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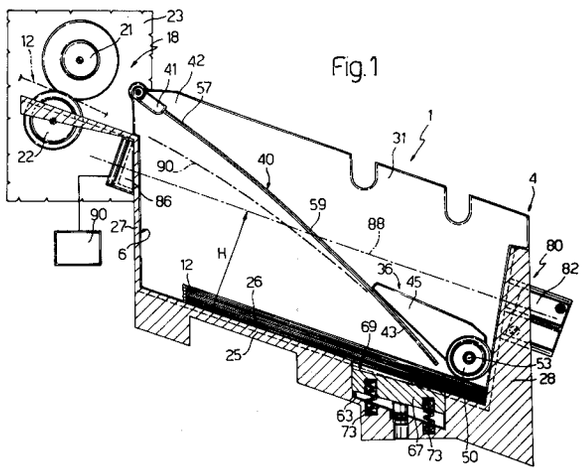
(54) A collector device for postal items.

(57) A collector device for postal items (12) provided with a container (4) defining a space (6) delimited by flat walls and operable to contain postal items (12) (letters and postcards) directed into the container (4) by an introduction device (18) formed by two rotating rollers (21, 22). The collector device (1) is provided with a kinetic energy absorber device (36) comprising a roller (50) which is angularly movable about a horizontal axis (53) and rests on a lower end (43) of a movable arm (40) pivoted at its upper end (41) to an upper portion of the container (4). The item (12) projected from the introduction device (18) performs a trajectory (90) which terminates when a front edge of the item (12) comes into contact with the walls of the roller (50) and the kinetic energy of the item (12) is transferred to the roller (50) itself. In this way rebounding of the item (12) is prevented.

Fig.1



EP 0 552 779 A1

The present invention relates to a collector device for postal items.

Collector devices are known comprising a container defining a space to contain postal items (letters and post cards) directed into the container from an introduction system coupled to the container itself.

Such postal items are normally projected into the container by an upper edge and describe a trajectory which terminates when one end of the postal item comes into contact with a vertical wall of the container.

This impact causes the postal item to stop substantially parallel to a bottom wall of the container and become disposed over the previously introduced postal item thereby forming a pile.

In devices of known type the impact between the item and the vertical wall, because of the high kinetic energy of the postal item, can cause rebounding and rotation of the postal item with the consequent formation of an inhomogeneous pile of items.

In this case the pile of items comprises letters and post cards lying in non-parallel planes and with their edges out of alignment. This disadvantage impedes automatic withdrawal of the postal items from the pile performed, for example, by means of a robot censor.

The object of the present invention is that of eliminating the disadvantage of known devices.

The above object is achieved by the present invention which relates to a collector device for postal items, comprising a container defining a space de-limited by substantially flat walls and able to contain postal items projected into the interior of the said space by an introduction device, characterised in that it includes a kinetic energy absorber device for absorbing the kinetic energy of the said postal item; the said absorber device being movable with respect to the said container within the said space and comprising at least one damper body co-operable with at least one edge of the said postal item when moved under the thrust of the postal item itself.

The invention will now be illustrated with reference to the attached drawings which represent a non-limitative preferred embodiment thereof, in which:

Figure 1 is a longitudinal section of a collector device formed according to the principles of the present invention; and

Figure 2 shows a gripper device which can be introduced into the collector of Figure 1 for extraction of postal items contained therein.

In Figure 1 a collector device, generally indicated 1, comprises a container 4 defining a space 6 delimited by substantially flat walls and able to contain postal items 12 (for example letters or postcards). These postal items come from a conveyor device of a postal sorter (not illustrated) and are projected into the space 6 from an introduction device 18 disposed close to an upper edge of the container 4 and comprising a pair of rollers 21 and 22 disposed with their axes parallel to one another.

In particular, the roller 21 is clad externally in soft rubber whilst the roller 22 has an outer cylindrical surface covered in plastics material which is harder than that covering the roller 21.

Both the rollers 21 and 22 are driven by a transmission (not shown) the input of which is connected to a three phase electric motor (not shown). The position of these rollers 21 and 22 carried by a wall 23 is, moreover, established upon calibration, with respect to the container 4, thus defining the angle at which items 12 enter the container 4.

The container 4 includes a bottom wall 25 defining a support plane 26, two vertical walls 27 and 28 which extend upwardly from the wall 25 and are substantially parallel to one another, and a rear side wall 31 (the container is open at the front to permit removal of items 12) disposed perpendicularly to the walls 27 and 28.

The device 1 is further provided with an energy absorber device 36 cooperating with an arm 40 pivoted at its first, upper free end 41 to an upper portion 42 of the wall 31, and supporting at its second, lower end 43, a flat triangular plate 45 which lies vertically, on only one edge, on the said end 43 and supports two coaxial rollers 50 (of which only one is shown) which are disposed on the opposite faces of the plate 45 and are free to rotate about a horizontal axis 53.

The rollers 50, moveover, are disposed within the space 6 and in contact with the wall 28.

Furthermore, the bottom wall 25 of the container 4 defines a cavity 63 which communicates with the space 6 and houses a portion 67 which defines an inclined frontal entrance portion and a flat upper surface 69 and is movable within the cavity 63. In particular, the portion 67 is movable between a first, rest position in which the surface 69 is disposed substantially coplanar to the plane 26, and a second, retracted position in which the surface 69 is disposed beneath the plane 26.

The cavity 63 further houses resilient elements 73 which are connected to the portion 67 and are operable to maintain the portion 67 in the rest position in the absence of forces applied to the portion 67 itself. In fact, if a component of force directed along a straight line substantially parallel to the walls 27 and 28 is applied to the portion 67, it becomes disposed beneath the plane 26 by compressing the resilient elements 73.

The collector device 1 is further provided with an opto-electronic transducer 80 comprising a photo-emitter device 82 (for example an LED) mounted on the wall 28 and a photodetector device 86 (for example a phototransistor) mounted on the wall 27. These devices 82 and 86 cooperate with one another defining an optical path 88 across the space 6 parallel to the plane 26 at a distance H from the plane 26 itself. The transducer 80 is connected to an electronic central control unit 90 which controls the sorting machine (not shown) which regulates the inflow of postal items 12 to the collector device 1.

In this way, when the height of the pile of postal items 21 reaches or exceeds the distance H the optical path 88 is interrupted and the signal generated by the transducer 80 is utilised by the central control unit 90 to indicate a "too full" condition of the container 4 and to allow emptying of the container 4.

In use the postal items 12 coming from the sorting machine (not shown) arrive at the introduction device 18 forming a flow of substantially ordered items. The rollers 21 and 22 drive the items 12 at a different velocity from that of the preceding conveyor section, projecting them into the container 4. In particular, the configuration and arrangement of the rollers 21 and 22 is such as to slightly bend the objects 12 towards the (softer) roller 21 during their passage in order to encourage homogenous superimposition within the container 4.

The postal item 12 follows a trajectory 90 which is upwardly limited by the arm 40 and which terminates when the front edge of the item 12 comes into contact with the walls of the rollers 50. The kinetic energy of the item 12 is almost entirely transferred to the rollers 50 which therefore rotate about the axis 53; in this way the rollers 50 transform the kinetic energy of translation of the postal items 12 into kinetic energy of rotation which in turn is dissipated by friction on the wall 28 of the container 4 and on the postal item 12 itself which, in attempting to rebound, finds itself moving in a direction opposite that of the surface of the rollers 50.

In this way rebounding of the postal item 12 is prevented and the item is disposed parallel to the plane 26 with its lateral edges substantially parallel to the wall 31.

With the progressive introduction of postal items 12 the arm 40 therefore progressively rises and consequently lifts the energy absorber device 36.

When the level of the pile of items 12 exceeds the height H emptying of the container 4 is enabled. This operation can be effected by means of a postal robot, for example of the type described in the Italian Patent Application entitled "Postal Robot" filed on the same date by the same applicant, the relevant contents of which are incorporated herein.

To effect the unloading operation of the container 4 a postal robot (not illustrated) can be used, which may be conveniently controlled by the same central control unit 90 and provided with a mechanical arm 100 (Figure 2) which carries at its end a pincer 104 comprising an L-shaped base 106 and a movable finger 108 operable to grip a pile of postal items 12.

In particular, the arm 100 of the Postal Robot is caused to translate towards the container 4 in a direction substantially perpendicular to the wall 31, and the L-shaped base 106, by pressing on the inclined frontal portion of the portion 67 causes this latter to displace downwardly. In this way the pile of items are supported on the L-shape base 106 whilst the finger 108 presses on the upper part of the pile of items 12 gripping it firmly. The arm 100 is then withdrawn from the container 4 and a pile of items is removed from the container 4.

The advantages obtained with the device of the present invention are apparent from the description.

In particular, by means of the absorption of the kinetic energy of the items 12 by the device 36 there is obtained an ordered superimposition of the items 12, which can therefore subsequently be withdrawn automatically.

This device 36 can, moreover, be made in a simple and therefore economic manner. By means of the rollers 21 and 22 of the introduction device 18 the velocity and angle of arrival of the postal items 12 into the space 6 are optimised. The movable bottom of the space 6 further allows automatic withdrawal of the postal items 12 by means of a robot pincer. The maximum predetermined filling level of the space 6 is indicated in an automatic manner by means of the optoelectronic transducer 80.

Finally, it is clear that modifications and variations can be introduced to the present invention without, however, departing from the protective ambit of the invention itself.

The energy absorber device 36 could have a different form from that described and could, for example, comprise a single roller or a plurality of rollers 50 disposed along the axis 53 and spaced from one another. The rollers 50, moreover, could be replaced by balls of plastics material, for example rubber, disposed along the axis 53 and angularly movable about the axis 53. The device 36 could be so arranged as not to be carried by the arm 40 and could on the other hand be connected to the wall 28 by vertical guides.

The arm 40 could be in several parts and could comprise several rectilinear elements connected slidably together, and the transducer 80 could be replaced by a microswitch or could be dispensed with.

The displacement of the portion 67 within the cavity 63 to allow introduction of the L-shaped base 106 of the pincer 104 of the robot could be achieved automatically, for example using a pneumatic cylinder controlled by the central control unit 90. Moreover, two spaced cavities 63 could be provided, with their associated two portions 67 in the bottom wall 25 of the space 6 to house two associated portions of the base of the robot pincer for removing items.

The introduction device 18 could, finally, have a different form from that shown, comprising, for example, a plurality of rollers connected together. Thus also a position adjustment device for the rollers 21 and 22 on the wall 23 of the associated space 6 could be provided.

The cylindrical surface of both rollers 21 and 22 could, finally, be made of hard material (for example hard plastics) and one of the rollers 21 and 22 could be thrust towards the other by a spring.

Claims

1. A collector device for postal items comprising a container (4) defining a space (6) delimited by substantially flat walls and able to contain the said postal items (12) projected into the interior of the said space (6) by an introduction device (18), characterised in that it includes an absorber device (36) for absorbing the kinetic energy of the said postal item (12); the said absorber device (36) being movable with respect to the said container (4) within the said space (6) and including at least one damper device (50) cooperable with at least one edge of the said postal item (12) to be moved under the thrust of the postal item (12).

2. A device according to Claim 1, characterised in that the said damper body comprises at least one rolling body (50) angularly movable about its axis (53).

3. A device according to Claim 2, characterised in that the said energy absorber device (36) cooperates with an elongate body (40) pivoted at its first, upper end (41) to an upper portion (42) of the said container (4) and supporting at its second, lower end (43) the said rolling body (50).

4. A device according to Claim 3, characterised in that the said rolling body (50) is supported by a plate (45); the said plate (45) being at least partly carried on the said lower end (43) of the said elongate body (40).

5. A device according to any of Claims from 2 to 4, characterised in that the said rolling body includes at least one roller (50).

6. A device according to any preceding claim, characterised in that the said container (4) includes a substantially flat bottom wall (25) defining a support plane (26) for supporting a pile of said postal items (12); the said container (4) further including at least one movable portion (67) movable with respect to the said bottom wall (25) and provided with an upper, substantially flat surface (69); the said portion (67) being movable between a first, rest position in which the said upper surface (69) is disposed substantially coplanar with the said support plane (26) and a second position for removal of the said postal items (12), in which the said upper surface (69) is disposed beneath the said support plane (26).

7. A device according to Claim 6, characterised in that the said bottom wall (25) defines a cavity (63) upwardly communicating with the said space (6); the said movable portion (67) being at least partially housed in the said cavity (63).

8. A device according to Claim 6 or Claim 7, characterised in that it includes resilient means (73) coupled to the said movable portion (67) and operable to maintain the said portion (67) in the said rest position in the absence of a force applied to the portion (67) itself.

9. A device according to any preceding claim, characterised in that the said introduction device (18) includes at least one pair of rollers (21, 22) disposed with their axes parallel and cooperating with one another, the said rollers (21, 22) being operable to transport the said postal items (12) coming from a conveyor and sorting device in order to project them into the interior of the said space (6).

10. A device according to Claim 9, characterised in that one (21) of the said rollers has a resiliently deformable outer cylindrical surface which is more deformable than the outer cylindrical surface of the other roller (22).

11. A device according to any preceding claim, characterised in that it includes a device (80) for detecting a predetermined filling level H in the said space (6) by the said postal items (12).

12. A device according to Claim 11, characterised in that the said detector device includes an opto-electronic transducer (80) comprising a photo-emitter device (82) and a photo-detector device (86) cooperating together and defining an optical path (88) across the said space (6).

13. A device according to Claim 12, characterised in that the said optical path (88) is disposed substantially parallel to a bottom wall (25) of the said container (4).

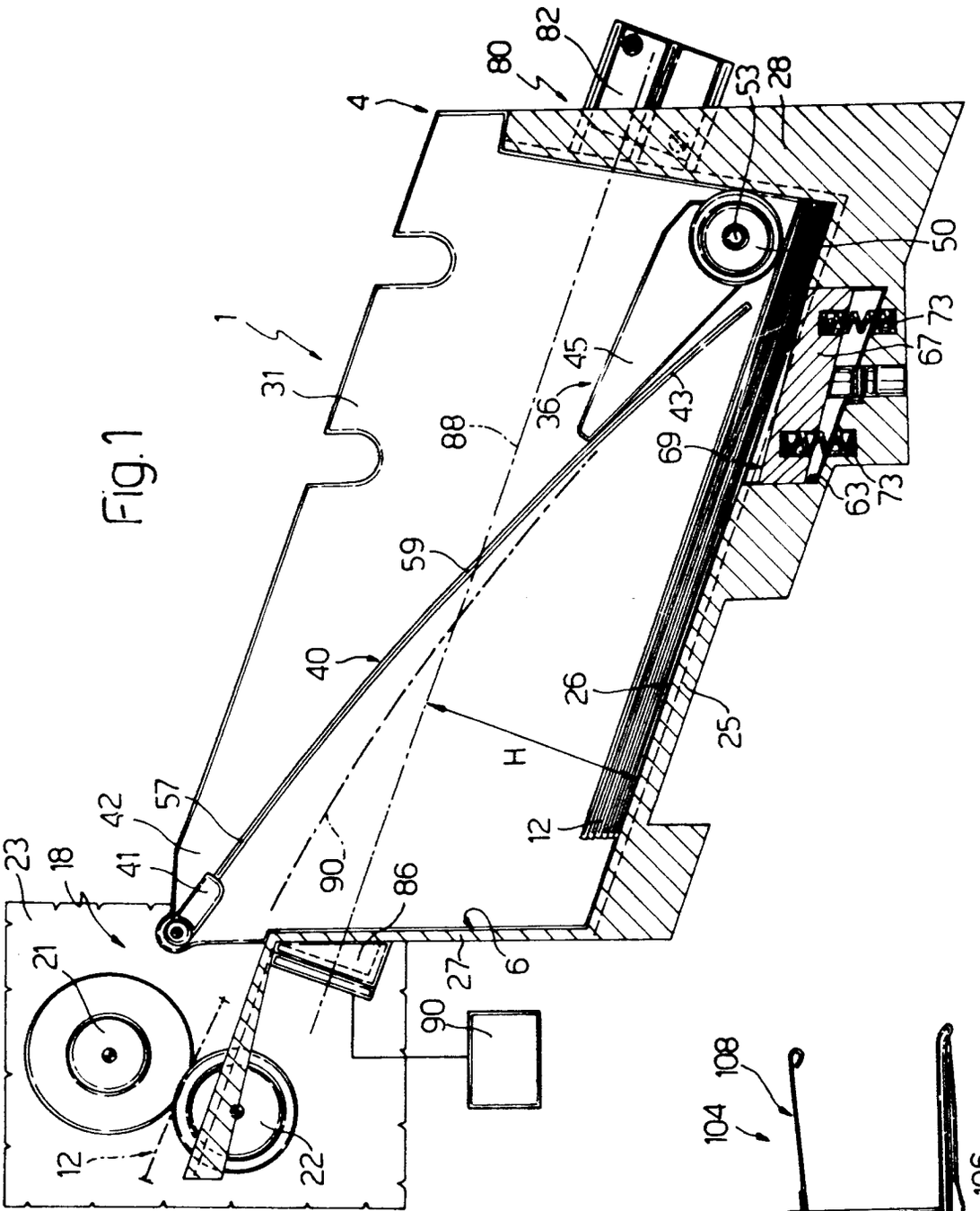


Fig.1
4
80
82
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31
73
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69
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59
40
26
25
H
42
57
12
23
18
41
90
86
6
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90
12
22

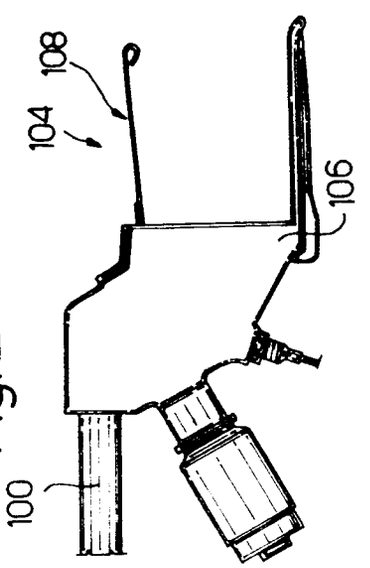
Fig.2
104
108
106
100

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EUROPEAN SEARCH REPORT

Application Number
EP 93 10 0920

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	EP-A-0 077 251 (HOTCHKISS-BRANDT SOGEME) * page 4, line 30 - page 5, line 15; figure 1 *	1,2,9	B65H31/36 B65H29/52
X	FR-A-2 480 720 (MARTIN) * page 3, line 12 - page 4, line 25; figures 1,2 *	1	
A	US-A-4 385 758 (ELLSWORTH) * the whole document *	1	
A	PATENT ABSTRACTS OF JAPAN vol. 15, no. 109 (M-1093)15 March 1991 & JP-A-30 03 860 (FUJI PHOTO FILM COMPANY) 9 January 1991 * abstract *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)
B65H G06K

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	14 APRIL 1993	EVANS A.J.

CATEGORY OF CITED DOCUMENTS

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