United States Patent [19]

März

[11] **3,841,516**

[45] **Oct. 15, 1974**

[54] **CONTAINER**

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[73] Assignee: **Martin Fiala KG**, Korntal, Germany

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[30] **Foreign Application Priority Data**

May 3, 1971 Germany 2121686

[52] **U.S. Cl.** ..... **220/1.5**, 16/171, 49/394, 220/55 W, 292/41, 292/300

[51] **Int. Cl.** **B65d 87/00**, E05c 19/00

[58] **Field of Search** ..... 220/1.5, 55 Y, 55 W, 55 Z; 16/176, 171, 172; 292/32, 41, 300; 49/394, 395

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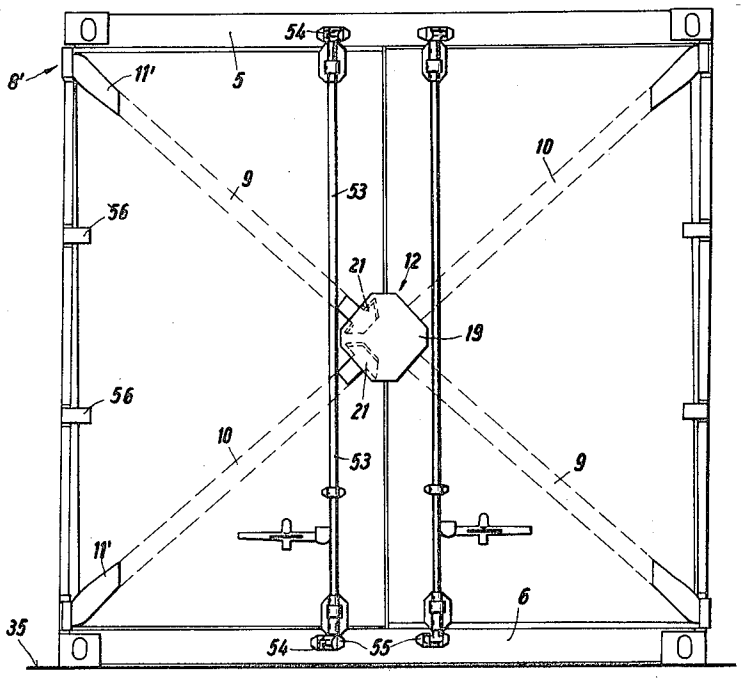
Assistant Examiner—Allan N. Shoap
Attorney, Agent, or Firm—Walter Becker

[57] **ABSTRACT**

A container especially for shipping goods and adapted for being stacked, which container has top and bottom and side walls and front and back end walls with a gate in one of the end walls consisting of two wings with elements of a positive interconnection on the wings near the center parts of the free edges. Hinges at the top and bottom of the other edges of the wings pivotally connect the wings to the container and together with the aforementioned elements brace the container against lateral deflection. Advantageously, brace elements extend diagonally from each wing to the pertaining element for positively interconnecting the wings to add strength to the structure.

23 Claims, 20 Drawing Figures



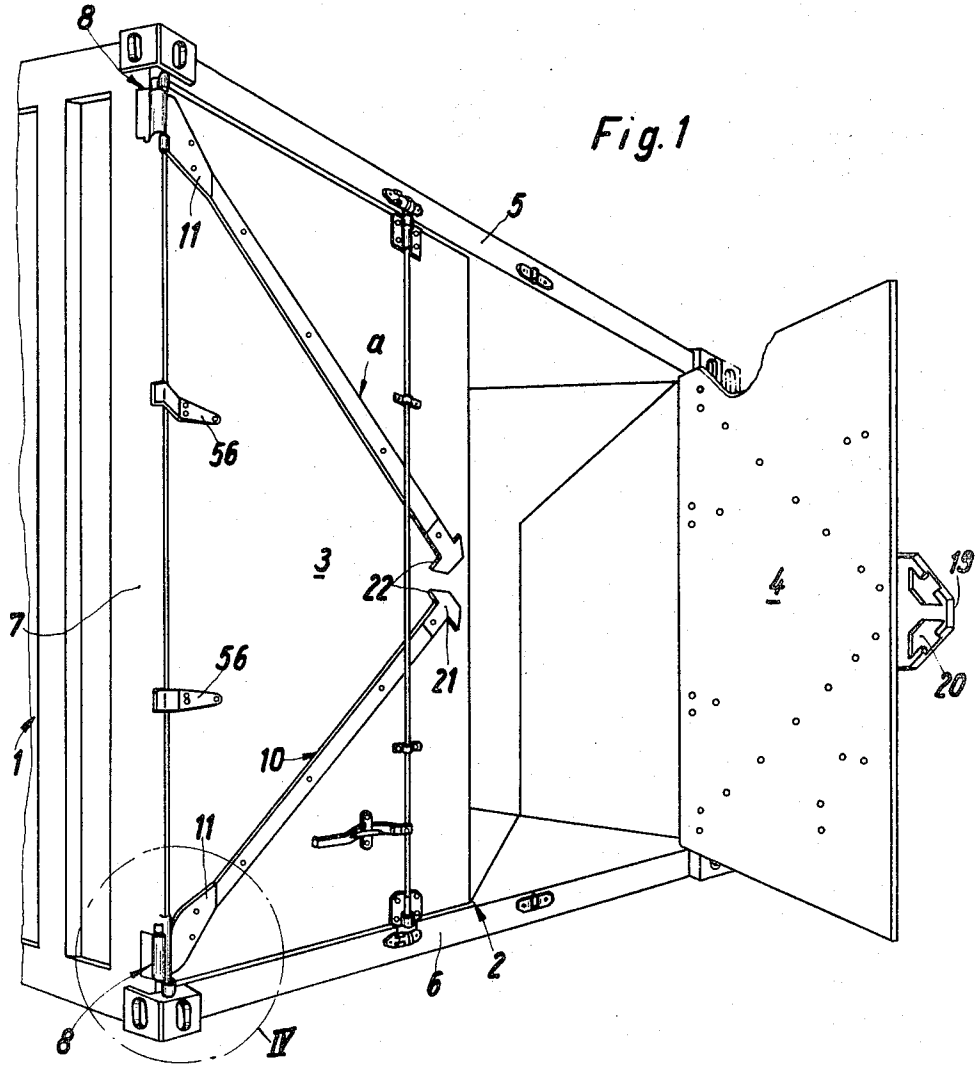


Fig. 1

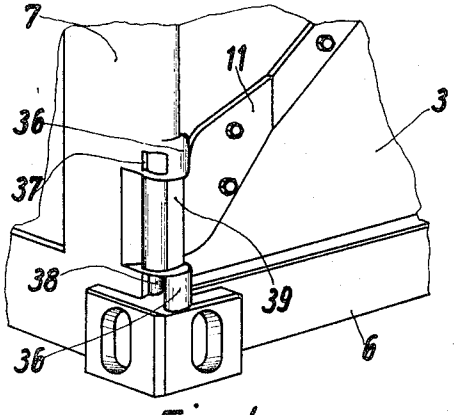


Fig. 4

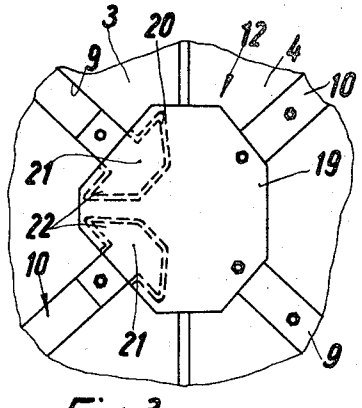


Fig. 3

Fig. 2

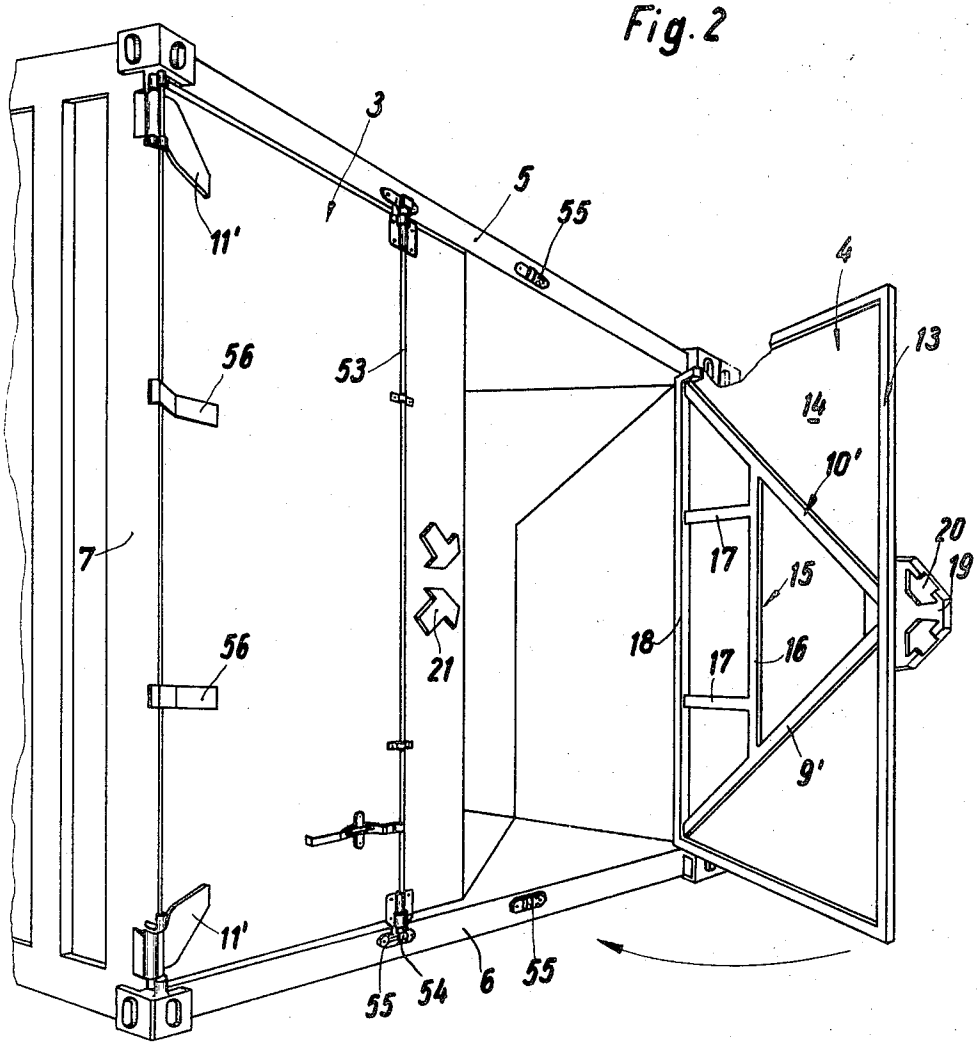
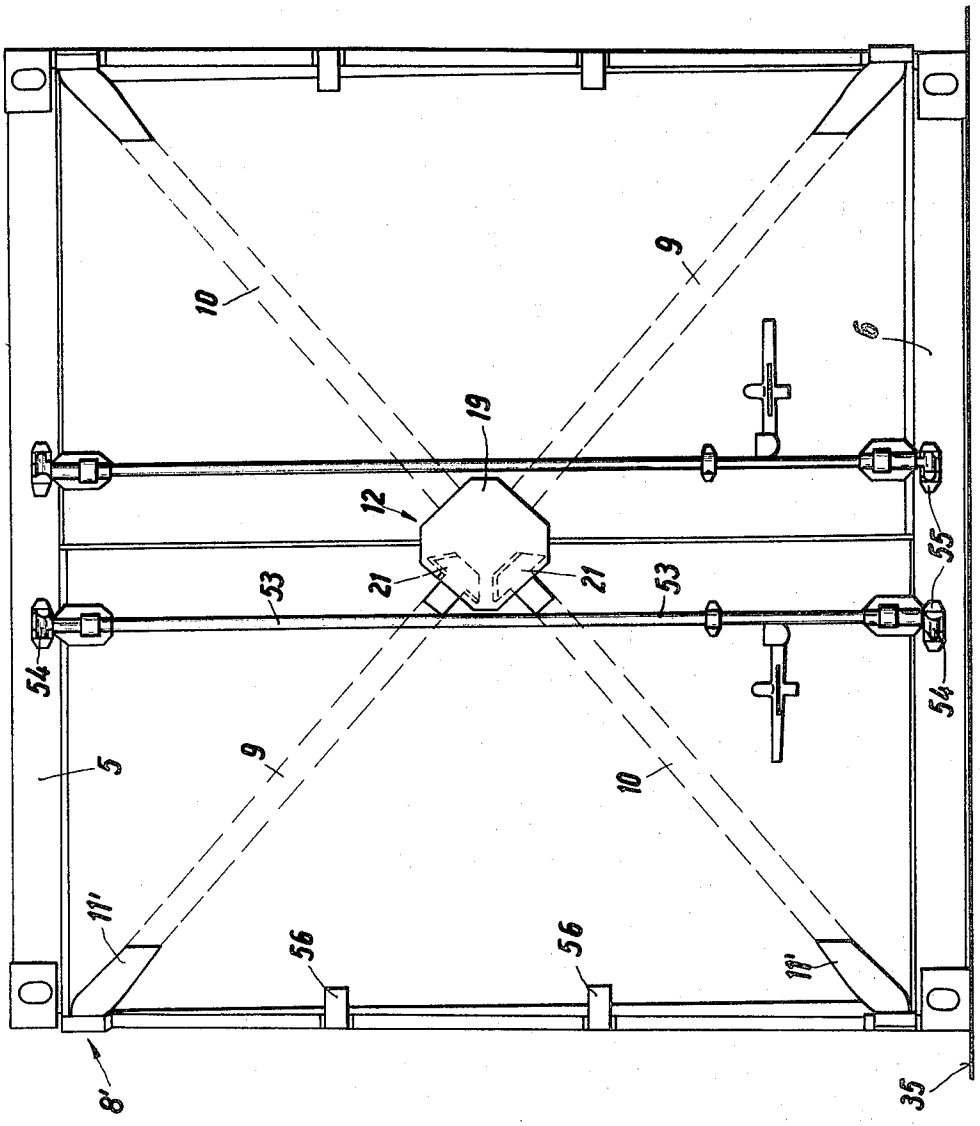


Fig. 5



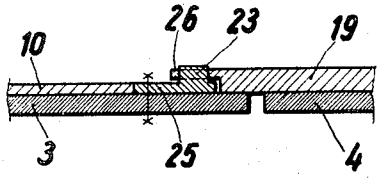


Fig. 7

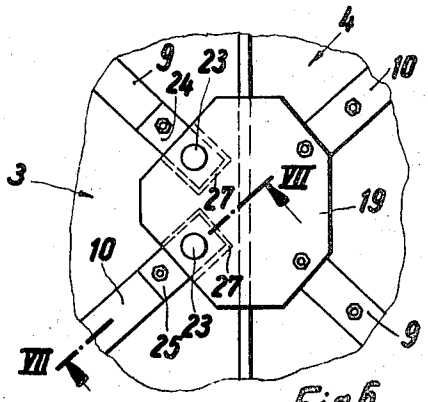


Fig. 6

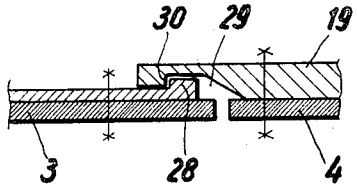


Fig. 9

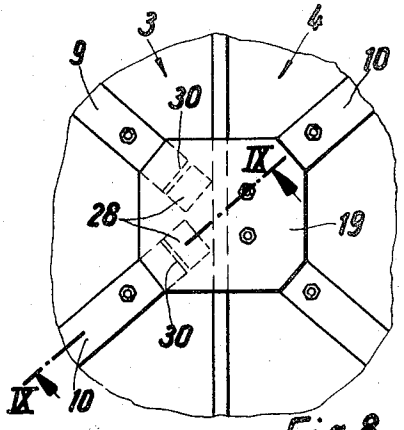


Fig. 8

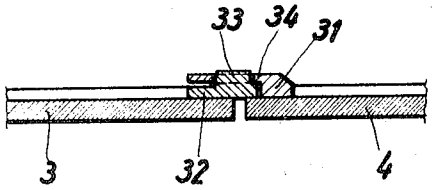


Fig. 11

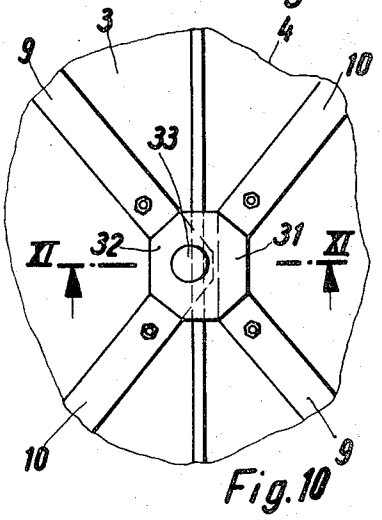


Fig. 10

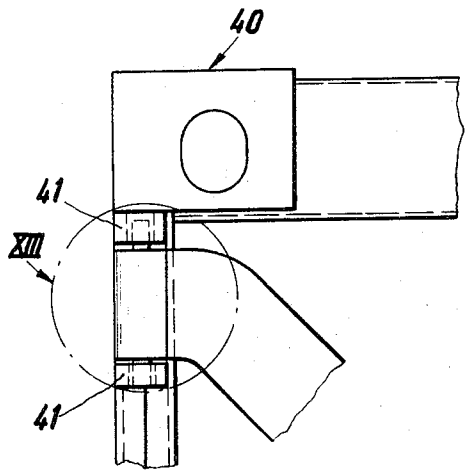


Fig. 12

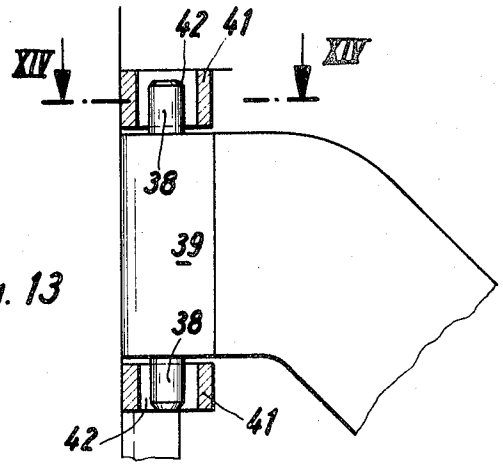


Fig. 13

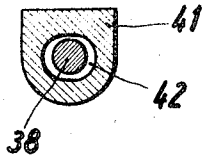


Fig. 14

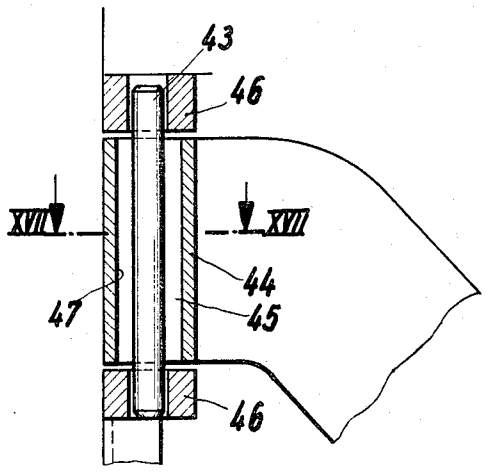


Fig. 15

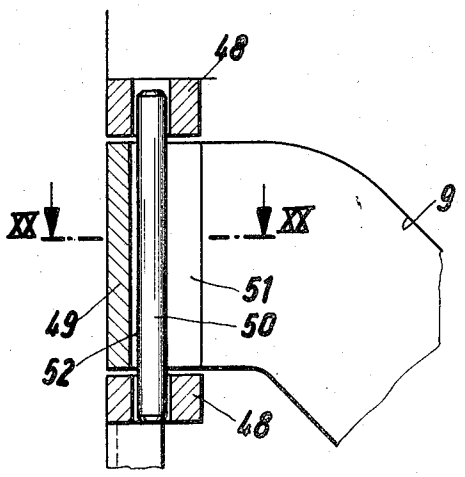


Fig. 18

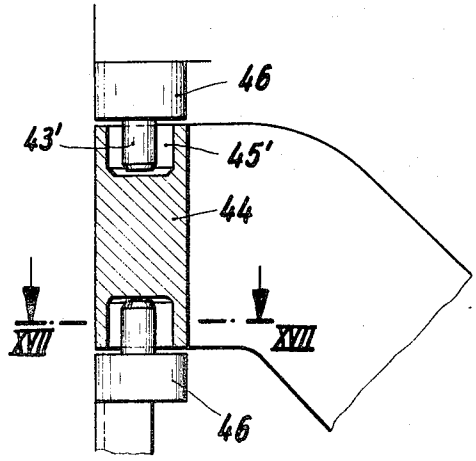


Fig. 16

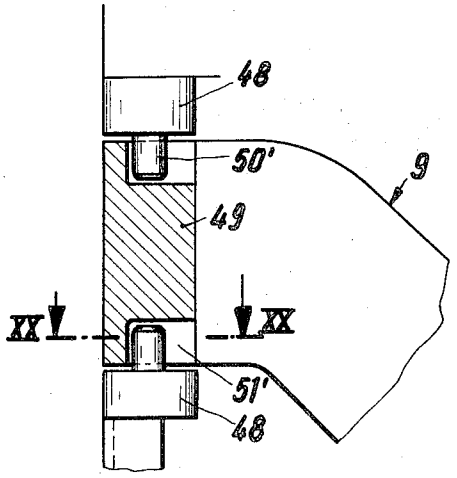


Fig. 19

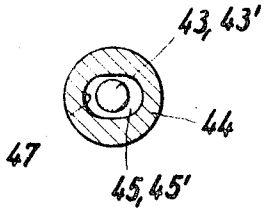


Fig. 17

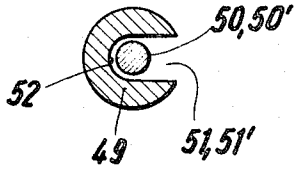


Fig. 20

CONTAINER

The present invention relates to a container with a gate provided on at least one end face of the container, said gate having two wings which are hinged within the region of the gate corners to a gate frame and are adapted in their closing position to be fixed relative to said gate frame.

In practice, containers of this type are frequently subjected to considerable loads and especially torsion loads. These loads are due to the fact that such containers are frequently stapled one above the other in the longitudinal direction on the deck of a ship with three or four containers on top of each other and are locked in this position. Such loads occur in particular with heavy seas when the ship alternately inclines up to an angle of 45°, which fact harmfully affects the loads especially when the alternate loads alternate rather frequently.

In order to check the properties of containers of the above mentioned type, which are built in conformity with international standards (ISO) concerning such loads, the containers are tested in conformity with testing regulations in connection with which the so-called torsion or racking tests are to be considered the most difficult ones to meet.

With the torsion or racking tests, the two respective lower corner fittings of a container end wall are anchored to the ground, and thereupon a force of 12,700 kilograms is applied, which force acts horizontally in the direction of the central axis of the upper end wall beam. It is intended in the future to increase this force to 15,000 kilograms and to apply the force alternately three times from the left and from the right. In this connection, alternating loads of this size have proved particularly critical for the rear end wall of the container which is equipped with two door wings.

With heretofore constructions, attempts have been made to increase the torsion resistance of the container within the region of the end wall, which practically is formed over the entire surface thereof by the door wings. To this end, it has been suggested toconnect the door wings to the door frame by end wall beams so as to form a "disc." To this end, the door wings were respectively connected to the upright beam of the door frame by four or five massive hinges, and in addition thereto, closure means associated with the door wings were provided for each door wing. These closure means were formed by pivotable bars connected to the door wings, which by clamping cams at their ends engage recesses provided at the upper and lower gate transverse beam. In addition to these closure means, of which there were provided two per each door wing in a heretofore known construction, there were, within the region of the division of the gate, provided beams extending in upward direction. One of each beam is associated with a door wing, and these beams are likewise locked relative to the gate transverse beam.

In spite of such expensive gate abutment and locking constructions in which the introduced torsion forces exert considerable bending moments on the gate frame and also exert high shearing forces upon the gate hinges, it was frequently impossible with heretofore known constructions to avoid twisting of the door frame at reasonable construction costs, which fact, in view of the already complicated closing and opening of

the gates of heretofore known constructions, resulted in many difficult problems.

It is, therefore, an object of the present invention so to design and improve a container of the above mentioned type that the above mentioned drawbacks of heretofore known constructions of the type involved will be avoided, and that the required reinforcement of the end face of the containers which comprises the double wing gate can be realized with structurally simple means.

These objects and other objects and advantages of the invention will appear more clearly from the following specification in connection with the accompanying drawings, in which:

FIG. 1 is a perspective view of the rear end wall of a container, which end wall is provided with a two-wing gate while in conformity with the invention diagonally oppositely located frame corner sections are connected to each other by means of a support which with the gate closed is adapted to be subjected to load in pulling direction but is yieldable in pressing direction.

FIG. 2 shows a modification over the frame corner sections of FIG. 1.

FIG. 3 is a diagrammatic illustration of a positive coupling employed with the embodiment of FIG. 1, by means of which in closed position of the gates those struts are in pulling direction non-yieldably connected to each other which extend in the direction of the diagonals interconnecting the corner sections of the frame.

FIG. 4 illustrates on an enlarged scale that portion of FIG. 1 which is encircled by a dot-dash circle IV.

FIG. 5 is a front view of the back side of a container of FIG. 2, which back side is provided with the two-wing gate, said container being subjected to torsion by a force acting in the direction of the upper transverse beam of the gate frame.

FIG. 6 shows a further development of the positive coupling according to FIG. 3.

FIG. 7 represents a section taken along the line VII—VII of FIG. 6.

FIG. 8 represents a third embodiment of a positive coupling according to the invention.

FIG. 9 is a section taken along the line IX—IX of FIG. 8.

FIG. 10 represents a fourth embodiment of a positive coupling according to the invention.

FIG. 11 illustrates a section taken along the line XI—XI of FIG. 10.

FIG. 12 is a diagrammatic illustration of the left-hand upper corner range of the rear wall of a container according to FIGS. 1 or 2, which rear wall is provided with the gate.

FIG. 13 shows on an enlarged scale that portion of FIG. 12 which is encircled by a dot-dash circle XIII and illustrates an embodiment of a link forming a hinge in conformity with the invention.

FIG. 14 is a section taken along the line XIV—XIV of FIG. 13.

FIG. 15 illustrates, similar to FIG. 13, a further embodiment of a link according to the invention.

FIG. 16 represents a further embodiment of a link according to the invention illustrated in a manner similar to that of FIG. 13.

FIG. 17 represents a section taken along the line XVII-XVII of FIGS. 15 or 16 and diagrammatically illustrates the design of the hinge eye when the hinge

bolt or connected hinge pivot is fixedly connected with the bearing supports.

FIG. 18 shows still another embodiment of a hinge according to the invention in a manner similar to FIG. 13.

FIG. 19 illustrates, similar to FIG. 13, an additional embodiment of a link according to the invention.

FIG. 20 diagrammatically represents a section taken along the line XX—XX of FIG. 18 or 19 through the hinge eye.

The container according to the present invention is characterized primarily in that with the gate closed there is provided a support which is adapted to be loaded in pulling direction and is yieldable in pressing direction while being arranged between diagonally oppositely located frame corner sections. This support comprises a positive coupling bridging the dividing plane of the gate and extends from the gate links pertaining to the frame corner areas. Said gate links respectively comprise 2° of freedom and in a plane parallel to the gate plane respectively form merely in the direction toward the door opening an abutment corresponding to the rated position of the gate. With the design according to the present invention, the occurring twisting forces are absorbed by pulling forces so that a favorable flow of forces and a moment-free support is obtained. The twisting of the outer or door frame from its rectangular position can with the arrangement according to the invention be precisely determined and limited. In this way, not only the danger of damage to the door and door jamming will be excluded but also the safety on ships of closesly adjacent containers will be increased and deck lashing will be relieved. Inasmuch as the twisting forces are absorbed by pulling forces, also the twisting of the individual frame parts as for instance the upper and the lower gate transverse beam will be avoided by the very high forces in the points of attack of the gate closing means.

According to a further development of the invention, it is expedient to arrange the positive coupling centrally in the intersecting region of the diagonals interconnecting the corner areas of the frame, and to have said positive coupling composed of two parts which are respectively associated with the gate wings and interengage when the gate is closed. In this way, when closing the gate, the pulling connection between diagonally oppositely located corner points of the gate frame is directly secured.

Particularly unequivocal power path and also particularly light gate constructions are in conformity with a further development of the invention obtainable by connecting one part of the coupling associated with one of the gate wings by means of struts extending along diagonals interconnecting corner areas connected to the links located within the region of the frame corner points and pertaining to the respective gate wing. Expediently, the V-shaped struts pertaining to a gate wing and extending away from each other from the corresponding part of the coupling may form fittings for the gate wings. In order to secure a favorable power transfer between the hinged linkage points provided within the region of the frame corners on one hand and the struts on the other hand, it has proved expedient to connect these points directly to the abutment part at the gate side of the abutment forming a hinge.

According to a further development of the invention, it has proved advantageous when at least one of the respective parts of the coupling pertaining to a gate wing protrudes beyond the pertaining gate wing and with the closed gate overlaps the other gate wing as well as that portion of the coupling which pertains to said other gate wing so that a separate abutment angle on one of the gate wings and for duty technical reasons on the left gate wing is not necessary.

According to a further development of the invention, it has been proved expedient to form the overlapping coupling part by a plate to which are connected the struts pertaining to the corresponding gate wing. Within the framework of the present invention, it is, of course, also possible to extend the struts pertaining to one of the gate wings beyond said gate wing and to design the same in such a way that these struts form a coupling part associated with one gate wing. The coupling part associated with the other gate wing may be formed by end sections of struts associated with the corresponding gate part, extending in a V-shaped manner toward each other and being independent of each other.

Within the scope of the invention, it is also possible to form both coupling parts by plates which are connected to struts associated with the respective corresponding gate wing. These plates overlap each other with the gate closed in such a way that the positive closing connection effective in pulling direction is located in the point of intersection of the straight lines which interconnect diagonally oppositely located frame corners.

As closing connection effective in the pulling direction along diagonal interconnecting oppositely located frame corners there may between the two coupling parts preferably be provided a pivot or a hook connection. Especially when the positive closing connection is always absorbed by the same positive closing element, regardless of along which diagonal the pulling force acts, a stud connection with round studs is particularly advisable. The support according to the invention, which is adapted to be loaded in pulling direction when the gate is closed and which in pressing direction is yieldable, can be realizedin a simple manner in that by an arrangement according to which with the link connections formed by hinges which respectively comprise two bearing supports, a hinge eye between said bearing supports and a hinge stud interconnecting the bearing supports and the hinge eye, the hinge eye is displaceable toward the outside relative to the bearing supports in a plane parallel to the gate plane from an abutment position which with regard to the gate frame is an inner abutment position and corresponds to the rated position of the respective gate wing.

This goal can be reached according to the present invention in various ways for instance by providing a fork-shaped slot for receiving the hinge bolt in the bearing supports, said slot being open toward the outside of the frame and extending in the direction of the plane of the gate while said reference to its cross section being perpendicular to said gate plane. Similarly, the displaceability may also be obtained by providing a fork-shaped slot for receiving the hinge slot, said slot being arranged in the hinge eye and with regard to the closing position of the respective gate wing being open toward the inner side of the frame while extending in

the direction of the gate plane and with reference to the cross section being perpendicular to said gate plane.

Instead of slots for receiving the hinge bolts, also correspondingly arranged oblong holes may be provided in the bearing supports or in the hinge eye. If the hinge bolt is formed by a bar-shaped element which is arranged between the bearing supports, it is necessary with the design of the slot or oblong hole provided in the hinge eye that the said slot or oblong hole extends over the entire length of the hinge eye. Instead of such hinge bolt, it is also possible according to the invention to provide hinge studs which are arranged either on the hinge eye or on the bearing supports. When employing hinge studs on the bearing supports, only the end sides of the adjacent ranges of the hinge eye need be provided with a slot or an oblong hole. For dimensioning the slot or oblong hole, it is expedient to make the width thereof somewhat greater than the diameter of the hinge bolt or hinge stud.

In view of the required rigidity of the corner connections of the gate frame according to the invention, it has provded expedient to provide the gate frame with cast corner sections and to provide the bearing supports which pertain to the hinging links provided in the frame corners with embracing corner parts. In this way, a particularly simple and favorable overall construction is obtained which is characterized by a particularly simple design of the hinge means.

According to a still further development of the invention, the gate wings are connected to the gate frame by at least one hinge of customary construction provided between the hinging links arranged within the region of the corners of the frame. In view of the fact that this hinge, due to the construction according to the invention, has merely to guide the respective gate wing when the latter is opened, it may be made relatively weak. In this connection, it is expedient also to provide the hinge, which is located in the region between the linkage means associated with the corner areas of the frame, with sufficient stud play in order to avoid jamming. Instead of an additional hinge for guiding the respective gate wing and located between the hinge means associated with the corners of the frame, it is, of course, possible to provide a plurality, preferably two hinges.

Inasmuch as with the construction according to the invention, only one gate closing means is provided for each gate wing, and since this closing means does not have to contribute to the reinforcement or stiffening of the gate frame but merely serves for anchoring the respective gate wing in its closing position, the opening and closing of the two-sectional gate is particularly simple with the arrangement according to the present invention. The said closing means is advantageously formed by a bar pivotable on the gate wing and extending upwardly, said bar within theregion of its ends being provided with cams having associated therewith corresponding receiving means at the upper and lower transverse beam of the gate frame.

Furthermore, with the construction according to the invention, also the assembly of the gate wing can easily be effected since when receiving the hinge bolt of the hinge connections located within the region of the frame connections, in slots of the bearing supports or in a slot of the hinge eye, the gate wings have to be suspended only. The great play which, with the construction according to the invention, is present in the hinges and may also be present in the closing means will assure that the gate wings can be well pivoted also when local deformations within the region of the gate occur. Furthermore, with the construction according to the invention, the lubrication of the hinges is of secondary importance in view of the large possible play in the hinges, which fact represents a considerable advantage over heretofore known constructions of the type involved. Over heretofore known constructions, the present invention excels also by saving hinges and additional closure means so that a container equipped according to the present invention not only has a higher twisting or torsion resistance but can additionally be made in a simpler and thereby less expensive manner. This fact is greatly aided by the fact that the stability of the leaves of the gate wings may be considerably less because they do not have to contribute to the stiffening of the frame.

Referring now to FIG. **1**, the arrangement shown therein comprises a container **1** of which in perspective illustration there is visible primarily only the rear side equipped with a gate **2**. Containers of the illustrated type are standardized as to their fundamental measurements and serve as large volume freight containers. Gate **2** has two wings **3, 4** of which wing **3** is shown in its closing position whereas wing **4** occupies its opening position. The wings **3, 4** are connected to the gate frame which forms the closure of the longitudinal walls of container **1** at the end face side. The gate frame comprises an upper transverse beam **5** and a lower transverse beam **6** as well as upright longitudinal beams **7** one of which only is visible. The connection of the gate wings **3, 4** is, as illustrated for the wing **3**, effected primarily by linkage means **8** provided within the region of the gate frame corners of which special designs will be explained further below. Between diagonally oppositely located frame corners or hinging means **8** pertaining thereto, there is provided (see in particular FIG. **5**) a support which is adapted to be subjected to loads in pulling direction. This support, in the illustrated embodiments, that of FIG. **1** being considered first, is formed by diagonally extending struts **9, 10**. The struts **9, 10** are, within the region of the link connections **8**, connected to the connecting part of fitting **11** on the gate side and within the region of the separating plane between the two gate wings where they are divided, are connected to each other through the invention of a positive coupling **12** (FIG. **3**). If as in the embodiment of FIG. **1**, the leaves of the gate wings **3, 4** are formed by plane self-supporting plates, those sections of the struts **9, 10** which are connected to the fittings **11** on the gate side, preferably by welding, and are respectively associated with a gate wing, **3, 4**, are preferably screwed onto the outside of the gate leaves.

If the gate wings as in the embodiment of FIG. **2** have frame **13** to the outside of which there are mounted covers for instance cover plates **14**, it is expedient to arrange the struts (**9'** and **10'** of FIG. **2**) with their sections respectively associated with a gate wing **3, 4** within the frame **13**. For stiffening the respective gate wing frames **13**, which include the corresponding strut sections, and also the additional support for the cover **14**, it is possible, as illustrated in FIG. **2**, to provide additional stiffening means **15** between the sections os struts **9'**, which sections are associated with a gate wing for instance the wing **4**. In the embodiment according to FIG. **4**, these stiffening means **15** are formed by a

profiled strut **16** which extends parallel to the vertical edges of frame **13** and by two transverse struts **17** which extend between the profiled struts **16** and the outside frame beam **18** of frame **13.** Also with this embodiment, the fittings on the gate side (here indicated by the reference numeral **11'**) are preferably directly connected to those sections of the struts **9', 10'** which pertain to the respective gate wing **3, 4.**

As mentioned above, the struts **9, 10; 9', 10'** are interrupted within the region of the division of the gate and when the gate **2** is closed are non-yieldably connected to each other in pulling direction by a positive coupling **12.** The coupling **12** of the embodiments according to FIGS. **1** and **2** is shown in detail in FIG. **3** and comprises primarily a plate **19** which is connected to the gate wing **4** and in closed position of gate **2** overlaps the central portion of gate wing **3.** Plate **19** is provided with recesses **20** having associated therewith counter members **21** on the gate wing **3** which counter members when the gate **2** is closed nest in the recesses **20** in such a manner that in pulling direction a non-yieldable anchoring of the sections of struts **9, 9'; 10, 10'** is obtained, which sections are provided along the diagonals and pertain to different gate wings **3, 4.** Of those parts of the positive coupling **12** to which the corresponding sections of struts **9, 10; 9', 10'** are respectively firmly connected, those sections of struts **9, 10; 9', 10'** which are associated with the corresponding gate wings, extend away from each other in a V-shaped manner. As will be seen from the drawings, the said parts of the coupling **12** are formed on one hand by plate **19** provided with recesses **20** and on the other hand by counter members **21.** The said parts of the coupling **12** are respectively associated with the gate wings **4** and **3.**

According to one embodiment of the coupling **12** as shown in FIGS. **1–3,** the counter members **21** are connected only with the pertaining strut section but are not connected to each other. Plate **19,** which is placed on the outside of the gate wing **4** is, on the other hand, directly connected to the strut sections pertaining to the corresponding gate wing. The recesses **20** in plate **19** have, in conformity with the shape of the counter members **21,** approximately trapezoidal cross section and are machined into the inner surface of plate **19** which in closed position of the gate faces toward the gate wing **3.**

The trapezoidal counter members **21** are so mounted on the gate wing **3** that they taper in the direction toward the oppositely located gate wing **4** so that in pulling direction relatively wide engaging surfaces **22** are obtained between the counter members **21** and the corresponding rim portions of the recesses **20.** As indicated in FIG. **3,** the recesses **20** may advantageously be over-dimensioned relative to the counter members **21.** With the gate wings closed, the play between the engaging surfaces **22** of the counter members **21** and the corresponding surfaces of the recesses **20** should be as small as possible.

Further embodiments of positive couplings **12** according to the invention are illustrated in FIGS. **7–11.** All embodiments in these figures have in common that the coupling **12** is located within the region of intersection of the diagonals which interconnect diagonally oppositely located frame corners.

The embodiment of FIG. **6** corresponds to a great extent to the embodiment of FIGS. **1** to **3,** and the same reference numerals used in connection with FIGS. **1** to **3** are therefore also applied with regard to the embodiment of FIG. **6.** According to the embodiment of FIGS. **6** and **7,** the positive connection between the plate **19** associated with the gate wing **4** and connected to the sections of struts **9** and **10** provided on these gate wings on one hand, and the sections of the corresponding struts associated with the gate wing **3,** is effected by connecting studs **23.** These connecting studs **23** are provided on sections **24, 25** ofthe corresponding strut sections, said sections **24, 25** being located in the overlapping range of plate **19.** Round recesses **26** in plate **19** correspond to the circular studs **23.** In the overlapping range of plate **19** with the sections **24** and **25,** the plate **19** has additionally recesses **27** in which the sections **24, 25** are located so that an overall flat construction is obtained.

According to the embodiment of FIGS. **8** and **9,** the struts **9** and **10** are, within the region of their sections **24, 25,** provided with a bead **28** which extends transverse to the direction of extension of the struts. Corresponding to the bead **28,** the plate **19** is provided with a recess **29** which has a rim **30** extending behind the bead **28** in pulling direction. In other respects, this embodiment, as far as its construction is concerned, corresponds to a major extent to that of FIGS. **6** and **7.** In contrast to the showing of FIGS. **6** and **7,** the plate **19** has an almost square-shaped cross section. In view of the over-lapping within the range of the positive coupling **12,** additional fittings, as strips or the like, can be omitted.

While with the above mentioned embodiments of the coupling **12** separate connections are provided for the strut sections with extend along a diagonal and are interrupted, according to FIGS. **10** and **11** there is provided an embodiment according to which a common positive connection is provided for the intercrossing and respectively interrupted struts **9** and **10.** To this end, the strut sections respectively associated with the gate wings **3, 4** are within the region of their intersecting points connected by plates **31** and **32** which overlap each other within the region of intersection of the diagonals when the gate is closed. The plate **32** is equipped with a stud-shaped extension **33** of circular cross section, which extension, when the gate is closed, engages a corresponding recess **34** of plate **31,** which latter partially rests on plate **32.** Stud or pivot **33** is located at the point of intersection of the diagonals as shown in FIG. **10** so that by means of said stud **33** always a proper power transfer is assured regardless of whether the struts **9** or **10** are subjected to pulling stresses.

Due to the fact that frame corners diagonally located opposite to each other and pertaining to the rear end face of the container **1,** which end face comprises the two-sectional gate **2,** are connected to each other so that they can be subjected to load only in the pulling direction, the design according to the present invention is able to absorb high torsion or twisting forces without any material distortion of the container. In order to make sure that with a twisting or torsion of the container, the pulling loads or stresses occur along a diagonal interconnecting two diagonally oppositely located frame corners and that no pressure load will occur in the direction of the other diagonal, the linkage means **8** for the gate wings **3, 4** within the range of the frame corners are so designed that the pivot axes of the linkage means can in pressing direction escape toward the

outside. Different embodimens of linkage means 8 by means of which the above conditions can be realized will now be described.

With linkage means 8 as they areshown in FIGS. 1, 2 and 4, the said operation or functioning is realized by the fact that the bearing supports 36 connected to the upright longitudinal beams 7 of the gate frame are respectively provided with a slot-shaped recess 37 extending in the direction of the gate plane and cross section-wise extending perpendicular to said gate plane. The width of such recess 37 is somewhat greater than the diameter of the hinge pivots 38 which are connected to the hinge eye 39, which latter forms a component of the fitting 11 on the gate side. Instead of separate hinge pivots 38, it is, of course, also possible to provide a single hinge bolt extending all the way through. That surface of slots 37 which is not visible in FIGS. 1, 2 and 4 and faces toward the gate inner side is surrounded in conformity with the diameter of the pivot 38. This surface represents for the hinge stud or pivot 38 an engaging surface when the respective gate wing for instance wing 3 occupies its rated closing position. This applies to the two linkage means 8 associated with a gate wing and arranged within the region of frame corners located above each other while the gate frame is of rectangular shape and the gate wing is in its closing position. This starting position of the gate frame is illustrated by dot-dash lines in FIG. 5. If now the gate frame as shown in FIG. 5 while being anchored relative to the surface 35 is subjected to a transverse force for instance a force P acting in the direction of the upper gate frame transverse beam 5, the gate frame will with a correspondingly heavy load occupy the position shown in full lines in FIG. 5. In this position, the gate frame has the shape of a paralellogram, and different lengths are obtained for the lines connecting diagonally oppositely located frame corners. From these changes in length, again with regard to the illustration of FIG. 5, pulling stresses in the direction of the strut 10 occur to which when retaining the starting position of the linkage means 8 associated with the struts 9 relative to the frame, a pressure load would correspond in the direction of the strut 9. This pressure load, however, will not occur with the arrangement according to the invention because in view of the design of the linkage means 8, the latter are able to escape in response to a shortening of the diagonal length. With regard to a design of the linkage 8 as it is shown in FIGS. 1, 2 and 4, this means that the hinge eye 39 and the hinge pivots 38 connected thereto can move in the direction toward the outside in the slots 37.

With a construction of the linkage means 8 in conformity with FIGS. 12–14, the desired operation is realized by the fact that the bearing supports 41 connected to the corner part 40 of the gate frame have oblong holes 42 for receiving the hinge pivots 38 connected to the hinge eye 39, said oblong holes 42 extending in the direction of the gate plane, and in cross section are perpendicular to the gate plane.

The1same effect is realized with the arrangement of FIG. 15 by the fact that the hinge eye 44 comprises a bore in the form of an oblong hole 45 for the hinge bolt 43, which latter is held in the bearing supports 46. With regard to the rated position of the gate wing with a rectangular gate frame and with a closed gate, with this design, that surface 47 of the oblong hole 45 which is adjacent to the outside of the frame will engage the hinge bolt 43. When pressure stresses occur, thus also in this instance the hinge eye 44 and thereby also the gate wing will be able in its range adjacent to said hinge means to move in outward direction.

Whereas with the design of FIG. 15 there is provided a hinge bolt 43 extending all the way through, FIG. 16 shows an embodiment in which instead of one hinge bolt there are employed two hinge pivots 43′ which engage oblong holes 45′ designed in conformity with the oblong hole 45.

Whereas with the hinge means of FIGS. 1, 2 and 4, the bearing supports have slots 37 in which the hinge eye together with the hinge pivot can escape toward the outside of the frame, FIGS. 18–20 illustrate two embodiments according to which the hinge eye 49 itself is so designed that a displacement toward the outside of the frame will be possible. This is realized according to FIG. 18 by the fact that the hinge eye 49, which is guided on a hinge bolt 50 held in the bearing supports 48, is over its entire length provided with a slot-shaped recess 51 which latter opens toward the gate. The engagement of the rearward slot surface 52 with the hinge bolt 50 in the vicinity of the outside of the frame corresponds to an above mentioned rated position of the gate wing. In contrast to the arrangement of FIG. 18, with the arrangement of FIG. 19 there are provided hinge pivots 50′ instead of a hinge bolt 50. These hinge pivots 50′ are connected to the bearing supports 48 and have associated therewith slot-shaped recesses 51 in the hinge eye 49. The design of the recesses 51′ correspond to the design of the bolt 51 in FIG. 18. The slots 51, 51′ are also with this embodiment arranged parallel to the gate plane and have a width which preferably is somewhat greater than the diameter of the hinge bolt 50, 50′.

Due to the fact that with the design of the linkage means 8 according to the invention, pressure stresses within the gate are avoided, the gate can in its overall construction be designed light inasmuch as distortions will not occur. This is also aided by the fact that with the design according to the invention, in contrast to heretofore constructions, the same torsion forces will cause considerably lower frame displacements so that a jamming of the gate wings relative to the gate frame under the customary occurring loads will not occur.

FIG. 5 shows that the displacements which occur between the gate wings and the frame of the gate with loads of the container within customary limits will, with ordinarily provided gate gaps, not cause the gate wings to engage the frame. Also in this respect, the fact that the linkage means 8 according to the invention bring about an inclined position of the gate wings relative to the frame beam on which they are mounted will have a favorable result.

As will be seen from FIGS. 1, 2 and 5, each of the gate wings 3, 4 has associated therewith closure means which in customary manner are formed by a bar 53 which is pivotable relative to the respective gate wing. Bar 53 is, within the range of its ends, provided with cams 54 which engage recess means 55 provided at the lower frame transverse beam 6. For each gate wing 3, 4, with the design according to the invention, only a relatively light closure means is necessary because the closure means 52–55 do not have to contribute to the stiffening of the gate frame or to the stiffening of that end face of the container 1 which is provided with a gate 2. In order, with the design according to the invention, to

assure a proper guiding of the gate wings 3, 4 in their opening position, the gate wings are in the embodiment pivotally connected by means of two further hinges **56** within the ranges between the link means **8.** The hinges **56** may be of a relatively light construction and may be designed in customary manner. Expediently, however, they have a relatively great play in order not to jam or to be twisted as a result of possible and admissible displacements of the gate wings relative to the frame. Hinges **56** are expediently arranged in the central range between the link means **8.**

With the design of the link means 8 in the form of hinges, according to the invention, two degrees of freedom are obtained in contrast to heretofore customary hinges. In addition to a rotation, with the link means 8 according to the invention, there is also possible a displacement in a plane parallel to the gate plane. This displacement movement is, with the design according to the invention, limited at least toward the inside of the frame and, more specifically, in such a way that an abutment is obtained which corresponds to the rated position of a gate wing.

Due to the fact that with the design according to the present invention, link means 8 pertaining to frame corners located opposite to each other are directly connected by the struts and the positive coupling, the gate itself is not subjected to twisting or torsion stresses even if these stresses are rather high.

It is, of course, to be understood that the present invention is, by no means, limited to the particular showing in the drawings but also comprises any modifications within the scope of the appended claims.

What is claimed is:

1. In a container having top and bottom and side walls and front and back end faces interconnected to form a container, one said end face comprising wings forming a closure and access gate for the container, hinge means near the top and bottom of the outer edge of each wing comprising first parts fixed to the container and second parts fixed to the wings, diagonal support arms and positive coupling means near the center of the inner edges of said wings for positively interconnecting with said diagonal support arms respectively as to the inner edges of said wings when the wings are in closed position, and means pivotally interconnecting each said first part of a said hinge means to the second part thereof for relative pivoted movement thereof on a vertical axis, said means preventing relative movement between the said parts of respective hinge means of a diagonally oppositely located pair of said hinge means in a respective direction of relative lateral movement of said top and bottom walls of said container and permitting relative movement therebetween in the other direction of relative lateral movement of said top and bottom walls of said container.

2. In a container having top and bottom and side walls and front and back end faces interconnected to form a container, one said end face comprising wings forming a closure and access gate for the container, hinge means near the top and bottom of the outer edge of each wing comprising first parts fixed to the container and second parts fixed to the wings, positive coupling means near the center of the inner edges of said wings for positively interconnecting the inner edges of said wings when the wings are in closed position, means pivotally interconnecting each said first part of a said hinge means to the second part thereof for relative pivoted movement thereof on a vertical axis, said means preventing relative movement between the said parts of respective hinge means of a diagonally oppositely located pair of said hinge means in a respective direction of relative lateral movement of said top and bottom walls of said container and permitting relative movement therebetween in the other direction of relative movement of said top and bottom walls of said container, and brace elements connected to each wing and extending from each said second part of said hinge means diagonally across the respective wing toward the said coupling means, said brace elements at the ends thereof adjacent to said coupling means being fixed to said coupling means.

3. A container according to claim **2** in which said coupling means is located substantially at the point of intersection of the diagonals interconnecting diagonally located hinge means, said coupling means comprising a first portion associated with one of said wings and a second portion associated with the other wing and said portions interfitting in closed position of said wings.

4. A container according to claim **2** which includes brace elements connected to each wing and extending from each said second part of said hinge means diagonally across the respective wing toward the said coupling means.

5. A container according to claim **2** in which said coupling means comprises a first portion on one of said wings and within the confines of the respective wing and a second portion fixed to the other wing and protruding therefrom so as to overlap said first portion when the wings are in closed position.

6. A container according to claim **2** in which said means pivotally interconnecting said parts of each hinge means comprises pin means on the pivot axis of the hinge means and carried by one of said parts, and recess means in the other of said parts receiving said pin means and having a dimension in a direction parallel to the respective wing in closed position thereof and perpendicular to said pivot axis which is greater than the diameter of said pin means, one end of said recess means abutting the pin means when the respective wing is in proper closed position.

7. A container according to claim **2** in which one of the parts of each hinge means has hinge bolt means on the pivot axis of the respective hinge means, and the other said part comprises slots receiving said hinge bolt means and parallel to the plane of the respective wing when the wing is in closed position and open at one end.

8. A container according to claim **2** in which the said second part of each hinge medium. These comprises hinge bolt means extending out opposite ends thereof on the pivot axis of the respective hinge means while the said first part of the respective hinge means has sockets formed therein for receiving the ends of the hinge bolt and open in a direction away from the respective wing in closed position thereof.

9. A container according to claim **2** in which each said first part of each hinge means comprises pivot pins spaced on thepivot axis of the respective hinge means and projecting totward each other, the said second part of the respective hinge means comprising sockets receiving said pin means and open in a direction toward the respective wing.

10. A container according to claim 2 in which the said means pivotally interconnecting the first and second part of each hinge means comprises a pivot bolt on the pivot axis of the hinge means, apertures in said first and second parts of the hinge means receiving said bolt, at least one of said apertures being elongated in a plane parallel to the plane of the respective wing when in closed position.

11. A container according to claim 10 in which said bolt is fixed to said first part of the respective hinge means.

12. A container according to claim 10 in which said bolt is fixed to said second part of their respective hinge means.

13. In a container having top and bottom and side walls and front and back end faces interconnected to form a container, one said end face comprising wings forming a closure and access gate for the container, hinge means near the top and bottom of the outer edge of each wing comprising first parts fixed to the container and second parts fixed to the wings, positive coupling means near the center of the inner edges of said wings for positively interconnecting the inner edges of said wings when the wings are in closed position, means pivotally interconnecting each said first part of a said hinge means to the second part thereof for relative pivoted movement thereof on a vertical axis, said means preventing relative movement between the said parts of respective hinge means of a diagonally oppositely located pair of said hinge means in a respective direction of relative lateral movement of said top and bottom walls of said container and permitting relative movement therebetween in the other direction of relative lateral movement of said top and bottom walls of said container, and brace elements connected to each wing and extending from each said second part of said hinge means diagonally across the respective wing toward the said coupling means, said coupling means comprising over-lapping plates with a said plate on each of said wings and connected to the adjacent ends of the brace elements on the respective wing.

14. In a container which top and bottom and side walls and front and back end faces interconnected to form a container, one said end face comprising wings forming a closure and access gate for the container, hinge means near the top and bottom of the outer edge of each wing comprises first parts fixed to the container and second parts fixed to the wings, positive coupling means near the center of the inner edges of said wings for positively interconnecting the inner edges of said wings when the wings are in closed position, means pivotally interconnecting each said first part of a said hinge means to the second part thereof for relative pivoted movement thereof on a vertical axis, said means preventing relative movement between the said parts of respective hinge means of a diagonally oppositely located pair of said hinge means in a respective direction of relative lateral movement of said top and bottom walls of said container and permitting relative movement therebetween in the other direction of relative lateral movement of said top and bottom walls of said container, brace elements connected to each wing and extending from each said second part of said hinge means diagonally across the respective wing toward the said coupling means, said coupling means including a plate on the inner edge of one of said wings which overlaps the inner edge of the other wing when the wings are in closed position, and means on the ends of the brace elements on the said other wing adjacent said plate and on said plate for interfitting engagement when said wings are in closed position.

15. In a container having top and bottom and side walls and front and back end faces interconnected to form a container, one said end face comprising wings forming a closure and access gate for the container, hinge means near the top and bottom of the outer edge of each wing comprising first parts fixed to the container and second parts fixed to the wings, positive coupling means near the center of the inner edges of said wings for positively interconnecting the inner edges of said wings when the wings are in closed position, means pivotally interconnecting each said first part of a said hinge means to the second part thereof for relative pivoted movement thereof on a vertical axis, said means preventing relative movement between the said parts of respective hinge means of a diagonally oppositely located pair of said hinge means in a respective direction of relative lateral movement of said top and bottom walls of said container and permitting relative movement therebetween in the outer direction of relative lateral movement of said top and bottom walls of said container, brace elements connected to each wing and extending from each said second part of said hinge means diagonally across the respective wing toward the said coupling means, said coupling means including a plate on the inner edge of one of said wings which overlaps the inner edge of the other wing when the wings are in closed position, and means on the ends of the brace elements on the said other wing adjacent said plate and on said plate for interfitting engagement when said wings are in closed position, said means for interfitting engagement comprising pin means upstanding from the brace elements and apertures in said plate into which said pin means extend.

16. In a container having top and bottom and side walls and front and back end faces interconnected to form a container, one said end face comprising wings forming a closure and access gate for the container, hinge means near the top and bottom of the outer edge of each wing comprising first parts fixed to the container and second parts fixed to the wings, positive coupling means near the center of the inner edges of said wings for positively interconnecting the inner edges of said wings when the wings are in closed position, means pivotally interconnecting each said first part of a said hinge means to the second part thereof for relative pivoted movement thereof on a vertical axis, said means preventing relative movement between the said parts of respective hinge means of a diagonally oppositely located pair of said hinge means in a respective direction of relative lateral movement of said top and bottom walls of said container and permitting relative movement therebetween in the other direction of relative lateral movement of said top and bottom walls of said container, brace elements connected to each wing and extending from each said second part of said hinge means diagonally across the respective wing toward the said coupling means, said coupling means including a plate on the inner edge of one of said wings which overlaps the inner edge of the other wing when the wings are in closed position, and means on the ends of the brace elements on the said other wing adjacent said plate and on said plate for interfitting engagement when said wings are in closed position, said means for

interfitting engagement comprising cooperating elements of hook means formed on the ends of the brace elements and on said plate and which elements engage in closed position of said wings.

17. A container according to claim **16** in which said coupling means comprises a plate on the inner edge of each wing and which plates overlap when said wings are in closed position, and diagonal brace elements connecting each said plate with the said second parts of the hinge means on the respective wing, said plates including means effecting positive interconnection therebetween when said wings are closed.

18. In a container having top and bottom and side walls and front and back end faces interconnected to form a container, one said end face comprising wings forming a closure and access gate for the container, hinge means near the top and bottom of the outer edge of each wing comprising first parts fixed to the container and second parts fixed to the wings, positive coupling means near the center of the inner edges of said wings for positively interconnecting the inner edges of said wings when the wings are in closed position, means pivotally interconnecting each said first part of a said hinge means to the second part thereof for relative pivoted movement thereof on a vertical axis, said means preventing relative movement between the said parts of respective hinge means of a diagonally oppositely located pair of said hinge means in a respective direction of relative lateral movement of said top and bottom walls of said container and permitting relative movement therebetween in the other direction of relative lateral movement of said top and bottom walls of said container, brace elements connected to each wing and extending from each said second part of said hinge means diagonally across the respective wing toward the said coupling means, said coupling means including a plate on the inner edge of one of said wings which overlaps the inner edge of the other wing when the wings are in closed position, and means on the ends of the brace elements on the said other wing adjacent said plate and on said plate for interfitting engagement when said wings are in closed position, said means effecting interfitting engagement comprising a single pin fixed to both of the said brace elements on said other wing substantially at the point of intersection thereof, and an aperture in said plate receiving said pin.

19. In a container having top and bottom and side walls and front and back end faces interconnected to form a container, one said end face comprising wings forming a closure and access gate for the container, hinge means near the top and bottom of the outer edge of each wing comprising first parts fixed to the container and second parts fixed to the wings, positive coupling means near the center of the inner edges of said wings for positively interconnecting the inner edges of said wings when the wings are in closed position, means pivotally interconnecting each said first part of a said hinge means to the second part thereof for relative pivoted movement thereof on a vertical axis, said means preventing relative movement between the said parts of respective hinge means of a diagonally oppositely located pair of said hinge means in a respective direction of relative lateral movement of said top and bottom walls of said container and permitting relative movement therebetween in the other direction of relative lateral movement of said top and bottom walls of said container, said one end face of said container being formed to provide a frame extending around said gate, said first part of said hinge means being mounted on said frame, and corner braces secured to said frame at the corners thereof and engaging said first parts of said hinge means.

20. A container according to claim **19** which includes brace elements connected to each wing and extending from each said second part of said hinge means diagonally across the respective wing toward the said coupling means, said brace elements being fixed to the respective second parts of said hinge means.

21. A container according to claim **19** in which further hinge means are provided disposed vertically between the first mentioned hinge means connecting the outer edge of each wing with said container, said further hinge means having play therein.

22. A container according to claim **21** in which said further hinge means on the outer edge of each wing comprises two vertically spaced hinges.

23. A container according to claim **19** in which said one end face of said container comprises beams interconnected at the ends thereof and forming a frame surrounding the said gate in one said end face.

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