

FIRST SCHEDULE

615332

FORM 1

Regulation 9

COMMONWEALTH OF AUSTRALIA

Patents Act 1952

CONVENTION APPLICATION FOR A STANDARD PATENT

AB TETRA PAK of Ruben Rausings Gata, S-221 86 Lund, Sweden, hereby applies for the grant of a standard patent for an invention entitled "A cutting and opening method and device for a rectangular package covered with packaging material" which is described in the accompanying complete specification.

Details of basic application(s) -

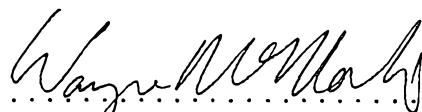
Number of basic application - 63-229667

Name of Convention country in which basic application was filed - Japan

Date of basic application - 13th September, 1988

The address for service is C/- FREEHILL, HOLLINGDALE & PAGE,  
32nd Floor, BHP House, 140 William Street, Melbourne, Vic. 3000.  
Our Ref: WM:1342443

DATED this 8th day of September, 1989.

  
.....  
AB TETRA PAK  
By their Solicitors Freehill,  
Hollingdale & Page.

To: The Commissioner of Patents

## COMMONWEALTH OF AUSTRALIA

Patents Act 1952

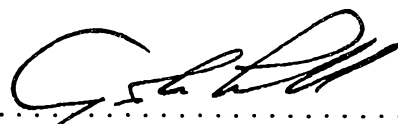
DECLARATION IN SUPPORT OF A CONVENTION APPLICATION FOR A PATENT

In support of the Convention application made for a patent for an invention entitled "A cutting and opening method and device for a rectangular package covered with packaging material".

I, Gösta Sevrell of Ruben Rausings gata, 221 86 LUND, do solemnly and sincerely declare as follows:

1. I am authorized by AB Tetra Pak, the applicant for the patent, to make this declaration on its behalf.
2. The basic application as defined by section 141 of the Act was made in Japan on the 13th day of September, 1988 by Nihon Tetra Pak K.K.
3. Mutsuo Kudo, of 2-22, Izumicho 5-chome, Hoya-shi, Tokyo, Japan, Paul Trädgårdh, of 8-10, Kamimeguro 1-chome, Meguro-ku, Tokyo, Japan and Masaru Gunji, of 20-13, Toyoshima 8-chome, Kita-ku, Tokyo, Japan, are the actual inventors of the invention and the facts upon which the applicant is entitled to make the application are as follows:  
  
    By virtue of assignment
4. The basic application referred to in paragraph 2 of this Declaration was the first application made in a Convention country in respect of the invention the subject of the application.

DECLARED at Lund this 6th day of November 1989.

  
.....  
(Signature of Declarant)  
Gösta Sevrell  
Manager of Patent Department

To: The Commissioner of Patents

AUSTRALIA

Patents Act 1990

**NOTICE OF ENTITLEMENT**

(To be filed before acceptance)

☒ We, AB Tetra Pak, .....  
of Ruben Rausing's Gata, S-221 86 Lund, Sweden, .....  
being the applicant in respect of Application No. 41186/89, state the following:-

**Part 1 - Must be completed for all applications.**

The person(s) nominated for the grant of the patent:

☐ \*is / \*are the actual inventor(s)

or

☒ has, for the following reasons, gained entitlement from the actual inventor(s):

The inventors have assigned their rights in the invention to  
Nihon Tetra Pak K.K., which company has in turn assigned all its  
rights in the invention to AB Tetra Pak.

**Part 2 - Must be completed if the application is Associated with one or more provisional applications.**

~~The person(s) nominated for the grant of the patent \*is / \*are:~~

~~☐ the applicant(s) of the provisional application(s) listed on the patent request form~~

~~or~~

~~☐ entitled to make a request under Section 113 of the Act in relation to the provisional application(s) listed on the patent request form.~~

**Part 3 - Must be completed if the application is a Convention application.**

The person(s) nominated for the grant of the patent \*is / \*are:

☐ the applicant(s) of the basic application(s) listed on the patent request form

or

☒ entitled to rely on the basic application(s) listed on the patent request form.

**Part 4 - Must be completed if the application was made under the PCT.**

~~The person(s) nominated for the grant of the patent \*is / \*are:~~

~~☐ the applicant(s) of the application(s) listed in the declaration under Article 8 of the PCT~~

~~or~~

~~☐ entitled to rely on the application(s) listed in the declaration under Article 8 of the PCT.~~

(Continued over)

**Part 5** - Must be completed if the application is a Divisional application.

~~The person(s) nominated for the grant of the patent \*is / \*are:~~

☐ the applicant(s) / patentee(s) of the original application / patent

or

☐ entitled to make a request under Section 113 of the Act in relation to the original application / patent.

**Part 6** - Must be completed if the application relates to a microorganism and relies on Section 6 of the Act.

~~The person(s) nominated for the grant of the patent \*is / \*are:~~

☐ the depositor(s) of the deposits listed hereafter (by number, depositary institution and date)

or

☐ entitled to rely on the deposits listed hereafter (by number, depositary institution, date, and depositor's name and address) for the following reasons:

**Part 7** - Must be completed if the application is a Convention application, or the application was made under the PCT and the applicant made a declaration under Article 8 of the PCT in respect of the basic application.

☒ Except as stated in the next paragraph, the basic application(s) \*listed on the patent request form / \*referred to in the declaration under Article 8 of the PCT \*is / \*are the application(s) first made in a Convention country in respect of the invention.

☐ A request has been made under Section 96 of the 1990 Act (or Section 142AA of the 1952 Act) to disregard the following application.

(Signature)

June 26, 1991

(Date)

Gösta Sevrell, Head of Patent Department

**Part 8** - Must be completed if the applicant for a patent of addition is not the applicant or patentee of the main invention.

I, the \*applicant / \*patentee for \*application / \*patent No. ....

authorise .....

to apply for a further patent for an improvement in, or modification of, the main invention.

Note: This MUST be signed by the applicant or patentee of the main invention.

(Signature)

(Date)

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(12) PATENT ABRIDGMENT      (11) Document No. AU-B-41186/89  
(19) AUSTRALIAN PATENT OFFICE      (10) Acceptance No. 615332

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(54) Title  
A CUTTING AND OPENING METHOD AND DEVICE FOR A RECTANGULAR PACKAGE COVERED WITH PACKAGING MATERIAL

International Patent Classification(s)  
(51)<sup>4</sup> B65B 069/00

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(22) Application Date : 08.09.89

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(57) Claim

1. A cutting and opening method for a rectangular package covered with packaging material wherein the packaging material of a rectangular package is cut from one edge to the other on two mutually opposing planes after forming a space between the packaging material and the package, the packaging material on the same two planes is cut from one of the two edges other than those passing the starting point and the finishing point of these cutting lines to the above mentioned cutting lines, the packaging material is cut on the plane adjacent to the above mentioned two planes and having two edges passing the two cutting lines in a manner so that the two cutting lines are connected after forming a space between the packaging material and the package, and thereafter, the packaging material is cut open at each area on the three planes where cutting lines are provided.

COMMONWEALTH OF AUSTRALIA

FORM 10

Patents Act 1952

C O M P L E T E   S P E C I F I C A T I O N

(ORIGINAL)

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Class

Int. Class

Application Number :  
Lodged :

Complete Specification Lodged :  
Accepted :  
Published :

Priority :

Related Art :

Name and Address of  
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(Our Ref: WM:1342443)

Complete specification of the invention entitled:

A cutting and opening method and device for a rectangular  
package covered with packaging material

The following is a full description of this invention including the best method of  
performing it known to us:-

FIELD OF THE INVENTION

The current invention relates to a method and a device for cutting a rectangular package covered with packaging material at a prescribed position and opening it.

- 5 Various types of paper containers have been manufactured up to now. For example, disposable packaging containers are widely used for liquid foodstuffs such as juice, some of which are of parallelepipedic forms as shown by A' in Fig. 21.

10 In most cases, such packaging container blanks are flatly folded and collected in bundle whose outside is covered with packaging material for easy storage and handling.

15 In order to take packaged items out of the rectangular package described above, the packaging material covering its outside needs to be cut and opened. Formerly, this was done manually or by the method and device described in Jap. Pat. Pub. (unexamined) No. 271828.

20 Performing the above mentioned operation manually is quite inefficient. On the other hand, the use of method and device described in Jap. Pat. Pub. (unexamined) No. 271828 enables the above mentioned operation to be performed automatically, in which case it is essential to clamp the package to cause loosening of the packaging material, but depending on the type of packaged items, loosening cannot be attained. An example is when hard objects unable to be clamped sufficiently are

packaged. In such cases, it is impossible to cut and open the package using the above mentioned method and device. And in performing this operation, a cutting blade is applied to the loosening of the packaging material, but when the packaging material is not of strong matter, the loosening of the packaging material tends to escape the cutting blade and the packaging material cannot be cut straight.

The purpose of this invention is to enable automatic cutting and opening of any type of package regardless of the type of packaged items or the strength of the packaging material.

#### DESCRIPTION OF THE INVENTION

In order to attain this purpose, in this invention, a space is formed between the packaging material and the package on the two mutually opposing planes of the rectangular package covered with packaging material, and thereafter, the packaging material is cut on those planes from one edge to the other in the direction of height or width, and the packaging material is cut on the above mentioned two planes from one of the two edges other than the edges passing the starting point and the finishing point of the cutting line, and after forming a space between the packaging material and the packaged items on the plane having two edges passing the ends of the above two cutting lines and adjacent to the above mentioned two planes, the packaging material is cut so as to connect the two cutting

lines, and thereafter the packaging material is opened from each cut area on the three planes provided with cutting lines.

In this case, it is preferred that a backplate be inserted from a slit made by cutting the packaging material on the two mutually opposing planes of the rectangular package from one edge to the other, and the packaging material on these planes is cut on top of the backplate, and in cutting the packaging material on the two mutually opposing planes, it is preferred that a space be formed between the packaging material and the packaged items by causing the packaging material to protrude using the tip of the backplate.

When the packages are different sizes, it is preferred that the positions of the cutting lines to be provided on the two mutually opposing planes from one edge to the other are varied with respect to the datum plane to be provided with a cutting line and adjacent to the two planes.

On the other hand, the device in this invention consists of a platform on which a package covered with packaging material is placed, a means to form a space between the packaging material and the package on the two mutually opposing planes of the package on the platform, a pair of cutting blades that cut the packaging material where a space is formed between the packaging material and the packaged items using the above means from one edge to the other, a pair of cutting blades that cut the packaging material from one of the two edges other than the edges passing the starting point and the

finishing point of the two edges cut by the above pair of cutting blades to the above mentioned cutting lines, a means to form a space between the packaging material and the packaged items on the plane having two edges passing the ends of the two cutting lines cut by the above pair of cutting blades, a cutting blade that cuts the packaging material so as to connect the two cutting lines on this plane, and a device to open the packaging material from each cut area on the three planes provided with cutting lines.

10 In this case, it is preferred that a pair of holders that hold a part of the two mutually opposing planes of the rectangular package placed on the platform from both sides are provided on the side of the platform. It is also preferred that a pair of backplates that can move parallel to the two mutually opposing planes of the rectangular package placed on the platform and can be inserted from slits on these two planes made by cutting the packaging material from one edge to the other.

When the rectangular packages to be placed on the platform are different sizes, it is preferred that the platform be positioned in relation to a cylinder so that the position of the platform can be varied with respect to the plane to be provided with a cutting line and adjacent to the two planes of the package to be cut from one edge to the other according to the size of each package. It is also preferred that a pair of cutting blades applied on the two mutually opposing planes in order to cut them from one edge to the other, a pair of holders and a pair of means to form a space between the

packaging material and the packaged items on the two planes cut from one edge to the other of the package are related to a cylinder so that their operating positions can all be varied according to the sizes of the rectangular packages as in the 5 case of the platform.

Furthermore, when the rectangular package is to be placed on the platform by pressing in onto the platform, it is preferred that the backboard that positions the back plane of the package with respect to the platform be located at the back of 10 the platform, and the backboard be positioned in relation to a cylinder so that the position of the said backboard can be varied with respect to the plane to be provided with cutting lines and adjacent to the two mutually opposing planes cut from one edge to the other according to the size of the 15 package to be placed on the platform. Especially when the package is pressed onto the platform from the place where the plane to be provided with a cutting line and adjacent to the two planes cut from one edge to the other of the package to be placed on the platform is aligned on the fixed position, it is 20 preferred that the activation positions of the platform, a pair of cutting blades, a pair of holders, a pair of means to form a space between the packaging material and the packaged items on the two planes of the package that are cut from one edge to the other, and the backboard are related to the 25 cylinder so that they can all be varied with respect to the datum plane of the package, and their positions are chosen according to the depth of the package as necessary. Also in

this case, the packages are preferably carried in a storage box to the prescribed position on the side of the platform.

A package cut by this method is further illustrated as follows. Cutting lines run longitudinally from one edge to the other on two mutually opposing planes, and on each plane, a cutting line is provided between the above mentioned cutting line and the edge, which is one of the two edges other than edges passing the starting point and the finishing point on the cutting line, and on the plane adjacent to the mutually opposing planes each having two edges passing points of the two cutting lines, a cutting line connecting these two cutting lines is provided. Thus, when the packaging material on the three planes on which cutting lines are provided is cut open at each cutting line, the package can be opened. Also, when the two mutually opposing planes are cut longitudinally from one edge to the other end, and a cutting line is provided on the plane adjacent the mutually opposing planes, spaces are formed on each of the planes between the packaging material and the package, preventing damage to the package even if the cutting blade is applied to the packaging material.

Alternatively cutting lines may run horizontally from one edge to the other on two mutually opposing planes, and on each plane, a cutting line is provided between the above mentioned cutting line and the edge, which is one of two edges other than edges passing the starting point and the finishing point on the cutting line, and on the plane adjacent to the two mutually opposing planes each having two edges passing points

of the two cutting lines, a cutting line connecting these two cutting lines is provided. Thus, when the packaging material on the three planes on which cutting lines are provided is cut and opened at each cutting line, the package can be opened, in  
5 a fashion that the package is in the horizontal position. Also, a space is formed between the packaging material and the packaged item on each of the two mutually opposing planes.

In providing a cutting line on the two mutually opposing planes, a ruler-like plate could be inserted from the slit to  
10 cut the packaging material on top of it to avoid damaging the edges of the packaged items. In cutting the packaging material on the plane adjacent to the two mutually opposing planes formation of a space between the packaging material and the packaged items requires no extra means because the plate  
15 presses the packaging material outward.

When the size of the package varies, the position of a cutting line to be provided on two mutually opposing planes could be varied with respect to the plane on which a cutting line is provided, and a slit running from one edge to the other end on  
20 two mutually opposing planes of each package of a different size can be placed at different positions with respect to the one plane. The same arrangement can be applied wherein a ripped part running from one edge to the other on two planes on different-sized packages can be placed at different  
25 positions with respect to the one plane.

Next, the functions of the cutting and opening device of the current invention will be explained.

A rectangular package covered with packaging material is placed on a platform. On each side of this platform is a

5 means to form a space between the packaging material and the packaged items on two planes, and this pair of space-forming means is used on the two mutually opposing planes among the six planes of the package placed on the platform. Then a space is formed between the packaging materials and the  
10 packaged items on these two planes. At this time, when a pair of cutting blades is pressed and run on the packaging material on the two planes, areas on the two planes are cut. When a cutting line is provided on the two mutually opposing planes, a means to form a space between the packaging material and the  
15 packaged items on the two planes is preferably placed in the latitudinal direction, in which case the pair of cutting blades to cut this packaging material shall also run in the latitudinal direction.

Next, a pair of cutting blades is applied in the latitudinal  
20 direction to the packaging material that is already cut from one edge to the other by the pair of cutting blades. The packaging material cut from one edge to the other by the pair of cutting blades is then provided with a cutting line. When  
25 providing a cutting line the pair of cutting blades are arranged perpendicularly, and run vertically.

Next, a means to form a space between the packaging material and the packaged items on the plane having two edges passing points of the two cutting lines, is activated. This forms a space between the packaging material and the packaged material  
5 on this plane. Then a cutting blade is pressed on the packaging material on the plane and run latitudinally. This provides the packaging material on the plane with a cutting line. When cutting a line on the plane, the cutting blade is arranged perpendicular, as opposed to the example in the  
10 figure, and run latitudinally.

Thereafter, a device is activated to open the package along the cutting lines on the three planes and a package cut as indicated can be opened.

In cutting the packaging material of the package on the two mutually opposing planes either in the direction of height or  
15 width, these two planes can be held by a pair of holders to prevent unnecessary movement of the package in the process of cutting on the platform.

In providing cutting lines on the two mutually opposing  
20 planes, by moving the backplates placed on the side of the platform parallel to these two planes, the tips of the plates are inserted between the packaging material and the packaged items through the slits that are made by cutting the packaging material on these two planes and the backplates can be used as  
25 underlays.

When different-sized rectangular packages are to be put on the platform, the activation positions of the platform, a pair of cutting blades applied on the two mutually opposing planes that are cut from one edge to the other, a pair of holders, and a means to form a space between the packaging material and the packaged items on the aforementioned two planes, can be varied with respect to the planes adjacent to the two planes to be cut from one edge to the other and on which cutting lines are to be provided, according to the size of the package by operating each cylinder according to the size of the package.

When a plane to be provided with a cutting line is placed on one datum line in the case of three packages of different sizes (depth, length), if a pair of cutting blades for providing a cutting line on each of the two mutually opposing planes are positioned at distances from each datum plane according to the size (depth, length) of each package, for example, a cutting line can be provided at those distances from each datum plane on each of the two mutually opposing planes. Also the operating positions of the pair of holders and the means to form a space between the packaging material and the packaged items on the two planes can also be varied as in the case of the pair of cutting blades, according to the size (depth, length) of the package.

When the rectangular package is placed onto the platform by pressing it onto the platform, the position of the backboard located at the back of the platform is varied with respect to

the datum line according to the size (depth, length) of the rectangular package. This way, the package to be placed on the platform can be placed at its prescribed position according to its size (depth, length).

- 5 Especially, when the package is pressed onto the platform from the same starting line, where the datum plane of each package of a different size (depth, length) is aligned, the activation positions, with respect to the package, of the platform, a pair of cutting blades, a pair of holders, a means to form a
- 10 space between the packaging material on the two planes of the package that are cut from one edge to the other and the packaged items, and the backboard, are selected appropriately according to the size (depth, length) of the package. This way, a package of any size (depth, length) can be provided
- 15 with a cutting line of a prescribed direction on a prescribed plane of the rectangular package by using a single device. In this case, if rectangular packages are carried to the side of the platform in a storage box, it is easier to align the datum plane of each package before placing on the platform on the
- 20 same starting line.

#### DESCRIPTION OF THE DRAWINGS

The invention is now illustrated with reference to the drawing in which:

Fig.1 is a diagonal view of an example of a rectangular package,

Fig.2 is a diagonal view of cutting positions in that case,

Fig.3 (a) - (h) are diagonal views showing step-by-step  
5 operations from the cutting and opening of a package carried  
in by the conveyor to the taking out of blanks contained in  
the package,

Fig.4 is a diagonal view showing a rectangular package cut at  
different positions from the case shown in Fig. 2,

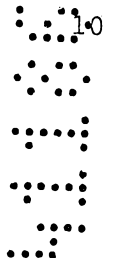


Fig.5 is an enlarged side view showing a condition where a  
package is cut from one edge to the other on the two mutually  
opposing planes of the packaging material in the direction of  
height and a backplate is inserted from there,

Fig.6 is its vertical cross sectional view,

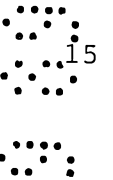


Fig.7 is an enlarged side view showing the opening conditions  
of a cut package,



Fig.8 is a plan view showing an entire view of the package  
cutting and opening device roughly,

Fig.9 is a plan view showing the relationship between the two  
20 platforms located above the platform, which is a part of the  
package cutting and opening device,

Fig.10 is a side view of the package cutting and opening device showing a condition where a storage box is placed in front of the platform, which is a part of the package cutting and opening device, and a pusher is located further in front  
5 of the storage box,

Fig.11 is a front view of the package cutting and opening device,

Fig.12 is a partial side view showing that the platform, which is a part of the package cutting and opening device, can be  
10 laid down from the middle of it,

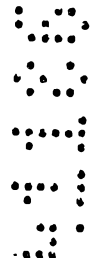


Fig.13 is an enlarged plan view showing the relationship between the package transferring device and the pusher located above it and used to press the rectangular package into the storage box of the transferring device,

15 Fig.14 is a vertical cross section of Fig.13 along line XIV - XIV,



Fig.15 is a plan view showing the relationship between the platform, the other two platforms located above it and the storage box lowered to the prescribed position,



20 Fig.16 (a) - (d) are plan views showing the relationship between the storage box positioned at the prescribed position and packages of different sizes and the platform contained in

it, a pair of suction pads, a pair of cutting blades, a pair of holders, and the backplate,

Fig.17 (a) - (d) are diagonal views showing conditions where a plane of each of the different-sized packages is positioned on the datum line,

Fig.18 is a side view showing a condition where an opening device of a cut package is combined with a cutting device,

Fig.19 is a side view showing the relationship between the package cutting and opening device of the current invention, the conveyor for carrying the package, the transferring device for transferring the package carried in by the conveyor to the cutting and opening device, and the robot for taking out the packaged items contained in the cut and opened package,

Fig.20 is a diagonal view of packaged flattened blanks,

Fig.21 is a diagonal view where the above is raised to form a parallelepiped.

In one embodiment of this current invention, an example is shown in which the packaged items are flattened packing container blanks as shown in Fig.20, where a case is shown in which multiple blanks A are bundled and covered with packaging material B on the outside as shown in Fig.1 and such a rectangular package C is cut and opened.

In another embodiment, a case in which the packaging material B of the package C shown in Fig.1 is cut as shown in Fig.2 and opened as shown in Fig.3(g). The method of the current invention can also be applied in cutting and opening the rectangular package C as shown in Fig.4.

Incidentally, the biggest difference between the cutting as shown in Fig.2 and cutting as shown in Fig.4, is that while in the case of Fig.2, the cutting direction of the packaging material on the two mutually opposing planes of the rectangular package C from one edge to the other is in the vertical direction (in the direction of height), in the case of Fig.4, it is the horizontal direction (in the direction of width). In accordance with this, the position of direction at or in which a space between the packaged items and the packaging material B is formed, or the direction of cutting lines c6, c6 and c61, c61 on the two mutually opposing planes C1, C1, the position of the planes C2, C3 each incorporating two edges c5, c5 and c2, c2 that pass points s3, s3 and s31, s31 of c6, c6 and c61, c61, and the direction of cutting lines c7, c7 provided on those planes are different between when cutting as shown in Fig.2 and when cutting as shown in Fig.4, but the cut condition shown in Fig.4 is in the horizontal position of the condition shown in Fig.2, and their cut conditions are essentially same. The open condition after cutting as shown in Fig.4 is like the condition in Fig.3(g) in the horizontal position, and they are essentially same. In providing cutting lines c6, c6 and c61, c61, a backplate 7 is inserted from slits c1, c1 and c11, c11, in which the only

difference between when cutting as shown in Fig.2 and when cutting as shown in Fig.4 is the insertion direction, and idea of inserting the backplate 7 from a cut area is the same.

On the other hand, while the device shown in the embodiment is used to cut the rectangular package as shown in Fig.3(b) and Fig.2 via a process shown in Fig.3(c) to (f) and open a package C' as shown in Fig.3(g) after cutting, the device used to cut and open a package C" as shown in Fig.4 after cutting has exactly same functions as the former except the arrangement direction, running direction or operating direction of the cutting blade and other components to cut the packaging material B on the prescribed positions.

More detailed description of the embodiments will be as follows. The package C is placed on platform 1 where the packaging material B is cut and opened. The packaging material B can be cut by applying a thin cutting blade on the packaging material B and move it. In order to avoid letting the cutting blade contact the packaged blanks A, a space is formed between the packaging material B and the blanks A. As a means to form a space between the packaging material B and the blanks A on the two mutually opposing planes C1, C1, the embodiment shows a case in which the suction pads 2 are used as shown in Fig.8, Fig.10 and Fig.11. Also, in providing a cutting line c7 on plane C2 of the rectangular package C, a means similar to these suction pads could be used to form a space between the packaging material B and the blanks A, but in the embodiment, a case is shown as an example in which the

backplate 7 inserted from slits c1, c1 is used to let the packaging material protrude outwards (explained in detail later).

The packaging material B could be cut as mentioned above by

5 pressing a thin cutting blade on the packaging material B and move it, but a rotating type cutting blade can also be used, of course. The cutting blade pressing positions in the case of the embodiment are on the symmetrical vertical line shown by c1 on the two mutually opposing planes C1, C1 of the  
10 package C as shown in Fig.2, on the horizontal lines shown by c6 that connect the aforementioned cutting line c1 with an edge c5, which is one of the two edges c4, c5 other than the two edges c2, c3 that pass the starting point s1 and the finishing point s2 of the cutting line c1 in the same figure, and on the horizontal line shown by c7 that connects c6 and c6 on the plane C2 in the same figure. The cutting blades to cut these areas are located on sides of the package C placed on the platform 1. The cutting blades to provide cutting lines on the packaging material B as shown by c1 in Fig.2 vertically  
15 (heightwise) from one edge to the other on the two mutually opposing planes C1, C1 on the rectangular package C are shown by 3 in Figs.8 and 11, the cutting blades to provide cutting lines c6 in Fig.2 are shown by 4 in Fig.8, and the cutting blade to provide a cutting line c7 in Fig.2 is shown by 5 in  
20 Fig.8.

25

As a means to move a left and right pair of cutting blades 3, 3 in Fig.11, the embodiment shows a case in which

cylinders 3a, 3a are placed on sides of platform 1. The left and right pair of cutting blades 3, 3 are pressed on the package C on the platform 1 and moved from the solid line in Fig.11 to the chain line in the same figure so that areas

5 shown by c1, c1 on the packaging material B of the package C

in Fig.2 can be cut. In addition to the cylinders 3a, cylinders 3b are provided to allow the cutting blades 3 to move in the left and right direction in Fig.11. these cylinders 3b are used to tentatively place the cutting

10 blades 3 at the back of the platform 1 (outside on the left

and right of Fig.11) and move then to the solid line in Fig.11 when cutting the packaging material B, and the cutting blades 3, after the cutting operation is finished, are lowered by the cylinders 3a that are withdrawn by the cylinders 3b.

15 The top and bottom cutting blades 4 are arranged to appear

symmetrically in Fig.8, and by moving forward from the solid line in Fig.8 toward the platform 1 on the left, they can cut areas shown by c6, c6 in Fig.2 on the packaging material B of the package C. As a means to move the pair of cutting

20 blades 4, 4 closer to the platform 1 as shown above or move them backward to the solid line in Fig.8 after cutting the

packaging material B, a case is shown in the embodiment as an example in which a frame 4a mounted with the pair of cutting

25 blades 4, 4 can be moved in the direction of left and right in Fig.8 by the cylinders 4b.

On the other hand, the cutting blade 5 is located as shown in Fig.8 and by moving forward from the solid line in the same

figure, it can cut an area shown by c7 in Fig.2 on the packaging material B of the package C placed on the platform 1. As a means to move the cutting blade 5 forward like this or to move it backward to the solid line in Fig.8

5 after cutting the packaging material B, a case is shown in the embodiment as an example in which the cylinder 5a is made to move the cutting blade 5 vertically in Fig.8.

In performing the above mentioned cuttings, the package C on the platform 1 is made not to move in the embodiment.

10 Specifically, in the embodiment, a pair of holders 6, 6 that can press the two mutually opposing planes C1, C1 are arranged as shown in Figs.8 and 11. And when the pair of holders 6, 6 drawn on the left and right in Fig.11 are on the solid line in the same figure, they hold the package C on the platform 1. When the pair of suction pads 2, 2 drawn on the left and right in Fig.11 are slightly withdrawn from the solid line in the same figure as shown by arrows in Fig.3(c) after performing suction, the areas on the packaging material B on the two vertical planes C1, C1 of the package C not pressed by the pair of holders 6, 6 are pulled outward as shown in Fig.3(d), and a space c8 is formed between the package and the rim edges of the blank A. This way, the packaged items A are not damaged when the aforementioned cutting blades 3 are pressed on the packaging material B and moved on it, and since the package C is held by the pair of holders 6, 6, the cutting position does not move.

The area c1 cut by the cutting blades 3 is in the open condition and is ingeniously utilized in the embodiment.

Specifically, ruler-like backplates are inserted through these areas as shown in Fig.3(e). Each backplate 7 can be placed in

the space c8 part between the packaging material B pulled outward by the suction pads 2, 2 and the packaged blanks A are shown in Fig.6. This way, by using these backplates 7 as underlays when cutting the areas shown by c6, c6 in Fig.2 with cutting blades 4, rim edges of the packaged blanks A are not

damaged. Also by forming a longitudinal hollow 7a on the outside of each backplate 7 as shown in Figs.5 and 6, and arranging the tip of the aforementioned cutting blade 4 to be positioned in the hollow 7a when it moves horizontally and cut the packaging material B, not only the tip of the blade but also the cutting position of the packaging material B is made not to deviate.

The tips of the backplates 7 that are inserted through the cut areas c1 of the package C push the packaging material B on the other perpendicular plane C2 in the package C outward as shown in Figs.3(e) and 5. This forms a space c9 between the packaging material B at this part and the packaged blanks A.

This way, when cutting the packaging material B on the plane C2 using the cutting blade 5, the rim edges of the packaged blanks A are not damaged. Also by forming a hollow 7f at the tip of the backplate 7 as shown in Fig.5, and arranging the tip of the aforementioned cutting blade 5 to be positioned in the hollow 7f when it moves horizontally and cut the packaging material B, not only the tip of the blade but

also the cutting positions of the packaging material B is made not to deviate.

In inserting backplates 7 through the slits c1 cut by the cutting blades 3 as shown in Figs.3(e) and 5 on the plane C1

5 on the package C, one end of the lever 7c that can be oscillated from a pivot 7b as shown in Fig.10 can be linked to the backplate 7, and the other end of the lever 7c and the tip of the rod of the cylinder 7d can be linked with a lever 7e. When the rod of the cylinder 7d withdraws from the solid line  
10 in Fig.10, lever 7c oscillates via lever 7e from pivot 7b as shown by chain line in the same figure. This way, the backplate 7 shown by solid line can move forward to the right in the figure as shown by chain line in the same figure, and it can be inserted into the package C gradually from the tip.

15 For the above mentioned cutting operations, a backboard 8 is provided at the back of the platform 1 and at the left of Fig.18 in order to determine the position of the package C on the platform 1. During the above operations, this backboard 8 is positioned to contact the back plane C4 shown in Fig.2 of  
20 the package C.

The holders 6 and the suction pads 2 are located on another platform 9 above the platform 1 as shown in Fig.8, and the backboard 8 is located on another platform 10 above this platform 9. The platform 1 is able to move with respect to  
25 the frame 11 by a cylinder 1a, the platform 9 is able to move with respect to the platform 1 by another cylinder D1 shown by

chain line in Fig.8 mounted on the platform 1 and a cylinder D2 mounted on the side of platform 9, and the platform 10 is able to move with respect to the platform 9 by another cylinder D3 shown by chain line in Fig.9 mounted on the platform 9 and a cylinder D4 mounted on the side of platform 10, respectively. Moving distances of platforms 1, 9 and 10 and the inter-platform positional relationships can be freely altered by operating all of the cylinders or only some of them as necessary. For example, in providing cutting lines c1, c1 on the two mutually opposing planes C1, C1 of four packages of different sizes (depth, length) as shown by L1 - L4 in Fig.17 (a) - (d), each package is placed on the platform 1 so that the plane C2 on which a cutting line c7 is to be provided is aligned on the one datum line L. In this case, in order for the package to at least be placed on the platform 1, the position of the platform 1 has to be varied according to the length of the package as shown by (a) - (d) in Fig.16. In the embodiment, the cylinder shown by 1a in Figs.10 and 18 does this operation. In other words, by activating the cylinder 1a to move the platform 1 for a prescribed distance in the left and right direction of the figure with respect to the frame 11, the position of the platform 1 can be varied according to the length of the package to be cut.

When cutting a package of a length of L1, the cutting blades 3, 3 shall be located at a distance of  $l_1$  from the datum line L, when cutting a package of a length of L2, the cutting blades 3, 3 shall be located at a distance of the

length of  $l_2$  from the datum line L, and when cutting packages of lengths of L3 and L4, the cutting blades 3, 3 shall be located at a distance of  $l_3$  from the datum line L, and at the same time the positions of the pair of suction pads 2, 2 and the pair of holders 6, 6 that activate on the two mutually opposing planes C1, C1 of each package shall be varied and the backboard 8 shall be located at distances L1, L2, L3 and L4 respectively from the datum line L. For doing that, all of the above mentioned four cylinders D1 - D4 are activated or only some of them are activated leaving others inactive as necessary. For example, when cutting packaging material B on the two mutually opposing planes C1, C1 of a package of length L1, a pair of cutting blades 3, 3 and a pair of holders 6, 6 are positioned so that the area at a distance of  $l_1$  from the datum line L can be cut, and in this case the backboard 8 is positioned so that it contacts the back plane of the package of length L1 (the plane opposite to the datum line L, i.e., the left end plane of Fig.(a) - (d)). And in the case of packages of lengths L2, L3 and L4, areas only 80 mm or 105 mm closer from the cutting positions of the packages to the datum line L are cut as shown in Fig.16 (b) - (d). In that case, if the backboard 8 is assumed to contact the back plane of each package at positions 100 mm, 125 mm or 150 mm closer to the datum line L as compared to the case handling a package of length L1, at least one of the four cylinders D1 - D4 could be moved to the amount shown in Table 1 to cut prescribed areas of packages of lengths L2, L3 and L4, and in this case, each backboard is made to contact the back plane of each package.

Table 1

(Unit: mm)

|                     |   |              |              |              |
|---------------------|---|--------------|--------------|--------------|
| Backboard (8)       | 0 | 100          | 125          | 150          |
| Cutting blade (3)   | 0 | 80           | 105          | 105          |
| Cylinder D4         | 0 | 0            | 0            | 25           |
| Cylinder D3         | 0 | 20           | 20           | 20           |
| Cylinder D2         | 0 | 0            | 25           | 25           |
| Cylinder D1         | 0 | 80           | 80           | 80           |
| package (length L1) |   | package (L2) | package (L3) | package (L4) |

More detailed descriptions about the case of cutting a package of length L4 will be as follows. As shown in Fig.8, the cylinder D1 mounted on the platform 1 is moved to the right side in the figure for a stroke of 80 mm (dimensions of the solid line. Numbers appearing hereafter are all actual dimensions). Incidentally, this cylinder D1 is mounted on the platform 1 as shown by chain line in Fig.8, and its head is linked with the perpendicular plate 9a (shown by solid line) on the platform 9 above the platform 1 shown in the same figure. Therefore, by moving the cylinder D1 for a stroke of 80 mm, the platform 9 will also move for 80 mm to the right side. When this cylinder D1 is activated, cylinder D2 is also moved for 25 mm simultaneously as shown in Table 1, moving the platform 9 for 25 mm further toward the right with respect to platform 1 in the figure. This way, the platform 9 will move for  $80 + 25 = 105$  mm toward the right with respect to platform 1. The fact that the platform 9 moves to the right for 105 mm from the initial position in the figure means that the pair of cutting blades 3, 3 mounted on it are moved for 105 mm to the right in the figure from the fixed position

where a package of length  $L_1$  is cut. If the pair of cutting blades 3, 3 are pressed and moved on a package of length  $L_4$ , the area 105 mm closer to the datum line  $L$  from the cutting position of the package of the length  $L_1$  can be cut. In this case, the pair of suction pads, and the pair of holders 6 mounted on the platform 9 are also moved according to the movement of the pair of cutting blades 3, 3 respectively.

In the above mentioned case, the cylinder D3 and the cylinder D4 are moved for 20 mm and 25 mm respectively to the right in the figure as shown in Table 1. Incidentally, the cylinder D3 is mounted on the platform 9 as shown by chain line in Fig. 9, and its head is linked with a perpendicular plate 10a (solid line) of the platform 10 above the platform 9 as shown in the same figure. Therefore, by moving the cylinder D3 for a stroke of 20 mm, the platform 9 that is moved for 105 mm with respect to the platform 1 as described earlier, moves for  $105 + 20 = 125$  mm to the right in the figure. When this cylinder D3 is moved for a stroke of 20 mm, the cylinder D4 is simultaneously moved for 25 mm as shown in Table 1, moving the platform 10 for 25 mm to the right in the figure with respect to the platform 9. This way, the platform 10 will move for  $125 + 25 = 150$  mm to the right with respect to the platform 1. The fact that the platform 10 moves for 150 mm to the right from the initial position in the figure means that the backboard 8 mounted on it is moved for 150 mm to the right in the figure from the fixed position where a package of length  $L_1$  is handled, and this backboard 8 contacts the back side of the package of the length  $L_4$  (the

plane opposite to the datum line L, the extreme left plane of Fig.16 (a) - (d)) to position it. When handling a package of length L2, cylinders D1 and D3 of the four cylinders are activated, and the other two cylinders D2 and D4 are stopped.

- 5 When handling a package of length L3, three cylinders D1 - D3 of the four cylinders are activated, and the remaining cylinder D4 is stopped. this allows packages of lengths L2 and L3 to be cut at desired places with a pair of cutting blades 3, 3, and in this case, the backboard 8 can be made to  
10 contact the back plane of each package.

As described above, by using multiple cylinders and having all of them or only some of them activated, a pair of cutting blades 3, 3, a pair of suction pads 2, 2, a pair of holders 6, 6 and a backboard 8 can be positioned at desired places.

- 15 In this manner, even in the case in which the lengths of blanks A and the package C bundled with packaging material B differ as shown in Figs.(a) - (d), by positioning one plane C2 of each package prior to loading on the platform 1 always at the same position, in other words, on the same datum line L,  
20 for example, positions of the one platform 1, the cutting blades 3, the suction pads, the holders 6 and backboard 8, can all be altered according to the lengths of packages. This means that even in the case in which packages to be cut are of different lengths, the platform 1 that supports these will go  
25 to the prescribed position to meet them, and prescribed positions on the two mutually opposing planes of each package can be vertically cut with cutting blades 3, and even when

handling packages of different lengths, packaging material B can be vertically cut at prescribed positions for each package.

The packaging material B of the package C on the platform 1 can be cut as described above. In this case, the platform 1 is at the position of the solid line in Fig.19, which is the cutting line. In the embodiment, platform 1 is lowered as shown in Fig.19 by chain line, and the cut packaging material B is opened at this position shown by chain line.

This is very convenient because the spaces above and below can be used to their maximum capacities. In order to lower the platform 1 from the solid line position in Fig.19 as shown by chain line in the same figure, a cylinder shown by 1b in Fig.8 can be used to lower the entire platform 1 with a frame 11.

Incidentally, when providing cutting lines c1, c1 on the two mutually opposing planes C1, C1 of packages of different sizes (depth, length) as shown by L1 to L4 in Fig.17 (a)-(d), in order to place each package on the platform 1 so that the plane C2 to be provided with a cutting line c7 is aligned on one datum line L, all packages, regardless of their sizes (depth, length), can be made to be placed on the datum line shown by Lc, and each package is pressed into the platform 1 therefrom. In the embodiment, a transferring device 12, whose right end with respect to the platform 1 is on the datum line Lo, is placed beside the platform 1 as shown in Figs.10 and 15, and the package C is transferred to the platform 1 from the transferring device 12 by a pusher 13 shown by 13 in

Figs.10 and 19. By aligning the right end of both the transferring device 12 and the package stored herein on the datum line shown by Lo in Figs.10, 15 and 16, and by making the stroke of the pusher 13 constant, each package can be  
 5 placed on the platform 1 so that each plane C2 to be provided with a cutting line c7 is positioned on one datum line L.

When providing cutting lines c1, c1 on the two mutually opposing planes C1, C1 of the package C, the package C can be stored in the transferring device 12 positioned at a fixed  
 10 distance from the platform 1, but in the case of the embodiment, the package C is carried in by two conveyors 14, 14 as shown in Figs.13 and 19, and stored in the transferring device 12 by pushing into the transferring device 12  
 15 positioned between the both conveyors 14, 14 alternately or from one of them, and this transferring device 12 is rotated thereafter as shown in Fig.14 by single-dotted chain line, and is lowered to the fixed position beside the platform 1 as  
 20 shown by double-dotted chain line in the same figure. In order to supply package C to the two conveyors 14, 14, a device (not illustrated) that can selectively lift and supply a package placed on the palette to the two conveyors 14, 14 can be installed to do this automatically.

The transferring device 12 shown in the embodiment is equipped with a storage box 12a with an L-shaped cross section as shown  
 25 in Fig.14, and the package C carried in by the two conveyors 14, 14 is pressed into the storage box 12a either alternately or continuously from either one of the two

openings 12b (Fig.14) shown in left and right of Fig.13. In order to press the package C into the storage box 12a, pushers 15a, 15b are arranged above the two conveyors 14, 14 as shown in Fig.13, and the pusher 15a and pusher 15b are alternately transferred from the solid line position in Fig.13 as shown by chain line in the same figure by cylinder 16a and cylinder 16b respectively. And in order to store the package C into the storage box 12a continuously from either one of the two openings 12b, only one of the two cylinders 16a, 16b is activated and the other is left inactive. And this storage box 12a can be rotated from the solid line position in Fig.14 as shown by the single-dotted chain line, and it can be further lowered to the prescribed position as shown by the double-dotted chain line in the same figure maintaining its position. In order to rotate the storage box 12a from the solid line position in Fig.14 as shown by the single-dotted chain line, a method can be used, for example, in which the storage box 12a and the tip of the rod of cylinder 12c are connected by the lever 12d. When the rod of the cylinder 12c is withdrawn from the solid line position in Fig.14, storage box 12a that was in the horizontal position via the lever 12d rotates for 90° as shown by the single-dotted chain line in the same figure. And in order to lower the storage box 12a to the prescribed position maintaining its position as shown by the double-dotted chain line in Fig.14, rod 12f of the vertically activatable cylinder 12e, for example, can be directly connected to the storage box 12a. This way, the package C carried in from the two conveyors 14, 14 can be pressed into the storage box 12a

either alternately or consecutively, and lowered to the position shown by the double-dotted chain line in Fig.14 after rotating its position for  $90^\circ$ .

At the lowermost position of the transferring device 12 is  
 5 installed a pusher shown by 13 in Figs.10, 14 and 19. This pusher 13, as described above, will move for only a certain stroke from one of the two openings 12b of the storage box 12a, i.e., from the right hand side to the left hand side in Fig.10, and this allows the package inside the storage  
 10 box 12a to be pushed out to the prescribed position. In other words, as described above, the storage box 12a and the package C stored inside are lowered so that their right ends are on the datum line  $L_0$  in Figs.10, 15 and 16. And with a movement of the pusher 13 of a prescribed stroke of  $l_0$ , the  
 15 package C can be placed on the platform 1 so that the right end of the package C is on the datum line shown by L in Figs.16 (a) - (d). This pusher 13 is slightly tilted until the storage box 12a is lowered as shown in Fig.10, but before the end of lowering of the storage box 12a it becomes vertical  
 20 as shown by chain line in the same figure by cylinder 13a to work as a kind of guide, and is moved by another cylinder 13b to the left in Fig.10 for a certain stroke  $l_0$  (Fig.16) maintaining its position to push the package C inside the storage box 12a out to the prescribed position (on the line  
 25 shown by L in Fig.16), and place it into the platform 1.

The bottom part 12g of the storage box 12a for lowering the package C to the prescribed position is partially cut out as

shown by 12h in Fig.15. This is to avoid mutual conflict of the platform 1 and the storage box 12a that is lowered to the prescribed position when handling packages of different sizes (depth, length). For example, if the platform 1 is set to be positioned at the place shown by (a) in Fig.16 when handling a package of length L1, handling of packages of lengths, L2, L3 and L4 that are shorter than that requires that the cylinder 1a (Fig.18) is activated as above described and the position of platform 1 with respect to the storage box 12a is varied according to the length of the package, in which case the part 1c at the front of the platform 1 is engaged in the cut-off part 12h of the storage box 12a and made not to conflict with each other.

It is already mentioned that the package C is placed on the platform 1 and the packaging material B is cut and opened thereon. Next, an example of a device to open the cut packaging material B by pairs of cutting blades 3, 3 and 4, 4 and a cutting blade 5, will be described in detail.

As a means to open the cut packaging material B, the embodiment shows a case comprising a lever 17 to grasp the upper corner of the cut package C' placed on the platform 1 (Fig.2), a stopper 18 to transfer the package from the bottom to the top, and a stopper 19 to transfer the package from the top to the bottom. The bottom of the lever 17 is pivoted to the rod 17b of the lever 17a, and when the rod 17b penetrates in the direction of the arrow in Fig.18, the lever rotates from its solid line position in the same figure as shown by

chain line with pivot 17c as the centre, and its top grasps the upper corner of the package C'. Then, the mouth of the cut packaging material B opens slightly, and the tip of the stopper 18 penetrates into it to hook the open edges shown by (b) and goes up as is. In this manner, the upper half of the packaging material B shown by b1 opens as shown by Fig.3(g) and Fig.7. Next, the upper stopper 19 goes down and its tip hooks the open edges b' of b2 of the packaging material B in Fig.7 and goes down as is. Then the lower half of the packaging material shown by b2 opens as shown by Fig.3 (g) and Fig.7. In this manner, the cut package C' is opened on the platform 1. In addition to the cases described in the embodiment, this opening operation can be performed to rip off the cut packaging material B by sucking either plane of the cut package C'.

As described above, rectangular package comprising and covering a bundle of many flattened blanks A with packaging material B can be automatically cut and opened.

Once opened, the packaging material B is no longer necessary, and only the contents have to be taken out. In the embodiment, this can be done by a robot shown by 20 in Fig.19. This robot 20 is equipped with a grasping means comprising a top-and-bottom pair of forks 20a, 20a, which approaches a cut package C" on platform 1 to take out only many stripped blanks A with the top-and-bottom pair of forks 20a, 20a as shown by Fig.3 (h). In this case, the front side 1c of the platform 1 can be laid down as shown by chain line in Fig.12

to avoid conflict of the bottom fork of the pair of forks 20a, 20a with the platform 1.

Among other figures, 21 (Fig.18) is a pusher to push the empty packaging material B after the many blanks A are taken out by the pair of forks 20a, 20a out of the platform 1, and it can move forward to the chain line position from the solid line position in Fig.18 by the activation of cylinder 21a. The empty packaging material pushed out by this pusher 21 can be made to be discharged automatically by an unillustrated device.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A cutting and opening method for a rectangular package covered with packaging material wherein the packaging material of a rectangular package is cut from one edge to the other on two mutually opposing planes after forming a space between the packaging material and the package, the packaging material on the same two planes is cut from one of the two edges other than those passing the starting point and the finishing point of these cutting lines to the above mentioned cutting lines, the packaging material is cut on the plane adjacent to the above mentioned two planes and having two edges passing the two cutting lines in a manner so that the two cutting lines are connected after forming a space between the packaging material and the package, and thereafter, the packaging material is cut open at each area on the three planes where cutting lines are provided.
2. A cutting and opening method for a rectangular package covered with packaging material in accordance with Claim 1 in which a backplate is inserted from a cut area made by cutting the packaging material from one edge to the other on each of the two mutually opposing planes, and the packaging material on the planes is cut on top of the backplate.

3. A cutting and opening method for a rectangular package covered with packaging material in accordance with Claim 2 in which the backplate has a tip which is inserted from the cut area on each of the two mutually opposing planes protrudes outward to form a space between the packaging material and the package when cutting the plane adjacent to the two mutually opposing planes.

4. A cutting and opening method for a rectangular package covered with packaging material in accordance with Claim 1 in which, when rectangular packages are different in sizes, the positions of the cutting lines running from one edge to the other on the two mutually opposing planes are varied with respect to the datum plane adjacent to the two planes according to the package sizes.

5. A cutting and opening device for a rectangular package covered with packaging material comprising a platform on which a rectangular package is placed, a means to form a space between the packaging material and the package on the two mutually opposing planes of the package on the said platform, a pair of cutting blades that cut the packaging material from one edge to the other in the direction of height or width where a space is formed between the packaging material and the packaged items by the above means, a pair of cutting blades that cut the packaging material from one of the

two edges other than the edges passing the starting point and the finishing point of each of the two cutting lines cut by the pair of cutting blades to the above mentioned cutting lines, a means to form a space between the packaging material and the package on the plane with two edges that pass the ends of the two cutting lines made by the pair of cutting blades, a cutting blade that cuts the packaging material so as to connect the two cutting lines on the above plane, and a device to open the packaging material from each area on the three planes provided with cutting lines.

6. A cutting and opening device for a rectangular package covered with packaging material in accordance with Claim 5 in which a pair of holders that hold parts of the two mutually opposing planes of the rectangular package placed on the platform from both sides are provided on the side of the platform.

7. A cutting and opening device for a rectangular package covered with packaging material in accordance with Claim 5 in which a pair of backplates that are movable parallel to the two mutually opposing planes of the rectangular package placed on the platform and insertable through slits made by cutting the packaging material from one edge to the other on these two planes are provided.

8. A cutting and opening device for a rectangular package covered with packaging material in accordance with Claim 5 in which, when different-sized rectangular packages are to be placed on the platform, the platform is positioned in relation to a cylinder so that the position of the platform can be varied with respect to the datum plane to be provided with a cutting line and adjacent to the two planes that are cut from one edge to the other according to the package sizes.

9. A cutting and opening device for a rectangular package covered with packaging material in accordance with Claim 5 in which, when different-sized rectangular packages are to be placed on the platform, a pair of cutting blades are related to a cylinder so that the activation position of the pair of cutting blades that cut the packaging material from one edge to the other in the direction of height or width on the two mutually opposing planes can be varied with respect to the datum plane to be provided with a cutting line and adjacent to the above two planes according to the package sizes.

10. A cutting and opening device for a rectangular package covered with packaging material in accordance with Claim 6 in which, when different-sized rectangular packages are to be placed on the platform, the aforementioned pair of holders is positioned in relation to a cylinder so that the activation position of the pair of holders can be varied with respect to

the datum plane to be provided with a cutting line and adjacent to the two mutually opposing planes cut from one edge to the other according to the package sizes.

11. A cutting and opening device for a rectangular package covered with packaging material in accordance with Claim 5 in which, when different-sized rectangular packages are to be placed on the platform, a pair of means to form a space between the packaging material and the package on the two mutually opposing planes are positioned in relation to a cylinder so that their position can be varied with respect to the datum plane to be provided with a cutting line and adjacent to the two mutually opposing planes cut from one edge to the other according to the package sizes.

12. A cutting and opening device for a rectangular package covered with packaging material in accordance with Claim 5 in which, when a rectangular package is pressed onto the platform, a backboard is provided at the back of the platform to position the back plane of the package with respect to the platform, and the said backboard is positioned in relation to a cylinder so that its activation position can be varied with respect to the datum plane to be provided with cutting lines and adjacent to the two mutually opposing planes cut from one edge to the other according to the package sizes to be placed on the platform.

13. A cutting and opening device for a rectangular package covered with packaging material in accordance with any one of Claims 8 to 12 in which, when a package is pressed into the platform from a place where the plane adjacent to the two planes cut from one edge to the other of each package is at a fixed position, the activation positions of the platform, a pair of cutting blades, a pair of holders, a pair of means to form a space between the packaging material and the packaged items on the two planes of the package that are cut from one edge to the other, and the backboard are positioned in relation to a cylinder so that they can be varied with respect to the datum plane of the package, and can be chosen according to the package sizes as necessary.

14. A cutting and opening device for a rectangular package covered with packaging material in accordance with Claim 13 in which a package is transported in a storage box toward the prescribed position on the side of the platform.

DATED this 8th day of September, 1989

AB TETRA PAK

By their Solicitors,

Freehill, Hollingdale & Page.

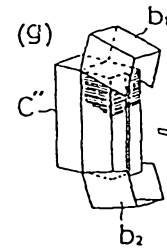
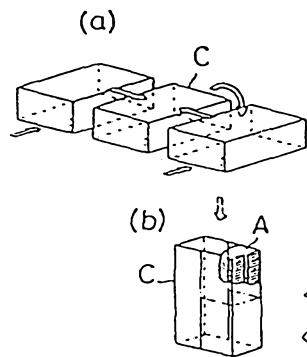


Fig. 2

Fig. 3

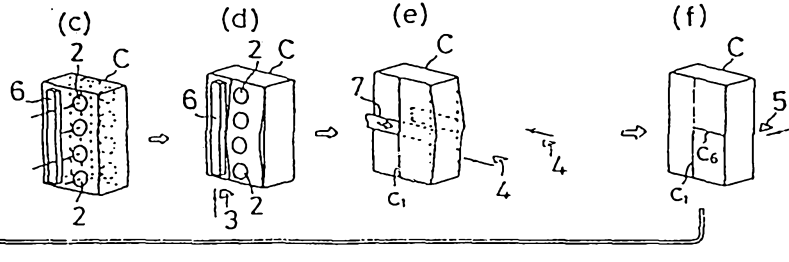


Fig. 4

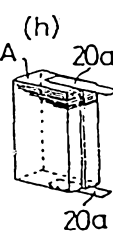


Fig. 1

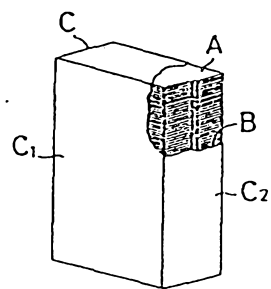


Fig. 5

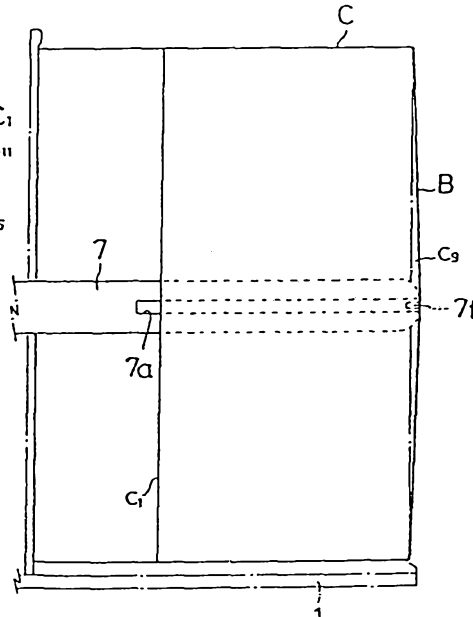


Fig. 6

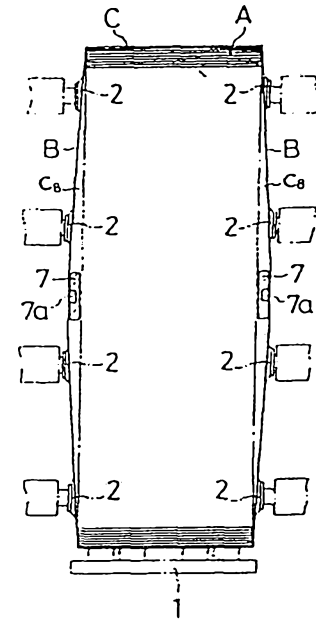




Fig. 8

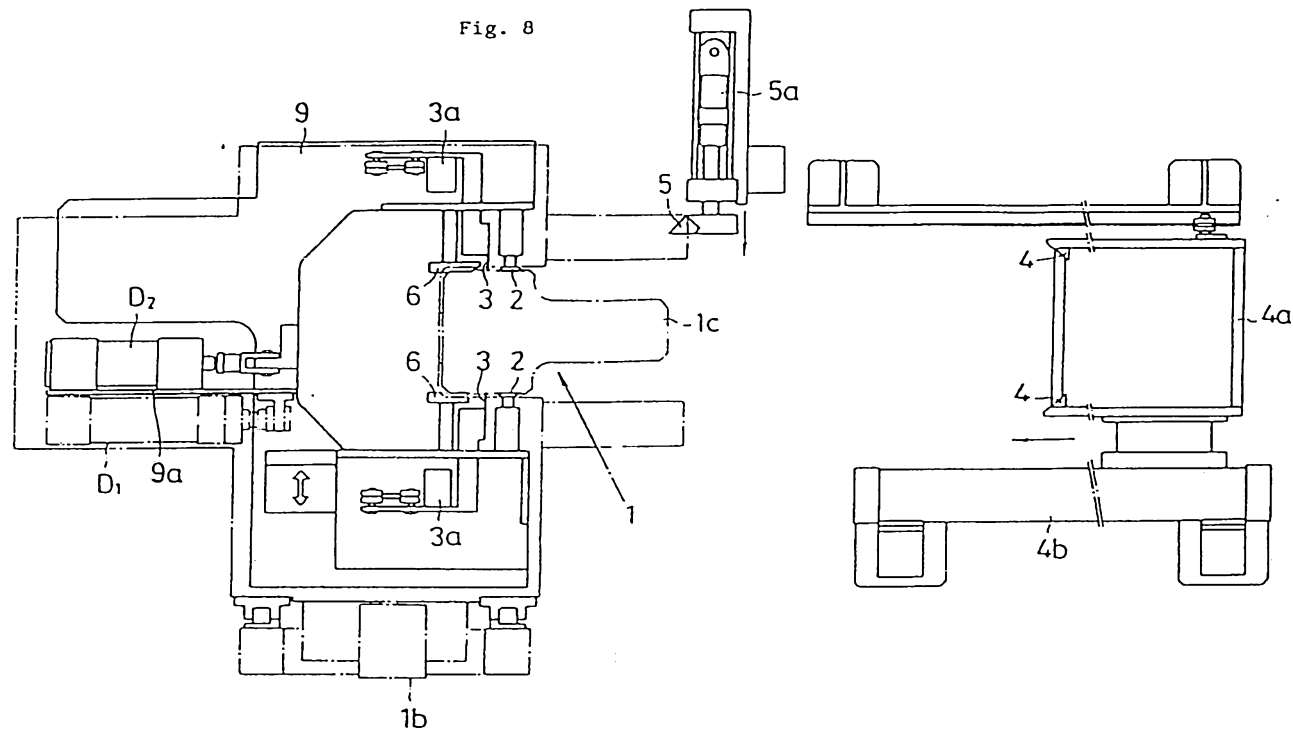


Fig. 10

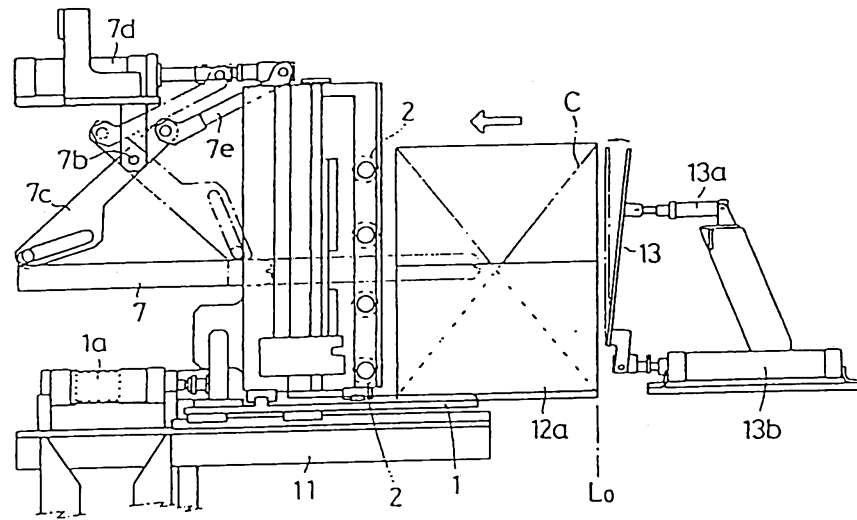


Fig. 11

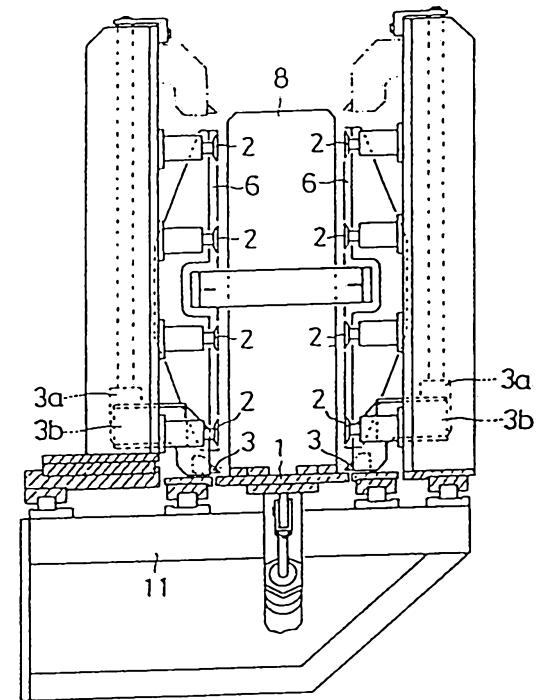


Fig. 15

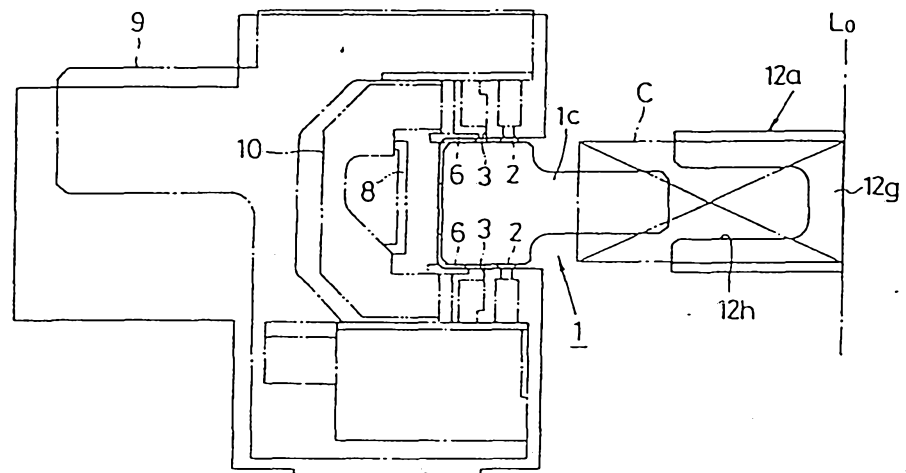
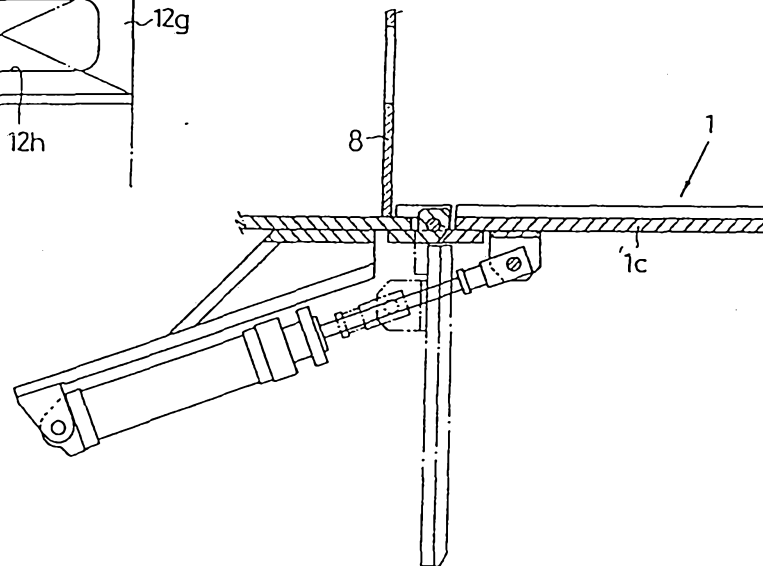


Fig. 12



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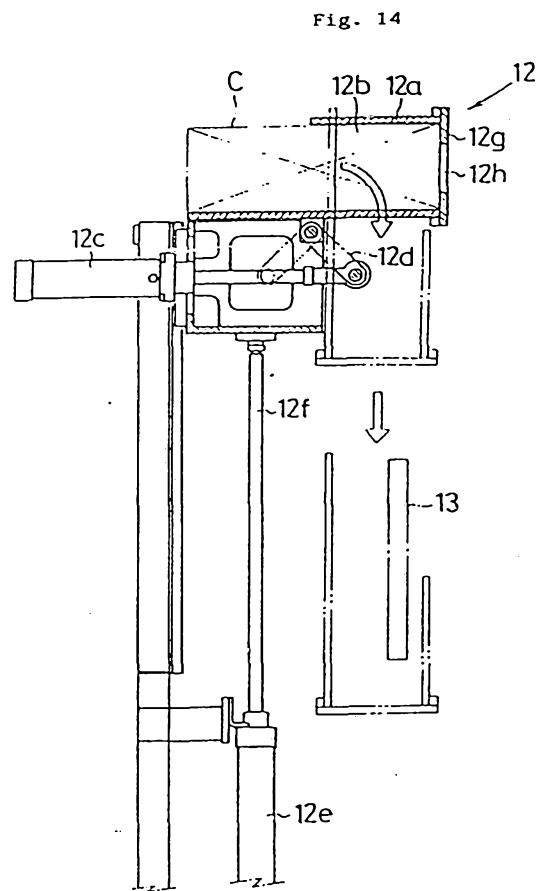
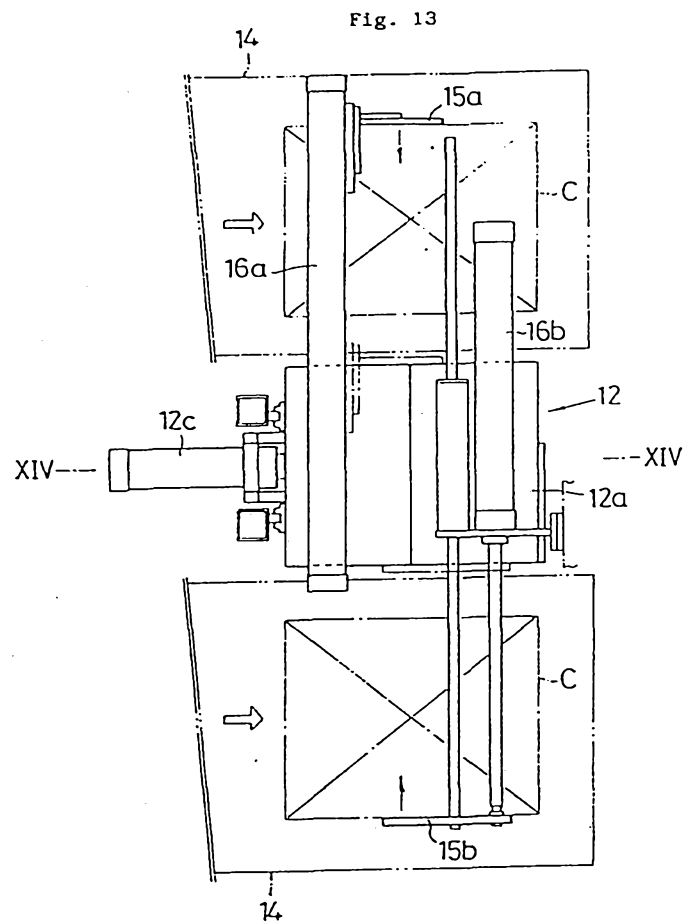


Fig. 16

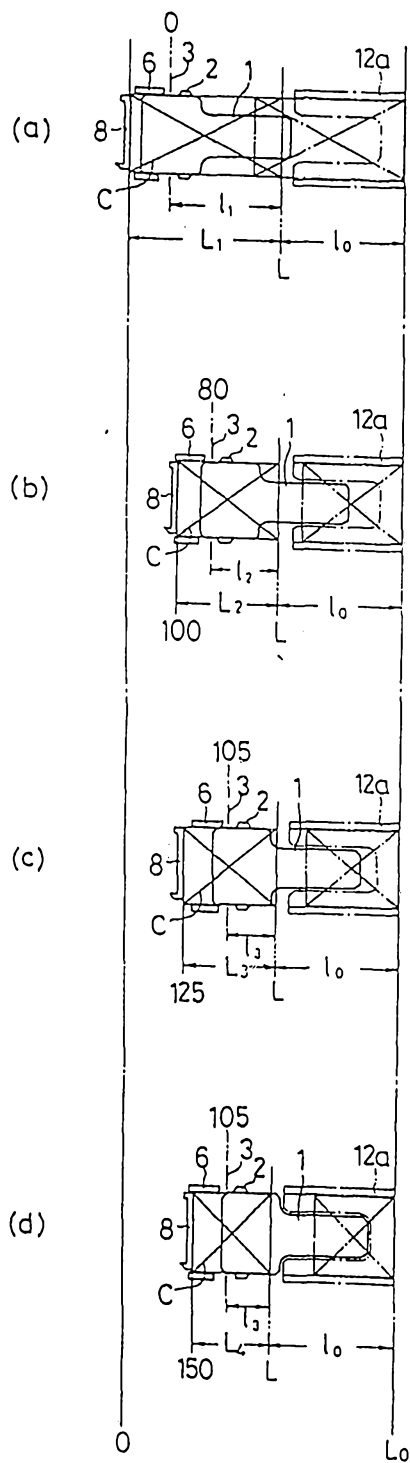


Fig. 17

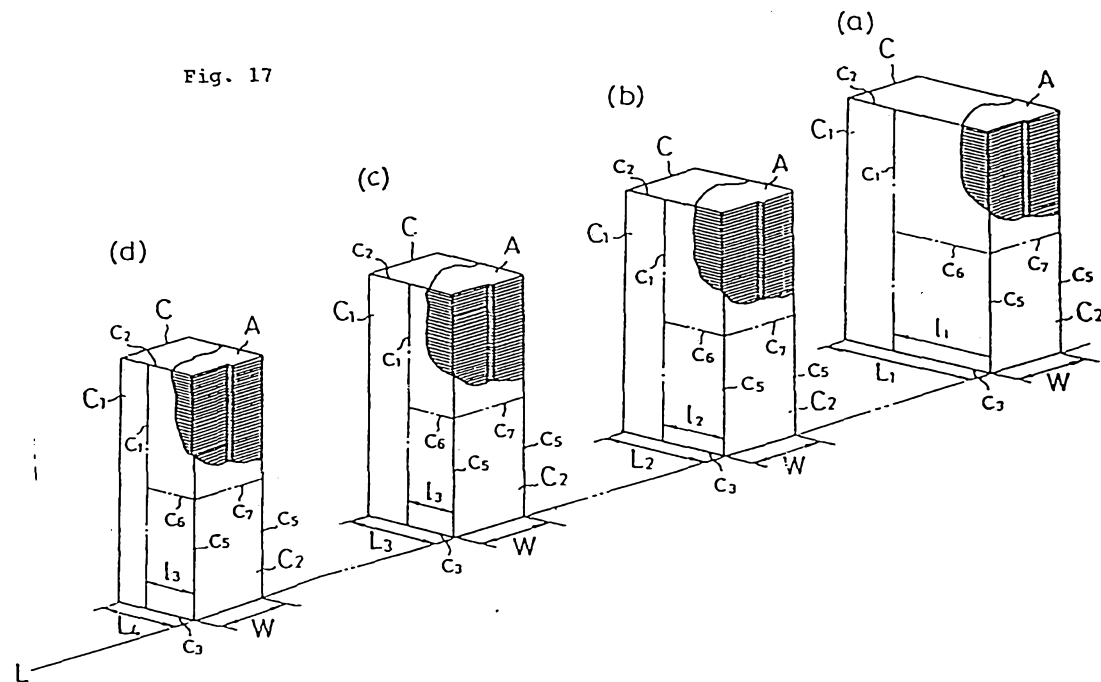


Fig. 19

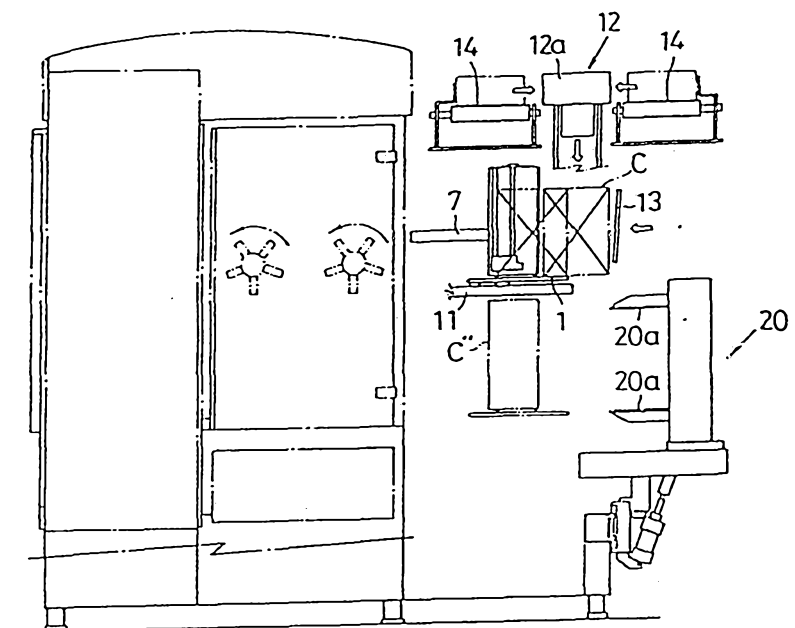


Fig. 21

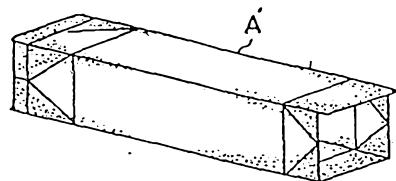
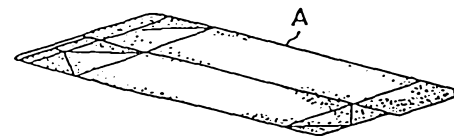


Fig. 20



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