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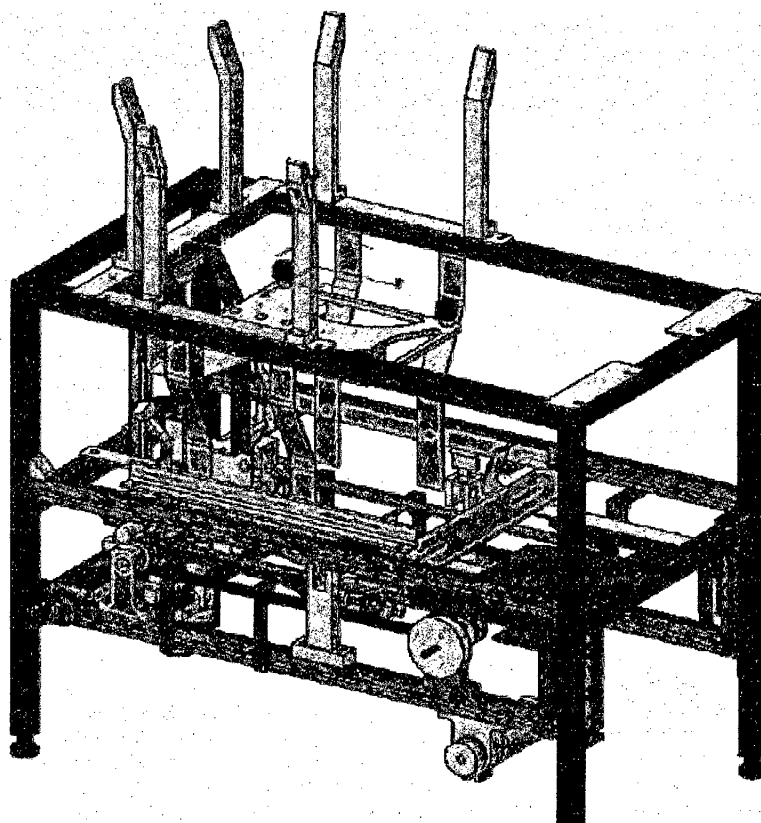
Amended claims in accordance with Rule 137(2)
EPC.

(71) Applicant: **De Vincentis, Umberto
Naples (IT)**

(54) **Automatic folding and disinfection device**

(57) An automatic folding and disinfection device that folds, prepare and sanitize boxes has an aluminum frame, and there is a storage compartment for the cardboards made by shaped bars on the top and by containment edges in order to place on a plate a stockpile of

cardboards. A dedicated adjustable sensor measures the low level of the stockpile of cardboards. The device optionally contains UV lamps for sterilising the cardboard.



TAB 2

EP 2 772 350 A1

Description

[0001] The **DESCRIPTION** of the invention named **"Automatic folding and disinfection device"** on behalf of:

DE VINCENTIS UMBERTO of Italian nationality, he was born in Naples on 21/3/1975 residing in Naples, at street Umberto Zanotti-Bianco 40 block. 11 building. A. Identity card: n° AR6131032, issued by the Naples's Municipality, taxpayer number.: DVNMRT75C21F839I;

A. The invention, named **"Automatic folding and disinfection device"** on belongs to the environment of the industrial mechanic and electric instrumentations and in particular to the category of food packing

B. The invention is ascribable to the category of boxes for food take-away

It works in automatic, electrical and healthy way. The purpose of this invention is to innovate and improve the actually manually folding of the boxes containers for food take-away in the following way:

- It reduces the time necessary for the folding of the boxes containers for food take-away
- It limits the hand touch of the cardboards, reducing the possibility of work related injury as nicks, hands chaps etc...and in this way it guarantees for the consumer the health and not influenced product.

Instrumentations like this already exist among the industrial environments but

- No one works completely in electric way
- No one guarantees the additional healthy of the boxes for food take-away by UV lamps that kill the germs, sterilize them.
- No one is able to resolve the issue of folding and of the stockpile of the cardboards for the take-away food boxes.

For the above described reasons the instrumentation is an improvement in the industry of food packaging.

C. Actually the boxes for food take-away are manually folded. The only instruments for the folding of these boxes are industrial while the above described instrument can be also used in the small-scale retail.

D. The attached tables containing the drawings are numbered from 1 to 7 and they explain respectively:

- the internal and external structure of the in-

strument

- its working principles
- all the steps which the cardboards undergone till the final expulsion.

E. The invention (Table 1, pictures 1-2) with parallelepiped shape, measures 516 x 945 x 985 (h) mm. The structure consists of aluminum estrus and contains all the mechanical and electrical parts suitable for the working machine. All the structure is covered by an external careening of panels.

On the machine there is a dedicated slot on the side where the user takes the box. There is also a switchboard in order to control and check the instrument.

The main aims of this instrument are the two following:

■ The folding of the food take-away boxes is automatic (robotic system) riding the user from complicate manual procedures.

■ Dedicated UV lamps kill the germs, sterilize the cardboards assuring the healthy and safety of the consumers avoiding contaminating events during the steps of boxes preparing and folding.

[0002] The Table 2 reports the drawing of whole packing instrument. In order to better describe the working machine principles, the description is split here after in blocks.

Block of cardboards filling:

[0003] Shaped bars (TAB 2) and retaining edges are on the top in order to place on a plate the stockpiles of cardboards as they are supplied by cardboard-mill. (tab 2).

[0004] The bars and the edges are adjustable according to the cardboards' format.

[0005] In order to guarantee the well work of the instrument a dedicated adjustable sensor measures the low level of the stockpile of cardboard (Table 3)

Block of truck cardboards taking

[0006] The truck moves in vertical way by endless crew with spiral ball and it moves very rapidly, in high reliability and micrometric precision. (Tab 4). The engine block, linked to the endless crew by the toothed belt, is bidirectional, direct current and with percussion brushes. (Tab 4) Two inductive sensors without touching, measure if the truck is on low position (standby) or on high position (withdrawing position). (Tab 4)

[0007] On the top of the truck, 4 parallel suckers are connected in equipotenzial bonding to a dedicated suction pump for the draw of the cardboard from the stock-

pile. (Tab 4)

Block of punches and bendings

[0008] Four small robots work symmetrically on the left and on the right side of the cardboard. (tab 5) 5
 [0009] The robotic parts are named as rear and lateral.
 [0010] By a dedicated flap (little hand) (Tab 5 drawings 3) moved by a electronic direct current gear motor, the lateral robotic parts arrest the cardboard and in the mean-time curve the lateral edge. (tab 5 drawings 3) 10
 [0011] The rear robotic parts curve the cardboards as the lateral one do. They also stamp the lateral block flaps in the fixed holes (Tab 5 drawings 3) by a dedicated punch (n°4) which is moved by another electronic direct current gear motor. (Tab 5 drawings 1-2-3-4). 15

Block of conveyor belt

[0012] A double rubber belt is moved in parallel way by a toothed pulley connected by a belt to a dedicated one-way motor. 20
 [0013] At the end of the belt a sensor notice the folded box ready to be withdrawn and filled by the operator). (Tab 6) (Tab 6 drawings 1 and 2) 25

The operation

[0014] The description of the instrument was split in blocks. In order to simplify the description of the instrument function it was split in the following phases: 30

- cardboard withdrawing
- folding and punching
- ready food takeaway box ejection

[0015] Here after the details of the above phases are reported.

Cardboards withdrawing phase

[0016] Here after are listed the necessary conditions for this phase

1. Enough cardboards have to be in the loading stockpile 45
2. All the flaps for the curving have to be open and secured by the relative limit system
3. Punches on back position

[0017] This phase starts pushing the bottom to start the process, after the instrument turning on, or at the end of the ejection phase of the ready food box, detected by the dedicated sensor measures. The operations of this phase are listed in sequence here after: 50

- Truck moves till the higher position measured by dedicated inductive sensor. This sensor is arranged

in order to the motor stops till the suckers touch and apply slightly pressure on the cardboard that have to be drawn.

- Turning on of the suction pump connected to the suckers that draw of the cardboards from the stockpile
- Truck move down on standby position detected by dedicated inductive sensor
- Turning off of suction pump releasing the cardboard on the conveyor belt.
- Calling of the folding phase

[0018] While the truck moves down, the lateral part of the cardboard is curved by dedicated shaped bars

Folding and punching phase

[0019] The operations of this phase are listed in sequence here after:

- Lateral flaps on ahead position in order to curve the edges
- Rear flaps on ahead position in order to curve the edges
- Rear punches on ahead position in order to insert the flaps in the prefixed holes
- Rear punches in back position till the relative limit position
- Rear flaps in back position till the relative limit position
- The sensor detects the ready food box coming out on the conveyor belt; since the box is on it wait for calling the "Ready food box ejection phase".

Ready food takeaway box ejection phase

[0020] This phase starts only when the box is ready. The operations of this phase are listed in sequence here after:

- Turning on of the engine of the belt for 0.4 seconds
- Stop of the belt
- Lateral flaps for the curving on rear position
- Restart of the belt's motion and stop detected by sensor for ready food box
- Calling draw food takeaway box

[0021] The abstract of the mechanism is reports in the Table 7

Claims

1. The instrument named "**Automatic folding and disinfection device**" that folds, prepare and sanitize boxes for food take-away
 Inside the instrument (tab 1 and 2), that is in aluminium extrusion, there is a storage compartment for the

cardboards made by shaped bars on the top and by containment edges in order to place on a plate the stockpiles of cardboards as they are supplied by cardboard-mill. In order to guarantee the well work of the instrument a dedicated adjustable sensor measures the low level of the stockpile of cardboards. (Table 3)

2. The instrument, as described in the previous claims, has a truck that moves in vertical way by endless crew with spiral ball and it moves very rapidly, in high reliability and micrometric precision. (Tab 4). The engine block, linked to the endless crew by the toothed belt, is bidirectional, direct current and with percussion brushes.
Two inductive sensors without touching, measure if the truck is on low position (standby) or on high position (withdrawing position)
On the top of the truck, 4 parallel suckers are connected in equipotenzial bonding to a dedicated suction pump for the draw of the cardboard from the stockpile. (Tab 4)
3. In the instrument there are four small robots working symmetrically on the left and on the right side of the cardboards.
The robotic parts are named as rear and lateral.
By a dedicated flap (little hand) moved by a electronic direct current gear motor, the lateral robotic parts arrest the cardboard and in the meantime curve the lateral edge.
The rear robotic parts curve the cardboard as the lateral ones do. They also stamp the lateral block flaps in the fixed holes (Tab 5 drawings 3) by a dedicated punch (n°4) which is moved by another electronic direct current gear motor. This operation determine the final shape of the box for food take-away.
The instrument contains UV lamps that kill the germs, sterilizing the cardboard, guaranteeing the health of the food boxes before the ready box ejection.
4. In the instrument there is a double rubber belt moved in parallel way by a toothed pulley connected by a belt to a dedicated one-way motor.
At the end of the belt a sensor notice the folded box ready to be withdrawn and filled by the operator (Tab 6 drawings 1 and 2).

by shaped bars on the top and by containment defining structure for the stockpile of cardboard blanks (also this structure in aluminum); and a dedicated adjustable sensor for measuring the low level of the stockpile of cardboard blanks.

3. 2) The device according to claim 1, wherein the device comprises a truck being vertically movable by a ball screw driven by an electric, brushed, bidirectional DC motor (or other), linked to the ball screw by a toothed belt; two inductive sensor for measuring if the truck is in a low position (standby) or in a high position (withdrawing position); the truck having, on its upper side, four parallel suckers which are connected in parallel to a dedicated suction pump for drawing the cardboard blanks from the stockpile.

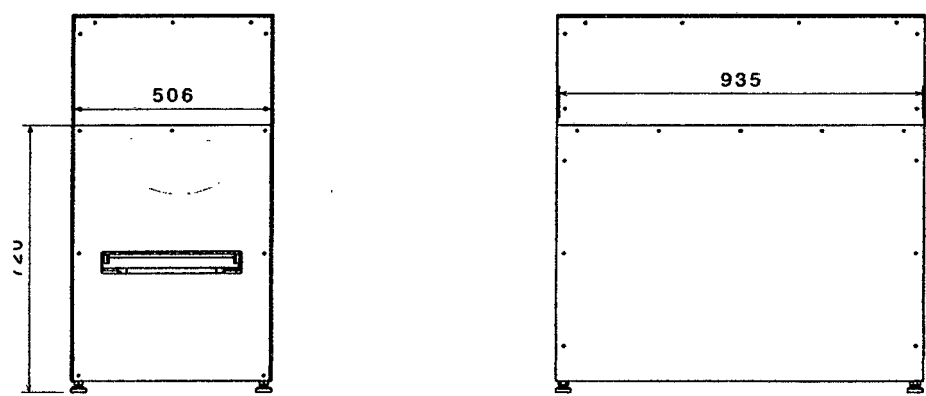
4. The device, described and explained externally according to claim 1, and internally according to claims 2 and 3, is now ready to expulsion of the cardboard, through a conveyor having a double rubber belt (or other suitable material) moved in parallel by a toothed pulley connected by a further belt to a dedicated one-way motor; and a sensor at the end of the conveyor for noticing the folded box ready to be withdrawn by and operator to the dedicate exit hole.

5. Is requested the patent for the device in its inner and outer part as described. The device is adapted to form and fold cardboard for food, composed of aluminum (or other suitable material) that sterilizes and sanitizes the cartoons in domestic and commercial applications (café, pizzeria, package store) and not industrial.

Amended claims in accordance with Rule 137(2) EPC.

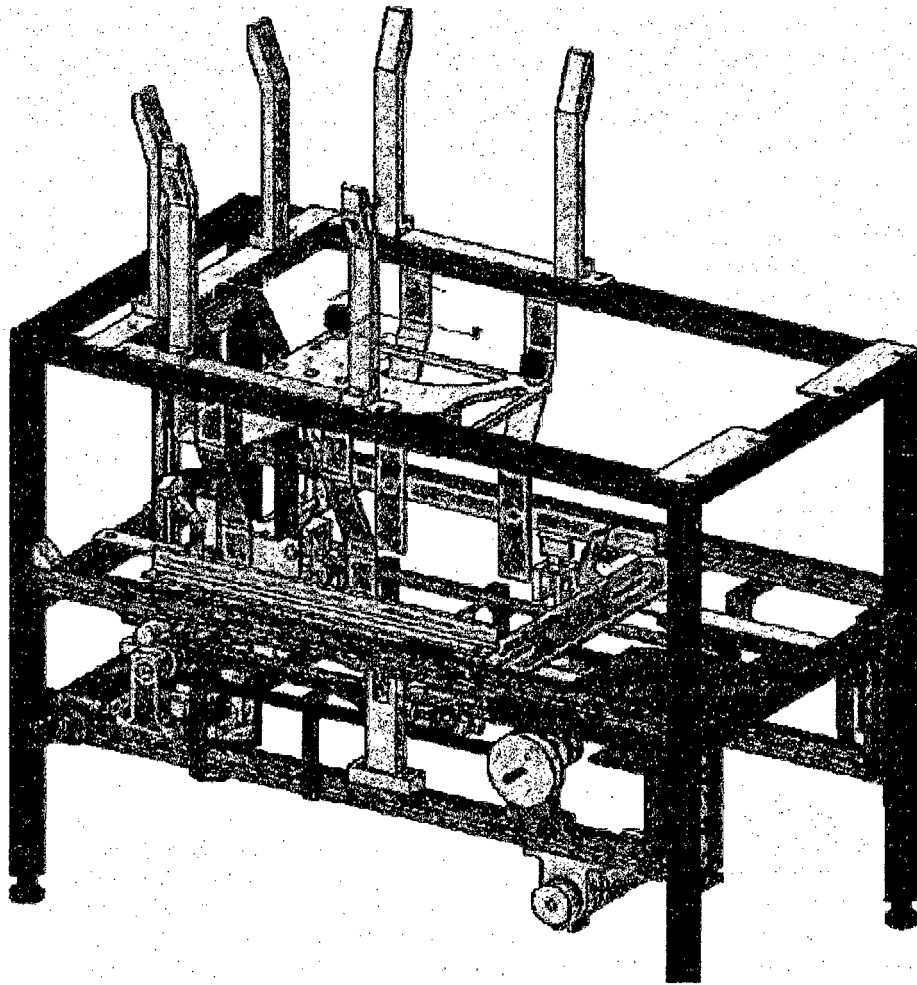
3. 1) A device for folding boxes for takeaway pizza (or similar), sanitized and sterilized with UV lamp, comprising an aluminum framing structure (or in estrus aluminum or biodegradable analogue material); a storage compartment for cardboard blanks made

TA_b 1



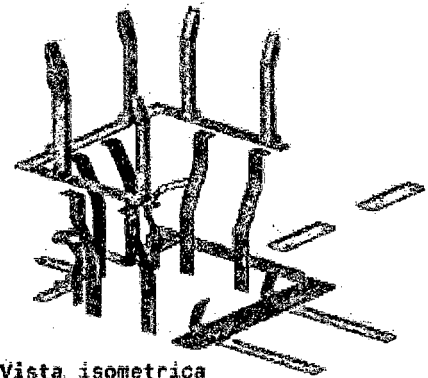
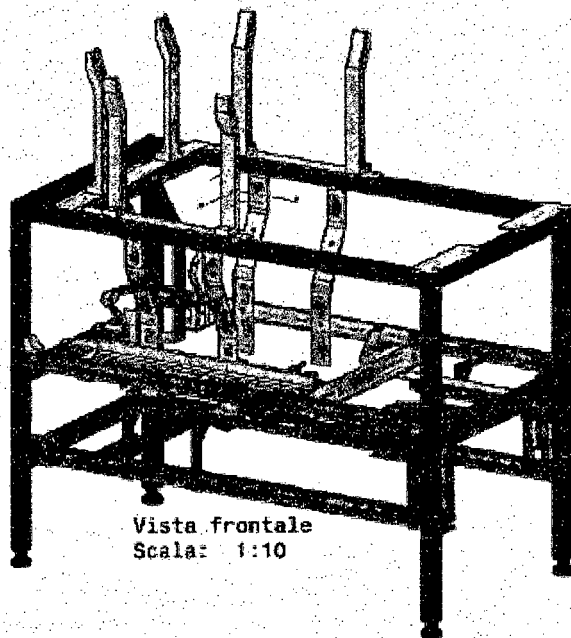
Drawing 1

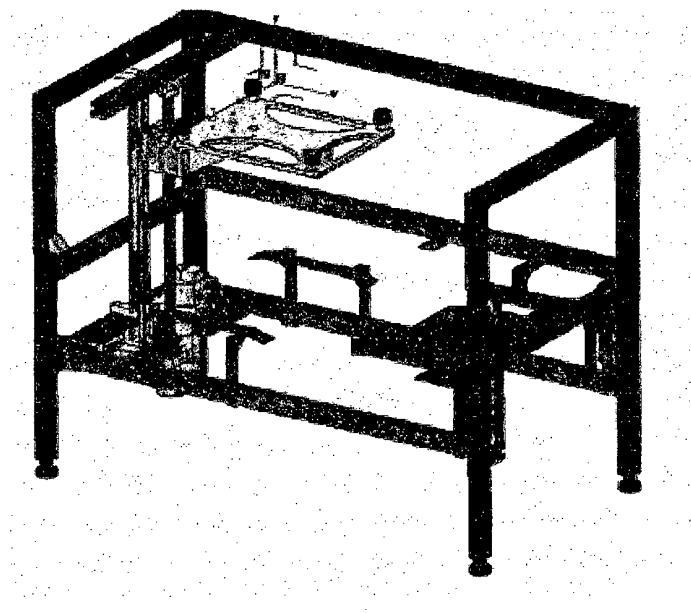
drawing 2



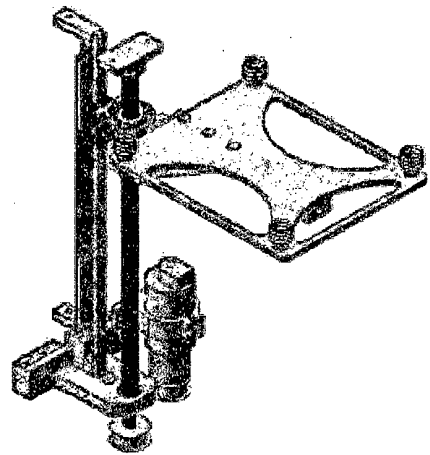
TAB 2

TAB 3



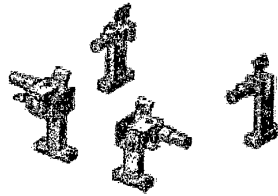


Drawing 1

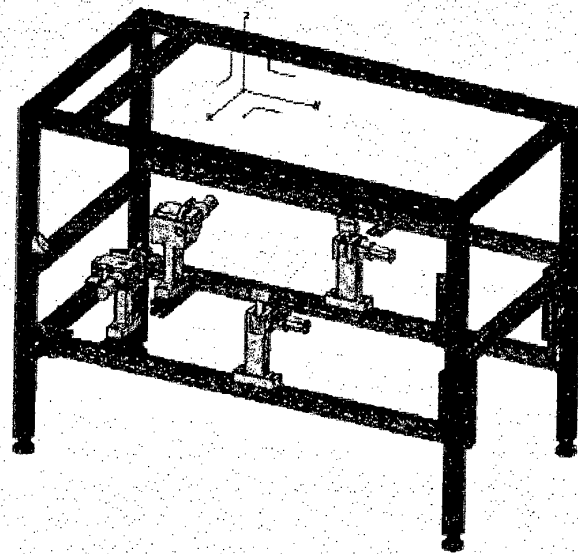


drawing 2

TAB 4

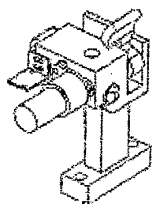


Drawing 2

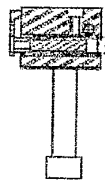


drawing 1

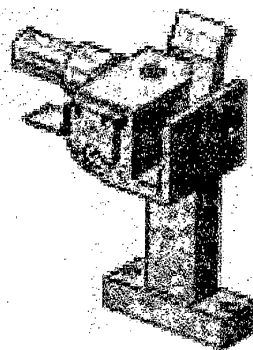
TAB 5

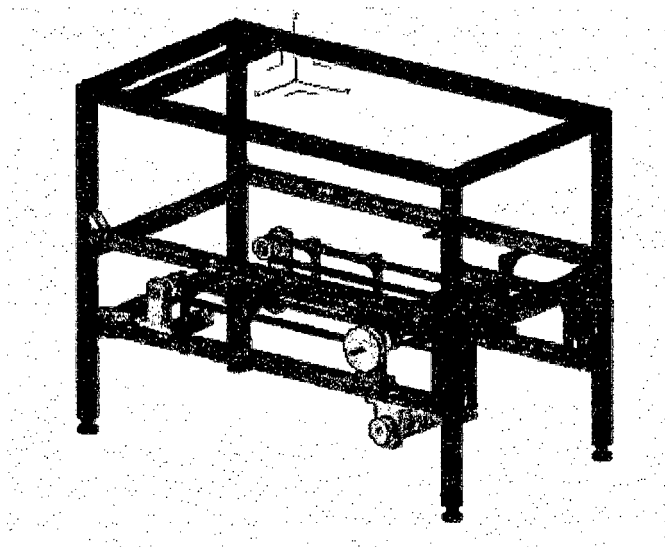


drawing 3

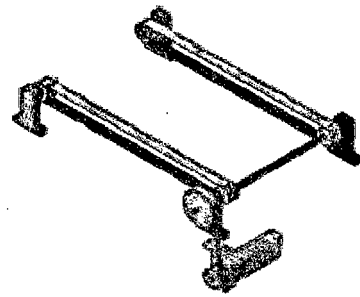


drawing 4





Drawing 1



drawing 2

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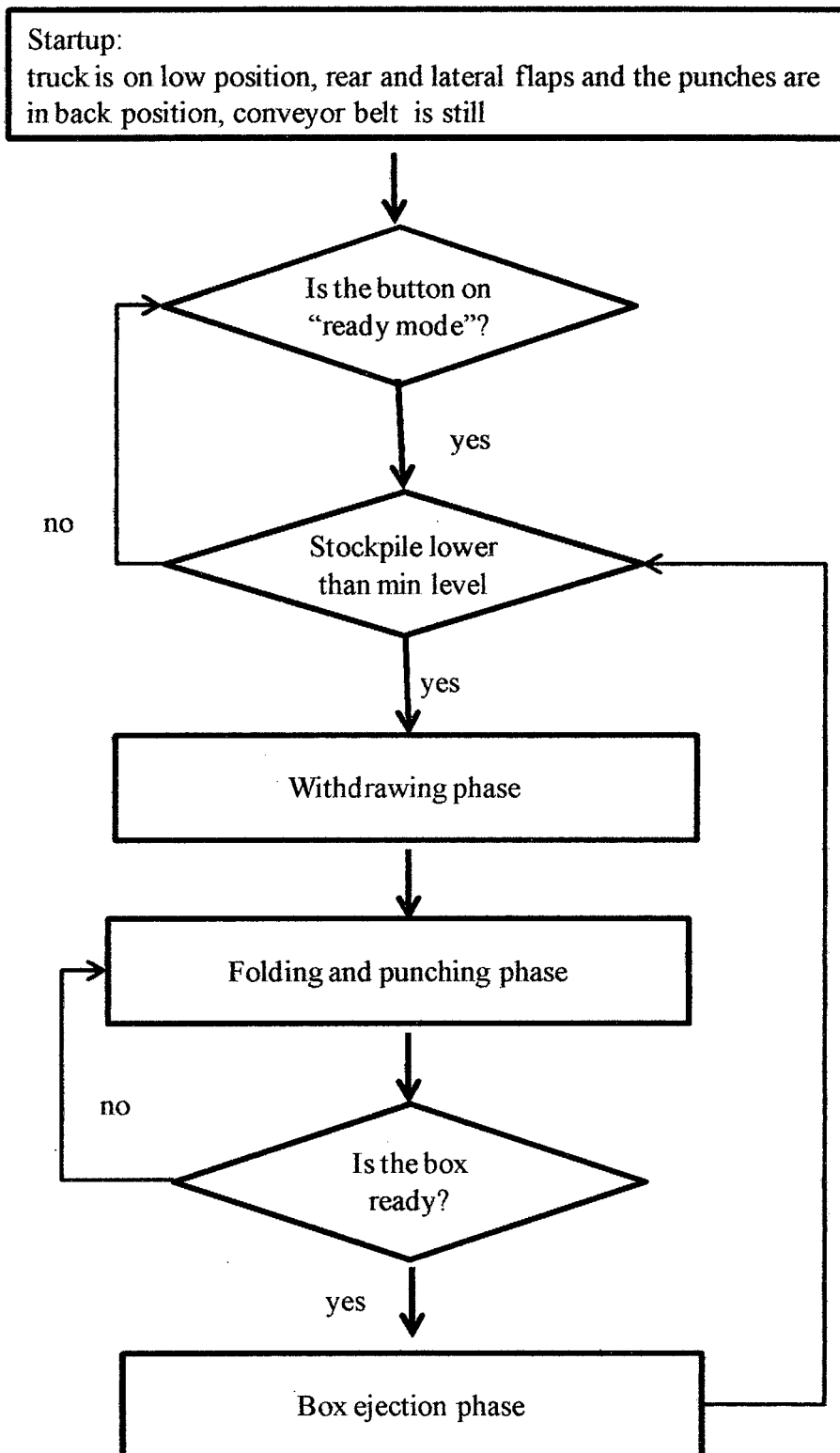


TABLE 7



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EP 13 42 5031

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Y	* paragraphs [0010] - [0014], [0042];	2	
A	figures 1-20 *	3	
Y	----- US 2006/100079 A1 (GRAHAM THOMAS D [US] ET AL) 11 May 2006 (2006-05-11)	2	
A	* the whole document *	3,4	
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A	----- US 2 723 603 A (CHANDLER AUSTIN S) 15 November 1955 (1955-11-15)	1-4	TECHNICAL FIELDS SEARCHED (IPC) B31B
A	* the whole document *	1-4	
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	* page 10, line 32 - line 33 *		
	* page 16, line 13 - line 18 *		

The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 18 July 2013	Examiner Sundqvist, Stefan
CATEGORY OF CITED DOCUMENTS		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	
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			

EPO FORM 1503 03 82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 13 42 5031

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82