11 Publication number:

0 154 558

A2

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: 85301581.6

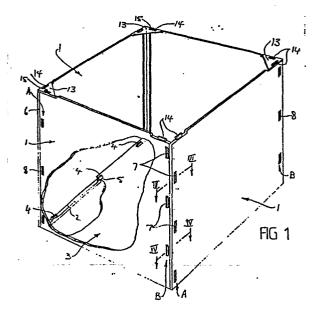
(51) Int. Cl.4: B 65 D 6/24

22) Date of filing: 07.03.85

- 30 Priority: 07.03.84 AU 3948/84
- (43) Date of publication of application: 11.09.85 Bulletin 85/37
- Designated Contracting States:
 AT BE CH DE FR GB IT LI LU NL SE
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54) Demountable container.

(57) A demountable container having a plurality of side walls (1) which are releasably connected in edge to redge relationship and in a manner such that adjacent said walls (1) extend angularly relative to one another. Means for interconnecting the walls (1) includes an alternating series of lugs (7) and apertures (8) provided along each of two side edges (6) of each wall (1). The lugs (7) of each of two interconnected side edges (6) engage with respective apertures (8) of the other side edge (6) and the lugs (7) and apertures (8) are so arranged that engagement is effected in a sequential order commencing at one end of the series and finishing at the other. The walls (1) are formed of plastic or other material such as to be capable of limited resilient distortion along their edges for the purpose of effecting the aforementioned engagement. Also, the arrangement of the lugs (7) and apertures (8) is such that each of two adjacent pair of engaging lugs (7) and apertures (8) resist separation of the respective walls (1) in different directions.



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DEMOUNTABLE CONTAINER

This invention relates to containers of the kind having a base and a plurality of upstanding side walls. It will be convenient to describe the invention with particular reference to a four-sided container, but it is to be understood that the invention is not limited to such an arrangement.

Demountable containers have the advantage of convenient storage either prior to initial use or during periods of temporary non-use. They also have advantage in situations where the supplier of goods requires return of the container in which the goods were shipped. There are many applications for such containers, but those used prior to the present invention have not been entirely satisfactory because of their complex construction, expense, or failure to provide sufficient resistance to collapse under conditions of use.

It is an object of the present invention to provide a demountable container of relatively simple construction and which provides substantial resistance to collapse when in the erected condition.

A container according to the invention can be 20 constructed from any of a variety of materials including paper board, but it will be convenient to particularly describe one form of the container which is manufactured from a plastics The container is characterized in that each side wall is provided with connecting means which interacts with 25 another side wall to resist collapse of the assembled container. In a preferred form, the connecting means of each side wall includes an alternating series of two types of integral components and each series is cooperable with a corresponding series of another side wall in a fashion such 30 that each adjacent pair of cooperating components resists separation of the two walls in different directions. That is, each pair is primarily responsible for resisting separation in a direction different to that for which an adjacent pair has primary responsibility.

35 It will be apparent from the following description however, that the invention is also applicable to situations in which each pair of cooperable components has substantially the same resistance to separation in the same directions as do adjacent pairs.

According to the present invention, there is provided a demountable container including, a plurality of side walls, connecting means provided along each of two opposite side edges of each said side wall, each said connecting means being cooperable with a said connecting means of another said side wall which is arranged angularly relative to the wall having the first said connecting means so as to releasably secure the two said walls in edge to edge relationship, each said connecting means includes a series of alternating first and 10 second elements which extends along the respective said side wall edge, said first and second elements of each said series being relatively arranged so that the first elements of each of two cooperating said connecting means engage with respective said second elements of the other said cooperating 15 connecting means, and the arrangement is such that the engaging first and second elements of two cooperating said connecting means function to resist separation of the respective said side walls in each of two directions which extend angularly relative to one another and transverse to the 20 said side edges connected by the said elements.

The essential features of the invention, and further optional features, are described in detail in the following passages of the specification which refer to the accompanying drawings. The drawings however, are merely illustrative of how the invention might be put into effect, so that the specific form and arrangement of the features (whether they be essential or optional features) shown is not to be understood as limiting on the invention.

In the drawings:

Figure 1 is a diagrammatic perspective view of one form of container incorporating an embodiment of the invention;

Figure 2 is an enlarged diagrammatic view of one bottom edge corner of the container shown in figure 1 and showing the adjacent side walls in the course of connection or

35 disconnection:

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Figure 3 is an enlarged cross sectional view taken along line III-III of figure 1;

Figure 4 is an enlarged cross sectional view taken along line IV-IV of figure 1 but showing the two side walls

separated;

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Figure 5 is a perspective view of the edge portions of two adjacent side walls having connecting means of the kind shown in figures 1, 3 and 4;

Figure 6 is a view similar to figure 5 but showing another form of connecting means;

Figure 7 is a view similar to figure 5 and showing still another embodiment of the connecting means;

Figure 8 is a view similar to figure 7 but showing the 10 two side walls connected;

Figure 9 is a cross sectional view taken along line 1X-1X of figure 8;

Figure 10 is a cross sectional view taken along line X-X of figure 8 but showing the two side walls separated;

15 Figure 11 is a perspective view of a side wall having yet another form of connecting means;

Figure 12 is a cross sectional view taken along line XII-XII of figure 11;

Figure 13 is a view similar to figure 12 but showing the 20 connecting means not fully operable;

Figure 14 is a perspective view showing another form of the connecting means;

Figure 15 is a cross-sectional view showing the connecting means of figure 14 in an operable condition;

25 Figure 16 is a view showing a variation of the figure 15 connecting means in a partially operable condition;

Figure 17 is a view similar to figure 15 but showing the connecting means of figure 16;

Figure 18 is a view similar to figure 5 but showing 30 still another form of connecting means;

Figure 19 is a view similar to figure 18 but showing the connecting means operable;

Figure 20 is a cross sectional view taken along line XX-XX of figure 19 but showing the walls in a separated 35 condition;

Figure 21 is a view similar to figure 20 but taken along line XX1-XX1 of figure 19;

Figure 22 is a view similar to figure 19 but showing another form of connecting means;

Figure 23 shows the connecting means of figure 22 released and the respective walls separated;

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Figure 24 shows two side walls interconnected by a bridging piece so as to understand the overall length of a container side;

Figure 25 is a cross sectional view taken along line XXV-XV of figure 24 but showing the bridging piece and walls 10 separated.

In an example four-sided version of a container according to the invention as shown in figure 1, each side wall 1 has an inwardly directed ledge 2 provided along or adjacent to its lower edge. That ledge 2 provides a support 15 for an edge portion of the container base 3 and locating means may be provided to resist lateral separation of the base 3 and each such wall 1. As shown, that locating means may include a series of laterally spaced lugs 4 provided along each ledge 2 and each lug 4 is arranged upstanding from the respective 20 ledge 2 so as to be locatable within a corresponding aperture 5 provided in an edge portion of the base 3. If desired, each lug 4 may be snap engagable within the respective aperture 5 so as to add to the security of the connection.

It will be appreciated that the foregoing arrangement 25 can be varied by providing the lugs 4 on the base 3 and the apertures within the side wall ledges 2. Alternatively, there may be a mixture of lugs and apertures on all panels of the container, or one side wall may have lugs whereas another has apertures and the base is arranged to suit.

The lugs 4 and apertures 5 cooperate in the most effective manner when the side walls 1 are arranged upstanding relative to the base 3 so that the upright edges 1 of each wall I lie adjacent and substantially parallel to respective edges 6 of the two other walls 1. Connecting means as 35 previously referred to enables interconnection of each pair of adjacent edges 6 so that the container becomes self supporting and has resistance to collapse.

In the example construction shown diagrammatically in figures 1 and 2, each side wall 1 has two series A and B of

connecting components provided along respective opposite side edges 6. Each series A and B includes a plurality of male and female components 7 and 8 arranged in alternating sequence.

Each female component 8 of the construction shown comprises an aperture 8 formed through the respective edge 6 and each male component 7 comprises a lug which projects laterally from the respective edge 6. The apertures 8 and lugs 7 are arranaged at spaced intervals along the side wall edge 6 and each aperture 8 of one series A or B is laterally aligned with a lug 7 of the other series B or A respectively of the same side wall 1 (see figure 1). That out of phase relationship between the two series A and B permits interaction of two side walls 1 as described below.

When the two side walls 1 of the foregoing kind are
15 arranged edge to edge and at right angles to one another, the
lugs 7 of each of teh two adjacent edges 6 are aligned with
the apertures 8 of the other adjacent edge 6 (see figure 2).
The two sets of lugs 7 however, extend in different directions
(at right angles to one another) because of the relative
20 disposition of their respective side walls 1. Assuming each
side wall 1 has some degree of flexibility it is nevertheless
possible to interconnect the two side walls 1 through the two
series of connecting means as shown diagramatically by figure
2.

25 The connection operation may conveniently commence at the bottom of the two side walls 1 as shown by figure 2 and invovles locating the lowermost lug 7B of the two series A and B i nthe adjacent aperture 8A of the other side wall 1. lug 7A immediately above that aperture 8A can then be located 30 in the adjacent aperture 8B which is immediately above the aforementioned lowermost lug 7B, and that operation is repeated until all lugs 7 penetrate into or through an associated aperture 8. Since the lugs 7 of the two side walls 1 project in different directions, at least one wall 1 needs 35 to be flexed to some extent during the connecting process. That difference in direction however, contributes to the security of the connection because a force applied to a side wall 1 in a direction such as to encourage separation of one lug 7A from its aperture 8B will not have the same affect on

each of the two adjacent lugs 7B.

It will be appreciated from the foregoing that inter-connection of the two side walls 1 at their edges 6 involves alternate penetration of part of one side wall 1 into the other and each such penetration step is effected in a direction different to that adopted for the immediately preceding step. That may be likened to a stitching operation. The same benefits might be obtained however, if the change in direction of penetration ocurs with less frequency so that two or more adjacent lugs 7 of the connected edges 6 extend in the same general direction.

Security of the connection described might be enhanced by arranging each lug 7 so that it snap engages within its respective aperture 8. Any suitable configuration may be adopted for that purpose. Figures 3 to 5 show a variation of the construction shown by figures 1 and 2 and in that variation each aperture 8 is in the form of a slot extending generally parallel to the adjacent side edge 6 of the respective side wall 1 and each lug 7 is of corresponding cross sectional shape. A locking lip 9 projects beyond both the upper and lower edges 10 and 11 of each lug 7 so as to snap behind a surface or step 12 (figure 4) of the other side wall 1 when the lug 7 is projected into or through an aperture 8 of that side wall 1. One or more slots (not shown) may be formed in the lug 7 between the upper and lower edges 10 and 11 so as to increase the flexibility of the lug 7.

The lugs 7 are preferably formed integral with their respective side walls 1 as shown, but the major advantages of the invention can be achieved if separately formed lugs are used. That is, in an arrangement not shown, each lug may be in the form of a pin or the like which is connected to both side walls during the fastening operation. If desired, such a pin may be loosely captured on the side wall not having the aperture with which the pin is to be associated.

35 Alternatively, the pins of each side wall edge may be interconnected through a strap-like member rather than existing as discrete components, and that strap-like member may be attached in an appropriate manner to the side wall or be completely separable therefrom.

An angularly disposed flange (not shown) may be provided along each side edge 6 of each side wall 1 to strengthen that edge 6 and also provide some degree of protection against inadvertant withdrawal of the lugs from their apertures 8. a four sided arrangement as described, each such flange may extend at substantially 45° to the general plane of its respective side wall and is arranged to adopt face to face engagement with the corresponding flange of an adjacent side The lugs and apertures may be located substantially at 10 the junction between each such flange and the main body of the respective side wall.

If desired, a connecting member 13 may be provided at the upper end of the adjacent edges 6 of each pair of connected side walls 1 as shown in figure 1 so as to add to 15 the security of the side edge connection. Such a member 13 may be of plate-like form and arranged to snap engage with an upper edge portion of each of the two side walls 1 so as to bridge the vertical separation line between those walls 1. Lugs 14 on the side walls 1 may engage within respective 20 apertures 15 of the connecting member 13, or alternatively the lugs 14 and apertures 15 may be provided on the connecting member 13 and walls 1 respectively.

As shown by figures 22 and 23, the connecting member 13 may be formed as an integral part of one side wall 1 in which 25 event a single lug 14 and aperture 15 connection with the other side wall 1 may be sufficient. Such an integral member 13 may be in the form of a flap which is hingedly connected at 16 to its respective side wall 1 so as to be movable into and out of a position at which it overlies a part 17 of the upper 30 edge 18 of an adjacent side wall 1. It may be an advantage to recess that upper edge part 17 as shown so that the connecting member 13 lies substantially flush with the uper edges 18 of the side walls I when in its operative position (figure 22). Also, neat location of the member 13 within such a recess 35 could improve the rigidity of the assembled container.

It is possible to adopt various types of side edge connecting means without disturbing the concept of the invention. For example, as shown diagrammatically by figure 6, each lug 7 may be of hooked-type configuration so as to

have a slot 19 which locates over a part 20 of the other side wall 1 when the two adjacent walls 1 are connected together. That is, each lug 7 is passed through an aperture 8 of the other side wall 1 and the two walls 1 are then moved vertical relative to one another to locate the wall parts 20 within respective slots 19.

According to another arrangement, each connecting lug 7 may have a locking lip 9 along side edges thereof as shown in figure 2 instead of at the upper and lower edges 10 and 11 as shown by figure 5. Alternatively, a shown in figures 7 to 10, each lug 7 may have a locking lip 9 along one side edge only and the corresponding aperture 8 may have sufficient width to allow passage of the enlarged front edge of the lug 7 without interference, or without substantial interference. With such an arrangement retention of the lug 7 in its operative position can be achieved through cooperation between engaging parts of the two side walls 1 such as to releasably hold the locking lip 9 against an opposed surface of the side wall 1 having the associated aperture 8.

In the arrangement according to figures 7 to 10, each 20 side wall 1 has a rib or outwardly stepped portion 21 at a location rearwardly of the lug 7. The rib or stepped portion 21 projects in a direction opposite to that of the locking lip 9 and is locatable beneath a laterally projecting part 22 of 25 the other side wall 1 as shown by figure 9. Such location occurs as the lug 7 is projected through the aperture 8 of the other side wall 1 and the resulting confinement of the rib or stepped portion 21 resists withdrawal of the lug 7 from its fully inserted position at which the locking lip 9 has snapped 30 behind the side wall 1 having the aperture 8. As shown, the locking lip 9 may lie against or near a step 23 in the last mentioned side wall 1 when fully inserted so as to be Protected against inadvertant deflection from its operative position.

With the foregoing arrangement, each lug 7 is positively locked against dislodgement by forces acting in a lateral direction relative to either side wall 1.

In any of the side locking arrangements described, the lugs 7 may be arranged to project from a recessed part 24 of

the respective wall side edge 9 as shown for example in figure Thus, in an alternating arrangement, the side edge 6 will have a plurality of recessed parts 24 which are spaced apart by an apertured portion 25 of the side wall 1, and a lug 7 will be disposed in each such recessed part 24. The resulting construction will therefore have a relatively neat appearance.

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According to yet another modification as shown by figures 11 to 13, each side edge connecting aperture 8 is provided in a section 26 of the respective side wall 1 which is adapted to be projected through an opening 27 in the other side wall 1. The cooperable lug 7 is therefore on a section 28 of its respective side wall 1 which is located outward of the opening 27 and is preferably arranged to extend laterally from that section 28. Either or both of the side wall 15 sections 26 and 28 can be hingedly connected to the main body of its respective side wall I so that, when the apertured section 26 is projected through the opening 27 as shown in figure 13, one or both of the sections 26 and 28 can be turned towards the other to permit location of the lug 7 within the 20 aperture 8 (figure 12). The hinge connection 29 of any such section 26 or 28 can be an integral part of the respective side wall 1 as shown.

In the arrangement shown, the apertured and lug bearing sections 26 and 28 are in the form of flaps which are disposed 25 in face to face engagement when the lug 7 and aperture 8 cooperate (figures 11 and 12). In the assembled condition of the container, there may be a space 30 between each pair of engaging sections 26 and 28 along each upright corner of the container. Alternatively, each pair of engaging sections 26 30 and 28 may be directly beside another such pair. Furthermore, apertured and lug bearing sections 26 and 28 may be arranged in alternate fashion along a side edge 6 of a side wall 1, or each side edge 6 may have one form only of such sections.

In a variation of the flap-type construction as shown by 35 figures 14 and 15, the cooperating flaps 31 and 32 may be arranged for face to face engagement without the need for one to pass through an opening in the other side wall 1. example shown, the apertured flap 31 extends laterally outwards from the side edge 6 of its respective side wall 1

without a hinge connection between it and that side edge 6.

It is preferred that the apertured flap 31 is arranged to extend at an angle to the general plane of its respective side wall 1 as shown, and although any suitable angle could be selected an angle of substantially 45° is generally preferred. The lug bearing flap 32 may or may not be hingedly connected to its respective side wall 1, but is nevertheless arranged to bear against the apertured flap 31 in face to face relationship with the lug 7 protruding through the aperture 8 10 as shown in figure 15.

According to the particular arrangement shown, the lug 7 is of a length such that it can penetrate through the apertured flap 31 and beyond the back surface 33 thereof, which is the surface remote from that engaging the lug bearing 15 flap 32. Also, a retaining flap 34 is hingedly connected to the outer edge 35 of the lug bearing flap 32 so that it can be turned over the outer edge 36 of the apertured flap 31 to bear against the back surface 33 of that flap 31 as shown in figure Preferably, that retaining flap 34 has an opening 37 20 which receives the part 38 of the lug 7 which projects beyond the back surface 33. Also, the edge 39 of the retaining flap 34 remote from its hinge connection 40 may snap within a recess or opening 41 provided at or adjacent the junction between the apertured flap 31 and its respective side wall 1. 25 As with other embodiments, all hinge connections can be integral parts of the respective side walls 1.

Figures 16 and 17 show a variation of the foregoing arrangement in which the lug 7 has a lateral projection 42 at its outer end and the aperture 8 is of a size such as to allow 30 passage of that enlarged outer end 42. A locking recess is formed between the lateral projection 42 and the flap 32 bearing the lug 7, and a portion of the apertured flap 31 is received in that recess in the operative condition of the connecting means as shown by figures 16 and 17. The retaining 35 flap 34 then functions to prevent removal of the apertured flap 31 from the locking recess.

In yet another embodiment of the invention as shown by figures 18 to 21, a tongue and groove connection provides a basic connection between two adjacent side walls 1 and the

connecting means serves to retain the tongue and groove in cooperation. Preferably, the groove is a continuous groove 43 formed in one side of an edge portion of one side wall 1, and the tongue 44 is an edge portion of the other side wall 1 which is neatly receivable within that groove 43. Any form of connecting means may be adopted in such an arrangement, but the following is a preferred form.

A plurality of flaps 45 are hingedly attached to the side edge 6 of each of the two side walls 1. Each flap 45

10 carries a locking lug 7 which is cooperable with an aperture or recess 8 in the other side wall 1. That is, when the two side walls 1 are arranged with the tongue 44 and groove 43 engaging (figure 19), each flap 45 can be turned against an adjacent surface of the other side wall 1 so that its lug 7 cooperatively engages in the aperture or recess 8 of that other side wall 1. Such an arrangement provides resistance to separation of the tongue 44 and groove 43.

As shown, each lug 7 may be a rib-like projection formed on a surface of the respective flap 45 and extending generally in the direction of the side edge 6 of the respective side wall. In that case, the corresponding aperture or recess 8 may be a groove of appropriate dimensions. Of course, the aperture or recess 8 could be provided on the flap 45 and the cooperating lug 7 on the other side wall 1. Also, each flap 45 may locate within a correspondingly shaped recess or cavity 46 as shown provided in the surface of the other wall 1 so as to minimize inadvertant deflection from its operative position.

Figures 22 and 23 show still another embodiment
involving hinged flaps in which each flap 47 is arranged transverse to its respective side wall 1 in much the same manner as the previously described connecting member 13 on the upper edge 18 of the side walls 1. Each flap 47 therefore extends laterally outwards from a surface 48 of its respective side wall 1 and is adapted to penetrate into an opening 49 provided in the other side wall 1. A lug and aperture type connection as previously described is provided between the flap 47 and that other side wall 1. Preferably, as shown, the lug 7 is formed on the lower side of the opening 49 and the

aperture 8 is formed through the flap 47. The opening 49 is of a size sufficient to allow the flap 47 to be movable within the opening 49 to permit engagement with and separation from the lug 7.

A plurality of flaps 47 may be provided in spaced relationship along the edge portion 6 of each side wall 1. that is, each of two adjacent side wall edges 6 may have an alternating series of flaps 47 and openings 49.

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The invention has been described in relation to single 10 piece side walls, but the invention is also applicable to containers in which a side wall is composed of two or more interconnected parts. In that regard, figure 24 shows two side walls 1 interconnected by a bridging piece 50 so as to produce a wall of double the normal length. 15 anarrangement is possible with any of the embodiments described, but figures 24 and 25 show the bridging piece 50 applied to walls 1 of the general kind described in connection with figures 1 to 5. The bridging piece 50 has a series of openings 51, each of which receives a respective lug 7, and a 20 series of lugs 52 each of which is receivable in a respective aperture 8. Such openings 51 and lugs 52 are arranged in alternating fashion along each of two longitudinal sides 53 of the bridging piece 50. The bridging piece 50 therefore cooperates with the connecting means of the two side walls 1 25 in the manner previously described but is so arranged as to retain the two walls 1 in the same general plane.

It will be apparent that there are many alternatives to the various forms of connecting means described above. It will be also apparent that a container according to the invention is convenient to assemble and dismantle, and the side walls are interconnected in a fashion such as to provide substantial resistance to collapse under conditions of use.

Various alterations, modifications and/or additions may be introduced into the constructions and arrangements of parts previously described without departing from the spirit or ambit of the invention as defined by the appended claims.

- A demountable container including, a plurality of side walls, connecting means provided along each of two opposite side edges of each said side wall, each said connecting means being cooperable with a said connecting means of another said side wall which is arranged angularly relative to the wall having the first said connecting means so as to releasably secure the two said walls in edge to edge and angularly extending relationship, each said connecting means includes a series of alternating first and second elements which extends 10 along the respective said side wall edge, said first and second elements of each said series being relatively arranged so that the first elements of each of two cooperating said connecting means engage with respective said second elements of the other said cooperating connecting means, and the 15 arrangement is such that the engaging first and second elements of two cooperating said connecting means function to resist separation of the respective said side walls in each of two directions which extend angularly relative to one another and transverse to the said side edges connected by the said 20 elements.
 - 2. A demountable container according to claim 1, wherein each of two adjacent pair of said engaging first and second elements resists said separation in a respective one of said two directions.
- 25 3. A demountable container according to any preceding claim, wherein the said first elements of one side wall are moved in one direction for engagement with or disengagement from the said second elements of another said side wall, and the said first elements of said other side wall are moved in a direction angularly disposed to said one direction for engagement with or disengagement from the said second elements of said one side wall.
- 4. A demountable container according to any preceding claim, wherein two of said connecting means are engaged or separated by sequential engagement and separation respectively of the said elements of the respective said series, and the order of said sequence is such that it commences at one end of the series and finishes at the other end therof.
 - 5. A demountable container according to any preceding

claim, wherein each said side wall has some degree of flexibility to permit localized resilient distortion along the said side edges thereof for the purpose of engaging or disengaging the said connecting means.

- 6. A demountable container according to any preceding claim, wherein each said first element is formed by at least one lug and each said second element is formed by at least one opening or recess adapted to receive a respective said lug.
- 7. A demountable container according to claim 6, wherein 10 each said lug extends generally in a direction which is substantially parallel to the general plane of the said side wall of which it forms part.
- 8. A demountable container according to claim 6 or 7, wherein each said lug is snap engagable within a respective 15 said opening or recess.
 - 9. A demountable container according to claim 6 wherin each said lug is provided on a flap which is hingedly connected to the respective said side wall.
- 10. A demountable container according to any one of claims 1 20 to 8, wherein each of either said first or second elements is provided on a hinged flap formed integral with the respective said side wall.
- 11. A demountable container according to any preceding claim, wherein at least one side of said container is formed
 25 by at least two said side walls connected in edge to edge and substantially parallel relationship by a bridging piece cooperating with a said connecting means of each of those two side walls.
- 12. A demountable container including, a plurality of side 30 walls, connecting means provided along each of two opposite side edges of each said side wall, each said connecting means being cooperable with a said connecting means of another said side wall which is arranged angularly relative to the wall having the first said connecting means so as to releasably
- 35 secure the two said walls in edge to edge and angularly extending relatinship, each said connecting means includes a series of alternating first and second elements which extends along the respective said side wall edge, said first and second elements of each said series being relatively arranged

so that the first elements of each of two cooperating said connecting means engage with respective said second elements of the other said cooperating connecting means, and the arrangement is such that the said first elements of one side wall are moved in one direction for engagement with or disengagement from the said second elements of another said side wall and the said first elements of said other side wall are moved in a different direction for engagement with or disengagement from the said second elements of said one side wall.

