

United States Patent

Sprick et al.

[15] 3,706,392

[45] Dec. 19, 1972

[54] BAGGAGE AND CARGO CONTAINER DOOR MECHANISM

[72] Inventors: **Walter F. Sprick; Frank C. Morse,**
both of Akron; **Alexander Holzer,**
Cuyahoga Falls; **Oscar W. Meller;**
John W. Lovich, both of Akron, all
of Ohio

[73] Assignee: **Goodyear Aerospace Corporation,**
Akron, Ohio

[22] Filed: **Oct. 26, 1971**

[21] Appl. No.: **192,451**

[52] U.S. Cl. **220/38, 220/1.5**

[51] Int. Cl. **B65d 43/16**

[58] Field of Search **220/38, 41, 1.5, 34; 49/197,**
49/201, 202; 312/333

[56]

References Cited

UNITED STATES PATENTS

2,569,254	9/1951	Page	220/38 X
3,672,529	6/1972	Feddersen	220/38 X

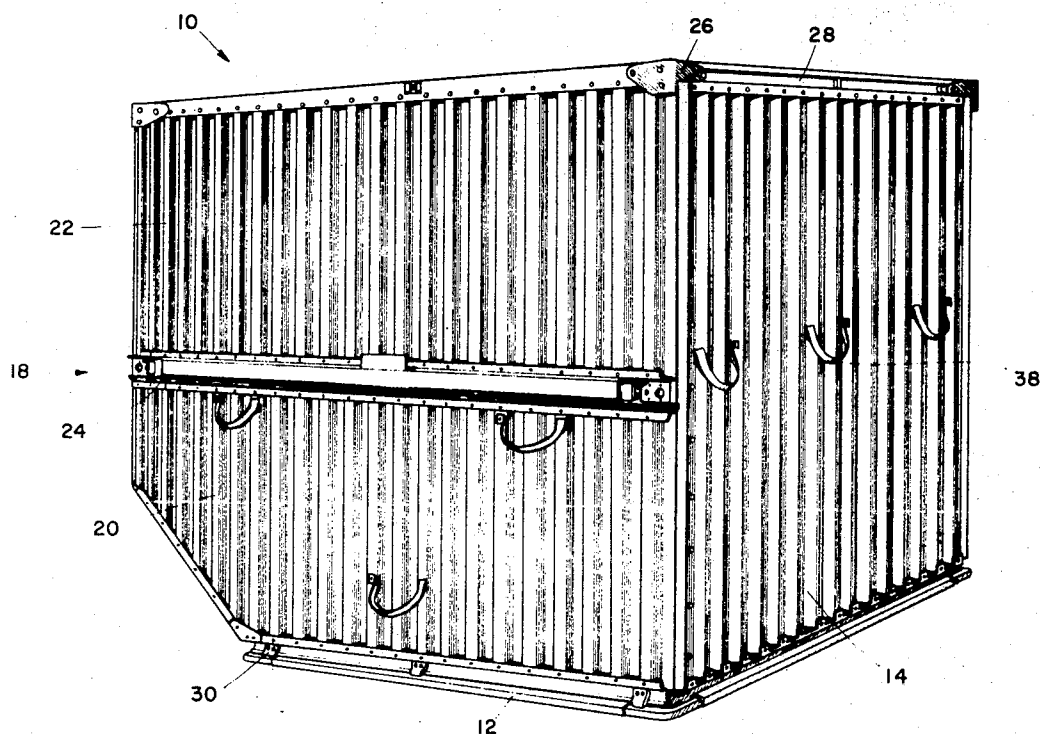
Primary Examiner—George T. Hall
Attorney—J. G. Pere et al.

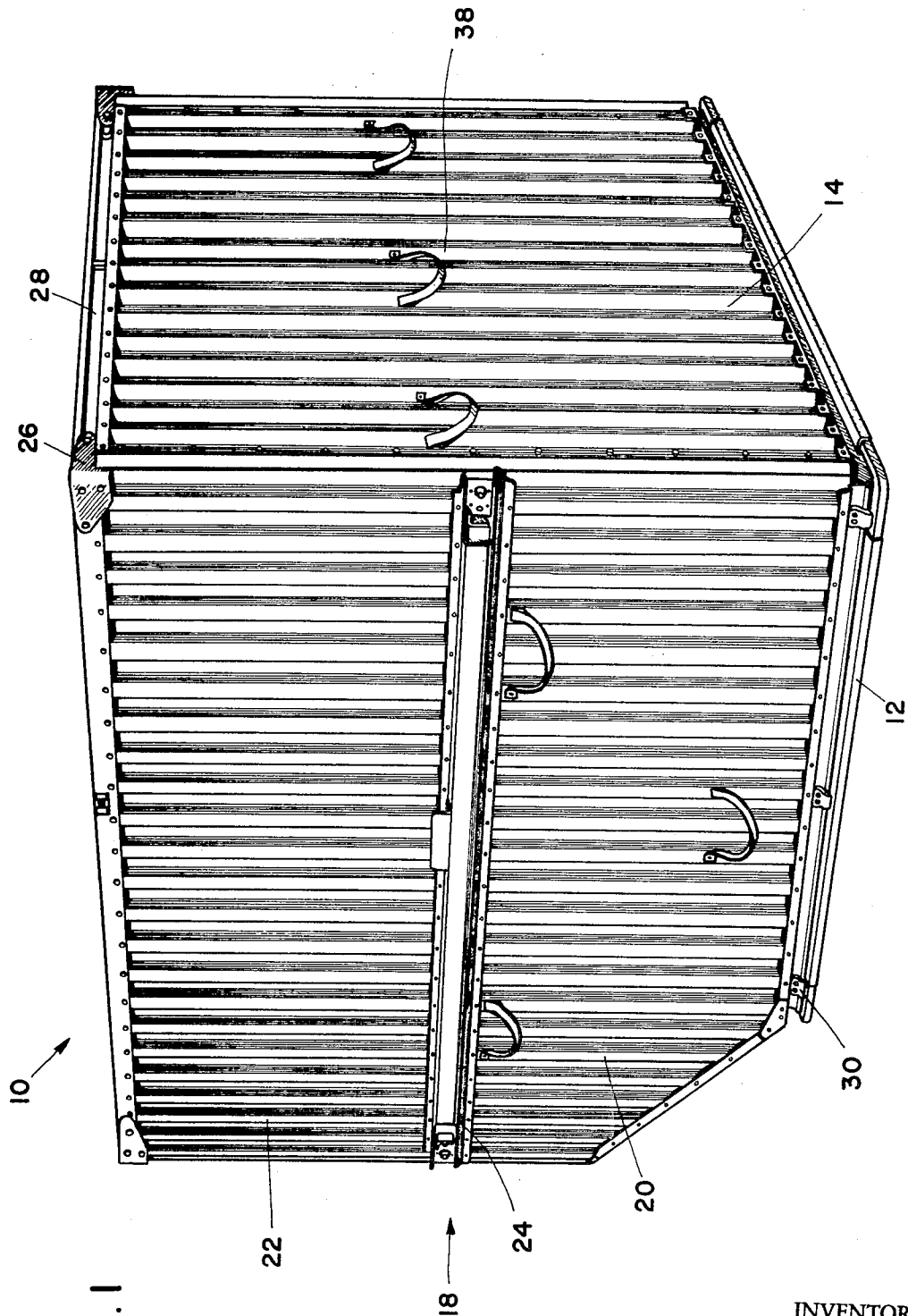
[57]

ABSTRACT

A door mechanism which forms an openable side of a cargo container. The door consists of upper and lower sections joined by a horizontal hinge. The doors are supported by means of brackets at the upper corners of the upper door sections which carry rollers running in tracks extending along the top of the container ends. Pins projecting from the lower edge of the lower door section engage suitable recesses in the container base when the doors are closed and a latch mechanism is provided for holding the door securely in its closed position.

17 Claims, 16 Drawing Figures





INVENTORS
ALEXANDER HOLZER
JOHN W. LOVICH
BY OSCAR N. MELLER
FRANK C. MORSE
WALTER F. SPRICK
Oldham & Oldham
ATTORNEYS

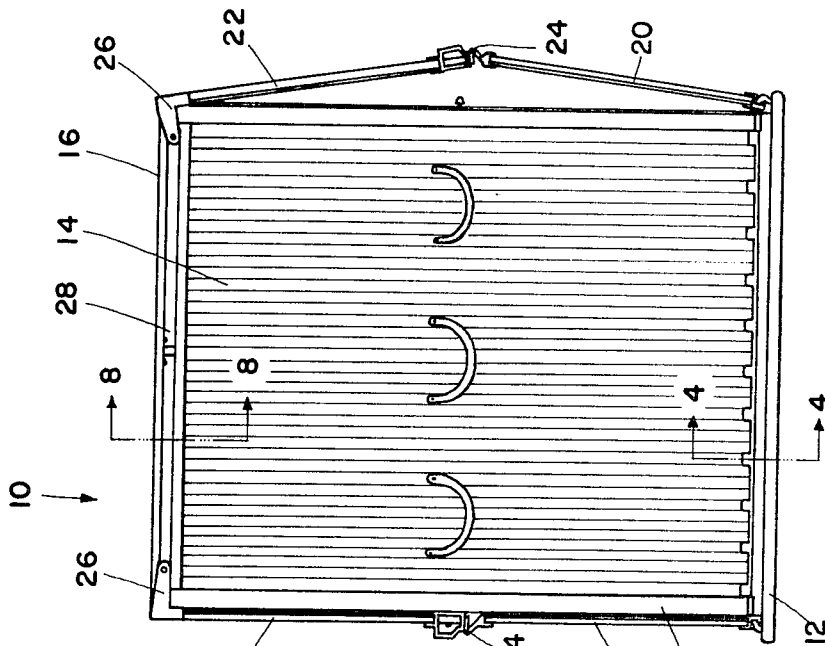


FIG. 2

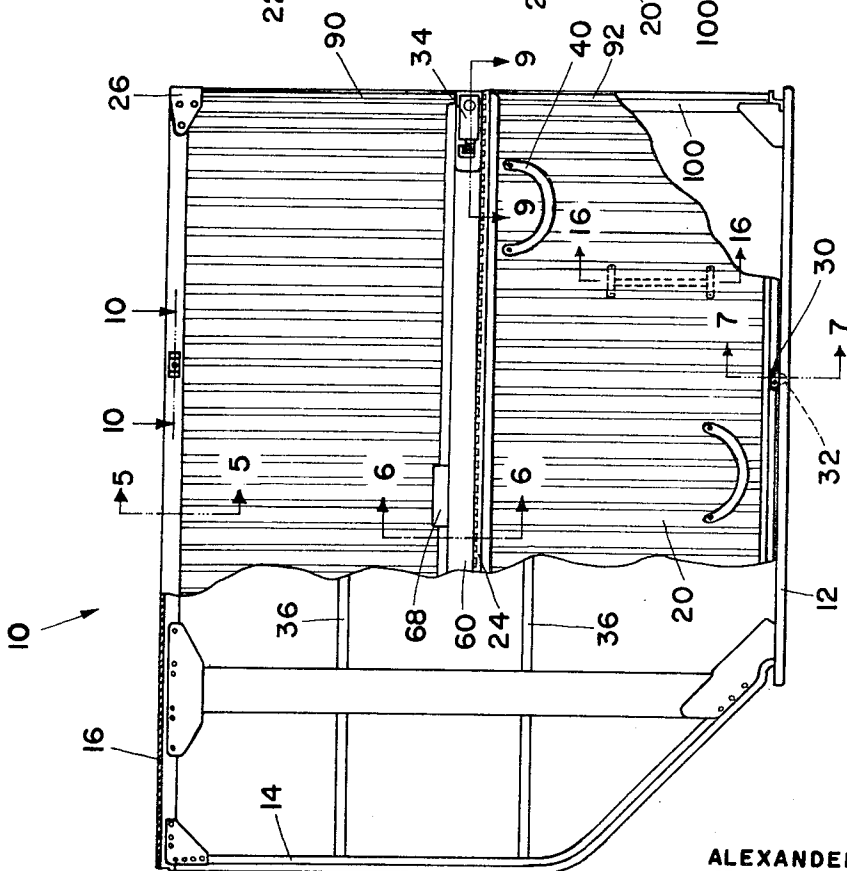


FIG. 3

INVENTORS
 ALEXANDER HOLZER
 JOHN W. LOVICH
 OSCAR N. MELLER
 FRANK C. MORSE
 WALTER F. SPRICK
 BY *O. L. L. & O. L. L.*
 ATTORNEYS

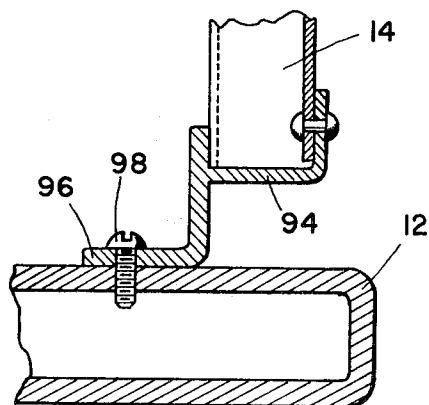


FIG. 4

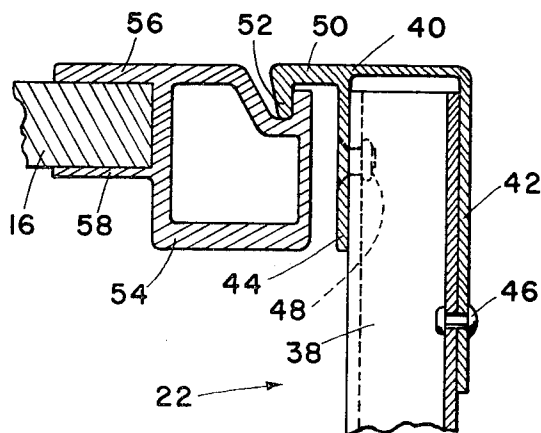


FIG. 5

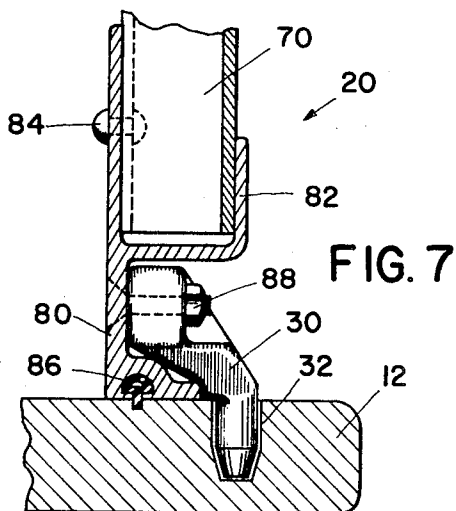


FIG. 7

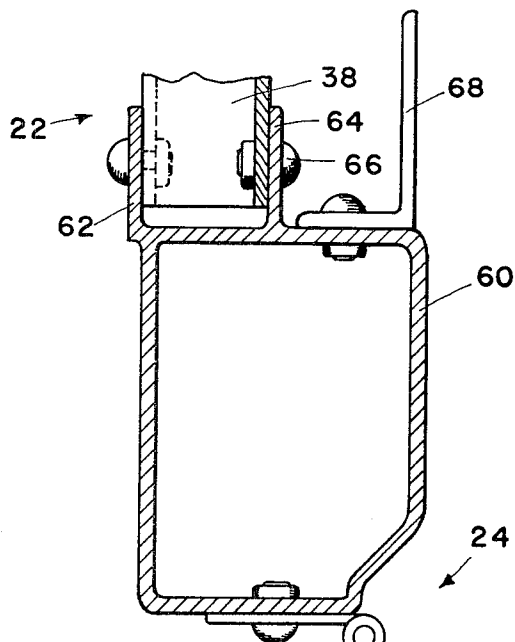


FIG. 6

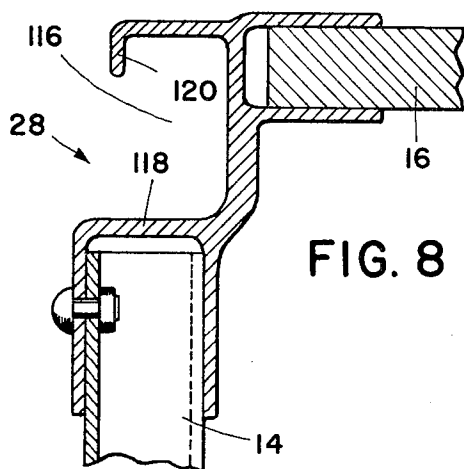
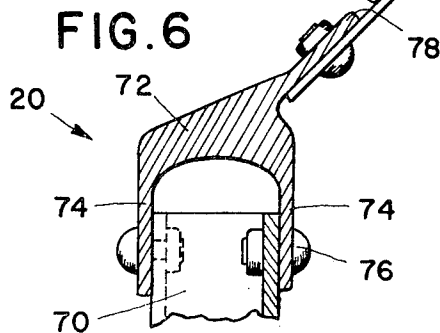


FIG. 8



INVENTORS
ALEXANDER HOLZER
JOHN W. LOVICH
BY OSCAR N. MELLER
FRANK C. MORSE
WALTER F. SPRICK
O. N. Meller & F. C. Morse
ATTORNEYS

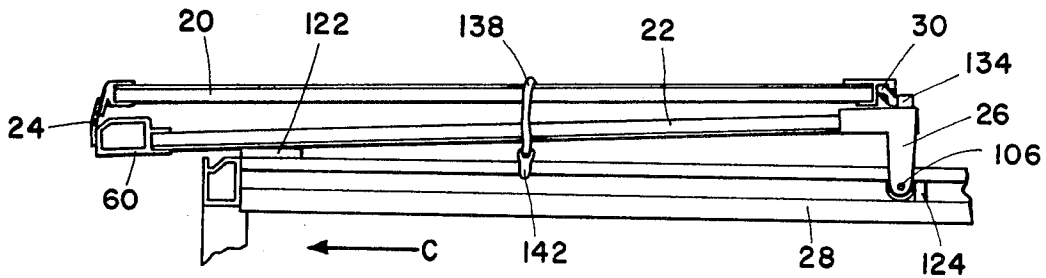


FIG. 15

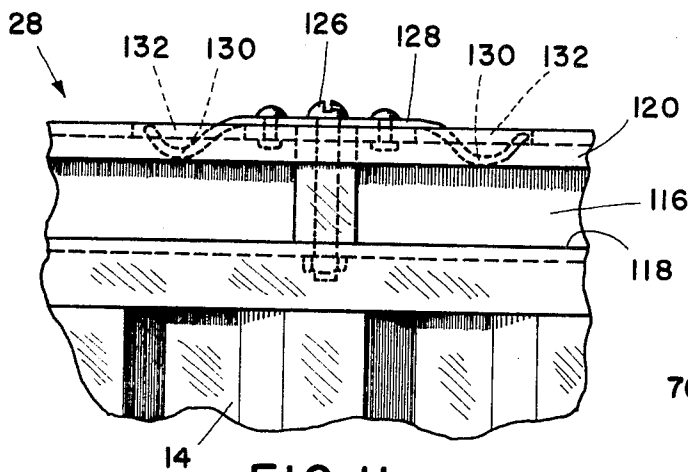


FIG. 11

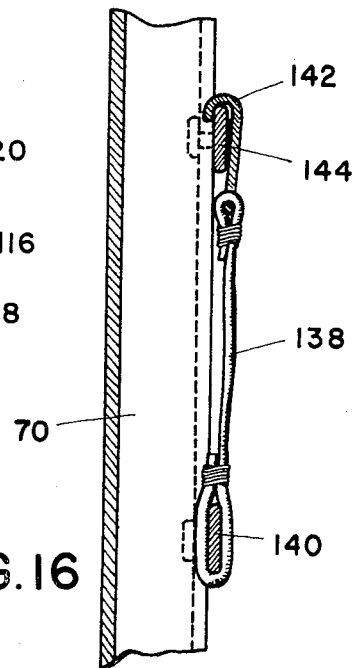


FIG. 16

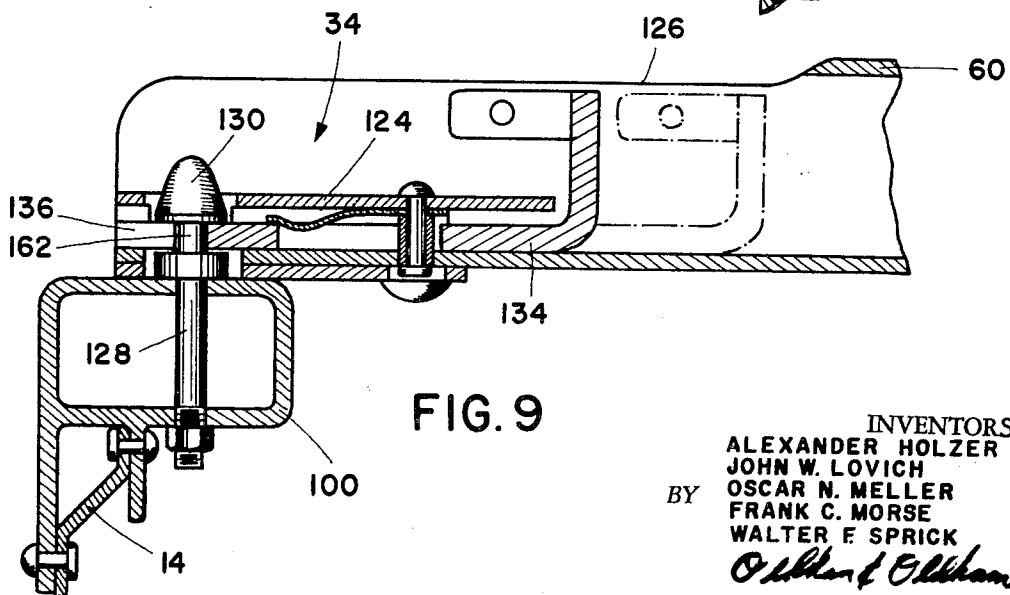
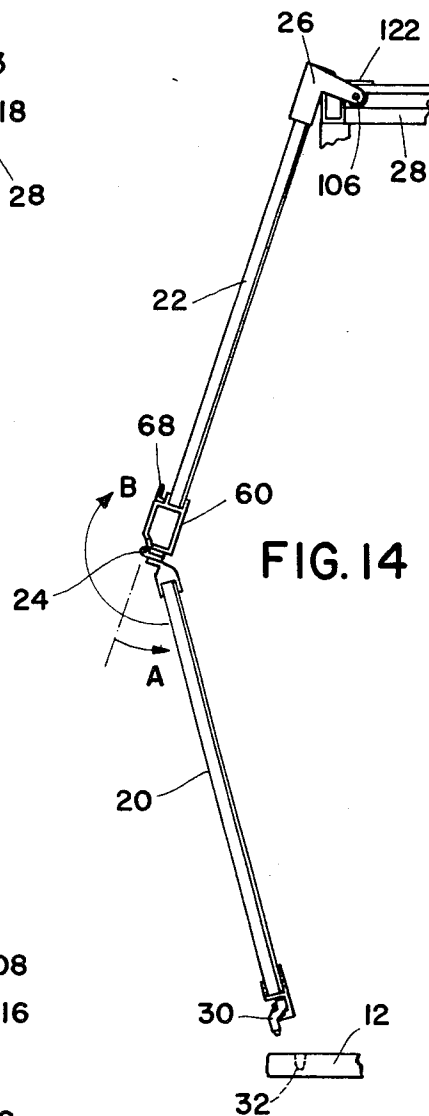
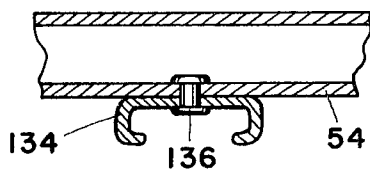
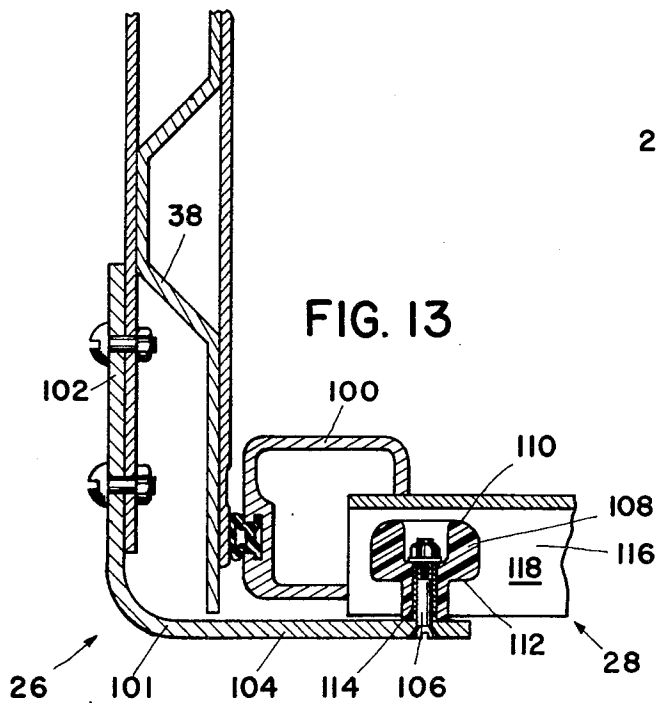
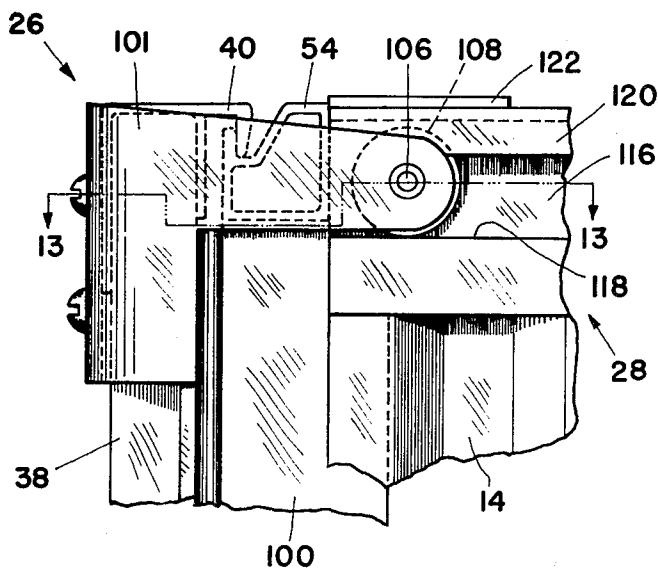


FIG. 9

INVENTORS
 ALEXANDER HOLZER
 JOHN W. LOVICH
 OSCAR N. MELLER
 FRANK C. MORSE
 WALTER F. SPRICK
 BY *O. L. & O. L.*
 ATTORNEYS



INVENTORS
ALEXANDER HOLZER
JOHN W. LOVICH
BY OSCAR N. MELLER
FRANK C. MORSE
WALTER F. SPRICK
O. Meller & O. Morse
ATTORNEYS

BAGGAGE AND CARGO CONTAINER DOOR MECHANISM

The present invention relates to cargo containers and more particularly to an improved door construction for such containers.

Cargo containers are now widely used to facilitate the handling of baggage and other cargo. For example, many of the larger modern aircraft are designed to receive cargo containers. Difficulties have been encountered, however, with the door mechanism of the containers presently in use. Since there may only be a small area available in which the container is to be loaded or unloaded the door mechanism must be designed so that it can be opened and closed without being moved through a large area. Also, where conveyor systems are used to handle the containers, the rails of the conveyor may present obstacles requiring the lower section of the door to be lifted upwardly before it can be swung to an open position. The arrangements which had been proposed heretofore to meet these requirements include doors which are formed of a number of sections each of which is guided by rollers running in tracks extending on the side of the opening and along the inner face of the top of the container. Such an arrangement, however, reduces the amount of available storage space within the container and, unless the rollers and tracks are closely fitted precision members, does not provide for tight sealing of the container. Another arrangement which has been used utilizes an elongated guide member which runs in a track mounted on the door. This arrangement requires a heavy door construction to provide sufficient rigidity for the track. Also, with such a construction the door must be opened carefully or jamming will occur as one side of the door attempts to lead the other.

It is the primary object of the present invention to provide an improved door operating mechanism for a cargo container.

A further object of the present invention is the provision of a door operating mechanism in which the door may be of lightweight construction while providing for the secure sealing of the container.

Another object of the present invention is the provision of a door operating mechanism for a cargo container in which the possibility of jamming the door is substantially reduced.

Among the other objects of the invention are the provision of a door operating mechanism for a cargo container which mechanism does not occupy any otherwise usable space within the container, the provision of an operating mechanism which permits the door to be opened and closed in a relatively small area and which permits the opening and closing of the door even if there are obstructions present near the base of the container, the provision of a container door assembly which will remain in its closed position even if the guide roller becomes damaged or broken, and the provision of a door mechanism in which the operating members are readily accessible for repair or replacement, if necessary.

The above and other objects of the invention which will become apparent in the following detailed description are achieved by providing a door mechanism for a cargo container which consists, essentially, of a door having upper and lower sections connected by a

horizontal hinge, rollers mounted to brackets at the upper corners of the upper door section, guide tracks extending lengthwise along the upper ends of the end panels of the containers for receiving the rollers, anchoring pins at the lower end of the door for engaging recesses in the container base when the door is closed, and a latching mechanism for holding the door securely in a closed position.

For a more complete understanding of the invention and the objects and advantages thereof reference should be had to the following detailed description and the accompanying drawings wherein there is shown a preferred embodiment of the invention.

In the drawing:

FIG. 1 is a perspective view of a cargo container having the door mechanism of the present invention;

FIG. 2 is a side elevational view of the cargo container of FIG. 1;

FIG. 3 is an end elevational view of the cargo container;

FIG. 4 is a fragmentary vertical sectional view taken along the line 4—4 of FIG. 2;

FIGS. 5, 6, and 7 are fragmentary vertical sectional views taken along the lines 5—5, 6—6, and 7—7, respectively, of FIG. 3;

FIG. 8 is a fragmentary vertical sectional view taken along the line 8—8 of FIG. 2;

FIG. 9 is a fragmentary horizontal sectional view taken along the line 9—9 of FIG. 3 and showing the door latch mechanism employed on the container of FIG. 1;

FIG. 10 is a fragmentary sectional view taken along the line 10—10 of FIG. 3;

FIG. 11 is a fragmentary elevational view of the center portion of the door guide track;

FIG. 12 is a fragmentary elevational view showing the relationship of the guide roller and support bracket to the door and the track;

FIG. 13 is a fragmentary sectional view taken along the line 13—13 of FIG. 12;

FIG. 14 is a schematic cross-sectional view showing the door in a partially opened position;

FIG. 15 is a view similar to that of FIG. 14 but showing the door in its fully opened position; and

FIG. 16 is a fragmentary sectional view taken along the line 16—16 of FIG. 3.

CONSTRUCTION OF THE CONTAINER

A cargo container having the door mechanisms of the present invention is illustrated in FIGS. 1-3 and designated generally by the reference numeral 10. This container has a base 12, end panels 14 which may be corrugated metal sheeting, a top panel 16, and side panels 18. The side panels 18 are doors which may be opened to provide access to the container. As will be discussed in more detail below, each of the doors 18 consists of a lower door section 20 and an upper section 22 which are joined together by a horizontal hinge 24. Brackets 26 are affixed to the upper corners of the upper door panels 22 and these brackets journal rollers which run in tracks 28 extending across the top of the side panels 14. The lower edge of the door panel is provided with a number of pins 30 which engage mating openings 32 in the base 12 when the door is in a closed position. A latch mechanism 34 is provided for fasten-

ing the door in its closed position. The cargo container 10 may be provided with shelves 36, if desired, and these shelves may be removably secured within the container. Handles 38 may be provided on the ends of the container to facilitate movement and additional handles 40 provided on the door panels 18.

It should be understood that the present invention resides in the construction of the door assembly and operating mechanism and that the container may be of other configurations than that shown. The base and top panels 12 and 16, respectively, may be of any suitable construction. Likewise, the side panels 14 may be of any suitable construction and are not necessarily formed of corrugated sheets, as illustrated. Preferably, the side panels 14 are removably connected to the base 12 and top panel 16 so that the container may be disassembled for shipment or storage. One possible arrangement for securing the side panels 14 to the base 12 is shown in FIG. 4 where the lower end of panel 14 is provided with a rail 94 which is riveted to the panel and which includes an inwardly projecting web 96 which may be secured to the base by screws 98.

DOOR CONSTRUCTION

As can be seen from FIGS. 5 and 6, the upper door panel 22 consists of a corrugated metal sheet 38 positioned with the corrugation extending vertically. A top rail 40 having downwardly projecting flanges 42 and 44 is secured to the upper edge of the corrugated sheet 38 by means of rivets 46 and 48. The rail 40, which is preferably an aluminum extrusion, has a web portion projecting at right angles to the plane of the corrugated sheet 38 and terminating in a lip 52 extending generally parallel to the sheet 38. The rail 54 which forms the front edge of the top panel 16 has a continuous groove 60 which mates with the lip 52 of the door top rail 40. This arrangement provides a seal between the door and top member when the door is closed, and, as will be discussed below, holds the door in a closed position if the roller assemblies 26 become broken or damaged. A sealing gasket (not shown) may also be provided to form a tight seal between the rails 40 and 54. The rail 54 has projecting flanges 58 and 60 for engaging the top panel 16 and may be secured to this panel by any suitable means, such as riveting or welding.

A beam 60 extends along the lower edge of the corrugated sheet 38, the beam having upwardly projecting flanges 64 and 66 for engaging opposite faces of the corrugated sheet 38 and rivets 66 are employed to secure the beam to the sheet 38. A suitable handle 68 may be attached to the beam, preferably midway between the edges of the door panel 18. The beam 60 is preferably a hollow aluminum extrusion forming a box beam which extends the width of the door assembly. This construction permits the use of relatively light gauge corrugated sheeting 38 while still maintaining sufficient strength and rigidity in the door assembly. Further, the use of a horizontally extending beam in conjunction with the vertically extending corrugations of the sheets provides an exceptionally rigid yet lightweight door assembly. It should be noted, however, that while this is the preferred construction, other materials may be used in place of the corrugated sheeting 38 or the sheeting may be arranged with the corrugations extending horizontally.

The lower door section 20 also consists of a corrugated sheet 70 which again, preferably, has its corrugations extending vertically. An upper rail 72 having parallel flanges 74 is riveted to the upper edge of the corrugated sheet 76 and extends the width of the door assembly. This rail 72, again preferably an aluminum extrusion, has a web portion 78 extending upwardly from the rail 72 and at an angle to the plane of the corrugated sheet 70. Preferably, this angle is approximately 45°. One leaf of the hinge 24 is riveted or otherwise connected to the bottom surface of the beam 60 while the other leaf of the hinge 24 is riveted or otherwise connected to the angled web 78 of the rail 72. The hinge 24 may be a stainless steel piano hinge. However, other types of hinges may be employed, if desired.

While in the illustrated preferred embodiment of the door, the horizontal beam 60 is provided at the lower end of the upper door section 18, this beam may be located at the upper end of the lower door panel 20.

The lower door panel 20 is completed by a bottom rail 80 which has upwardly projecting parallel flanges 82 which are secured to the corrugated sheet 70 by rivets 84. A sealing member 86, for example a rubber or neoprene gasket, is provided along the lower surface of the bottom rail 80 performing a weathertight seal with the container base 12 when the door is closed. The pins 30 are connected to the lower rail 80 by suitable fasteners such as bolts 88.

The lateral edges of the upper door panel 22 may be provided with side rails 90. Side rails 92 may also be provided on the lateral edges of the lower door panel 20. Preferably, each of these rails 90 and 92 carries a sealing gasket for engaging the face of the rail 100 which forms the lateral edge of the container side panel 14. Obviously, if desired, the sealing strip may be affixed to the side panel rail 100 and engage the inner face of the door edge rails 90 and 92.

DOOR OPERATING MECHANISM

Referring now to FIGS. 8, 12, and 13, the door guide roller assemblies 26 and the tracks 28 will now be described. Affixed to each of the upper corners of the door panel assembly 18 are roller guide assemblies 26. Each assembly has an angle bracket 101 which has a first leg 102 extending parallel to the plane of the corrugated sheets forming the door and which is securely riveted or bolted to the door and a second leg 104 extending at right angles to the plane of the door. A stud or other suitable pin 106 is provided at the outer end of the bracket leg 104 and a guide roller 108 is journaled on the stud or pin. The roller 108 is preferably a nylon roller and, as can be seen from FIG. 13, the edge 110 of the roller furthest from the bracket is rounded on a fairly large radius while the edge 112 of the roller closer to the bracket has a smaller radius. A suitable bushing 116 may be provided on the stud 106 to assure free rotation of the roller 108.

The track 28 in which the roller 108 runs forms the top rail of the end panel 14 of the container assembly. As will be seen from FIG. 8, the track 28 has a channel-like passage 116 extending its length and the roller 108 runs in this passage, generally bearing on the wall 118. A downwardly projecting lip 120 serves to retain the roller within the channel 116. It should be noted that the roller 108 has a loose fitting relationship with the

channel 116, the roller being of sufficient height to be retained in place by the downwardly projecting lip 120 but normally being free to move a limited extent both vertically and laterally within the confines of the channel 116. This arrangement eliminates one of the major difficulties encountered with prior container door mechanisms where the door guide assemblies have relatively close tolerances. In such situations, if one side of the door is moved further than the opposite side, that is, if one side is leading the other side, the guide members tend to jam against the sides of the guiding track and the door becomes wedged. In the system of the present invention, however, the rollers 108 will continue to move within the channel 116 of the track 28 even if the door is considerably skewed. The radiused corners 110 and 112 of the roller together with the loose tolerances maintained between the roller and the walls of the channel 116 facilitate this action.

At the midpoint of the track 28 there is provided a stop member 124 which is retained by a bolt 126. The bolt 126 also retains a spring 128 which has downwardly projecting end portions 130 protruding into the channel 116 through suitable notches 132 in the rail 128. The downwardly projecting end portion 130 of the spring 128 serve to engage the rollers 108 to retain the doors in their fully opened position. In the container construction illustrated, the rollers for the doors on opposite sides of the container travel to substantially the midpoint of the container so that a common stop member 124 may be employed. Obviously, in a container construction in which the depth of the container is relatively greater than the height, separate stop members will be provided for the doors on the front and rear sides of the container.

The latch mechanism 34 employed to hold the doors in a closed position may be any suitable latch. Also, the location of the latch mechanisms are not critical so long as the mechanisms are capable of holding the door securely in its closed position. One mechanism which may be used is illustrated in FIG. 9. This latch mechanism has a housing 124 which is mounted at the end 126 of the beam 60, the outer wall of the beam being cut away at the end thereof. A latching stud 128 which has a frusto-conical head portion 130 and an annular groove 132 immediately below the head portion 130 is secured to the end panel rail 100 in any suitable manner. Slidably received within the housing 124 is a latch plate 134 which has a notch 136 at one end. When the latch plate is in the position shown in solid outline in FIG. 9 the notch 136 engages the annular groove 132 of the stud 128 to securely lock the door assembly and end panel 14 together. When the latch plate is slid to its open position, as shown in dotted outline in FIG. 9, the end portion of the latch plate is moved clear of the stud 130 so that the door may be opened. This latch mechanism is described in greater detail in Patent Application Ser. No. 201,590, filed Oct. 27, 1971 for Container Door Latch.

The manner in which the door assembly 18 is opened is illustrated in FIGS. 14 and 15. When the latch assemblies 34 have been released, the door is opened by pulling the handle 68 outwardly. This will result in a pivoting of the upper door section 22 about the studs 106 while the lower door assembly 20 pivots inwardly about the hinge 24 so that the lower end of the door

moves substantially vertically. This pivoting of the lower door section 20 relative to the upper door section 22 in the direction of the arrow A causes the lowermost end of the door to be raised before being swung outwardly and thus permits the door to clear obstructions such as the rail 138. It will be noted that the amount of movement in the direction of the arrow A is limited by the bottom side of the beam 60 and the web 78 of the lower door top rail 72. Typically, this movement will be through an angle of less than 45°. Once the door has been raised to the position shown in FIG. 14, the lower door section 20 can be pivoted upwardly about the hinge 24 in the direction of the arrow B to bring this door section into substantially parallel relationship with the upper door section 22. The top rail 40 of the upper door section 22 is provided with suitable clips 134 which engage the pins 30 to hold the upper section in this folded position. The door may now be continued to be moved upwardly, pivoting about the axis of the roller 108. As the door moves upwardly the roller 108 is free to move forwardly in the track 28, that is in the directions of the arrow C. This forward motion of the roller brings the upper portion of the door 22 to a position clear of the rail 54 at the edge of the top panel 16. The door is moved upwardly until it has assumed a substantially horizontal position. The door assembly 18 is now moved towards the container centerline, the rollers 108 running in the tracks 28 until they contact the stop members 124. Wear plates 122 may be provided at the corners of the top panel 16 so that the door can be easily slid to its fully opened position. Preferably, these plates 122 are formed of nylon or other suitable material which will not mar the faces of the door sections 20 and 22. It should be noted that as the door is opened only a small amount of distance above the container is necessary, the door being in a fully folded position before being slid along the top surface of the container. This arrangement, it will be noted, requires only a limited amount of vertical clearance above the container.

In order to hold the door in its open position hold down straps 138 may be provided. As is shown in FIG. 16, the straps 138 may be connected to a suitable rod 140 riveted to the corrugated sheet 70 forming the lower door panel. A hook member 142 is provided at the free end of the strap 138 and a rod 144 may be provided on the corrugated sheet 70 for retaining this hook when the strap is not in use. The hook 140 engages the lip portion 120 of the track 128 when the door is open to provide a hold down, preventing the door from accidentally being blown or knocked from its fully opened position.

As can be seen clearly from FIGS. 5 and 12, when the door is in its closed position, the lip 52 of the door top rail 40 engages the groove 60 of the top panel edge rail 54. Should one of the roller support brackets 101 become broken or one of the rollers 108 disengaged from the track 28 while the door is closed, the interlocking relationship of the lip 52 and groove 60 will hold the upper edge of the door in its closed position.

It should also be noted that the bracket 101 and rollers 108 are readily accessible and may be removed for repair or replacement, if necessary, without requiring the disassembly of the door itself.

While only the best known embodiments of the invention have been illustrated and described in detail herein, it will be clearly understood that the invention is not limited thereto or thereby. Reference should therefore be had to the appended claims in determining the true scope of the invention.

What is claimed is:

1. A door assembly for a container having a top panel, a base panel, and a pair of end panels connecting the top and base panels along opposite edges, comprising:
 - a door panel on at least one side of the container;
 - a pair of guide rails, one rail extending horizontally along the upper edge of each end panel;
 - a pair of guide rollers, one roller being associated with and running on each guide rail; and
 - a pair of brackets, one bracket being secured to each of the upper corners of the door panel, extending perpendicular to the plane of the door panel, and journaling one of the guide rollers for rotation about a horizontal axis parallel to the plane of the door panel.
2. The door assembly according to claim 1 wherein the door panel is comprised of upper and lower sections and a horizontally extending hinge connecting the upper and lower sections.
3. The door assembly according to claim 2 wherein the hinge permits the lower section to pivot relative to the upper section through only an angle of less than 45° toward the container and an angle of approximately 180° away from the container.
4. The door assembly according to claim 1 further including means to secure the lower end of the door panel to the base panel when the door panel is in its closed position.
5. The door assembly according to claim 1 further including latch means to secure the door in its closed position.
6. The door assembly according to claim 1 wherein each guide rail is of channel-like configuration having its open side directed away from the container.
7. A container door assembly for a container having top, bottom, and end walls and at least one open side, comprising:
 - a door panel which, when in closed position, covers the open side of the container;
 - latching means for securing the door panel in closed position; and
 - a guide mechanism for the door panel to direct the panel between its closed position and an open position in which the panel is positioned above and substantially parallel to the top of the container, the mechanism comprising
 - a pair of channel-like tracks, the tracks being located at opposite edges of the top wall of the

- container and extending perpendicular to the plane of the open side,
- a guide roller associated with each track and running in the channel thereof, and
- a bracket journaling each roller for rotation about an axis parallel to the planes of the opening and the top wall, the brackets being secured to the respective upper corners of the panel and extending generally perpendicular to the plane of the panel.
8. The container door assembly according to claim 7 wherein the door panel is comprised of upper and lower panel sections and hinge means connecting the upper and lower sections.
9. The container door assembly according to claim 8 wherein the latching means comprises at least one pin projecting downwardly from the lower edge of the lower panel section, the bottom wall of the container having a recess for receiving the pin, a first latching member mounted on the door panel, and a second latching member mounted on the container, the first and second latching members co-operating to releasably secure the door panel.
10. The container door assembly according to claim 9 further including clip means carried by the upper panel section for engaging the pin to retain the lower panel section in folded relation to the upper panel section.
11. The container door assembly according to claim 7 wherein each track comprises a rail connecting the top wall to the respective side wall of the container.
12. The container door assembly according to claim 11 wherein the roller receiving portion of each track is of generally rectangular cross section having a slot extending along the outer side edge of the track.
13. The container door assembly according to claim 12 wherein each guide roller is a cylindrical roller of lesser diameter and width than the height and width, respectively, of the channel, the edges of the roller being rounded.
14. The container door assembly according to claim 13 wherein the radius of the roller edge adjacent the outer side of the channel is smaller than the radius of the opposite edge of the roller.
15. The container door assembly according to claim 11 wherein the channel portion of each track is offset inwardly from the plane of the corresponding end wall of the container.
16. The container door assembly according to claim 7 further including a stop within each track for limiting inward movement of the rollers.
17. The container door assembly according to claim 16 further including means adjacent each stop for releasably engaging the roller to hold the door panel in its fully open position.

* * * * *