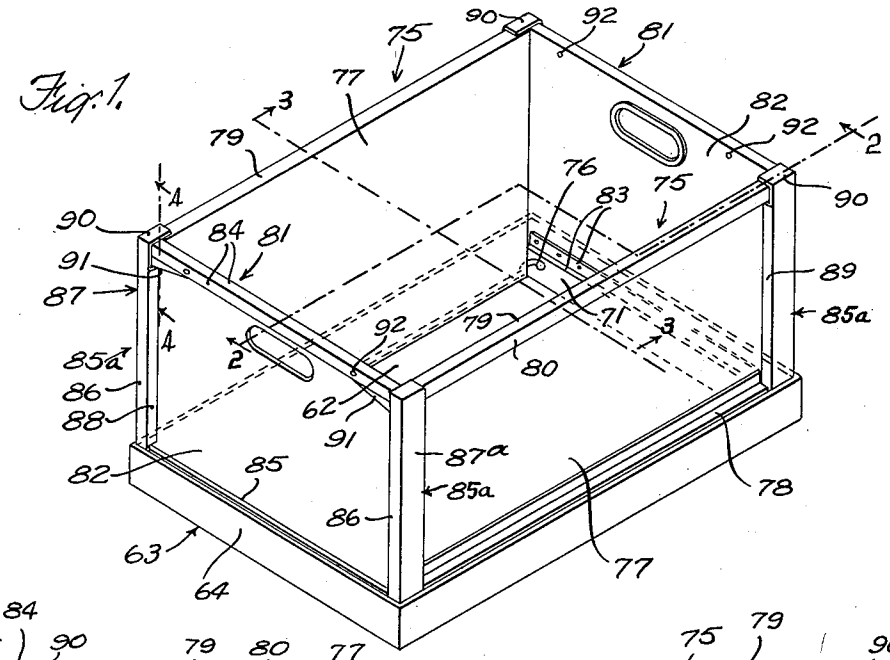
May 22, 1951 P. ROSENBERG 2,553,607

COLLAPSIBLE DELIVERY BOX

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Fig. 1.



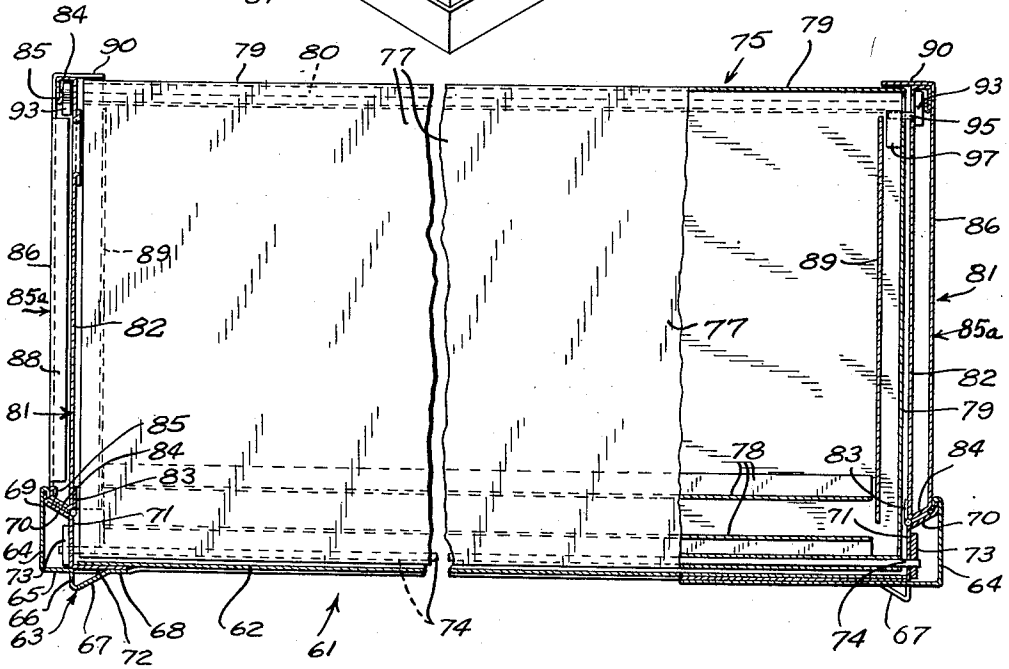


Fig. 2.

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COLLAPSIBLE DELIVERY BOX

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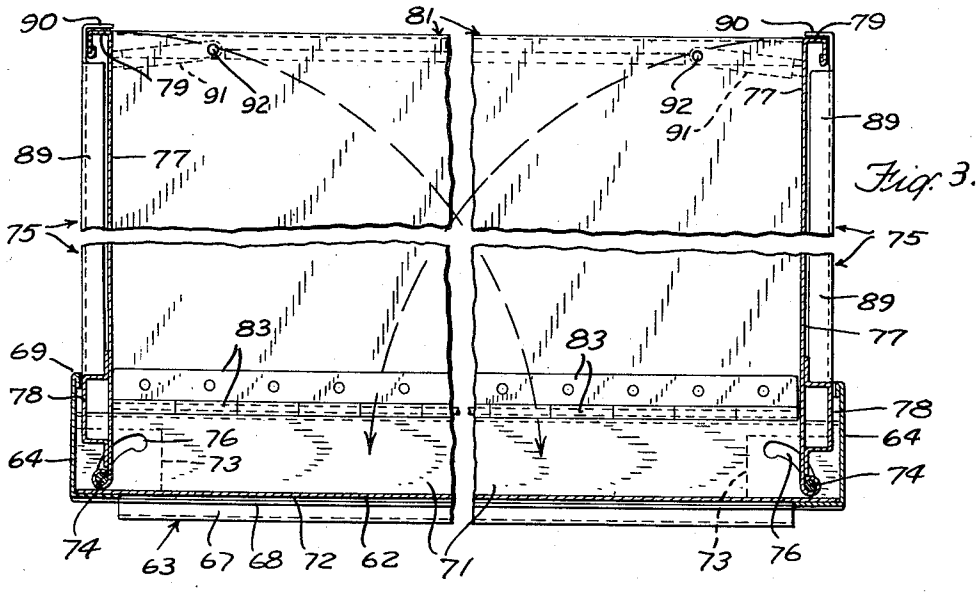


Fig. 3.

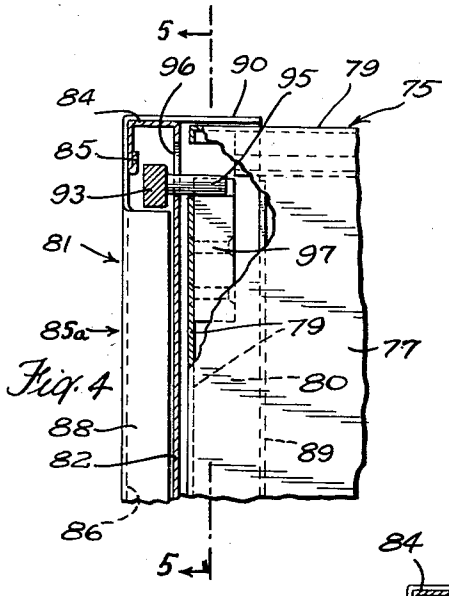


Fig. 4

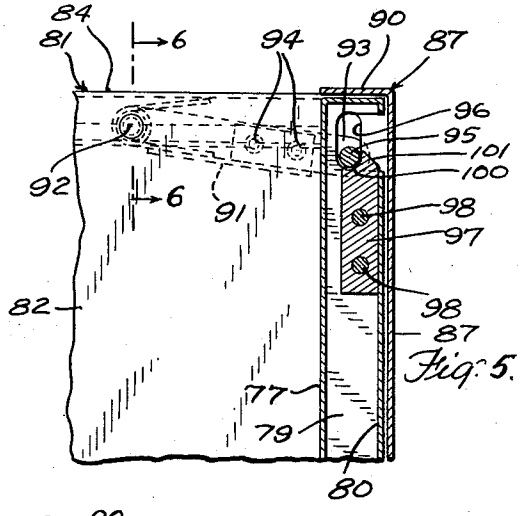


Fig. 5.

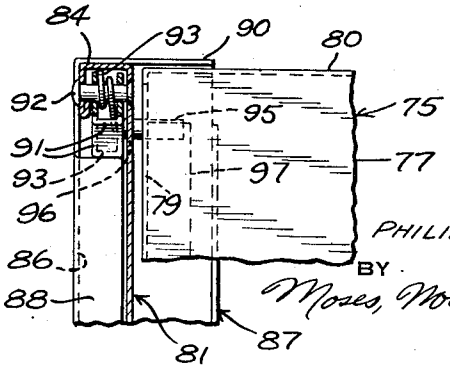


Fig. 6

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Fig. 7.

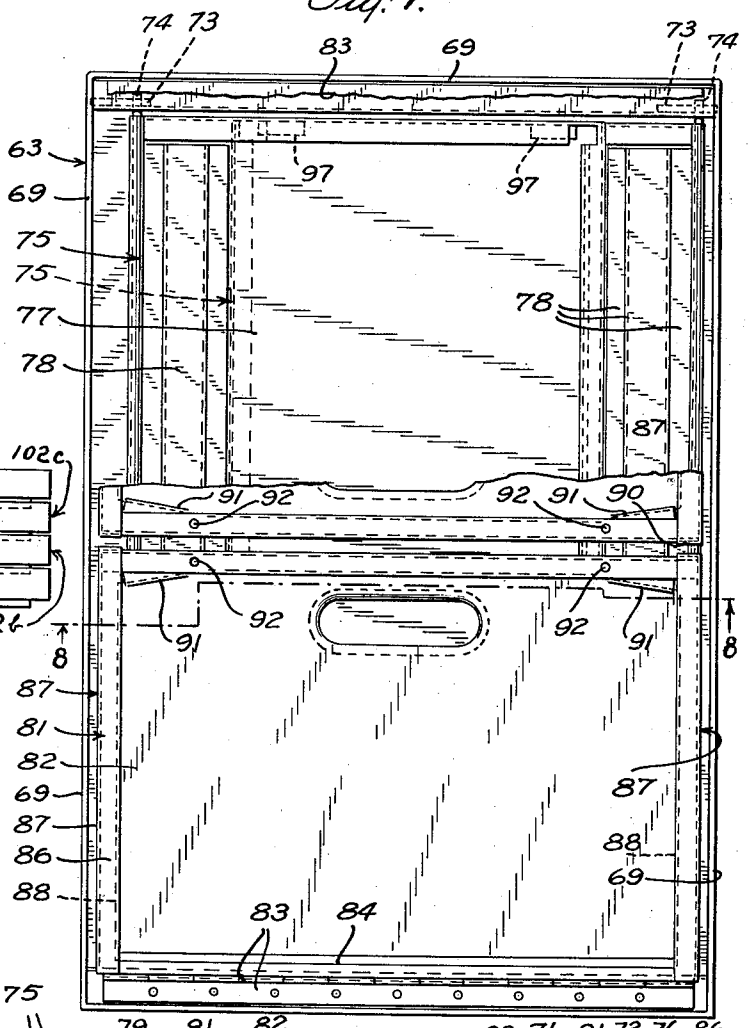
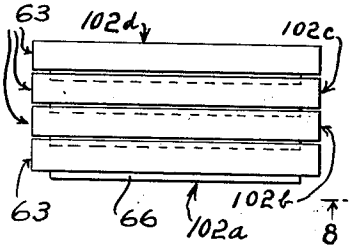


Fig. 9.



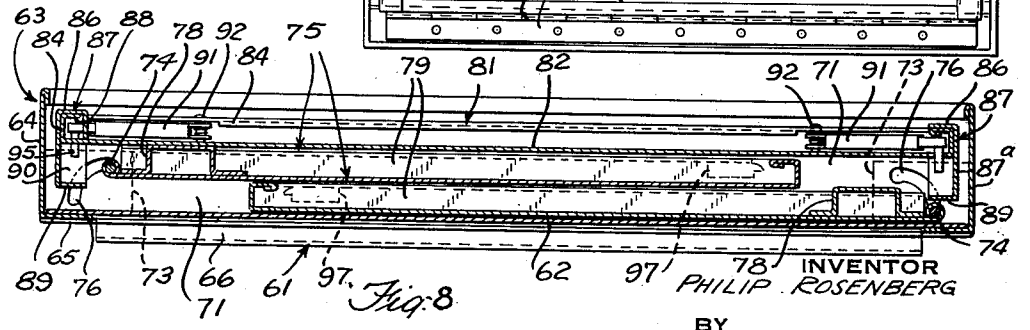


Fig. 8.

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UNITED STATES PATENT OFFICE

2,553,607

COLLAPSIBLE DELIVERY BOX

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Application February 27, 1945, Serial No. 579,958

3 Claims. (Cl. 220—6)

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This invention relates to shipping or delivery boxes adapted for use again and again in transporting small packages or articles. While the invention is not exclusively useful under war conditions, since economy is desirable at any time, it is especially useful at a time like the present when there are serious shortages of carton and box materials, making the usual wasteful practice of one time use of a box or carton unwise and nearly impossible.

Boxes made in accordance with the present invention have a multiplicity of uses. For example, they are useful in the delivery of express or parcel post packages, in the delivery of canned, bottled or wrapped merchandise from warehouse to retail stores and in the delivery of similar merchandise from retail stores to customers. The boxes may be used with advantage both for truck and railway shipments.

For a box to be adapted for economical reuse it is important that it embody a number of characteristics. The box should be of moderate cost; should be strong and rugged so that it can be used many times before deteriorating sufficiently to impair its usefulness; should be of light weight in relation to its strength; should involve little bulk of its own; should be quickly and conveniently collapsible and should desirably be nestable.

The making of the box to be quickly and conveniently collapsible is of primary importance. In some instances the collapsibility is very advantageous for saving of space when the boxes are shipped back empty to the place from which they are sent out loaded. In all instances the collapsibility is important for convenience of handling of the empty boxes. If the box could not be collapsed, a workman would be limited as to the number of boxes he could carry at one load by the mere size of the box. He can, however, carry several times as many of the collapsed boxes as he could of uncollapsed empty boxes. The collapsibility of the boxes moreover enables progressively more space to be made available as successive deliveries are made by a delivery truck, thereby enabling convenient access to be had to boxes which were originally inaccessible.

It is very desirable that the boxes be nestable, particularly when collapsed. The nested boxes can be stacked in orderly fashion without serious liability of the stack being overturned. A stack of the collapsed and nested boxes can be carried comfortably and conveniently by a workman.

It is a primary object of the present invention

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to provide reusable delivery boxes of the kind referred to which may be readily collapsed and erected or expanded at the will of the user.

It is a further important object of the invention to provide reusable delivery boxes embodying in combination all or a substantial part of the advantageous features hereinbefore referred to.

Other objects and advantages will hereinafter appear.

In the drawing forming part of this specification:

Fig. 1 is a perspective view of an illustrative box embodying features of the invention;

Fig. 2 is a sectional view taken upon the line 2—2 of Fig. 1 looking in the direction of the arrows, the view being on a larger scale than Fig. 1 and being broken away intermediate its ends for compactness of illustration;

Fig. 3 is a sectional view taken upon the line 3—3 of Fig. 1 looking in the direction of the arrows, the view being on a larger scale than Fig. 1 and being broken away intermediate its length and height for compactness of illustration;

Fig. 4 is a fragmentary view partly broken away and partly in section, the section being taken upon the line 4—4 of Fig. 1 looking in the direction of the arrows;

Fig. 5 is a fragmentary sectional view taken upon the line 5—5 of Fig. 4 looking in the direction of the arrows;

Fig. 6 is a sectional view taken upon the line 6—6 of Fig. 5, looking in the direction of the arrows;

Fig. 7 is a plan view partly broken away showing the box of Fig. 1 in a collapsed condition;

Fig. 8 is a sectional view taken upon the line 8—8 of Fig. 7 looking in the direction of the arrows; and

Fig. 9 shows a stack of collapsed and nested boxes of the kind illustrated in Figs. 1 to 8.

In the illustrative box the sides as well as the bottom and ends are of rigid construction. The ends and sides are both hingedly connected to the bottom, and the resulting boxes are adapted for nested stacking when open and when collapsed. Latches are provided for retaining the end walls and the side walls connected to one another in the erected or open condition.

The bottom 61 comprises a flat plate 62 and a surrounding frame member 63 secured thereto as by welding. The frame member 63 is in the form of a hollow rectangle. The frame member 63 comprises along its ends and outer vertical wall 64, a horizontal wall 65, a vertical wall 66, an inclined wall 67 and a horizontal wall

68. The same walls are present at the sides, save that the walls 66 and 67 are omitted, the walls 65 and 68 merging into one. Along the ends and sides the wall 64 is folded in and down to form a reinforcing lip 69. At the ends the frame includes inclined walls 70, vertical walls 71, and horizontal walls 72. The walls 70, 71 and 72 are omitted at the sides. Cam plates 73 are secured to the walls 71. Follower pins 74, which form parts of sides 75, extend through cam slots 76 formed in the walls 71 and in the cam plates 73. The pins 74 form supports and guides for controlling the folding inward of the sides 75. Each side 75 comprises a plate 77, the lower margin of which is wrapped around the associated pin 74. A flanged channeled reinforcing member 78 is secured to the outer face of each plate 77, the upper wall of the channel standing substantially flush with the upper edge of wall 64 when the plate 77 is in upright position. Along the top and along the sides down to the upper channel wall of member 78, the plate 77 is formed with an outturned flange 79. The flange 79 is folded downward along the top and inward along the sides to provide an inturned flange 80.

When the sides 75 are folded inward they lie in overlapping relation. Either side may be folded in first, and will lie flat against the bottom. The hinge pin 74 of this side wall remains in the bottom of the cam slot 76, as seen at the right hand side of Fig. 8. The second side wall will fold against, and lie flat upon the first, the hinge pins of the second side rising to the top of slots 76 as seen on the left hand side of Fig. 8.

When the box is in the open or erected condition, the sides 75 stand between ends 81 which are hingedly connected to the bottom frame 63. Each end 81 comprises a plate 82 which is connected to the wall 70 of the bottom frame 63 through a hinge 83. The plate 82 is formed all around with an outwardly extending flange 84. The flange 84 is substantially perpendicular to the plate 82 along the top and side edges of the plate, but slopes upward and outward at the inclination of flange 70 along the lower edge of plate 82. An inturned, double thickness flange 85 is formed all around the outer boundary of the flange 84. End openings 82*a* are formed in the plates 82, the metal being displaced inward and rolled to provide a smooth surface.

Hollow corner posts 85*a* embrace the vertical portions of flanges 84 and 85 of the plate 82 and are secured to the flanges. Each post 85*a* includes two complete walls 86 and 87 and two partial walls 88 and 89. The walls 86 and 87 bear against the vertical portions of flanges 85 and 84 respectively. Wall 88 extends inward into contact with the body of plate 82. Wall 89 extends far enough inward to cover the vertical portion of flange 80 of side plate 77. Wall 89 extends inward substantially to engage the body of side plate 77 when the box is in the open or erected condition. The wall 88 is notched to accommodate end wall flanges 84 and 85, and the wall 89 is notched to accommodate side wall flanges 79 and 80. Each corner post includes a top wall 90.

When the box is erected, outward swinging of the side walls 75 beyond the vertical is obstructed not only by engagement of the side walls with the bottom frame, but also by engagement of walls 87 of corner posts 85*a* with

the vertical portions of flanges 80 of the side walls. Outward swinging of the end walls beyond the vertical is not only obstructed by engagement of the end walls with the bottom frame but also by engagement of corner post walls 89 with the vertical portions of flanges 80 of the side walls.

Mechanism is provided for latching the side walls to the end walls to prevent collapse of the former. Since the side walls stand between the end walls, the end walls cannot be folded inward so long as the side walls are prevented from collapsing.

Within the upper channel of each end 81 a channeled lever 91 is supported by means of a pivot pin 92. A wire spring surrounds the pivot pin 92 and has its opposite ends engaged respectively in the channel of the lever 91 and against the lower face of flange 84. The spring urges the lever 91 downward. A finger 93 has one of its ends secured in the channel of lever 91 by means of rivets 94. A latch pin 95 is carried by the outer end of the finger 93 and extends through a slot 96 formed in plate 82 of the end 81. A block 97 is secured by rivets 98 to the flange 79 of the side plate 77 for cooperation with the pin 95. The block 97 is formed with a finger 99 having a vertical inner face 100 and a sloping outer face 101. When the end walls have been swung to vertical positions the side walls may be successively swung to vertical positions. As an incident of the swinging movement of a side wall, the surface 101 engages the pin 95 and cams it upward. The spring 93 then snaps the pin 95 downward against the vertical face 100 of block 97, so that the side wall is latched in upright position. The pin 95 is held at a proper level for engagement by the face 101 of block 97 by engagement with the lower end of the slot 96. The flanges 79 and 80 are cut away to provide clearance for the pin 95 so that the pin when moved to its release position will not obstruct swinging of the side 75 between the collapsed and erected positions. A latch structure of the kind described is provided at each upper corner of the box.

When it is desired to fold the side walls inward, the user presses upward the levers 91 at opposite ends adjacent the same side of the box. That side of the box is thereby released at both its ends, and is caused to fold inward automatically under the influence of gravity, the center of mass of the wall being disposed inwardly with reference to the axis of the hinge pins 74. This operation is repeated at the opposite side of the box. When both the side walls have been caused to fold inward the end walls may be released by the operator and will be automatically folded in over the side walls as illustrated in Figs. 7 and 8. The end walls in this instance do not overlap, and hence both end walls lie flat against the upper one of the two involved side walls.

The boxes can be nested when in the open condition, the upper margins of the sides 75 and the ends 81 being adapted to receive the bosses defined by walls 66 and 67 of the bottom frame 63. When the boxes are collapsed, they may be stacked in the manner illustrated in Fig. 9. In this figure four boxes are shown which are designated respectively 102*a*, 102*b*, 102*c*, and 102*d*.

The walls 67 of the bottom fit against the sloping margins formed by the flanges 84 at the lower edges of the end plates 82, and be-

tween the corner posts of the next underlying box.

I have described what I believe to be the best embodiment of my invention. I do not wish, however, to be confined to the embodiment shown, but what I desire to cover by Letters Patent is set forth in the appended claims.

I claim:

1. In a reusable collapsible sheet metal delivery box, in combination, a bottom, end walls hingedly connected to opposite ends of the bottom and foldable toward one another, side walls disposed between the end walls and foldable into overlapping relation between and beneath the end walls, said side walls including hinge pins at their lower ends, and said bottom including cam slots for receiving the hinge pins, each cam slot extending upward and inward, substantially arcuately, and being of a height at least as great as the thickness of a side wall so that either side wall may be folded in automatically to lie flat against the bottom or may be folded in automatically to lie flat upon the other side wall.

2. In a reusable collapsible sheet metal delivery box, in combination, a bottom, side walls hingedly connected to the bottom, and end walls hingedly connected to the bottom, said side and end walls including interengageable parts for retaining them in their erected positions, levers carried by the end walls, latch pins carried by the levers, and springs acting on the levers and urging the latch pins toward latching positions, and latch blocks carried by the side walls and formed with outwardly facing beveled surfaces to cam the latch pins aside as they swing outward with the side walls to open positions of the latter, and to catch outside the latch pins for preventing collapse of the side walls, the side walls being formed with outwardly facing openings to receive the latch pins and admit them to engagement with latch blocks, and the levers being manually operable to move the latch pins to block releasing positions.

3. In a reusable collapsible sheet metal delivery box, in combination, a bottom, side walls hingedly connected to the bottom, end walls hingedly connected to the bottom, said side and end walls having outturned flanges at their upper ends, levers pivotally connected at the outer sides of the end walls just below the outturned flanges at the upper ends thereof, latch pins carried by the levers and extending through openings formed in the extreme side margins of said end walls, and springs acting on the levers and urging the latch pins downward toward latching positions, latch blocks carried at the outer sides of the side walls substantially at the end extremities thereof, said latch blocks being formed with outwardly facing beveled surfaces to cam the latch pins aside as the latch blocks swing outward with the side walls to the open positions of the latter, and to catch outside the latch pins for preventing collapse of the side walls, the levers being manually operable to move the latch pins to block releasing positions, and the end walls being equipped with hollow corner posts in which the latch pins are housed and protected.

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