United States Patent

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[72] Inventor **Wolfgang Erhard Friedrich**
Bieber Kamp 31, Lendringsen, Germany

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[54] **COLLAPSIBLE BOX**
7 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **220/6**
[51] **Int. Cl.** **B65d 7/24**
[50] **Field of Search** 220/6

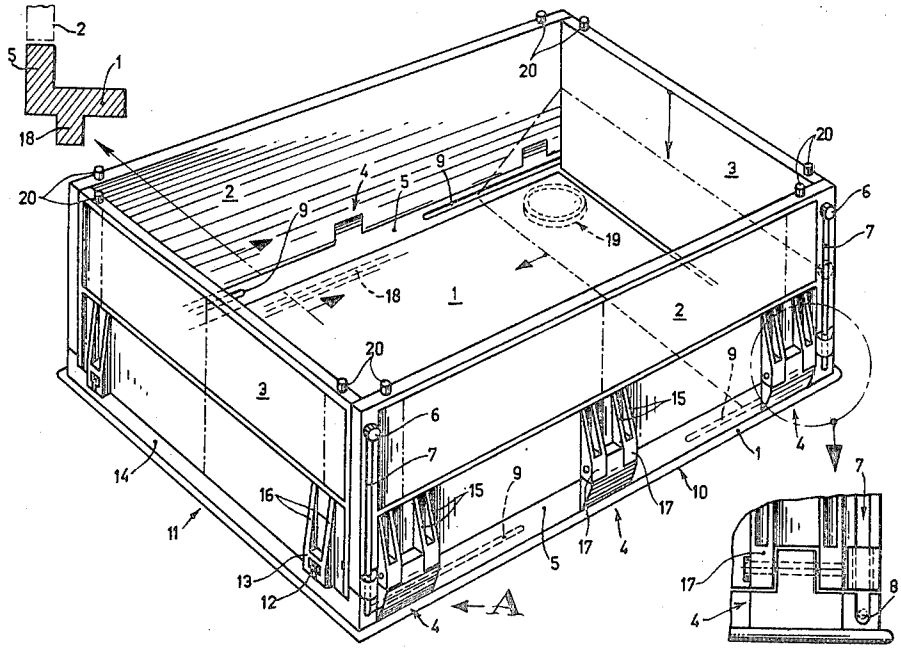
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Primary Examiner—Lloyd L. King
Attorney—Edmund M. Jaskiewicz

ABSTRACT: A collapsible box comprising a bottom plate, two inwardly folding sidewalls and two inwardly folding end walls, in which the sidewalls are connected by hinges to upstanding ridges of the bottom, whereas the edges of the end walls have pegs near the upper ends and pins near their lower ends, which pegs engage in vertical slots along the edges of the sidewalls, whereas the pins engage in horizontal grooves in the upstanding ridges of the bottom plate.



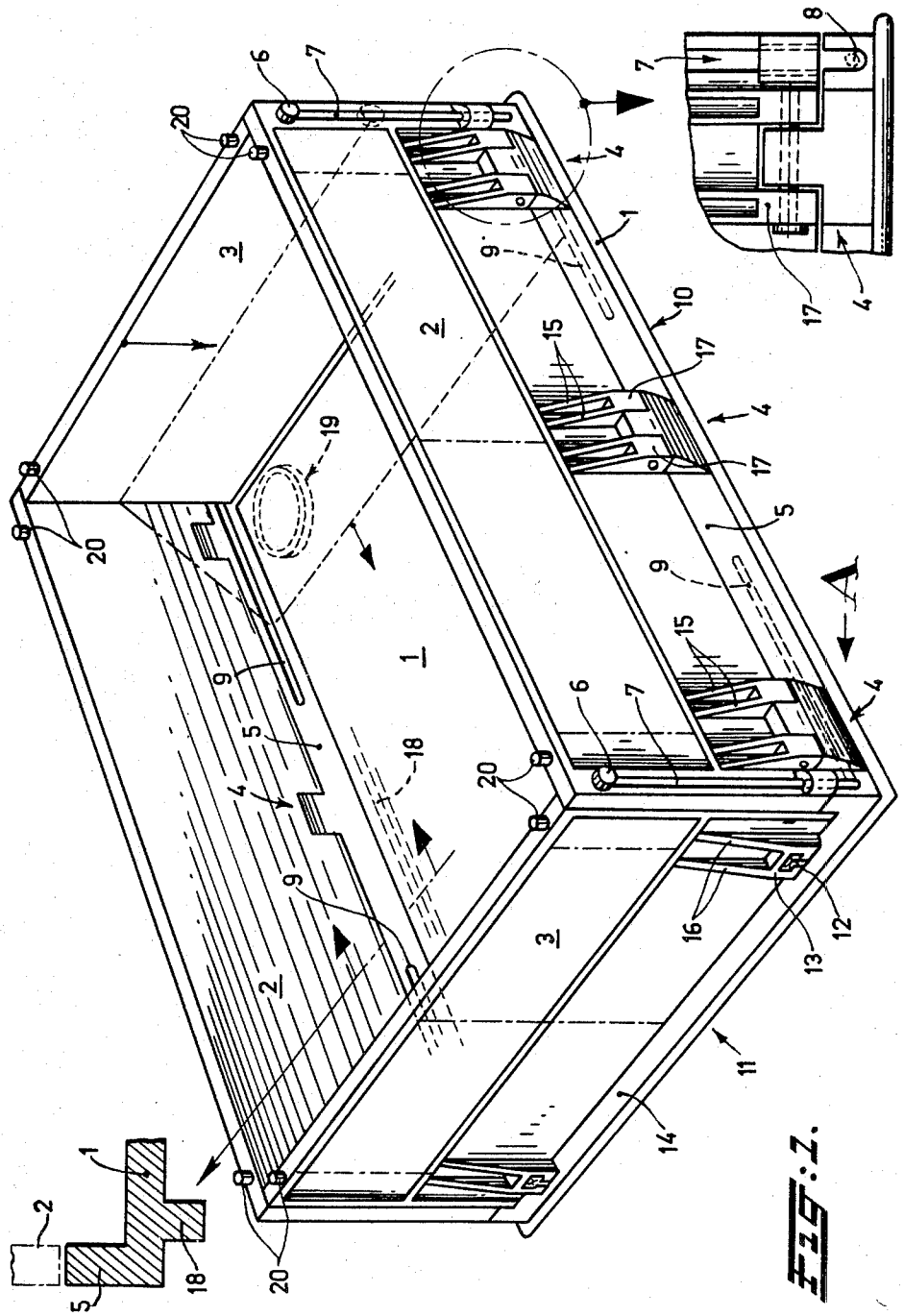


Fig. 2.

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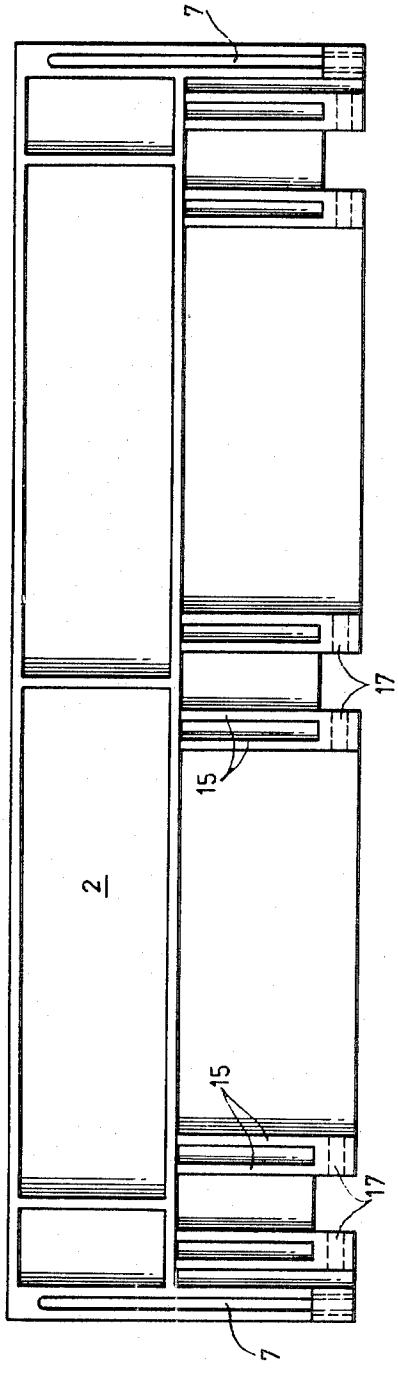


FIG. 2.

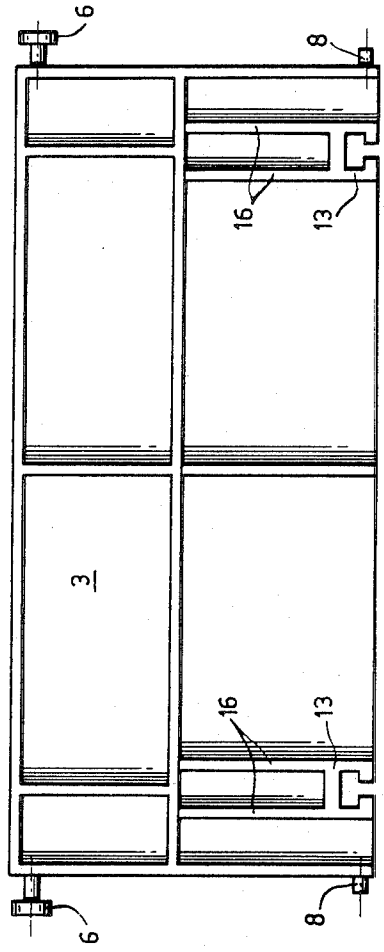
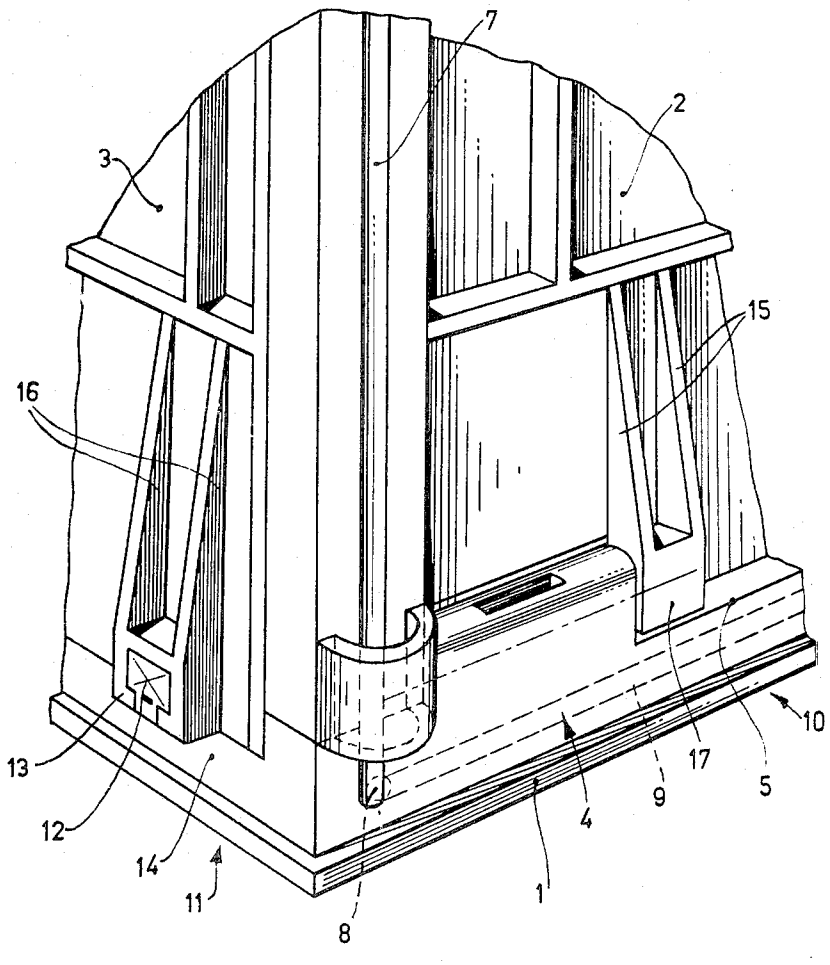


FIG. 3.

Fig: 4.



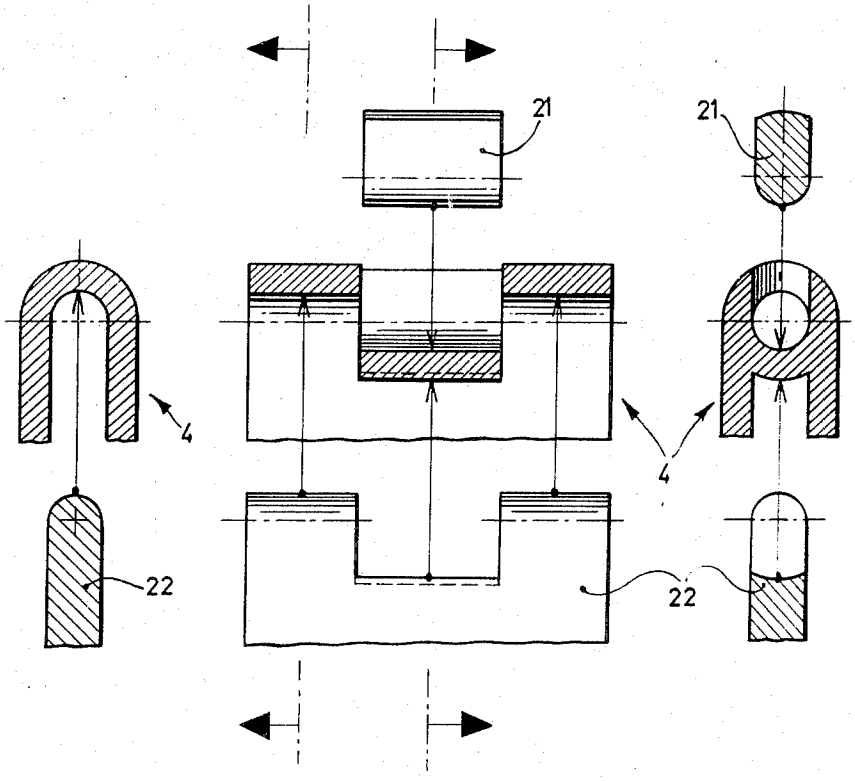


Fig: 5.

COLLAPSIBLE BOX

This invention relates to a collapsible box. Several embodiments of collapsible boxes are known for saving freight space when shipping empty boxes. These collapsible boxes essentially comprise a plate-shaped bottom, tow folding sidewalls and two folding end walls with guiding and connecting means.

In an known embodiment of a collapsible box, the sidewalls and the end walls are connected to the bottom by hinges and fold outwardly. The guiding and connecting means comprise pegs at the end walls which cooperate with arcuate slots in the sidewalls. This box, however, has several disadvantages. Since the end walls and sidewalls fold outwardly, the collapsed boxes require a substantially larger floor area than when they are ready for use. Thus, collapsed empty boxes cannot be stacked alternately with filled boxes. Moreover, erecting the sidewalls and end walls and assembling the guiding and connecting means requires a number of operations which cannot easily be performed by one person.

In another known collapsible box, the end walls and the sidewalls fold inwardly. The guiding and connecting means of this box comprise pegs at the end walls which cooperate with arcuate slots in the sidewalls, which slots extend into two upstanding ridges of the bottom, whereas the pegs remain in the slots in all positions of the sidewalls and end walls. The connection of the sidewalls to the bottom is at a higher level than the hinge axis of the end walls. This box is satisfactory as to its function, but its production is difficult, especially when it is to be moulded from a synthetic resin.

It is an object of the invention to provide a collapsible box of the latter type, which has such a structure that it can easily be produced, whereas its function remains unimpaired.

In a collapsible box, especially for shipping fruit and vegetables, comprising a plate-shaped bottom, two inwardly folding sidewalls and two inwardly folding end walls, in which the sidewalls are mounted by hinges to two upstanding ridges of the bottom, whereas guiding and connecting means comprising hammer shaped pegs are provided at the upper part of the end walls, the object of the invention is obtained by providing vertical slots at the ends of the sidewalls, which slots extend into the upstanding ridges of the bottom, whereas the hammer shaped pegs of the end walls protrude through said slots, and the upstanding ridges have horizontal grooves engaged by a pin shaped guiding means protruding from the lower part of the end walls, the transverse edges of the bottom plate being provided with stops cooperating with stops of the end walls in the erected position of the box.

Several embodiments of the box according to the invention are possible. Especially if the box is used for shipping fruit, it is advantageous to provide the bottom with four upstanding ridges along its edges, the ridges along the longitudinal edges of the bottom being higher than the ridges along the transverse edges of the bottom. Thus there is a ridge all around the bottom so that juice which may be squeezed out of the fruit, cannot flow out of the box. If the box is used for shipping dry materials, a ridge all around the bottom is not necessary and no ridges will be provided at the transverse edges, which makes it possible to have a lower stacking height of the collapsed box.

As to production requirements it is advantageous that the hinges for attaching the sidewalls are unitary with the upstanding ridges. The sidewalls may be provided with reinforcing ribs, the outer ends of which are formed to hinge elements. Also the end walls may be provided with stiffening ribs, the lower edges of which are shaped as stops.

For obtaining an easy stacking of the box, the bottom can be provided with a shoulder for engaging the upper edges of the next lower box. The stacking can also be improved by moulding rings on the underside of the bottom, which rings engage protrusions of the upper edges of the sidewalls and end walls of the next box.

The invention provides the advantage that hinges need only be provided for attaching the sidewalls to the upstanding ridges of the bottom. Moreover, arcuate, T-shaped or dovetail shaped slots are not necessary. Thus, a box is obtained which can easily be produced without impairing its function.

The invention will be further illustrated with reference to the accompanying drawing.

FIG. 1 is a perspective view of a box according to the invention.

FIG. 2 is a front view of a sidewall.

FIG. 3 is a front view of an end wall.

FIG. 4 shows another embodiment of the part of the box indicated by the arrow A in FIG. 1.

FIG. 5 is a diagram of the advantages obtained by the embodiment of FIG. 4, on the base of a drawing of a hinge on a larger scale.

The collapsible box according to the invention comprises a plate-shaped bottom 1, two sidewalls 2 and two end walls 3. The sidewalls 2 and the end walls 3 can be folded inwardly. The sidewalls 2 are connected by hinges 4 to two upstanding ridges 5 of the bottom 1. The box comprises guiding and connecting means for keeping the parts of the box in the desired position when in use.

The upper part of the end walls 3 carries hammer-shaped pegs 6, which protrude through vertical slots 7 provided at the end of the sidewalls 2. The lower part of the end walls 3 carry pin-shaped guiding means 8 which engage in horizontal grooves 9 provided in the upstanding ridges 5 of the bottom 1. Finally, the transverse edges 11 of the bottom 1 carry stops 12 which engage stops 13 on the end walls 3 when the box is erected.

The transverse edges 11 of the bottom 1 also carry upstanding ridges 14, so that there is an upstanding ridge all around the bottom. The ridges 5 along the longitudinal edges 10 of the bottom are higher than the ridges 14 along the transverse edges 11 of the bottom 1.

The box according to the invention can be easily manufactured when, as shown in the drawing, the hinges 4 for the sidewalls 3 are moulded unitary with the ridges 5. The sidewalls 2 carry reinforcement ribs 15, the lower ends of which are shaped as hinge elements 17, whereas the end walls 3 carry reinforcement ribs 16, the lower ends of which are shaped as stops 13. It is also possible, see FIG. 4, to shape the lower ends of the lateral, reinforced edges, of the slots 7 as hinge elements.

FIG. 5 shows an embodiment of the hinges 4 which has advantages in the manufacture. As shown in FIG. 5 the hinges can be moulded unitary with the bottom plate by using core pieces 21, 22 in the mould so that no subsequent drilling is necessary. The hinge elements 17 can be moulded in the same way.

Finally, the underside of the bottom 1 is provided with a shoulder 18 which follows the interior shape of the erected box. Also, rings 19 may be moulded under the underside of the bottom 1, so as to engage protrusions 20 of the upper edges of the sidewalls 2 and end walls 3 of the boxes when stacking. Preferably, all parts of the box are moulded from a synthetic resin.

What I claim is:

1. Collapsible box, especially for shipping fruit and vegetables, comprising a plate-shaped bottom, two inwardly folding side walls and two inwardly folding end walls, the sidewalls being connected by hinges to two upstanding ridges of the bottom, whereas the upper part of the end walls carry guiding and connecting means which are formed by hammer-shaped pegs extending through vertical slots in the end parts of the sidewalls, said slots extending into the upstanding ridges of the bottom, said upstanding ridges being provided with horizontal grooves engaged by pin-shaped guiding means extending from the lower part of the end walls, the top edges of said end walls sliding vertically downwardly and the bottom edges thereof sliding horizontally inwardly when collapsing the box, the transverse edges of the bottom carrying stops which cooperate with stops of the end walls when the box is erected.

2. Box according to claim 1, in which the bottom carries four upstanding ridges which follow the four edges of the bot-

tom, the ridges of the longitudinal edges of the bottom being higher than the ridges of the transverse edges of the bottom.

3. Box according to claim 2, in which the hinges for the sidewalls are moulded unitary with the upstanding ridges.

4. Box according to claim 1 in which the sidewalls carry reinforcement ribs, the lower ends of which are shaped as hinge elements.

5. Box according to claim 1 in which the end walls carry reinforcement ribs, the lower ends of which are shaped as stops.

6. Box according to claim 1 in which a shoulder following the interior contours of the erected box is moulded on the underside of the bottom plate.

7. Box according to claim 1 wherein rings engaging protrusions of the upper edges of the sidewalls and end walls of the next lower box are moulded on the underside of the bottom plate.

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