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(54) **A flexible tank for liquids and a process for its manufacture.**

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EP 0 578 033 B1

Description

The present invention relates to flexible tanks for liquids.

In particular it relates to a tank of the type comprising:

- a plurality of superposed flexible containers which are substantially polygonal in plan, each being constituted by a pair of superposed flexible sheets sealed together along their peripheries,
- each container being welded to the adjacent containers along a weld line inside the periphery of the sheets,
- the interiors of the containers communicating with each other through a series of holes formed in the sheets inside the held line and vertically aligned with each other,
- the interior of one of the containers communicating with the exterior of the tank through connector means.

A flexible tank of the type defined above is known, for example from Italian Patent Application No 53468-B/83 and corresponding French Patent Application FR-A-2 547 562.

A flexible tank of the type referred to above is also disclosed in US-A-3 724 497 .

The flexible tank described in these documents comprises a plurality of containers each constituted by a pair of superposed flexible sheets having the same dimensions welded together around their peripheries. When the tank is full of liquid, the pressure of the fluid within it tends to open it and possibly to cause the welded flaps of the two flexible sheets constituting each container to come apart.

During transport of the tank full of liquid, in addition to the static load due to the pressure of the liquid alone, there is the added dynamic stress caused by the movement to which the entire tank is subjected which aggravates the tendency of the sheets forming a container to separate.

The object of the present invention is to provide a flexible tank in which the welding which joins the sheets constituting the various containers can better withstand the stresses produced by the liquid within the tank.

This object is achieved by virtue of the fact that one of the flexible sheets constituting each of the individual containers is more extensive than the other sheet and has projecting portions folded over the edges of the less extensive sheet so as to leave its vertices free, the projecting portions being welded to edge portions of the less extensive sheet and, also, each container being provided with seal elements welded at its vertices.

By virtue of this characteristic, the flexible containers forming parts of the tank of the invention do not have any tendency to separate even when acted upon by strong external stresses caused, for example, during transport of the tank full of liquid over broken roads.

A further subject of the present invention is a process for the manufacture of a flexible tank for liquids of the type comprising at least one flexible container having a substantially polygonal shape in plan and constituted by a pair of superposed flexible sheets sealed together along their peripheries, characterised in that it includes the following steps:

- providing the two sheets, one of which is more extensive than the other sheet and has parts which project beyond the less extensive sheet, the projecting parts being able to be disposed in correspondence with the edges of the less extensive sheet leaving the vertices free,
- providing metallic strips of a length corresponding substantially to the sides of the less extensive sheet,
- superposing the said sheets with the metal strips interposed between them along the edges of the less extensive sheet,
- folding the projecting parts of the more extensive sheet over the edges of the less extensive sheet,
- welding the projecting parts of the more extensive sheet along the edges of the less extensive sheet in correspondence with the metal strips, leaving the vertices of the container open,
- removing the metal strips through the vertices of the container, and
- closing the vertices of the container by welding a seal element to each of them.

Further characteristics and advantages of the present invention will become apparent from the detailed description which follows, given with reference to the appended drawings, provided purely by way of non-limiting example, in which:

Figure 1 illustrates a flexible tank according to the present invention associated with a containing framework,

Figure 2 is a schematic elevational view of flexible containers forming part of the tank of Figure 1,

Figure 3 is a partially-sectioned side elevational view taken on the line III-III of Figure 2,

Figure 4 is a view similar to Figure 3 showing a detail indicated by the arrows IV-IV in Figure 2,

Figure 5 is a perspective view of the framework which surrounds the tank of the invention,

Figure 6 is a partially-sectioned side elevational view of a device for retaining the tank in the framework, indicated by the arrow VI in Figure 1, and

Figure 7 is a partially-sectioned elevational view of the device of Figure 6.

With reference to the drawings, a flexible tank for liquids is generally indicated 1. It includes a plurality of superposed flexible containers 2 which, in the present embodiment, are substantially rectangular in shape.

Each container 2 includes an upper sheet 2a and a lower sheet 2b joined together around their peripheries by a weld 3 achieved, for example, by high-frequency vibrations.

The sheet 2a is more extensive than the sheet 2b and includes projecting portions 3a which can be folded so as to enclose the edges of the less extensive sheet 2b. The projecting portions 3a are shaped so as to enclose the edges of a sheet 2b leaving the vertices free. In order to achieve the welding 3 joining each of the sheets 2a to the respective sheet 2b, metal strips (not illustrated in the drawings) must be provided, the strips having a length approximately corresponding to the length of the sides of the less extensive sheet 2b and a width at least equal to the width of the weld which is wished to obtain. These metal strips are arranged along the sides of the less extensive sheet and then the two sheets 2a and 2b are superposed by the successive folding of the projecting portions 3a of the sheet 2a over the edges of the sheet 2b leaving apertures at the vertices of the container. The welding 3 is then effected so as to join the projecting portions 3a to the edge portions of the respective sheet 2b in correspondence with the metal strips. Subsequently the metal strips are withdrawn through the open vertices of the container. The open vertices of the container are then sealed in the manner which will be explained more fully in the description below.

Each of the containers 2 of the tank is made so that the pressure exerted by the liquid therein generates tangential forces between the sheets 2a and 2b in the welding zone 3. The welding achieved in the manner described above thus provides very good resistance to the stresses to which it is subjected, in which it differs from the welding in prior art containers in which the welds were, on the contrary, subjected to traction which tended to open the welds.

Each flexible container 2 is welded to the adjacent containers by a weld line 4 inside the weld lines 3.

Apertures 6 are formed inside the weld line 4 in each of the sheets 2a and 2b of adjacent containers 2, there being no less than five apertures as illustrated in Figure 2, each of these apertures having an edge 8 with projections 9 which extend perpendicular to the sheets and enable the sheets to be spaced from each other so as to facilitate the filling of the containers 2. The apertures 6 in the containers 2 of the tank are arranged so as to be vertically aligned with each other.

Seal elements 11 are provided at each vertex of the containers 2 and enable each container to be sealed after the welding of the sheets 2a and 2b.

Each element 11 includes two outer parts 11a located against the outer faces of the sheets 2a and 2b respectively and an inner portion 11b interposed between the sheet 2a and the sheet 2b of each container 2. The elements 11 are welded to the vertices of each container, for example by high-frequency welding.

The tank 1 is surrounded by a framework 15 (Figures 1 and 5) which comprises a rigid structure formed from upper cross-members 18a and 18b and lower cross-members 19a and 19b interconnected by uprights 20.

Pivotable frames 22 are articulated at 21 to the outwardly facing sides of the cross-members 18a and 19a, each frame including a pair of cross-members 25 which, in the open condition of the frames 22, can be arranged as extensions of the cross-members 18b and 19b of the rigid structure, the cross-members 25 being rigidly interconnected by uprights 27.

The uprights 20 and 27 are constituted by metal profiled sections having a longitudinal slot facing inwardly of the framework 15, in its open configuration, to allow access to the hollow interiors of the profiled sections for purposes which will be clarified below. Close to the articulations 21 of the frames 22 are anchoring devices 23 for clamping the frames 22 to the fixed structure of the framework 15 in their open position. These devices 23 for example comprise screws adapted to engage corresponding holes formed in the cross-members 25.

The pivotable frames 22 are particularly useful, for example, when the tank 1, with its framework 15, must be introduced into a space provided with a narrow opening. In this case, the framework 15 is first inserted through the opening with the frames 22 folded, afterwards the frames 22 are moved into their open position and clamped in these position by means of the anchoring devices 23.

Subsequently the tank 1 is inserted through the narrow opening into the framework 15.

An assembly 30 is rigidly fixed to the top of the framework 15 (Figure 1) and includes a rotatable drum on which is wound a flexible tube 32 connected by a connector 33 to a motor-pump unit 35 also connected rigidly to the top of the framework 15 and to which are connected, in known manner, a pair of ducts 37 and 39 which open into the lowermost container 2 of the tank 1.

The ducts 37 and 39 allow the emptying and filling of the tank 1; more particularly, one of these acts as an air vent during filling of the tank through

the other duct while, during emptying of the tank, it is used for discharging liquid to the exterior.

On the upper face of the uppermost container 2 of the tank 1 is an automatic valve 42 which enables any air present in the tank 1 to escape.

A cap 43 is also provided on the upper face and can be used to facilitate refilling of the tank 1.

The upper container 2 of the tank 1 has associated retaining devices 46 whose function is to limit both transverse movements and vertical movements of the tank 1 when it is located within the framework 15. The devices 46 are particularly useful when the tank 1 is partially full and when it is subjected to oscillations in transport. In fact, in this case, it is possible to adjust the position of the upper face of the upper container 2 of the tank relative to the uprights 20 and 27 of the framework and to clamp it in this position by means of the devices 46.

Flexible belts 48 each having an eyelet 48a at one end are welded at 49 to the upper face of the uppermost container 2 of the tank 1. Each eyelet 48a is traversed by a pin 50 which engages a through-hole 53 formed in a rigid stabilising arm 51. The end of the arm 51 opposite that having the hole 53 is inserted into the cavity in the respective upright 20 or 27 through the said longitudinal slot indicated 52. The end of the arm 51 within the upright 20 or 27 has a through-hole 54 formed transversely thereto and to the upright and engaged by a pin 56 which, on opposite sides of the arm 51, carries two wheels 58 of deformable material, for example an elastomer or the like. The wheels 58 have radially-outer concave surfaces 59 so as to generate less friction during their rolling within the upright 22 or 27 and to provide their radially outermost part with greater deformability.

A substantially square annulus, or ring, 62 is articulated at 64 to each of the arms 51 while its side 66 opposite that which is engaged at 64 can pivot between an inactive position, for example located above the arm 51 and nearer the hole 53 (shown in chain line in Figure 7), to an active position in which the side 66 engages a transverse groove 68 in the arm 51 close to the hole 54 (continuous line in Figure 7).

Two wheels 58a, of the same type as the wheels 58, are located in correspondence with the articulation 64, also on opposite sides of the arm 51, the wheels being traversed by the ring 62 and serving as spacers to keep the ring 62 in a substantially centred position with respect to the arm 51.

In operation of the device 46, when the tank is full of liquid, for example even only partly, the ring 62 is in its inactive position described above.

When a downward force is exerted on each of the arms 51, the belts 48 are tensioned. The arms 51 being kept in this position, the ring 62 is rotated so as to engage the corresponding groove 68 such that the outermost side 66 of the ring 62 contacts the wall of the upright 22 (or 27) facing the tank 1, preventing movement of the device 46 along the respective upright. In this position, the wheels 58 of deformable material located within the uprights 22 (or 27) deform and, in particular, their radially outermost parts 59 having the outwardly concave surfaces which are more easily deformable, deform. The clamping of the devices 46 enables the upper face of the uppermost container 2 of the tank 1 to be secured extremely effectively so as to limit upward and transverse movements of the tank relative to the framework 15, giving the tank-framework system the maximum stability.

Claims

1. A flexible tank for liquids, of the type comprising:
- a plurality of superposed flexible containers (2) which are substantially polygonal in plan, each being constituted by a pair of superposed flexible sheets (2a, 2b) sealed together along their peripheries,
- each container (2) being welded to the adjacent containers (2) along a weld line (4) inside the periphery of the sheets (2a, 2b),
- the interiors of the containers (2) communicating with each other through a series of holes (6) formed in the sheets (2a, 2b) inside the weld line (4) and vertically aligned with each other,
- the interior of one of the containers (2) communicating with the exterior of the tank (1) through connector means (37, 39),

characterised in that one (2a) of the flexible sheets (2a, 2b) constituting each of the individual containers (2) is more extensive than the other sheet (2b) and has projecting portions (3a) folded over the edges of the less extensive sheet (2b) so as to leave its vertices free, the projecting portions (3a) being welded to the edge portions of the less extensive sheet (2b) and, also, each container (2) being provided with seal elements (11) welded at its vertices.

2. A tank according to Claim 1, characterised in that each of the seal elements (11) welded to the vertices of each container (2) has an inner portion (11b) interposed between the more extensive sheet (2a) and the less extensive sheet (2b) and two outer portions (11a) located outside the more extensive sheet (2a) and the

less extensive sheet (2b) respectively, these outer portions (11a) and the inner portion (11b) being connected together.

3. A tank according to Claim 2, characterised in that the connector means comprise a first duct (37) and a second duct (39) both connected to the lowermost container (2), the first duct (37) acting as an air vent during filling of the tank (1) effected through the second connector (39) and as an outlet for liquid during emptying of the tank (1).

4. A tank according to Claim 3, characterised in that the uppermost container (2) has an automatic valve (42) for allowing air to flow out of the tank (1).

5. A tank according to any one of Claims 1 to 4, characterised in that the tank has a framework (15) which surrounds the tank (1) and includes a plurality of uprights (20, 27) and an adjustable retaining device (46) for anchoring the upper face of the upper container (2) of the tank (1) to the framework (15), the device (46) including tie connecting means (48, 49, 50, 51) each having one end connected to the container (2) and its opposite end slidably engaged with a respective upright (20, 27) forming part of the framework (15).

6. A tank according to Claim 5, characterised in that the tie connecting means include a belt (48), each disposed in correspondence with an upright (20, 27) of the framework (15), an arm (51) being articulated to each of the belts (48) and adapted to engage slidingly with a respective upright (20, 27).

7. A tank according to Claim 6, characterised in that the uprights (20, 27) are hollow and have a longitudinal respective slot (52) facing the tank (1), said slot (52) being traversed by one end of a respective stabilising arm (51), and in that the guide means are wheels (59) which can run within the uprights (20, 27), the wheels (58) being articulated at the opposite end of the respective stabilizing arm (51) from the belt (48).

8. A tank according to Claim 7, characterised in that the stabilising arms (51) include means (62, 68) for adjusting the height of the tank (1) relative to the framework (15).

9. A tank according to Claim 8, characterised in that the means for adjusting the height of the tank (1) include a clamping ring (62) articulated to the stabilising arm (51), the ring (62) being pivotable between an inactive position and an active position in which it engages a groove (68) in the respective stabilising arm (51) so as to interfere with the respective upright (20, 27) whereby movements of the top of the tank (1) longitudinally of the respective upright (20, 27) are prevented.

10. A tank according to Claim 9, characterised in that the wheels (58) are resiliently deformable.

11. A tank according to Claim 10, characterised in that the radially-outer surfaces of the wheels (58) are outwardly concave (59).

12. A tank according to Claim 5, characterised in that the framework (15) includes pivotable frames (22) hinged to a ridged structure (18a, 18b, 19a, 19b, 20).

13. A process for the manufacture of a flexible tank for liquids of the type comprising at least one flexible container (2) having a substantially polygonal shape in plan and constituted by a pair of superposed flexible sheets (2a, 2b) sealed together along their peripheries, characterised in that it includes the following steps:

- providing the two sheets (2a, 2b), one of which (2a) is more extensive than the other sheet (2b) and has portions (3a) which project beyond the less extensive sheet (2b), the projecting portions (3a) being able to be disposed in correspondence with the edges of the less extensive sheet (2b) leaving the vertices free,
- providing metallic strips of a length corresponding substantially to the sides of the less extensive sheet (2b),
- superposing the said sheets (2a, 2b) with the metal strips interposed between them along the edges of the less extensive sheet (2b),
- folding the projecting portions (3a) of the more extensive sheet (2a) over the edges of the less extensive sheet (2b),
- welding the projecting portions (3a) of the more extensive sheet (2a) along the edges of the less extensive sheet (2b) in correspondence with the metal strips, leaving the vertices of the container (2) open,
- removing the metal strips through the vertices of the container (2), and
- closing the vertices of the container (2) by welding a seal element (11) to each of them.

14. A process according to Claim 13, characterised in that each of the seal elements (11) comprises an inner portion (11b) adapted to be interposed between the more extensive sheet (2a) and the less extensive sheet (2b) and a pair of outer portions (11a) adapted to be located outside the more extensive sheet (2a) and the less extensive sheet (2b) respectively, the outer portions (11a) and the inner portion (11b) being connected together.

Patentansprüche

1. Flexibler Tank für Flüssigkeiten des Typs, der aufweist:

- eine Vielzahl von übereinander angeordneten flexiblen Behältern (2), die im wesentlichen polygonal in der Draufsicht sind, wobei jeder gebildet ist durch ein Paar von übereinander angeordneten flexiblen Lagen (2a, 2b), die entlang ihrer Randlinien miteinander verbunden sind,
- wobei jeder Behälter (2) mit dem benachbarten Behälter (2) entlang einer Schweißlinie (4) innerhalb der Randlinien der Lagen (2a, 2b) verschweißt ist,
- die Innenräume der Behälter (2) miteinander durch eine Reihe von Löchern (6) in Verbindung stehen, die in den Lagen (2a, 2b) innerhalb der Schweißlinie (4) ausgebildet und vertikal zueinander ausgerichtet sind,
- das Innere von einem der Behälter (2) mit dem Raum außerhalb des Tanks (1) durch Verbindungsmittel (37 , 39) in Verbindung steht,

dadurch gekennzeichnet, daß eine (2a) der flexiblen Lagen (2a, 2b), die jeden der einzelnen Behälter (2) bilden, ausgedehnter als die andere Lage (2b) ist und vorstehende Teile (3a) aufweist, die über die Kanten der weniger ausgedehnten Lage (2b) gefaltet sind, so daß die Scheitel frei gelassen werden, wobei die vorstehenden Teile (3a) mit den Kantenteilen der weniger ausgedehnten Lage (2b) verschweißt sind und jeder Behälter (2) audh mit Dichtungselementen (11) versehen ist, die an seine Scheitel geschweißt sind.

2. Tank nach Anspruch 1, dadurch gekennzeichnet, daß jedes der Dichtungselemente (11), die an die Scheitel eines jeden Behälters (2) geschweißt sind, einen inneren Teil (11b) aufweist, der zwischen der ausgedehnteren Lage (2a) und der weniger ausgedehnten Lage (2b) eingefügt ist, und zwei äußere Teile (11a), die außerhalb der ausgedehnteren Lage (2a) bzw. der weniger ausgedehnten Lage (2b) angeordnet sind, wobei die äußeren Teile (11a) und der innere Teil (11b) miteinander verbunden sind.

3. Tank nach Anspruch 2, dadurch gekennzeichnet, daß die Verbindungsmittel eine erste Leitung (37) und eine zweite Leitung (39) aufweisen, die beide mit dem untersten Behälter (2) verbunden sind, wobei die erste Leitung als Entlüftungsöffnung während des Füllens des Tanks (1), das durch den zweiten Verbinder (39) bewirkt wird, und als ein Auslaß für Flüssigkeit während des Entleerens des Tanks (1) wirkt.

4. Tank nach Anspruch 3, dadurch gekennzeichnet, daß der oberste Behälter (2) ein automatisches Ventil (42) aufweist, um Luft zu erlauben, aus dem Tank (1) zu strömen.

5. Tank nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß der Tank einen Rahmen (15) aufweist, der den Tank (1) umgibt und eine Vielzahl von Ständern (20, 27) und eine Halteeinrichtung (46) zum Verankern der Oberseite des oberen Behälters (2) des Tanks (1) an dem Rahmen (15) aufweist, wobei die Einrichtung (46) Bandverbindungsmittel (48, 49, 50, 51) aufweist, von denen jedes ein Ende mit dem Behälter (2) und sein anderes Ende verschiebbar verbunden mit einem jeweiligen Ständer (20, 27) hat, der einen Teil des Rahmens (15) bildet.

6. Tank nach Anspruch 5, dadurch gekennzeichnet, daß die Bandverbindungsmittel einen Gurt (48) aufweisen, der jeweils in Übereinstimmung mit einem Ständer (20, 27) des Rahmens (15) angeordnet ist, wobei ein Arm (51) mit jedem der Gurte (48) gelenkig verbunden ist und so angepaßt ist, daß er mit einem jeweiligen Ständer (20, 27) verschiebbar in Eingriff steht.

7. Tank nach Anspruch 6, dadurch gekennzeichnet, daß die Ständer (20, 27) hohl sind und einen jeweiligen Längsschlitz (52) haben, der dem Tank (1) gegenüberliegt, wobei der Schlitz (52) durchquert wird durch ein Ende eines jeweiligen Stabilisierungsarms (51), und dadurch, daß die Führungsmittel Räder (59) sind, die innerhalb der Ständer (20, 27) laufen können, wobei die Räder (58) gelenkig an dem Ende des jeweiligen Stabilisierungsarms (51) angeordnet sind, das dem Gurt (48) gegenüberliegt.

8. Tank nach Anspruch 7, dadurch gekennzeichnet, daß die Stabilisierungsarme (51) Mittel (62,

68) aufweisen zum Einstellen der Höhe des Tanks (1) in Bezug zum Rahmen (15).

9. Tank nach Anspruch 8, dadurch gekennzeichnet, daß die Mittel zum Einstellen der Höhe des Tanks (1) einen Klemmring (62) aufweisen, der an dem Stabilisierungsarm (51) angelenkt ist, wobei der Ring (62) verschwenkbar zwischen einer inaktiven Position und einer aktiven Position ist, in der er mit einer Nut (68) in dem jeweiligen Stabilisierungsarm (51) in Eingriff steht, um so in den jeweiligen Ständer (20, 27) einzugreifen, wodurch Bewegungen der Oberseite des Tanks (1) längs zu dem jeweiligen Ständer (20, 27) verhindert werden.

10. Tank nach Anspruch 9, dadurch gekennzeichnet, daß die Räder (58) elastisch verformbar sind.

11. Tank nach Anspruch 10, dadurch gekennzeichnet, daß die radial äußeren Oberflächen der Räder (58) auswärts konkav (59) sind.

12. Tank nach Anspruch 5, dadurch gekennzeichnet, daß der Rahmen (15) schwenkbare Rähmchen (22) aufweist, die gelenkig mit einer steifen Struktur (18a, 18b, 19a, 19b, 20) verbunden sind.

13. Verfahren zur Herstellung eines flexiblen Tanks für Flüssigkeiten des Typs, der mindestens einen flexiblen Behälter (2) aufweist, der eine im wesentlichen polygonale Form in der Draufsicht hat und gebildet ist durch ein Paar von übereinander angeordneten flexiblen Lagen (2a, 2b), die entlang ihrer Randlinien miteinander verbunden sind, dadurch gekennzeichnet, daß es die folgenden Schritte aufweist:

- Bereitstellen von zwei Lagen (2a, 2b), von denen eine (2a) weiter ausgedehnt ist als die andere Lage (2b) und Teile (3a) aufweist, die über die weniger ausgedehnte Lage (2b) vorstehen, wobei die vorstehenden Teile (3a) in der Lage sind, in Übereinstimmung mit den Kanten der weniger ausgedehnten Lage (2b) gebracht zu werden, wobei sie die Scheitel frei lassen,
- Bereitstellen von metallischen Streifen einer Länge, die im wesentlichen den Seiten der weniger ausgedehnten Lage (2b) entspricht,
- Übereinander Anordnen der Lagen (2a, 2b) mit den Metallstreifen, die zwischen ihnen entlang der Kanten der weniger ausgedehnten Lage (2b) angeordnet sind,
- Falten der vorstehenden Teile (3a) der ausgedehnteren Lage (2a) über die Kanten der weniger ausgedehnten Lage (2b),
- Verschweißen der vorstehenden Teile (3a) der ausgedehnteren Lage (2a) entlang der Kanten der weniger ausgedehnten Lage (2b) in Übereinstimmung mit den Metallstreifen, wobei die Scheitel der Behälter (2) offen gelassen werden,
- Entfernen der Metallstreifen durch die Scheitel der Behälter (2) und
- Schließen der Scheitel der Behälter (2) durch Schweißen eines Dichtungselements (11) an jeden von ihnen.

14. Verfahren nach Anspruch 13, dadurch gekennzeichnet, daß jedes der Dichtungselemente (11) einen inneren Teil (11b) aufweist, der geeignet ist, zwischen der ausgedehnteren Lage (2a) und der weniger ausgedehnten Lage (2b) eingeschoben zu werden, und ein Paar von äußeren Teilen (11a), die geeignet sind, außerhalb der ausgedehnteren Lage (2a) bzw. der weniger ausgedehnten Lage (2b) plaziert zu werden, wobei die äußeren Teile (11a) und der innere Teil (11b) miteinander verbunden sind.

Revendications

1. Réservoir flexible pour liquides, du type comprenant :

- une pluralité de récipients flexibles superposés (2) qui, en plan, sont sensiblement polygonaux, chacun étant constitué par une paire de feuilles flexibles superposées (2a, 2b) fixées de façon étanche l'une à l'autre le long de leurs périphéries,
- chaque récipient (2) étant soudé aux récipients adjacents (2) le long d'une ligne de soudure (4) à l'intérieur de la périphérie des feuilles (2a, 2b),
- les intérieurs des récipients (2) communiquant l'un avec l'autre à travers une série de trous (6) formés dans les feuilles (2a, 2b) à l'intérieur de la ligne de soudure (4) et étant alignés verticalement l'un avec l'autre,
- l'intérieur d'un des récipients (2) communiquant avec l'extérieur du réservoir (1) à travers un moyen de raccordement (37, 39),

caractérisé en ce que l'une (2a) des feuilles flexibles (2a, 2b) constituant chacune des récipients individuels (2) a une plus grande étendue que l'autre feuille (2b) et comporte des parties saillantes (3a) repliées sur les bords de la feuille moins étendue (2b) de manière à

laisser ses sommets dégagés, les parties saillantes (3a) étant soudées aux parties de bord de la feuille moins étendue (2b) et chaque récipient (2) étant en outre pourvu d'éléments d'étanchéité (11) soudés à ses sommets.

2. Réservoir selon la revendication 1, **caractérisé** on ce que chacun dos éléments d'étancheité (11) soudés aux sommets de chaque récipient (2) comporte une partie intérieure (11b) interposée entre la feuille plus étendue (2a) et la feuille moins étendue (2b) et deux parties extérieures (11a) placées à l'extérieur de la feuille plus étendue (2a) et de la feuille moins étendue (2b), respectivement, ces parties extérieures (11a) et la partie intérieure (11b) étant raccordées mutuellement.

3. Réservoir selon la revendication 2, **caractérisé** en ce que le moyen de raccordement comprend un premier conduit (37) et un second conduit (39) raccordés tous deux au récipient inférieur extrême (2), le premier conduit (37) agissant comme un orifice de communication à l'air libre pendant le remplissage du réservoir (1) effectué à travers le second conduit (39) et comme un orifice de sortie pour le liquide pendant le remplissage du réservoir (1).

4. Réservoir selon la revendication 3, **caractérisé** en ce que le récipient supérieur extrême (2) comporte une valve automatique (42) pour permettre à l'air de s'écouler hors du réservoir (1).

5. Réservoir selon l'une quelconque des revendications 1 à 4, **caractérisé** en ce que le réservoir comporte un bâti (15) qui entoure le réservoir (1) et comprend une pluralité de montants (20, 27) et un dispositif de retenue réglable (46) pour fixer la face supérieure du réservoir supérieur (2) du réservoir (1) au bâti (15), ce dispositif (46) comprenant deux moyens de liaison (48, 49, 50, 51), chacun ayant une extrémité reliée au récipient (2) et son extrémité opposée en prise de façon coulissante avec un montant correspondant (20, 27) faisant partie du bâti (15).

6. Réservoir selon la revendication 5, **caractérisé** en ce que le moyen de liaison comprend une sangle (48), chaque sangle étant disposée en correspondance avec un montant (20, 27) du bâti (15), un bras (51) étant articulé à chacune des sangles (48) et étant adapté pour venir en prise de façon coulissante avec un montant correspondant (20, 27).

7. Réservoir selon la revendication 6, **caractérisé** en ce que les montants (20, 27) sont creux et comportent une lente respective longitudinale (52) en face du réservoir (1), ladite lente (52) étant traversée par une des extrémités d'un bras de stabilisation correspondant (51) et en ce que les moyens de guidage sont des roulettes (59) qui peuvent circuler à l'intérieur des montants (20, 27), les roulettes (58) étant articulées à l'extrémité du bras de stabilisation correspondant (51), située à l'opposé de la sangle (48).

8. Réservoir selon la revendication 7, **caractérisé** en ce que les bras de stabilisation (51) comprennent des moyens (62, 68) pour régler la hauteur du réservoir (1) par rapport au bâti (15).

9. Réservoir selon la revendication 8, **caractérisé** en ce que les moyens servant à régler la hauteur du réservoir (1) comprennent un anneau de blocage (62) articulé au bras de stabilisation (51), l'anneau (62) pouvant pivoter entre une position inactive et une position active dans laquelle il s'encastre dans une encoche (68) du bras de stabilisation correspondant (51) de manière à interagir avec le montant correspondant (20, 27) en empêchant ainsi la partie supérieure du réservoir (1) de se déplacer dans le sens longitudinal du montant correspondant (20, 27).

10. Réservoir selon la revendication 9, **caractérisé** en ce que les roulettes (58) peuvent être déformées élastiquement.

11. Réservoir selon la revendication 10, **caractérisé** en ce que les surfaces radialement extérieures des roulettes (58) sont concaves extérieurement (59).

12. Réservoir selon la revendication 5, **caractérisé** en ce que le bâti (15) comprend des châssis pivotants (22) articulés à une structure nervurée (18a, 18b, 19a, 19b, 20).

13. Procédé pour la fabrication d'un réservoir flexible pour liquides du type comprenant au moins un récipient flexible (2) ayant, en plan, une forme sensiblement polygonale et constitué par une paire de feuilles flexibles superposées (2a, 2b) reliées de façon étanche l'une à l'autre le long de leurs périphéries, **caractérisé** en ce qu'il comprend les étapes consistant :

- à préparer les deux feuilles (2a, 2b) dont une (2a) est plus étendue que l'autre (2b)

et comporte des parties (3a) qui font saillie au-delà de la feuille moins étendue (2b), les parties saillantes (3a) pouvant être disposées en correspondance avec les bords de la feuille moins étendue (2b) en laissant les sommets dégagés,

- à préparer des bandes métalliques d'une longueur correspondant sensiblement aux côtés de la feuille moins étendue (2b),
- à superposer les feuilles (2a, 2b) avec les bandes métalliques interposées entre elles le long des bords de la feuille moins étendue (2b),
- à plier les parties saillantes (3a) de la feuille plus étendue (2a) sur les bords de la feuille moins étendue (2b),
- à souder les parties saillantes (3a) de la feuille plus étendue (2a) le long des bords de la feuille moins étendue (2b) en correspondance avec les bandes métalliques, en laissant les sommets du récipient (2) ouverts,
- à retirer les bandes métalliques à travers les sommets du récipient (2), et
- à fermer les sommets du récipient (2) en soudant un élément d'étanchéité (11) sur chacun d'eux.

14. Procédé selon la revendication 13, **caractérisé** en ce que chacun des éléments d'étanchéité (11) comprend une partie intérieure (11b) adaptée pour être interposée entre la feuille plus étendue (2a) et la feuille moins étendue (2b) et une paire des parties extérieures (11a) adaptées pour être placées à l'extérieur de la feuille plus étendue (2a) et de la feuille moins étendue (2b) respectivement, les parties extérieures (11a) et la partie intérieure (11b) étant fixées l'une à l'autre.

FIG. 1

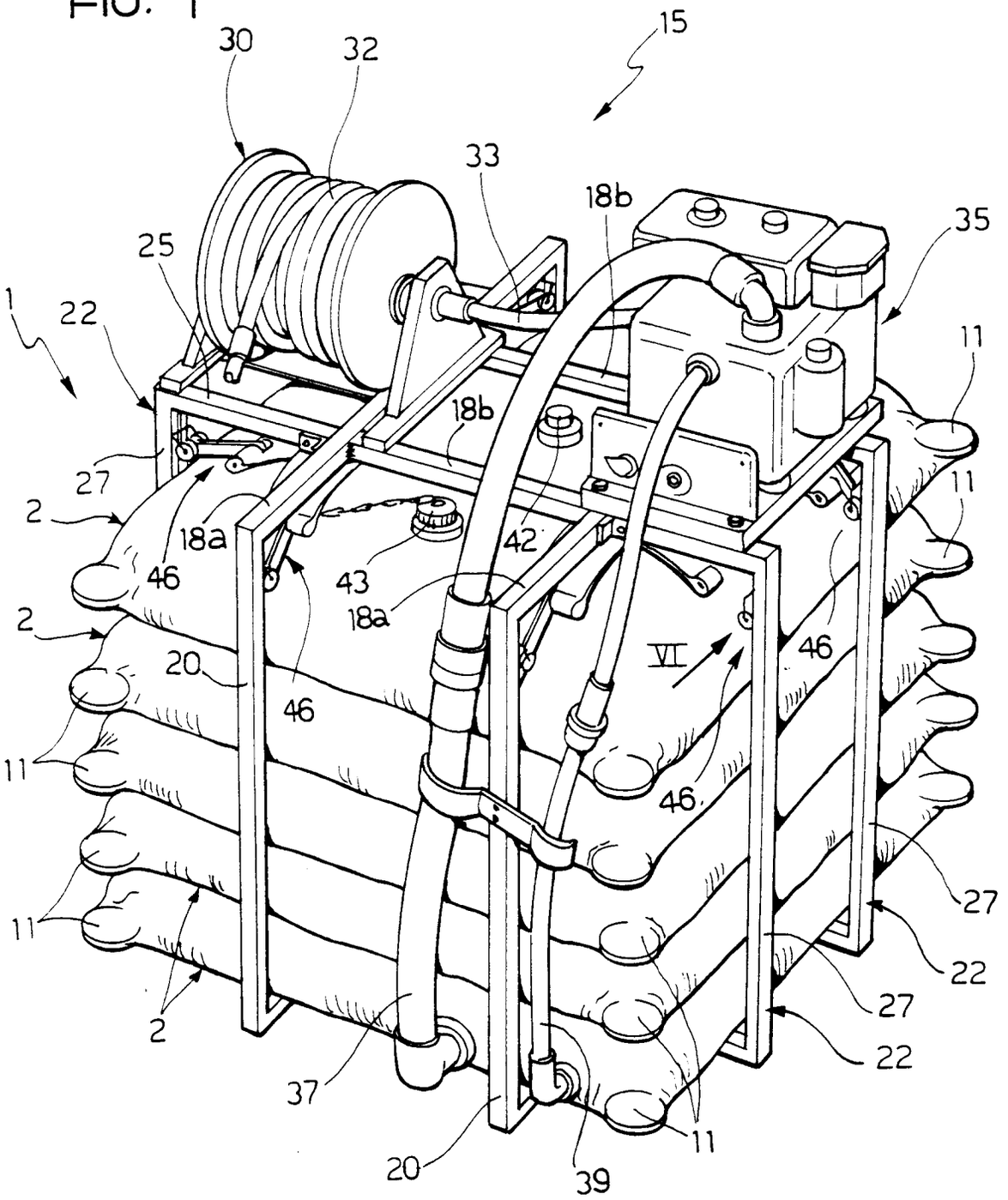

30
32
15
33
18b
35
25
1
22
11
18b
27
11
2
18a
42
46
43
18a
2
VI
46
20
46
11
46
27
11
22
27
2
22
37
11
20
39

FIG. 2

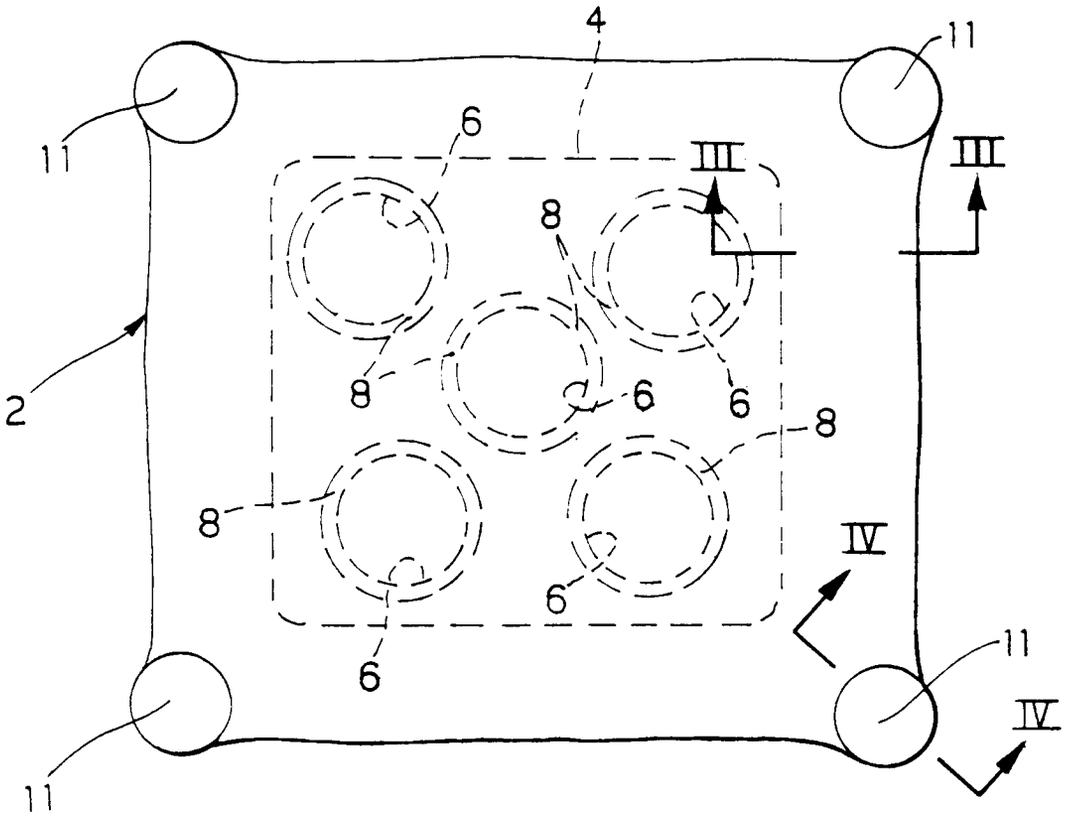


FIG. 3

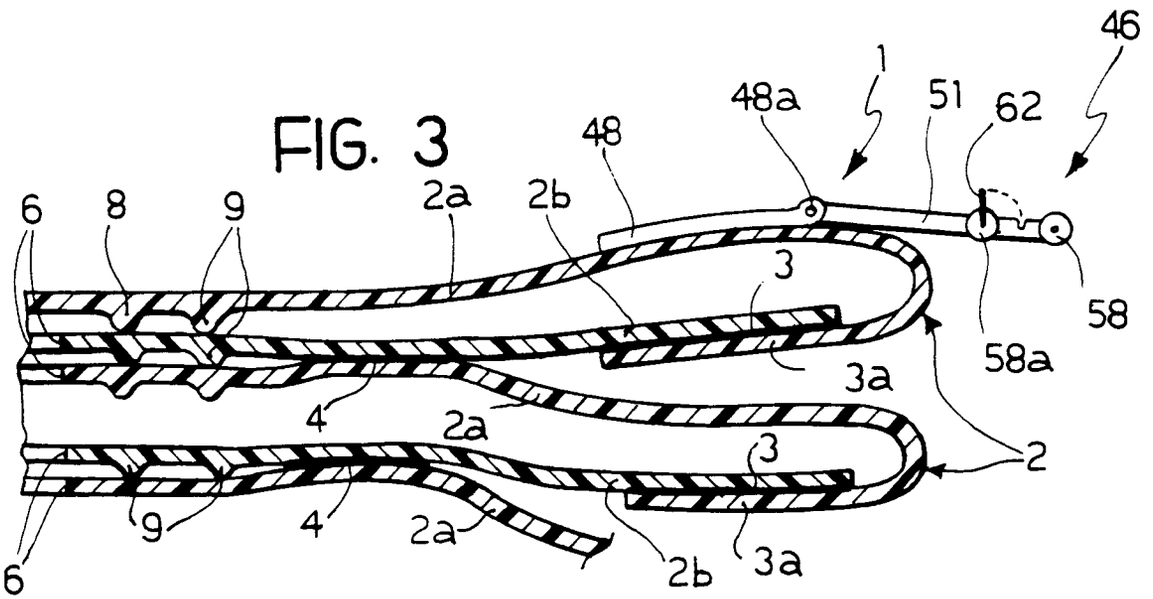


FIG. 4

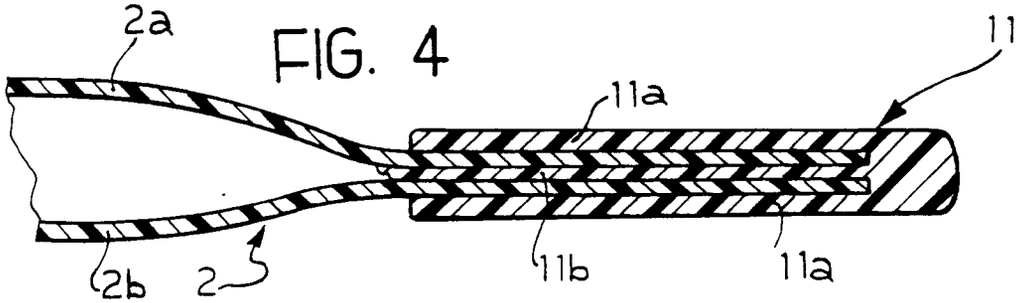
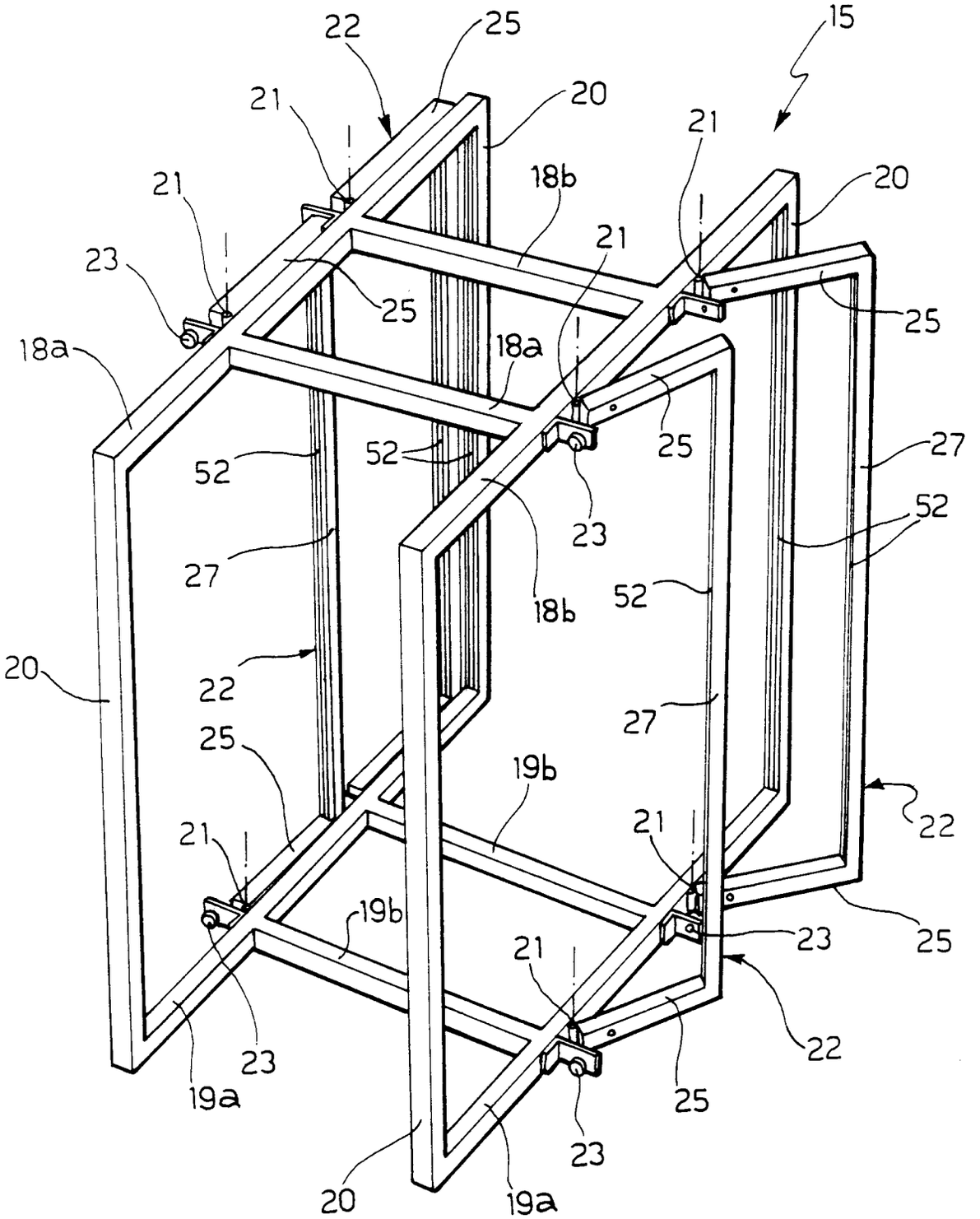


FIG. 5


22
25
15
21
20
21
21
18b
20
21
23
25
25
18a
18a
25
27
52
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52
27
18b
52
20
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22
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19a
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23
19a

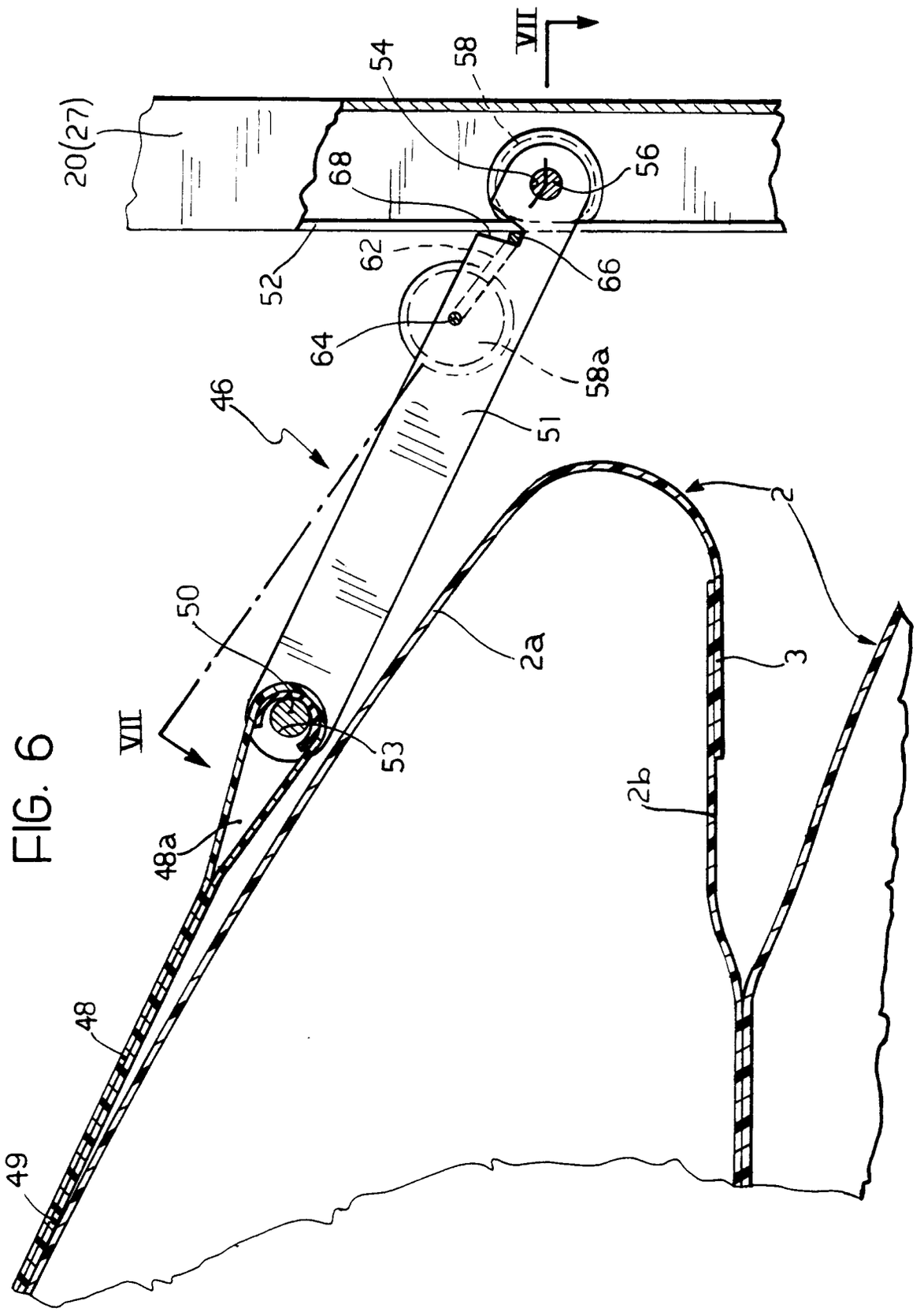
VII
54
58
20(27)
68
56
52
62
66
64
58a
46
51
2
50
2a
3
VII
53
2b
48a
48
49

FIG. 6

FIG. 7