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METHOD OF MAKING ENVELOPES

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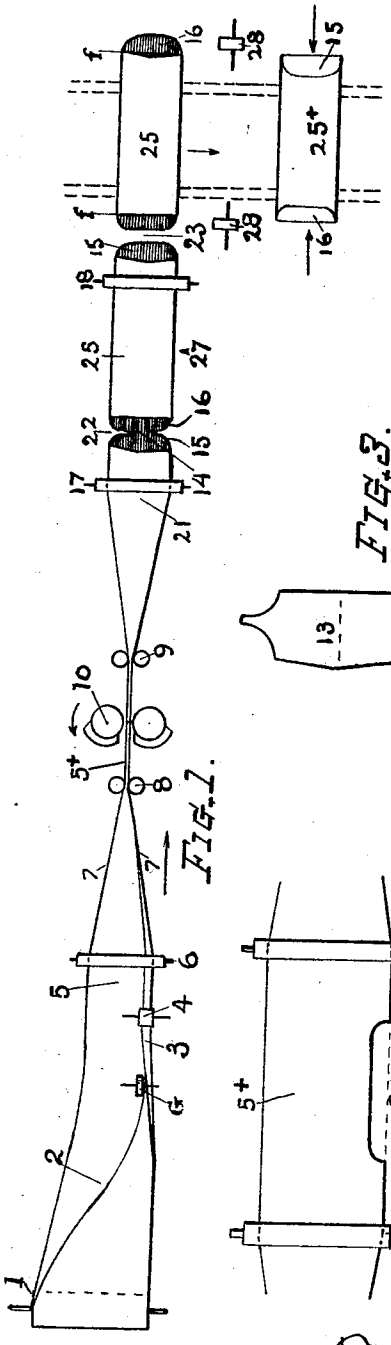


FIG. 1.

FIG. 3.

FIG. 4.

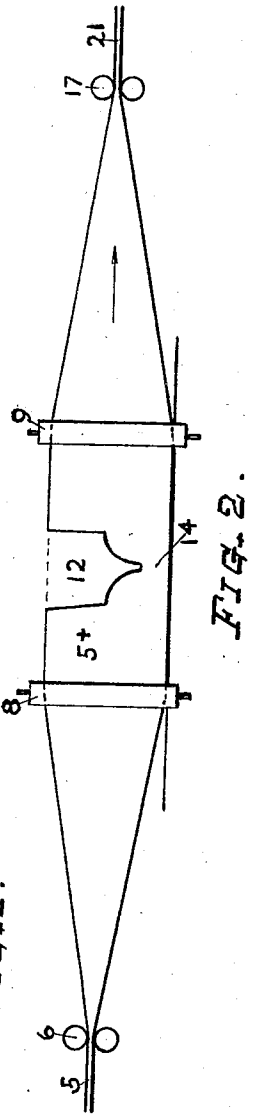


FIG. 2.

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UNITED STATES PATENT OFFICE.

FREDERICK E. ARROUQUIER, OF SHREWSBURY, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO REBLIN MANUFACTURING COMPANY, INC., A CORPORATION OF NEW YORK.

METHOD OF MAKING ENVELOPES.

Application filed October 11, 1922. Serial No. 593,889.

To all whom it may concern:

Be it known that I, FREDERICK E. ARROUQUIER, a citizen of the United States, residing at Shrewsbury, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Methods of Making Envelopes, of which the following is a specification.

This invention relates to a novel method of making open-end envelopes from a web or continuous tube of paper or the like, and to certain peculiar process steps which are applicable in the art of making open-end or tubular envelopes, with or without window-openings therein; the prime object being to provide a method whereby envelopes of the character specified can be rapidly, conveniently and economically manufactured. Another object is to provide an efficient method for forming the end-opening and projecting end-folding-flaps therefor, from a continuous advancing tube of paper.

For attaining these objects, and other advantageous results, my invention consists in the method and several method steps, as more fully explained in the following description, the particular subject matter claimed being hereinafter definitely specified in the summary.

In the accompanying drawing Fig. 1 diagrammatically illustrates the nature of my improved method, and the sequential occurrence of the several steps as employed in this method of producing an envelope or envelope-blank.

Fig. 2 is a side view, drawn on larger scale, representing a portion of the longitudinally closed tube, in transposed plane relation, and showing the nature of the cut-out.

Fig. 3 represents the discharged waste-section unfolded; and

Fig. 4 shows a form of cut-out for producing a window-opening in the tubular blank.

An important feature of my invention in producing envelopes of the class specified from and at the end of a continuously advanced tube, consists in the manner of disposing and severing said tube, at a distance from its extremity equal to the length required for the size of envelope in any instance to be made, the severance cut being effected in such manner that the desired forms of the end-openings and ample backwardly and forwardly projecting adjoined folding flaps are simultaneously attained at a single action, and by removal of a unitary waste section; a sufficient portion of the fabric connecting the oppositely adjacent edges of the flaps being temporarily left uncut for assisting the forward movement, of the partially formed envelope.

By my method envelopes of the class specified may be manufactured from a continuously, or intermittently, advanced tube of paper or the like, delivered from the original roll, or from a supply wherein the web has been preparatively folded longitudinally. If from the web, the first step is to fold the web longitudinally into the form of a closed flat tube, preferably with a broad fold, 2, at one edge of the web and a narrow overfold, 3, at its other edge; the narrow fold being laid upon the margin of the broad fold and there firmly secured by suitable adhesive substance introduced at G adjacent the point where the opposite folds come together as the folded web is advanced; the lapped portions being then firmly compressed by a suitable presser device or roll 4, thereby producing a continuous longitudinally closed tube 5, having a straight edge and a flat plane surface the breadth of which is made to be the same as the required width of the envelopes, in any particular instance to be made therefrom, irrespective of the length of the envelope, which may be more or less in any instance, as desired.

As primarily formed the tube has its flat upper and lower portions disposed together in a plane (preferably horizontal) which coincides with the normal plane of the finished envelope. As the tube is advanced such plane is supported at a desired position, 6, then as it moves forward from said position its flat sides are separated, preferably by internally forcing them outward and causing its edges, 7, to converge inward towards each other, so that a given portion of the tube, $5^{\times}$, assumes a flatwise position approximately perpendicular to the normal or primarily occupied plane, thus transposing the flatwise relation of the tube as from a horizontal to a vertical plane without rotating the tube.

This given portion $5^{\times}$ of the advancing tube is sustained in its transposed or vertical plane relation, by suitable feed-rolls or

guides, at 8 and 9, to keep the plies of the intervening portion of the tube close together while receiving the action of cutting devices 10 thereon. At this stage flap defining recess 12 for the semi-division of the tube, at the predetermined length for the blank, is formed by cutting out and discarding or removing a unitary waste section 13 at one edge of the tube while supported in its flatwise transposed relation, said removed waste section including an area approximately equal to or exceeding the combined area of the required flaps; its length at the fold edge being somewhat greater than the length required for the two adjoined flaps, and its width extending laterally from the folded edge partially across the tube, but leaving a portion 14, more or less, of the width of the tube uncut to afford a continued attachment between adjacent blanks. The contour of the folded cutout scrap reversely coincides with one half of the outline shape of the united and un-removed portion or area providing the respective end flaps 15 and 16 for the tubular blanks 25. The temporarily transposed plane relation of the tube is best maintained in such manner as will not produce any permanent crease in the paper, which would be liable to appear in the face of the finished envelope. The tubular blanks 25 may be propelled forward by suitable feed rolls 17 and 18.

When it is desired to provide tubular envelopes with window openings therein, the method includes the additional step which consists in cutting out at a predetermined distance from the above described flap-defining cut, and while the tube is in its transformed or vertical flatwise relation, a second section 20 extending inward from the folded edge of the tube; and of an arched shape or contour coinciding with one half of the desired shape of the window opening; which may be disposed either longitudinal or crosswise of the tube. The cuts are preferably effected by rotary shear devices operating while the tube is traveling forward; or other suitable means may be employed. The cutting out of the waste section and window opening (either or both) can be effected while the tube is continuously advancing, by suitable means; or in other instances, the advancement of the tube may be intermittent and the cut-out effected, by any approved means, during the dwell.

It will be observed that by my method of cutting, the end-openings can be suitably formed, whether of similar or dis-similar shape and size, for the top and bottom ends of the envelope; ample sized fold-over flaps 15 and 16 provided for, in equal or unequal dimensions as in any instance desired, and the waste scrap 13 removed by a single-cut action of the nature described. Also, the produced blanks pass forward in regular and uniform successive order, all with their same end foremost and the same side up. After the flap-defining cut has been effected the flatwise relation, $5^{\times}$ of the tube is restored, as at 21, to its normal or horizontal plane; thus bringing the end flaps and openings into coincidence with the face plane of the envelope blank and spreading the flaps in their full lateral development; as at 22, but attached to each other in sequence by the portion, 14, of uncut fabric; while a transverse end opening or mouth is attained completely across the tubular blank; the intervening space, longitudinally, being equal to or slightly greater than the combined projection of the two adjoined flaps. The respective tubular blanks joined in train are advanced for any desired predetermined distance, more or less, which may be sufficient to permit the operation of printing thereon when desired. The blank being suitably supported, print is applied upon the surface thereof, as it is carried forward past a given position as 27, or any suitable position in the progress.

At a predetermined position the attachment 14 between the blanks 25 is severed by cutting along their contour or adjacent outlines, as at 23, after which the blanks proceed individually to a predetermined position at which their direct advancement is arrested and their movement changed to a transverse direction, the blanks being then carried or propelled laterally at suitable spaced intervals for the final folding of the flaps.

The blank is then creased transversely across its ends on the lines *f* where the respective flaps are to fold. Adhesive substance is then applied to the respective flaps, by suitable gummers 28; the bottom flap 16 is folded over and pressed upon the body portion, and the sealing-flap 15 is folded over without allowing its gum to adhere to the body, thus completing the envelope, indicated at $25^{\times}$.

By the herein described method tubular or open-end envelopes may be economically and rapidly made, by a continuous process, from a web of paper or the like, delivered from a supply roll in its full width of the web, or a web once folded longitudinally. The method is peculiarly adapted for making such envelopes from very thin paper, or of the material known as "glassine paper" since the fabric being worked in tubular form and in the manner specified, is not liable to assume wrinkles or irregular edge portion, while undergoing complete formation.

What I claim and desire to secure by Letters Patent is:

1. In the art of making open-end envelopes from a web of paper or the like; the

method which consists in creasing and folding the delivered web longitudinally and adhesively uniting the lapped edges thereof to form a continuous flat closed tube, advancing said tube while a portion thereof is guided and supported flatwise in a given plane, causing a portion of the advancing tube to assume a plane approximately perpendicular to said given plane, supporting the portion of tube at the assumed plane with its plies closely adjacent, cutting therefrom a flap-defining section extending from one edge of the tube towards its other edge, releasing the cut-out scrap, then spreading the tube laterally to a flatwise plane substantially coinciding with the preceding plane, thereby bringing flaps and the face of the body portion into a common given plane, then separating the tubular blank from the tube, creasing its ends at the flap-fold position, and suitably gumming and folding down the flaps.

2. The method of making open-end envelopes from a continuous web of paper or the like; which consists in creasing and folding the web longitudinally with a broad and a narrow fold, adhesively attaching the narrow fold upon the margin of the broad fold to form a closed flat tube, its plies disposed flatwise adjacent on a predetermined primary plane, then transposing the flatwise relation of the tube to a plane approximately perpendicular to said primary plane, maintaining a portion of the advancing tube in such transposed flatwise relation, cutting out and releasing from said transposed portion of the tube a unitary flap-defining waste-section extending laterally from one edge partially across the tube towards its other edge, then restoring the flatwise relation of the tube to coincide with the primary plane, thereby developing an attached tubular blank with extending connected end-flaps, then detaching the individual blank on the desired contour for the flaps, transversely creasing the ends of the blank, and then gumming and folding down the flaps.

3. In the art of making tubular or open-end envelopes, the process steps which consist in temporarily changing the flatwise-form of the closed tube from its original plane to a plane approximately at right angles to the original plane by gradually forcing apart the flat sides of the tube and causing the opposite folded edges to approach each other, without rotating the tube, cutting out and discharging a unitary section the semi-contour of the end-openings and flaps for the blank, by a transverse incision while the tube is in such changed flatwise relation, then restoring the flatwise-fold plane of the blank and end of the tube to the original plane relation before detaching the blank from the tube.

4. The method of making open-end tubular envelopes from a continuous web of paper or the like; which consists in primarily producing a longitudinally extended tube, temporarily presenting a portion of said tube on a plane perpendicular to the normal final plane of the envelope blank, cutting and releasing therefrom at one edge of said tube a waste section on the semi-outline of the fold-over flaps, leaving an uncut portion at the other edge of the portion of the tube, then causing the tube to assume a flatwise relation coinciding to the normal plane of the envelope and subsequently severing the attachment between the adjacent connected flaps, and advancing the blanks individually in uniform serial order to a predetermined position and thence carried laterally to receive the final folding operation upon their flaps.

5. In the art of making envelopes from a continuous tube of paper or the like, the method of producing individual blanks which consists in forming a flat tube of the predetermined width of the required envelope, the sides of the tube closely adjacent on a plane, supporting the tube flatwise at two separate positions to keep the plies of the intervening portion of the tube in relatively close alinement, cutting through and releasing from one edge of said closely alined portion a folded waste-section extending partially across the tube and of a length equaling the combined length of the required fold-over flaps, advancing the tube and transposing the flatwise relation of the partially formed blank and end of the tube to a plane approximately perperdicular to the plane of said intervening portion, thus presenting the blank with the united end-flaps and cut-out space spread flatwise across its plane, and subsequently detaching the blank from the tube by severing the uniting single ply on the required outline for the end of the flaps.

6. In the art of making envelopes from a continuous tube of paper or the like; the method steps which consist in causing a portion of the tube to assume an approximately flatwise position perpendicular to the normal flatwise plane of the tube, removing at one edge of said perpendicular portion, a folded section of material corresponding to one half the required shape for a window-opening, then restoring the flatwise relation of the tube to its normal flatwise plane.

7. In the art of making open-end envelopes, the method of forming a window opening in a continuous advancing tube or tubular blank, which consists in temporarily transposing the flatwise plane of the tube or blank to form a longitudinal fold in the face thereof, on a plane approximately at right angles to the normal plane, without creating a permanent crease therein, then cutting out a suitable shaped semi-section

along the edge of said longitudinal fold, then restoring the flatwise relation of the tube or blank to its normal plane, thereby developing the opening in full form within the face area of the blank.

8. In the art of making envelopes from a continuous formed tube, the method which consists in preparing a closed flat tube the width of the required envelope and delivering said tube in its normal flatwise plane, changing the flatwise relation of an intermedial portion of the tube, without rotation thereof, to bring the sides of the tube closely adjacent to each other on a plane at right angles to said normal plane, then transversely cutting from one edge thereof a folded waste scrap including about one half the width of the tube and leaving an endwise connected portion of a dimension equal to the area and combined length of the united flaps, also at approximately the same time cutting from the other edge of said tube a waste scrap of suitable dimension for a window opening, then restoring the flatwise relation of the tube to the normal plane with the cut out spaces and flat-forming area coincident with said plane, then completely detaching the blank by cutting the outline of the adjoined flaps, and subsequently gumming and folding down the flaps, substantially as set forth.

9. In the art of making envelopes from a continuously advancing longitudinally closed tube of paper or the like, the method which consists in transposing and presenting a predetermined portion of the tube on a plane approximately perpendicular to the normal plane of the envelope, cutting out and discharging therefrom a unitary waste section adapted to partially detach a blank and form end-openings, but leaving connected a portion representing the combined area of the projecting flaps for said blank, then restoring the flatwise form thereof to the normal plane relation, supporting the partially detached advancing blank to permit printing thereon, applying print upon the surface of the advancing blank, then completely detaching the blank, and subsequently creasing, gumming and folding the flaps to complete envelope form.

FREDERICK E. ARROUQUIER.