METHOD FOR INSERTING MATERIALS IN ENVELOPE BLANKS

ABSTRACT: Methods of enclosing insert materials in continuously advancing envelope blanks and forming mailing pieces comprising an envelope having insert materials sealed therein wherein the insert materials are enclosed and sealed in an envelope blank during the envelope formation process. An envelope blank having closure flap, body and bottom flap portions is contacted with a rotating cylinder having vacuum and pressure ports. A negative pressure is formed at the vacuum ports for maintaining the envelope blank in overlying contacting relationship with the cylinder. A positive pressure is formed at the pressure ports for urging the bottom flap portion of the blank away from the rotating cylinder to form a fold between the bottom flap and body portions of the envelope blank. Insert materials are injected into the fold thus formed and the bottom flap portion is thereafter folded into overlying contacting relationship with the body portion of the blank to enclose the insert materials therein. The envelope blank has adhesive strips applied thereto as required and is folded and sealed to form an envelope having insert materials sealed therein.
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BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to the formation of mailing pieces comprising envelopes having insert materials sealed therein, more particularly to methods of forming such pieces during the envelope formation process.

2. Description of the Prior Art

It is often necessary to form many identical pieces of mail comprising an envelope having one or more inserts enclosed therein. In the past, such mailing pieces have been formed by placing materials in a preformed envelope and thereafter sealing the envelope to complete the package. It has been proposed to place the desired insert materials in an envelope blank during the envelope formation process. For example, U.S. Pat. No. 3,457,696 teaches a process for forming a mailing piece comprising an envelope having insert materials sealed therein wherein insert materials are placed upon an advancing envelope blank and thereafter the envelope is formed by folding the various portions of the envelope blank, i.e., bottom flap, side flaps and closure flap portions upwardly and inwardly about the insert material to form the completed mailing piece. U.S. Pat. No. Re. 25,961 discloses a similar process wherein the various portions of an envelope blank are folded downwardly about a mailing insert.

Even though these processes represent an improvement over placing insert materials in a preformed envelope, there remain certain disadvantages. For example, each requires the use of rather elaborate attendant equipment. Furthermore, each process slows down or interrupts the envelope formation process. Moreover, neither of these processes is adaptable to high speed rotary envelope forming apparatus employed extensively in the industry today.

The principal object of this invention is to provide a method for enclosing insert materials in an envelope blank during the envelope formation process in a rapid and more economical manner than heretofore known.

Another object of this invention is to provide a method for enclosing insert materials in an envelope blank having bottom flap, body, and closure flap portions during the envelope formation process wherein the bottom flap portion is folded into overlying, contacting relationship with the body portion of the envelope blank. My method permits the enclosure of insert materials in a continuously advancing envelope blank without interruption of the envelope formation process. Additionally, my method is applicable in high speed rotary envelope forming apparatus.

These and other objects and advantages of this invention will be more completely disclosed and described in the following specification, the accompanying drawings and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates the use of my novel method as applied to an envelope blank having no side flaps or to an envelope blank having prefolded side flaps.

FIGS. 2-6 are diagrammatic views illustrating the sequential steps of forming an envelope with an insert therein from a blank having no side flaps.

FIG. 7 illustrates my novel method as applied to an envelope blank having ordinary side flaps.

FIGS. 8-11 are diagrammatic views similar to FIGS. 2-6 illustrating the sequential steps of forming an envelope with an insert therein from a blank having side flaps.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the Figures, an envelope blank designated generally 1 having closure flap 2, body 4 and bottom flap portions 6 is advanced from a continuously moving web or inter- mittent type envelope blank feed device (not shown) into contact with rotating cylinder 8.

Envelope blank 1 preferably is provided with preliminary fold or score lines 10 and 12 which mark off the closure flap, body and bottom flap portions. Score lines 10 and 12 facilitate the later folding of envelope blank 1 to its final form. Alternatively, envelope blank 1 may have one or more windows or panels 34 cut therein with or without a transparent patch 36 glued thereover in a conventional manner. Furthermore, my method, as illustrated in FIG. 1, is likewise applicable to an envelope blank having prefolded side flaps 38. My method as applied to envelope blanks whose side flaps are not prefolded is illustrated in FIG. 7 and will be explained in detail hereafter.

Cylinder 8 is provided with vacuum and pressure ports at its surface. As shown in FIG. 1, cylinder 8 has pressure ports 14 and 14', and vacuum ports 16, 16', 18' and 18, ports 14, 16 and 18 are arranged or located at the surface of cylinder 8 whereby they contact respectively bottom flap 6, body 4 and closure flap 2 portions of a first envelope blank 1 as it is fed into contact with cylinder 8. Ports 14', 16', and 18' are likewise arranged to contact the bottom flap, body and closure flap portions of the next succeeding blank fed to the cylinder 8 and so on as cylinder 8 rotates. I prefer that the spacing between the various ports be adjustable such that envelope blanks of nearly any size may be fed to and processed (as will be more fully described hereafter) on cylinder 8. Where desired, the cylinder may have a reduced diameter, a single pressure port 14 and a pair of vacuum ports 16 and 18 to transport only one envelope blank per revolution of the cylinder.

As an envelope blank 1 is advanced into contact with cylinder 8 a negative pressure or vacuum is formed in vacuum ports 16 and 18. The vacuum formed in those ports maintains blank 1 in overlying contact with cylinder 8. In the embodiment illustrated in FIG. 1, envelope blank 1 has adhesive applied thereto so that it rotates with cylinder 8 by conventional gumming equipment such as rotating cylinder 20 having dies 22 and 24 for applying adhesive to moving or advancing blank 1. Die 22 has curved adhesive-applying surface 26 adapted to receive adhesive and thereafter, as cylinder 20 rotates, contact advancing blank 1 and thereby apply that adhesive as marginal strips 28 lengthwise of body portion 4 of the envelope blank. The arcuate length of curved surface 26 equals the linear dimension of marginal adhesive strip 28 applied to advancing envelope blank 1. The length of adhesive strip 28 may, of course, be varied, e.g., with the length of the envelope blank being processed. Closure flap die 24 on rotating cylinder 20 extends transversely across cylinder 20 and has an adhesive bearing surface 30 adapted to apply an adhesive strip 32 transversely of closure flap 2 of blank 1 as cylinder 20 rotates to contact the die 24 with blank 1 on rotating cylinder 8.

Envelope blank 1, maintained in overlying contacting relationship with continuously rotating cylinder 8 by means of vacuum in ports 16 and 18, is advanced with the rotating cylinder to a point remote from adhesive applying cylinder 20 (approximately a one-fourth revolution of cylinder 8). A positive pressure is formed in pressure port 14 whereby bottom flap portion 6 of blank 1 is urged in a direction generally away from rotating cylinder 8. At the same time, vacuum is maintained in ports 16 and 18 to maintain body portion 4 and closure flap 2 of blank 1 in contact with cylinder 8. An open fold is thereby formed in envelope blank 1 between bottom flap portion 6 and body portion 4. In the case where envelope blank 1 is provided with preliminary score lines 10 and 12, the fold is formed along the fold line 12, which delineates bottom flap portion 6 and body portion 4 of envelope blank 1. I prefer that the open fold as formed from bottom flap portion 6 form an angle of about 90° with a tangential line contacting cylinder 8 at the apex 40 of the fold.

A 90°, or right, angle provides a wide open fold to facilitate accurate and reliable reception of insert materials as will now be explained. As the fold is formed between bottom flap 6 and body portion 4 of the envelope blank, insert materials 42 are
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placed onto the open fold in a manner whereby the leading edge of the insert material tends to contact and settle in the aperture 7 of the fold. Thus, insert materials 42 are fed or injected into the continuously advancing envelope blank in a timed relationship therewith whereby insert materials 42 are inserted into each advancing, folding envelope blank. Preferably insert materials 42 are inserted into the advancing folding envelope blank by a conveyor means comprising a pair of opposed timing belts 44 adapted to engage insert materials 42 and advance those materials in a direction in line with axes 40 of the fold in an advancing envelope blank 1. One of the timing belts 44 is provided with register pins 46 for engaging an insert 42 and thrusting that insert material into the fold. Timing belts 44 may be of variable length and the spacing between register pins 46 may likewise be varied to facilitate the insertion or injection of insert materials of varying sizes into the advancing folding envelope blank.

First and second guides 48 and 50 may be provided to facilitate the accurate insertion of insert materials 42 in an advancing envelope blank 1. First guide 48 aids in maintaining bottom flap portion 6 of envelope blank 1 in close overlying relationship with cylinder 8 as it advances and has curved guide face portions 52 and 54. Guide member 50 has curved guide face portion 56. When a positive pressure is formed in pressure port 14 to thereby urge bottom flap portion 6 of an advancing envelope blank away from rotating cylinder 8, curved guide face portions 54 and 56 cooperate to direct bottom flap portion to the desired angle with rotating cylinder 8. Guide means 50 forms part of a paper folding station comprising guide means 50, baseplate 58 spaced therefrom and paper stop 60. Paper stop 60 is adjustable toward and away from cylinder 8 to thereby facilitate the folding of envelopes having bottom flap portions of various sizes. Bottom flap portion 6 of advancing envelope blank 1, as urged away from advancing cylinder 8, passes into the space between guide means 50 and baseplate 58 until reaching paper stop 60. Upon reaching that point, envelope blank 1, being maintained in contact with rotating cylinder 8 by means of vacuum ports 16 and 18, will tend to buckle and be drawn into the nip between the first pair of coating rollers formed from rotating cylinder 8 and a second rotating cylinder 62. Cylinders 8 and 62 have a common tangential plane and are adapted to receive the partly folded envelope blank 1 having insert material therein in a manner whereby bottom flap portion 6 is folded into overlying contacting relationship with body portion 4 of envelope blank 1. Insert materials 42 are injected onto the blank 1 and strike the fold line between the bottom flap 6 and body portion 4 to assist in the folding operation. The insert materials are, in this manner, enclosed in the continuously advancing envelope blank 1. Preferably apex 40 of the fold constitutes the first point of contact of the partially folded advancing envelope blank 1 with the area of tangential contact between rollers 8 and 62. Where envelope blank 1 is provided with marginal adhesive strip 28, or in the alternative has prefolded side flaps 38 having marginal strips 28, passing of the envelope blank between coating rollers 8 and 62 results in a scaling of insert materials 42 on the envelope blank.

The final step in the formation of a completed envelope having an insert material sealed therein during the envelope formation process as illustrated in FIG. 1 comprises the folding of closure flap 2 (to which adhesive has been previously applied) into overlying contacting relationship with the folded and sealed bottom flap portion 6 of envelope blank 1. For the folding of the closure flap, I prefer that the cylinder 62 be provided with a vacuum port 64 adapted to engage bottom flap portion 6 of partially folded envelope blank 1 as it emerges from the tangential contact area between coating cylinders 8 and 62. In this manner, the partially folded envelope blank is advanced to a second folding station comprising closure flap 6, which is similar in construction to that for folding bottom flap portion 6. The closure flap folding station comprises generally a guide 66, paper stop 68 and bottom plate 70 and is adapted to receive partially folded envelope blank 1 having an insert enclosed or sealed therein between its guide and baseplate portions.

Closing flap portion 2 having adhesive strip 32 thereon is folded then into overlying contacting relationship with partially folded or sealed envelope blank 1 having insert materials 42 enclosed or sealed therein by means of a second pair of coating rollers having a common tangential plane formed from first rotating cylinder 8 and a third rotating cylinder 72. Preferably rotating cylinder 72 has a vacuum port 74 on its surface adapted to engage and withdraw partially folded envelope blank 1 from the area between baseplate 70 and guide 66. Activation and deactivation of negative pressure in vacuum ports 64 and 74 in cylinders 62 and 72 respectively is coordinated whereby as a vacuum is deactivated in port 64 (i.e., after partially folded envelope blank has been inserted into the opening between guide 66 and baseplate 70 to rest upon paper stop 68) a vacuum is formed in vacuum port 74 to withdraw the partially folded envelope blank and further advance it into the nip between contacting cylinders 8 and 72. Vacuum port 18 by holding closure flap 2 also advances the envelope blank into the nip. Advancing the partially folded blank in this manner tends to buckle closure flap portion 2, e.g. along preliminary score or fold line 10. Further advancing cylinder 72 while maintaining vacuum in vacuum port 74 carries the envelope blank and insert material through the area of tangential contact between coating cylinders 8 and 72 to thereby close flap portion 2 into overlying contacting relationship with the partially folded envelope blank. The completed mailing package comprising an envelope having insert materials enclosed therein is thus formed.

The completed mailing piece may now be removed from the envelope formation process. To this end the vacuum is maintained in port 74 as cylinder 72 advances thereby withdrawing the envelope from contact with cylinder 8 after passing through the area of tangential contact between cylinders 8 and 72. Stripper guide 76 may be employed to aid in the removal of the envelope from contact with cylinder 8. Stripper guide 76 has a curved guide face 78 to direct an envelope into contact with a conventional delivery spiral 80 which is adapted to deliver the completed mailing piece as formed to a delivery table shown and designated generally 82. Vacuum in port 74 is of course released upon delivery of an envelope to delivery spiral 80.

Referring now to FIG. 7, my method is illustrated with reference to an envelope blank having side flaps 38 in addition to closure flap 2, body 4 and bottom flap portions 6. Side flaps 38 are not prefolded. An envelope blank processed as illustrated in FIG. 7 may, like the others previously described, have a panel or window 34 cut therefrom with transparent patch 36 adhesively glued thereover in a conventional manner.

In FIG. 7, envelope blanks as fed from a web or envelope blank intermittent feeder are contacted with a continuously rotating cylinder 84 having vacuum ports 86, 86' and pressure ports 88, 88' on its surface. As envelope blank 1 is fed into contact with rotating cylinder 84 a negative pressure or vacuum is formed in vacuum port 86 whereby envelope blank 1 is maintained in overlying contacting relationship with cylinder 84. Envelope blanks 1 are fed into contact with rotating cylinder 84 in timed relationship whereby vacuum port 86 contacts envelope blank 1 at body portion 4 thereof while pressure port 88 contacts envelope blank 1 at the closure flap portion 6 thereof in a manner similar to that described with reference to FIG. 1. A guide 90 may be provided to aid in maintaining envelope blank 1 in overlying contact with cylinder 84.

Envelope blank 1 advances with rotating cylinder 84 through approximately a one-fourth revolution whereupon a positive pressure is formed in pressure port 88 to urge bottom flap portion 6 of envelope blank 1 generally away from rotating cylinder 8 to form an open fold in the envelope blank between bottom flap 6 and body portion 4. Preferably the fold
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occur along preliminary score or fold line 12 previously formed in the envelope blank. The angle formed by the open fold is preferably about 90° to facilitate reception of insert materials in the envelope blank. Bottom flap portion 6 is urged by positive pressure in port 88 into a folding station including guide 92, baseplate 94 spaced therefrom and paper stop 96. Here, as in FIG. 1, guides 90 and 92 have curved face portions to aid in directing bottom flap portion 6 of envelope blank 1 into the area between guide 92 and baseplate 94.

As the fold is formed insert materials 42 are injected into the fold in timed relationship with the fold formation by means, e.g. of timing belts 44 having register pins 46 thereon in the manner described more fully hereinabove with reference to FIG. 1. Vacuum is maintained in port 86 to carry the partially folded envelope blank and insert materials into the nip between a pair of coating rollers formed from cylinder 84 and a second cylinder 98. The pair of rollers has a common tangential plane and is adapted to receive and advance the partially folded envelope blank 1 and insert materials 42 in a manner that bottom flap portion 6 is folded into overlying contacting relationship with body portion 4 of envelope blank 1 to thereby enclose the insert materials in the advancing envelope blank.

Cylinder 98 has a vacuum port 100 on its surface. A vacuum is formed in port 100 to cooperate with the vacuum in port 86 for advancing partially folded envelope blank 1 into the lead-in portion between cylinders 84 and 98 and for further advancing envelope blank and insert materials after passing between those cylinders.

Partially folded envelope blank 1 having insert material 42 enclosed therein is next advanced as by conveyor belt 102 and driven feed rolls 104 to a station where marginal adhesive strips 106 are applied to side flaps 38 lengthwise of advancing blank 1. Adhesive strip 106 may be applied by conventional gummig equipment such as a rotating cylinder 108 having a raised die portion 110 and an adhesive bearing surface 112 cooperating with opposed counter roller 114. Side flaps 38, having adhesive strips 106 applied thereto are then folded upwardly and inwardly into overlying contacting relationship with bottom flap portion 6 of envelope blank 1 to thereby seal insert materials 42 on advancing blank 1. Folding of the side flaps may be accomplished in a conventional manner such as by plowshares and finger blades shown in simplified form 116. Nondriven idler rollers 118 may be employed to maintain bottom flap 6 and insert materials 42 in proper overlying relationship with envelope blank 1 while folding of side flaps 38 occurs. Preferably, folding takes place along preliminary fold lines 120 previously scored in blank 1.

Closure flap portion 2 is then gummed and folded into overlying contacting relationship with body portion 4 of advancing envelope blank 1 in conventional manner to form a completed mailing piece comprising an envelope having insert materials sealed therein. To that end an adhesive applyng station and folding station, generally 122 and 124, respectively as shown in simplified form. Similarly illustrated is delivery spiral 126 described more fully hereinabove with reference to FIG. 1.

According to the provisions of the patent statutes, I have explained the principle, preferred construction and mode of operation of my invention and have illustrated and described what I now consider to represent its best embodiment. However, it should be understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. A method of enclosing insert materials in a continuously advancing envelope blank having closure flaps, body, and bottom flap portions comprising, contacting said blank with a first rotating cylinder having vacuum ports and pressure ports on the surface thereof, forming a negative pressure in said vacuum ports whereby 70

said envelope blank is maintained in overlying contacting relationship with said first cylinder, forming a positive pressure in said pressure ports whereby said bottom flap portion of said blank is urged in a direction generally away from said first cylinder while said remaining portions are maintained in contact therewith to form an open fold in said envelope blank between the bottom flap and body portions thereof, injecting said insert materials into said fold, advancing said folded blank and said insert material between a pair of coating rollers having a common tangential plane, said pair of coating rollers formed from said first rotating cylinder and a second rotating cylinder, and receiving and advancing said blank and insert materials between said coating rollers whereby said bottom flap portion is folded into overlying contacting relationship with said body portion to thereby enclose said insert materials in said continuously advancing envelope blank.

2. A method of enclosing insert materials in a continuously advancing envelope blank as set forth in claim 1 which includes, forming marginal adhesive strips on said body portion of said envelope blank whereby said insert materials upon being enclosed in said envelope blank are adhesively sealed therein.

3. A method of enclosing insert materials in a continuously advancing envelope blank as set forth in claim 1 which includes, forming marginal adhesive strips on said side flap portions, and folding said side flap portions upwardly and inwardly into overlying contacting relationship with said bottom flap portion whereby said insert materials are sealed in said continuously advancing envelope blank.

4. A method of enclosing insert materials in a continuously advancing envelope blank as set forth in claim 1 which includes, folding said closure flap portion into overlying contacting relationship with said bottom flap portion whereby envelopes having insert seals therein are formed.

5. A method of forming envelopes having insert seals therein from a continuously advancing envelope blank having closure flap, body and bottom flap portions as set forth in claim 4 wherein said folding of said closure flap portion includes, advancing said folded envelope blank having said insert material sealed therein between a second pair of coating rollers, said second pair of coating rollers formed from said first rotating cylinder and a third rotating cylinder adapted to receive and advance said blank having said insert material sealed thereon whereby said closure flap portion is folded into overlying contacting relationship with said bottom flap portion.

6. A method of enclosing insert materials in a continuously advancing envelope blank as set forth in claim 1 which includes, forming adhesive strips on said side flap portions of said blank, folding said side flap portions upwardly and inwardly into overlying contacting relationship with said bottom flap portion whereby said insert materials are sealed on said envelope blank, forming a transverse adhesive strip on said closure flap portion of said blank and folding said closure flap portion into overlying contacting relationship with said bottom flap portion whereby envelopes are formed having insert seals therein.