Oct. 28, 1969 T. C. SWINYAR 3,474,711

ENVELOPE FLAP DEFLECTING APPARATUS

Filed Aug. 14, 1967 3 Sheets-Sheet 1

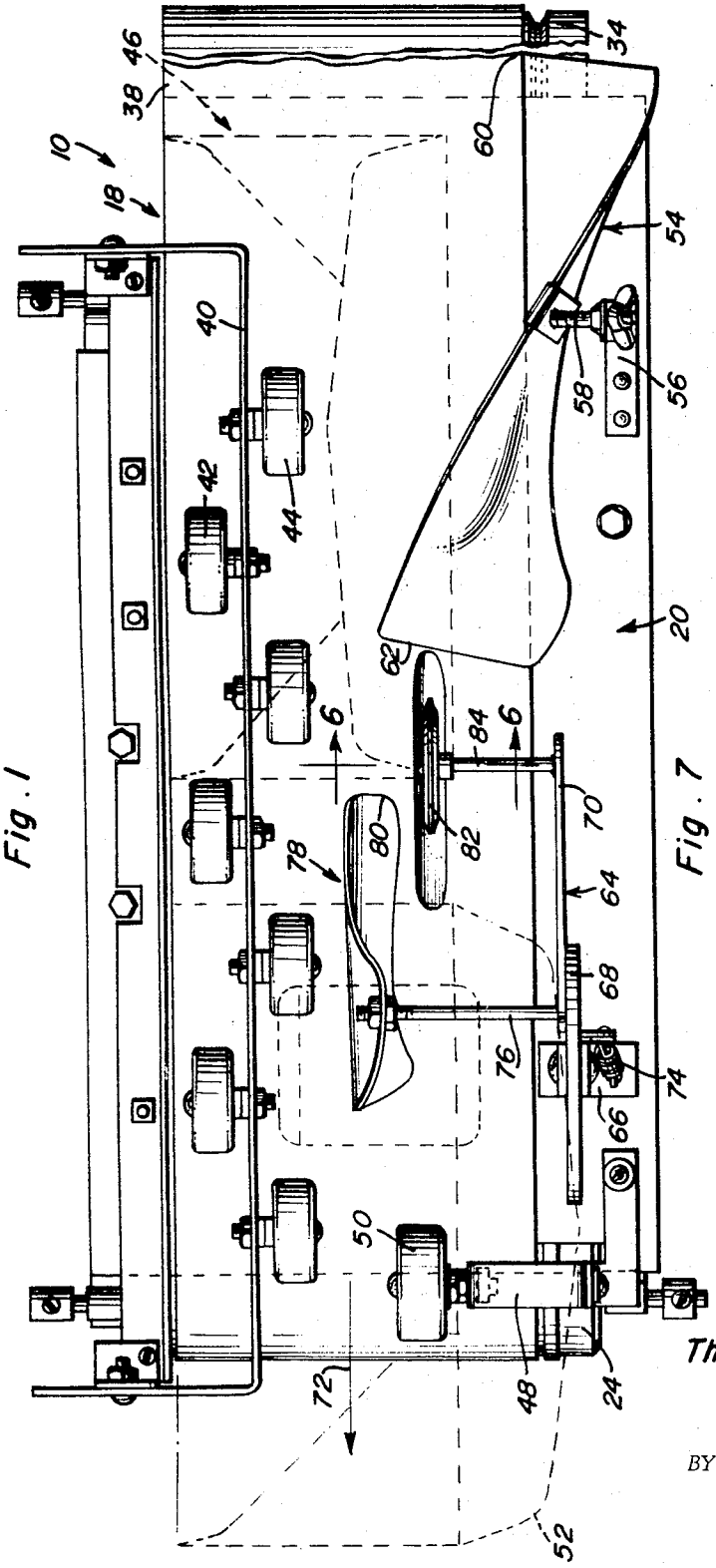


Fig. 1

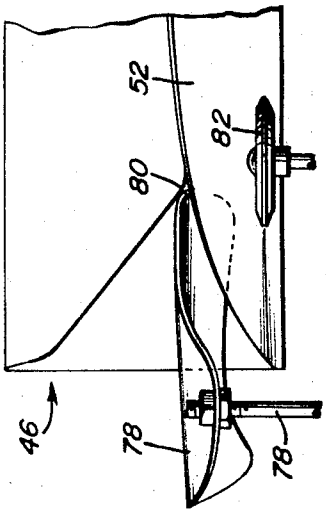


Fig. 7

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ENVELOPE FLAP DEFLECTING APPARATUS

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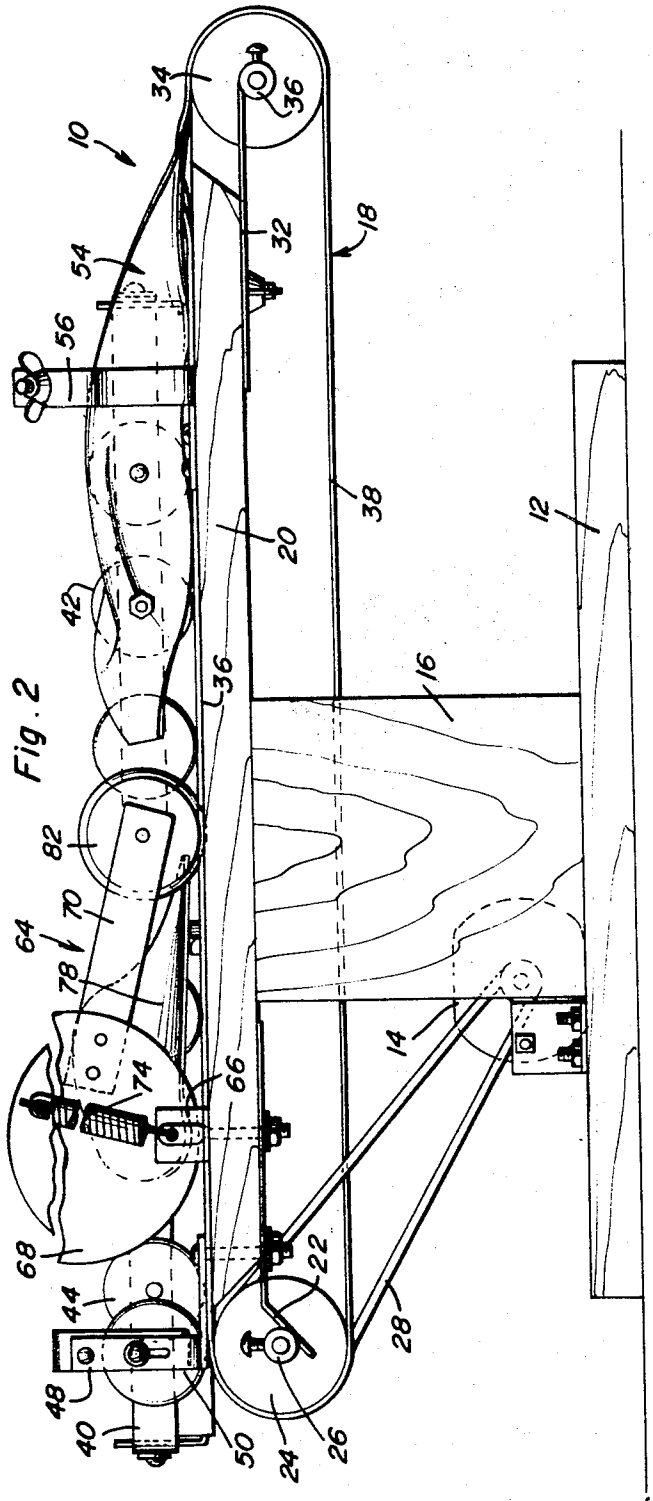


Fig. 2

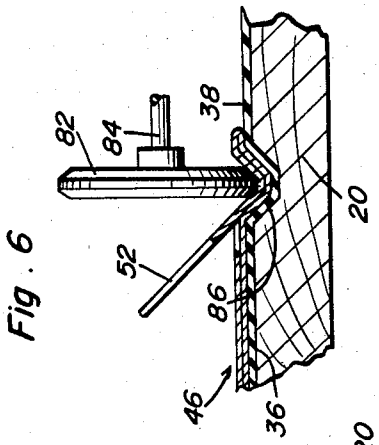


Fig. 6

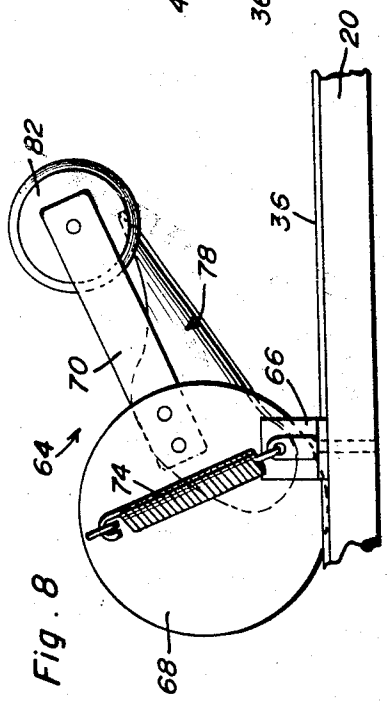


Fig. 8

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ENVELOPE FLAP DEFLECTING APPARATUS

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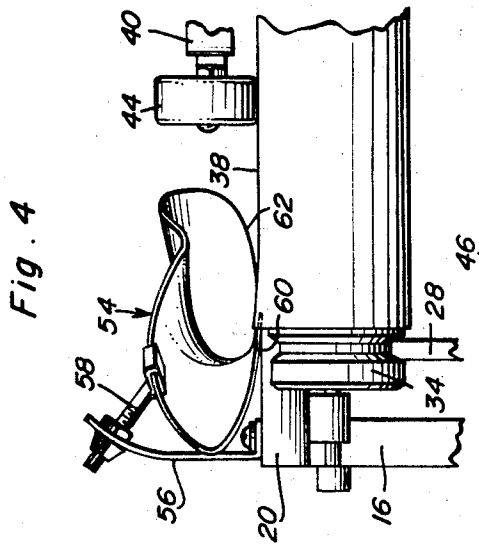


Fig. 4

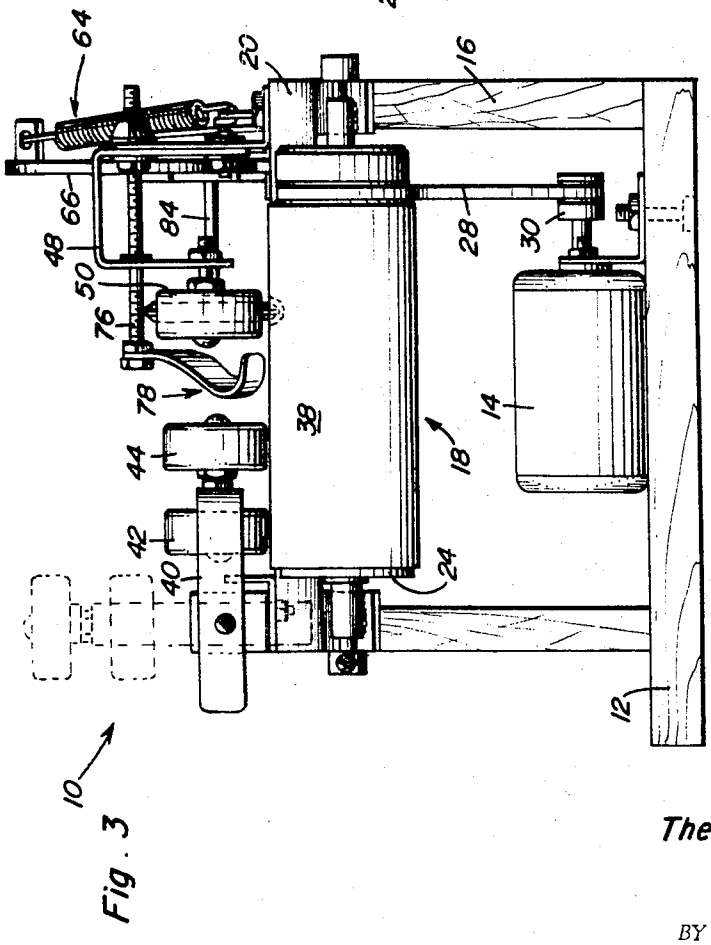


Fig. 3

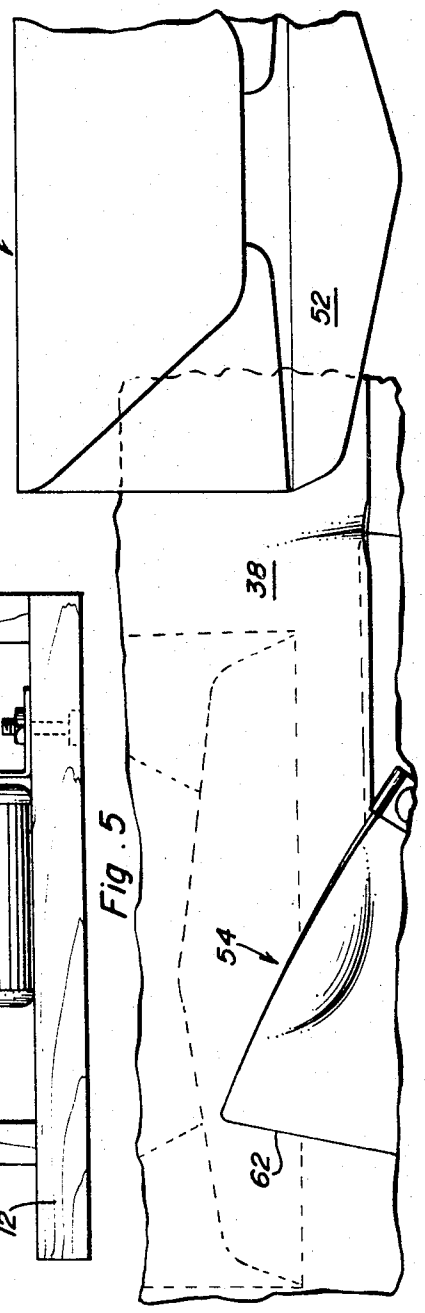


Fig. 5

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3,474,711

ENVELOPE FLAP DEFLECTING APPARATUS

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Int. Cl. B31b 1/74
U.S. Cl. 93—61 8 Claims

ABSTRACT OF THE DISCLOSURE

A device for conditioning the flaps on envelopes by either opening folded flaps or closing open flaps. A flap folding element which is ineffective when envelopes with folded flaps pass under it, is mounted along a feeding belt on which the envelopes are conveyed toward a flap unfolding element. A flap deflecting roller engages the edge portion of each envelope from which the flap extends to upwardly deflect the flap and insure its engagement by the flap unfolding element. Both the flap deflecting roller and the flap unfolding element are mounted on a frame displaceable to an inactive position when the device is being used for flap folding purposes.

This invention relates to the handling of articles such as envelopes provided with flaps that are either folded or unfolded. More particularly, the present invention relates to an apparatus which may be conditioned for either folding the flaps on envelopes or unfolding the flaps introduced to the apparatus in a folded condition.

In connection with the handling of articles such as envelopes, curved elements are often utilized which engage the envelope flaps as the envelopes are being conveyed along a predetermined path so as to either fold the flaps or unfold them. Particularly where the envelope flaps are to be unfolded, it is particularly difficult to insure consistent successful unfolding of the flaps. This problem is overcome in a unique but simple manner by the apparatus of the present invention which may also function to fold the envelope flaps without any alteration of the apparatus except to reposition the flap unfolding elements in an inactive position.

In accordance with the present invention, prior to engagement of the folded envelope flaps by the usual flap unfolding element, a flap deflecting roller downwardly deflects an edge portion of the envelope from which the flap extends so as to upwardly project the flap. In this manner, the flap is partially opened just before it is engaged by the flap unfolding element in order to insure its engagement by the flap unfolding element.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a top plan view of the flap conditioning apparatus of the present invention.

FIGURE 2 is a side elevational view of the apparatus shown in FIGURE 1.

FIGURE 3 is a rear elevational view of the apparatus.

FIGURE 4 is a partial front elevational view of the apparatus.

FIGURE 5 is a partial top plan view of the apparatus being utilized for flap folding purposes.

FIGURE 6 is an enlarged partial sectional view taken substantially through a plane indicated by section line 6—6 in FIGURE 1 showing the apparatus being used for flap unfolding purposes.

FIGURE 7 is a partial top plan view of the apparatus while performing its flap unfolding function.

FIGURE 8 is a partial side elevational view of the apparatus with the flap unfolding component thereof in an inactive position.

Referring now to the drawings in detail, the flap conditioning apparatus generally referred to by reference numeral **10** is shown in FIGURES 1, 2 and 3. The apparatus includes a base **12** on which a drive motor **14** is fixedly mounted. Supported by a pair of upright members **16** on the base, is an envelope feeding mechanism generally referred to by reference numeral **18** which is driven by the motor **14**. Envelopes are accordingly conveyed along a predetermined path by the feeding mechanism **18** from a right end as viewed in FIGURES 1 and 2 toward the left end as viewed in these figures.

The feeding mechanism **18** includes a longitudinal supporting bed **20** vertically spaced above the base **12** by the members **16** on which the bed is mounted. Secured to the underside of the bed **20** and projecting from the left end thereof, are support arms **22** on which a drive roller **24** is rotatably mounted by means of the axle **26** secured to the arms **22**. Formed adjacent one axial end of the drive roller **24**, is a groove within which an endless drive belt **28** is disposed, the drive belt being drivingly entrained about the drive pulley **30** connected to the output shaft of the drive motor **14**. Adjustably secured to the underside of the bed **20** adjacent the right end as viewed in FIGURE 2, are a pair of arms **32** which rotatably mount an idler roller **34** by means of the axle **36** secured to the arms **32**. The rollers **24** and **34** are dimensioned so that they are tangent to the upper flat supporting surface **36** of the bed **20**. An endless conveyor belt **38** may thereby be entrained about the rollers **24** and **34** with its upper run supported on the surface **36**.

As more clearly seen in FIGURES 1 and 3, the bed **20** pivotally mounts an elongated roller bracket **40** which rotatably mounts two rows of longitudinally spaced rollers **42** and **44**. When the roller bracket **40** is disposed in a substantially horizontal position as shown by solid line in FIGURE 3, the rollers **42** and **44** are closely positioned above the upper run of the conveyor belt **38** so as to hold envelopes **46** on the moving conveyor belt. The roller bracket **40** may of course be upwardly displaced to an inactive position as shown by dotted line in FIGURE 3 when it is desired to remove any envelopes from the feeding mechanism. Also mounted on the supporting bed adjacent the delivery end is an adjustable bracket **48** rotatably mounting a roller **50** in laterally spaced relation to the rollers **44** for engagement with the envelopes **46** adjacent to the edge portions from which the flaps **52** extend.

A flap folding element generally referred to by reference numeral **54** is fixedly mounted in an adjusted position on the bed **20** alongside of the conveyor belt **38** adjacent the supply end of the feeding mechanism. A bracket **56** extends upwardly from the bed **20** and adjustably mounts a downwardly inclined threaded rod **58** to which the flap folding element **54** is secured in an adjusted position. The element **54** is provided with an inlet end **60** which may be in contact or extend under the conveyor belt **38** as more clearly seen in FIGURE 4 so as to initially engage each envelope **46** below its open flap as more clearly seen in FIGURE 5. From the edge **60**, the flap folding element **54** curves laterally and angularly by approximately 180° toward an edge **62** overlying the flaps **52** of the envelopes conveyed thereunder. In this fashion, the open flaps are folded to the closed position before the folded flaps are passed under the roller **50** adjacent the delivery end of the conveyor belt. It should also be apparent, that if an envelope with its flap **52** already folded is introduced to the feeding mechanism at

the supply end, it will merely pass under the flap folding element **54** without this element performing any flap folding function. The folded flap may then be opened by a flap opening mechanism generally referred to by reference numeral **64**.

The flap opening mechanism is mounted on the bed **20** alongside of the conveyor belt **38** by means of the mounting bracket **66** longitudinally between the flap folding element **54** and the delivery end of the feeding mechanism. The bracket **66** pivotally mounts a supporting disk **68** from which a supporting arm **70** extends rearwardly opposite to the forward direction of feed as indicated by arrow **72** in FIGURE 1. An over-center positioning spring **74** is connected at its opposite ends to the pivot bracket **66** and the disk **68** so as to yieldably hold the supporting disk **68** in either an operative position as shown in FIGURES 1 and 2 or in an inactive position as shown in FIGURE 8. A mounting rod **76** extends laterally from the disk **68** and is connected to a curved flap unfolding element **78** thereby positioned closely spaced above the flaps of the envelopes being conveyed thereunder when the flap opening mechanism **64** is in its operative position. Thus, one end **80** of the flap unfolding element in the operative position is received under the folded flap **52** of an envelope as shown in FIGURE 7 in order to effect unfolding of the flap as the envelope is conveyed under the element **78**. It is essential therefore that the end **80** move under the flap **52** as each envelope approaches the flap unfolding element.

Toward this end, a beveled roller **82** is rotatably mounted on a rod **84** extending laterally from the end of the support arm **70** spaced rearwardly of the flap unfolding element **78**. As more clearly seen in FIGURE 6, when the flap opening mechanism is in the operative position, the beveled roller **82** is aligned with and projects into a depression **86** formed in the flat surface **36** of the bed **20** so as to depress the conveyor belt **38** into this depression together with the edge portions of the envelopes being fed along the conveyor belt. As a result thereof, the flaps **52** associated with the envelopes are deflected upwardly so as to insure that the flap infolding element **78** will be received under the flap.

The construction of the flap conditioning apparatus and its operation will be apparent from the foregoing description. It will be appreciated therefore that the apparatus may be used for either folding or unfolding envelope flaps by operatively positioning the flap opening mechanism **64** in either an operative position as shown in FIGURE 2 or in an inactive position as shown in FIGURE 8. If envelopes with opened flaps are supplied to the feeding mechanism **18**, the flap folding element **54** will be effective to fold the flaps. In such case, the flap opening mechanism **64** will be in its inactive position. On the other hand, when the flap opening mechanism is in its operative position the apparatus may be used for flap opening purposes in which case the flap folding element **54** will be ineffective, requiring no movement thereof from its operative position as in the case of the flap opening mechanism **64**. The flap opening mechanism is unique in that it not only operatively positions a flap opening element **78** in the path of the envelope flaps but insures that the envelope flaps are upwardly deflected just prior to its engagement by the flap unfolding element, this being accomplished by a flap deflecting roller **82** depressing the edge portion of the envelope from which the flap extends together with the conveyor belt into a depression **86** formed in the supporting surface **36** of the bed.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact

construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. In a flap conditioning apparatus having means for feeding articles along a predetermined path, flap unfolding means fixedly mounted in closed spaced relation to said feeding means for engagement with folded flaps extending from said articles, and article deflecting means engageable with said articles rearwardly of the flap unfolding means in the direction of feed along said path for deflecting the flaps prior to engagement thereof by the flap unfolding means.

2. The combination of claim **1** wherein said article deflecting means comprises a beveled roller engageable with each article adjacent to an edge portion from which the flap extends, and means rotatably mounting the roller for depressing the feeding means and the articles carried thereon.

3. The combination of claim **2** wherein said feeding means includes an endless conveyor belt, a supporting surface over which the belt carries the articles along said path, and roller means holding the articles on the belt while being conveyed past said article deflecting means and the flap unfolding means, said supporting surface being provided with a depression into which the belt is depressed by said beveled roller of the article deflecting means.

4. The combination of claim **3** including movable frame means mounting the article deflecting means and the flap unfolding means in operative positions relative to the feeding means, and over-center positioning means connected to the frame means for holding the deflecting means and the unfolding means in inactive positions spaced from the feeding means.

5. The combination of claim **4** including flap folding means operatively mounted rearwardly of the article deflecting means for folding open flaps extended from said articles while the deflecting means and the unfolding means are in the inactive positions.

6 The combination of claim **1** wherein said feeding means includes an endless conveyor belt, a supporting surface over which the belt carries the articles along said path, and roller means holding the articles on the belt while being conveyed past said article deflecting means and the flap unfolding means, said supporting surface being provided with a depression into which the belt is depressed by said article deflecting means.

7. The combination of claim **1** including movable frame means mounting the article deflecting means and the flap unfolding means in operative positions relative to the feeding means, and over-center positioning means connected to the frame means for holding the deflecting means and the unfolding means in inactive positions spaced from the feeding means.

8. The combination of claim **7** including flap folding means operatively mounted rearwardly of the article deflecting means for folding open flaps extended from said articles while the deflecting means and the unfolding means are in the inactive positions.

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U.S. Cl. X.R.

53—384; 118—32; 156—442