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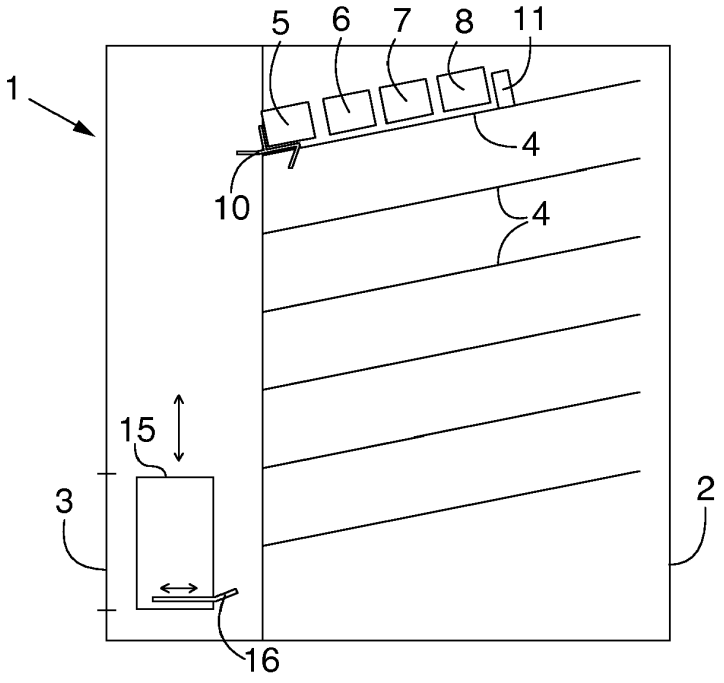
(54) Product dispensing machine and dispensing method

(57) The invention relates to a product dispensing machine comprising a motorized collecting means and a plurality of product trays, each being arranged to store products in line and comprising a dispensing mechanism at an outer end of the tray. The motorized collecting means is arranged to approach each of said product trays and to move at least one dispensing mechanism from a blocking position, in which said dispensing mechanism blocks a product first in line on said tray, into a dispense position in which the product first in line is removed from the tray onto the collecting means, said dispensing mechanism being arranged to block a product second in line while being in the dispense position.

Fig. 1



EP 2 363 841 A1

Description

FIELD OF THE INVENTION

[0001] The invention relates to a product dispensing machine and a dispensing method.

BACKGROUND OF THE INVENTION

[0002] Vending machines are known to have a plurality of product trays for storing products before they get dispensed. Some vending machines comprise trays having separate compartments for every product. The separating means take up space and therefore reduce space and also narrow down the variety of dispensable articles. Furthermore, for each tray such vending machines will need a separate motor for driving the articles on the tray towards an outlet.

[0003] Publication WO 03/074396 A1 describes a dispensing mechanism which adjusts for dispensing different product packaging formats and dimensions. One or more sliding carrier back-sleds are used which force a product last in line towards the outlet thereby forcing the products in front of the last product in the same direction. The dispensing mechanism of WO 03/074396 A1 does not have separating means for separating the products. But still it needs at least one motor for each product tray. The more motors that are needed, the more expensive the vending machine will become. Furthermore, the chance of a malfunctioning increases with the number of motors as well.

OBJECT AND SUMMARY OF THE INVENTION

[0004] It is an objective of the invention to provide a product dispensing machine having a plurality of product trays, in which there is no need for separate motors for each product tray.

[0005] In a first aspect, the invention provides a product dispensing machine comprising a motorized collecting means and a plurality of product trays , each being arranged to store products in line and comprising a dispensing mechanism at an outer end of the tray. The motorized collecting means is arranged to approach each of said product trays and to move at least one dispensing mechanism from a blocking position, in which said dispensing mechanism blocks a product first in line on said tray, into a dispense position in which the product first in line is removed from the tray onto the collecting means, said dispensing mechanism being arranged to block a product second in line while being in the dispense position.

[0006] The invention enables dispensing products that vary in size and weight in a vending machine, maximizing product space and using a minimum of motorized elements, thus reducing production costs, maintenance and incidents.

[0007] In an embodiment, the motorized collecting means is arranged to move said at least one dispensing mechanism from said dispense position back into said blocking position.

[0008] In a further embodiment, each of said product trays further comprises pushing means for pushing a product last in line towards the dispensing mechanism. If the trays are placed horizontal, the gravity force cannot be used, and a pushing means can deliver the necessary force. An example is a sliding carrier back sled.

[0009] In a further embodiment, the pushing means are arranged to bias said products on said tray by means of springs, so no additional motor needed to push the products.

[0010] The dispensing mechanism may comprise a blocking surface for blocking said product first in line and a pushing surface for pushing said product first in line out of place.

[0011] In an embodiment, the dispensing mechanism is arranged, when activated by said collecting means, to lift said product first in line.

[0012] In an embodiment, the dispensing mechanism comprises a lever arranged to rotate about a pivoting axis and having a first lever arm for engaging said collecting means and a second arm connected to the pushing surface. This results in a very effective and simple design.

[0013] The dispensing mechanism described above may comprise:

- a first sheet steel forming said first lever arm, said second lever arm and said pushing surface;
- a second sheet steel forming said blocking surface, said second sheet steel being pivot ably connected to said second lever arm.

[0014] In a further embodiment, two side edges of the blocking surface are guided by guiding means so as to be forced in a substantially upright position in the blocking position of the dispensing mechanism, and be able to pivot once the dispensing mechanism gets pivoted to a certain degree by the collecting means. In this configuration, the first product only needs to be lifted just a little bit and will then be pushed forward due to the pushing force of the product behind and or the pushing means.

[0015] Preferably, the guiding means comprise a cam having a curved edge at the top.

[0016] The invention also relates to a product tray for use in a dispensing machine as described above.

[0017] Finally, the invention relates to a method of dispensing products out of a vending machine, the method comprising:

- storing products in line on a plurality of product trays,
- blocking a product first in line at an outer end of the trays,
- approaching a particular product tray by means of a motorized collecting means,
- moving, by means of said collecting means, at least one dispensing mechanism from a blocking position,

in which said dispensing mechanism blocks said product first in line, into a dispense position, in which said product first in line is removed from said particular product tray onto the collecting means,

- blocking a product second in line by said dispensing mechanism while being in the dispense position.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The invention and embodiments thereof will now be further elucidated by means of figures. In the figures,

Figure 1 shows a schematic side view of a product dispensing machine according to an embodiment of the invention;

Figure 1 shows a first view of an embodiment of the

Figure 2 schematically shows a front view of the machine of Figure 1 in which only one product is shown;

Figure 3 shows a perspective view of a floor according to an embodiment of the invention;

Figure 4 is a perspective view of a single dispensing mechanism according to an embodiment.

Figure 5-7 show part of the product tray with the dispensing mechanism in different positions;

Figure 8 shows a cross section of a dispensing mechanism according to a further embodiment.

DESCRIPTION OF PREFERRED EMBODIMENTS

[0019] Figure 1 shows a schematic side view of a product dispensing machine 1 according to an embodiment of the invention. The machine 1 comprises a housing 2 with an outlet opening 3 for taking out an ordered product. The machine 1 comprises a plurality of product trays 4 on which products 5-8 can be stored. At an outer end of each tray 4, one or more dispensing mechanisms 10 are arranged to block a product 5 first in line. In the embodiment of figure 1, the last product 8 in line is pushed towards the dispensing mechanism 10 by means of a back sled 11 slidably arranged on said product tray 4.

[0020] Furthermore, the machine 1 comprises a collecting means 15 for collecting a product from one of the trays 4. In an embodiment, the collecting means comprise an elevator 15 which can move up and down, and from left to right. Inside the elevator 15 a slide is arranged that can be moved out of the elevator 15 as will be explained in more detail below.

[0021] Figure 2 schematically shows a front view of the machine 1 in which only one product is shown, see product 5. Figure 2 shows that the trays 4 are arranged in so-called floors 20, 21. Each floor 20, 21 may comprise one or more product trays 4.

[0022] The elevator 15 can be moved in two dimensions. In this way, the elevator 15 can approach any product tray 4 on any floor 20, 21.

[0023] Figure 3 shows a perspective view of a floor 20 according to an embodiment of the invention. The floor 20 comprises three product trays 31, 32, 33. The trays are defined by walls 34,35,36,37. The trays are preferably manufactured out of aluminum. On the trays between two walls, products can be lined up. Preferably, the products are packed in box-shaped packages. Due to their flat outer surfaces, box-shaped packages can be positioned close to each other.

[0024] A single product tray 31, 32, 33 can contain one or multiple dispensing mechanisms depending on the products to be vended. In figure 3, the tray 31 contains two dispensing mechanisms 41 and 42.

[0025] Figure 4 is a perspective view of a single dispensing mechanism 41 according to an embodiment. The dispensing mechanism 41 of this embodiment works as a lever and is also referred to as lever mechanism 41. The lever mechanism 41 pivots around an axis 51 which also holds the lever mechanism 41 in its position. The axis 51 is clamped into an axis holder 57 which is arranged next to a base plate 58 of the dispensing mechanism 41. In this embodiment, the axis holder 57 comprises a slit for passing through the lever arm 52. It is noted that in this embodiment the pivot arm 52 comprises two suitable kinks which also make the lever arm more flexible. The dispensing mechanism 41 comprises a first lever arm 52 and a second lever arm 53. In an embodiment, the lever arms 52 and 53 are manufactured out of single sheet steel which results in a strong and simple design. The second lever arm 53 transcends into a first blocking plate 54 which makes an angle α with the second lever arm 53. Near the end of the second lever arm 53, a second blocking plate 55 is pivot ably connected to the second lever arm 53 by means of a hinge 58. That part of the upper surface of the second lever arm 53 which makes contact with the product 5 first in line is also referred to as pushing surface 53. At both sides of the dispensing mechanism 41, guiding means 56 are arranged.

[0026] Now, the working of the dispensing mechanism 41 is explained with reference to Figure 5-7. In Figure 5 part of the product tray 4 is shown with the dispensing mechanism 41 of Figure 4. In Figure 5, the dispensing mechanism 41 is in a blocking position in which the product first in line is prevented from leaving the tray. When collecting a product, the collecting means 15, i.e. the elevator 15, moves above the product tray to be approached. Next, it extends a bucket 16 and moves slowly downward. By moving downward, the bucket 16 will push down on the front of the lever arm 52 resulting in a pivoting/rotating movement about the axis 51, which lifts up the rear end of the second lever arm 53. Once the mechanism 41 starts rotating, the product positioned on the rear end of the second lever arm 53, i.e. product 5, starts moving upward (see Figure 6) and then forward, sliding

along the rotatable arm 55 on top which subsequently rotates towards the front lever giving the product 5 the possibility to slide over the lever mechanism off the tray, see Figure 7. The back side of the lever 54 which tilts up while the front is being pushed down, holds the next article in line, thus preventing it from sliding forward off the tray.

[0027] In a particular embodiment, the lever arm 52 is flexible making it possible that the relative heavy products can be dispensed onto the collecting means. Once the product 5 is loaded onto the elevator 15, the bucket 16 will be retracted into the elevator 15, so that the elevator can go down and pass the lever arm 52. Once, the bucket 16 is beneath the lever arm 52, it extends again and the elevator 15 will go up so that the lever arm 52 is pushed up and the dispensing mechanism is back into its blocking position. Due to the lever mechanism, the back side of the lever arm 53 pushes the next product, i.e. product 6, a bit back when the front of the lever is being tilted, creating room for the lever mechanism to get back in its blocking position. The two guiding means 56, also referred to as side ridges 56, make sure the top arm 55 is being guided along the rotation.

[0028] The lever mechanism 41, 42 shown in Figures 4-7 is capable of dispensing a range of products that vary in size, weight and packaging.

[0029] By pushing downward on one side of the lever, the first product is being lifted out of its position from the particular tray. While one side is lifting up the article, the next article in line is being held back by the backside of the lever mechanism. Once the product has been dispensed, the lever can be pushed upward, thus creating the possibility for the next article to move onto the lever.

[0030] Figure 8 shows a cross section of a dispensing mechanism according to a further embodiment. The dispensing mechanism comprises a roller 80 rotatable around an axis, mounted at an outer end of a product tray. The roller has a circular cross section and comprises a recess which results in a pushing surface 83 for pushing the first product out of line. The roller 80 can be activated by a gear mechanism 82 present on the elevator 15.

[0031] A person skilled in the art will readily appreciate that various features disclosed in the description may be modified and that various embodiments disclosed and/or claimed may be combined without departing from the scope of the invention.

Claims

1. A product dispensing machine (1) comprising:

- a motorized collecting means (15,16) and,
- a plurality of product trays (31,32,33), each being arranged to store products in line and comprising a dispensing mechanism (41, 42) at an outer end of the tray,

wherein said motorized collecting means is arranged to approach each of said product trays and to move at least one dispensing mechanism from a blocking position, in which said dispensing mechanism blocks a product (5) first in line on said tray, into a dispense position in which the product first in line is removed from the tray onto the collecting means, said dispensing mechanism being arranged to block a product (6) second in line while being in the dispense position.

2. Product dispensing machine according to claim 1, wherein said motorized collecting means is arranged to move said at least one dispensing mechanism (41, 42) from said dispense position back into said blocking position.

3. Product dispensing machine according to any one of the preceding claims, wherein each of said product trays further comprises pushing means (11) for pushing a product last in line towards the dispensing mechanism (41, 42).

4. Product dispensing machine according to claim 3, wherein said pushing means are arranged to bias said products on said tray by means of springs.

5. Product dispensing machine according to any one of the preceding claims, wherein said dispensing mechanism comprises a blocking surface for blocking said product (5) first in line and a pushing surface (53) for pushing said product first in line out of place.

6. Product dispensing machine according to claim 5, wherein said dispensing mechanism is arranged, when activated by said collecting means, to lift said product (5) first in line.

7. Product dispensing machine according to any one of claims 5-6, wherein said dispensing mechanism comprises a lever arranged to rotate about a pivoting axis and having a first lever arm for engaging said collecting means and a second arm connected to said pushing surface.

8. Product dispensing machine according to claim 7, wherein said dispensing mechanism comprises:

- a first sheet steel forming said first lever arm, said second lever arm and said pushing surface;
- a second sheet steel forming said blocking surface, said second sheet steel being pivot ably connected to said second lever arm.

9. Product dispensing machine according to claim 8, wherein two side edges of said blocking surface are guided by guiding means so as to be forced in a substantially upright position in the blocking position

of the dispensing mechanism, and be able to pivot once the dispensing mechanism gets pivoted to a certain degree by the collecting means.

10. Product dispensing machine according to claim 10, wherein said guiding means comprise a cam having a curved edge at the top.

11. Product tray (31, 32, 33) for use in a dispensing machine according to any one of the preceding claims.

12. A method of dispensing products out of a vending machine, the method comprising:

- storing products in line on a plurality of product trays,
- blocking a product first in line at an outer end of the trays,
- approaching a particular product tray by means of a motorized collecting means,
- moving, by means of said collecting means, at least one dispensing mechanism from a blocking position, in which said dispensing mechanism blocks said product first in line, into a dispense position, in which said product first in line is removed from said particular product tray onto the collecting means,
- blocking a product second in line by said dispensing mechanism while being in the dispense position.

13. Method according to claim 12, wherein said products are packed in boxes.

Fig. 1

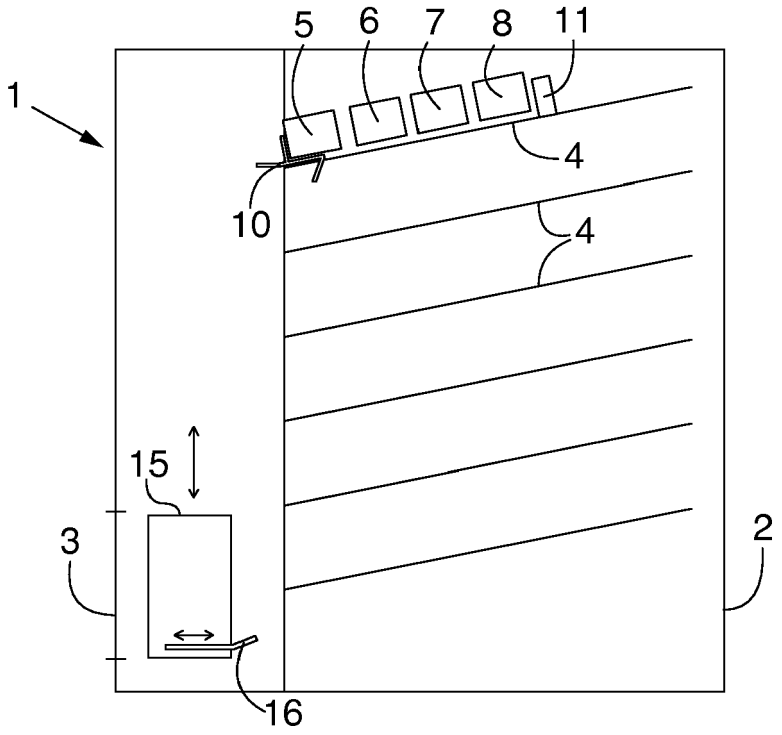


Fig. 2

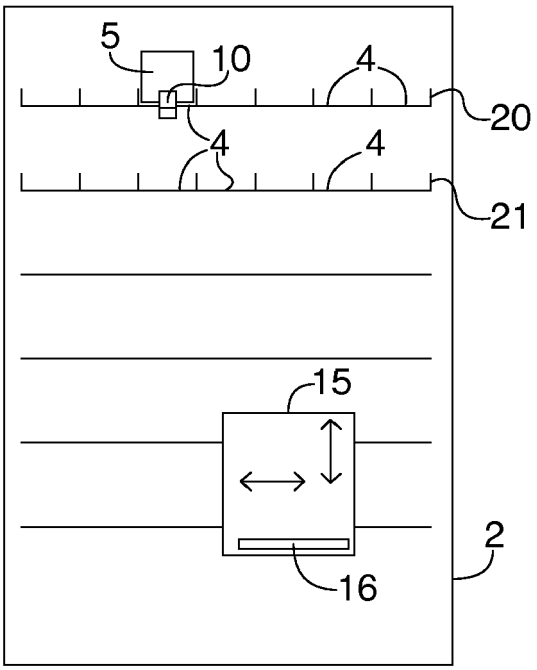


Fig. 3

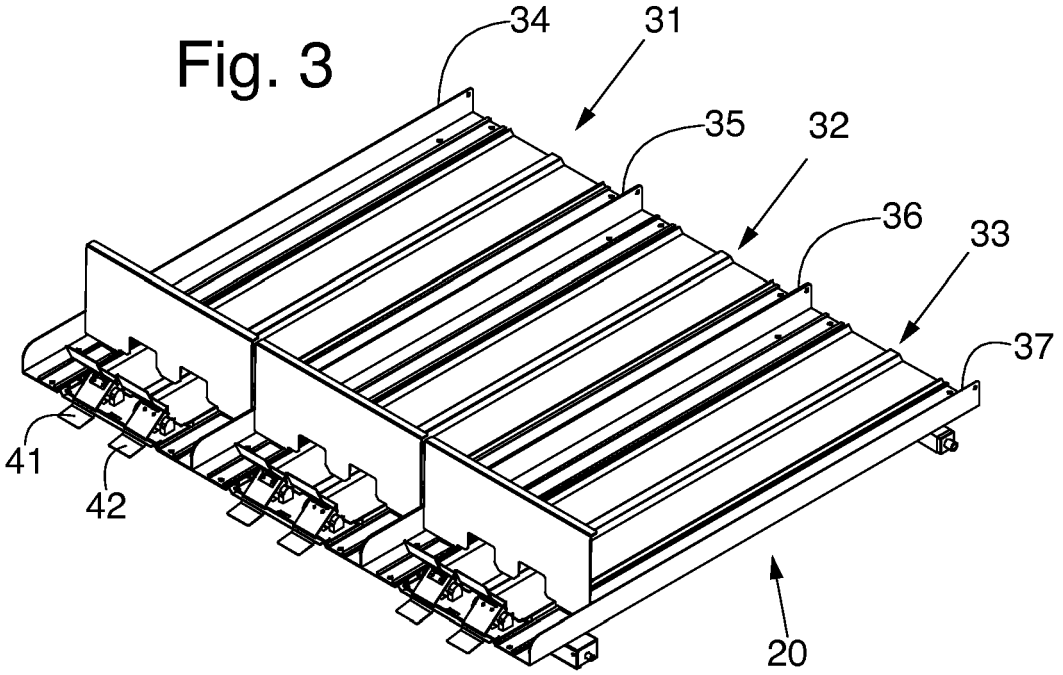


Fig. 4

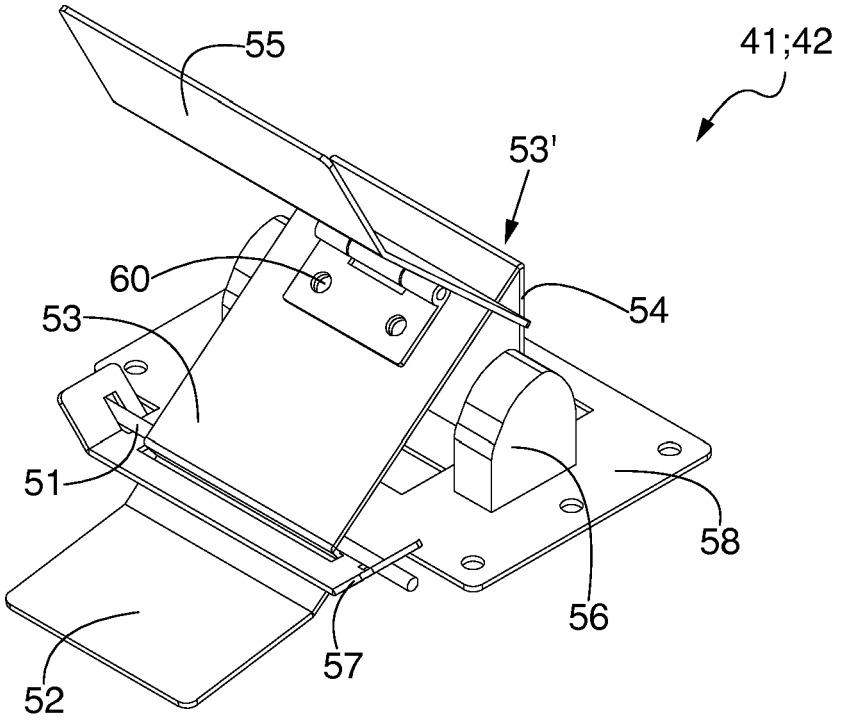


Fig. 5

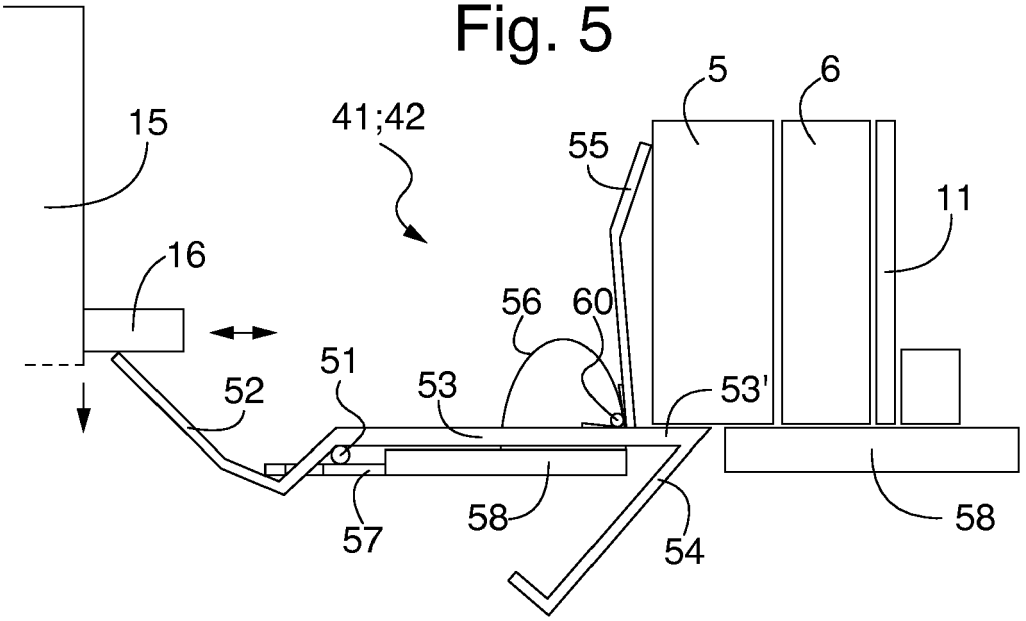

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Fig. 6

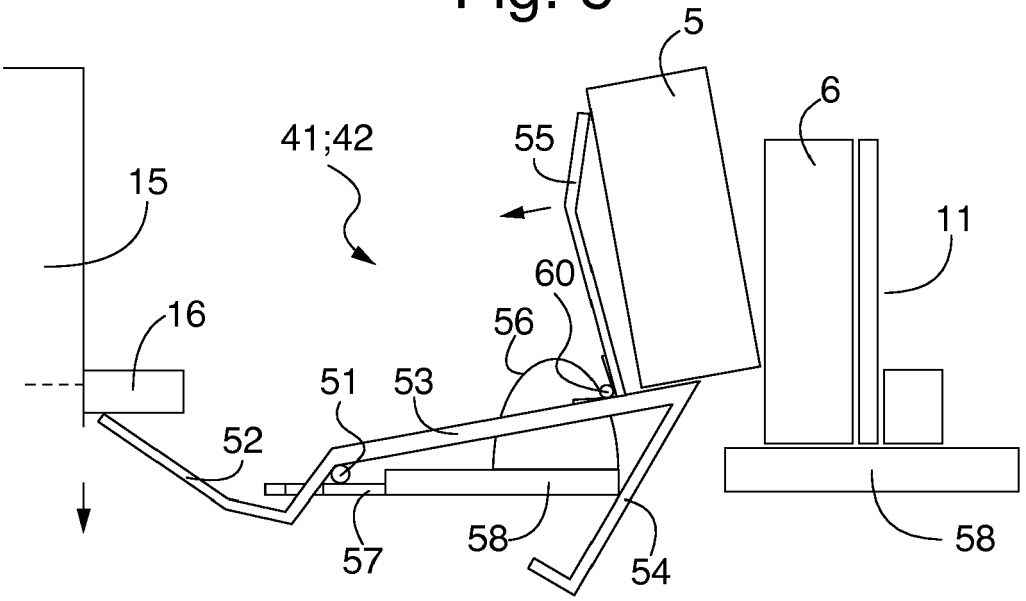
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Fig. 7

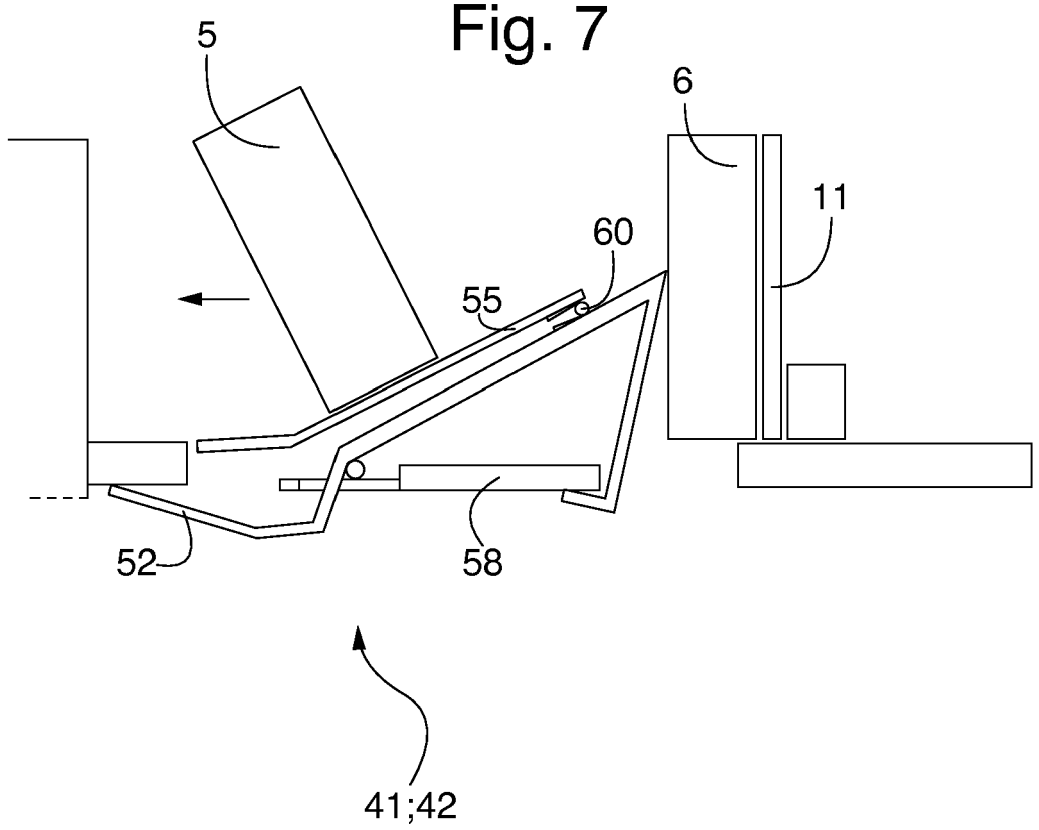
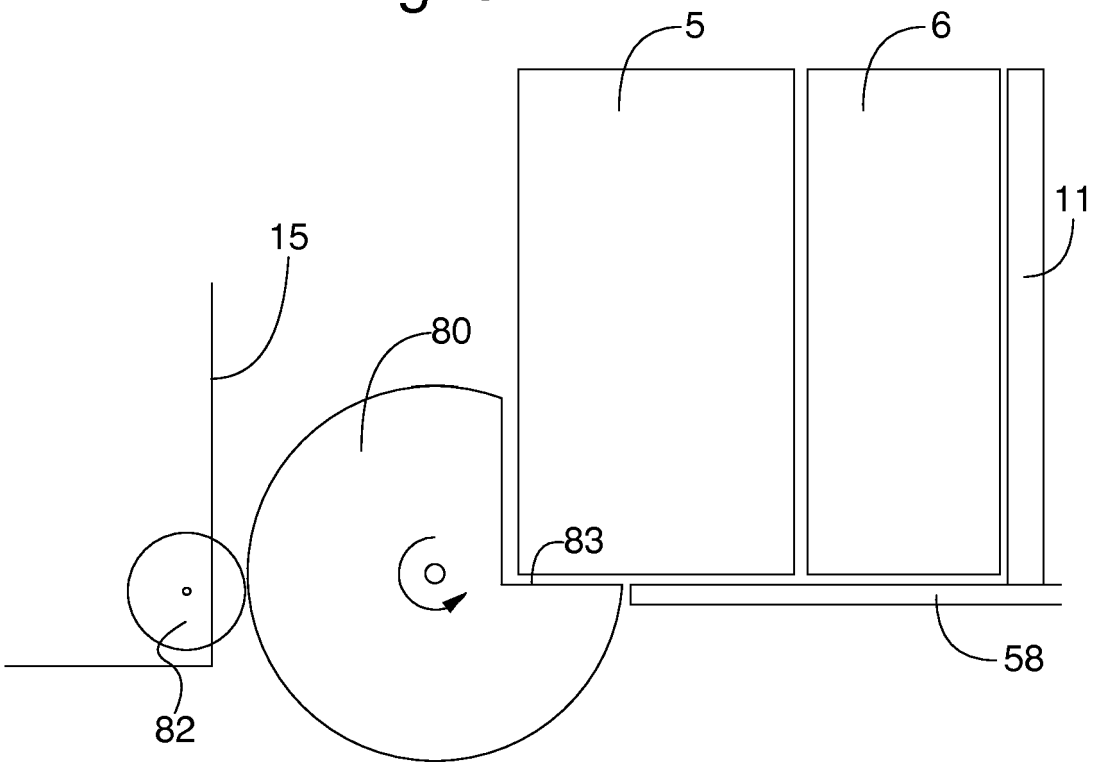


Fig. 8



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EUROPEAN SEARCH REPORT

Application Number
EP 10 15 5534

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2005/067426 A1 (HOLDWAY JOHN BARRETT [US] ET AL HOLDWAY JOHN [US] ET AL) 31 March 2005 (2005-03-31) * paragraph [0012] - paragraph [0020] * * paragraph [0064] - paragraph [0077] * * figures 1-13 *	1-13	INV. G07F11/28 G07F11/42
X	US 6 513 677 B1 (SORENSEN STEVEN W [US] ET AL) 4 February 2003 (2003-02-04) * column 3, line 33 - column 4, line 28; figures 1-13 * * column 8, line 66 - column 16, line 34 * * column 19, line 18 - column 22, line 14 *	1-13	
A	US 6 682 289 B1 (CREDLE JR WILLIAM S [US]) 27 January 2004 (2004-01-27) * the whole document *	1-13	
A	US 5 121 854 A (TROUTEAUD LEE E [US] ET AL) 16 June 1992 (1992-06-16) * the whole document *	1-13	TECHNICAL FIELDS SEARCHED (IPC) G07F
A	US 5 873 489 A (IDE YOSHIAKI [JP] ET AL) 23 February 1999 (1999-02-23) * the whole document *	1-13	
A	US 2 784 872 A (LUX EUGENE J) 12 March 1957 (1957-03-12) * the whole document *	1-13	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	30 July 2010	Guenov, Mihail

CATEGORY OF CITED DOCUMENTS

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30-07-2010

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005067426 A1	31-03-2005	AU 2004280866 A1	21-04-2005
		AU 2009208170 A1	10-09-2009
		AU 2009208171 A1	10-09-2009
		CA 2540277 A1	21-04-2005
		CA 2666089 A1	21-04-2005
		EP 1665178 A2	07-06-2006
		EP 2138982 A2	30-12-2009
		EP 2141668 A2	06-01-2010
		MX PA06002768 A	14-06-2006
		US 2006169714 A1	03-08-2006
		US 2006169713 A1	03-08-2006
		US 2005082309 A1	21-04-2005
		WO 2005036482 A2	21-04-2005
US 6513677 B1	04-02-2003	NONE	
US 6682289 B1	27-01-2004	NONE	
US 5121854 A	16-06-1992	NONE	
US 5873489 A	23-02-1999	CN 1164907 A	12-11-1997
		EP 0806749 A1	12-11-1997
		WO 9708666 A1	06-03-1997
		KR 100228027 B1	01-11-1999
US 2784872 A	12-03-1957	NONE	

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 03074396 A1 **[0003]**