

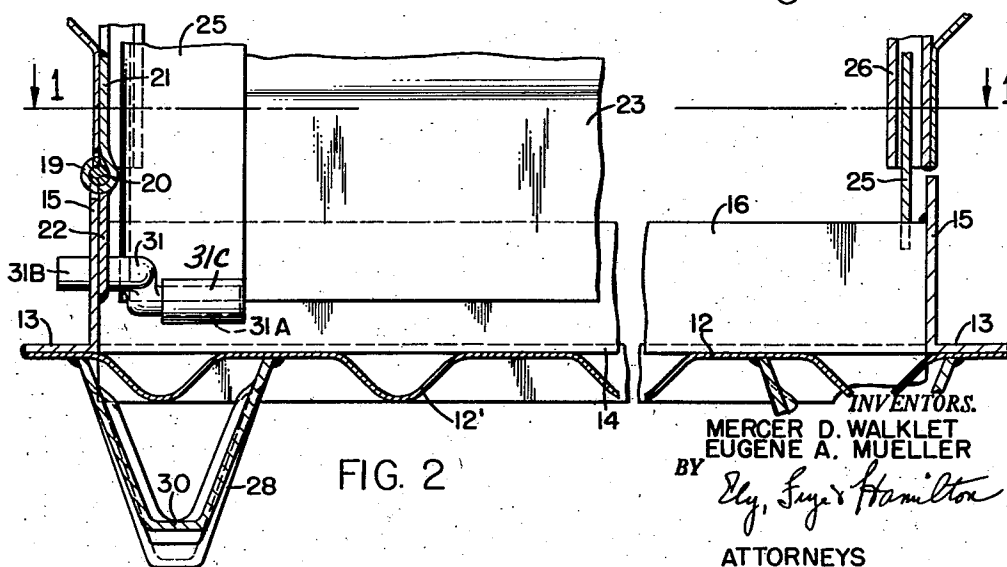
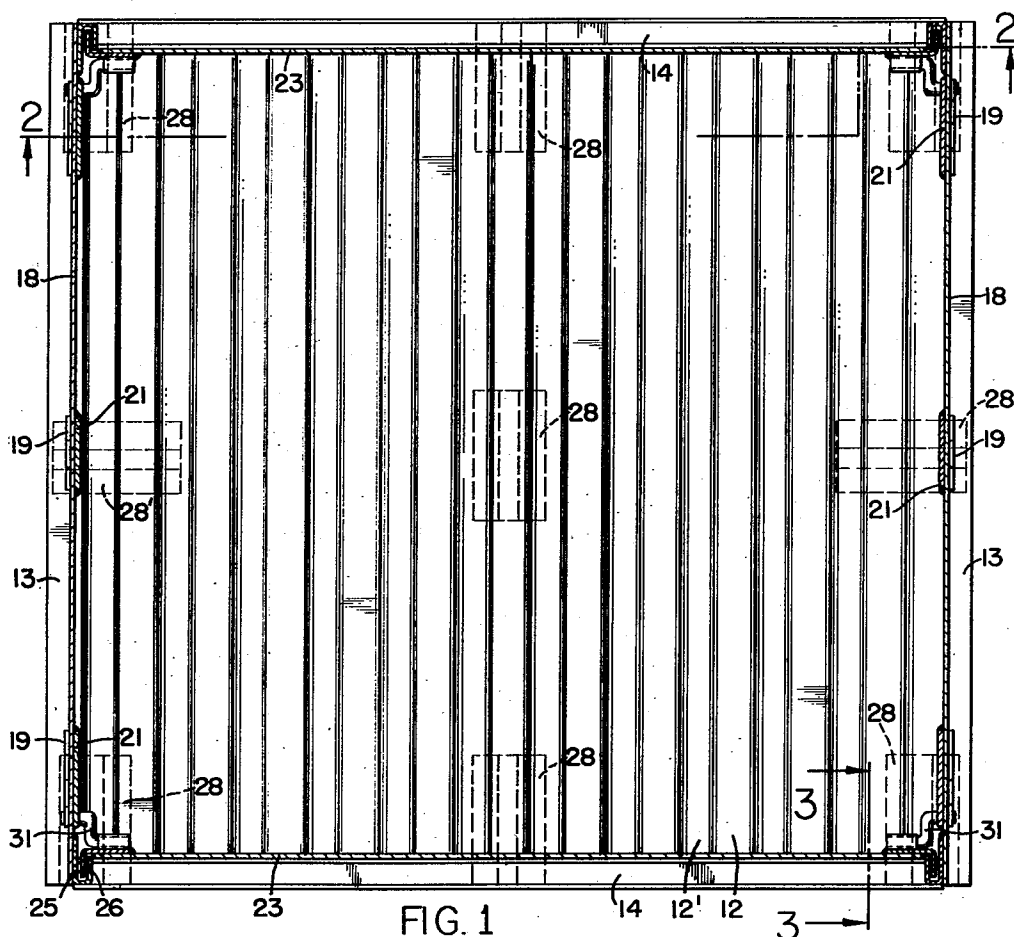
May 28, 1957

M. D. WALKLET ET AL
COLLAPSIBLE SHIPPING CONTAINER

2,793,780

Filed Oct. 21, 1954

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

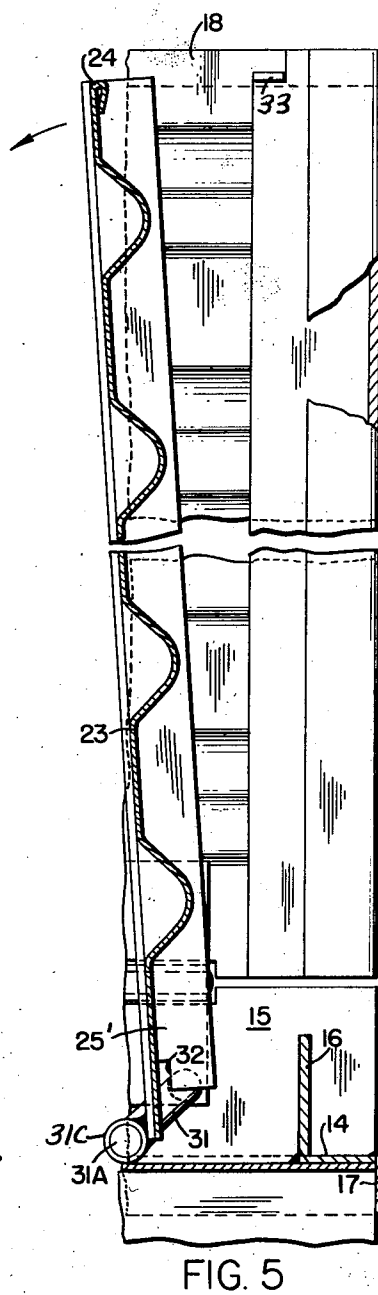
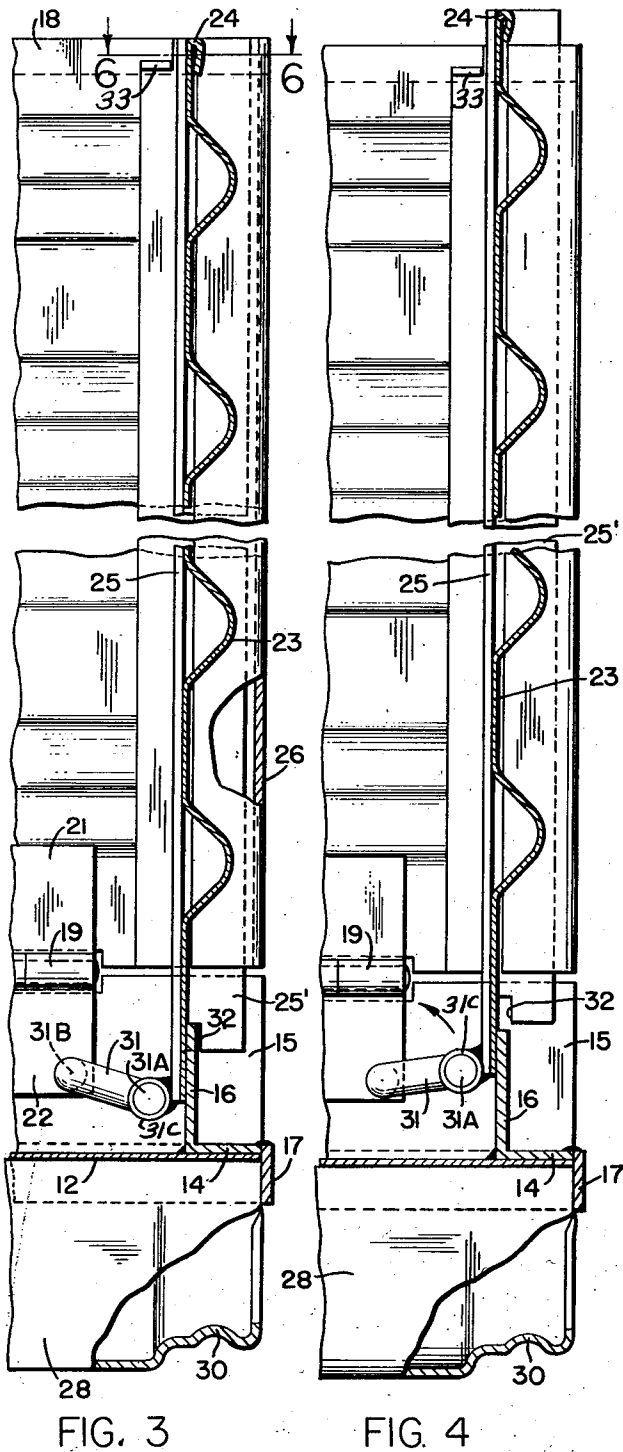


FIG. 5

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4 Sheets-Sheet 3

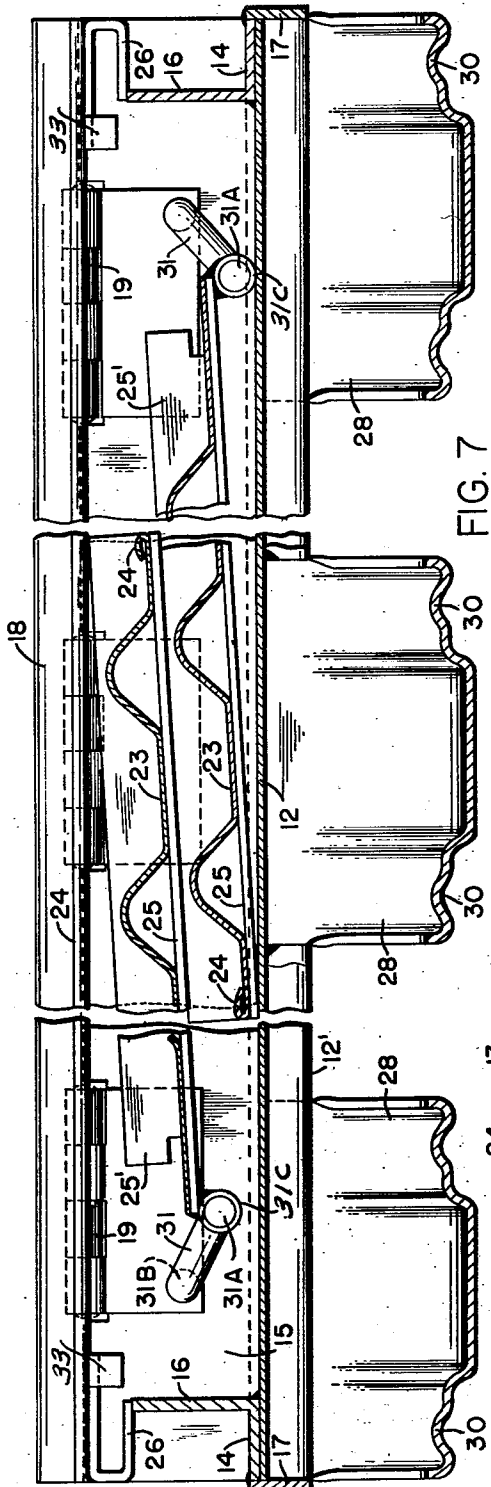


FIG. 7

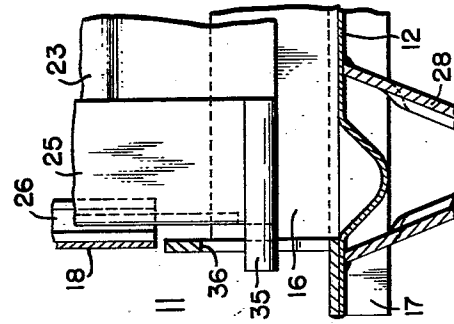


FIG. 11

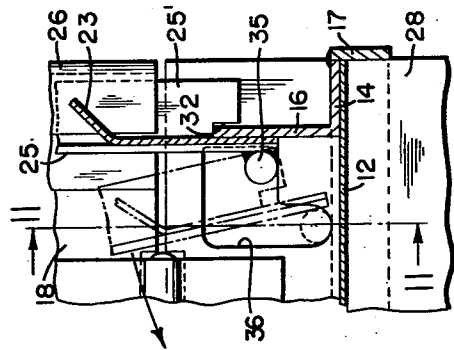


FIG. 10

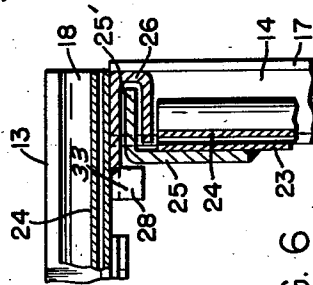


FIG. 6

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4 Sheets-Sheet 4

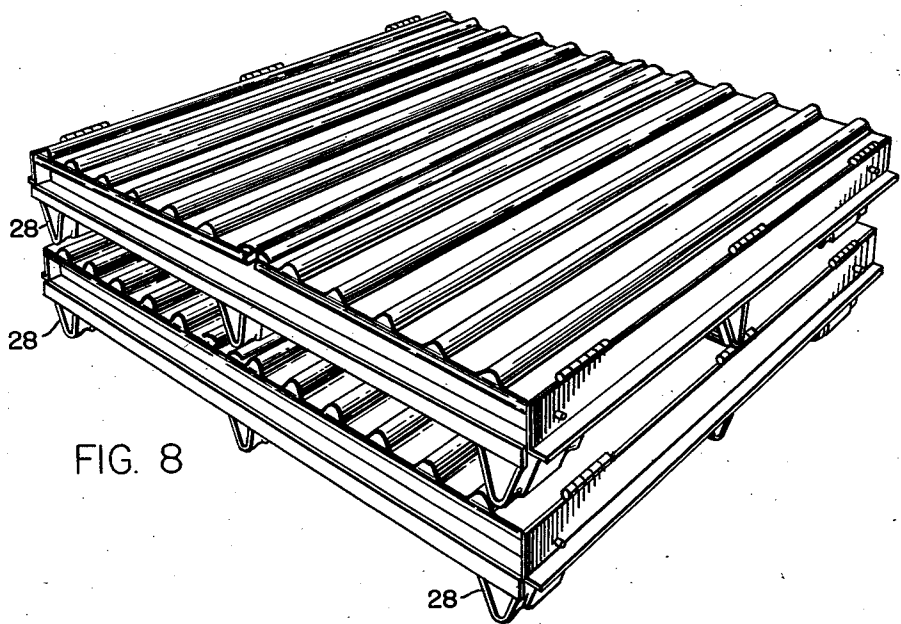


FIG. 8

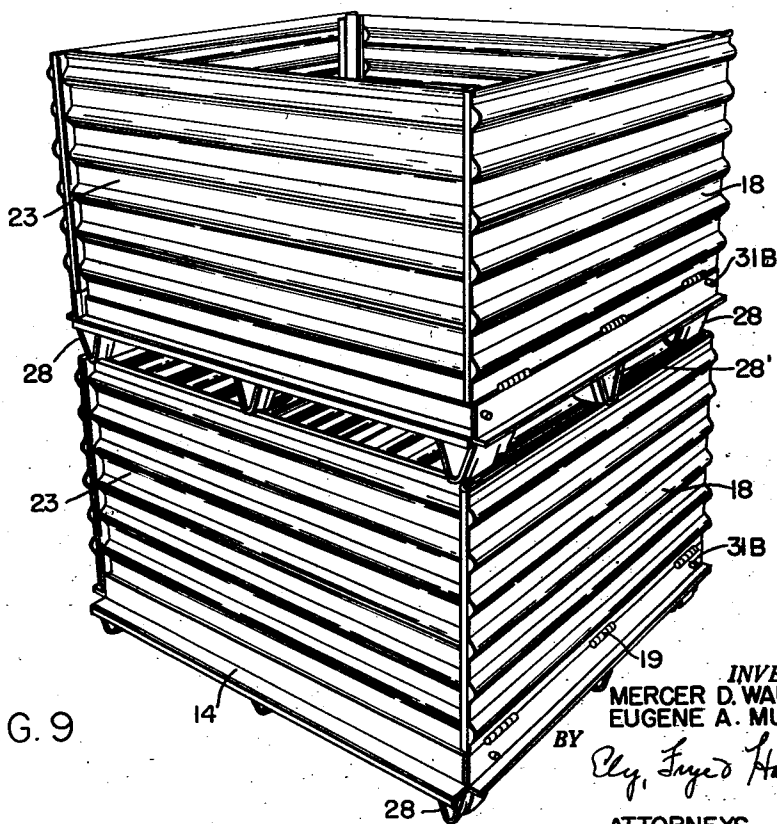


FIG. 9

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COLLAPSIBLE SHIPPING CONTAINER

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10 Claims. (Cl. 220—6)

The invention relates generally to materials handling containers or boxes for handling and shipping quantities of relatively small manufactured articles such as small castings and stampings, bolts, rivets, etc. More particularly, the invention relates to a rigid container, preferably of metal, which can be collapsed easily into a small space for economical reshipment back to the supplier of the articles.

Such shipping containers are made in more or less standard dimensions for fitting into a freight car or truck body with little or no waste space, and the overall collapsed height must be not greater than one-fourth the set-up or extended height in order to take advantage of the most favorable shipping rates for reshipment in collapsed condition. Furthermore, the containers must be capable of being tiered or stacked, both in extended and collapsed condition, and this requires that the top of the collapsed container be completely flat and not raised in the middle.

Certain prior shipping containers, as for example the collapsible container shown in Patent No. 2,640,620, issued June 2, 1953, have had two opposed walls hinged to the bottom of the container and the other two walls upwardly slidable along the edges of the two hinged walls by means of interengaging flanges and channels. The container is collapsed by withdrawing the slidable walls upwardly the full height of the hinged walls, superposing the slidable walls over the bottom, and then folding the hinged walls over the superposed walls. A serious objection to such a container is that the slidable walls are often laid aside when emptying the container, and may become bent or damaged, or lost or mislaid and not returned to the shipper. Moreover, the handling of the slidable walls during the collapsing operation is awkward and laborious. Another objection is that the slidable walls tend to work upwardly due to vibration, or due to a prying load on one side raising the opposite side, which allows small articles to fall out in transit.

An important object of the present invention is to provide an improved collapsible shipping container which is simply and easily collapsed into a flat topped assembly of minimum overall height.

Another object is to provide a collapsible container having side and end walls hinged to the base both in extended and collapsed position, so that none of the walls can be laid aside and lost, mislaid or damaged.

Further objects include the provision of an improved shipping container which will meet the requirements of the trade, including sturdy construction with minimum weight to facilitate handling and reduce shipping costs, capability of being tiered both in collapsed and extended position, adaptability for use with conventional lift trucks, and designed for easy unloading of its contents.

These and related objects are accomplished by the improved construction comprising the present invention, preferred embodiments of which are illustrated by way of example in the accompanying drawings and described in detail herein. Various modifications and changes in de-

tails of construction are comprehended within the scope of the invention as defined in the appended claims.

The improved collapsible container includes a rectangular base having side and end flanges, with opposed end walls hinged to the end flanges for folding inwardly over the base and opposed side walls between the end walls, the four walls being interconnected when upright by laterally disengageable retainer flanges along the adjoining edges of the end and side walls, the side walls in upright position being detachably interlocked with the side flanges of the base and with the top portions of the end walls, and the bottom ends of the side walls having movable hinge connections with the base to permit unlocking and then inward folding of the side walls within said end walls.

Referring to the drawings:

Fig. 1 is a plan sectional view of the improved container in open or extended position, as on line 1—1, Fig. 2.

Fig. 2 is an enlarged vertical sectional view, partly broken away, taken on line 2—2, Fig. 1.

Fig. 3 is an enlarged fragmentary sectional view, as on line 3—3, Fig. 1, showing one of the side walls locked in upright position to an adjoining end wall.

Fig. 4 is a similar view showing the side wall partially raised to unlock it from the side flange of the base.

Fig. 5 is a similar view showing the side wall unlocked from the end wall and starting to fold inwardly over the base.

Fig. 6 is a fragmentary plan sectional view on line 6—6, Fig. 3.

Fig. 7 is a vertical sectional view showing the container fully collapsed, with the side walls folded within the end flanges of the base, and the end walls folded inwardly over the side walls.

Fig. 8 is a perspective view showing two collapsed containers superposed or stacked one upon the other.

Fig. 9 is a perspective view showing two upright or open containers superposed or stacked one upon the other.

Fig. 10 is a fragmentary sectional view similar to Fig. 3 of a modified form of hinge construction for the side walls which allows unlocking and inward folding movement thereof.

Fig. 11 is a sectional view on line 11—11 of Fig. 10.

The present improved collapsible container may be made of any material which is adequately strong and durable, but preferably is made of alloy steel so as to be amply sturdy and rugged to stand rough treatment over and over again while handling and shipping loose metal parts, and then reshipping the containers in collapsed position.

Referring to Figs. 1 and 2, the container has a rectangular base or bottom plate 12, preferably made of corrugated sheet metal provided with corrugations 12 and having angles 13 welded to its two opposite ends and angles 14 welded to the other two edges or sides, said angles 13 and 14 extending along the top marginal surface of the sheet. Angles 13 have upright legs or flanges 15, and angles 14 have upright flanges 16 of somewhat less height, the flanges 15 and 16 being preferably connected by welding to form a shallow rectangular enclosure around the base 12. Preferably, strips 17 are welded to the outer edges of angles 14 to cover the ends of the corrugations, as shown in Fig. 7.

The two opposite end walls 18 are hinged to the upper edges of the end flanges 15 by hinges 19. The hinges 19 are of substantially conventional construction and include a hinge pin 20 with an upper plate 21 attached to the inner bottom edge portion of the wall 18 and a lower plate 22 attached to the inner surface of the flange 15. A plurality of hinges 19 may be provided for each end wall 18, three being shown, one in the middle and one at each end of the wall.

The two opposite side walls 23 extend between the ends

of the end walls 18 when the container is erected or set up, to form a rectangular wall supported on the base plate 12. Both the end and side walls 18 and 23 are preferably made of corrugated sheet material similar to the base plate 12 and their top edges may be rolled or bent over as shown at 24. Angle strips 25 are welded along the edges of the side walls providing outturned flanges 25' which are slidably received in flanged guides or channels 26 welded along the edges of end walls 18, as best shown in Fig. 6. The guide channels 26 open inwardly so that the flanges 25' are laterally disengageable therefrom by swinging the side walls inwardly toward each other.

The base plate 12 is provided with supporting feet indicated generally at 28 for raising the bottom of the plate above the floor level sufficiently to allow for the entrance of the usual lifting forks or arms of a lift truck. As indicated in Fig. 1, there may be three rows each having three feet 28 spaced lengthwise of the container, one row along each side and one midway of the outer rows. Thus the lifting forks may be entered from either side or end. The two outer feet 28' of the middle row are preferably turned or rotated 90° relative to the other feet to provide additional support in tiering the containers, as shown in Fig. 9.

The feet 28 may be formed in substantially pyramidal shape, as shown with their large ends welded to the underside of the base plate. As shown in Fig. 7, the bottom of each foot is preferably provided with a central rib with a recessed shoulder 30 on each side, and one recess of each foot is adapted to engage over the top rolled edge of another container when the containers are tiered in set-up position. The two feet 28' provide intermediate supports on the rolled edges of the end walls 18 of the container below.

The novel hinge connections for hinging the bottom ends of each side wall on the base, may comprise hinge pintles in the form of cranks 31 at opposite ends of each side wall having one end rotatably mounted on the side wall and the other end rotatably connected to the adjoining end wall. As shown in Figs. 2-7, one end 31A of each crank 31 may be rotatably mounted on a side wall 23 by journaling the crank end in a sleeve 31C welded to the bottom end of the angle strip 25 extending along the side wall. The other end 31B of the crank is rotatable in a hole in the adjacent end flange 15 of the base, said hole preferably passing also through an aligned hole in a hinge plate 22.

In set-up or upright position, the side walls are normally interlocked with the side flanges 16 of the base and with the top portions of the end walls 18. The interlock with the side flanges 16 is accomplished by providing notches 32 on the bottom ends of angle flanges 25', for engaging over the top edges of base flanges 16, as shown in Fig. 3, as the bottom of the side wall slidably overlaps the end flange 16. The top portions of the guide channels 26 are provided with inwardly projecting lugs 33 which engage behind the adjacent angle flanges 25, as shown in Fig. 6, to interlock the side walls with the top portions of the end walls 18.

As seen in Figs. 3-5, the offset relation of the hinge arms 31A and 31B permits each arm 31A to rotate bodily around arm 31B as a pivot, raising the bottom end of a side wall 23 to first disengage the notches 32 from the side flanges 16, then to swing the bottom end of the side wall inwardly over and down around the arms 31B. In this position the upper end of the side wall 23 can be passed under the locking lugs 33, and the wall is then swung inwardly downward about the pivots 31A until it rests on the base plate. As shown in Fig. 7, the side walls 23 may be overlapped within the end flanges 15 of the base, and are located below the level of the hinges 19, so that the end walls 18 may be folded inwardly thereover to form a flat top in collapsed position, and the collapsed containers can be tiered in compact and stable condition. Because the side walls are overlapped within

the end flanges of the base, the overall height of the collapsed container is less than one-fourth the overall height of the set-up container, to gain the advantage of favorable shipping rates on reshipment.

The operation of collapsing the container is extremely simple and rapid, because all that is necessary is to grasp one side wall at the upper edge and raise it sufficiently to unlock the bottom notches, then swing the bottom end over and around the crank hinge pivots to lower the upper edge, and then swing the upper edge inwardly past the upper locking lugs. The operation is repeated for the other side wall and then the end walls are folded over. To set up the container the operation is reversed.

In the modified form shown in Figs. 10 and 11, a sliding hinge connection is provided between the side and end walls to accomplish the same unlocking and swinging movement of the side walls 23. In this form a hinge pin 35 is welded to the bottom of each angle flange 25 on the side walls 23, and the outer end of each pin projects through an opening or slot 36 in the adjacent end flange 15 of the base. The slots 36 are generally of an inverted L-shape, with the upper part substantially wider vertically than the pin diameter to allow raising the side wall 23 sufficiently to disengage or unlock the notches 32 from the side flange 16 of the base, after which the pins are moved horizontally inward in the upper parts of the slots and then downward into the vertical portions thereof, as indicated in chain lines in Fig. 10. This allows swinging the upper end of the side wall past the upper locking lugs 28, in the same manner as indicated in Fig. 5.

In both embodiments of the improved container, the collapsible side and end walls are always hinged to the base, and cannot become detached and lost, mislaid or damaged. When the container is unloaded, one or more of the side and end walls may be folded outwardly until their upper edges are fully supported on the floor, in which position they are unlikely to be damaged. When the walls of the container are folded inwardly into collapsed condition, in the manner previously described, the operation is simple and rapid because it is only necessary to raise the side walls a slight amount to unlock them before swinging them inwardly to collapsed position.

The combination of the crank hinges and the locking notches 32 and upper locking lugs 33, together with the laterally sliding engagement of the angle flanges 25' in the guide channels 26, provides a detachable connection which, while easily detached when desired, remains tightly closed during shipment to prevent the escape of small parts from the container. As clearly shown in Figs. 8 and 9, the improved containers provide a stable tier when stacked in collapsed or extended position.

Accordingly, the improved collapsible container is constructed to meet all of the exacting requirements of the trade with respect to shipping, unloading and reshipment.

What is claimed is:

1. A collapsible container including a rectangular base having vertically disposed side and end flanges, opposed end walls hinged to said end flanges for swinging over the base, opposed side walls extending between the end walls in erected position, laterally disengageable interconnecting flanges along the adjoining edges of the end and side walls, the flanges on the side walls when erected being detachably interlocked with the side flanges of the base, means on said end walls detachably locking the tops of said side walls in erected position, and bodily movable hinge connections between the bottom ends of said side walls and the base to permit unlocking the side walls from the base and end walls for swinging the side walls inwardly within the end flanges of said base.

2. A collapsible container including a rectangular base having vertically disposed side and end flanges, opposed end walls hinged to said end flanges for swinging over the base, opposed side walls extending between the end walls in erected position, means on said side walls for detachably interlocking with the side flanges of the base

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in the erected position of the side walls, means on said end walls detachably locking the top portions of said side walls in erected position, and hinge connections between the bottom ends of said side walls and the base, said hinge connections having bodily movable hinge pintles to permit unlocking the side walls from the base and end walls for swinging the side walls within the end flanges of said base.

3. A collapsible container including a rectangular base having vertically disposed side and end flanges, opposed end walls hinged to said end flanges for swinging over the base, opposed side walls extending between the end walls in erected position, laterally disengageable interconnecting flanges along the adjoining edges of the end and side walls, the flanges on the side walls when erected being vertically detachably interlocked with the side flanges of the base means on the tops of the end walls to lock the side walls in erected position, and bodily movable hinge connections between the bottom ends of said side walls and the base to permit upward movement of the side walls to unlock them from the side flanges of the base and then downward swinging movement to disengage them from the locking means on the end walls for swinging the side walls within the end flanges of said base.

4. A collapsible container including a rectangular base having vertically disposed side and end flanges, opposed end walls hinged to said end flanges for swinging over the base, opposed side walls extending between the end walls in erected position, flanges on the bottom ends of said side walls having notches engaging over the side flanges of the base, inwardly projecting lugs on the top portions of said end walls normally preventing inward movement of said side walls, and bodily movable hinge connections between the bottom ends of said side walls and the base to permit raising of the side walls to disengage the notches and then lowering the side walls to swing them inwardly past the lugs.

5. A collapsible container including a rectangular base having vertically disposed side and end flanges, opposed end walls hinged to said end flanges for swinging over the base, opposed side walls extending between the end walls in erected position, laterally disengageable interconnecting flanges along the adjoining edges of the end and side walls preventing outward swinging of said walls, means on the bottom ends of said side walls detachably engaging over the side flanges of the base, inwardly projecting lugs on the top portions of said end walls normally preventing inward swinging of said side walls, and hinge cranks having one end rotatably mounted on the bottom end of a side wall and the other end pivoted in an end flange of the base whereby the side wall can be raised to disengage it from the side flange of the base and then the bottom of the side wall swung inwardly downward to clear said inwardly projecting lugs as the side wall is swung inwardly over the base.

6. A collapsible container including a rectangular base having vertically disposed side and end flanges, opposed end walls hinged to said end flanges for swinging over the base, opposed side walls extending between the end walls in erected position, flanges on the bottom ends of said side walls having notches engaging over the side flanges of the base, inwardly projecting lugs on the top portions of said end walls normally preventing inward movement of said side walls, and hinge cranks having one end rotatably mounted on the bottom end of a side wall and the other end pivoted in the base whereby the

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side wall can be raised to disengage the notches and the bottom of the side wall then swung inwardly downward to clear said inwardly projecting lugs as the side wall is swung inwardly over the base.

7. A collapsible container including a rectangular base having vertically disposed side and end flanges, opposed end walls hinged to said end flanges for swinging over the base, opposed side walls extending between the end walls in erected position, said side walls detachably engaged over said side flanges, inwardly projecting lugs on the end walls abutting the inner edges of the side walls near the tops thereof, and crank pins hinged at one end on the bottoms of the side walls and at the other end on the base, said crank pins permitting disengaging the side walls end then inwardly downward swinging of the side walls under the lugs.

8. A collapsible container including a rectangular base having vertically disposed side and end flanges, said end flanges having inverted L-shaped slots therein, opposed end walls hinged to said end flanges for swinging over the base, opposed side walls extending between the end walls in erected position, said side walls detachably engaged over said side flanges, inwardly projecting lugs on the end walls abutting the inner edges of the side walls near the tops thereof, and hinge pins mounted at one end on the bottom ends of said side walls and movably engaged in said L-shaped slots permitting disengaging the side walls and then inwardly downward swinging of the side walls under the lugs.

9. A collapsible container including a rectangular base having vertically disposed side and end flanges, opposed end walls hinged to said end flanges for swinging over the base, opposed side walls extending between the end walls in erected position, laterally disengageable interconnecting flanges along the adjoining edges of the end and side walls, said side walls detachably engaged over said side flanges, inner projections on the end walls engaging the inner edges of said side walls near the tops thereof in erected position, and crank pins hinged at one end on the bottoms of said side walls and at the other end on the base, said crank pins permitting disengaging the side walls and then inwardly downward swinging of the bottoms thereof to allow inward swinging of the side walls under said projections.

10. A collapsible container including a rectangular base having vertically disposed side and end flanges, opposed end walls hinged to said end flanges for swinging over the base, opposed side walls extending between the end walls in erected position, said side walls in erected position detachably engaging over said side flanges, means on the end walls detachably locking the top portions of said side walls in erected position, and hinge connections between the bottom ends of said side walls and the base, said hinge connections having bodily movable hinge pintles to permit disengaging the side walls from said side flanges and from said end walls for swinging the side walls within the end flanges of said base.

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