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E. B. STOCKING.

METHOD OF AND MEANS FOR THE MANUFACTURE OF ENVELOPES, &c.

No. 302,690. Patented July 29, 1884.

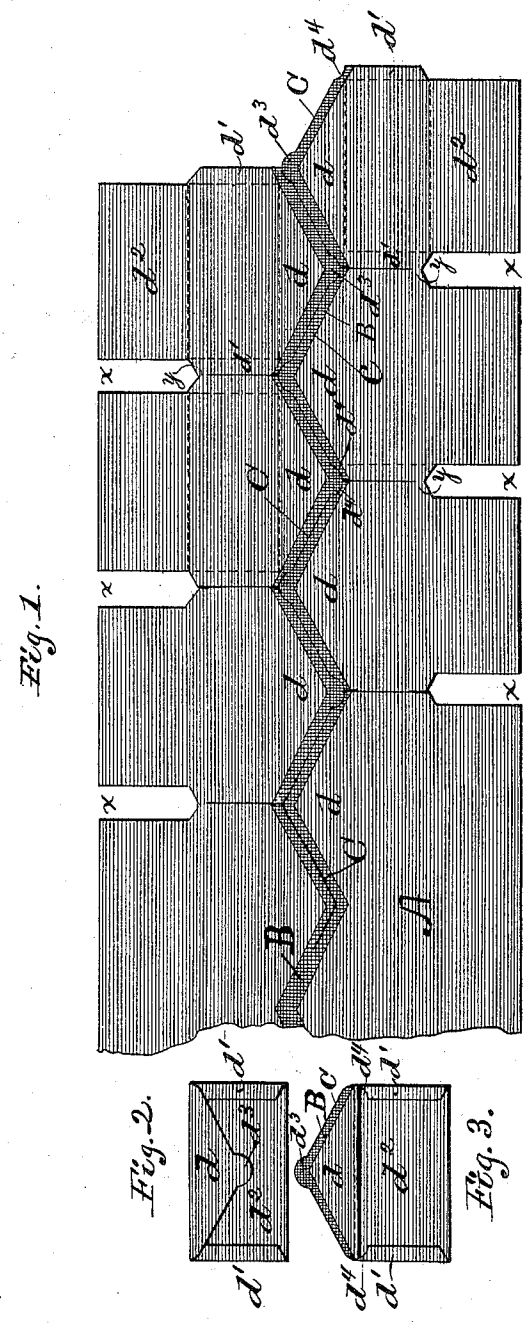


Fig. 1.

Fig. 2.

Fig. 3.

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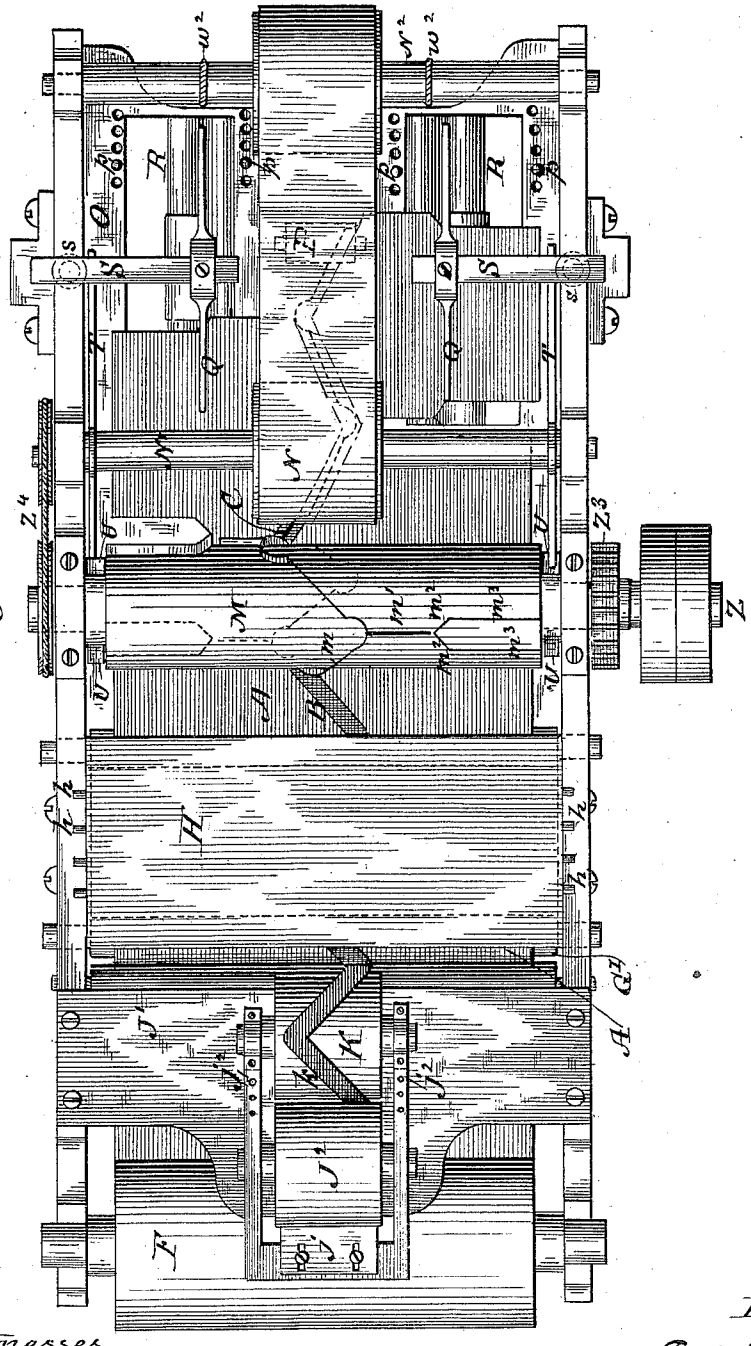
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Fig. 4.



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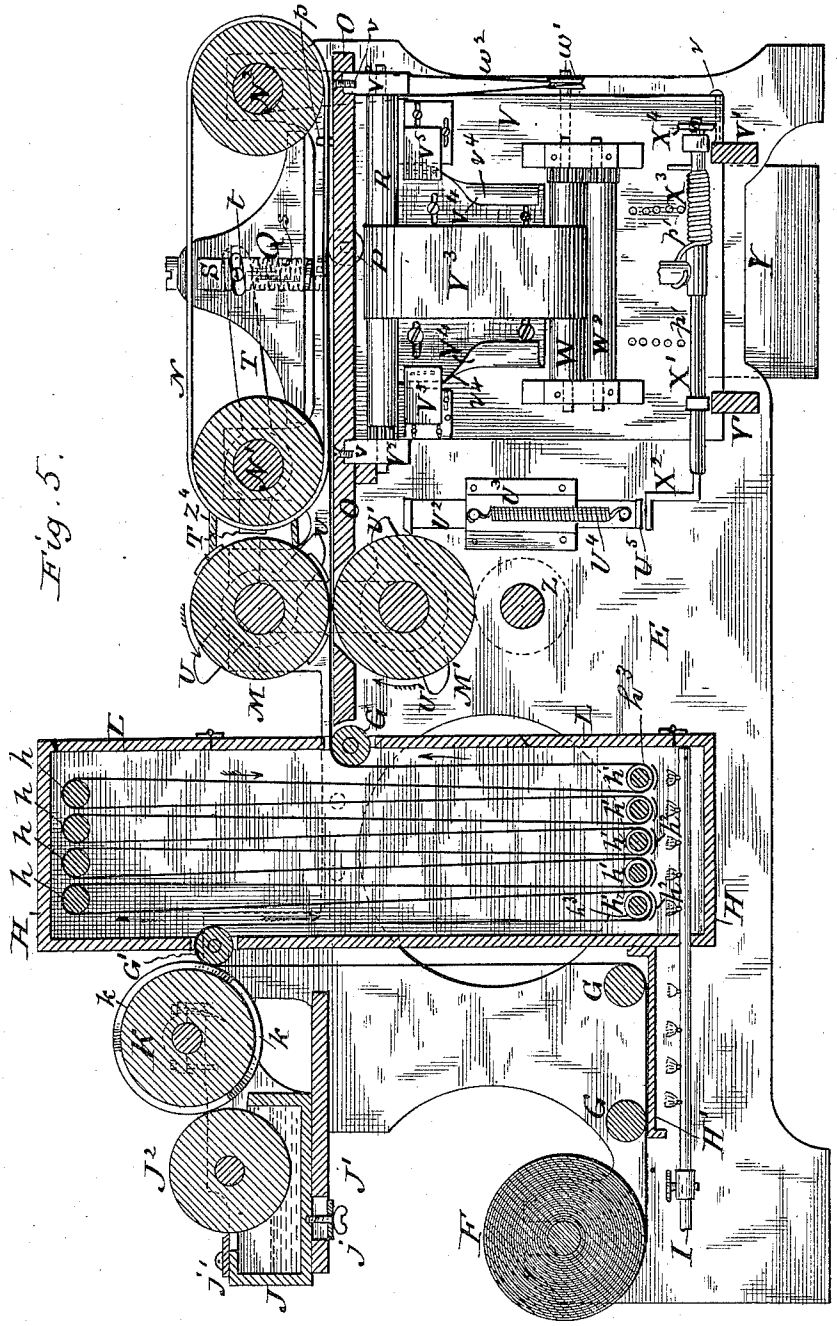
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Fig. 5.



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Fig. 7.

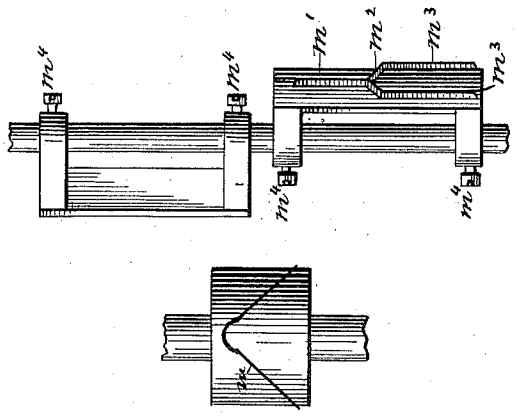
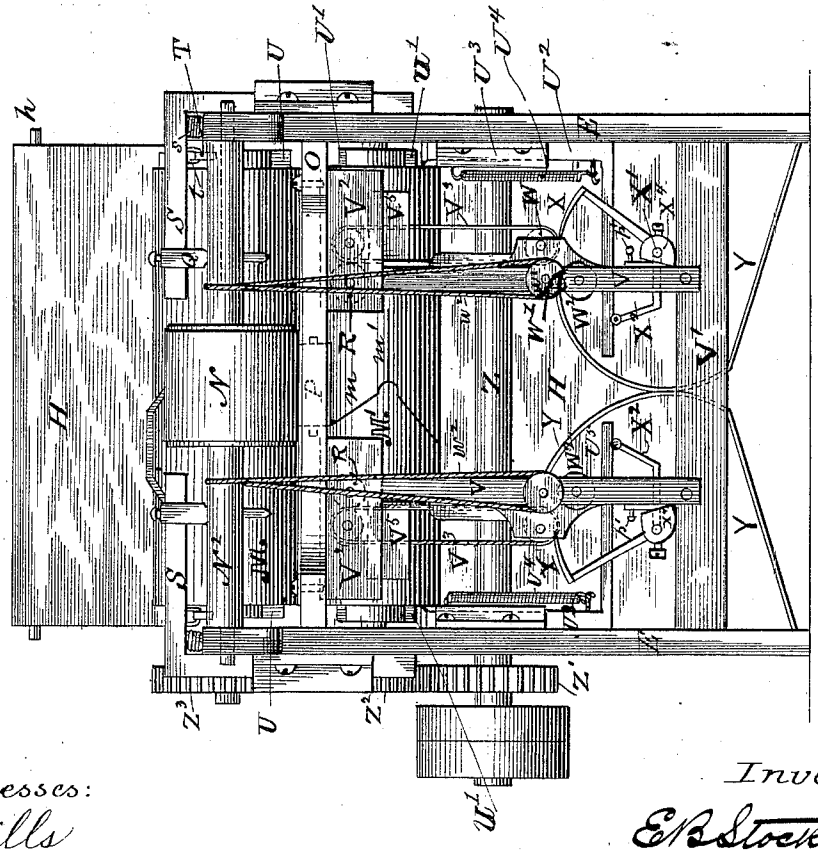


Fig. 6.



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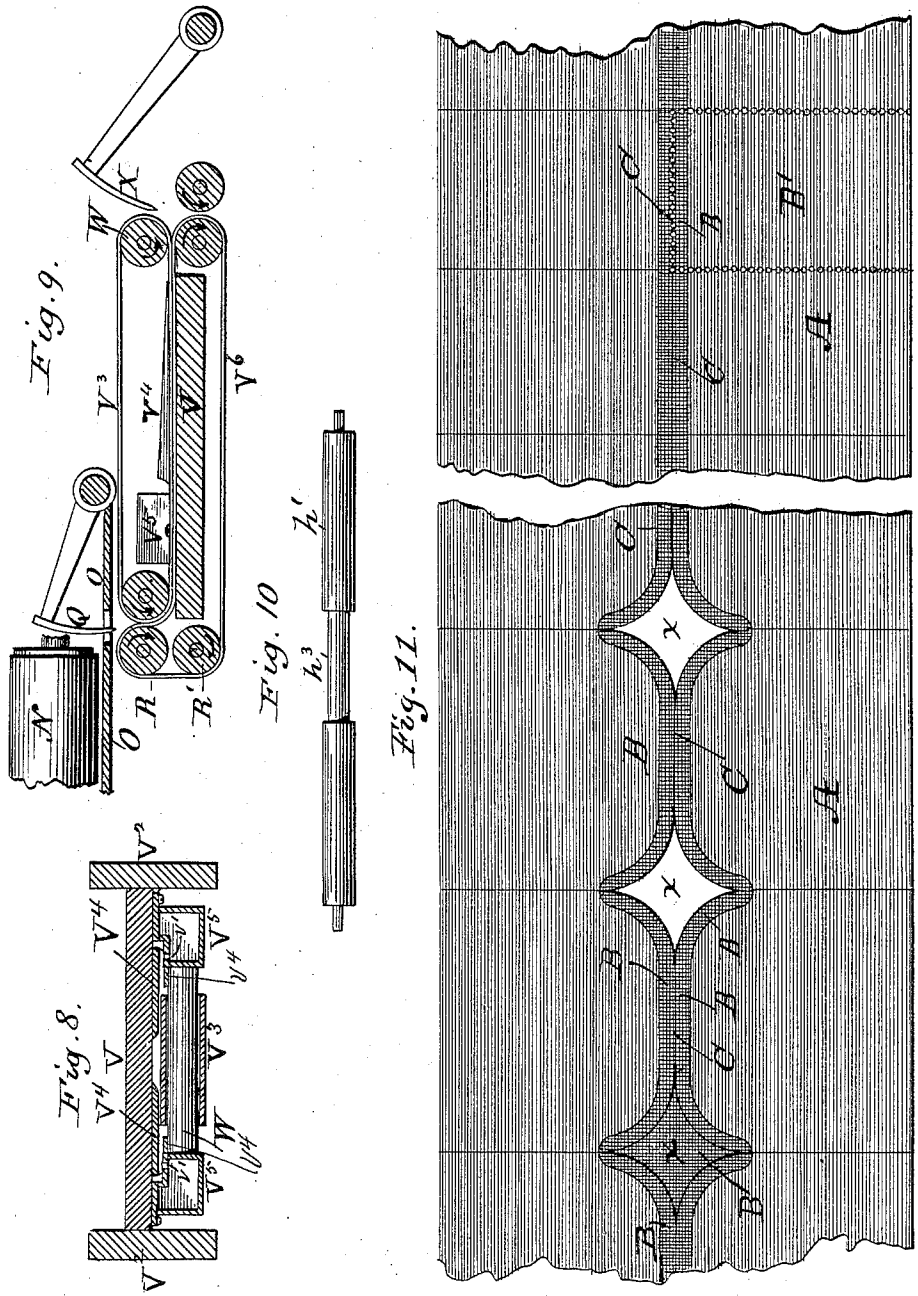
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UNITED STATES PATENT OFFICE.

EDGAR B. STOCKING, OF WASHINGTON, DISTRICT OF COLUMBIA.

METHOD OF AND MEANS FOR THE MANUFACTURE OF ENVELOPES, &c.

SPECIFICATION forming part of Letters Patent No. 302,690, dated July 29, 1884.

Application filed December 26, 1883. (No model.)

To all whom it may concern:

Be it known that I, EDGAR B. STOCKING, a citizen of the United States, residing at Washington, in the District of Columbia, have invented a certain new and useful Method of and Means for the Manufacture of Envelopes and Similar Articles, of which the following is a specification, reference being had therein to the accompanying drawings.

The main object of my invention is to increase in number the product of machinery for making envelopes and similar articles, and I accomplish this object by my new method of making envelopes and the means employed in practicing the same, both of which are hereinafter fully described, and the novel features of each specifically set forth in the claims.

Referring to the drawings, Figure 1 represents a portion of a web of paper as it appears after certain successive steps of my method have been practiced thereon to form blanks ready to be folded into envelopes. Fig. 2 represents a closed envelope, and Fig. 3 an open envelope formed of or from said blanks. Fig. 4 is a plan of one arrangement of mechanism for practicing my method of making envelopes. Fig. 5 is a substantially central longitudinal vertical section of said mechanism with folding devices in side elevation. Fig. 6 is an end elevation of said mechanism. Fig. 7 is a modified arrangement of rotary cutters. Fig. 8 is a horizontal section of the folding mechanism, taken on a line immediately below the first folding-rolls. Fig. 9 is a sectional view of modified folding mechanism, a portion of adjacent parts being in elevation. Fig. 10 is a side elevation of one of the lower rolls of the drying-chamber. Fig. 11 is a plan of different blanks hereinafter described.

Like letters indicate like parts in all the figures.

Referring to Figs. 1, 2, and 3, A represents a portion of a continuous web, at the longitudinal center of which I apply a straight, waving, curved, or zigzag line of gum, B, of a width sufficient for two sealing-flaps, and I subsequently sever the web on a similar line, as C, which determines the outline of the sealing-flaps d of the envelopes. The disposition of the gum-line and the line of severance may be varied, so as to produce various styles of sealing-flaps, and this either with or without waste of material along said lines—that is, with or without cutting out and separating portions along said line which do not form a part of the envelopes produced. In this instance I have shown but a single line of severance, and this occurs substantially in the center of the web and extends lengthwise thereon; but if desired, a web of sufficient width may be twice so severed to produce four blanks in its width, in which case a straight line of severance would be made to determine the lower edge of the back-forming portions d^2 of the blanks, and the gum and severance line may be arranged transversely on the web and alternately with straight lines of severance; but as this leads to the waste of a half-blank at each edge of the web on each transverse row of blanks produced, I do not deem it a preferable disposition of the gum and severance lines. Such a disposition of these lines is illustrated by considering the top of Fig. 1 as the leading end of a continuous web with transverse gum and severance lines B and C. The width of such web being considered as for three blanks, the waste appears as a half-blank in each row. From the bends or angles of the zigzag line I sever the web transversely to determine the edges of the side flaps, d', of the blanks, and I remove the portions x of the web as waste material, on lines which determine the bottom edges of said side flaps, and the side edges of the back-forming portions d^2 of the blanks. In this instance I produce a sealing-flap having a lip, d^3, at its point, but as shown at the transverse cut at the left of Fig. 1, this lip may be dispensed with. When the lip is formed the outline given to the adjacent blanks is such that those portions of the sealing and side flaps which in the web are adjacent to each other are concaved, as at d^4, so that when sealed the envelope has a neat and finished appearance. It will be noticed that unlike ordinary machine-made envelopes the gum is by my method so applied that it extends completely down the flap to the folding-line. At y, Fig. 1, I show the transverse severance-lines as stopping short of the edges of the blank. At the left of said figure said lines do extend to said edges. The former modification is useful in

feeding the blanks through a machine, while the latter modification may be employed by the use of proper feeding devices well known in the art of paper manufactures. The blanks thus produced, either by hand or machinery, may be folded upon the dotted lines shown to produce envelopes, paste or gum being applied to the side flaps; and so far as my methods of applying the sealing-flap gum, severing the web to produce the sealing-flaps and the complete blanks are concerned, I do not limit myself to any means for practicing the same, but deem the use of said methods in the manufacture of envelopes either by hand or by machinery as an infringement of my rights. I have, however, herein illustrated and disclosed one form of mechanism for practicing by machinery my method of making envelopes.

In any suitable frame-work, E, I support the endless or continuous web F and guide-rolls G G′ and the other operative parts of the machine.

H represents a drying-chamber, at the entrance of which the guide-roll G′ is located, and at the opposite ends of which (in this instance, to save floor-space, the upper and lower ends) are other guide-rolls, *h h′*, the latter of which are cut away at h^3, their middle portions (see Fig. 10) to prevent smearing the gum-line B. If desired, these guide-rolls *h h′* may be positively driven by being suitably connected with any proper moving part of the machine, in order that they may act also as feed-rolls, which would be preferable where their number is large. Beneath the rolls *h′* are plates h^2, to prevent the flame of the gas-heater I, or excessive heat otherwise produced below said plates, from injuring the web in its passage around the rolls and through the drying-chamber. I have shown the gas-heater provided with jets outside of the chamber and beneath a plate, H′, over and along which the web is conducted to be preliminarily warmed to facilitate the process of drying the zigzag line of gum which is subsequently applied.

J represents a gum-well, adjustably secured to a slotted table or bracket, J′, by means of the thumb-screw *j*, and running in the well is a supply-roll, J^2. *j′* is a doctor.

K represents the gumming-roll, removably supported in bearings, adjustable by means of additional bolt-holes, j^2, (see Fig. 4,) on the well J, and provided with a continuous peripheral printing-surface, *k*, of a desired contour, to print upon the web a suitable line of gum for sealing-flaps while the web is on the guide-roll G′.

To produce the gum-applying surface *k* upon a roll for printing a desired sealing-flap gum-line, I lay off on paper, and in line with each other, three of the flaps, of a desired contour. I then cut the paper upon the lines of the flaps and wrap it about a roll, the circumference of which is equal to the length of the three flaps, and mark upon the periphery of such roll a line agreeing with the edges of said flaps, and a second line parallel therewith and a distance therefrom equal to twice the width of the gum-line desired on each flap, and then remove to a sufficient depth the surface of the roll which is not included by said lines. In this manner I produce a roll which will print or apply a continuous gum-line of the desired contour. Gumming-rolls of different diameters are required for envelopes of different sizes, and the gum-well is so adjusted that the gumming-roll bears upon the supply-roll and upon the web while on the guide-roll G′. From the drying-chamber the web is conducted to the cutting, folding, and pasting devices. Any suitable doors, as L, may be provided for the drying-chamber, to give access to the interior, for the introductory passage of the web therethrough.

M M′ represent a pair of rotary cutters, the former provided with blades, and the latter with corresponding grooves, as usual in this class of cutters. In this instance there is a peripheral zigzag knife, *m*, (see Fig. 4,) for cutting the sealing-flap line through the middle of the web, transverse knives *m′* for cutting the side-flap lines, and short divergent knives m^2 and parallel transverse knives m^3 for cutting out the wasted portion *x*, Fig. 1, and determining the side edges of the back-forming portions of the blanks. It is apparent that the middle knife, *m*, may be mounted on a separate roll and the remaining knives mounted by themselves, as indicated in Fig. 7, in which case a proper timing of the revolutions of the rolls would produce the desired cuts at desired points along the web. In this modification the transverse blades are arranged on segments of a roll, and are adjustably secured to the shaft by set-screws m^4 for the purpose of circumferential arrangement upon and removal from the shaft. Companion grooved rolls or segments are used in this modification also. Rotary cutters of different diameters for envelope-blanks of different sizes are substituted for each other to adapt the machine for making different sizes of envelopes. Reciprocating or other cutters may be employed instead of those herein shown. In this instance the connecting-links *y*, Fig. 1, are retained between the blanks by terminating the knives *m′* short of the divergent knives m^2; or, if desired, other points may be selected as connecting-links, and perforators may be inserted in the place of the removed portions of any of the knives, so that the blanks shall be connected by perforated links or in place of all of the knives. (See wrapper B′, Fig. 11.) As the web emerges from the drying-chamber it is severed into blanks by the cutters, and is drawn along by the feed-belt N, which runs in contact with the bed O, (or it may be in contact with a companion belt running on said bed,) and is presented to the first-fold mechanism.

The feeding-belt N is designed to bear

lightly upon the blanks and yieldingly draw them until they arrive at the nipping-roll P, which, by being elevated slightly above the bed, is rotated by the belt and causes it to take a stronger hold upon the blank, and then, by reason of the slightly-increased speed given the belt over the feeding devices in rear of it, each blank is separated from its successor and delivered against stops *p*, which are simple pins arranged to hold the blank in position for the first fold.

Q Q represent ordinary reciprocating folding-blades which co-operate with the first fold-rolls R. These blades are mounted adjustably upon brackets S, which are elevated by coiled springs *s* and depressed by levers T, pivotally connected to the brackets (by a fastening device, *t*, passing through a slot in the lever, as shown, and into the bracket) and pivotally supported on the shaft N′ of the rear roll upon which the feed-belt is mounted, and extended back of said shaft, where, during each revolution of the rotary cutter M, said levers are twice depressed by cams U mounted on the shaft of said cutter, and at each end thereof.

In Fig. 6 the levers T are shown as connected to the lower side of the horizontal portions of brackets S. Either arrangement may be used. As the blanks are produced in steps from the web—that is with the sealing-flap portion of those upon opposite sides of the web alternating—the cams U are arranged or timed to operate the blades Q alternately.

The next operations are the pasting and folding of the side flaps and the folding of the closing or sealing flap over, upon, and against the back of the envelope, and these are performed by duplicate mechanisms arranged at opposite sides of the machine. A description of one set of devices is sufficient, as both are alike.

V represents a longitudinal vertical wall, adjustably mounted upon cross-bars V′, (see Fig. 1,) and having short cross-bars V^2 at the top, which slide in grooves formed in the under surface of the bed O. (See Fig. 5.) Set-screws *v* serve to hold the wall firmly at desired points. The first-fold rolls R are journaled in the short cross-bars V^2, and are thus carried by the walls. It will be seen, therefore, that by adjusting the blades Q and the walls at various points transversely of the machine, blanks of varied sizes may be longitudinally folded on the line, forming the bottom edge of the envelope. The wall V serves as a bed along which the blank is fed by the belt V^3, which passes around the outside-fold roll R and around the roll W, journaled on the wall. Back of the roll W is a roll, W′, which, with the roll W^2, constitutes the final-fold rolls, both journaled in the wall. The rolls W W′ and belt V^3 feed the blank in front of and below the rolls W′ W^2, between which it is driven by the folding-blade X, to make the final cross-fold upon the line where the closing-flap merges into the face portion of the envelope, the blank being stopped by the adjusting-pins *p*′, so that said line is opposite the bite of rolls W′ and W^2.

V^5 are laterally-adjustable paste-boxes, which are secured to the wall V, (see Fig. 8,) and are perforated at *v*′, in or through a wall thereof which is raised from the wall V and projected over the path of the side flaps, so that the said flaps come in contact therewith, and a line of paste is transferred therefrom to said flaps.

V^4 are ordinary folding plates or hemmers fixed adjustably to the wall V, so as to be capable of folding the side flaps of envelopes of varied sizes. The folding-wings v^4 of the hemmers are so bent up from the bed or wall that they aid in bringing the side flaps against the perforated walls of the paste-boxes, and are so bent over as to gradually turn said flaps over, upon, and against the back of the envelope. After the final fold is made the envelope is delivered at the side of the machine by the curved and inclined plate Y. (See Fig. 6.)

I do not limit myself to any particular means for giving proper motion to the principal elements of the machine, but show one arrangement of means, which may be varied in any manner and to any extent within the skill of any person conversant in the construction of machinery for operating upon paper.

The rolls of each pair of folding-rolls are geared together, as are the rolls W W′ W^2. The shaft of the roll W′ is extended and provided with a pulley, *w*′, which is geared to the shaft N^2 of one of the rolls of the feed-belt N by a belt, w^2, which is shifted along said shaft to agree with any adjustment of the wall V.

In this instance Z is the main or power shaft of the machine, and it is provided with a gear, Z′, Fig. 6, which meshes with the gear Z^2 on the lower one of the rotary cutters, the upper one having a companion gear, Z^3. A belt, Z^4, gives motion to the feed-belt N. (See Fig. 4.) Upon the lower one of the rotary cutters cams U′, similar to cams U, are secured and similarly timed to depress a slide, U^2, (running in a box, U^3, fixed to the inside of the frame E,) which is elevated by a spring, U^4. The lower end of the slide has an arm, U^5, which projects inwardly over the arm X^2 of the rock-shaft X′, which carries the folding-blade X. A coiled spring, X^3, causes a return of the folding-blade after a fold is made.

X^4 represents a stop adjustably secured to the rock-shaft, and, by its upper and lower corners coming in contact with the wall V, limits the extent of both movements of the blade.

In Fig. 9 I have illustrated an arrangement of folding devices which will deliver the envelopes at a higher point at each side of the machine, (the devices shown being duplicated and arranged on each side of the feed-belt,) and I have embodied an additional feed-belt, V^6, to co-operate with the belt V^3, to insure a positive feed of the blank along the horizontal

bed or wall V. A guide-roll, R′, is thus made necessary. The arrows indicate the direction of the movement of the rolls and belts. In this arrangement the parts are more accessible and can be more easily inspected while in operation. In this modified arrangement similar lateral adjustment of the devices as a whole—that is, the bed and its adjuncts—would be provided as in the arrangement hereinbefore described.

If desired, additional feeding devices may be provided at desired points in the machine.

It is apparent that where the sealing-flap is to be provided with a wider or deeper gummed surface than that shown, the outer edges of the gum-line on the web need not conform so strictly to the outline of the flaps to be produced; hence a substantially central line of gum of suitable width would answer in such cases. It is also apparent that in the manufacture of cheap printed-matter envelopes, the sealing-gum not being used upon the closing-flaps, my method and means for applying the sealing-gum would not be required, and yet the method which I have herein disclosed of producing blanks from a web would secure the rapid production of such envelopes. I therefore do not limit my invention to the manufacture of gummed envelopes, but should deem the manufacture of ungummed envelopes by the practicing of my method of cutting the blanks therefor from a web, and the use of my means or their substantial equivalents for so cutting the blanks, as an infringement of my rights; nor do I limit myself to the exact proportions of the machine herein illustrated, but reserve the right to vary the same at will.

I deem it proper to state that although I have herein specified envelopes as the articles which are made by my method of applying and drying the gum for the sealing-flaps thereof, yet it is apparent that other similar articles—that is, any articles having a closing-flap edge or edges provided with sealing-gum—may also be made by said method; and I do not, therefore, limit myself to envelopes alone. I may mention, without limitation to them, as similar articles, newspaper and other wrappers for mercantile purposes, paper boxes, bags, leaves of scrap-books, and cigarette-papers. In all of these and many other articles the improvements of the manner of applying and drying the sealing-gum are readily and advantageously applicable. I herein use the terms "zigzag" and "sealing-flap line" when designating a gum-applying surface or a severing-blade, and mean by such terms a gumming surface or a knife or a line of perforators which has a shape or contour which substantially conforms to the outline of a sealing-flap.

In Fig. 11 I have illustrated a portion of a web, A, gummed and cut, or showing the severance-lines to produce (at the left of said figure) newspaper-wrappers and (at the right of said figure) cigarette papers and wrappers with a single gummed edge. As shown at the extreme left corners of the first pair of blanks, I may gum the waste portions *x*, or, as shown in the remaining blanks, the gum-line B may conform more strictly to the sealing-flap portion of the blank, whereby the waste portions are not gummed, while in either and all cases the line C of severance necessarily more or less conforms to the outlines of the said flap. In cigarette-papers it will be noticed that the central gum and severance lines and the transverse severance-lines are straight. This figure illustrates the minor changes in the disposition of the gum and severance lines to produce different blanks.

Having described my invention and its operation, what I claim is—

1. A step in the art of making envelopes and similar articles, which consists in printing upon a web a substantially central gum-line conforming to the outline of the sealing-flaps of the article to be produced and of a width sufficient for two of said flaps, substantially as specified.

2. That improvement in the art of making envelopes and similar articles which consists in printing upon a web a sealing-flap line of gum, and severing the web within said line to form sealing-flaps, substantially as specified.

3. That improvement in the art of making envelopes and similar articles which consists in printing upon a web a continuous sealing-flap line of gum, and severing said web on lines forming blanks, substantially as specified.

4. The method herein set forth of making envelopes from a web, which consists in printing a gum-line conforming to the sealing-flaps, drying said gum-line, severing the web within said gum-line and on transverse lines, and subsequently pasting and folding the flaps thus formed, substantially as specified.

5. The method herein set forth of making envelopes from a web, which consists in first heating the central portion of the web; second, printing upon said heated portion a sealing-flap line of gum; third, severing the web within said gum-line and on transverse lines, and subsequently pasting and folding the blanks thus formed, substantially as specified.

6. In an envelope-machine, a gumming-roll having a continuous peripheral zigzag gum-applying surface, in combination with a drying-chamber having a projecting guide-roll, as G′, substantially as specified.

7. In an envelope-machine, rotary cutters having a continuous zigzag blade, and transverse blades arranged at the bends of the zigzag blade, substantially as specified.

8. The combination of a gumming-roll, having a continuous zigzag gum-applying surface, a drying-chamber, and a zigzag cutter constructed and arranged substantially as specified.

9. The combination of a warming-plate, a gum-roll having a continuous sealing-flap-line gum-applying surface, a drying-surface, and a rotary cutter having a continuous sealing-flap-line blade, substantially as specified.

10. The combination of mechanism, sub-

stantially as specified, for producing blanks in steps from a web with duplicate folding mechanisms arranged on opposite sides of the web and timed to operate alternately, substantially as specified.

11. The combination, with blank-producing mechanism, substantially as specified, of duplicate adjustable folding-blades and duplicate adjustable pasting, flap, and final-folding mechanisms, substantially as specified.

12. The combination, with blank-producing mechanism, substantially as specified, of duplicate adjustable folding-blades and duplicate adjustable walls, carrying duplicate adjustable pasting, flap, and final-folding mechanisms, substantially as specified.

13. The combination of a drying-chamber having a projecting guide-roll, a gum-well adjustable to and from the same, and a removably-mounted intermediate gumming-roll, substantially as shown and described.

14. The combination of the adjustable gum-well J, its roll J^2, the gumming-roll K, having the continuous zigzag gum-applying surface *k*, the guide-roll G', and the drying-chamber H, having the guide-rolls *h h'*, the latter having the grooves h^3, substantially as shown and described.

15. The drying-chamber H, having the guide-rolls *h h'*, and the protecting-plates h^2, with the gas-heater I and warming-plate H', in combination with the guide-rolls G G G' and gumming-rolls J^2 K, substantially as shown and described.

16. The combination of the gumming-roll K, the drying-chamber H, and the rotary cutters M M', having knives *m m' m²* m^3, substantially as shown and described.

17. The combination of the feed-belt N, the roll P, folding-blades Q, rolls R, and the bed O of the machine, the roll P being arranged at a right angle to and between the pairs of rolls R, substantially as shown and described.

18. The combination of the rotary cutter M, having cams U, the pivoted levers T, folding-blades Q, and rolls R, substantially as shown and described.

19. The combination of the adjustable folding-blade Q and the adjustable wall V, carrying the folding-rolls R, adjustable paste-boxes V^5, adjustable folders V^4, belt V^3, and rolls W' W^2, substantially as shown and described.

20. The combination of the wall V, belt V^3, and adjustable paste-boxes V^5, substantially as shown and described.

21. The combination of the wall V, belt V^3, and the adjustable folders V^4, substantially as shown and described.

22. The combination of the adjustable wall V, carrying the final-fold rolls W' W^2, and the folding-blade X, mounted on the rock-shaft X', having the arm X^2, with the slide U^2, having the arm U^5, and means, substantially as shown and described, for operating the slide.

23. The combination of the rotary cutters M M', having cams U U', the levers T, brackets S, blades Q, and rolls R, with the slides U^2, arms X^2, rock-shafts X', blades X, and rolls W' W^2, substantially as shown and described.

24. The combination of the adjustable wall V, rolls W' W^2, feed-belt N, shaft N^2, and belt w^2, substantially as shown and described.

25. The combination of the rotary cutters M M', having cams U U', the slide U^2, lever T, and folding-blades Q X, with intermediate pasting and side-flap-folding mechanism, substantially as shown and described.

In testimony whereof I affix my signature in presence of two witnesses.

EDGAR B. STOCKING.

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L. C. HILLS.