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3,384,252

APPARATUS FOR EXTRACTING ITEMS FROM ENVELOPES

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2 Sheets-Sheet 1

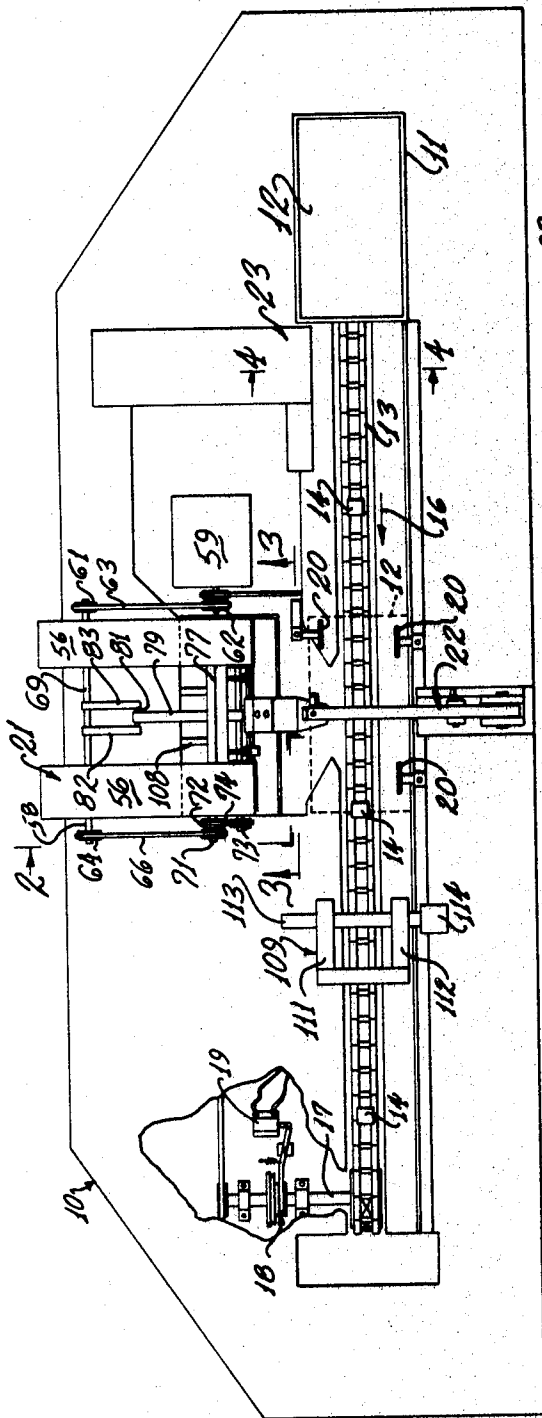


Fig. 1

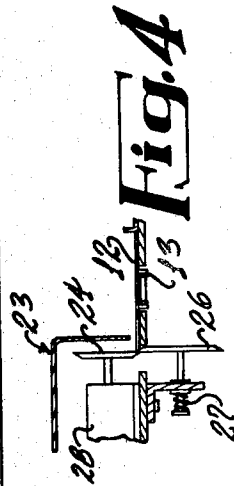


Fig. 4

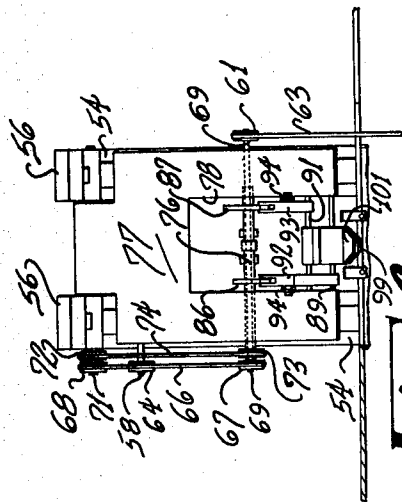


Fig. 3

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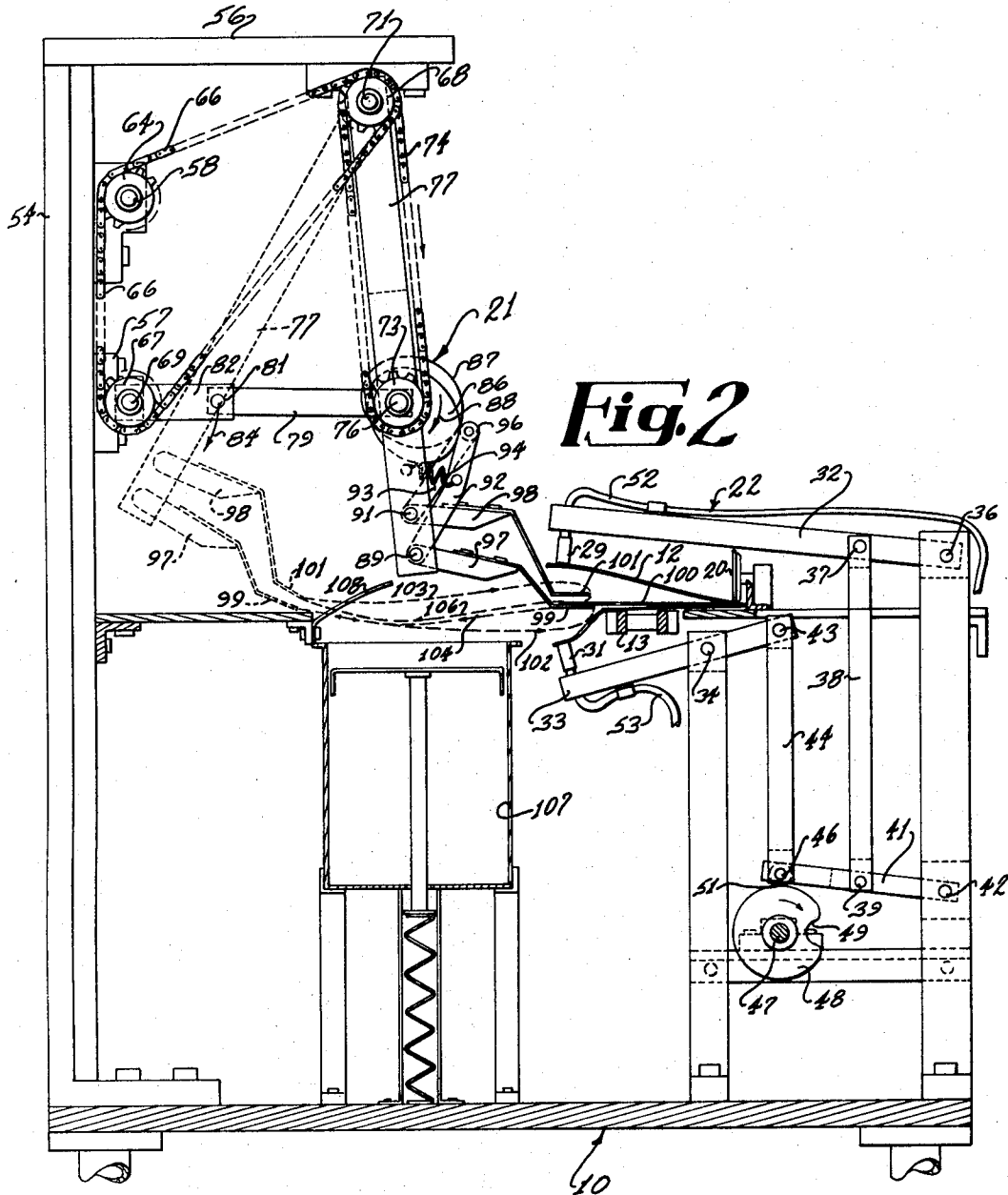
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1

3,384,252 APPARATUS FOR EXTRACTING ITEMS FROM ENVELOPES

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ABSTRACT OF THE DISCLOSURE

An apparatus to sever the edge of an envelope outwardly of the enclosed item to be removed and to feed the envelope sequentially to an extracting station. The envelope is held against lateral movement while in the extracting location and suction members move into engagement with opposite sides of the envelope adjacent the severed edge thereof and then move outwardly away from each other while the suction members are in engagement with the sides of the envelope whereby the sides of the envelope are moved outwardly away from each other. Clamping members of an extractor unit are then moved inwardly of the envelope adjacent opposite sides of the item to be removed. The clamping members move into engagement with the item and then the clamping members are removed to thus extract the item from the envelope.

Heretofore in the art to which my invention relates, various devices have been proposed to insert items in envelopes but no effective means has been devised for extracting items, such as checks and the like from an envelope. The removal of checks from envelopes is a costly and time consuming operation where large numbers of such envelopes are received, such as occurs in the payments of bills to large companies, such as utility companies, which mail to their customers along with the monthly statement a return envelope for receiving a check. Upon receipt of these envelopes from the customers, the envelopes are opened by hand and the checks extracted therefrom.

To overcome the time consuming and expensive method of removing items, such as checks, from envelopes, I have devised apparatus which is adapted to sever an edge of each envelope outwardly of the item to be removed, together with means for moving the sides of the envelope adjacent the severed edge outwardly away from each other whereupon an extractor unit is inserted into the envelope to remove the item therefrom.

Apparatus embodying features of my invention is illustrated in the accompanying drawings, forming a part of this application, in which:

FIG. 1 is a top plan view, partly broken away, showing my improved apparatus;

FIG. 2 is an enlarged, sectional view taken generally along the line 2—2 of FIG. 1;

FIG. 3 is a view taken generally along the line 3—3 of FIG. 1; and

FIG. 4 is a fragmental, sectional view taken generally along the line 4—4 of FIG. 1.

Referring now to the drawings for a better understanding of my invention, I show a supporting frame 10 having an envelope supply hopper 11 adjacent one end thereof. The envelopes, indicated at 12, are removed from the bottom of the hopper 11 by an endless chain unit 13 having a series of longitudinally spaced conveying elements 14 thereon which are in position to determine the longitudinal spacing of the envelopes along the chain 13. The envelopes 12 are delivered sequentially onto the endless chain 13 in a manner well understood in the art whereby a single envelope is engaged by each conveying element 14 as the chain 13 moves in the direction of the

2

arrow 16. Since the means for delivering the envelopes sequentially onto the chain 13 is a conventional feed unit, no further description thereof is deemed necessary.

The movement of the chain 13 is stopped each time an envelope 12 reaches an extracting position and then after extraction of the envelope, the chain moves forwardly until another envelope reaches the extracting location. As shown in FIG. 1, the endless chain 13 is driven by a drive shaft 17. Rotary motion is imparted to the drive shaft 17 through a clutch unit 18 which is deenergized each time a conveying element 14 positions an envelope 12 at the extracting location. The clutch 18 is energized and deenergized by suitable means, such as an electrical solenoid 19.

In FIG. 1 of the drawings, I show an envelope 12 in dotted lines in the extracting position. That is, the envelope is opposite an extracting unit indicated generally at 21. Also mounted on the frame 10 at the extracting location is an envelope opening unit indicated generally at 22. Rollers 20 having resilient contact surfaces are mounted on the frame in position to engage an envelope 12 and restrain lateral movement thereof while in the extracting position.

As shown in FIGS. 1 and 4, a cutter unit 23 is mounted on the frame 10 in position to sever an edge of each envelope 12 outwardly of the item to be removed therefrom. The cutter unit 23 is mounted adjacent the supply hopper 11 whereby the edges are severed prior to reaching the extracting location. The cutter unit comprises a pair of rotary cutter elements 24 and 26 which are mounted in position to sever only the envelope 12 whereby the item to be removed is not damaged in any way. Preferably, the lower cutter element 26 is urged toward the upper cutter element 24 by a spring 27. The upper cutter element 24 is driven by a motor 28, as shown.

The unit 22 for opening the envelope 12 as it reaches the extracting location comprises a pair of suction members 29 and 31 which are adapted to engage opposite sides of the envelope 12 adjacent the severed edge thereof, as shown in FIG. 2. The suction members 29 and 31 are moved toward and away from each other by a pair of arms 32 and 33 which are pivotally supported by parts of the supporting frame 10 by pivot pins 34 and 36, respectively. Pivotally connected to the arm 32 by a pivot pin 37 is the upper end of a link 38. The lower end of link 38 is pivotally connected by a pin 39 to an elongated link 41 which is pivotally connected to the frame 10 by a pivot pin 42. Pivotally connected to the end of the arm 33 by a pivot pin 43 is the upper end of a link 44, having its lower end pivotally connected by a pivot pin 46 to the end of link 41.

Mounted for rotation on the frame 10 subjacent the arm 41 is a shaft 47 which carries a cam 48. A recess 49 is provided in the rotary cam 48 in position to receive a roller 51 carried by the arm 41. The cam 48 is rotated in timed relation with movement of the chain 13 whereby each time a conveying element 14 positions an envelope 12 in the extracting position, the roller 51 engages the recess 49 whereupon the arm 32 and its suction member 29 move downwardly to engage envelope 12 while the arm 33 and its suction member 31 move upwardly to engage envelope 12. Suitable conduits 52 and 53 communicate with the suction members 29 and 31, respectively, whereby a partial vacuum is created in the suction members to thus detachably connect the sides of the envelope to the suction members whereby the sides of the envelope move outwardly with the suction members as the rotary cam 48 moves the arms 32 and 33 and their suction members 29 and 31 outwardly to the position shown in FIG. 2. That is, as the roller 51 moves outwardly of the recess 49, the links 38 and 44 are lifted

to thus move the free ends of the arms 32 and 33 outwardly away from each other.

The extractor unit 21 is mounted on upstanding frame members 54 carried by the frame 10. As shown in FIGS. 1, 2 and 3, the frame members 54 carry horizontally extending brackets 56 at their upper ends. Mounted for rotation in suitable bearing brackets 57 carried by the upstanding frame 54 is a shaft 69 which is operatively connected to a motor 59 by sprockets 61 and 62 and a drive chain 63. Mounted on the drive shaft 69 is a sprocket 67 which drives a chain 66 that passes around sprockets 64 and 68 carried by shafts 58 and 71, respectively. Also mounted on the shaft 71 is a sprocket 72 which is operatively connected to a sprocket 73 by a sprocket chain 74. The sprocket 73 is mounted on a shaft 76 which is mounted for rotation in suitable bearings carried by a plate-like member 77. As shown in FIGS. 2 and 3, the upper end of the plate-like member 77 is secured to the shaft 71 whereby it is adapted to pivot from the solid line position shown in FIG. 2 to the dotted line position. As shown in FIG. 3, a downwardly opening recess 78 is provided in the plate-like member 77. Pivotaly connected to the shaft 76 within the opening 78 is one end of an arm 79. The other end of the arm 79 is connected by a pivot pin 81 to a pair of arms 82 and 83 which in turn are rigidly secured to the shaft 69 whereby upon rotation of the shaft 69, the arms 82, 83 and 79 rotate in the direction of the arrow 84 to thus move the member 77 from the solid line position to the dotted line position shown in FIG. 2.

Mounted on the shaft 76 in spaced relation to each other, as shown in FIG. 3, are a pair of cam members 86 and 87 which rotate in the direction of the arrow 88. Pivotaly connected to the depending portions of the plate-like member 77 by pivot pins 89 and 91 are clamping arms 92 and 93, respectively. The clamping arms 92 and 93 are urged toward the rotary cams 86 and 87 by suitable spring members 94, as shown in FIG. 2. The upper end of each arm 92 and 93 carries a roller element 96 which is adapted to engage the cams 86 and 87. Secured rigidly to or formed integrally with the lower ends of the arms 92 and 93 are forwardly extending portions 97 and 98 which in turn carry clamp members 99 and 101 which are adapted to move inwardly of the envelope 12 while the sides thereof are moved outwardly, as shown in FIG. 2. That is, the clamping members 99 and 101 are adapted to move along opposite sides of the item to be removed indicated generally at 100. As shown in FIG. 2, the cams 86 and 87 are of a shape to cause the arms 92 and 93 and the clamping members 99 and 101 carried thereby to move from the solid line position shown in FIG. 2 to the dotted line position. Also, the clamping members 99 and 101 move along the dotted lines 102 and 103, respectively, during movement toward the envelope 12 and move along the dotted lines 104 and 106 while moving away from the envelope 12. Accordingly, the clamping members 99 and 101 are in spaced relation to each other as they enter the envelope 12 whereupon they then move inwardly toward each other and into engagement with the item 100. The item is then extracted upon movement of the plate-like member 77 to the dotted line position shown in FIG. 2. A suitable receptacle 107 is provided in position to receive the items 100 as they are discharged by the clamping members 99 and 101. To facilitate removal of the items 100 from the clamping members 99 and 101, upwardly and inwardly extending leaf-like members 108 are mounted in position to engage the item and thus separate the same from the clamping members 99 and 101.

In order to be sure that the items 100 have been removed from the envelopes 12, I provide a sensing unit 109 in position to engage the envelopes 12 after they leave the extracting location. In the drawings, I show the sensing unit 109 as being in the form of a thickness indicator having downwardly and forwardly extending arms

111 and 112 which are connected to a transverse shaft 113. The lower ends of the arms 111 and 112 are adapted to ride upon the envelope as it passes therebeneath to thus indicate the thickness of the envelope. The arms 111 and 112 are secured to the shaft 113 whereby the shaft rotates upon movement of the arms. A suitable switch element 114 is operatively connected to the shaft 113 and is actuated to stop the apparatus in the event an item 100 has not been removed from the envelope 12 positioned therebeneath. That is, in the event the item 100 remains in the envelope, the overall thickness of the envelope would be such that the switch element 114 would be actuated.

From the foregoing description, the operation of my improved apparatus will be readily understood. The envelopes 12 are fed sequentially from the supply hopper 11 to the cutter unit 23 whereupon an edge of the envelope, outwardly of the item to be removed, is severed. The conveying elements 14 convey the envelopes 12 sequentially to the extracting location which is directly opposite the clamping elements 99 and 101. The clutch unit 18 deenergizes the circuit to the driving motor as the envelope reaches the extracting location. At this time, the roller 51 falls into the recess 49 whereupon the suction members 29 and 31 move inwardly into engagement with the envelope 12. As the roller 51 moves out of the recess 49, the suction members 29 and 31 are moved outwardly to thus move the sides of the envelope outwardly to the position shown in FIG. 2. Rotation of the shaft 69 is synchronized with the rotation of shaft 47 for cam 48 whereby the clamping members 99 and 101 are positioned to enter the open end of the envelope 12 immediately upon opening thereof by the suction members 29 and 31. After entering the envelope 12 along opposite sides of the item 100, the cams 86 and 87 move relative to the clamping arms 92 and 93 to thus move the clamping members 99 and 101 into clamping engagement with the item 100 whereupon it is extracted as the plate-like member 77 moves toward the dotted line position shown in FIG. 2.

After being removed from the envelope, the items 100 are deposited into receptacle 107. That is, the clamping members 99 and 101 move away from each other after the item has been extracted whereby it falls into the receptacle 107. To further assure that all items are separated from the clamping members, the upwardly and inwardly extending leaf members 108 are in position to engage the items.

After the items 100 have been extracted from the envelopes, the envelopes pass beneath the sensing unit 109 and then pass to a suitable container therefor. In the event an item is secured to the envelope whereby it cannot be separated therefrom, the arms 111 and 112 of the sensing 109 would ride upon the envelope to thus indicate the presence of the item whereupon the switch 114 would be actuated to stop the apparatus.

From the foregoing, it will be seen that I have devised improved apparatus for extracting items from envelopes. By providing means for severing an edge of the envelope and then opening the sides of the envelope for receiving the clamping members, each item is removed from the envelope in an efficient manner. Also, by providing suction means for positively opening the envelope, sufficient clearance is always provided for the reception of the extracting unit. Furthermore, by providing clamping members which release the item after it has been fully extracted from the envelope, there is no possibility of the item remaining in the clamping members.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

I claim:

1. Apparatus for extracting items from envelopes comprising:

- (a) means to sever an edge of each envelope outwardly of the item therein, 5
 - (b) means to feed envelopes with the edges thus severed sequentially to an extracting location,
 - (c) means limiting lateral movement of each envelope while in said extracting location,
 - (d) suction members mounted in position to engage opposite sides of each envelope adjacent the severed edge thereof while the envelope is in said extracting location, 10
 - (e) means creating a partial vacuum in said suction members so that the sides of the envelope are drawn into engagement with the suction members, 15
 - (f) means moving said suction members toward each other and then outwardly away from each other while the suction members are in engagement with said sides of the envelope so that the sides of the envelope adjacent said severed edge are moved outwardly away from each other while the envelope is in said extracting location, and 20
 - (g) means to engage and positively extract items sequentially from said envelopes while the envelopes are in said extracting location. 25
2. Apparatus for extracting items from envelopes as defined in claim 1 in which the means to extract items sequentially from said envelopes comprises, 30
- (a) a pair of cooperating clamping members mounted in position to move inwardly of an envelope while the envelope is in said extracting location with its sides moved outwardly away from each other,
 - (b) means to move said clamping members inwardly and outwardly of said envelope, 35
 - (c) means to move said clamping members away from each other as the clamping members move inwardly of the envelope to position the clamping members at opposite sides of the item to be extracted, and
 - (d) means to move said clamping members toward each other prior to movement of the clamping members outwardly of the envelope. 40
3. Apparatus for extracting items from envelopes as defined in claim 2 in which the means to move the clamping members inwardly and outwardly of an envelope and toward and away from each other comprises, 45
- (a) an oscillating member mounted for movement toward and away from an envelope while in said extracting location,
 - (b) a pair of clamping arms pivotally connected to 50

said oscillating member with each clamping arm carrying one of said clamping members, and

- (c) cam members carried by said oscillating member and operatively connected to said clamping arms to move said clamping arms away from each other as the clamping members move inwardly of the envelope and to move said clamping arms toward each other prior to movement of the clamping members outwardly of the envelope.

4. Apparatus for extracting items from envelopes as defined in claim 3 in which the cam members are rotary members and the clamping arms have angularly disposed cam engaging members which extend in position to engage the rotary cam members.

5. Apparatus for extracting items from envelopes as defined in claim 1 in which the means moving the suction members toward and away from each other comprises,

- (a) a pair of arms carrying said suction members and pivotally supported for movement toward and away from an envelope while in said extracting location, and

- (b) cam members operatively connected to said arms to move said arms and the suction members carried thereby toward each other and then outwardly away from each other each time an envelope is moved into said extracting location.

6. Apparatus for extracting items from envelopes as defined in claim 1 in which an indicator is mounted in position to indicate the removal of the item from the envelope after the envelope moves past said extracting location.

7. Apparatus for extracting items from envelopes as defined in claim 6 in which the indicator is a thickness indicator mounted in position to engage the envelope to determine the thickness thereof.

8. Apparatus for extracting items from envelopes as defined in claim 1 in which the means limiting lateral movement of the envelope comprises resilient roller-like members disposed to engage the envelope while in said extracting location.

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