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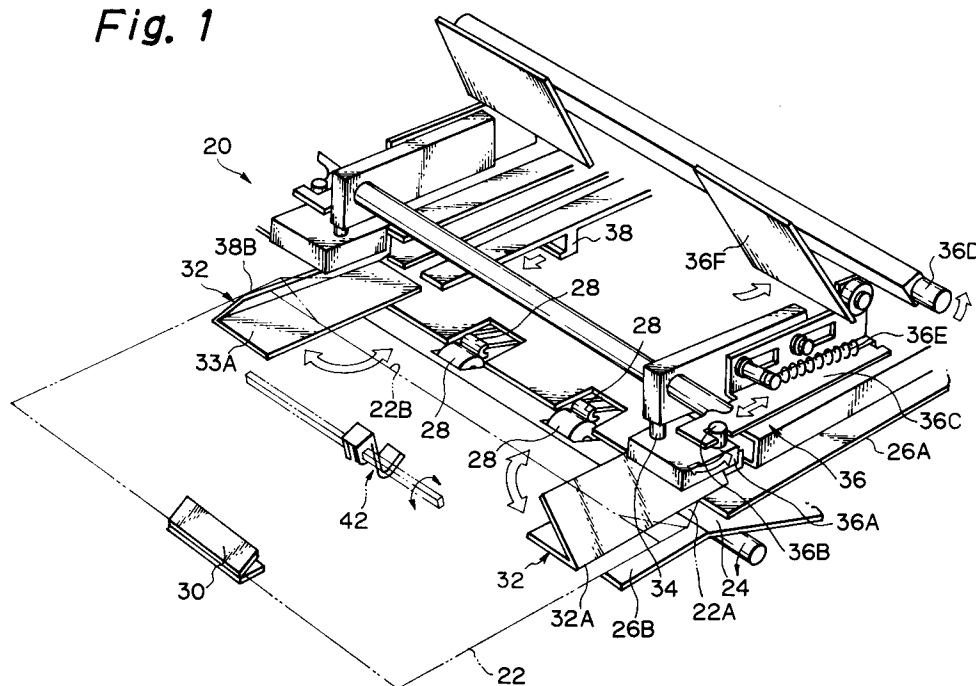
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D-70182 Stuttgart (DE)(54) **Envelope open-end widening device for enclosure inserting and sealing machine.**

(57) An envelope open-end widening or expanding device (20) having insert guides (32) for so advancing deeper each of the enclosures as not stick in the middle of the envelope (22) and as to prevent the envelope from being jammed into device. The device comprises flap holding rollers (28) for holding

a flap of an envelope (22a) at the mouth thereof in its open condition, a pair of insert guides (32) adapted to enter from the center of the mouth thereof, and an insert guide moving mechanism (36) for moving the insert guides from the center of the mouth of the envelope to the opposite sides thereof.

Fig. 1**EP 0 604 918 A1**

This invention relates to an envelope open-end widening device for use in an enclosure inserting and sealing machine. The machine enables the insertion of enclosures such as a letter, a printed matter, documents and the like into a plurality of envelopes and sealing envelopes automatically. The device of the invention opens the open-end or the mouth of respective envelopes automatically thereby enabling easy insertion of enclosures.

Figs. 7 through 9 show a typical prior art envelope opening device in an automatic mail inserting and sealing machine (although the entire machine is not shown in these drawings). The device functions to open the open-end or the mouth of an envelope 5 which has been delivered through an envelope passage 4 defined between tables 2 and 3, with a flap portion 5A of the envelope 5 clamped by rollers 6. A pair of insert guides 7 are utilized to open the envelope 5.

The insert guides 7 are pivotally mounted around fulcrums 8A, and are urged by springs (not shown) in the counter clockwise direction in Fig. 8 around the fulcrums 8A, which are supported on tip ends of arms 9 pivotally supported around a shaft 8B.

When an envelope 5 is delivered through the envelope passage 4 to the position shown in Fig. 8 with the flap portion 5A clamped by rollers 6, the shaft 8B rotates in the clockwise direction in Fig. 8, then, the arms 9 move from the position shown by chain lines to the position of solid lines in Fig. 8, and the tip ends of the insert guides 7, which are urged by springs such that the one ends contact with the surface of the table 2, move along the upper surface of the table 2, and advance along the surface of the flap 5A and the front sheet of the envelope 5, and into the envelope 5, whereby the opening or the mouth the envelope 5 is enlarged.

As shown in Fig. 9, items such as a letter, documents and the like 10 are pushed by an insert carriage 11 and inserted into the envelope 5 enlarged by the insert guides 7. At that time, the tip ends of the enclosures 10 push up the insert guides 7 against the spring force and move into the envelope 5.

To enable smooth insertion of enclosures 10 into the envelope 5, the insert guides 7 should be located as near as the opposite side edges of the envelope 5.

Generally, the envelope 5 includes, as shown in Fig. 10, a front sheet 5B, a rear sheet 5E, a flap or the top flap 5A formed integrally with the front sheet 5B, and side flaps or margins 5C bent at opposite side edges of the front sheet 5B and secured respectively to the rear sheet 5E by a glue 5D. It will be noted that portions 5F of the side margins 5C near to the flap 5A are not secured to the rear sheet 5E.

Accordingly, to enable smooth insertion of the items 10 into the envelope 5, the insert guides 7 should be located as near as possible to the opposite side edges of the envelope 5 so that items 10 as inserted into the envelope do not contact or interfere with non-secured portions of the side flaps 5C, thereby preventing jamming.

An object of the invention is to provide a novel envelope opening device for use in an enclosure inserting and sealing machine, whose machine delivers envelopes intermittently one by one with the top flap portion of an envelope positioned on the downstream side. The device opens the opening of the envelope for inserting items or enclosure such as a letter, a printed matter, documents and the like into the envelope.

This and other objects of the invention are accomplished by an envelope opening device which comprises flap retaining means for retaining the top flap of the envelope in an open position; and

a pair of insert guides disposed at positions near to respective sidewise opposite ends of the envelope with the top flap portion thereof and retained by the flap retaining means and rockingly movable along a surface nearly parallel to the surface of the envelope in the synchronized relationship and between a first position and a second position such that the leading edges of the insert guides adjacent to the envelope are, at the first position, positioned on the rear side or outside of the open-end of the envelope with the top flap portion thereof retained by the flap retaining means, and at the second position and further positioned near to sidewise opposite ends of the envelope and inside thereof; with the tip ends opposing each other and being provided close to the sidewise central portion of the envelope at the first position, and at the second position, the leading edges extending along and inside of sidewise opposite edges of the envelope, the insert guides including inclined surface portions which are extending from the leading edges rearwardly, separating from the envelope upwardly and separating from the front surface of the envelope as viewed at the first position, the leading edge being rockingly movable in a surface nearly equal to the inner surface of the front surface of the envelope.

The insert guide may have a generally V-shaped cross-section, at least in the range to be inserted into the envelope at the second position, with the apex defined by the leading edge, one side extending from the leading edge upwardly and the other side extending generally parallel to and adjacent to the front sheet of the envelope.

According to the present invention, the tip ends of the pair of insert guides move into the envelope widthwise at a central position, thus enabling easy

opening of the envelope. And since the insert guides move to widthwise opposite ends of the envelope, the open-end can be easily enlarged.

Further, the inclined surfaces of the insert guides extend from respective leading edges, thus, the insert guides do not interfere with portions of the side margins not secured to the rear sheet of the envelope, and the open-end of the envelope can be easily and sufficiently widened.

Further, by providing an inclined surface portion and a horizontally extending surface portion on each of the insert guides, the horizontally extending surface portion acts to restrict movement such as upward movement of the front sheet of the envelope, whereby items can be easily inserted into the envelope.

Further objects and advantages of the invention will become apparent from the following descriptions in conjunction with attached drawings in which:

Fig. 1 is a perspective view of an envelope opening device according to a preferred embodiment of the present invention;

Fig. 2 is a plan view showing a portion of the envelope opening device of Fig. 1;

Fig. 3 is a sectional view taken along line III-III in Fig. 2;

Fig. 4 is a side view as viewed along line IV-IV in Fig. 2;

Fig. 5 is a plan view showing the insert guides according to a second embodiment of the present invention;

Fig. 6 is a side view similar to Fig. 4 showing the relation between the envelope and the insert guides according to a third embodiment of the invention;

Fig. 7 is a schematic plan view of a prior art envelope opening device;

Fig. 8 is a sectional view taken along line VIII-VIII in Fig. 7;

Fig. 9 is a sectional view showing the operation of the envelope opening device of Fig. 7; and

Fig. 10 is a perspective view showing an essential portion of a usual envelope.

Some preferred embodiments of the present invention will now be explained referring to the drawings.

Fig. 1 through Fig. 4 show an envelope opening device 20 according to an embodiment of the present invention comprises tables 26A and 26B spaced through an envelope passage 24 through which an envelope 22 with a flap portion 22A opened is delivered; flap retaining rollers 28 for retaining in the envelope passage 24 the flap portion 22A of the envelope 22 delivered through the envelope passage 24 onto the table 26B; and a pair of insert guides 32 adapted to be inserted into the envelope 22 when an end opposite to the flap

portion 22A of the envelope 22 is retained by an envelope gripper 30, the flap portion 22A being retained by the flap retaining rollers 28.

Each insert guide 32 has a generally rectangular shape as viewed in the plan view of Fig. 2 with one end slightly tapered, and as viewed in the sectional view of Fig. 4, has a generally V-shape cross-section consisting of a horizontally extending surface portion 33A parallel to the upper surface of the table 26B and an inclined surface portion 33B extending from one end of the horizontal surface portion 33A.

The inclined surface portions 33B of the pair of the insert guides 32 are integrally connected respectively to the lower ends of a pair of vertical rotatable shafts 34, and the shafts 34 are rockingly movable around 90 degrees and in synchronous relationship by a rocking device 36, the details of which will be explained hereinafter.

Particularly, each insert guide 32 rockingly moves between a first position, as shown in double dotted chain line in Fig. 2, at which an apex or a ridge 32A of the V-shape is parallel to an edge 22B of the opening of the envelope 22 being located by the envelope gripper 30 and the flap retaining rollers 28, and the lengthwise tip end 32B is positioned near to the widthwise central portion of the envelope 22, and a second position, as shown in solid line and broken line in Fig. 2, at which the tip end 32B moves into the interior of the envelope and the tip edge 32A approaches and is generally parallel to the widthwise edge 22C of the envelope 22.

The rocking device 36 is constituted of a pair of rocking plates 36A secured respectively and integrally to the rotatable shafts 34; pins 36B mounted respectively on the rocking plates 36A; slide plates 36C slidably engaging with respective pins 36B and being slidably mounted in the envelope delivery direction or in the directions shown in double arrow line in Fig. 1, thereby the rocking plates 36A are rockingly moved around respective rotatable shafts 34 through the range of 90 degrees; a drive shaft 36D being disposed above the table 26A to extend horizontally and in a direction perpendicular to the envelope delivery direction; tension springs 36E; and drive plates 36F secured to the drive shaft 36D with one end (the lower end) of each drive plate engaging on each slide plate 36C against the force of the spring 36E to move the slide plate in the left upper direction as viewed in Fig. 1.

The spring 36F urges the slide plate 36C in the envelope delivery direction, thereby urging the insert guide 32 to its first position. Shown at numeral 38 in Fig. 1 is an insert carriage for pushing items such as mail, documents and the like into the envelope 22.

The operation of the device 20 will hereinafter be explained.

An envelope 22 is delivered onto the table 22B through the envelope passage 24 with the flap portion 22A left open and oriented back. The upstream edge of the envelope 22 is located on the table 26B and abuts against the envelope gripper 30, and the flap portion 22A of the envelope 22 is retained by the flap retaining rollers 28.

The insert guides 32 are, at this condition, located on the first position with the slide plates 36C pulled in the left downward directions in Fig. 1 by springs 36E of the rocking device 36. At this condition, the drive shaft 36D is rotated in the arrow direction in Fig. 1, the drive plates 36F integrally connected to the drive shaft 36D act to push the slide plates 36C against the force of the springs 36E in the right upper direction in Fig. 1, and the slide plates 36C rockingly drive the rocking plates 36A and the rotatable shafts 34 through the pins 36B, thereby the insert guides 32 are moved to the second position.

When the insert guides 32 are moved from the first position to the second position, the tip ends 32B of the insert guides 32 move from the positions near to the widthwise central portion of the edge 22B of the mouth or the open-end of the envelope 22 to positions between the front sheet 22D and the rear sheet 22E of the envelope 22.

The widthwise central portion of the open-end 22B of the envelope 22 can move upward easily as compared with the widthwise edge portions of the envelope, and does not have any overlapping portion such as side margins and the like, thus, the insert guides 32 can smoothly move into the interior of the envelope 22.

During the movement of the insert guides 32 from the first position to the second position, the insert guides move into the lowerside of the side margins 22F of the envelope 22 as shown in Fig. 2. The side margins 22F of the envelope 22 is sufficiently secured to the rear sheet of the envelope in a zone through which the portion near to the tip end 32B of the insert guide 32 moves along during the rocking movement from the first position to the second position, and the inclined surface portion 33B pushes up sufficiently the rear sheet of the envelope and side margins 22F secured thereto, thus the tip edge 32A of the insert guide 32 can easily move to the location near to the widthwise edge 22C of the envelope 22.

At the second position of the insert guides 32, the envelope 22 is, as shown in Figs. 1 and 4, widely opened by the inclined surface portions 33B of the pair of the insert guides 32.

Under this condition, the insert carriage 38 acts to push an item 40 in the left downward direction as viewed in Fig. 1, then, the item 40 does not

interfere with side margins 22F of the envelope 22 and, can smoothly be inserted into the most inner portion of the envelope 22. At that time, the inclined surface portions 33B of the insert guides 32 act to locate the item 40 in the widthwise direction, and the item 40 are inserted moves slidingly on the upper surfaces of the horizontal surface portions 33A of the insert guides 32.

When the item 40 has been inserted into the envelope 22, the envelope gripper 30 acts to clamp or grip the leading edge of the envelope 22 and the inner end portion of the item 40, and to carry the envelope 22 and the item 40 in the left lower direction as viewed in Fig. 1. When the envelope 22 and the item 40 have been moved away, the rocking device 36 moves to the standby position by the springs 36, and the insert guides 32 move to the first position shown by double dotted chain line in Fig. 2.

As described above, the insert guides 32 rockingly move between the first position and the second position, whereby the items 40 such as a letter, documents and the like can sequentially and reliably be inserted into respective envelopes 22 which are intermittently delivered to the inserting station.

In the embodiment, the insert guide 32 has a generally rectangular shape in the plan view, however, the invention is not limited to the embodiment, the insert guide according to the invention may be of the type which can move rockingly between a first position and a second position where the side flap portion of the envelope is not interfered and can push up sufficiently the rear surface of the envelope with respect to the front sheet of the envelope.

Fig. 5 shows a second embodiment of the invention, in which an arcuate shaped horizontal surface portion 33C is provided integrally to the inclined surface portion 33B. The horizontal surface portion 33C reliably prevents the upward movement of the front surface portion 22D of the envelope 22, and acts as a guide when an item 40 is inserted into the envelope 22.

Fig. 6 shows another embodiment of the invention, in which the insert guides are not provided with the horizontal surface portions, or the insert guides are composed of inclined surface portions 33B only.

In the above embodiments, the envelope 22 is delivered to the envelope opening device 20 with the front sheet 22D downside, however, the envelope 20 may be delivered with the front sheet 22D and the flap portion 22A upperside.

In such case, the positional relationship between the horizontal surface portions and the inclined surface portions of the insert guides may be reversed as compared with the first embodiment of

Fig. 1.

In the embodiments, the insert guides 32 are arranged such that the tip ends 32B of the insert guides 32 move into the interior of the envelope 22 from the widthwise central portion of the open-end 22B of the envelope 22, which portion is easiest to push up. However, to further assist the opening or the raising up of the open-end 22B, an envelope pusher 42 may be provided as shown in double dotted chain line and solid line in Fig. 1 at the location between the envelope gripper 30 and the open-end 22B of the envelope 22. The envelope pusher 42 pushes down the envelope, whereby the open-end 22B of the envelope 22 is expanded by the reaction force of the envelope pusher 42.

As described heretofore, according to the present invention, the tip ends of the pair of the insert guides move into the envelope at widthwise central position, whose position is very easy in expanding the mouth of the envelope, thus, the insert guides can easily be inserted into the envelope. And since the insert guides move to widthwise opposite ends of the envelope, the open-end can be widened.

Further, the inclined surfaces of the insert guides extend from respective leading edges, thus, the insert guides do not interfere with portions of the side margins not secured to the rear surface of the envelope, and the open-end of the envelope can easily and sufficiently be expanded.

Further, by providing an inclined surface portion and a horizontally extending surface portion on each of the insert guides, the horizontally extending surface portion acts to restrict movement such as upward movement of the front surface of the envelope, thereby enabling easy insertion of the items into the envelope.

Claims

1. An envelope open-end widening device for an automatic enclosure inserting and sealing machine, comprising:

flap retaining means for retaining a flap portion of an envelope in the open position, a pair of insert guides and adapted to be inserted into the mouth of the envelope from the central portion of the mouth of the envelope, and an insert guide displacing mechanism for displacing the pair of insert guides from the widthwise central portion of the mouth of the envelope to the widthwise opposite end portions of the envelope.

2. An envelope open-end widening device according to claim 1, in which said insert guides are rockingly movable around respective shafts.

3. An envelope open-end widening device for use in an enclosure inserting and sealing machine, whose machine delivers intermittently one by one envelopes with the top flap portion of the envelope oriented back, comprising:

flap retaining means for retaining the top flap of the envelope in an open position, and

a pair of insert guides disposed at positions near to respective sidewise opposite ends of the envelope with the top flap portion thereof retained by the flap retaining means, and being rockingly movable along a surface nearly parallel to the surface of the envelope in synchronized relationship and between a first position and a second position such that the leading edges of the insert guides adjacent to the envelope is, at the first position, positioned rear side or the outside of the opening of the envelope with the top flap portion thereof is retained by the flap retaining means, and at the second position, and is positioned near to sidewise opposite ends of the envelope and inside thereof; with the tip ends opposing each other and provided nearly at a central portion of the opening of the envelope at the first position, and at the second position, the leading edges extending along and inside of widthwise opposite edges of the envelope;

each of the insert guides including an inclined surface portion extending from the leading edge rearward or separating from the envelope and upward or separating from the front surface of the envelope, the leading edge being rockingly movable in a surface nearly equal to the inner surface of the front surface of the envelope.

4. An envelope open-end widening device according to claim 3, in which each of the insert guides includes a horizontal surface portion extending from the leading edge parallel to the inner surface of the front surface of the envelope thereby defining a generally V-shape with the inclined surface portion.

5. An envelope open-end widening device according to claim 3 or 4, in which said pair of insert guides are rockingly moved by a rocking device between a first position and a second position, said rocking device being constituted of a rotary shaft, a rocking plate integrally connected to the rotary shaft, a pin mounted on the rocking plate, a slide plate slidably engaging with the pin for rockingly moving the rocking plate around the rotary shaft, a drive shaft disposed above the envelope to extend in a direction perpendicular to the envelope delivery direction, a drive plate mounted on the

drive shaft, and a spring acting between the slide plate and the drive plate.

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Fig. 1

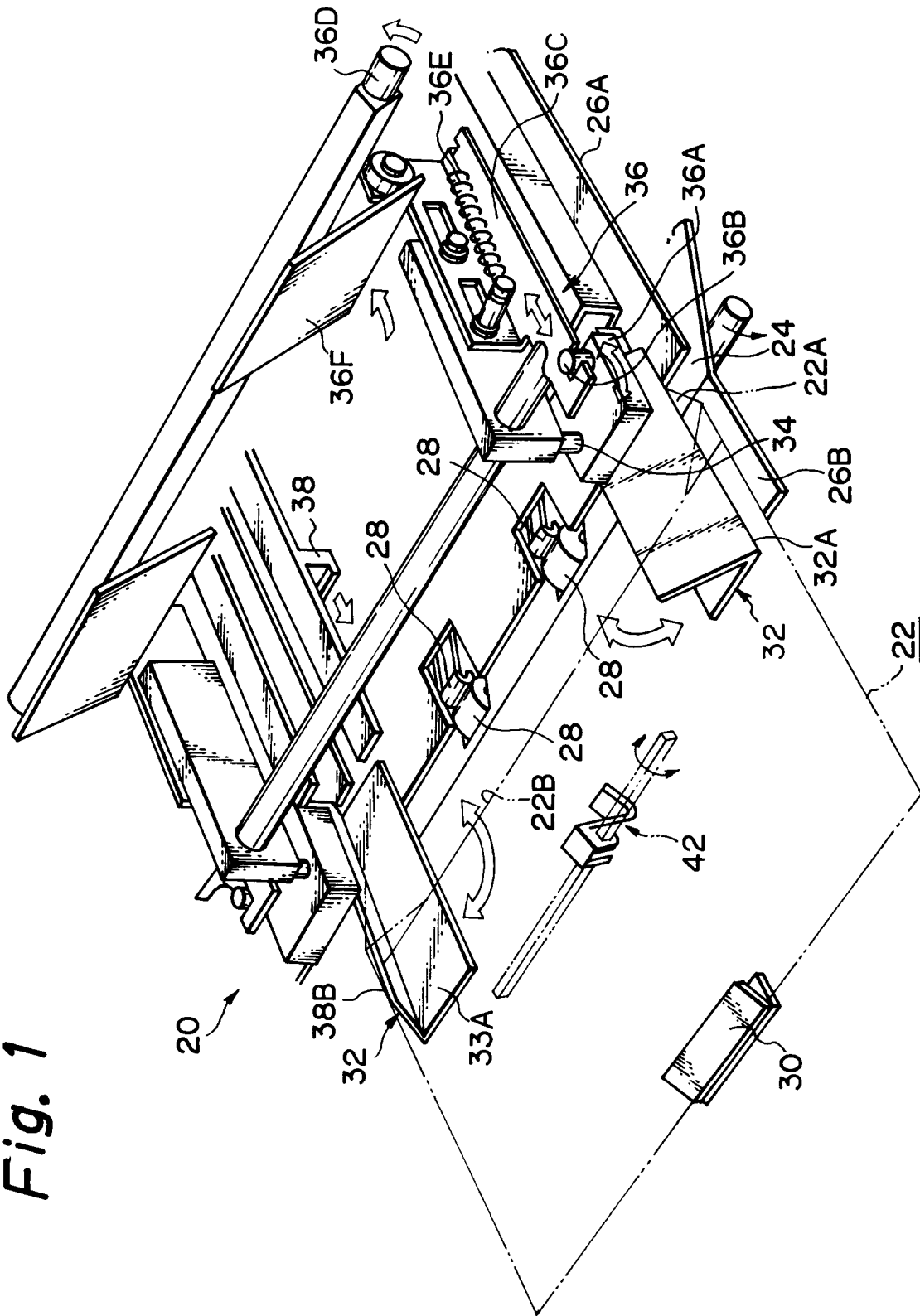


Fig. 2

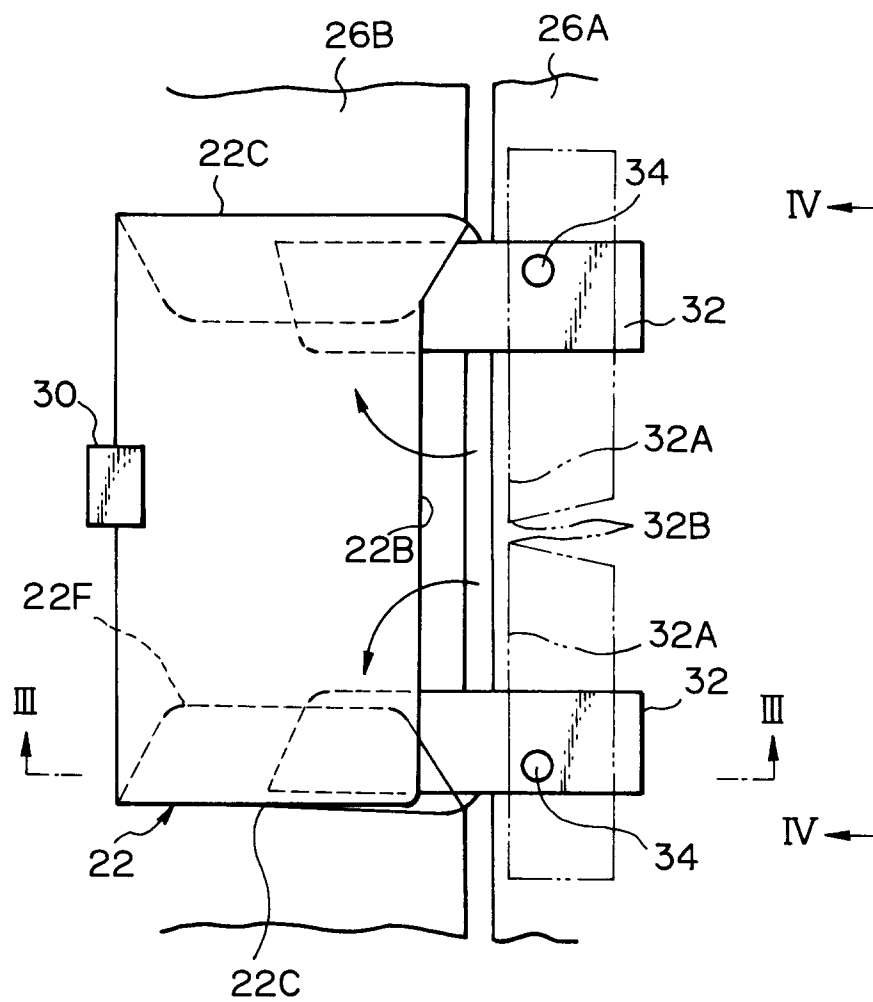


Fig. 3

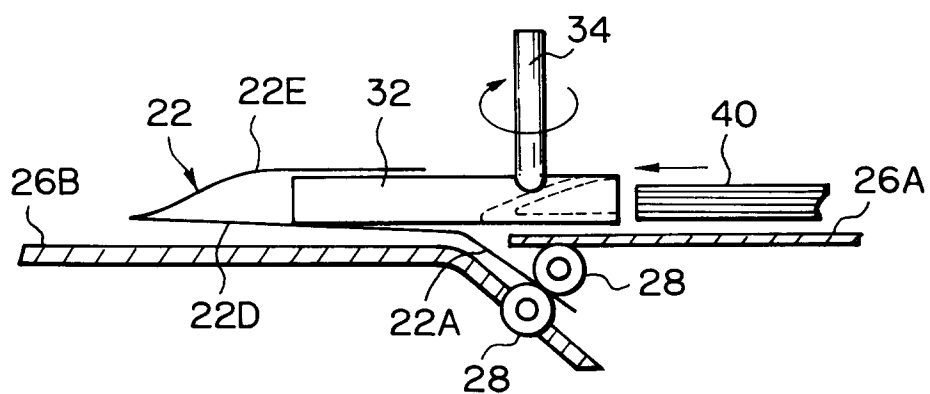


Fig. 4

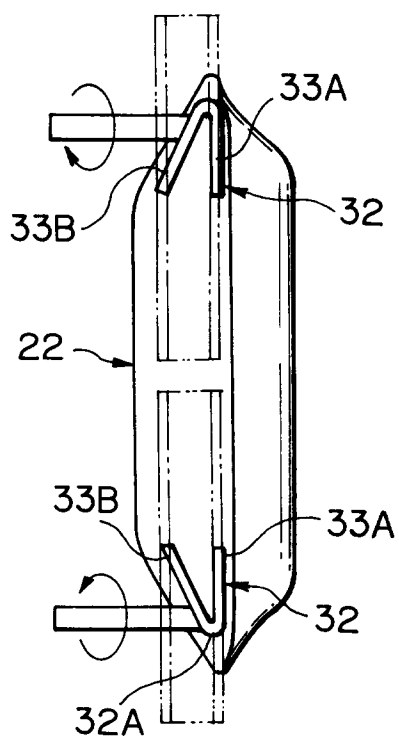


Fig. 5

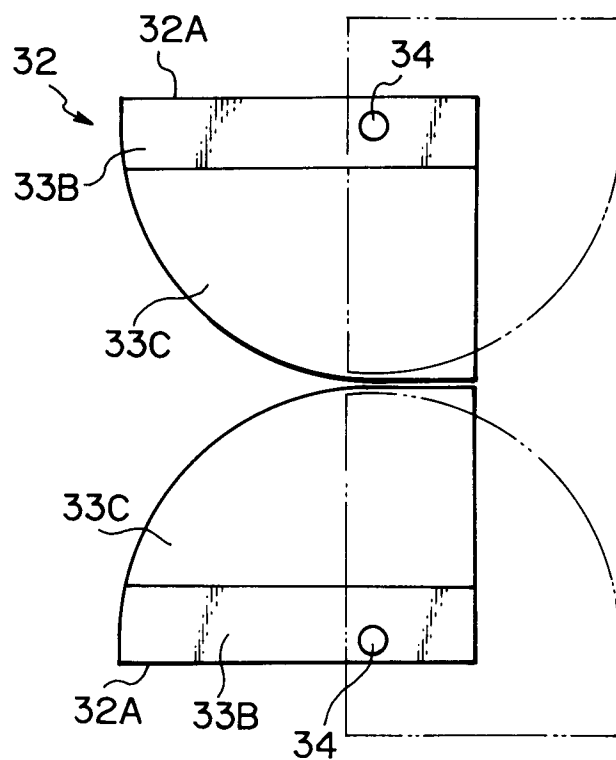


Fig. 6

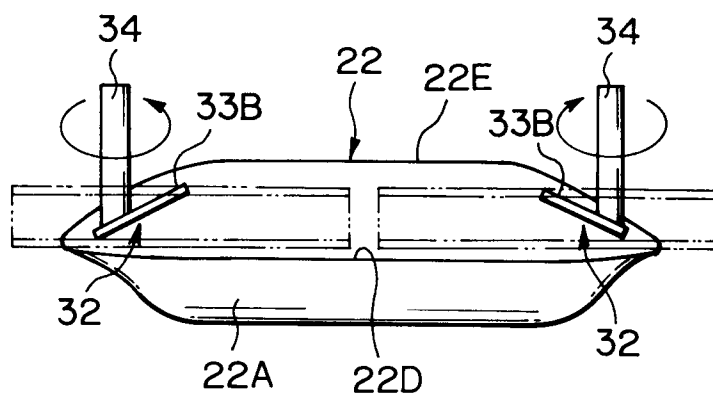


Fig. 7

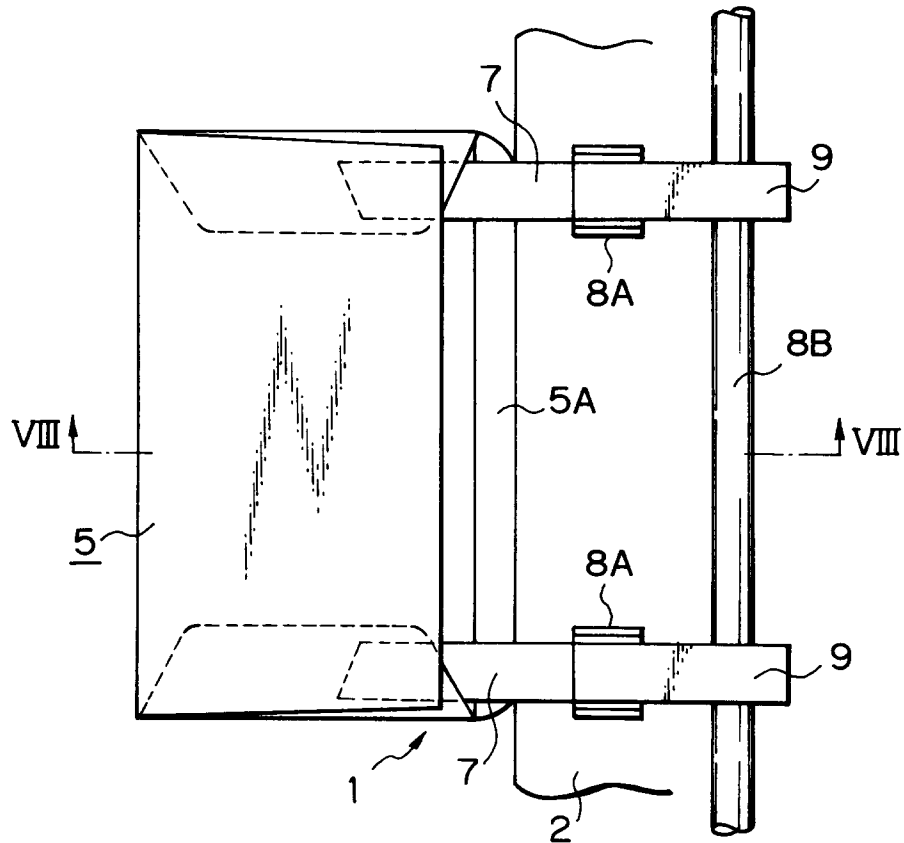


Fig. 8

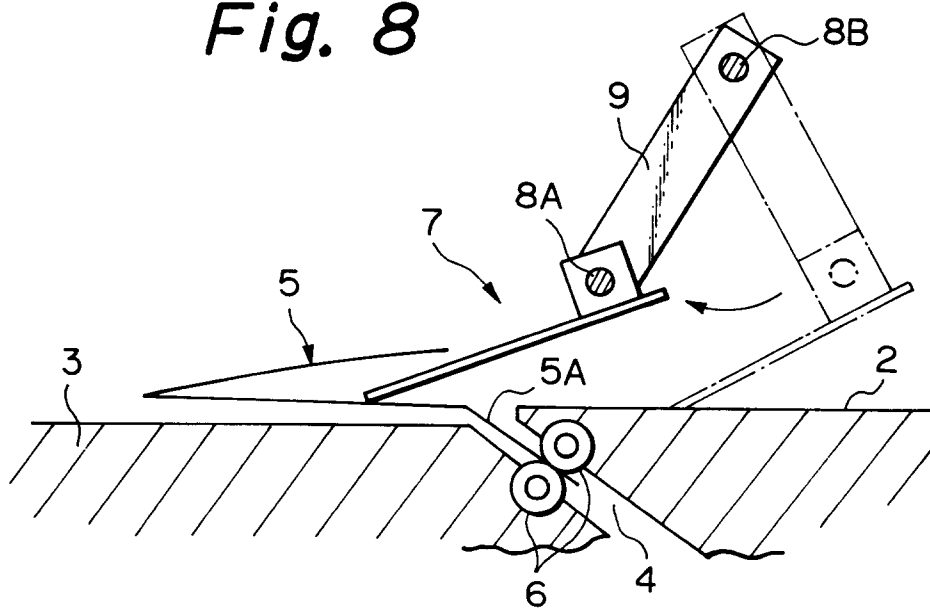


Fig. 9

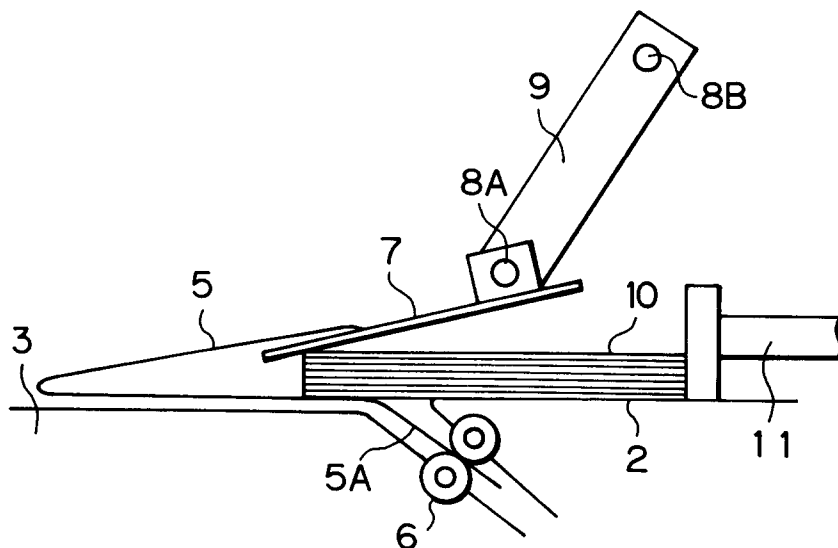
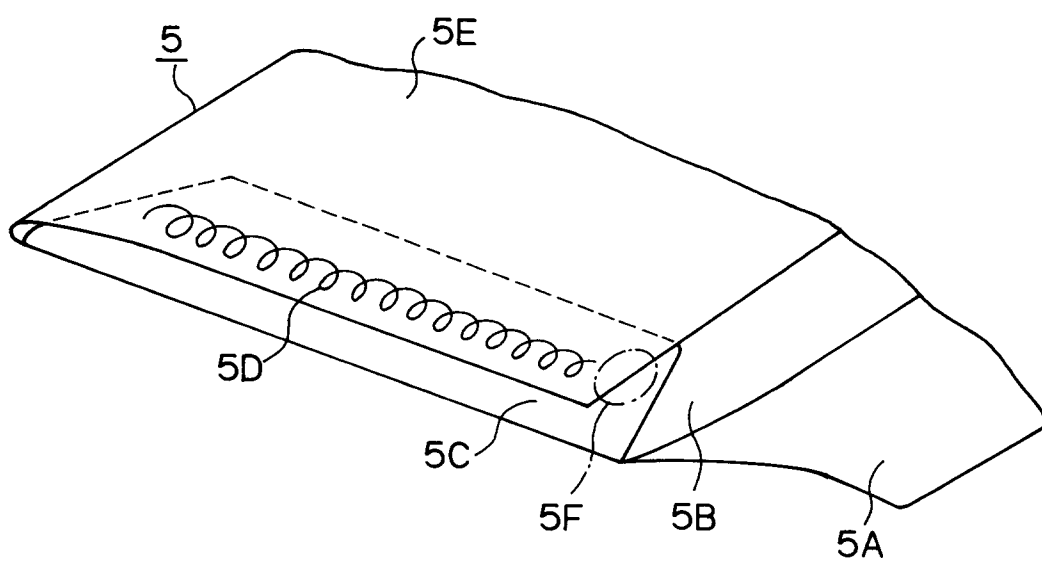


Fig. 10





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 93 12 0825

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
X	US-A-3 423 900 (ORSINGER) * column 5, line 69 - column 7, line 71; figures 1-4 *	1,2	B43M3/04
A	---	3-5	
X	EP-A-0 392 867 (BELL & HOWELL) * column 9, line 49 - column 10, line 21; figures 3A-3C *	1,2	
X	---	1,2	
X	US-A-2 001 009 (BAKER) * page 1, right column, line 24 - page 2, right column, line 63; figures *	1,2	
A	---	3	
P,X	US-A-5 247 780 (KULPA ET AL.) * column 2, line 6 - column 3, line 15; figures *	1,2	
A	---	1,3	
A	US-A-4 020 615 (IRVINE ET AL.) * column 2, line 22 - column 5, line 5; figures *	1,3	TECHNICAL FIELDS SEARCHED (Int.Cl.5)
A	---	1,3	B43M
A	US-A-5 168 689 (MACELIS) * abstract; figures 1,2,4,5 *	1,3	

The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 8 April 1994	Examiner Perney, Y
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	