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(54) **Folding container**

(57) A folding container has side panels associated with short side cylinders fixed to the base and movable between an unassembled condition in which the faces of the panels are parallel to the base plane and an assembled condition in which the panels define a close storage space. Side panels are releasably retained to side support cylinders during assembling. A cover panel is associated to one of the side panels and closes the container.

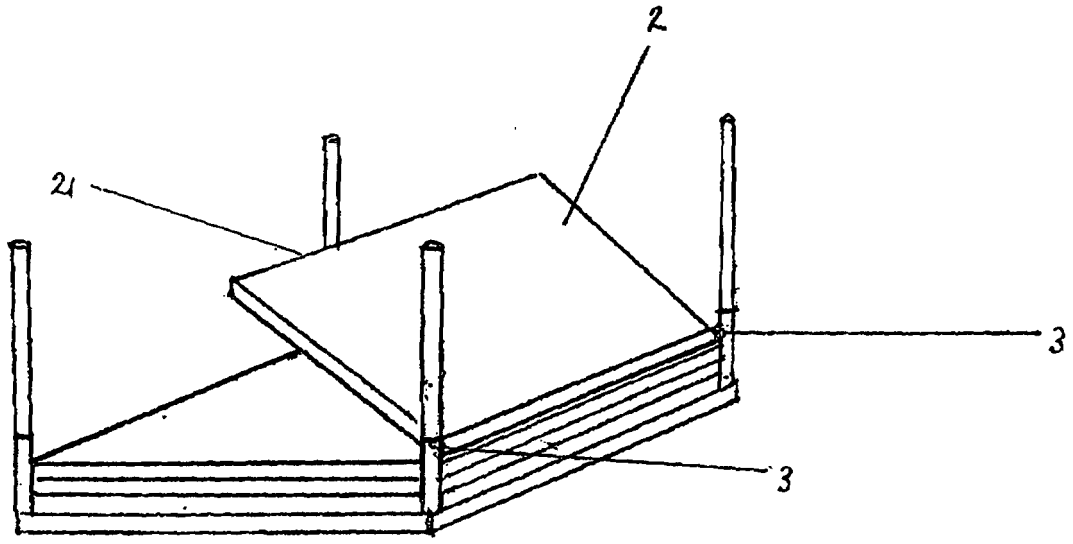


FIG. 9

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Description

[0001] This invention relates to a folding or collapsible container such as shipping crate or a freight container.

[0002] Shipping Containers are used on a variety of transportation means: on road, rail, sea. Often are used for long trips from the manufacturers (original shipper) to the destination warehouses. When unloaded, because of their size, it results expensive to return them to the original shipper where these trips may involve up to thousands of miles; in many circumstances these containers are hence left empty crowding dock areas at harbours as well as in warehouse facilities. It would result hence of great advantage if these containers could be stored, when not used, in a reduced space, slashing in this way the cost of returning them to the original shipper. For these reasons , a container with a practicable folding technology may result of many industrial uses.

[0003] The realization of a folding container presents technical impediment that so far, in this 45 year old industry, result not yet overcome. These relates mainly to the large and heavy panels that result in the container not easily assembled from a flat condition into a ready to use position.

[0004] The present invention provides a folding container comprising side panels (2) associated with a base panel (1) and movable between a folded condition in which the faces of the panels are parallel with a common plane and an assembled condition in which the faces of the side panels, together with a cover panel, define a closed storage space (fig.17), wherein the container is releasably retained in the assembled condition by side support means engaging adjacent side panels.

[0005] The side support means comprise short cylinders (3,4) fixed at the four corners of the base panel and four upright members (5) associated to the short side cylinders and bent down when the container is unassembled. The end of the upper cylinder being of diameter smaller than the lower cylinder (fig.7a) fits, when in a vertical position, into a portion of the latter that is hollow; an horizontal small bar (18) secured to lateral wing of the lower cylinder matches with a slot (14) that runs vertically along the end of the top cylinder. This makes the lower and upper cylinder to form one part (fig. 5 to 7b) where the combined height of the two does not exceed the height of the container.

[0006] In order to facilitate the assembling of the panels, furthermore, it may result in an improved use if they can be slid out from an assembled position in which they lie stacked one on the other to a position in which they extend in a flat condition outside the perimeter of the base allowing their assembling in a vertical position by rotation from the outside in rather than the inside out. The present container hence provides that each of the short cylinders possess small pins (fig.4) that face along the direction of the edges of the base panel that form the corner on which the cylinder is mounted. The pins of each pair of cylinder facing one another along the side of the base panel are equally distanced from the base panel, the first at a distance T -S/2, where T is S+R, S the thickness of the panel, and R is the distance between adjacent panels. the pair corresponding to the second side of the base panels at a distance 2T-S/2 the third pair, adjacent in relation to the 3d side of the base at a distance 3T- S/2 , the forth pair at a distance 4T -S/2.

[0007] Each side panel has in correspondence with each of the 2 lateral edges (fig. 3), a guiding slot (7) of width sufficient for a pin as just described, to slide along and inside it. The sliding guide runs along the width of the edge side of the panel. The guide slot is closed in correspondence with each end; The panels are so permanently engaged and retained within the pins allowed to slide along the length of the slots. The side panels are pivotally mounted to the short fixed cylinders (fig.9) in conjunction to a pair of adjacent pins in such a way that each side panel lies on a different plane in respect of the others. When unfolded to reach a vertical position the panels are either rotated up and outwardly (fig.9) or slid out along its horizontal plane (fig.11) by means of the guide slot and then rotated up and inwardly l (fig.12). Because of the impediment caused by the other panels, assembling the panels in a vertical position from the outside result an easier operation to perform. When the rotation is completed the first panels to be unfolded, being on a higher horizontal plane in respect of the others, can be slid down (fig.10) in such a way that, after this operation, the bottom edge of each lays on the base panel.

[0008] A folding container to be of an industrial use in the shipping container industry must overcome the problem of assembling the panels that are heavy and large; specifically it results necessary to assemble each of these before and independently of the next panel is unfolded. Therefore the present container presents lateral support cylinders (fig.8) to which the side panel are fastened in a vertical position (fig. 10). Detent means (34) are provided on the support cylinders to fasten each of the side panels and prevent movements of it away from a vertical position securing it to the upright members supports when the container panel is assembled before unfolding the next panel. The detent means will be preferably screws disposed along the support cylinders. This feature, of securing the panel in a vertical position, is by no means obvious; the absence of which results in the folding of a freight container to be an unfeasible process.

[0009] The first of the side panel to be unfolded is mounted in correspondence with the pair of pins farther away from the base panel and is the back panel; this is opened by rotation from the inside out. 2 metal bars (fig. 14) are mounted on the top of each side edge. These bars of width equal the thickness of the panel, extend above the top edge of the panel. These bars are allowed a short rotational movement (28) toward the outside face of the panel. On the The small part that extend above the the top edge of the panel, mounted inwardly and facing one another, are 2 pins (29) of same shape and size as those mounted on the short cylinders above de-

scribed.

[0010] A cover panel (30) is of shape similar to the side panels having guided slot of width sufficient for a pin to slide along it and inside it. The cover panel is mounted in correspondence with the two side bar and pins just described and is allowed to slide from an assembled position (fig.16) where it lies parallel to the back panel on its outward face, to a closed position in which it lies on top of the assembled container closing the container (fig. 17).

[0011] A full understanding of the various aspects of the invention will be gained from the following detailed description of a preferred embodiment given by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of the preferred embodiment in an unassembled condition.

Figure 2 is a top section view of the container shown in Figure 1.

Figure 4 shows the disposition of the pins on the side cylinders and fig 3 a view of the side panel.

Figure 5 to 7b are detailed views showing the folding movement of the side cylinders.

Figures 8 to 12 are side views of the container showing the different steps of assembling.

Figures 13 and 14 show details of the back panel.

Figures 15 and 16 show the assembling of the cover panel.

Figures 17 shows the assembled container.

[0012] The unassembled container illustrated in Figure 1, has metallic or plastic horizontal base (1), folded panels (2), four short cylinders fixed at the corner of the base (3), upright members (5) adaptable to the short cylinders or forming one piece with each of these and folded down in the initial position.

[0013] The side cylinders are placed at the corner of the base; each of the side panels is of width less than the distance of the two adjacent side cylinders. (fig.2)

[0014] With reference to Figures 8 to 12, the container is initially in its folded condition with the panels overlying one another. The upright tubes (4) are unfolded one by one in a vertical position (fig.8). As mounted The tubes project vertically upwards from the base panel.

One by one, each side panels (2), pivotally mounted (3) to the short cylinders, is unfolded by rotation into a vertical position (fig.9), slid down so to juxtapose the base panel (fig. 10), and secured to the upright cylindrical tubules . Alternatively , each side panel can be slid out along its horizontal plane first (fig.11) , then rotated up and inwardly (fig.12) before being secured in the upright position to the side cylinders. Movement of the side panels past the vertical is prevented by contact of the outer faces of the panels with side cylinders. The assembling of the panel just described allows also heavy panel to be secured in a vertical position individually; The rectangular cover panel (30) which is associated with the back panel, the first of the side panels to be unfolded, is slid from its initial position (fig.15) to a closed position (fig.16) to rest upon the side panels edges, where the sliding is guided by bars (24) in conjunction with pivots points (29) . A lock or catch may be provided to secure the cover panel in position. The container is unassembled or folded by reversing the steps described above.

[0015] Though other containers in prior art are characterised by some folding mechanism that allows a container to be stacked in a flat condition, for all the reasons stated and described, the present product is different both in term of the technical features and of the assembling properties. These properties are meant to simplify the assembling; These are the sliding panels and the side support cylinders features. The first allows panels to be assembled in a vertical position from the outside in ; operation that result easier to perform than the assembling them from inside out. The second allows each side panel , during assembling, to be secured in a vertical position independently and before other panels are unfolded. The present product is hence characterised as a new product.

[0016] Of course, the skilled man will appreciate that many modifications to the described embodiment are possible. For instance a door may be cut on one of the panels, locks may be provided to secure the container from unauthorized opening, other grips may be provided for the moving of the container by cranes on and off trasportation means. Although the panels are preferably formed from metal, they could be formed of plastics or any other suitable material; the container can be suited for different uses and be of different sizes.

Claims

1. A Folding Container with side panels unfoldable by rotation in a vertical position secured to side supports during assembling where the container is assembled without the use of tools or spare parts is know prior art from same applicant (EP 00300994.1 - Collapsible Container)
   A folding container comprising side panels, which can be of equal height, pivotally mounted to four side support cylinders and being capable of being assembled by a combination of sliding and rotational movements between a folded condition in which the side panels overlie a base panel, and an assembled condition in which the side panels , together with a cover panel, defin e a closed storage space where the container may be formed as one unit of combined ele-

ments are features which characterise the present invention.

2. A folding container as claimed in claim 1 in which four short cylinders (fig.1) are fixed at the corners of the base.

3. A Folding container as in claim 1 in which each of the 4 side panels is of width less than the distance between two adjacent short cylinders (fig.2).

4. A folding container as claimed in claim 2 where each short cylinder posses small circular pins (fig.4) each directed along the line of one panel edge side such that each cylinder has 2 pins that direct along each of the 2 side edges that make the corner where the cylinder is disposed.

5. A Folding container as claimed in claim 2 and 4 in which each pin is at an equal distance from the base panel as that of the opposing pin of the adjacent cylinder. The first pair of pins that are closest to the base plan are disposed at a distance T -S/2, where T is S+R, S the thickness of the panel, and R is the distance between adjacent panels. The pair corresponding to the second side of the base panels at a distance 2T-S/2; the third pair, adjacent in relation to the 3d side of the base at a distance 3T- S/2 , the forth pair at a distance 4T -S/2

6. A folding container as claimed in claim 2 where to each short fixed cylinder is mounted an upper unit of same shape that can be unfolded in a vertical position thereby forming with the lower part a lateral cylindrical support whose height does not exceed the height of the container when assembled.

7. A folding container as claimed in claim 2 and 5 in which the upper cylinder lower end (fig.5) is of diameter less than that of the short fixed cylinder; this end fits into a corresponding female cavity in the short cylinder. This end is as well **characterized by** a having a short slot running along the length of cylinder. A short bar, running horizontally is fixed to two opposing wings support fixed to the top end on the short fixed cylinder and co-operates with the slot in such a way that the upper cylinder and the short portion fixed to the base form one combined and disjoint unit allowed to move from a folded position where the upper portion lies parallel to the base of the container to an unfolded one in which it is mounted on top of the short portion.

8. A folding container as in claim 1 and 3 and in which four side panels, which can be of equal height, each posses along its side edges a guide slot that is terminated at each end (fig.3).

9. A folding container as claimed in claim 3 and 8 where each side panel is mounted to two adjacent short cylinders each a different horizontal plane and each in correspondence with a pair of pins as claimed in claim 2 and 4. The pins, fitted in the lateral guide slots in such a way that the panel is allowed both to rotate in a vertical position and to slide along an horizontal plane out or in from its original position.

10. A container as claimed in Claim 4 and 7 , in which detent means or other mechanisms are provided on the the side support cylinders to secure each panel when unfolded, in an vertical position to the same support cylinders during assembling.

11. A container as in claim 8 and 9 wherein the side panels when in the unfolded state in which they lie parallel to the base plan can be either first slid out from their unassembled position (fig. 11) and then rotated up and inward or are rotated from the inside out (fig.9) and up in a vertical position.

12. A folding container as in Claim 10 and 11 wherein each of the side panels to be unfolded, once in a vertical position , is slid down so to juxtapose the base panel (fig.10); it is then releasably secured in this position to the upright side members.

13. A folding container as claimed in claim 8 where the first of the side panel to be unfolded, or the back panel, is unfolded by rotation from the inside out and mounts in correspondence to each of its sides edges toward the top if seen when in a vertical position, 2 bars secured to the panel edges by a screw positioned toward the lower end of the bar (fig.14).

14. A folding container as claimed in claim 13 where each bar extend above the top end of the panel and mount a pin of circular shape facing the correspondent pin of the opposing bar along the direction of the upper edge of the panel. The bar is allowed a short rotational movement out toward the outside face of the panel.

15. A container as claimed in Claim 1 in which a cover panel present along each of its side edge a slot that is terminated at each end.

16. A folding container as claimed in claim 14 and 15 where the cover panel is mounted in correspondence with the 2 pins (fig.15) and is allowed to slide along the length of the slot guide where the panel is retained within the bars by the close ends and the pins.

17. A folding container as claimed in claim 16 where the cover panel is allowed to slide from an assembled position in which it lies parallel to the back panel to a close position in which it lies on top of the side

panels closing the container (fig.17).

18. A folding container as in claim 1, in which the base panel , the upright supports, the side panels and the cover panel can be formed as one unit of combined parts.

19. A container as claimed in claim 1 in which the panels are formed from metal or plastics sheet material.

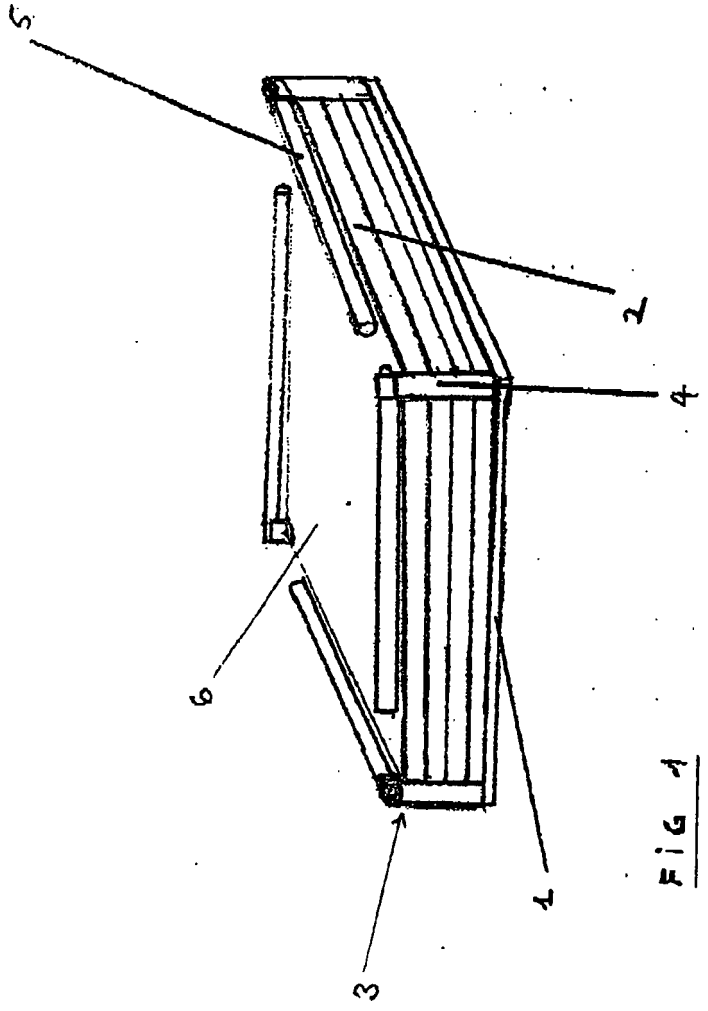
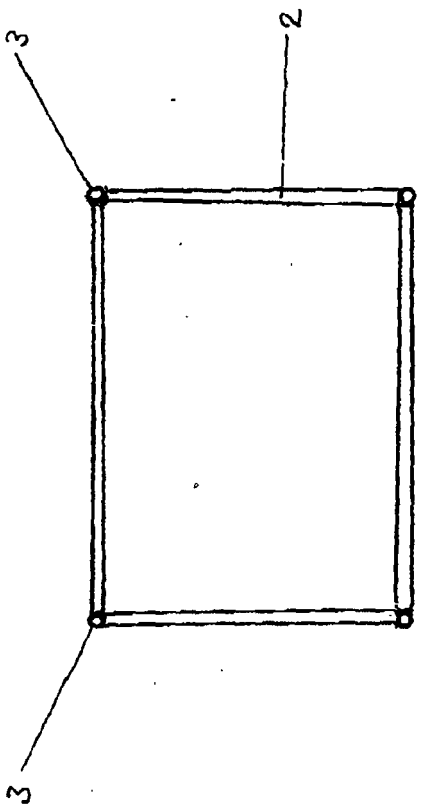


FIG 1

FIG.2



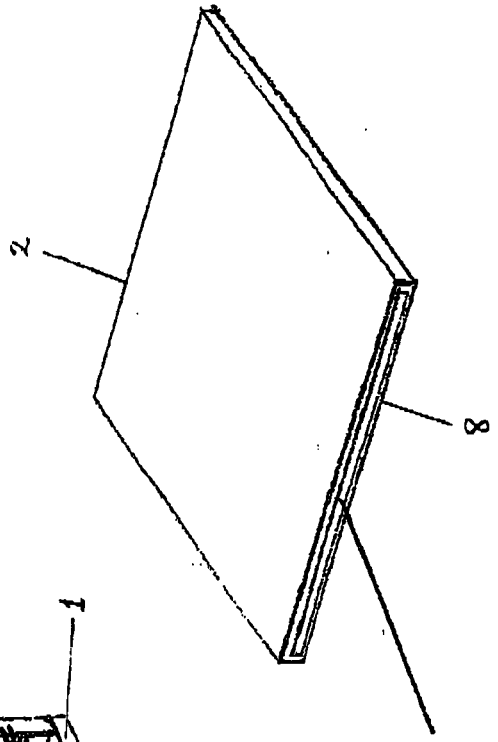


Fig 3

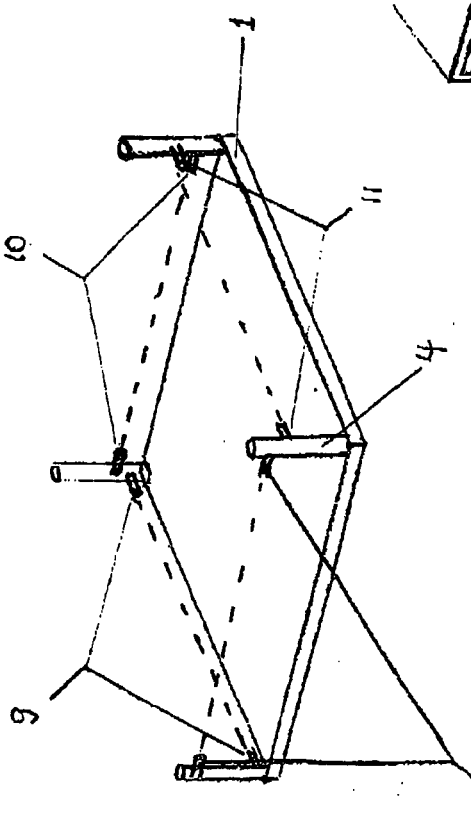


Fig 4

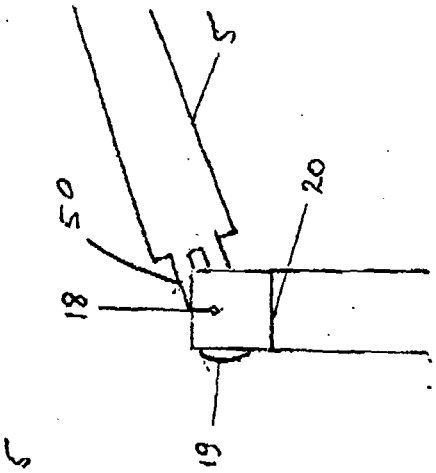


Fig 7b

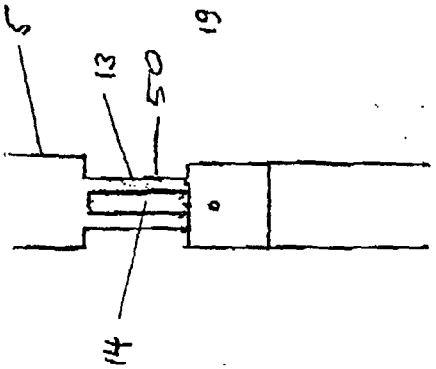


Fig 7a

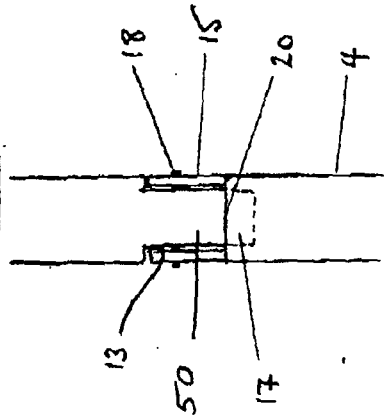


Fig 6

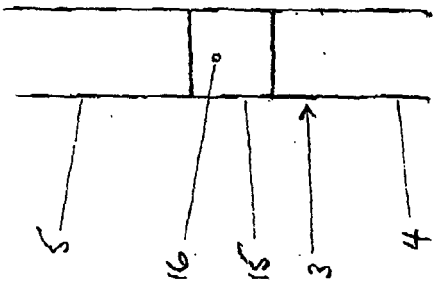
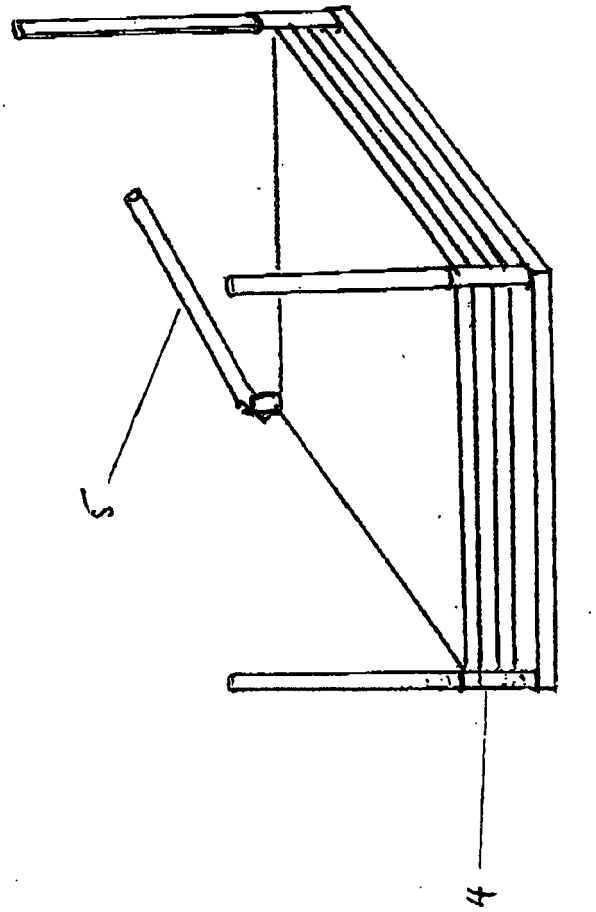


Fig 5

FIG. 8



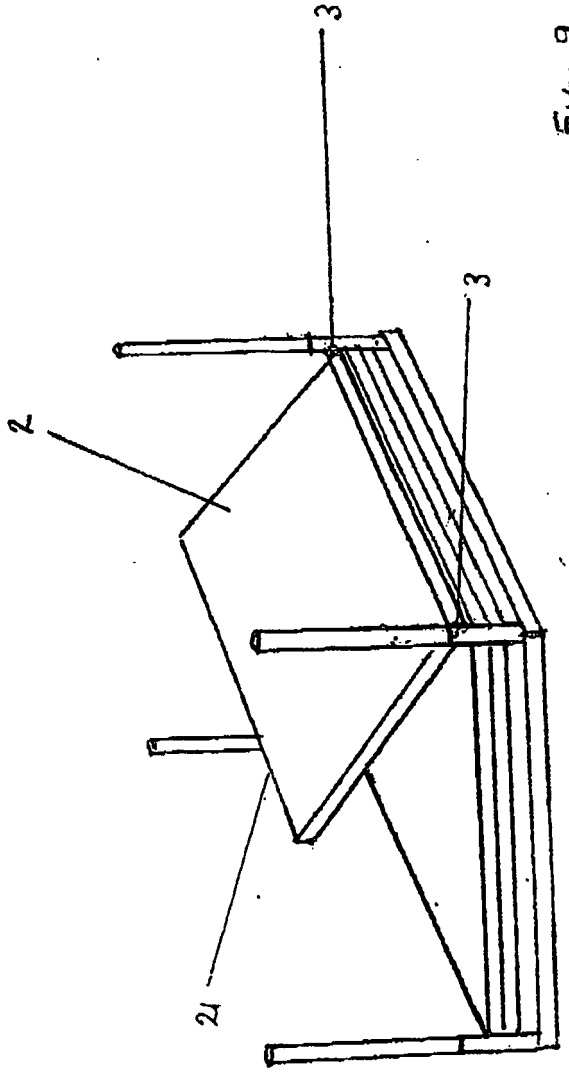


Fig. 9

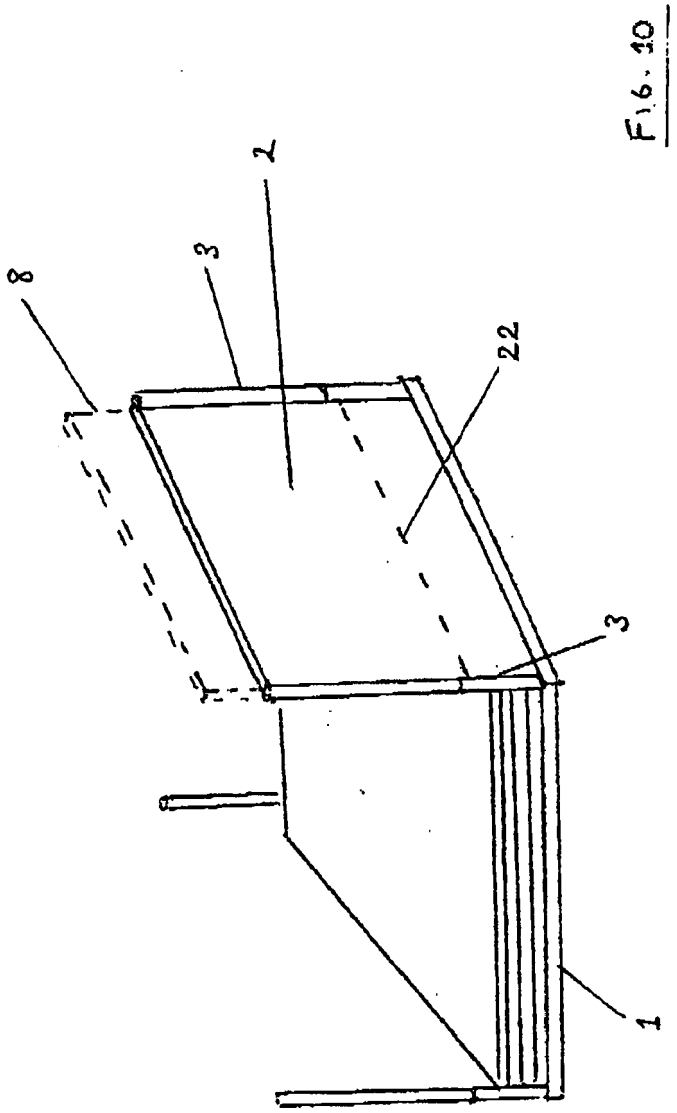
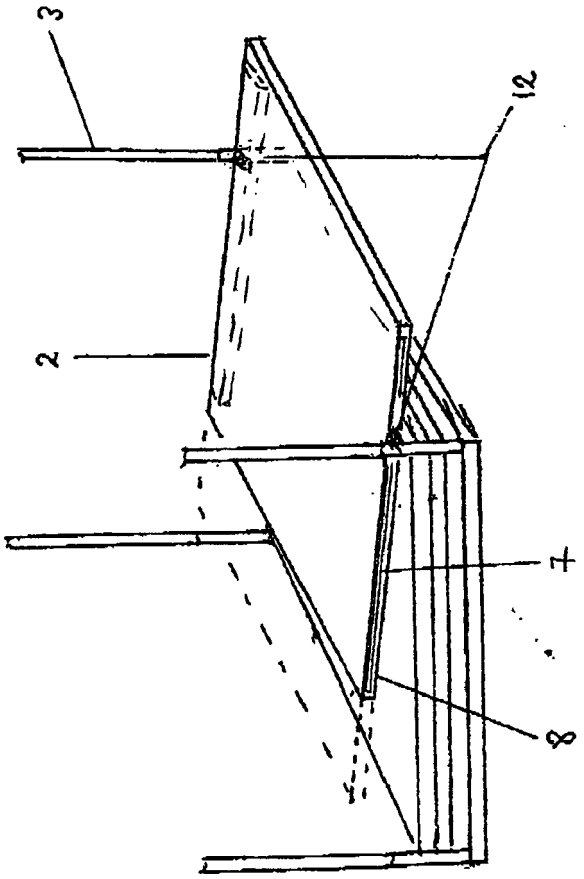


FIG. 10

FIG. 11



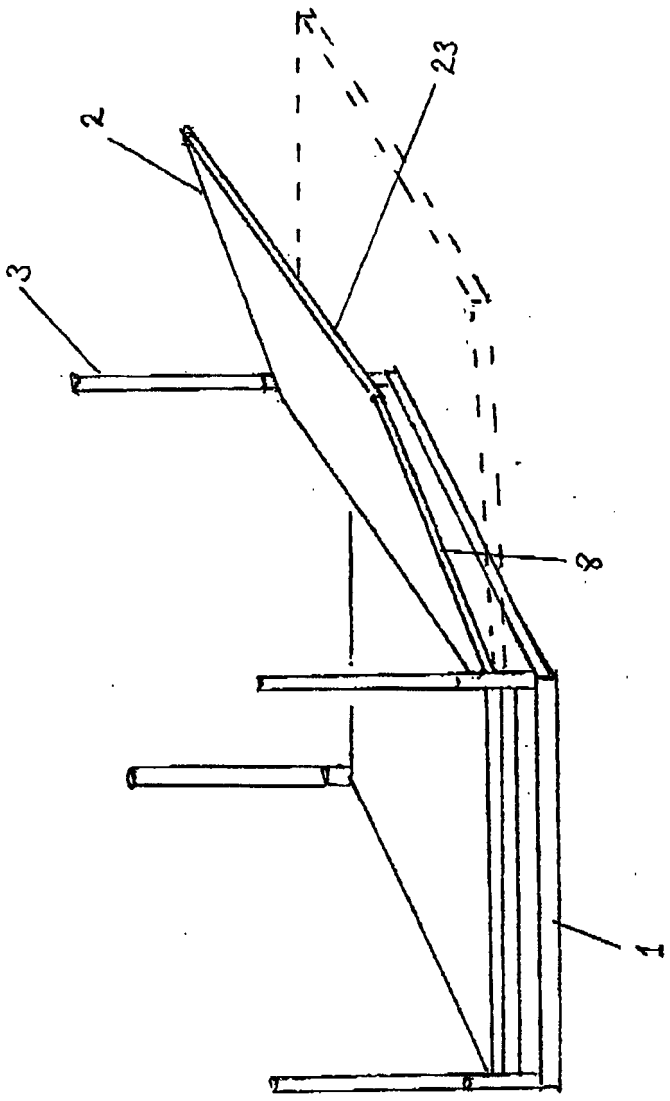


FIG. 12

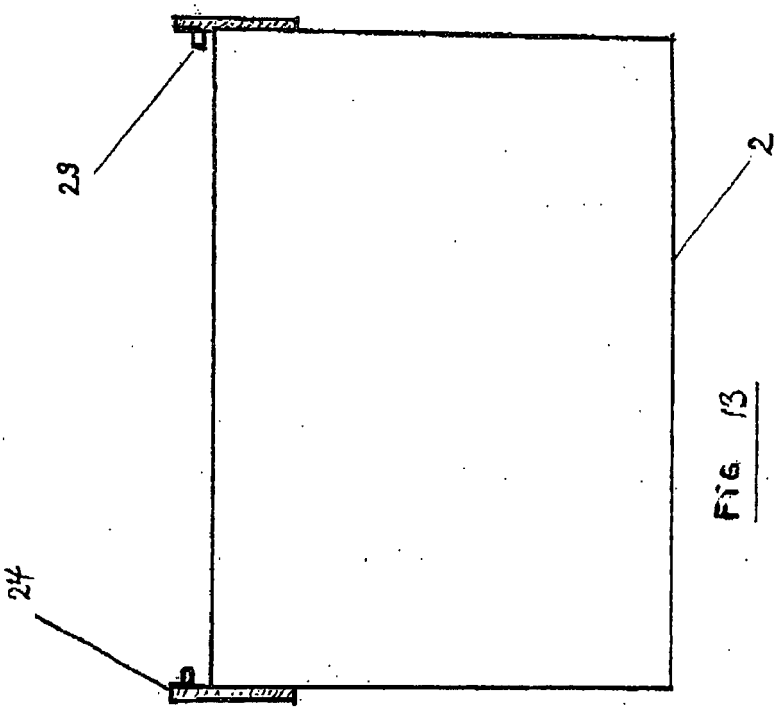


FIG 13

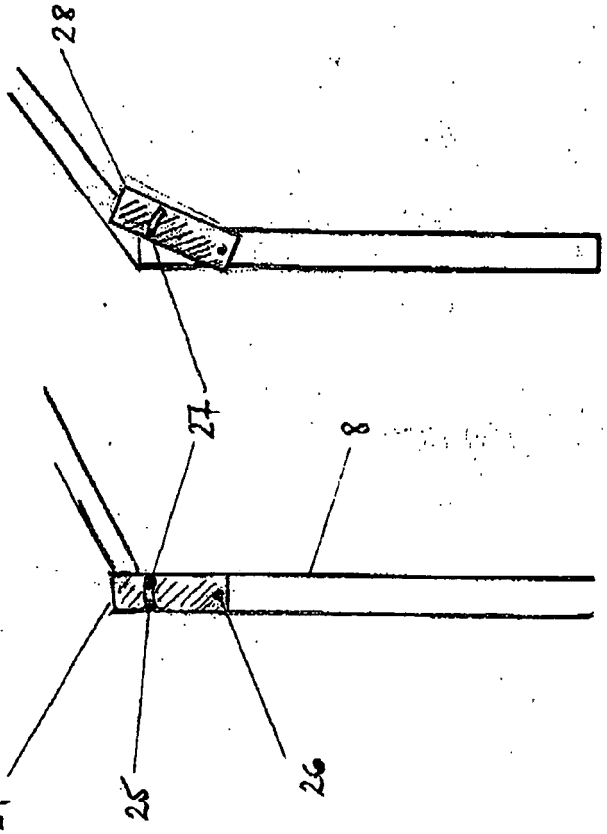


FIG 14b

FIG 14a

FIG 15

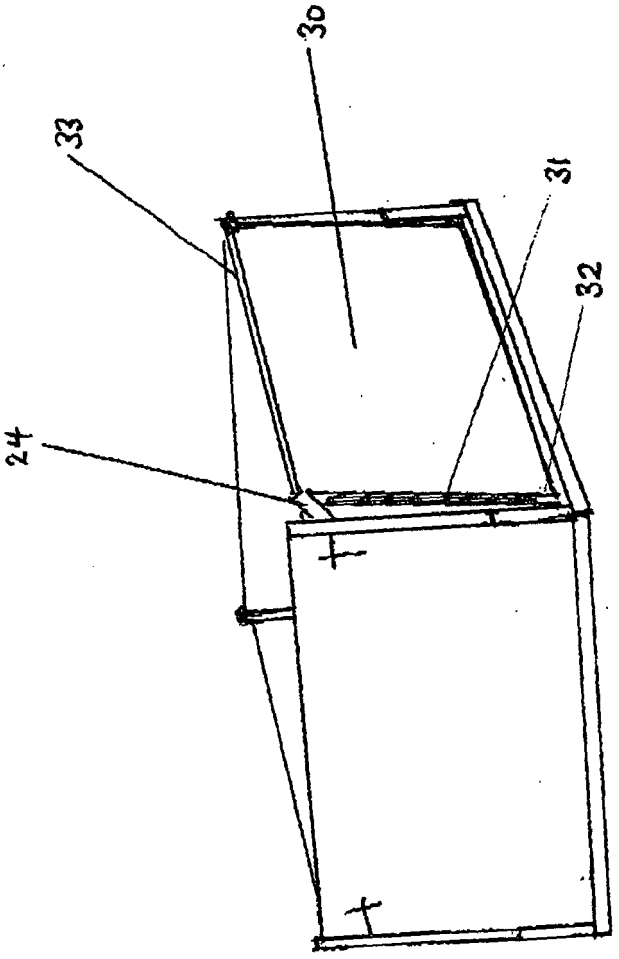


FIG. 16

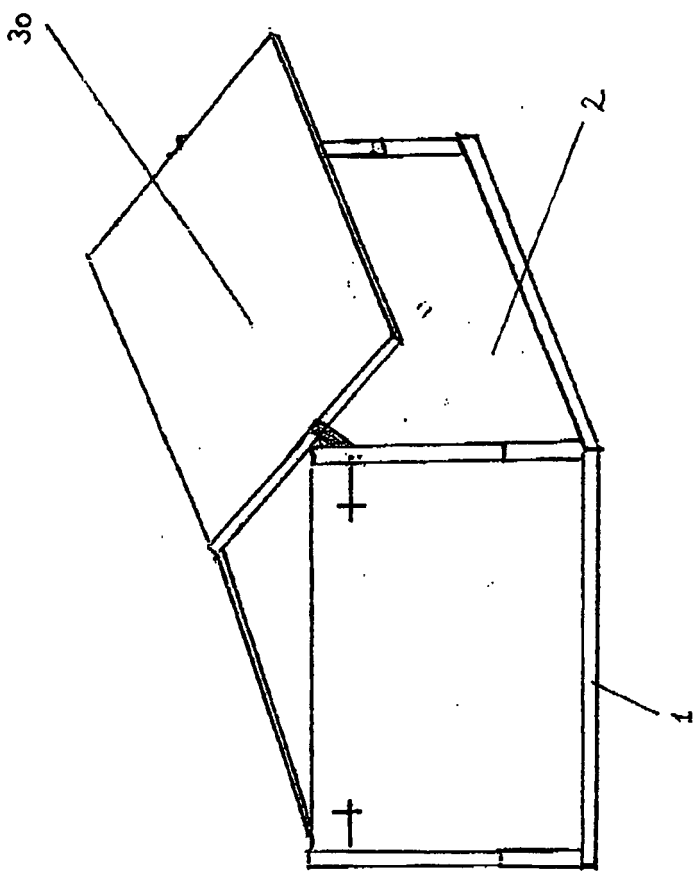
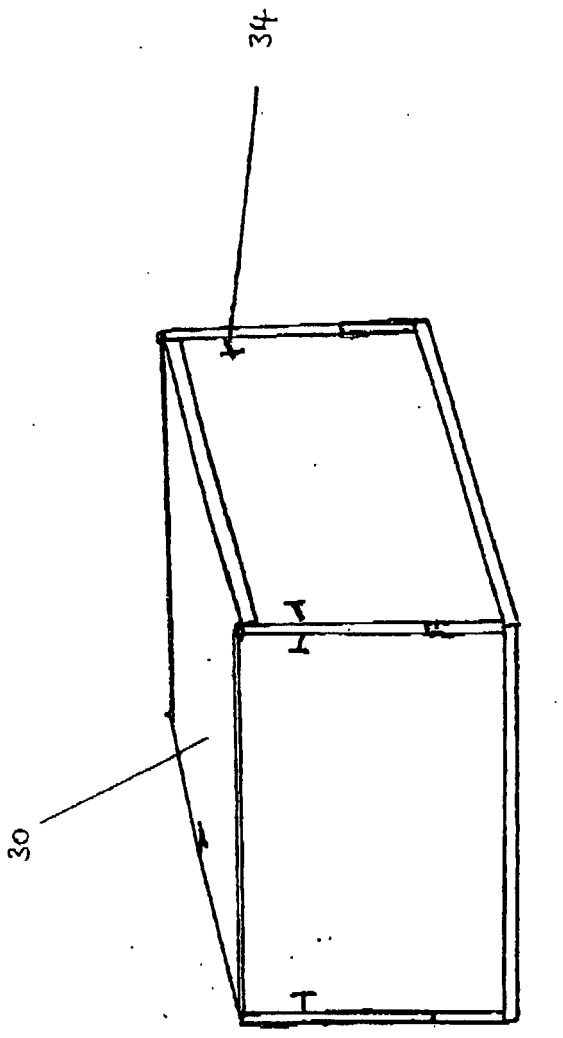


FIG 17



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EUROPEAN SEARCH REPORT

Application Number
EP 05 02 5735

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	13 December 2006	Visentin, Mauro

CATEGORY OF CITED DOCUMENTS

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