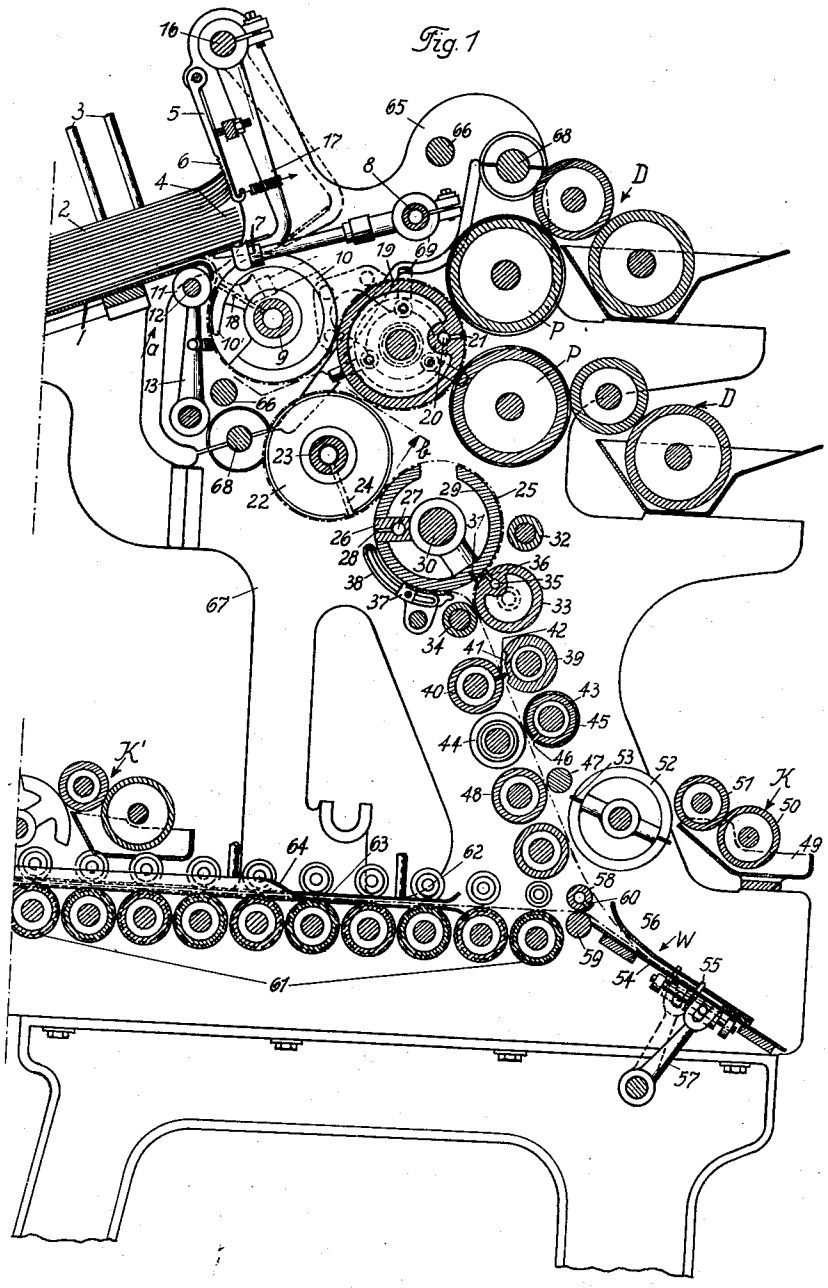
Sept. 28, 1954 R. WINKLER ET AL 2,690,103

MACHINE FOR THE MANUFACTURE AND PRINTING OF ENVELOPES

Filed Nov. 14, 1950

2 Sheets-Sheet 1

Fig. 1



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2 Sheets-Sheet 2

Fig.2

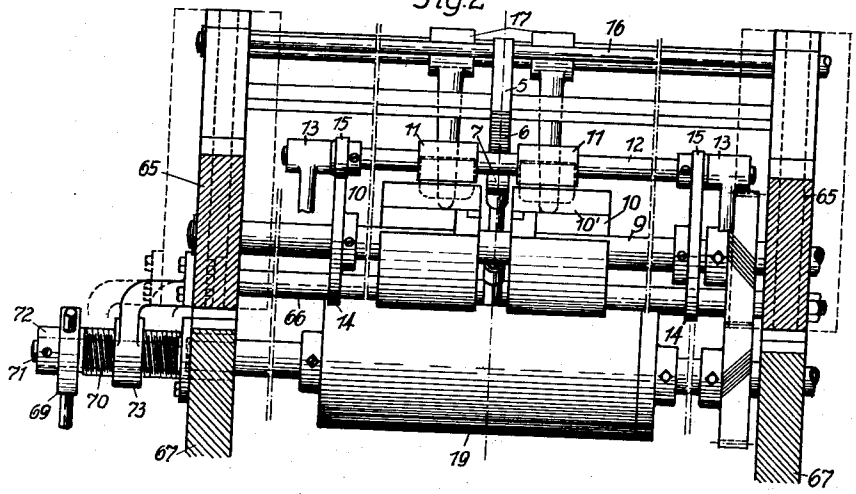
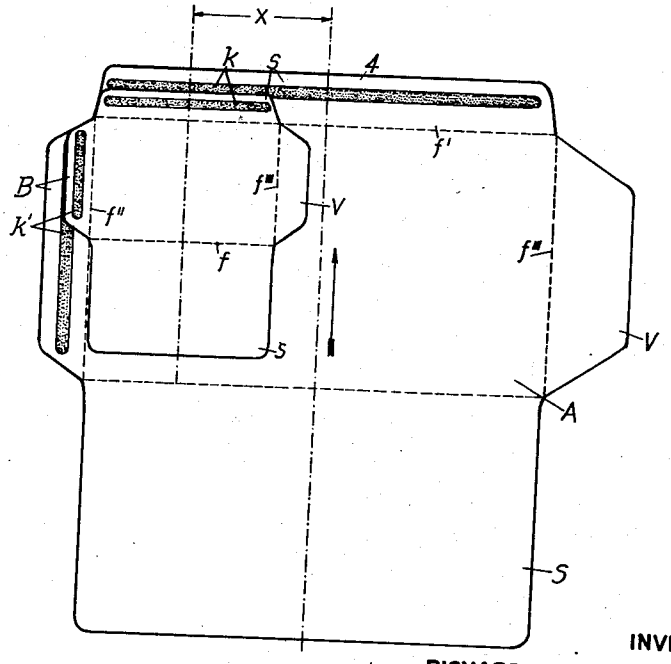


Fig.3



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UNITED STATES PATENT OFFICE

2,690,103

MACHINE FOR THE MANUFACTURE AND PRINTING OF ENVELOPES

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Claims priority, application Germany November 18, 1949

12 Claims. (Cl. 93—62)

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This invention relates to a machine for the manufacture and printing of open-end envelopes in one operation.

In the manufacture of open-end envelopes, folding machines have heretofore been employed in which each blank receives a longitudinal fold while being removed from the bottom of the pile. Such known machines have a number of advantages, the most important of which are the high efficiency and the reduced dimensions, these advantages being due to the fact that there is a single longitudinal folding of the blank simultaneously with the feeding from the pile, and to the fact that the length of the blank in the direction of feed is reduced by the folding and the blanks can thus be moved consecutively through the machine in close relation to each other so that useless idling of the machine is avoided. The operating cylinders of the machine equipped with the necessary tools for the required operation may be of small diameter but must be of sufficient dimensions to accommodate the largest blank to be handled by the machine.

In spite of the above-mentioned advantages, however, these so-called "fold-feed" machines, in which each blank is fed and folded at the same time, have certain disadvantages when the finished envelope is to be provided with printing on both outer sides if such printing is to be effected in a single operation together with the folding and sealing of the blanks in one and the same machine, since special printing mechanism for each side is necessary and, in the case of multicolor printing, a plurality of printing mechanisms is necessary for each individual side and for such envelopes with printing on both sides, the advantages of the roller "fold-feed" machine cannot be fully utilized.

One object of the present invention is to solve this problem by feeding each blank from the bottom of the pile without folding and in accordance with this invention, the blank is fed in a direction parallel to the bottom and closure flap folds which are subsequently produced. The blank is then printed on one side so that a single operation is sufficient for the printing of both sides i. e. the back and front of the finished envelope.

A further object of this invention is to provide special means for carrying the mechanism for feeding and receiving the blanks from the feed pile, in combination with and independently of the mechanism for the printing and other treatment of the blanks, and to provide

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means for the adjustment of said special means at right angles to the direction of feed of the blanks.

Still another object of this invention is to provide, for the folding of the blank, after the printing operation, suction means for gripping the blank immediately behind the score for the first fold in combination with adjustable stop means for engaging the free leading edge of the blank to cause the introduction of the folded edge between rotating cylinders whereby such edge is caused to form the leading edge of the folded blank.

With the above and other objects in view, this invention consists in the novel construction and arrangement of parts of the machine as hereinafter described with reference to the accompanying drawings which show, by way of illustration or example, the necessary parts of a machine for the manufacturing and printing of flat paper bags in one continuous operation.

On the drawings:

Fig. 1 is a vertical cross-section through the part of the machine to which the invention relates.

Fig. 2 is a longitudinal section on the line *a—b*, through the part of the machine comprising the feed device, and

Fig. 3 is a plan view showing two superimposed flat-bag blanks of different sizes.

In the drawing, there are shown only the parts and details of the machine which are necessary for a detailed description of the invention, a showing of the entire operating means being omitted for the sake of clarity.

In the feed-pile **2** resting on the feed-table **1**, the blanks may be of the shape shown in Fig. 3. It should be noted, however, that the paste coatings *k* and *k'* indicated in Fig. 3 for the longitudinal and bottom pastings, respectively, are applied during the operation and are located on the under side of the blank as seen from Fig. 3.

The edge **4** of Fig. 3 which represents the free longitudinal edge of the narrow side flap *s* is the leading edge of the blank and is the uppermost or right-hand edge in feed pile **2**, Fig. 1. With the exception of a small lower layer all the blanks in the pile **2** are supported with the center of their said edges **4** against a so-called "leafer" **5** which is provided with teeth **6**, Fig. 1, and the blanks slide down one after the other from this "leafer" in accordance with the removal of the blanks from the bottom of the pile. The front ends of the blanks extend

beyond the front, downwardly bent end of the pile feed table 1.

The lowermost blank in the feed pile 2 is grasped at its center, just behind its edge 4, by a swinging suction device 7 and the end of said blank which extends beyond table 1 is bent downwardly. The suction device 7 is carried by a hollow shaft 8 and swings from the position shown in full lines into the position shown in dotted lines so that the leading portion of the blank is bent downwardly to the position indicated by a dot-and-dash line.

The suction device 7 operates in timed relation to two continuously rotating feed segments 10 arranged on a hollow shaft 9 on both sides of the suction device (see also Fig. 2), the timing being such that the leading edge of the blank can enter into the recessed peripheral parts of these segments upon being bent down by the suction device 7. The leading edges of tongues 10' of the segments accordingly engage the bent-down end of the blank and remove it from the suction device 7 and bend it down completely between themselves and the feed cylinder 11, which also consists of two parts which are carried by a shaft 12. This shaft 12 is supported in two levers 13 and is pressed against the feed segments 10 by springs which engage these levers. This motion is limited, however, by two distance discs 14 and 15 which have the same diameter as the feed segments 10 and the parts of the feed cylinder 11 and are carried on shafts 9 and 12, respectively. In order to permit the bending of the end of the blank downwards between the segments 10 and the feed cylinder 11, a short part of the peripheral surface connected to the front end of the segment tongues 10' is somewhat recessed so that a small space exists between segments 10 and the feed cylinder 11 when the pair of distance discs 14 and 15 engage each other. Only at the end of these recesses where the full outer diameter of the feed segments 10 begins is the blank positively grasped between said segments and the feed cylinder parts 11 and pulled out from the bottom of the feed pile. This withdrawal of the lowermost blank is facilitated by two swinging pile supports 17 also arranged on both sides of the suction device 7 and carried on a shaft 16. These pile supports swing in below the front end of the pile and lift said pile as soon as the front end of the lowermost blank has been bent down by the suction device 7. The supports 17 remain in this position until the suction device starts to bend down the front end of the next blank, and it is then necessary for them to swing out again.

Each of the two feed segments 10 is provided with a suction device, and suction channels 18 extend from the hollow segment shaft 9 and open directly behind the recessed segment tongues 10' in the segment peripheral surfaces, and, through suitable well known control devices for the suction air, each blank end bent down and grasped between segments 10 and feed cylinder parts 11, is simultaneously also grasped by the suction openings 18 thus insuring a dependable feeding of the blank until it is taken over by a printing cylinder 19 even although it may not be so taken over until after it is released by the feed segments 10 and the feed cylinder parts 11. The printing cylinder 19 has a suction channel 20 and suction openings 21 extending from said channel to the surface of the cylinder. Under the action of suitable control devices for the suction air, the cylinder 19 grasps the blank delivered thereto by the feed segments 10. The cylinder 19 grasps each blank close to the leading edge 4 thereof and conveys the blank successively between itself and the two plate cylinders P and P' of the two aniline printing mechanisms D and D' shown by way of example in Fig. 1 of the drawings. In this manner the still unfolded blank can be printed in two colors on one side over its full extent so that the finished envelope made from the blank by successive foldings and pasting operations has a two-color impression on both sides thereof.

The printing cylinder 19 conveys the printed blank to several feed discs 22 which are adjustable on a hollow shaft 23 in accordance with the size of the blank being handled. They take over the blank, by means of their suction passages 24 extending from the hollow shaft 23 to their peripheries but contact is limited in order to avoid smearing of the printing which is still wet, and the feed discs 22 thus convey the blank to the following cylinder 25.

The cylinder 25 consists of a narrow segment 26, having a suction channel 27 communicating with a suction opening 28 at its outer surface, and of a larger segment 29 which constitutes the greater part of the periphery of the cylinder. The latter segment 29 is subdivided into individual strips extending over a part of its periphery and located in corresponding recesses of the outer surface of the narrow segment 26. The segment 29 can therefore be shifted angularly with respect to the smaller segment 26 by rotation on the shaft 30 common to both segments. Large segment 29 carries a scoring member 31 and the entire cylinder 25 comprising parts 26—31 serves, in cooperation with a countercylinder 32, for the scoring of the first longitudinal fold *f* (Fig. 3) which extends between the front part A of the envelope which is to later receive the inscription, and the wide side or back flap S. By adjustment of the large segment 29, the distance, measured on the periphery of the cylinder, between the suction openings 28 and the fold scoring member 31, can thus be changed and adjusted according to the size of envelope being handled. Inasmuch as, after the machine has once been adjusted, all blanks of the same size are grasped by the suction devices of the individual cylinders at exactly the same place closely behind the leading edge 4, there is positive assurance, after the corresponding adjustment of large segment 29, that the scoring for the first longitudinal fold *f* shall be applied at the same correct position for all blanks of the same size.

The blanks are thus fed over the path described above and as shown in Fig. 1 by dot-and-dash lines, from the feed pile 2 to their passage between cylinder 25 and its countercylinder 32 in unfolded condition with the edge 4 leading. The periphery or diameter of the feed segments 10, of cylinders 19 and 25, of feed discs 22 and of the plate cylinders P and P' are therefore dependent on the full dimension of the blank from its leading edge 4 to its opposite trailing edge for the largest blank to be handled by the machine. For the further course of the blank after leaving the scoring cylinder 25 and its countercylinder 32 the length of travel for each blank is considerably reduced since the following pair of cylinders 33, 34 effect the first longitudinal folding along the fold score line *f* produced by the cylinder 25. The cylinder 33 and

all following cylinders accordingly require only a diameter or circumference which is sufficient by one revolution to convey a length of paper which corresponds to the distance between the front edge 4 and the first longitudinal fold at the line *f* measured on the largest blank size.

The cylinder 33 has a suction channel 35 in communication with openings 36 in the periphery of the cylinder. By means of said openings, the cylinder grips the blank directly behind the score line *f* of the first longitudinal fold. Further rotation of the cylinder 33 causes the blank to bend between such cylinder and its countercylinder 34 along the score line *f* and the blank then advances with its fold forming the leading edge. Since the blanks may consist of heavier paper which always remains more or less stiff at the score line, stops 37 are provided to ensure the correct passage of the fold scoring *f* between the two cylinders 33 and 34. These stops 37 are adjustably mounted in arcuate guides 38 which extend over a part of the periphery of the cylinder 25. The leading edge 4 of the blank fed by the cylinder 25 enters the guides 38 and a rearward motion of the edge 4 starts upon the blank being gripped by suction by cylinder 33 behind the score line *f*. In order that, in case of heavier papers, the stiffness in the score line *f* does not interfere with the proper grasping by cylinder 33 and with the correct introduction of the fold between said cylinder and its countercylinder 34, the stops 37 are so adjusted that the blank edge 4 comes against the stops at the same instant as the blank is gripped by the suction of the cylinder 33. With this gripping, therefore, the bending of the blank must also commence and in this way the part of the blank gripped by cylinder 33 is pressed against the cylinder so that a loosening of the blank from the suction nozzles of the cylinder due to the stiffness at the score line cannot take place and a correct introduction of the fold is assured.

The folded blank emerging from the cylinders 33, 34 is first straightened by the next pair of cylinders 39, 40. For this purpose, the cylinder 39 is provided with a peripheral recess 41 extending in a longitudinal direction, and the cylinder 40 is provided with a longitudinal rail 42 extending from its periphery and which rail moves into said recess 41. The cylinders 39, 40 and all subsequent conveying and working cylinders also require a lesser angular velocity than the preceding cylinders due to the reduction of the blank size by the folding of the blank, and the cylinders 39 and 40 can be so adjusted that the leading fold in the work-piece fed from the cylinders 33, 34 comes against the rail 42 of cylinder 40 and the work-piece is so retarded that the full length of the fold engages against the rail 42 and in this manner the work-piece is accurately straightened. The cylinders 39, 40 convey the straightened work-piece to a pair of cylinders 43, 44, cylinder 43 of which is provided with a longitudinal scoring member 46 and two circular scoring members 45 by which the folded blank which passes between these cylinders receives the scoring *f'* for the fold of the narrow side flap *s* and the two scorings *f''* and *f'''* for the folds of the bottom and closure flaps B and V, respectively (Fig. 3). The work-piece is now fed by means of rolls 47, 48 to a device K which applies the adhesive coating indicated by *k* in Fig. 3 for the longitudinal sealing on the narrow side flap *s*. The cylinder 50 which rotates

in the adhesive container 49 feeds the adhesive to a transfer cylinder 51 from which it is received by the application cylinder 52 which is provided with two longitudinal adhesive applicators 53 which apply the adhesive to the work-pieces, the cylinder 52 making only one revolution for every two work-pieces.

From device K the work-piece passes along the dot-and-dash line between suitable guides, not shown in the drawing, to a turning station W consisting of an oblique plane 54 over which the work-piece slides until its leading fold *f* comes into contact with adjustable stops 55. Top rails 56 serve to hold down the wide side flap S which has already been folded over. The stops 55 actuated by a lever pair 57 then move the work-piece on the oblique plane 54 a short distance upwardly, so that its narrow side flap *s* can be gripped by the upper cylinder 58 of the pair of cylinders 58, 59, the said cylinder 59 being provided with suction means comprising suction openings 60. In this way the cylinders 58, 59 convey the work-piece, while forming the second longitudinal fold *f'*, the work-piece being carried between these cylinders, and the sealing of the flaps *s* and S is thus effected and the leading edge of the work-piece is now the fold *f'*.

Upon leaving cylinders 58, 59 the work-piece is passed in a horizontal direction between a plurality of cylinders 61 and their counterrolls 62, where a device K' applies the adhesive *k'* for the bottom sealing, and folding rails 63 and folding recesses 64 effect the folding of the bottom and enclosure flaps V and B, respectively, on their score lines *f''* and *f'''*, whereupon these folds and flaps are pressed down by cylinders and counterrolls. As is usual in such envelopes, the flap B may remain unfolded. The envelopes produced in this manner then pass, stacked closely together, into a delivery pile, but this part of the machine is not shown in the drawing as its construction and manner of operation are well known in the art.

Fig. 3 shows two superimposed blanks for envelopes to be produced in the machine, these being the largest and smallest envelope sizes for the production of which the machine can be used, and it can be seen from this figure by what amount *x* the central line of the maximum and minimum sizes are displaced when the folding line *f''* of the bottom flap B of the two blanks coincide with each other. This is of importance for the following reasons:

On the horizontal path determined by cylinders 61 and their counterrolls 62, the work-pieces are conducted in such a manner that the folding lines or score lines *f''* of the bottom flaps B follow the same line for all sizes, with the advantage that for a change in size both the folding tool for the bottom folding, for instance the folding rails 63 and the folding recesses 64 as well as the device K' for the application of the adhesive coating *k'* of the bottom flap need not be shifted.

Such an identical conveying of all blank sizes within their aforementioned horizontal path naturally requires that the blanks are also so arranged in the feed pile 2 that the bottom fold lines *f''* of all blank sizes lie at the same place. It is also essential for the dependable operation of the full feed device above described that the various members act at the center of all blank sizes and, when said members are present in pairs, they must act symmetrically to the central line for all sizes. All of these individual

members would therefore have to be adjusted to the position of the central line of the new blank upon each change of size if the position of the central line of the blank were changed due to the fact that the position of the bottom folding line *f''* has remained the same. In accordance with the example shown in the drawing, the parts involved in such adjustment would be the "leafer" 5, the suction device 7, the feed segments 10, the feed cylinder parts 11 and the swinging pile supports 17, and the extent of the greatest shifting of these individual members would be the measurement *x* of Fig. 3. In order to obviate the necessity of such a cumbersome and time-consuming individual adjustment of many parts upon each change in size, however, the following arrangement has been employed.

All of the aforementioned parts belonging directly to the full feed device and the position of which, with respect to the transverse extent of the machine, depends on the central line of the blank size which is to be handled, or their shafts or other carriers are supported in a special auxiliary bracket pair 65 which are connected with each other by cross-members 66 and are adjustable in the direction of the transverse extent of the machine with respect to the main brackets 67, which latter serve as support for all other cylinders, and other parts not directly belonging to the feed device. The auxiliary brackets 65 rest in a displaceable manner on cross-members 68, which cross-members are fastened to the main brackets 67.

For the necessary adjustment of the auxiliary brackets 65 with respect to main brackets 67 upon a change of blank size, a threaded spindle 70 having an adjusting wheel 69 is employed. This spindle 70 is adapted to turn on a journal pin 71 which is screwed to one of the main brackets 67. An adjusting ring 72 secures the threaded spindle 70 against longitudinal displacement on pin 71, and on this threaded spindle 70 an internal thread hub of arm 73 engages. The arm 73 is secured to the auxiliary bracket 65 at one side of the machine, so that rotation of the spindle 70 by its hand wheel 69 displaces the arm 73 upon the spindle 70 and thus shifts the auxiliary brackets 65 in either direction.

Although the drawings and the above specification disclose the best mode in which we have contemplated embodying this invention, we desire to be in no way limited to the details of such disclosure for, in the further practical application of the invention, many changes in form and construction may be made as circumstances require or experience suggests without departing from the spirit of the invention within the scope of the appended claims.

We claim:

1. A machine for the manufacture and printing of open-end envelopes in one continuous operation, comprising means for accommodating the envelope blanks in a feed pile, feed mechanism for the complete withdrawal of each lowermost blank from said pile, rotary means for receiving the blanks from said feed mechanism and for conveying the withdrawn blanks successively with their closure and bottom flaps at the opposite side edges of the blanks and parallel to the direction of feed, at least one rotary printing mechanism for receiving the blanks from said rotary means and for printing one surface of the unfolded blank to form the outer back and front surfaces of the finished envelopes, means for then scoring the printed blank on a line at right angles to its direction of feed, means for then folding the blank upon the said score line, means for feeding the folded blank with its folded edge leading, means for scoring, gumming and folding the side and bottom flaps of the envelope, supports for said feed mechanism, means for mounting the other parts of the machine, and means for the transverse displacement of said supports with respect to the mounting of the other parts of the machine and to said feed pile, to adjust the machine to different blank sizes.

2. A machine for the manufacture and printing of open-end envelopes in one continuous operation, comprising means for accommodating the envelope blanks in a feed pile, feed mechanism for the complete withdrawal of each lowermost blank from said pile, rotary means for receiving and conveying the withdrawn blanks successively with their closure and bottom flaps at the opposite side edges of the blanks and parallel to the direction of feed, at least one rotary printing mechanism for printing one surface of the unfolded blank to form the outer back and front surfaces of the finished envelope, means for then scoring the printed blank on a line at right angles to its direction of feed, means for folding the blank upon the said score line, means for scoring, gumming and folding the side and bottom flaps of the envelope, main supporting brackets for said feed pile and for said printing and envelope making means, auxiliary brackets for the support of said feed mechanism, and means for the displacement of said auxiliary brackets at right angles to the direction of feed of the blanks and envelopes to adjust the machine to different blank sizes.

3. A machine according to claim 1, comprising a pair of cylinders for straightening the blank after the folding thereof upon the said score line.

4. A machine according to claim 1, wherein said gumming means comprises rotary means for the application of gum to the blank in strips extending transversely of the direction of feed.

5. A machine according to claim 1, comprising means for folding the closure flap at the opposite side edge of the blank from the bottom flap.

6. A machine according to claim 1, wherein said scoring and folding means comprises means for scoring the blank for a second fold parallel to the said score line, and cylinders for folding the blank along the second score line.

7. A machine according to claim 1, wherein said second scoring means comprises means for scoring the blank for a second fold parallel to the said score line at right angles to the direction of feed of the blank.

8. A machine according to claim 1, wherein the means for folding the blank comprises adjustable stop means for reversing the direction of feed of the folded blank.

9. A machine according to claim 1, wherein the means for folding the blanks comprises cylinders and stop means for engaging the fold in the blank.

10. A machine according to claim 1, wherein the means for gumming the side and bottom flaps of the envelopes comprises rotary means for applying the gum in strips extending parallel to the direction of feed.

11. A machine according to claim 1, wherein the supports for the said means for the withdrawal of the blanks from the feed pile comprise brackets and screw-and-nut adjusting means whereby the said supports are displaced with respect to the said pile.

12. A machine according to claim 1, wherein the said means for folding the blank upon the said first score line at right angles to its direction of feed comprises a pair of cylinders, suction means whereby one of said cylinders grips the blank directly behind the said score line and conveys the folded blank between said cylinders to form the fold, and stop means for engaging the folded leading edge of the blank.

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