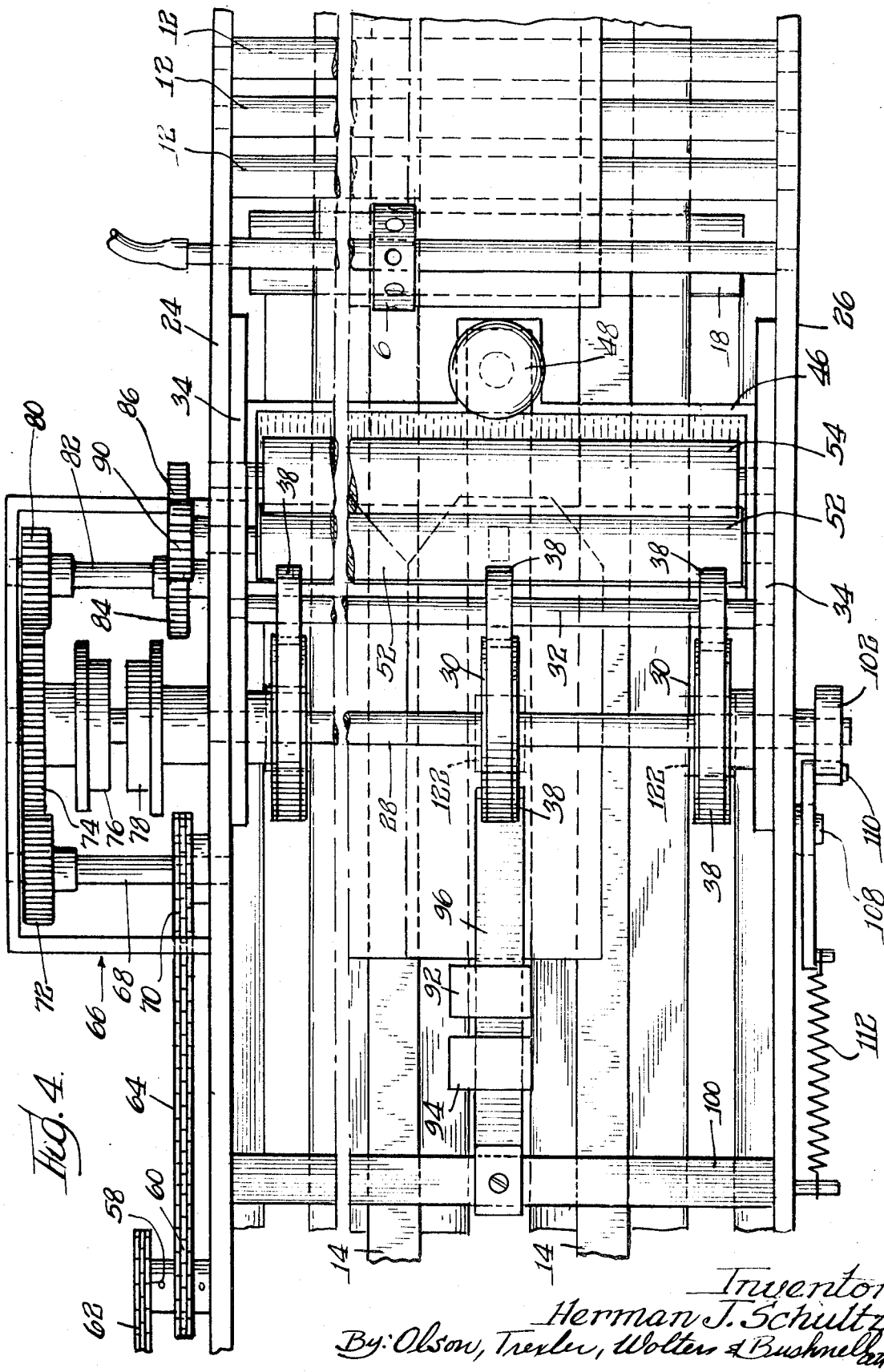


Fig. 4.

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Fig. 5.

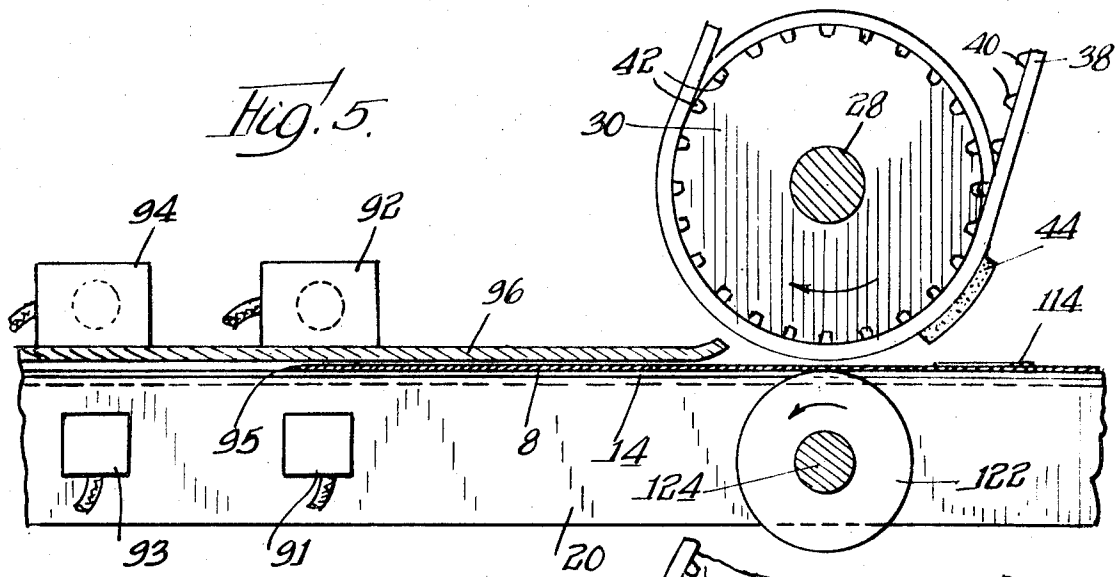


Fig. 6.

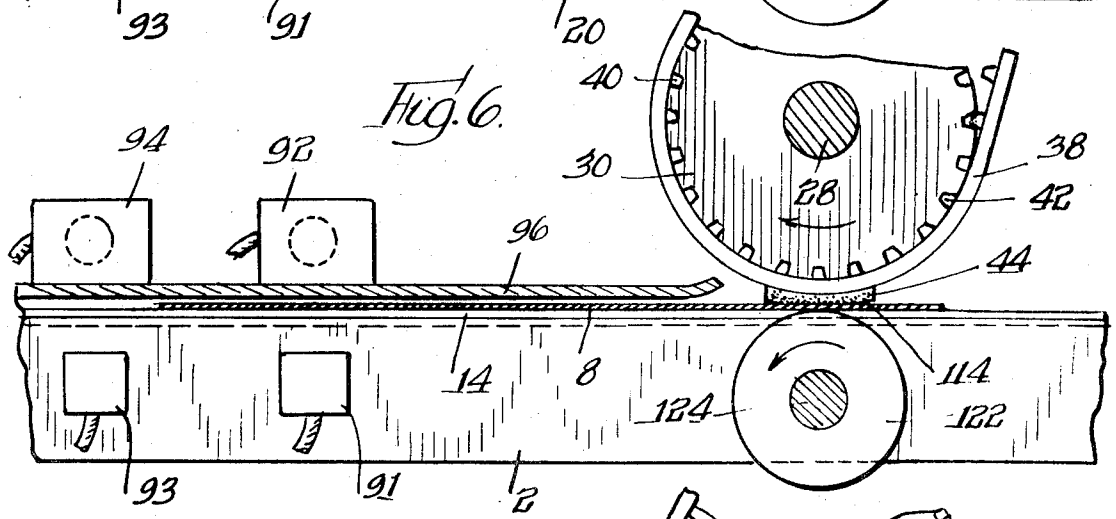
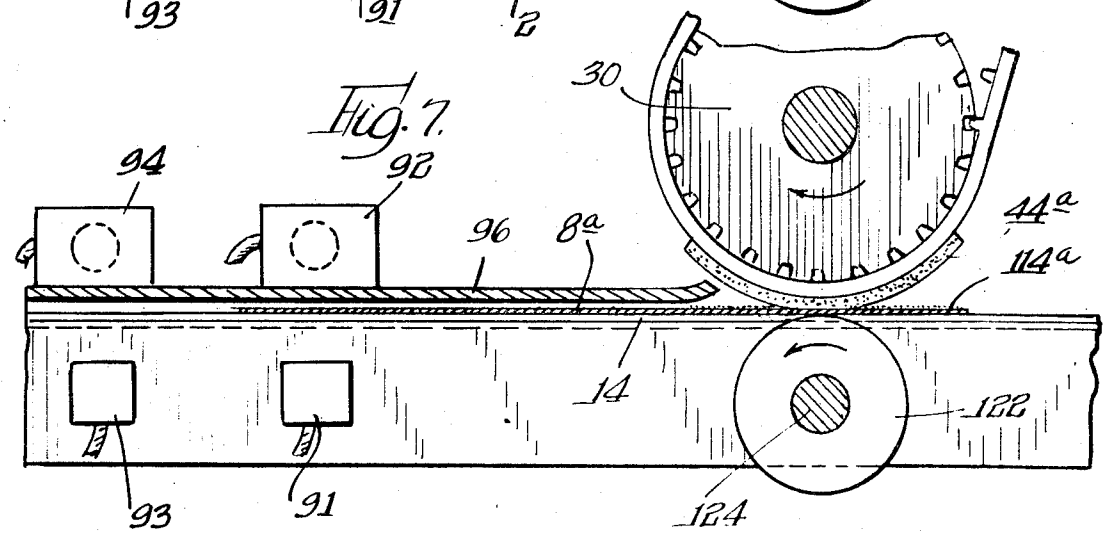


Fig. 7.



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Fig. 10.

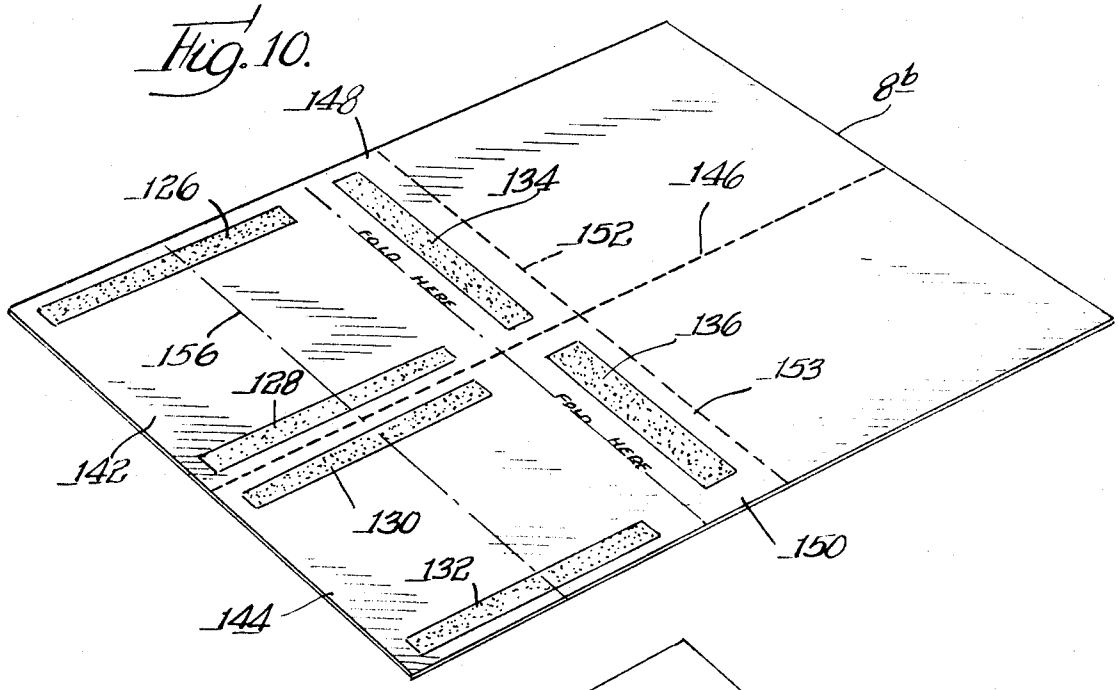


Fig. 11.

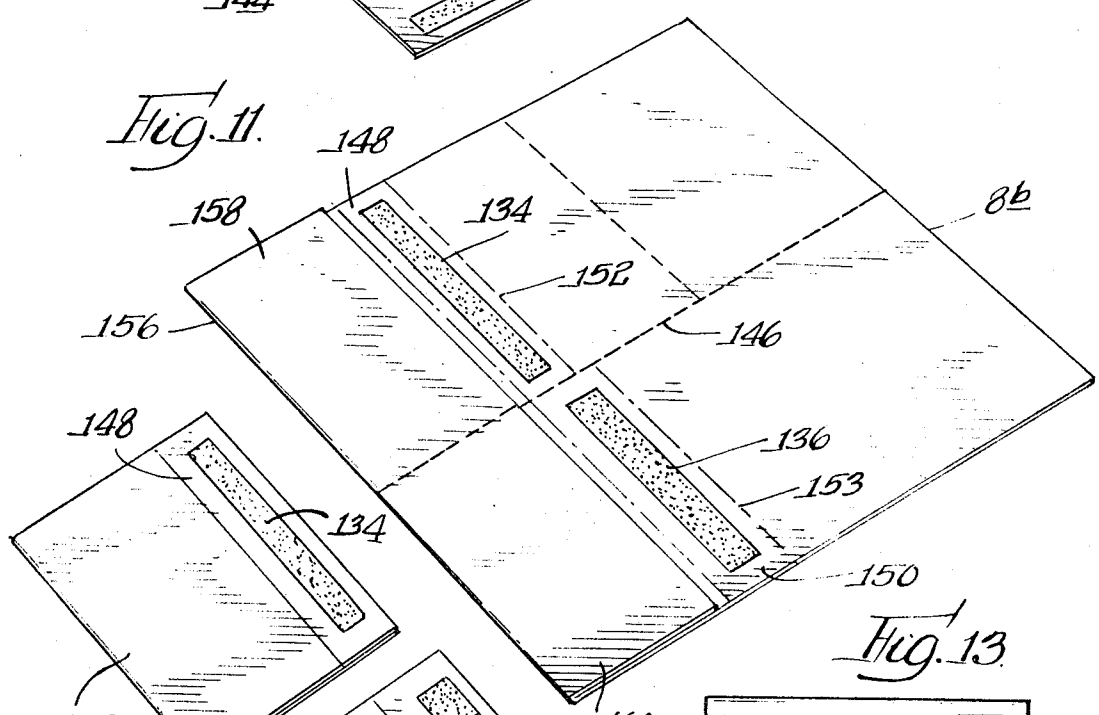


Fig. 12.

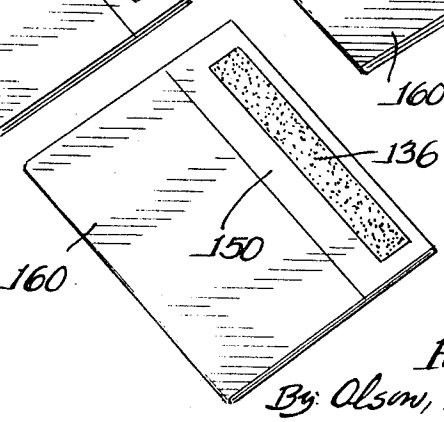
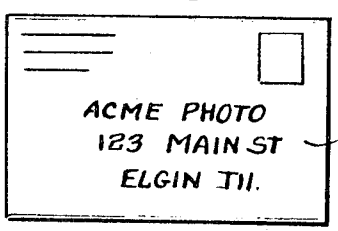


Fig. 13



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REMOISTENING APPARATUS

BACKGROUND OF THE INVENTION

This invention relates to remoistening apparatus for use with a paper folding machine that contain an envelope or a group of envelopes.

In the manufacture of mail advertising pieces that include tear off envelopes, it is customary to preprint sheets of material with advertising matter and then pass the sheets through an envelope forming machine. In the envelope forming machines, wet adhesive is applied to the printed stock in predetermined areas. While the adhesive is wet the sheets are folded and sealed to form the envelope or envelopes. In instances where the envelopes are also intended to be sealed by the recipient of the advertising, a band of adhesive is applied to the envelope flap and allowed to dry. Because of the fact that the envelope machines apply adhesive and also fold the sheet, the possibility of jamming or malfunctioning is increased over that of the simple folding machine. Such malfunctioning results in a loss of comparatively expensive printed stock materials.

OBJECTS AND SUMMARY OF THE INVENTION

An object of the present invention is to provide an apparatus in which the adhesive is applied to the preprinted stock and allowed to dry, and thereafter the stock is passed through an apparatus in which the adhesive necessary to form the envelope portion or portions of the sheet are remoistened, after which the sheets are folded in a standard folding machine. Because the standard folding machine has no adhesive-applying structure, it is more reliable in operation than an envelope machine, whereby a smaller loss of printed stock is encountered.

A further object of this invention is to provide a remoistening apparatus for dried adhesive-containing areas of the sheet that can be readily embodied into a conventional folding machine between the usual input feed roll of the folding machine and the folding mechanism proper.

The invention further comprises a remoistening apparatus that includes a moisture supply member, moisture transfer means including moisture abosrbent members operable in a first position to receive moisture from the supply member and operable in a second position to transfer the moisture to selected areas on the sheet containing dry adhesive. The moisture transfer means has a drive for moving the absorbent members between the two positions, and there is a control arrangement for operating the drive in synchronism with the sheets passing through the apparatus to insure that the moisture absorbent members accurately register with adhesive areas to be moistened. As the sheets pass through the apparatus, each adhesive area is contacted by a moisture absorbent member that is approximately congruent therewith. The moisture absorbent members are preferably mounted on endless belts which permit removal and replacement of different sizes of moisture absorbent members for different sizes of adhesive areas, which may vary in accordance with the particular sheets being run.

In accordance with a further feature of the present invention, the sheets are fed into the remoistener by an untimed vacuum feed roll, and the remoistener is actuated in proper timed relationship to the movement of the sheet by a photocell detector arrangement that

senses the presence of the sheet. Consequently, the remoistener undergoes a cycle of operation only when the presence of a sheet is detected.

BRIEF DESCRIPTION OF THE FIGURES

In the drawing:

FIG. 1 is a fragmentary perspective view of a remoistening apparatus constructed in accordance with and embodying the present invention;

FIG. 2 is a fragmentary sectional view taken approximately along line 2—2 of FIG. 1;

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

FIG. 4 is a fragmentary top plan view of the remoistening apparatus;

FIG. 5 is an enlarged fragmentary sectional view of a portion of FIG. 2 and showing the apparatus at the initiation of a cycle of operation;

FIG. 6 is a fragmentary sectional view similar to FIG. 5 and showing the apparatus in a condition in which moisture is being transferred to a dry adhesive area of a sheet passing through the apparatus;

FIG. 7 is a fragmentary sectional view similar to FIG. 6 but showing an arrangement in which the adhesive area is longer than that of FIGS. 5 and 6;

FIG. 8 is a perspective view of a sheet of the type that may be remoistened and folded in accordance with the method and apparatus of the present invention;

FIG. 9 is a perspective view of the sheet of FIG. 8 after remoistening and folding into envelopes;

FIG. 10 is a perspective view of another type of sheet that may be remoistened and folded in accordance with the present invention;

FIG. 11 is a perspective view of the sheet of FIG. 10 after remoistening and folding to provide detachable envelopes thereon;

FIG. 12 illustrates the envelope of FIG. 11 but detached from the remainder of the sheet thereof; and

FIG. 13 shows one of the envelopes of FIG. 12 with the flap sealed as would be done by a user or recipient of the advertising sheet of FIG. 11.

DETAILED DESCRIPTION

Referring now in more detail and by reference characters to the drawing, which illustrates a preferred embodiment of the present invention, 2 designates a remoistening apparatus that is embodied into a folding machine. More specifically, the folding machine comprises a folding section 4 of known type that includes a power driven vacuum type pick-up and feed roll 6 adapted to feed sheets 8 from a stack 10, one by one, through the remoistening apparatus 2 and from which the sheets are then fed to the folding section 4. The stack of sheets 10 is supported in a conventional manner on a series of rollers 12. As each sheet 8 is fed into the apparatus 2 it is carried through the apparatus 2 by a series of parallel endless belts 14 which are trained around respective pairs of rollers 16, 18. The upper runs of the belts 14 are supported on a feed table 19 that is formed by spaced, parallel downwardly opening channels 20. The drive for the belts 14 may be provided for in a known manner as by a drive to the shaft 22 (FIG. 2) upon which the rollers 18 are mounted.

The apparatus 2 comprises side plates 24, 26 for suitably journalling a main or driven shaft 28 having a series of spaced apart pulleys 30 rigidly mounted thereon and positioned in the spaces between the channels 20.

Upwardly of and parallel to the shaft **28** is a shaft **32** that is journalled in auxiliary plates **34, 34** that are rigidly secured to the inside faces of the side plates **24, 26.** Rigidly mounted on the shaft **32** are pulleys **36** which are in alignment with pulleys **30** respectively. Endless belts **38** are trained around the respective pairs of pulleys **30, 36.** As best shown in FIGS. **5–7,** the belts **38** are provided with ribs **40** that are received in peripheral notches **42** of the pulleys **30.** The peripheries of the pulleys **36** are similarly notched whereby the belts **38** are prevented from slipping relative to the pulleys **30, 36.** On the exterior of one or more of the belts **38** are moisture-absorbent transfer pads **44** of a suitable sponge material. In the present illustration there are two equally spaced pads on two belts. The pads **44** may be secured to the belts **38** by pressure sensitive adhesive that is applied to the backs of the pads **44** so that pads of different lengths may be secured at desired positions on the belts **38,** all for purposes presently more fully appearing.

Mounted on and extending transversely between the plates **34, 34** is a reservoir or trough **46,** the bottom of which is substantially above the feed table **19.** An inverted container **48** supplies water or other adhesive-activating fluid to the trough **46.** Preferably the container **48** extends upwardly from an offset section **50** of the trough **46** so as not to interfere with other components of the apparatus. Journalled in the side plates **24, 26** and disposed within the trough **46** is an elongated moistening roller **52** that is partially in the fluid and serves to pick up fluid and transfer the fluid to the pads **44** as the latter come in contact with the surface of the roller **52.** Also journalled in the side plates **24, 26** and running parallel to the moistening roller **52** is a metering roller **54** which serves to spread the fluid on the roller **52** into a peripheral layer or coating of predetermined thickness so that just the right amount of fluid is supplied to the pads **44** by the roller **52.**

A drive for the rollers **52, 54** and shafts **28, 32** is provided which is independent of (i.e., not synchronized with) the drive for the folding section **4** and the vacuum feed roll **6.** For this purpose the side plate **24** may have a shaft **56** (FIG. **2**) journalled thereon and projecting laterally outwardly therefrom and upon which sprockets **58, 60** are mounted. The sprocket **58** receives power through a drive chain **62** which is driven from a motor or other source of power. A chain **64** is trained around the sprocket **60** for delivering power to a transmission unit **66.** Within the unit **66** is a shaft **68** carrying a sprocket **70** around which the chain **64** is trained. The shaft **68** also supports a gear **72** which meshes with a gear **74** that drives the driving member **76** of a conventional electromagnetic clutch. The driven member **78** of the clutch is mounted on the shaft **28** so that when the clutch is engaged the shaft **28** will be driven, thereby driving the belts **38.** The gear **74** also meshes with a gear **80** that is rigidly mounted on a countershaft **82,** and an additional gear **84** is mounted on the countershaft **82** for meshing with an idler gear **85** on an idler shaft **88** (FIG. **2**). The idler gear **86** in turn meshes with a gear **90** on the reduced diameter or shaft portion of the moisture transfer roller **52.** Thus, by the present arrangement the rollers **52, 54** are continuously driven whereas the belts **38** are driven only when the electromagnetic clutch is engaged.

Two photocells **92, 94** are provided for actuating conventional circuitry to engage and disengage the electromagnetic clutch, and thereby operate the drive to the shaft **28** in synchronism with the moving sheets **8.** The photocells **92, 94** are individually adjustably clamped or otherwise mounted on a support bar **96** in spaced relationship relative to the path of movement of sheets **8** passing through the apparatus. Light sources **91, 93** for the photocells **92, 94** are mounted below the belts **14** in a suitable manner to be adjusted with the photocells. One end of the bar **96** has a bracket **98** by which the support bar **96** is secured adjustably to a transverse bar **100** that runs between the side plates **24, 26.** As a result, the photocells **92, 94** and their light sources may be mounted in desired positions intermediate the side plates **24, 26** and also at selected distances from the shaft **28.**

While the photocells **92, 94** actuate conventional circuitry, as aforesaid, suffice it to say that light beams from the light sources **91, 93** below are directed upwardly to the photocells **92, 94** for interruption by the sheets **8.** When the leading edge **95** (FIG. **5**) of the sheet interrupts the light beam to the photocell **92** the electromagnetic clutch is caused to engage, thereby rotating the shaft **28.** When the light beam to the photocell **94** is interrupted by the leading edge of the sheet **8** the electromagnetic clutch is caused to disengage.

The shaft **28** projects outwardly beyond the side **26** and has an indexing cam **102** with one or more notches, in this instance two notches **104, 104** diametrally opposed. An index lever **106** is pivoted by a pin **108** to the side plate **26** and has a finger **110** for engagement wwth one of the notches **104, 104.** At the end opposite to the finger **110** the lever **106** is connected to one end of a tension spring **112,** the other end of which is fixed to a pin or like member projecting from the side **26.** The spring **112** thus biases the finger **110** into engagement with the indexing cam **102.** Therefore, when the leading edge **95** of a sheet **8** is detected by the photocell **92** causing the electromagnetic clutch to engage and rotate the shaft **28,** the finger **110** will ride out of the notch **104** in which it is then positioned. The leading edge of the sheet will be detected by the photocell **94** before the shaft **28** completes a half revolution. Thus, the electromagnetic clutch **76** is disengaged before the next-to-be-received notch **104** has come into alignment with the finger **110.** However, the momentum of the shaft **28** causes the shaft to continue to rotate following disengagement of the magnetic clutch until the notch **104** comes into alignment with the finger **110** at which time the shaft **28** is stopped. In this regard it should be noted that the indexing cam **102** may have only one notch **104** or such other number of notches as may be necessary to assure a predetermined amount of rotation of the shaft **28** and a consequent predetermined travel of each belt **38** for each cycle of operation.

FIG. **8** shows a sheet **8** that has been printed and die cut and to which adhesive areas **114** have been applied and which have been allowed to dry. The adhesive areas **114, 114** may be applied to flap members **115** of the sheet. As a sheet is fed onto the moving belts **14** by the vacuum feed roller **6** the sheet passes under the then stationary belt **38** until the leading edge of the sheet interrupts the light beam to the photocell **92** causing the electromagnetic clutch to engage and move the belt **38.** The pads **44** on the belts **38** will then come into facewise contact with the adhesive areas **114** to moisten them. Just underlying the belts are idler rollers **122** which are mounted on a shaft **124** and are located

between the channels **20.** These rollers **122** co-operate with the belts **38** to provide a backing or support for the sheet **8** at the regions where the sheet is contacted by the pads **44.** When the leading edge of the sheet **8** interrupts the light beam to the photocell **94,** the belts **38** will subsequently stop when the finger **110** on the index lever **106** engages the next notch **104** on the index cam **102.**

The sheet **8** then proceeds to the folding section **4** where the sheet is folded first along a line **118** to bring the leading edge of the sheet into superposed relationship with the margins **120** of the flaps **115.** Then the flaps **115** are folded along the margin **120** to form the structure of FIG. **9** which consists of two sealed envelopes separated by a scoreline **116.** The article shown in FIG. **9** may be used as part of a mailing piece in which one of the two envelopes is intended to be torn from the other along the scoreline **116** and then opened. In fabricating the article of FIGS. **8** and **9** only two of the belts **38** need be used and each of these belts may have two equally spaced pads **44** whereby for each cycle a pad will moisten an adhesive area and the other pad will come into position preparatory to moistening an adhesive area on the next sheet fed through the machine. If the article of FIG. **9** is intended to have more than two envelopes the sheet **8** will be formed with more than two sections and with a scoreline between each section. Also additional pads will be applied to additional belts.

The number of pads, the number of notches in the indexing cam **102,** and the position of each photocell **92, 94** are all sized, adjusted and positioned, as the case may be, in accordance with the locations of the dry adhesive areas, the number and lengths thereof, and the size and shape of the sheets in a particular run. The outer or moisture transfer surface of the pad is substantially congruent with the adhesive area that the pad is intended to moisten. Moreover, each pad **44** engages the adhesive area that it moistens in approximately congruent relationship. As shown in FIG. **5,** the belt **38** and pad **44** have just begun to move since the leading edge **95** of the sheet **8** has interrupted the light beam to the photocell **92.** In FIG. **6** the leading edge has not reached the light beam to the photocell **94** and the pad **44** is shown in contact with the adhesive area **14.** FIG. **7** is like FIG. **6** except that it shows a longer pad **44***a* for wetting a longer area of adhesive **114***a* on a different sheet **8***a.*

FIG. **10** shows a fragmentary portion of a sheet **8***b* representing another form of advertising piece produced in accordance with the present invention. The sheet **8***b* has a number of parallel dry adhesive areas **126, 128, 130, 132** that are remoistened by the apparatus **2** in the manner previously described. However, for the sheet **8***b* there will be moisture transfer pads on four of the belts since there are four adhesive areas to be moistened. The sheet **8***b* is printed and die cut as desired and is further provided with envelope portions **142, 144** that are separated by a scoreline **146.** The envelope portions **142, 144** contain flaps **148, 150** that are joined to the remainder of the sheet by border score-lines **152, 153.** When the sheets **8***a* are successively passed through the apparatus **2** the adhesive areas **134, 136** are left dry. However, the sheets **8***a* with the remoistened areas **126, 128, 130, 132** are sent to the folding section **4** and are folded along a transverse fold line **156** to form envelopes **158, 160** as shown in FIG. **11.**

The recipient receives the mailing piece in the form shown in FIG. **11.** The envelopes **158, 160** may be separated by tearing along the scorelines **152, 153, 146.** The adhesive **134, 136** on the respective envelope flaps may then be moistened to seal the envelope which may be used to enclose other matter separable from or which forms a part of the mailing piece. The face of each envelope includes an address as shown in FIG. **13.**

It should be understood that the invention is not limited to the precise method and apparatus herein shown and described since the invention contemplates all forms coming within the scope of the appended claims.

The invention is claimed as follows:

1. Remoistening apparatus for use in conjunction with a paper folding machine, said apparatus comprising: moisture supply means; moisture transfer means including an endless belt and an absorbent transfer member of lesser length than said belt and mounted on said belt to be cyclically operable between a first position in moisture-receptive relationship with said moisture supply means and a second position in moisture-delivery relationship with a selected region of a paper blank; drive means for cycling said transfer member between said first and second positions; conveyor means for conveying paper blanks in sequential operative association with said moisture transfer member; and control means for operating said drive means in synchronism with moving paper sheets on said conveyor means and including sensor means along the length of said conveyor means to sense the leading edge of a paper blank thereon for initiating operation of said drive means to move the transfer member into moisture-delivery relationship with a selected region of the paper blank, and to sense the leading edge of the moistened paper blank at an advanced position thereof on the conveyor means to initiate stopping of the drive means for the transfer member.

2. Apparatus according to claim **1** wherein said drive means further includes a driven shaft, power transmitting means, and selectively actuatable clutch means for connecting said driven shaft and said power-transmitting means.

3. Apparatus according to claim **2** wherein said apparatus further includes indexing means for stopping said driven shaft upon disconnecting said driven shaft from said power-transmitting means.

4. Apparatus according to claim **1** wherein said moisture supply means includes reservoir means, a supply roller disposed adjacent said first position, and wherein said first position is spaced generally above said second position whereby to create an accessible free space.

5. Apparatus according to claim **4** wherein said moisture supply means further includes a metering roller aligned parallel with said supply roller and spaced therefrom to regulate the rate of moisture transmitted to said transfer means.

* * * * *