June 7, 1960 S. E. CALHOUN 2,939,261

ENVELOPE FLAP OPENING DEVICE

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Fig. 1

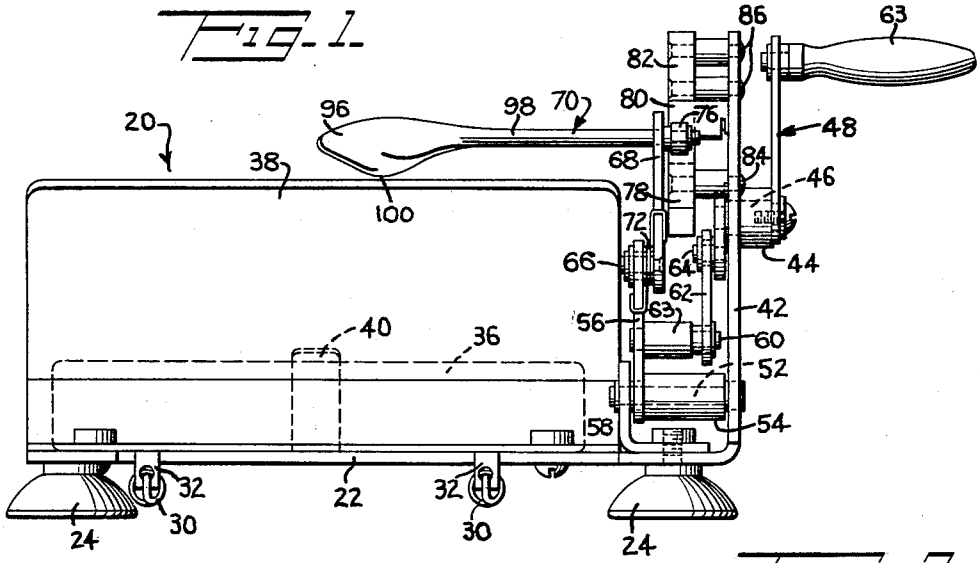


Fig. 2

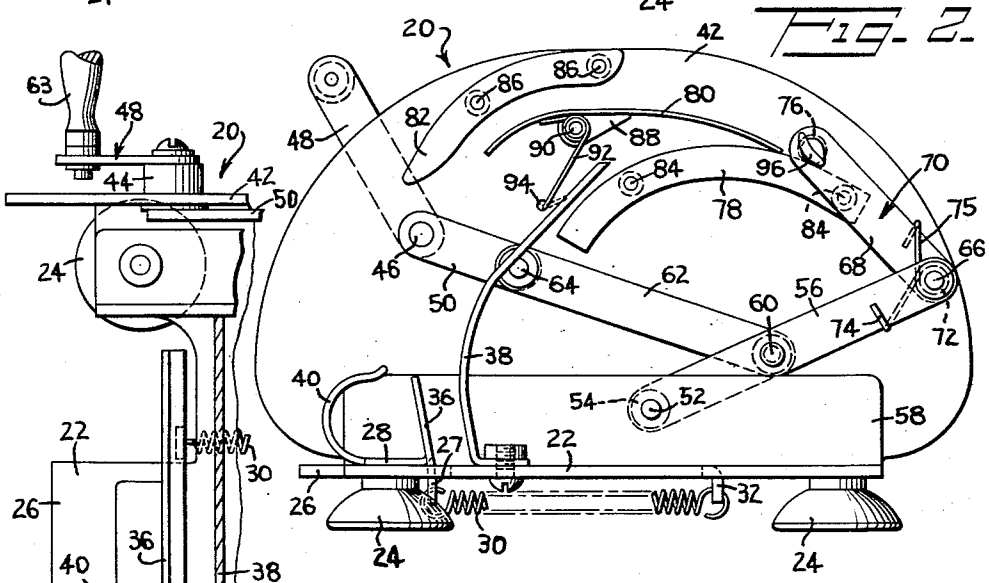


Fig. 3

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Fig. 4

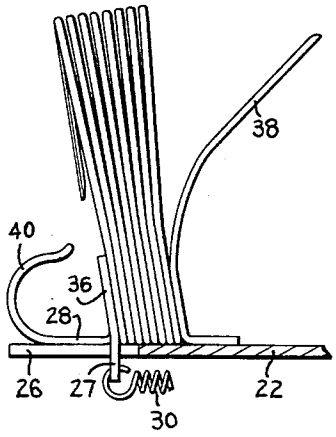


Fig. 5

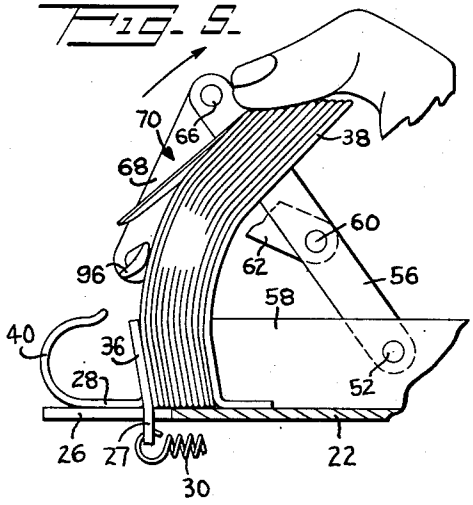


Fig. 6

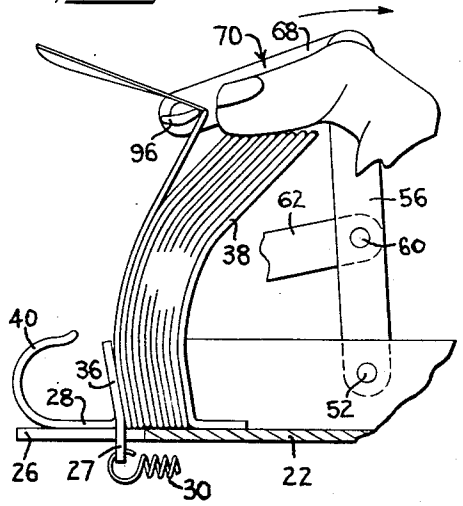


Fig. 7

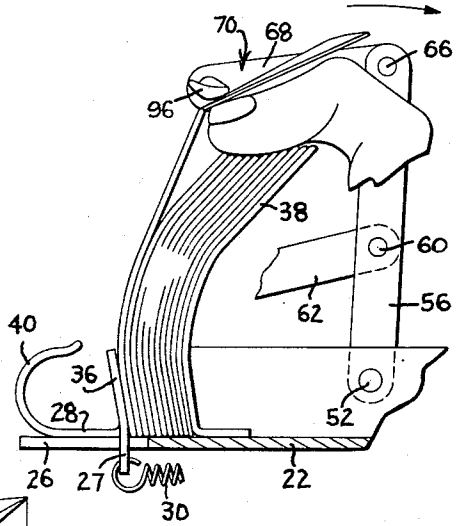


Fig. 11

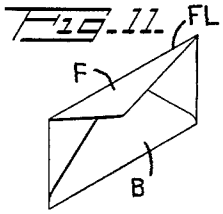
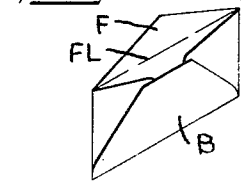


Fig. 12



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Fig. 8.

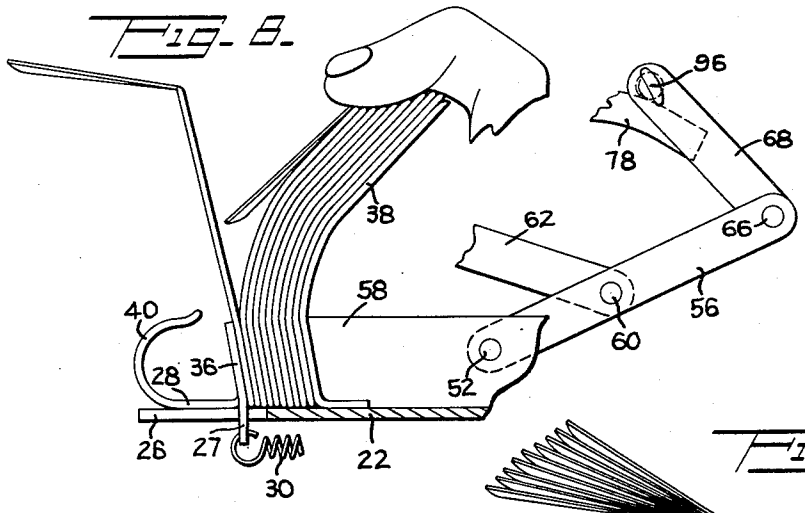


Fig. 9.

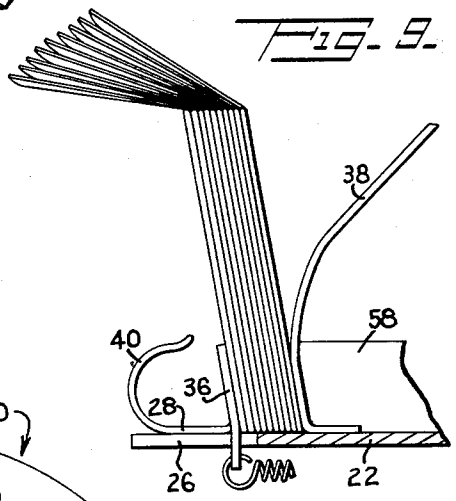
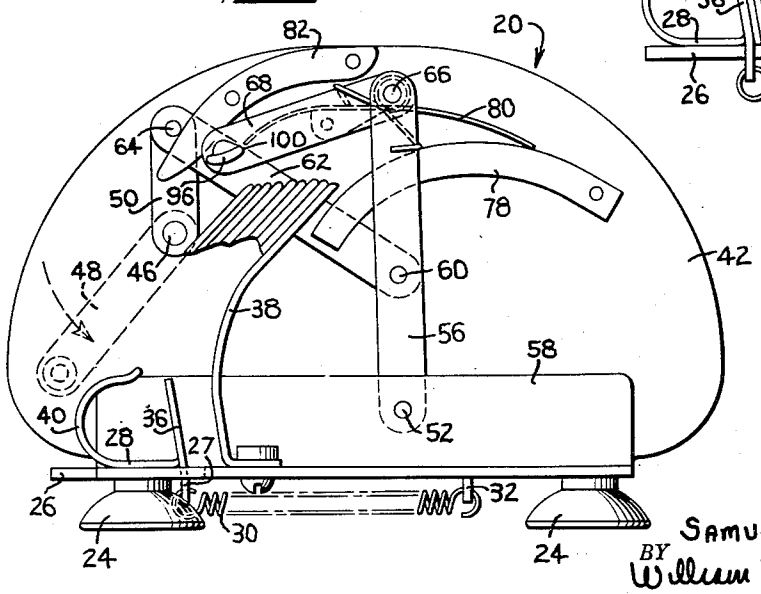


Fig. 10.



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2,939,261

ENVELOPE FLAP OPENING DEVICE

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Filed Dec. 5, 1958, Ser. No. 778,477

8 Claims. (Cl. 53—381)

This invention relates to a device for preparing mailing envelopes for use in certain types of mail treating machines. More particularly, the invention relates to a device for opening the flaps of envelopes for the purpose of providing groups of open-flapped envelopes which can, for example, be stacked in a letter mail inserting machine.

Such a machine is disclosed in U.S. Patent No. 2,771,-726 granted to E. H. Owen et al., wherein a group of open-flapped envelopes are shown stacked at one end of the machine with the lowermost envelope positioned in the path of a reciprocating ram element which is adapted to pass a folded sheet or the like into the mouth of the envelope.

It is accordingly one object of this invention to provide a novel device for opening the flaps of envelopes.

A further object of this invention is to provide an improved device for quickly and expeditiously opening the flaps of envelopes. A further object is to provide such a device which is simple in construction, economical to manufacture and easy to operate.

A further object of the invention is to provide an improved device for operating upon envelopes successively while stacked in a group to open the flaps thereof and further, to permit such opening of the flaps without requiring the transportation of the envelopes from one location to another during the flap-opening operation.

A still further object of the invention is to provide an improved flap-opening device which is adapted to operate upon a substantial range of sizes of envelopes.

Further objects and advantages will become apparent as the description proceeds.

A preferred embodiment of the invention is shown in the accompanying drawings, wherein:

Fig. 1 is a rear elevational view of an envelope flap-opening device according to the invention;

Fig. 2 is a side elevational view thereof;

Fig. 3 is a fragmentary, top plan view thereof, partly in section;

Figs. 4 through 9 are fragmentary, side elevational views, partly in section and respectively showing movable parts of the device in different stages of operation;

Fig. 10 is a view similar to Fig. 2 but showing parts thereof in a different stage of operation; and

Figs. 11 and 12 are perspective views on a reduced scale of a typical envelope upon which a device embodying the invention is operable, Fig. 11 showing the flap thereof closed and Fig. 12 the flap opened.

Referring to Figs. 1 through 3 and 10, reference numeral **20** generally indicates an envelope flap-opening device according to the invention and which includes a base member **22**. Suitably secured by means such as screws threadedly received by the base member or a member carried thereby, are a plurality of suction cups **24** for supporting the device on a table, desk or the like. Base member **22** provides an extension **26** of reduced width adjacent each side of which is disposed a downwardly extending tab **27** carried by a slide **28**. One end of each

of a pair of tension springs **30** is connected to a downwardly extending projection **32** carried by base member **22**, and the other end of each of these springs is connected to one of tabs **27, 27**. In this manner a clamping member **36** also carried by slide **28** is resiliently biased to the right as viewed in Fig. 2 toward a supporting member **38** carried by base member **22**. By grasping a handle **40** carried by slide **28** and pulling the former to the left as viewed in Fig. 2, clamping member **36** may be withdrawn in the direction away from supporting member **38** for the insertion of a stack or group of envelopes therebetween. Upon releasing handle **40**, clamping member **36** will be resiliently biased by springs **30, 30** to the right as viewed in Fig. 2 to clamp the stack of envelopes against supporting member **38**. A stack of envelopes so clamped is shown in Fig. 4, it being noted that clamping means **36** is remote from the closed flaps of the envelopes of the stack. This permits the stack to be transversely bowed whereby the free end of the flap of the outermost envelope of the stack is separated from the body thereof.

Supporting member **38** presents a convex surface to the stack of envelopes so that by releasably biasing the folded edges of the envelopes of the stack against this convex surface such as with one's thumb as shown in Fig. 5, the stack of envelopes will be so transversely bowed.

A typical envelope is shown in each of Figs. 11 and 12, the flap F thereof being shown closed in Fig. 11 and opened in Fig. 12. The body of the envelope is indicated in these figures at B and the fold-line between the body and flap at FL.

Integral with or otherwise carried by base **22** is side wall **42**. Suitably secured about an aperture in side wall **42** is a journal **44** rotatably mounting a shaft **46**. A crank generally designated by the reference numeral **48** and a first linkage member **50** are fixedly secured to shaft **46** for rotation about a common axis. A shaft **52** extends through aligned apertures in side wall **42**, a hub **54**, a second linkage member **56** which carries hub **54**, and another wall **58**, the latter being carried by base member **22** in spaced relation to side wall **42**. In this manner, linkage member **56** is mounted for pivotal movement about the axis of shaft **52**, the latter axis being spaced from and parallel to the axis about which linkage member **50** is rotatable. A pin **60** pivotally interconnects one end of a third linkage member **62** with linkage member **58** intermediate the ends of the latter. In this regard, pin **60** extends through aligned apertures in linkage members **58** and **62** and through a hub **63** carried by member **56**. Another pin **64**, in like manner pivotally connects the opposite end of linkage member **62** with the distal end of linkage member **50**; pin **64** extending through aligned apertures in the latter linkage members and in a hub **65** carried by member **56**. It will be apparent that rotation of handle **63** of crank **48** continuously in the counter-clockwise direction, as viewed in Fig. 2, results in corresponding, continuous, counter-clockwise rotation of linkage member **50** and concomitant reciprocating pivotal movement of linkage member **56** about the axis of shaft **52**.

A pin **66** mounts one end of a leg **68** of a substantially L-shaped member generally designated at **70** for pivotal movement about the distal end of linkage member **56**. A torsion spring **72** disposed about pin **66** has one end **74** biased against leg **68** and its other end **75** biased against second member **56** resiliently to bias leg **68** in the counter-clockwise direction about pin **66** as viewed in Fig. 2. A cam-follower roller **76** is rotatably carried by L-shaped member **70** and is cooperable with three cams **78, 80** and **82**, respectively. Cam **78** is fixedly supported on side wall **42** by means such as rivets **84, 84**, and in like manner cam **82** is supported on side wall **42** by means such as rivets **86, 86**. Cam **80** carries a right-angle extension

88 having an aperture for receiving a pin 90 carried by side wall 42 thereby providing for pivotal movement of cam 80 about the axis of pin 90. A torsion spring 92 has one end engaged in an aperture 94 provided by side wall 42 and its other end biased against cam 80 resiliently to bias the latter in the clockwise direction as viewed in Fig. 2 thereby urging the right-hand end of cam 80 toward engagement with the adjacent portion of cam 78.

The above-described operating structure is effective, upon rotation of crank 48 in the counter-clockwise direction as viewed in Fig. 2, to move a smoothly surfaced end 96 of a flap-opening finger member 98 which forms the other leg of L-shaped member 70 under and across the flap of each envelope to release each of the latter from said bowing and to open the flap thereof. More particularly, finger end 96 is movable in a path from an advanced position, along and against the body of the outermost envelope releasably held in transversely bowed condition as viewed in Fig. 5, to a position between the flap and body thereof, and then to a retracted position past the body thereof to open said flap and to release this envelope from transversely bowed condition; all as will be described more in detail below. It will be noted that the edge of finger end 96, which is the leading edge thereof during movement of the finger from advanced to retracted position, comes to a dull point 100 thus facilitating entry of the finger end between the flap and body of the respective envelopes.

With flap-opening finger 98 in the fully advanced position as shown in Fig. 5 and with the stack of envelopes releasably biased against support 38, all as shown in Fig. 5, counterclockwise rotation of crank 48 as viewed in Fig. 2 results in clockwise pivotal movement of linkage member 56 about shaft 52 which in turn results in arcuate movement of end 96 of flap-opening member 98 along and against the body of the outermost envelope of the stack. It is to be noted that at this stage in the operation of the device, torsion spring 72 resiliently biases finger end 96 against the body of the outermost envelope of the stack and in the direction generally perpendicular to said path of finger 98 between advanced and retracted positions, and resiliently biases cam-follower 76 toward cam 78. Continued rotation of crank 48 brings finger end 96 along and against the body of the outermost envelope of the stack to a position between the flap and the body thereof. Further rotation of the crank brings finger end 96 farther along the body of the outermost envelope of the stack and then past the body and flap thereof as well as past the remaining releasably held envelopes of the stack as respectively depicted in sequence in Figs. 6, 7 and 8. Referring to Figs. 6 and 7, it will be apparent that finger end 96, as it moves past the body of said outermost envelope of the stack, opens the flap of that envelope and releases that envelope from the releasable bias toward support 38. As best indicated in Figs. 2, 6 and 7, cam 78 and the convex surface of support 38 can be configured so that finger end 96 will have moved in the general direction away from the stack of transversely bowed envelopes before reaching the fold between the flap and body of the outermost envelope. It will be noted that this facilitates opening of the respective flap by effecting this opening more gradually than would otherwise be the case. With flap-opening member 98 in the fully retracted position shown in Figs. 2 and 8, finger end 96 will have moved past the stack of envelopes and cam-follower 76 will have come into engagement with cam 78 thereby to prevent finger end 96 from dropping behind the stack of envelopes and support 38. As cam-follower 76 moves along cam 78 toward the fully retracted position shown in Figs. 2 and 8, it moves into engagement with and biases cam 80 in the counter-clockwise direction as viewed in Fig. 2, and upon moving past cam 80 permits the latter to return under the bias of spring 92 into engagement with cam 78.

Upon continued rotation of crank 48 in the counter-clockwise direction as view in Fig. 2, linkage member 56 will begin pivotal movement in the counter-clockwise direction about pin 52 resulting in movement of cam-follower 76 and finger end 96 in an arcuate path to the left as viewed in Fig. 2. With continued movement to the left of cam-follower member 76, the latter moves onto and along cam 80 thereby causing finger end 96 to move from retracted to advanced position at a higher level than that during its movement from advanced to retracted position with the result that finger end 96 moves from retracted to advanced position in spaced relation to the remainder of the releasably bowed envelopes of said stack during movement thereacross. The space between the left-hand end of cam 80, as viewed in Fig. 2, and the adjacent portion of cam 82 may be slightly less than the diameter of cam-follower 76 so that the latter will be resiliently forced by cam 80 to ride against cam 82 until cam-follower 76 rides off the end of cam 80. Cam 80 is so configured that finger end 96 moves off the end of cam 80 under the bias of spring 72 onto the then outermost envelope of the remaining releasably bowed envelopes of the stack. It will be noted that cam 82 prevents finger end 96 from passing across any envelope or envelopes released from the remaining transversely bowed envelopes of the stack even when the tendency would be strongly otherwise due to the inertia of the flap-opening member in returning to the advanced position during high-speed operation of the device.

Continued rotation of crank 48 results in repetition of the above-described cycle of operation, in turn resulting in the successive release of the then outermost envelope from transverse bowing and opening of the flap thereof until the flaps of all of the envelopes of the stack have been opened as shown in Fig. 9 whereby the envelope flaps project from their respective bodies in overlapped relation to each other.

Since many changes could be made in the embodiment of the invention as particularly disclosed herein without departing from the scope of the invention, it is intended that this embodiment be considered as exemplary and that the invention not be limited except as warranted by the following claims.

What is claimed is:

1. An envelope flap-opening device comprising means for clamping a stack of envelopes having their flaps folded closed along an edge thereof said means permitting releasable, transverse bowing of the stack whereby the free edge of the flap of the outermost bowed envelope is separated from the body thereof; a flap-opening member; means mounting said flap-opening member for movement transversely of said stack between advanced and retracted positions; cam means; cam-follower means operatively connected with said flap-opening member and cooperable with said cam means; means resiliently biasing said flap-opening member against the body of said outermost bowed envelope during a portion of the movement of the flap-opening member from said advanced to retracted positions; said cam means being configured to permit movement of said flap-opening member from advanced position, along and against the body of said outermost bowed envelope to a position between the flap and the body thereof, and then to retracted position past the body thereof to open the flap thereof and release said last-mentioned envelope from said releasable bowing; and said cam means being configured to effect return movement of said flap-opening member to advanced position across and in spaced relation to the remaining releasably bowed envelopes of the stack.

2. The device as set forth in claim 1 including a support presenting a convex surface to said stack for biasing the latter thereagainst to effect said releasable transverse bowing of the stack.

3. An envelope flap-opening device comprising means for clamping a stack of envelopes remote from the flaps thereof to permit releasable, transverse bowing of the stack for separating the leading edge of the flap of the

outermost envelope of the stack from the body thereof; a flap-opening member; means mounting said member for movement transversely of said stack from an advanced to a retracted position along and against the body of said outermost envelope to a position between the flap and body thereof and then past the body thereof to open said last-named flap and to release said last-mentioned envelope from said releasable bowing; a cam-follower operatively connected with said member; a first cam cooperable with said cam-follower to prevent said member from moving behind said stack after passing therepast during movement of said member from advanced to retracted position; and a second cam cooperable with said cam-follower to retain said member in spaced relation to the remainder of the releasably bowed envelopes of said stack during movement thereacross from said retracted to said advanced position.

4. The device as set forth in claim 3 including a support presenting a convex surface to said stack for biasing the latter thereagainst to effect said releasable transverse bowing of the stack.

5. The device as set forth in claim 3 including a third cam cooperable with said cam-follower to prevent said member from passing across any envelopes released from said releasable bias during movement of the cam-follower from said retracted to said advanced position.

6. An envelope flap-opening device comprising a base, clamping means on said base for supporting a stack of envelopes at a position permitting releasable transverse bowing of the stack to separate the free edge of the flap of the outermost envelope from the body thereof, a first member mounted for rotation about a first axis; a second member mounted for pivotal movement about a second axis substantially parallel with said first axis; a linkage interconnecting said first and second members for reciprocating pivotal movement of said second member upon

continuous rotational movement of said first member; a flap-opening member carried by said second member for reciprocating movement from an advanced position, along and against the body of said outermost envelope, to a position between the flap and body thereof, and then to a retracted position past the body thereof to open the flap thereof and release said last-mentioned envelope from said releasable bowing; cam means; cam-follower means operatively connected with said flap-opening member; means resiliently biasing said cam-follower means toward said cam means; and said cam means being configured to prevent said member from moving behind said stack under said resilient bias after passing therepast during movement from advanced to retracted position and to retain said flap-opening member against said resilient bias so as to clear the remaining releasably bowed envelopes of the stack during movement from the retracted to the advanced position.

7. The device as set forth in claim 6 including a support presenting a convex surface to said stack for biasing the latter thereagainst to effect said releasable transverse bowing of the stack.

8. The device as set forth in claim 7 wherein said cam means and the convex surface of said support are configured to effect movement of said flap-opening member in the general direction away from the transversely bowed envelopes of the stack before reaching the fold between the flap and body of the then outermost, transversely bowed envelope during movement from advanced to retracted position.

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