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CA 2678143 A1 2011/03/08

(21) 2 678 143

(12) DEMANDE DE BREVET CANADIEN
CANADIAN PATENT APPLICATION

(13) A1

(22) Date de dépôt/Filing Date: 2009/09/08

(41) Mise à la disp. pub./Open to Public Insp.: 2011/03/08

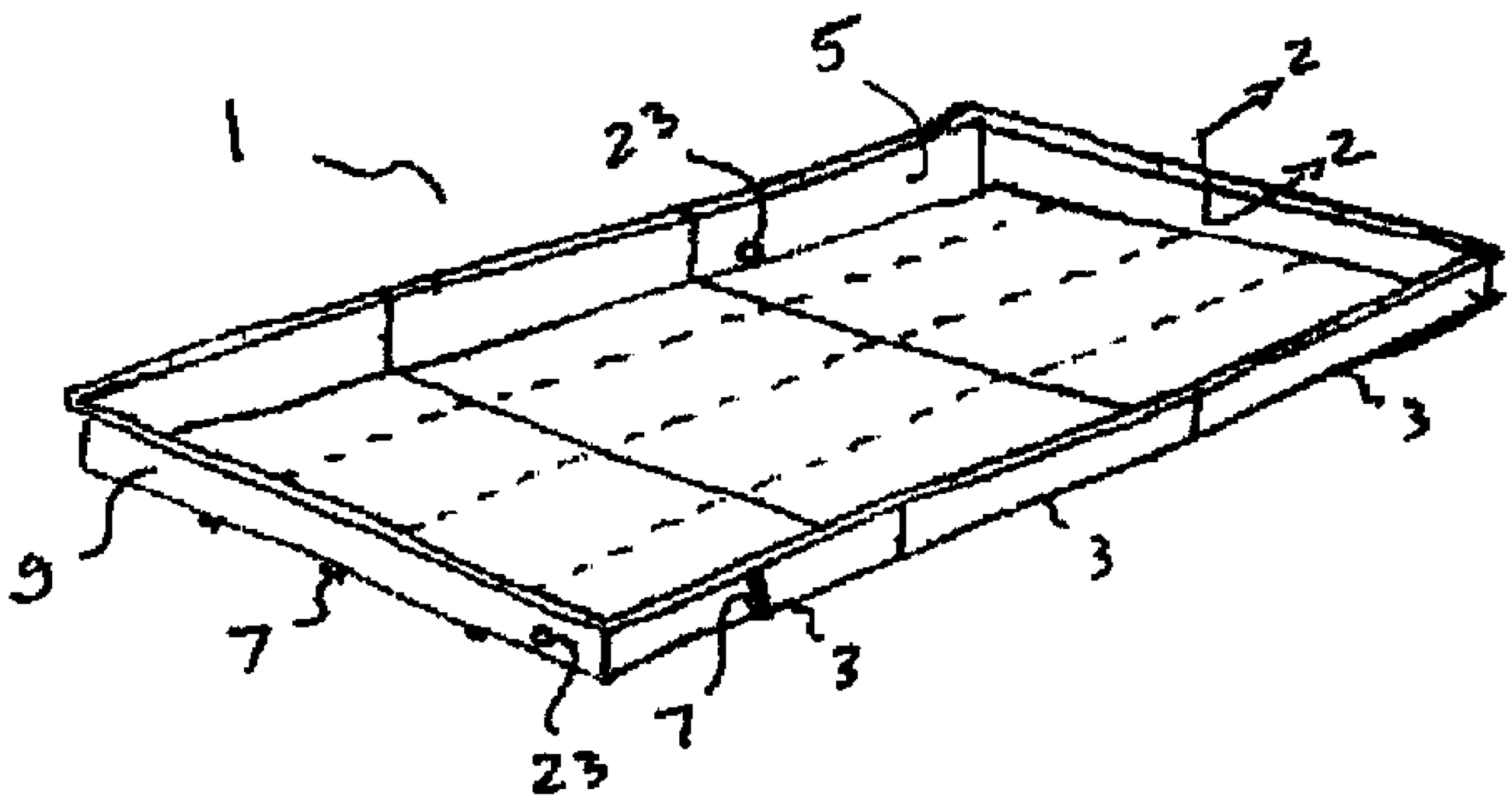
(51) Cl.Int./Int.Cl. *B65D 90/24* (2006.01),
E04H 17/18 (2006.01)

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(54) Titre : SYSTEME DE CONFINEMENT
(54) Title: CONTAINMENT SYSTEM



(57) Abrégé/Abstract:
This invention is in the field of liquid storage equipment and in particular a containment apparatus for containing liquid that might leak from liquid storage tanks.

ABSTRACT

STORAGE TANK CONTAINMENT APPARATUS

This invention is in the field of liquid storage equipment and in particular a containment apparatus for containing liquid that might leak from liquid storage tanks.

BACKGROUND

Large liquid storage tanks are used in a variety of industries. For example in the petroleum industry, oil is pumped from underground reservoirs to the surface at oil well sites. The oil coming from the well site is commonly connected to a pipeline system and conveyed to a central storage location through the pipeline system. Where such a pipeline system is not available however, one or more large storage tanks are placed on the well site, and the oil is pumped into the tanks. Periodically a transport will remove oil from the tanks and haul it away.

Where the stored liquid, such as oil, poses an environmental hazard, the storage tanks must be located inside a containment structure that is configured to contain any liquid that might be spilled from the tank. Such containment structures include walls around the tank, and an impervious liner made from plastic or the like that covers the ground and extends generally to the top of the inside surface of the walls, thereby forming a container. The area enclosed by the walls and the height of the walls are configured to provide sufficient volume to contain the required amount of liquid, which is usually regulated in the jurisdiction where it will be used, based on the number and capacity of the tanks being contained.

A typical containment structure is disclosed for example in Canadian Patent Number 2,362,105 to Mackie. A plurality of wall panels are connected end-to-end with corners

as required to form an enclosure and the liner is laid on the ground and up over the top of the wall panels. The storage tanks are placed on the liner inside the enclosure.

In a typical oil well site then, a conduit extends along the ground from the oil well output to the wall, then up over the wall and down along the inside of the wall to the ground, and then along the ground to the tank where it is connected to a port in the wall of the tank, such that oil can flow from the well output into the tank. Valves are also provided to allow for connection of conduits to remove oil from the tanks.

Thus the typical containment structure is quite time consuming to erect. As well, the conduit needs to have a number of elbows to go up and over the wall, which increases the risk of leaks, and also increases the cost and the time to connect the oil well to the tank, and restricts flow to the tank, increasing the pressure required to push the oil to the tank. Going up and over the wall can also provide a liquid trap where liquid gathers in the conduit when idle, and which can be subject to freezing and disruption of flow to the tank.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a containment apparatus for storage tanks that overcomes problems in the prior art.

The present invention provides a one piece containment apparatus that can be transported in one piece to a work location and placed on the ground without further construction. Conveniently the apparatus is made from welded steel and the inside is coated with epoxy or the like to protect the steel. The apparatus includes required bracing and support, and can also include a base onto which a tank can be placed. Once the containment apparatus is in place at the site, a tank is raised over the wall by a crane, and placed in the desired location on the floor of the apparatus, or on the base provided.

To facilitate connection to a supply conduit, such as the output from an oil well, threaded

or flanged ports can be provided through lower portions of the walls so that the outer supply conduit from the well output can run along the ground and be sealed to the outside of the port. Then the inner supply conduit from the tank can be sealed to the inside of the port, such that the supply conduit extends through the wall instead of over the wall, making a simpler connection, with reduced pressure loss and reduced risk that liquid will be trapped in the supply conduit. A plurality of ports can be provided to accommodate more than one tank, or to provide increased options for connecting to the supply conduit.

The one-piece construction of the present invention reduces the time and labor required to set up the containment apparatus in the desired working location. The port through the wall allows for convenient connection of a conduit to the tank inside the containment apparatus.

DESCRIPTION OF THE DRAWINGS

While the invention is claimed in the concluding portions hereof, preferred embodiments are provided in the accompanying detailed description which may be best understood in conjunction with the accompanying diagrams where like parts in each of the several diagrams are labeled with like numbers, and where:

Fig. 1 is a schematic perspective view of an embodiment of a containment apparatus of the present invention;

Fig. 2 is schematic sectional view along lines 2-2 in Fig. 1;

Fig. 3 is a schematic top view of the embodiment of Fig. 1, with tanks installed inside the containment apparatus;

Fig. 4 is a schematic sectional view of a wall port of the embodiment of Fig. 1 connected to outer and inner supply conduits;

Fig. 5 is a schematic sectional view of an alternate wall port connected to outer and inner supply conduits.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

Fig. 1 schematically illustrates an embodiment of a one piece containment apparatus 1 of the present invention. The apparatus 1 can be conveniently made, for example, by forming a number of sections 3 from steel and welding them together. The inside surface 5 of the apparatus 1 is coated with an epoxy or like material to seal and protect the steel material. Braces 7 are provided on the floor and walls as required to provide sufficient rigidity to the apparatus 1 to allow same to be transported on a trailer or the like, and to be substantially free standing at the working location. The top of the wall 9 can be formed as illustrated in Fig. 2 to provide increased strength and rigidity.

The area enclosed by the walls 9 and the height of the walls 9 are calculated so that the apparatus 1 can contain all the liquid that is stored in the tanks that will be located in the apparatus 1. As an example and as schematically illustrated in Fig. 3, to contain two 400 barrel tanks, each about 12 feet in diameter, the apparatus 1 could be about 20 feet wide, 36.5 feet long and have walls 9 that are about 3.5 feet high to satisfy capacity requirements in a particular jurisdiction.

The one piece apparatus 1 at about 20 feet wide can be transported in one piece on a trailer or the like along a public road in many jurisdictions, using pilot vehicles and warning lights as needed.

Once at the work location, such as an oil well site as schematically illustrated in Fig. 3, the apparatus can be placed on a leveled area of ground without further construction. Some tanks come with a base 11 onto which the tank 13 is mounted but many tanks do not include such a base and the tank 13 is simply placed on the floor 15 of the apparatus 1. Once the containment apparatus 1 is in place at the site, the tanks 13 are raised over the wall 9 of the apparatus 1 by a crane, and placed in the desired location on the floor of

the apparatus, or on the base provided. This crane can be used to both place the apparatus 1 on the ground, and then place the tanks 13 inside the apparatus 1. Fig. 3 shows one tank 13A located on the base 9, and the other tank 13B resting on the floor 15.

At the oil well site in Fig. 3, there are shown two separate oil wells 17, each with an output 19. To facilitate connection of supply conduits 21 from the outputs 19 to the tanks 13, wall ports 23 are provided through lower portions of the walls 9. Each outer supply conduit 21A, which lies outside the apparatus 1, is connected at one end to the well output 19 and runs along the ground or supported somewhat above the ground to the opposite end which is connected and sealed to the outer side 23A of the wall port 23.

The inner supply conduit 21B, which lies inside the apparatus 1, is connected at one end to a fill port 25 of the tank 19 and runs along the ground or supported somewhat above the ground to the opposite end which is connected and sealed to the inner side 23B of the port 23. Thus the resulting complete supply conduit 21 comprises outer and inner supply conduits 21A, 21B passing through the wall 9 just above the ground, with the resulting reduced complexity.

A number of wall ports can be provided at various locations along the walls to provide increased options and allow for other connections to the tanks through the wall, or for greater versatility in placing the tanks 13 by providing optional routes for the supply conduit 21. These added wall ports 23 can be blocked off when not in use to seal the wall 9.

The wall port 23 can be flanged as schematically illustrated in Fig. 4 where the outer and inner conduits 21A, 21B are attached to the corresponding outer and inner sides 23A, 23B of the wall port 23, by connecting bolts 27 through holes in the flanges 29 as is known in the art. The resulting complete supply conduit 21 passes through the wall 9 just above the floor 15.

Fig. 5 schematically illustrates a threaded wall port 123 where threaded outer and inner conduits 121A, 121B are connected to threaded outer and inner sides 123A, 123B of the wall port 123 by a threaded coupler 131. It is contemplated that other connection means known in the art could also be used to connect the supply conduits to the wall port.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous changes and modifications will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all such suitable changes or modifications in structure or operation which may be resorted to are intended to fall within the scope of the claimed invention.

CLAIMS

FIG. 1

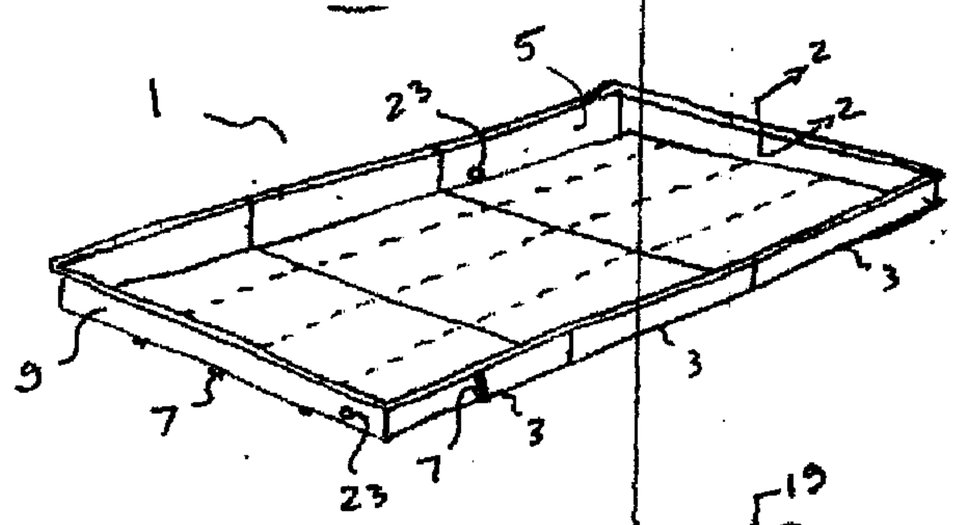


FIG. 2

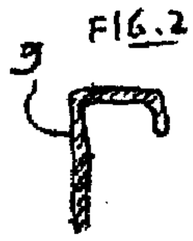


FIG. 3

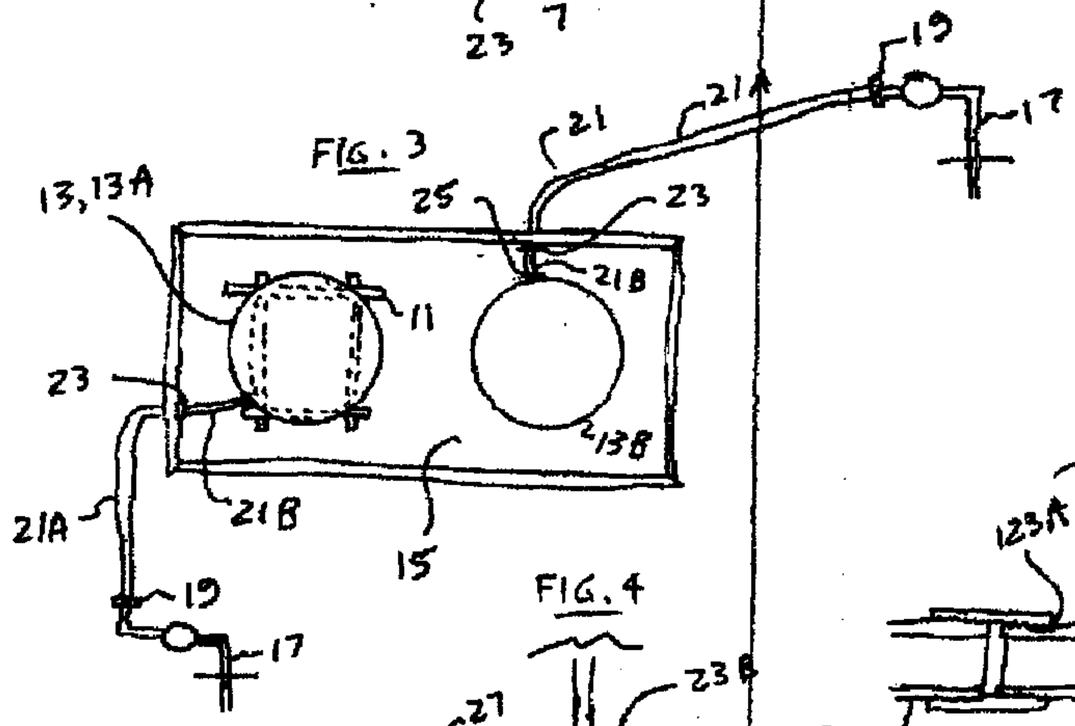


FIG. 4

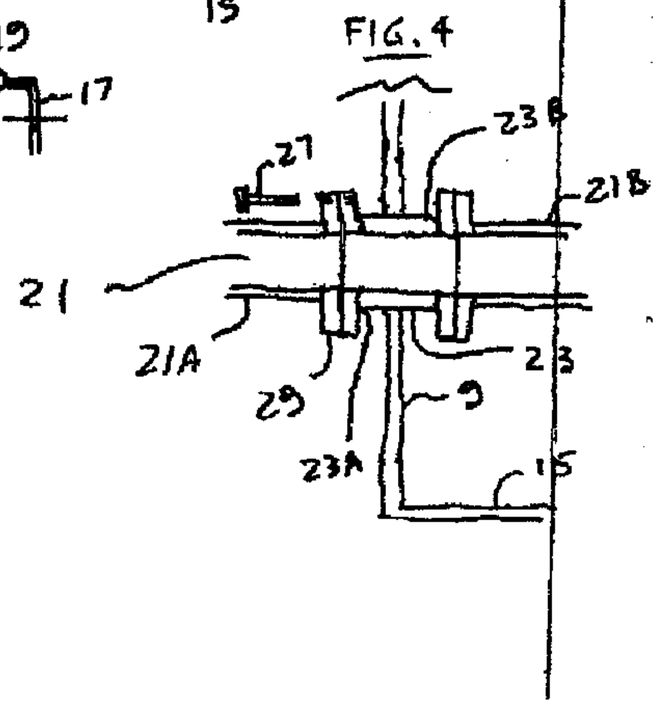
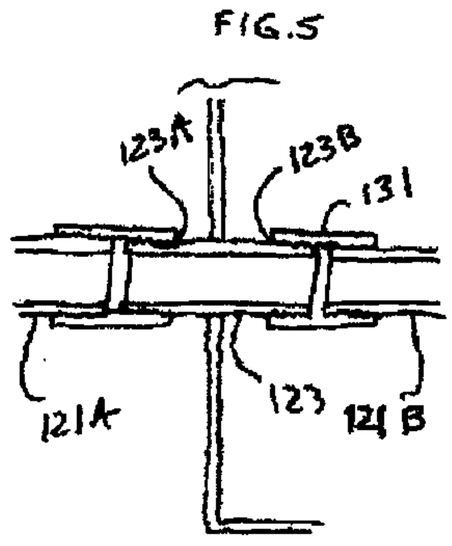
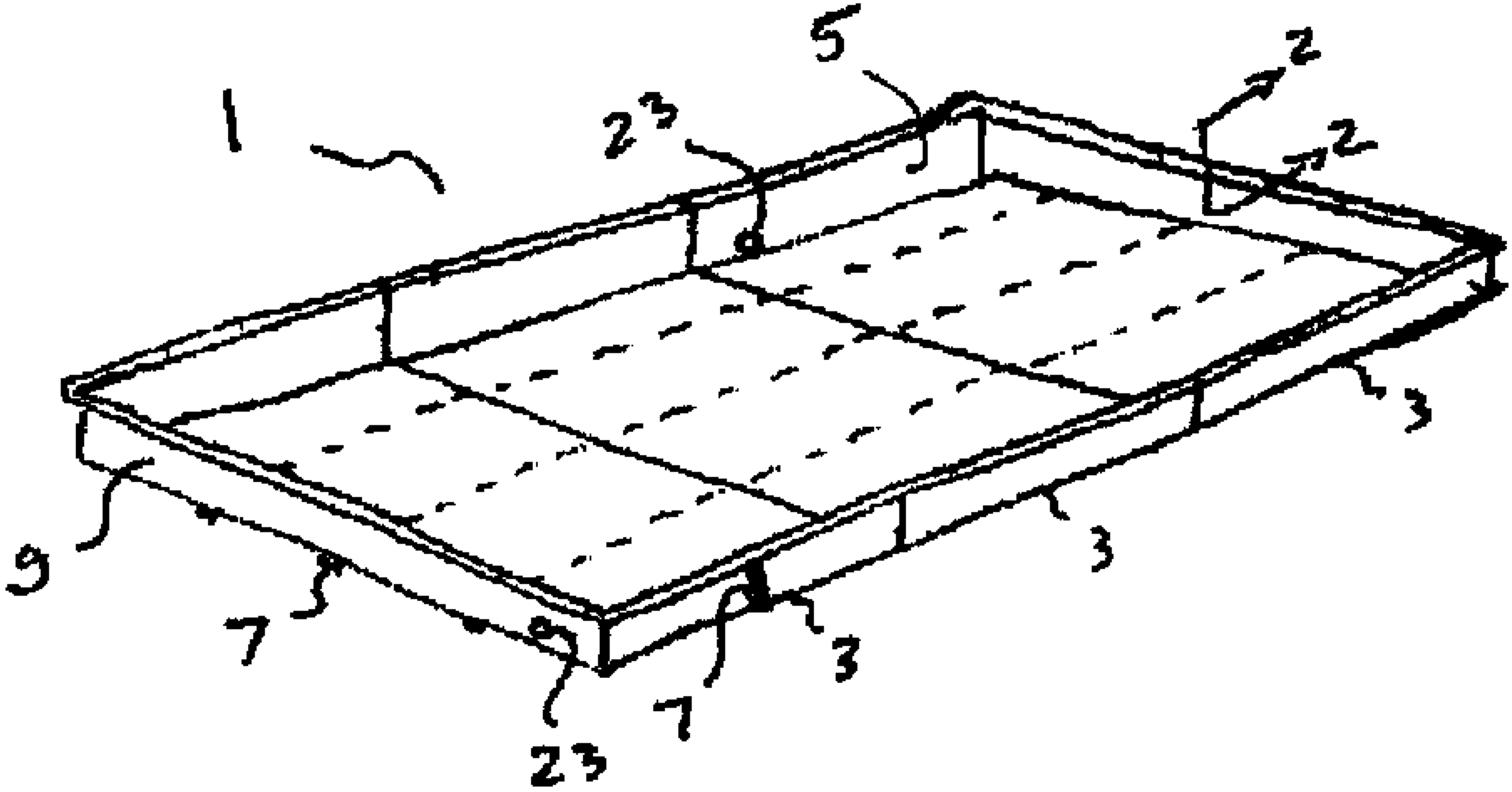


FIG. 5




1
2
3
5
9
7
23