United States Patent [19]

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[11] **3,910,007**

[45] **Oct. 7, 1975**

[54] **DEVICE FOR OPENING THE FLAPS OF ENVELOPES**

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[22] Filed: **Mar. 25, 1974**

[21] Appl. No.: **454,252**

[30] **Foreign Application Priority Data**

Apr. 26, 1973 Germany 2321128

[52] **U.S. Cl.** **53/58;** 53/384

[51] **Int. Cl.²** **B65B 57/04;** B65B 43/26

[58] **Field of Search** ..... 53/29, 58, 187, 266 A, 53/381, 384; 93/61 B

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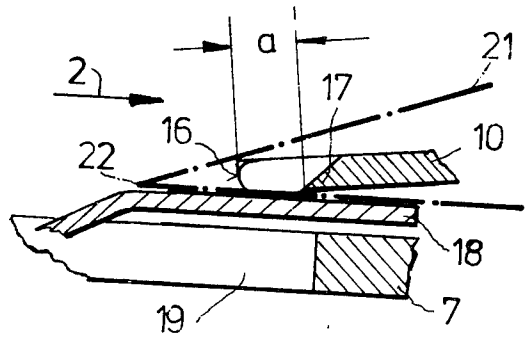
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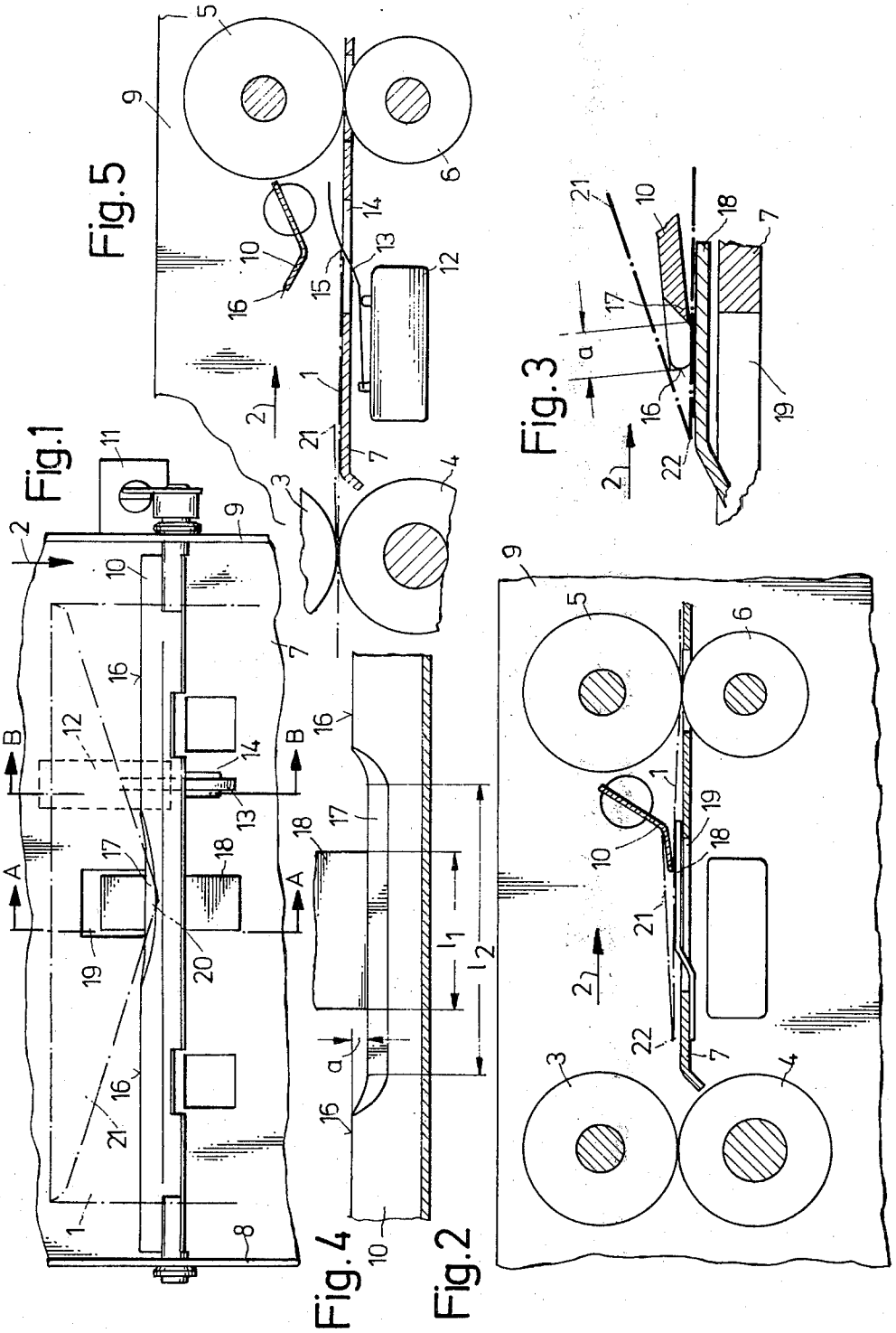
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[57] **ABSTRACT**

A stripper device for lifting and opening the flaps of envelopes transported by a conveyor to a work station prior to transport of the envelopes to a filling station of an envelope stuffing machine includes a pair of conveyor rollers for advancing an envelope in a transport plane to the work station and a pair of discharge rollers for transporting the envelope from the work station towards the filling station. At a position spaced above the transport plane and extending transversely thereto there is provided a stripper member adapted to be moved between an inoperative position spaced above the envelope and an operative position in which the stripper member is effective to engage and lift up and open the flap of the envelope. The lead edge of the stripper member, intermediate the ends of the stripper member, is provided with a recessed knife edge for entering between the body and the flap of the envelope to provide positive gripping and opening of the flap. A spring element is provided at a position beneath the transport plane and acts to urge the envelope in an upward direction towards the knife edge of the lowered stripper member to further assure that the envelope in the zone of the flap is pressed firmly against the knife edge of the stripper member thereby facilitating the entry of the knife edge between the envelope body and the flap.

9 Claims, 5 Drawing Figures




Fig.1
Fig.2
Fig.3
Fig.4
Fig.5

DEVICE FOR OPENING THE FLAPS OF ENVELOPES

BACKGROUND OF THE INVENTION

In a known prior art device of this general kind there is shown an arrangement for transporting an envelope to a position under a stripper member at the work station of the envelope stuffing machine. The stripper member extends in a direction transverse to the direction of envelope feed and extends over the whole width of the transport plane. The lead edge of the stripper member is also provided with a knife edge and the stripper member is arranged for movement between raised and lowered positions. In operation, as the front edge of the envelope approaches the stripper member, the stripper member is lowered to the side and onto the envelope in such a way so as to grip, raise and fold back the flap of the envelope.

However, in order to assure positivve lifting of the flap by the stripper member, this prior art device also requires that a suitable blast of compressed air be directed towards the flap so as to partially lift the flap to permit positive insertion of the stripper member thereunder. This partial opening of the flap by the air blast is required before engagement of the flap by the knife edge since the weight of the stripper member in its lowered position rests on the entire length of the envelope. Also, if the knife edge of the stripper member were to be an extremely sharp cutting edge to provide for more positive stripping of the flap without the aid of an air blast there would be the danger of the sharp edge cutting the flap of the envelope at its fold.

SUMMARY OF THE INVENTION

The present invention provides a device for lifting and opening the flap of an envelope at a work station of an envelope stuffing machine without the need of a preliminary opening of the flap by an air blast as disclosed in the prior art device.

It is an object of the present to provide an envelope flap opening device including a stripper member having a knife edge recessed from a pair of rounded lead edges of the stripper member. The knife edge extends laterally over only a central portion intermediate the rounded lead edges of the stripper member. The rounded lead edges prevent the knife edge from coming into contact with the fold and cutting the flap at the fold, and permit the use of a knife edge having an extremely sharp edge which, even when the flap lies flat on the body of the envelope, can grip and lift the flap in a positive manner without the assist of a preliminary air blast as required in the prior art device.

It is another object of the invention to provide a spring-pressure element arranged below the knife edge. The spring-pressure element is narrower than the length of the knife edge such that the pressure element presses firmly against the underside of the knife edge only in the zone of the point of the flap to permit positive gripping and lifting of the flap of the envelope by the knife edge.

Other objects, features and advantages will appear hereinafter as the description proceeds.

IN THE DRAWING

FIG. 1 is a plan view, partially broken away, showing a stripper device for opening the flap of an envelope in accordance with the present invention;

FIG. 2 is an end elevation, in section, of the stripper device as viewed on the line A—A in FIG. 1 and showing the stripper device in a lowered position for lifting the envelope flap;

FIG. 3 is an enlarged sectional end view, partially broken away, showing the stripper device inserted between the flap and the body of the envelope;

FIG. 4 is a partial section of the stripper device showing the knife edge of the stripper in detail; and

FIG. 5 is a sectional end view of the stripper device as viewed on the line B—B in FIG. 1, partially broken away, similar to FIG. 2 but showing the stripper in a raised position.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to FIGS. 2 and 5 there is shown a pair of conveyor rollers 3 and 4 for transporting an envelope 1 (shown in phantom in FIG. 1) along a path to a work station, and a pair of discharge rollers 5 and 6 for transporting the envelope from the work station to a filling station of an envelope stuffing machine. The conveyor rollers 3 and 4 are driven at the same peripheral speed as the discharge rollers 5 and 6 and transport the envelope 1 in the direction of arrow 2 shown in FIG. 2.

A guide plate 7 is provided for supporting the envelope 1 at the work station and the upper surface of the guide plate defines a transport plane in alignment with the nip of the conveyor rollers 3 and 4 and the nip of the discharge rollers 5 and 6. A separator or stripper member 10 is pivotally supported in a pair of side plates 8 and 9 and extends transverse to the transport plane and the direction of envelope feed substantially the whole width of the guide plate 7. The separator member 10 is positioned above the guide plate 7 immediately ahead of the discharge roller 5, and is arranged for swinging movement between an inoperative raised position shown in FIG. 5 and an operative lowered position as shown in FIGS. 2 and 3 wherein the foot member of the stripper 10 is in engagement with the envelope to separatingly engage and lift a closed flap 21 of the envelope 1.

The separator member 10 is moved between its raised and lowered positions in response to energization of a solenoid 11 activated by a microswitch 12. The microswitch 12 is provided with a feeler arm 13 projecting through an opening 14 in the guide plate 7 and extends from below the guide plate into the path of movement of the envelope 1 being transported to the work station. The envelope 1 is transported to the work station with the flap 21 thereof facing upwardly and with the flap trailing a lead edge 15 of the envelope in the direction of envelope transport. Thus, as the lead transverse edge 15 (FIG. 5) of the envelope 1 is transported beyond a pair of rounded lead edges 16 of the raised stripper member 10, the edge 15 of the envelope strikes the feeler arm 13 thereby actuating the microswitch 12 and energizing the solenoid 11 to effect swinging movement of the stripper member 10 from the raised to the lowered position.

As best shown in FIGS. 1 and 4, extending laterally between and parallel with the pair of rounded lead edges 16 of the stripper member 10, the rounded lead edges 16 being in aligned and spaced apart relationship with each other, there is provided a sharp knife edge 17 recessed from the rounded lead edges 16 by a distance

a. The length of the knife edge **17**, indicated by the reference character 1_2, is about **20%** – **25%** of the total length of the stripper member **10**.

A spring-pressure element in the form of a leaf spring **18** is mounted on the underside of the guide plate **7** and projects upwardly through an opening **19** in the guide plate **7** and extends into the transport plane of the envelope path. The leaf spring **18** is biased in an upward direction so as to press against the underside of the stripper member **10** in the area of the knife edge **17** when the stripper member **10** is in the lowered position as shown in FIG. **2**. The width or surface of the leaf spring **18**, represented by the reference character 1_1 in FIG. **4**, is preferable about one-half the length 1_2 of the knife edge **17** to assure that the envelope is pressed in the zone of the flap firmly against the underside of the knife edge **17** of the stripper member **10** for positive gripping and lifting of the envelope flap **21** by the knife edge **17**.

Subsequent to the initial opening of the flap **21** by the knife edge **17** as shown in FIG. **2**, as the envelope **1** is further transported toward the discharge rollers **5** and **6** the flap **21** continues to be raised by the stripper member **10** until such time as the rounded lead edges **16** of the stripper member **10** arrive at a fold **22** of the flap **21** as shown in FIG. **3**. In this position the flap **21** is in its extreme open position and the envelope is in readiness for further transport from the work station to the filling station of the envelope stuffing machine.

After the flap of the envelope **1** is opened, further transport of the envelope by the discharge rollers **5** and **6** moves the envelope from the work station towards the filling station. As the envelope is moved out of the work station and the trailing edge of the envelope travels beyond and releases the feeler arm **13**, the microswitch **12** activates the solenoid **11** which restores the stripper member **10** to the inoperative raised position.

Because the knife edge **17** is recessed from the rounded lead edges **16** of the stripper member **10** by an amount indicated by the reference character a, the knife edge **17** does not come into contact with the fold **22** of the flap **21** thereby eliminating the possibility of the knife edge **17** cutting the fold **22** of the flap **21**. Also, as a result of the leaf spring **18** urging the envelope firmly against the underside of the knife edge **17** to assure positive gripping, lifting and opening of the flap **21**, the possibility of a tip **20** of the flap **21** sliding under the stripper member **10**, such that the knife edge **17** would fail to engage and lift the flap **21**, is virtually eliminated.

From the foregoing it will be seen that the present invention provides a novel arrangement of a stripper member for lifting and opening the flaps of envelopes at the work station for further transport to the filling station of an envelope stuffing machine. The recessed knife edge of the stripper member together with the pressure spring element acting against the envelope in the zone of the flap to urge it into firm engagement with the knife edge provide an extremely reliable means for insuring that the knife edge will enter between the body and the flap of the envelope to thereby raise the flap to the open position. Additionally, the rounded lead edges of the stripper member are effective to progressively raise the flap to the open position without danger of the knife edge cutting the fold of the flap of the envelope.

I claim:

1. A stripper device for lifting and opening a flap of an envelope at a work station prior to transporting the envelope to a filling station of an envelope stuffing machine, comprising:

means for transporting an envelope having a folded flap closure to the work station with the flap facing upwardly and trailing a lead edge of the envelope in the direction of envelope transport;

a guide plate defining a transport plane for supporting an envelope at the work station;

a stripper member pivotally mounted above and transverse to the transport plane for movement between an inoperative position spaced from the envelope at the work station and an operative position in engagement with the envelope, said stripper member comprising a continuous singular member having a lead edge comprising rounded segments at its lateral ends and a knife blade section intermediate said ends and recessed from the rounded lead edges;

biasing means for urging the envelope against said stripper member; and

means actuable by the lead edge of the envelope transported to the work station for moving the stripper member from the inoperative position to the operative position whereby the knife blade engages and lifts the flap of the envelope and the rounded lead edges open and fold back the flap of said envelope and prevent the knife blade from coming into cutting engagement with the fold of the flap.

2. A stripper device as set forth in claim **1** in which the biasing means includes a spring pressure element positioned beneath the transport plane and having a surface thereof acting against the envelope at the work station for pressing the envelope firmly against the knife blade when the stripper member is in the operative position.

3. A stripper device as set forth in claim **2** in which the surface of the spring pressure element extends laterally a distance less than the length of the knife blade so as to act against the envelope in a zone of the envelope flap.

4. A stripper device as set forth in claim **1** in which the stripper member is moved from the operative position to the inoperative position in response to actuation of the last-named means which is actuated in response to movement of the envelope out of the work station and towards the filling station by the transport means.

5. A stripper device for lifting and opening a flap of an envelope at a work station prior to transport of the envelope to a filling station of an envelope stuffing machine, comprising:

means for delivering an envelope having a folded flap closure to the work station;

a transport plane for supporting an envelope at the work station;

a stripper member pivotally mounted above the transport plane for movement between an inoperative position and an operative position in engagement with the envelope at the work station, said stripper member comprising a continuous singular member having a lead edge comprising rounded segments at its lateral ends and a knife blade section intermediate said ends and recessed from the rounded lead edges;

biasing means for urging the envelope against said stripper member; and

means responsive to the presence of an envelope at the work station for moving the stripper member from the inoperative position to the operative position whereby the knife blade engages and lifts the flap of the envelope and the rounded lead edges open and fold back the flap of said envelope and prevent the knife blade from coming into cutting engagement with the fold of the flap.

6. A stripper device as set forth in claim **5** in which the biasing means includes a spring pressure element positioned beneath the transport plane and having a surface thereof acting against the envelope at the work station for pressing the envelope firmly against the knife blade when the stripper member is in the operative position.

7. A stripper device as set forth in claim **6** in which the surface of the spring pressure element extends laterally a distance less than the length of the knife blade so as to act against the envelope in a zone of the envelope flap.

8. A stripper device as set forth in claim **5** in which the stripper member is moved from the operative position to the inoperative position in response to actuation of the last-named means which is actuated in response to movement of the envelope out of the work station and towards the filling station by the transport means.

9. A device for lifting and opening a flap of an envelope at a work station prior to transporting the envelope to a filling station of an envelope stuffing machine, comprising:

means for transporting the envelope having a folded flap closure along a path to a work station in a position that exposes the flap containing side of the envelope so that the flap is transverse to the path of movement and opens in a direction countercurrent the envelope transport direction;

a separator member pivotally mounted above and transverse to the path of the envelope, said separator member comprising a continuous singular member having a lead edge comprising rounded segments at its lateral ends and a knife blade section intermediate said ends and recessed from the rounded lead edges; and

biasing means for urging the envelope against said separator member.

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