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54 **Stackable carton tray.**

57 The invention relates to a completed carbon-box (tray), especially spacious, durable, practical and elegant.

A "New Generation" carbon-box suitable for the packaging and transporting of agricultural products etc.

The maximum thickness of the lengthwise and breadthwise sides of the carbon-box is double the thickness of the corrugated paper (cardboard etc) from which it is made.

In this way, an optimum use of the inner available space is yielded.

In the completed carbon-box, there are triangular columns formed inside at its four corners.

The way of their lock when they are placed in columns is done with corner extensions of its sides or with others which are located at the folding sides.

These, respectively, come into slots which are made on the sides of the carbon-box as well as on its base.

The completed carbon-box may also have just its big sides with a maximum thickness equal to the double thickness of the corrugated paper from which it is made.

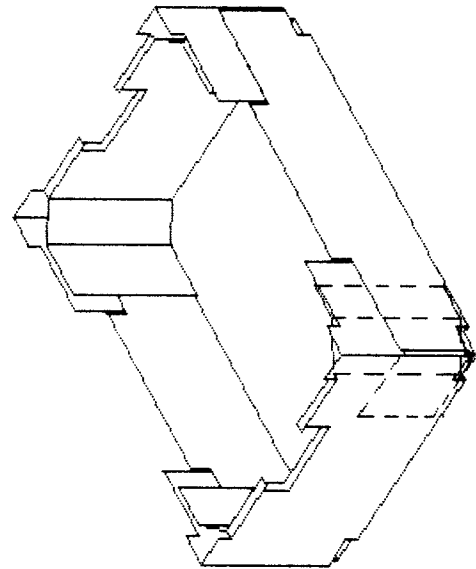


FIG 51

The invention relates to a completed carton-box, especially spacious, durable, practical and elegant. A "New Generation" carton-box, suitable for the packaging and transporting of agricultural products etc.

There are many carton-boxes in a variety of shapes and usages. Each type has advantages but serious disadvantages, too.

In the modern packing-houses of fruits and vegetables, during the production process the fruits roll from the conveyor belt directly to the trays.

This is the reason why the advisable trays are those which are all open top so as not to prevent the rolling of the fruits.

The carton-boxes which are all open top are called "New Generation" boxes so as to differ from the rest because they have a substantial advantage over them.

Some other disadvantages, even in the New Generation carton-boxes, were brought out when the Europalettes were imposed for the transportation of the products. The Europalettes have a definite, fixed size of 80X120 cm and the size of the fruit-cases which are placed into the carton-boxes is definite, too.

The thickness of the sheet of the corrugated paper which is used for the production of the carton-boxes is usually 6,5 mm. But in spite of this a carton-box, in order to have a bigger interior space, must be formed in such a way so as to be durable without its sidewalls having too many sheets.

This is the substantial objective as, in any case, the outer dimensions of the tray are definite (it is a whole submultiple of the Europalette's dimensions) and the fruit-cases have been designed according to the wooden boxes whose sidewalls are 4-5 mm.

An advantage of this invention is that the maximum thickness of the lengthwise or breadthwise sides of the carton-box is double the thickness of the corrugated paper (cardboard etc). The advisable completed carton-box has a bigger available space which is combined with the big resistance, the elegance and the economy in paper.

Figure 1 illustrates the development of the completed carton-box according to the invention, with a saving of paper breadthwise equal to $2b$.

In spite of all these, the final completed carton-box has the desirable dimensions $LXWXH$.

Figure 11 is a perspective view of it.

Figure 2 illustrates the development of the completed carton-box according to the invention, in case $b_1 > a_3$. In this case, a corresponding cutaway is made on the surface of length $H-p$, so as the side walls of the small sides of the carton-box to have a thickness equal to the double thickness of the corrugated paper (cardboard etc).

Figure 21 is a perspective view of it.

Figure 3 illustrates the development of the completed carton-box according to the invention, where in

the inside there are no columns formed at the four corners and as a result the interior available space is bigger than the one of Figure 2.

Figure 31 is a perspective view of it.

Figure 4 illustrates the development of the completed carton-box according to the invention, in which when the carton-boxes are placed in columns, the one's lock with the other is done according to the way shown by the figure.

Figure 41 is a perspective view of it.

Figure 5 illustrates the development of a completed carton-box according to the invention, in case there is no restriction of yield of the maximum interior space.

Just the big sides have a thickness equal to the double thickness of the corrugated paper (cardboard etc).

The small side may have the triple thickness of that of the corrugated paper as the surface of length b_1 is located between the surfaces of length H and $H-p$.

Figure 51 is a perspective view of it.

Embodiments of the invention will now be described.

The reference is usually made for one quadrant or for the half of the carton-box in each case, because of the symmetry to the horizontal and vertical axis which goes through its centre.

The fold lines in figures 1, 2, 3, 4 and 5 correspond to the creasings or the perforatings (bending, folding of the paper) and the continual ones to the cuttings of the paper.

a) Figure 1 illustrates a surface of paper (corrugated, cardboard etc) of thickness p which is cut and creased according to the figure, so that the completed carton-box with the external dimensions of length L , width W and height H of the figure 11, will arise during the forming.

According to the present invention, on the folding surface of length $H-p$, there is an addition of perforatings or creasings in fixed distances a_1, a_2 where $a_1 > 0$.

On the surface of length H on which the surface of length $H-p$ abuts and is glued, there is a corresponding cutaway and process and we define the distances a_4 and a_5 where $a_4 \leq H-b$, $a_5 \geq b$ if $b \neq 0$ and $a_5 = 0$ if $b = 0$, b is the depth of the big window.

On the surface of height $H-b$ we define the distances b_1, b_2 and b_3 where $0 < b_1 < a_3 - p$, $0 < b_2 \leq H-b$, $b_2 + b_3 = H-b$.

$A_4 > a_3$ is effective, when the column formed inside, at the corner of the completed carton-box, is isosceles and the length of the equal sides is a_3 . When the column is not isosceles, then the a_4 is bigger than the third perpendicular side formed by the surfaces (perpendicular) of length a_3 and (hypotenuse) of length a_2 which we define as a_6 .

$A1+a6 \leq a4-p$, $b2+a5 \leq H$, $b1+a5 \leq H+p$ are also effective.

According to the present invention illustrated by figure 11, the surfaces of length $H-b$ and width $a4$ form a uniform surface whereas the surface of length $b1$ abuts and is glued on to the side of length H forming a plane with the folding interior side of length $H-p$.

The extensions $P1$, $P2$, $P3$ and $P4$ which are formed at the four corners fit into corresponding slots, apertures $T1$, $T2$, $T3$ and $T4$ whose depth is exactly the same with the length of the extensions.

b) Figure 2 illustrates a surface of corrugated paper (cardboard etc) which is creased and cut proportionally, so as to arise the completed carton-box (figure 21) of the same external and internal dimensions with that of figure 11.

c) Figure 3 illustrates a surface of corrugated paper (cardboard etc) which is creased and cut proportionally, so as to arise the completed carton-box, figure 31, of the same external dimensions with those of figure 11 but the folding sides do not form any columns at the four corners.

According to the present invention, on the folding surface of length $H-p$ there is a corresponding cutaway and process with the addition of only one perforating or only one creasing.

$0 < a1 \leq a4-2p$ and $a4 \leq H-b$ with $b \geq 0$ are also effective.

d) Figure 4 illustrates a surface of corrugated paper (cardboard etc) which is creased and cut proportionally, so as to arise the completed carton-box, figure 41, of the same external and internal dimensions with the one of figure 11.

It differs from the one of figure 11 in the way of lock of the trays. The extensions $R1$, $R2$, $R3$ and $R4$ which are formed, are inserted into the positions $r1$, $r2$, $r3$ and $r4$. The usual length of extensions is p .

e) Figure 5 illustrates a surface of corrugated paper (cardboard etc) which is creased and cut proportionally, so as to arise the completed carton-box figure 51, of the same external dimensions with the one of figure 11 but smaller interior space.

As the surface of length $b1$ gets in between the surfaces of length H and $H-p$, the interior space is decreased in regard to the length.

In this case, only the big sides of the carton-box have a thickness equal to $2p$.

According to the present invention, in each one of the cases a), b), c) and e) depending on the packed product, the means of transport etc, there are windows and holes for ventilation opened on any surface of the completed carton-box, as well as handles for its transport.

Claims

- 5 1. A completed carton-box with triangular columns inside, in which the maximum thickness of its side walls is equal to the double thickness of the corrugated paper (cardboard etc) from which it is made.
- 10 2. A completed carton-box as claimed in claim 1, in which the folding side does not form any columns in the inside.
- 15 3. A completed carton-box as claimed in claims 1 and 2, in which the lock of each one with the other when they form a column, is made with corner projections $P1$, $P2$, $P3$ and $P4$ and the respective slots $T1$, $T2$, $T3$ and $T4$ of the sides and the base of the carton-box.
- 20 4. A completed carton-box as claimed in claims 1 and 2 in which the lock of each one with the other when they form a column, is made with projections $R1$, $R2$, $R3$ and $R4$ which are on the folding surfaces of the carton-box and respective slots $r1$, $r2$, $r3$ and $r4$ on its base.
- 25 5. A completed carton-box with triangular columns inside, in which only the sidewalls at its big sides, have a maximum thickness equal to the double thickness of the corrugated paper (cardboard etc).
- 30 6. A completed carton-box as claimed in claim 5, in which the folding side does not form any columns in the inside.
- 35 7. A completed carton-box as claimed in claims 5, 6 which is characterized by the corner projections $P1$, $P2$, $P3$ and $P4$ and the respective slots $T1$, $T2$, $T3$ and $T4$.
- 40 8. A completed carton-box as claimed in claims 5, 6 characterized by the projections $R1$, $R2$, $R3$ and $R4$ and the respective slots $r1$, $r2$, $r3$ and $r4$ on the base of the carton-box.
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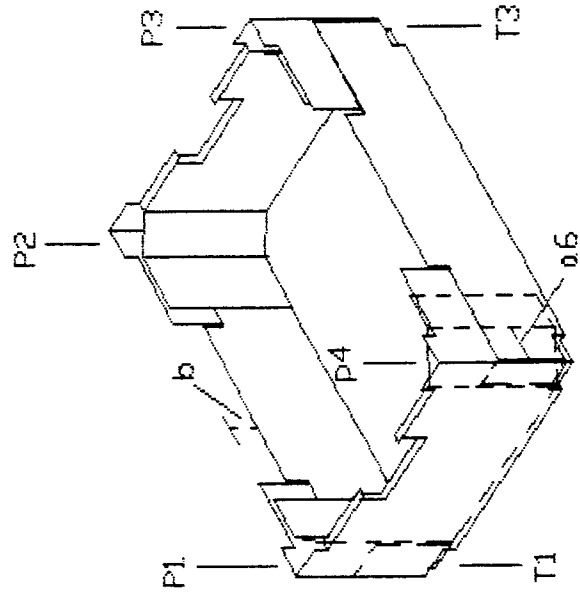


FIG 11

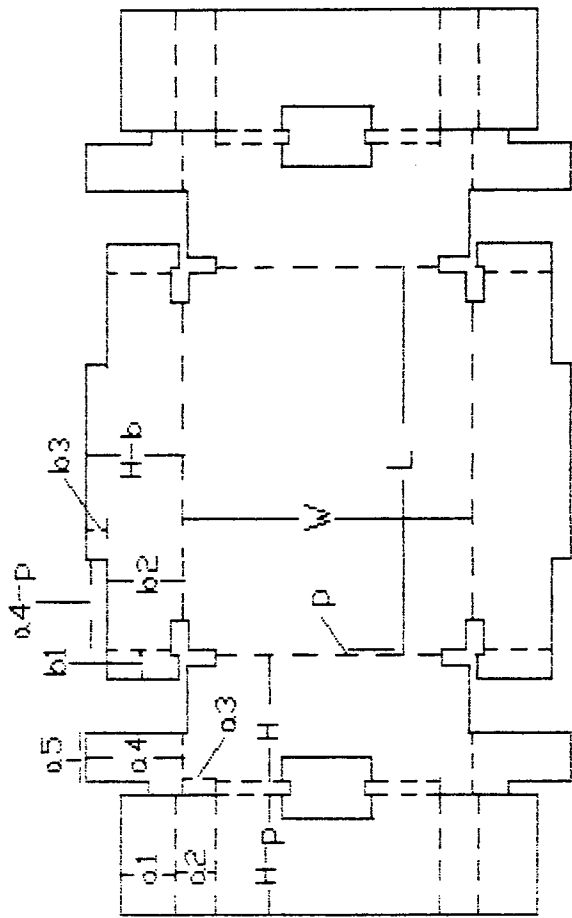


FIG 1

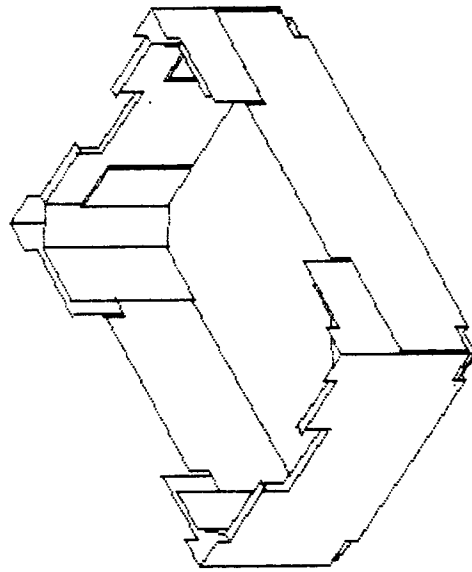


FIG 21

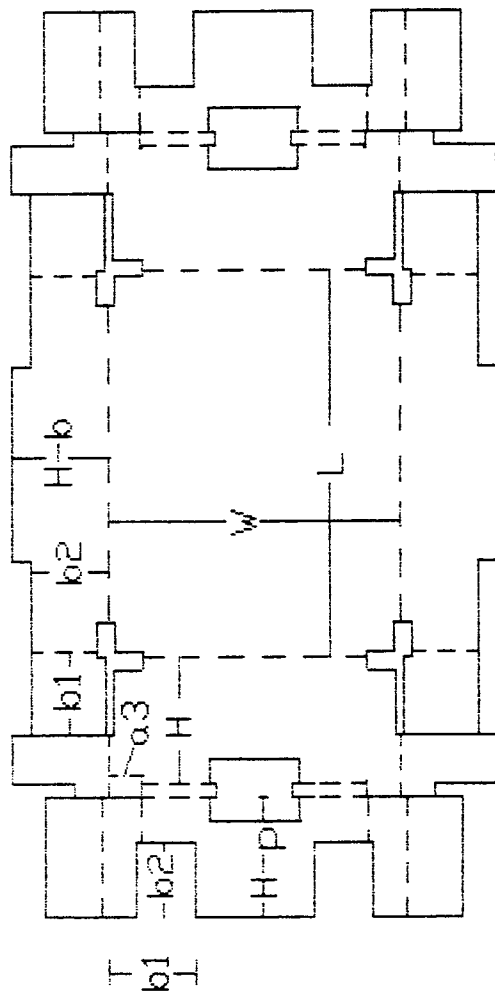


FIG 2

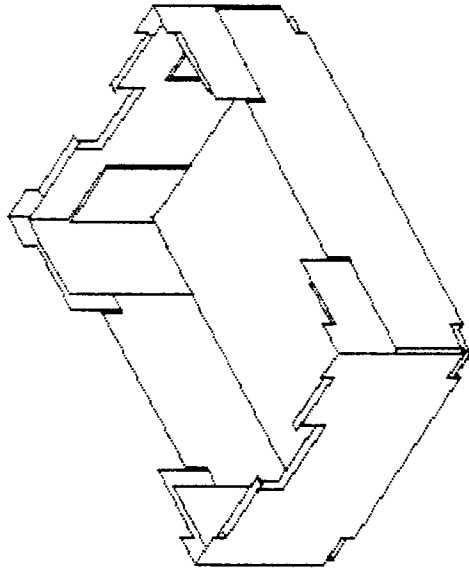


FIG 31

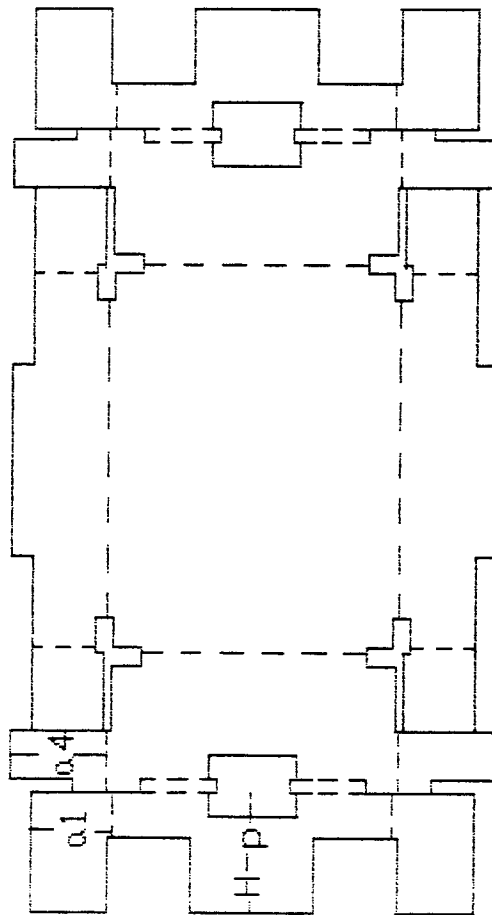


FIG 3

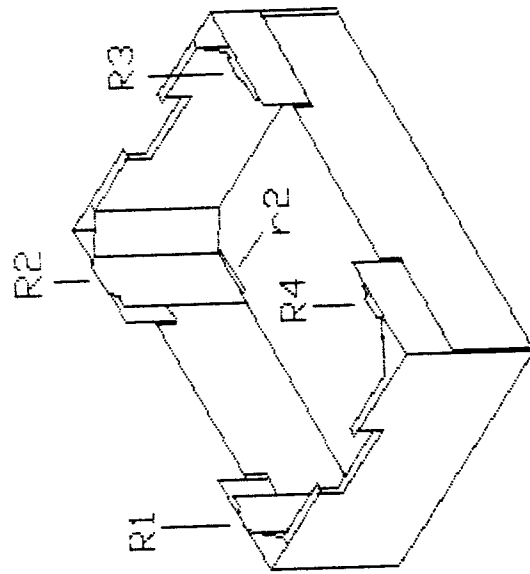


FIG 41

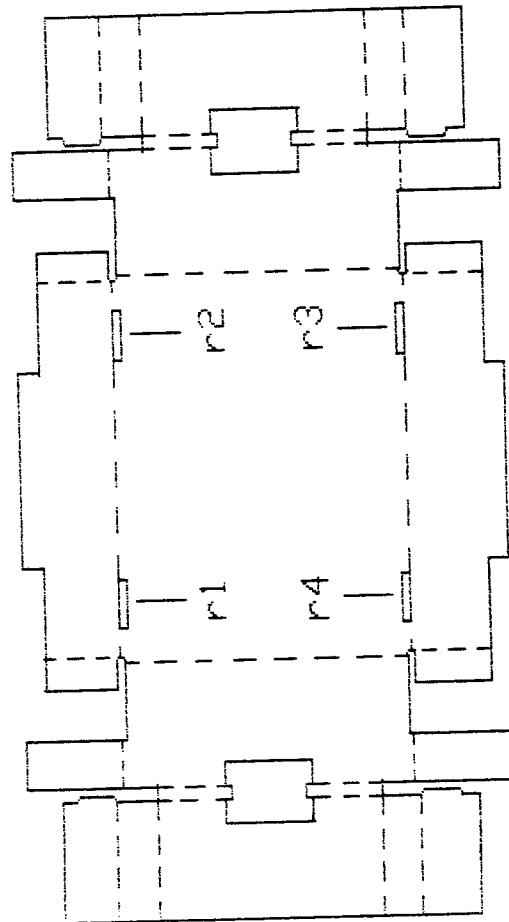


FIG 4

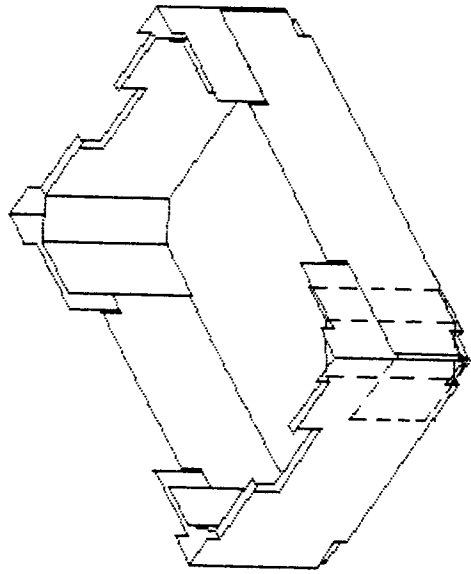


FIG 5I

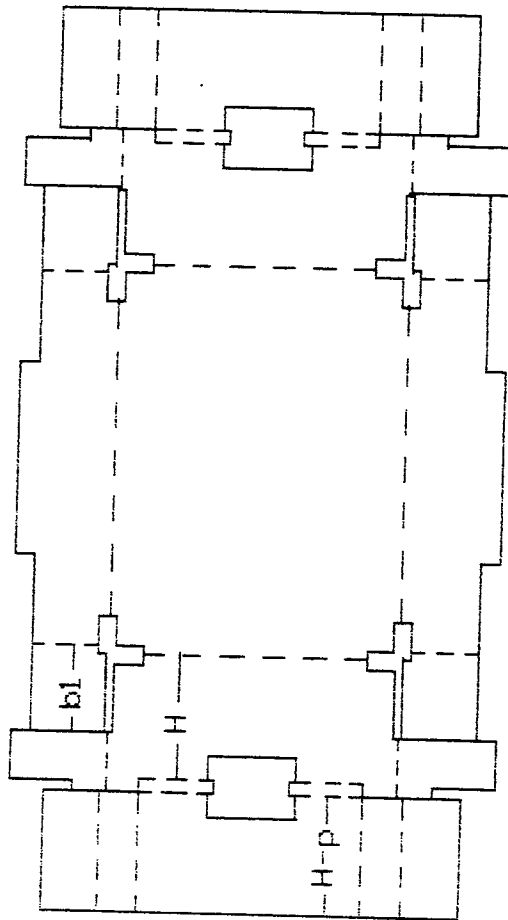


FIG 5



European Patent
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EUROPEAN SEARCH REPORT

Application Number

EP 93 60 0009

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	FR-A-2 584 375 (IBEROAMERICANA DEL EMBALAJE)	1	B65D5/00
A	* figures * ---	3,7	
A	FR-A-2 236 734 (SOFHUNIC) * figures 16,17 *	2,6	
X	FR-A-2 306 888 (ALLARD)	1	
A	* figures 2,3,5 * ---	4,8	
X	EP-A-0 444 004 (HAROLD PIET) * figure 6 * -----	5	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B65D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 05 AUGUST 1993	Examiner Amedeo ZANGHI
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	
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