Aug. 27, 1968 H. J. KENNARD 3,398,850

COLLAPSIBLE CONTAINER UNITS FOR GOODS TRANSPORT

Filed Sept. 12, 1966 3 Sheets-Sheet 1

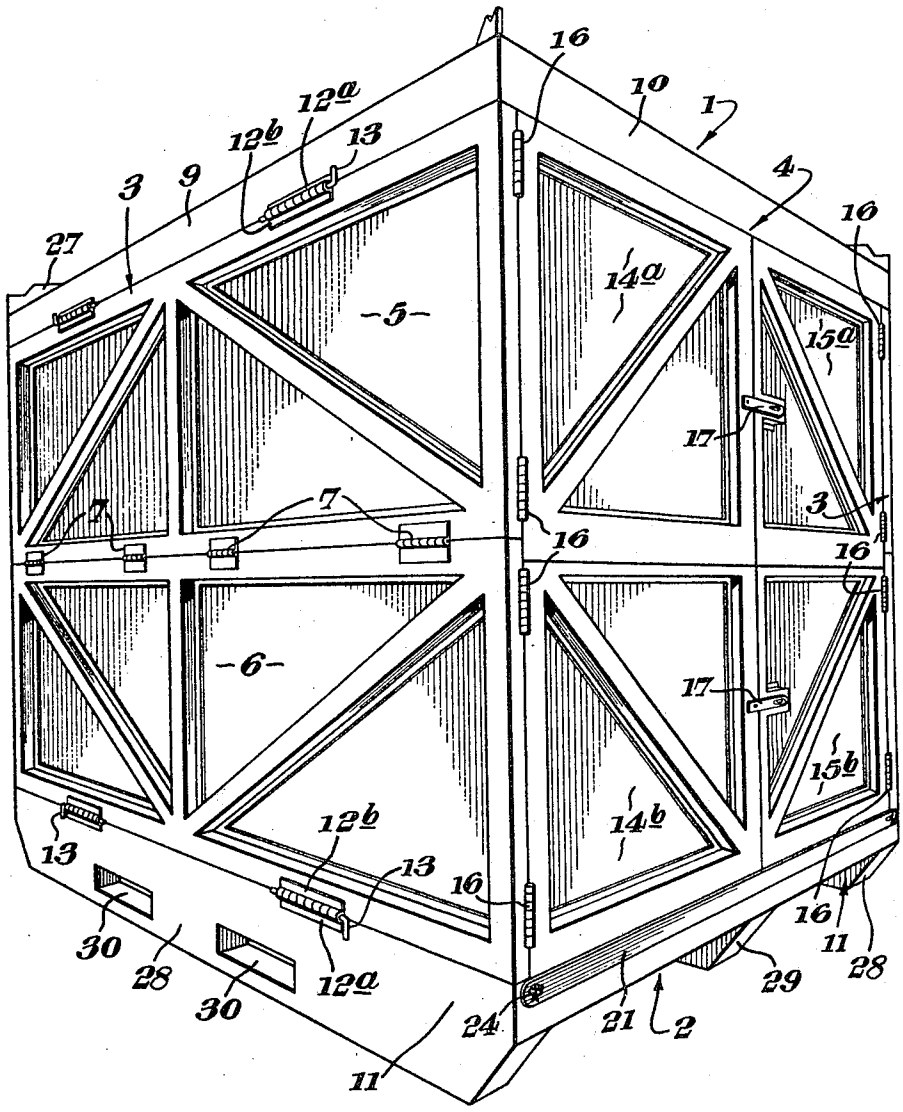


Fig. 1.

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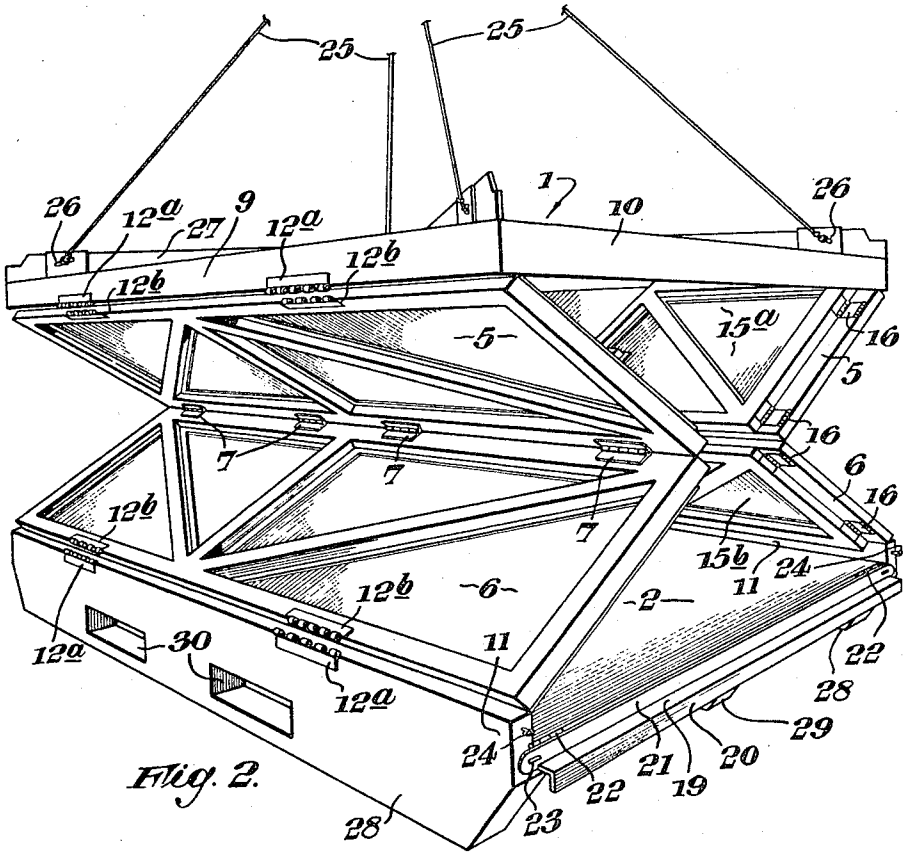


Fig. 2.

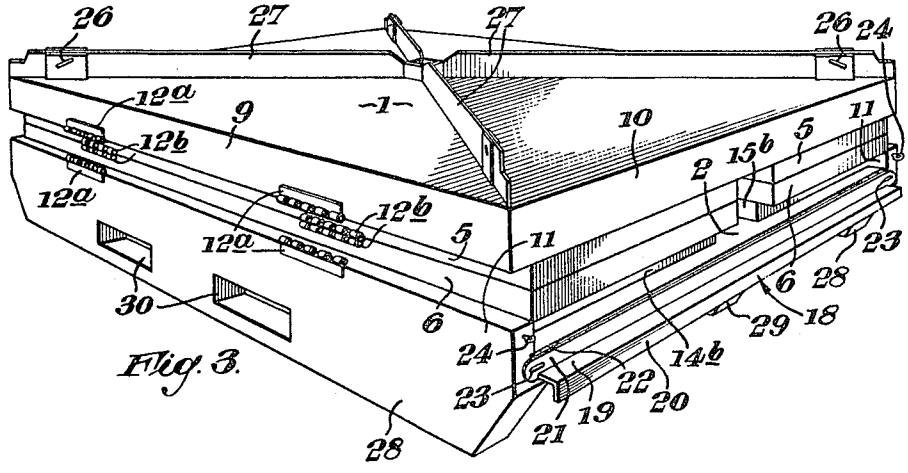


Fig. 3.

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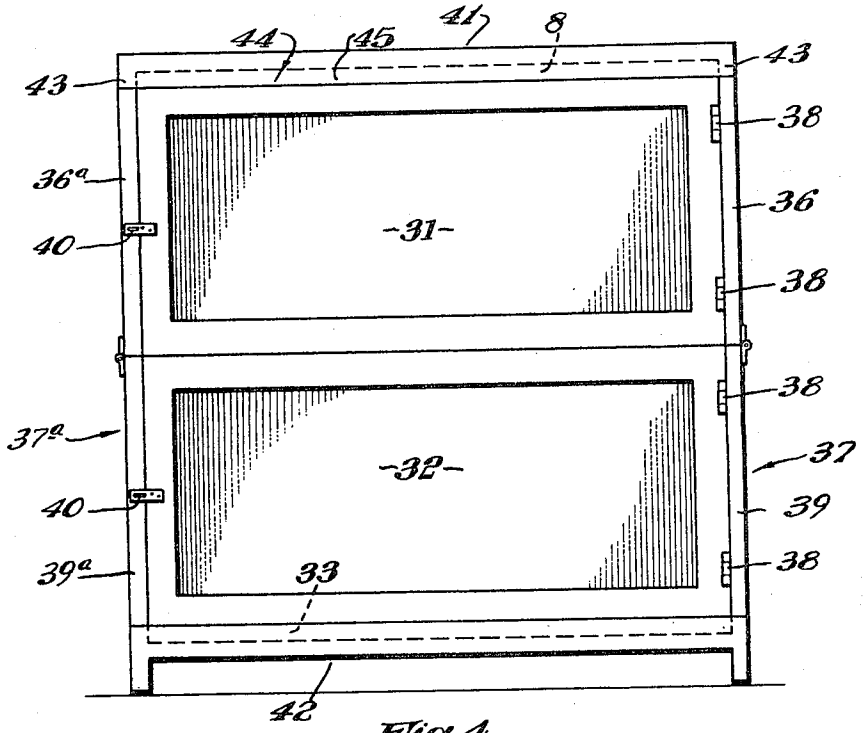


Fig. 4.

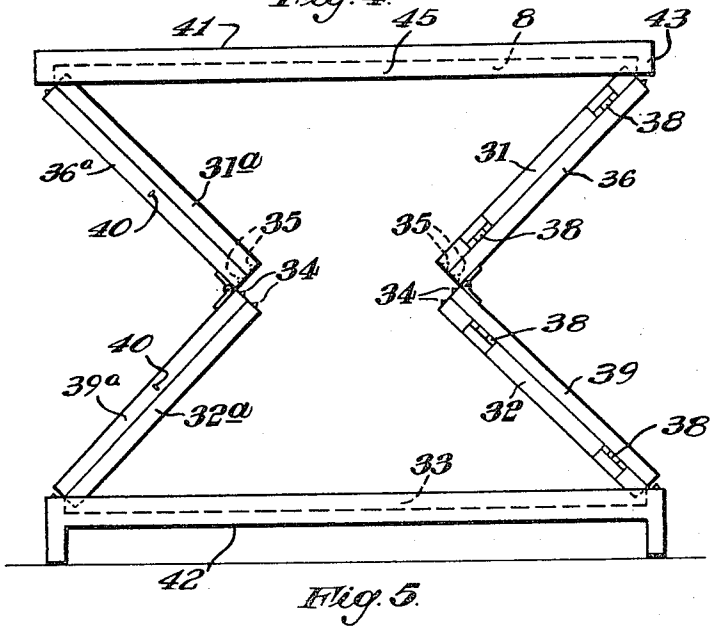


Fig. 5.

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United States Patent Office 3,398,850 Patented Aug. 27, 1968

3,398,850

COLLAPSIBLE CONTAINER UNITS FOR GOODS TRANSPORT

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Filed Sept. 12, 1966, Ser. No. 578,818
Claims priority, application Great Britain, Sept. 13, 1965, 38,984/65; June 22, 1966, 27,835/66
3 Claims. (Cl. 220—6)

ABSTRACT OF THE DISCLOSURE

A collapsible parallelepipedal freight container has a unit top, a unit base, two opposite sides releasably secured at their upper and lower edges to the base and top and each divided horizontally into similar sections secured together by one-way hinges which provide for the sides to be collapsed inwards, and at each end an end wall horizontally divided into two flaps secured by two-way hinges to adjacent end edges of the sides so that the flaps can be out-turned as doors and can be inturned against the sides to permit the container to be collapsed into a compact unit comprising the closely superimposed sides and ends sandwiched between the top and base.

This invention relates to collapsible rectangular-sided units, that is units of parallelepipedal form. It is particularly concerned with containers of such form, for instance for transporting goods, especially of the kind usually employed for continuous passage without unloading the goods in transit between the sender and the ultimate destination and including, wherever necessary, transference between road and/or rail and/or ship. These containers are returnable to sender and, as they are generally of considerable capacity, e.g., of the order of 30 cubic metres or more, they are made collapsible so that the returned empty containers will occupy a minimum space and so reduce freightage. The invention is not restricted to any particular dimension nor to the foregoing use of a container. In another application the unit is employed as a box-form building which can be readily transported to and speedily erected on site for use, for instance, as a contractor's office or workman's shed. For convenience the unit will be generically referred to as a collapsible container.

Existing methods of collapsing and erecting such containers involve a disproportionate amount of time and labour, and the object of the invention is to provide a construction whereby the collapsing and erection is greatly simplified and with economy of time. Moreover it is an object to provide for the collapsed parts to fit together in a very compact manner.

The basis of the invention is a system of easy detachment of the various edges of the walls of the container one from another, and the use of hinged sections comprising some of the walls for folding together and superimposition.

In accordance with the invention, a collapsible parallelepipedal container comprises a unitary top and a unitary base, two opposite side walls each releasably attached at its upper and lower edges to the sides of the top and base respectively and each divided substantially centrally and horizontally into an upper and a lower side section, the side sections being hingedly connected so as to be foldable together by displacing their hingedly connected regions inwardly of the container after detaching the

side walls from the top and base, and two opposite end walls each divided into at least two flap sections, each flap section being hingedly connected by at least one two-way hinge to an adjacent end edge of an upper or a lower side section, whereby each flap section can be folded inward against the inside of a side section, and the container is collapsible into a compact structure comprising, in close engagement, the superimposed upper and lower side sections positioned between the end flap sections above and below the side sections with the top and base respectively above and below and closely adjacent the superimposed side and end flap sections.

Two embodiments of the invention will now be described, by way of example, with reference to the accompanying drawings, wherein:

FIGURE 1 is a perspective view of a fully erected container;

FIGURE 2 is a view of the same container partly collapsed;

FIGURE 3 is a view of the container completely collapsed;

FIGURE 4 is an end view of a modified form of the container, erected; and

FIGURE 5 is an end view of the same container, partly collapsed.

Referring first to FIGURES 1–3, the erected container is of parallelepiped form having a horizontal top **1** and a horizontal base **2** connected together by two opposite vertical side walls **3** and two opposite vertical end walls **4**. Each side wall **3** is divided on a horizontal mid-line into two similar sections, namely an upper section **5** and a lower section **6**, connected externally and on the mid-line by hinges **7**, such that when the upper and lower edges of the side wall are released from the top **1** and base **2** respectively, the upper and lower sections **5**, **6** can break inwardly about the hinges **7**, first folding towards one another (FIG. 2) and finally becoming horizontal with the upper section **5** superimposed on the lower section **6** (FIG. 3). In the erected state the height of each side wall **3** does not exceed the width of the top **1** and base **2** so that in the collapsed condition the folded side walls lie wholly between the side boundaries of the top and base without overlapping of their respective folded edges; in the arrangement shown, in FIG. 3, there is a central gap between those edges.

The top **1** is of inverted tray-like form, a recess in the underside of which is defined by opposite side flanges **9** and opposite end flanges **10**. Each side wall **3** when fully opened out is secured at the top to the lower outside edge of a top side flange **9** and similarly at the bottom to the upper outside edge of an upstanding side flange **11** of the base **2**. The securing means are adapted to provide for speedy detachment and each comprises two hinge plates **12***a*, **12***b* of which, for instance, one plate **12***a* is fastened to the outside of and adjacent the lower edge of a top side flange **9** and the other **12***b* to the outside of and near the upper edge of the upper side section **5**. The adjacent edges of the plates **12***a*, **12***b* have tubular portions adapted to interengage in mutual axial alignment in the erected condition to receive removable hinge pins **13**. A similar arrangement releasably secures the lower edge of the lower side section **6** to the adjacent upper edge of a lower side flange **11**.

Each vertical end wall **4** is divided into four flaps, comprising an upper pair **14***a*, **15***a* and a lower pair **14***b*, **15***b*, each pair meeting and abutting on a vertical dividing line which is central of the end wall, and each pair of upper

and lower doors **14***a*, **14***b* and **15***a*, **15***b* respectively meeting and abutting on a horizontal line which divides the end wall approximately into two halves. At each end, each flap is hingedly connected to the inside edge of an adjacent side section, **5** or **6**, by hinges **16** of the two-way action type to provide for each flap to swing both inward and outward. Thus the upper flaps **14***a*, **15***a* are each attached to an upper side section **5** by two two-way hinges **16** and the lower flaps **14***b*, **15***b* are similarly attached to the lower side sections **6**. In the erected state the flaps **14***a*–**15***b* can be individually swung outward as doors to give access to the interior of the container. The flaps can be closed and held shut by means of fasteners **17**.

A movable door-jamb strip is mounted along the upper edge of each end of the base **2**; this is a horizontal Z-section member **18**, the web of which is at right angles to its flanges **20**, **21**. The outer edge of one flange **21** is shown connected by hinges **22**, **22** to the upper end edge of the base **2**. The length of the web **19** and the other flange **20** is such that they will lie between the side flanges **11** of the base **2**. The ends **23** of the first flange **21** are extended over the ends of the side flanges **11** and each is apertured. For collapsing the container the strip **18** is turned outwardly and downwardly into the position shown in FIGS. 2 and 3, so that the longer flange **21** is vertical against the end of the base **2**, the web **19** extends horizontally outwards from the bottom of the flange **21** and the other flange **20** extends vertically downward from the outer edge of the web **19**. In the erected state the strip **18** has been turned upward about the hinges **22** so that the longer flange **21** is vertical with its ends lying against the ends of the lower side flanges **11** and held there by removable pins passed through eyelets **24**, fixed to the flanges **11** and projecting through the apertures in the ends **23** of the flange **21**. The web **19** is now horizontal within the container with the other flange **20** upright to form the door jamb.

To collapse the container, the top is supported from above by slings **25** secured to eyelets **26** in the ends of diagonal vertical strengthening webs **27** on the top **1**. The lower flaps **14***b*, **15***b* are opened outward to permit the Z-section strip **18** to be turned to the position shown in FIGURE 2, and then the lower flaps are turned inward against the inside of the lower side sections **6** and may be held there by spring clips. The side walls are released from the top and base by withdrawing the pins **13** and their sections are folded inwards, as indicated in FIGURE 2, while the upper flaps **14***a*, **15***a* are turned inward against the upper side sections **5**. The folding of the sides is now continued to the condition of FIGURE 3, there now being on the base **2** two side-by-side compact portions each comprising, in the following order, two end flaps uppermost, an upper side section, a lower side section and, lowermost, two end flaps. Those portions lie within the boundaries of the base with the lower flaps **14***b*, **15***b* in the recess between the side flanges **11**. The top **1** is now lowered on to the compact portions, the upper flaps entering the recess in the underside of the top, and the collapsed assembly may then be secured together in any convenient manner.

The side flanges **11** extend below the base **2** to form side support runners **28** and optionally there may be provided one or more intermediate support runners such as **29**, the runners serving to raise the main part of the base to permit the passing of slings or insertion of fork lifting devices beneath it. In FIG. 1 the support runners **28** are shown formed with apertures **30** so that lifting devices can be inserted therethrough at right angles to the runners.

The modification shown in FIGS. 4 and 5 is similar to that already described except that the end walls are differently sub-divided.

In this case, each end wall **44** comprises two similar flap sections meeting and abutting on a horizontal line centrally of the end wall to provide, at the end shown in FIG. 4, an upper end flap **31** and a lower end flap **32**.

The upper flap **31** is connected to the end edge of the upper side section **36** of one side wall **37** by two-way hinges **38**, and the lower flap **32** is similarly connected to the lower side section **39** of the same side wall **37**. At the other end of the container the upper and lower end flaps **31***a* and **32***a* are similarly connected to the upper and lower side sections **36***a* and **39***a* of the other side wall **37***a*. At their ends opposite to the hinges **38**, fasteners **40** provide releasable connections between the outer ends of the flaps **31**, **32** and the adjacent side wall **36***a*, **39***a*.

To collapse this container the side walls **37**, **37***a* are released from the top **41** and base **42** as previously described and are folded inward as indicated in FIG. 5. The end flaps **31**, **32** at one end are folded inwards against the inside faces of the upper and lower side sections **36**, **39** to which they are pivotally connected; similarly the other end flaps **31***a*, **32***a* are folded inward on to the other side sections **36***a*, **39***a*. Thereafter the folding is continued to a condition similar to that shown in FIG. 3, with the upper end flaps **31**, **31***a* positioned in the recess **8** formed by the downwardly extending side flanges **43** and end flanges **45** in the underside of the top **41** and the lower end flaps **32**, **32***a* in a similar recess **33** in the base **42**.

In both embodiments a fixed door jamb strip may be secured along the end of the tray-like top.

To increase the stability of the erected container, the abutting edges of two parts, for instance upper and lower side sections, may be provided as shown in FIG. 5 with interengaging ribs **34** and grooves **35**. Such ribs and grooves may also be provided on the adjacent edges of upper and lower flaps **31**, **32** and **31***a*, **32***a*. The ribs and grooves may additionally constitute weather sealing means, and/or be frictionally engageable to constitute readily releasable frictional grips. Other means of weather sealing engaging and relatively movable parts may be provided. Also there may be provided other frictional clip devices to hold relatively movable parts, for instance the end flaps and the side sections against which they are folded back, together in readily releasable manner.

All six walls of the container may be internally provided with heat-insulating surfaces to provide a thermally insulated container.

I claim:

1. A collapsible parallelepipedal container comprising a unitary top of inverted tray-like form with downwardly extending side flanges and end flanges defining a recess in its underside, a unitary base with upstanding side flanges, two opposite side walls each releasably attached at its upper and lower edges to the sides of the top and base respectively and each divided centrally and horizontally into an upper side section and a lower side section, the side sections being secured together by one-way hinges so as to be foldable together by displacing their hingedly connected regions inwardly of the container after detaching the side walls from the top and base, and two opposite end walls each divided horizontally into an upper flap section and a lower flap section, the upper flap section being secured at one side edge thereof to an adjacent end edge of an upper side section by at least one two-way hinge, and the lower flap section being secured at one side edge thereof to an adjacent end edge of a lower side section by at least one two-way hinge, whereby each flap section can be folded inward against the inside of the side section to which it is secured and the container is collapsible into a compact structure comprising, in close engagement, the superimposed upper and lower side sections positioned between end flap sections above and below the side sections with the unitary top and unitary base respectively above and below the superimposed side and flap sections, with the upper flap sections in the recess in the underside of the unitary top and the lower flap sections between the upstanding side flanges of the unitary base.

2. A collapsible container as claimed in claim **1**, wherein the upper and lower flap sections at one end of the con-

tainer are secured by the two-way hinges to the side sections of one side wall, and the upper and lower flap sections at the other end of the container are secured by the two-way hinges to the side sections of the other side wall.

3. A collapsible container as claimed in claim 1, wherein at each end of the container each flap section is vertically divided into two similar sub-sections which meet at and abut on the line of division, one of said two similar sub-sections is secured by at least one two-way hinge to an adjacent end edge of a side section of one side wall and the other of said two similar sub-sections is secured by at least one two-way hinge to an adjacent end edge of a side section of the other side wall.

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