

Dec. 11, 1962

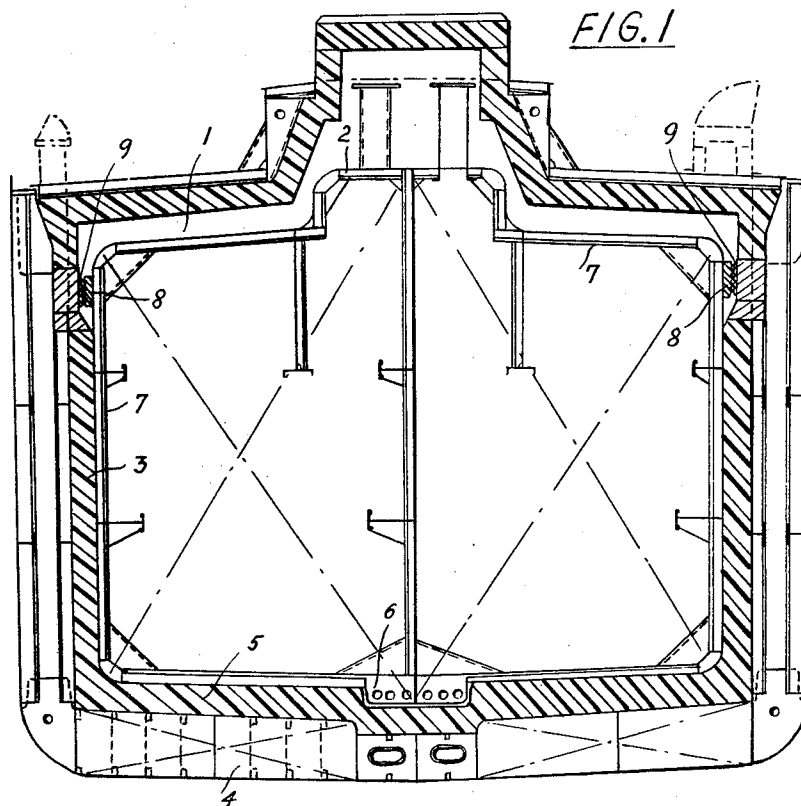
H. MEESEN

3,067,713

FREIGHTER FOR LIQUID GASES

Filed Aug. 30, 1960

3 Sheets-Sheet 1



INVENTOR
Heinrich Meesen
By
Lowry & Linehart
ATTYS.

Dec. 11, 1962

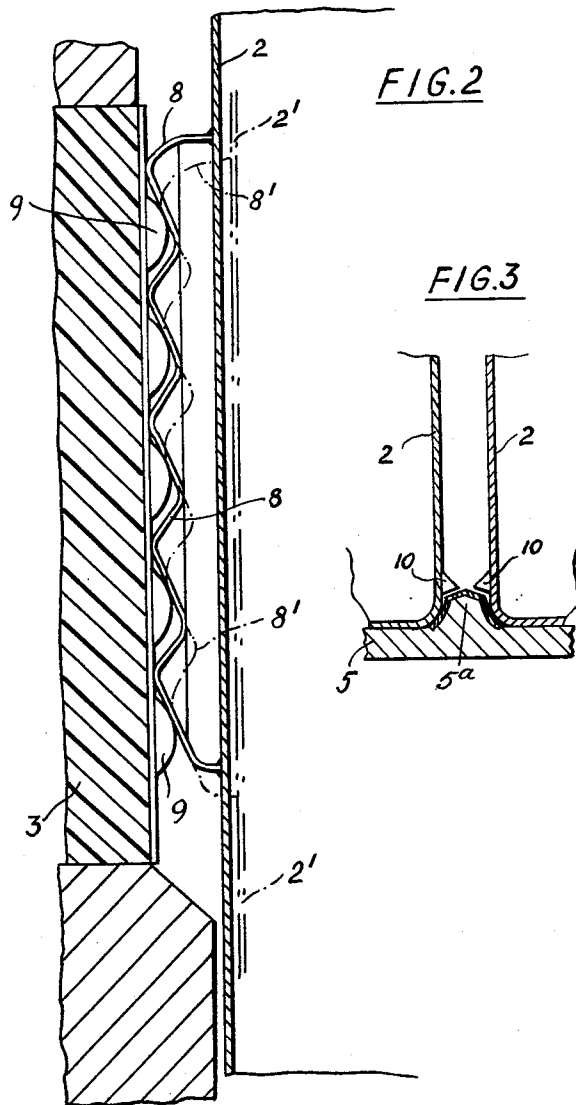
H. MEESEN

3,067,713

FREIGHTER FOR LIQUID GASES

Filed Aug. 30, 1960

3 Sheets-Sheet 2



INVENTOR
Heinrich Meesen
By
Lowy + Rinehart
ATTYS.

Dec. 11, 1962

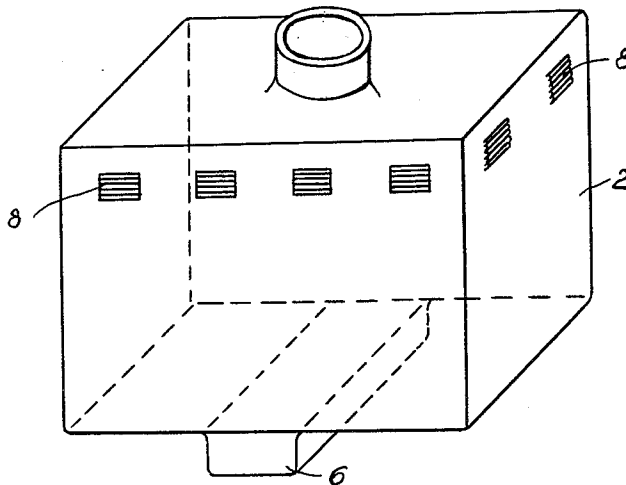
H. MEESEN
FREIGHTER FOR LIQUID GASES

3,067,713

Filed Aug. 30, 1960

3 Sheets-Sheet 3

FIG. 4



INVENTOR:

Heinrich Meesen

By

Lowy & Rinehart

ATTYS.

1

3,067,713

FREIGHTER FOR LIQUID GASES

Heinrich Meesen, Kiel-Ellerbek, Germany, assignor to
Kieler Howaldtswerke A.G., Kiel-Dietrichsdorf, Ger-
many, a firm.

Filed Aug. 30, 1960, Ser. No. 52,976

Claims priority, application Germany Sept. 5, 1959

4 Claims. (Cl. 114—74)

For the transport of pressure-liquefied gases in the hold of ships it is known to use tanks insulated against differences in temperature and anchored in the hold. Such tanks must be fixed in the hold in such a manner that no heat bridges are formed, no stresses are transmitted from the ship's hull to the tanks by the ship's movements, and the possibility of free expansion of the tanks in the case of differences in temperature between the contents of the tanks and the atmosphere is ensured.

Tanks are known which have in one of their centroidal axes a supporting structure composed of pins which are guided in the bottom and the deck of the ship. Likewise spherical or similarly shaped tanks were provided with suspension devices between the ship bottom and the deck, the suspension being effected in the equatorial plane of the tanks.

Finally, lateral guide rails have been arranged on the tanks and on the inner wall of the hold and the tanks have been kept floating in the hold.

The known tanks are open to the objection that they do not take fully into consideration the shrinkage of their walls which occurs during the filling of liquefied gases (boiling point of methane $\text{CH}_4 = -161^\circ \text{C.}$). After the shrinkage has taken place the tanks are no longer tight in their guides and the movements of the ship are transmitted to the tanks.

To overcome this disadvantage and enable liquefied gases of different kinds with different boiling points to be transported without the fixed position of the tank in the insulated hold of the freighter being disturbed, the invention provides a freighter for liquid gases, which comprises freight rooms having at least one insulating layer and provided in the inner hull of the freighter, tanks arranged in the freight rooms and supported in relation to the hull and adapted to avoid heat bridges, and sliding supports constructed in accordance with the amount of shrinkage of the tanks and so arranged that the tanks are freely movable in all directions under the influence of heat, said sliding supports being composed of corrugated and bevelled guides mounted both on the tanks and on the insulating layer.

The tanks are preferably made of a light metal alloy.

The sliding supports may be composed of individual sections and distributed on the outer sides of the tanks.

The tanks may be supported in trough-like recesses in the insulating layer on the double bottom of the freighter.

Each tank is provided in the usual manner with safety valves connected to an escape gas conduit leading to the mast, liquid conduits, vapor conduits, riser pipes, temperature measuring installations and gauge instruments, as well as deepwell pumps with a driving motor on the deck. The insulated freight rooms in the inner hull are so constructed that no cold bridges lead to the outer hull of the freighter. The insulation must be such that it cannot be dissolved by the medium to be transported and is repulsive to liquid. The insulation preferably consists of synthetic resin foam material, thermoplastic synthetic substance, balsa wood, cork, glass fibres, foam glass or similar material.

Two preferred embodiments of the invention will now be described by way of example and with reference to the accompanying drawings, in which:

2

FIG. 1 is a vertical cross-section through a freighter showing a tank movably supported in an insulated freight room by means of sliding supports;

FIG. 2 is a view similar to FIG. 1 but showing, on an enlarged scale, only one of the sliding supports;

FIG. 3 is a cross-section showing a modified form of construction of sliding supports along the centerline of the freighter.

FIG. 4 is a perspective view of a tank showing longitudinally spaced supports carried by the side and end walls thereof.

As shown in FIG. 1, insulated freight rooms 1 are provided in the interior of a freighter, in which freight rooms tanks 2 for liquid gas are placed. The freight rooms 1 have on the side facing the tanks 2 one or more insulating layers 3 and are arranged between the longitudinal and transverse bulkheads of the freighter. The freighter has a double bottom 4 carrying an insulating layer 5 with a trough-like depression 6 in which the tank 2 is inserted. The insulating layers 3 and 5 are so constructed that there are no cold bridges from the freight rooms 1 to the bulkheads.

Each tank 2 is provided with internal reinforcements 7 and has in sections external sliding supports 8 that slope downwardly and inwardly and which slide on guides 9 of convex formation mounted on the insulating layer 3. The sliding supports 8 ensure that the tank 2, owing to its radius link, will always sit firmly in the insulated freight room 1, even if it has shrunk.

Liquefied gases have very low temperatures. The boiling point of methane is -161°C. , ethane -89°C. , propane -42.2°C. and butane -10.2°C. Light metal alloys are suitable as material for the tanks 2, which alloys under the influence of low-temperature cooling have increasing strength properties and, contrary to S.M. steel, are not cold-short. Between 20°C. and -161°C. light metal undergoes a shrinkage of approximately 4 mm. per meter, so that in the case of tanks with a height of 10 meters a shrinkage of about 40 mm. will take place.

As can be seen from FIG. 2, the sliding supports 8 allow, after the shrinkage of the tank 2 which comes into position 2', a constant firm seating of the tank in the insulated freight room 1. The sliding supports 3 consist of corrugated and bevelled guides which bear against the curved guides 9 of the insulating layer. The sliding supports are constructed according to the amount of shrinkage. The position 8' of the sliding supports 8 is reached after the tank 2 has shrunk under the influence of liquid methane filled into it at a temperature of -161°C.

Facets 10, as shown in FIG. 3, can also serve for holding and firmly mounting the tank 2, the angle of the facets being determined by the amount of shrinkage of the tank 2. FIG. 3 shows the supporting of two tanks 2 arranged side by side in an insulated freight room 1 with the tanks seated on the insulating layer 5 and with the facets 10 contacting the upstanding rib 5a rising from the insulating layer 5.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

I claim:

1. A transport for tanks comprising freight rooms having completely insulated walls, tanks supported in said freight rooms in completely insulated relation to said freight room walls, and cooperating support means carried by said freight room walls and walls of said tanks

3

supporting said tanks in all conditions of expansion and contraction of said tanks, said support means including vertical supports carried by vertical walls of said freight rooms and said tanks, each of said vertical supports including a pair of support elements, said support elements having abutting sloping surfaces with variable lines of contact, certain of said abutting sloping surfaces sloping downwardly and inwardly and others of said abutting sloping surfaces being of convex formation.

2. A transport for tanks comprising freight rooms having completely insulated walls, tanks supported in said freight rooms in completely insulated relation to said freight room walls, and cooperating support means carried by said freight room walls and walls of said tanks supporting said tanks in all conditions of expansion and contraction of said tanks, said support means including vertical supports carried by vertical walls of said freight rooms and said tanks, each of said vertical supports including a pair of support elements, said support elements having abutting sloping surfaces with variable lines of contact, one support element of each pair of support elements being of a zig-zag configuration and the other support element of each pair of support elements including a plurality of vertically spaced curved guides.

3. A transport for tanks comprising freight rooms having completely insulated walls, tanks supported in said freight rooms in completely insulated relation to said freight room walls, and cooperating support means carried by said freight room walls and walls of said tanks supporting said tanks in all conditions of expansion and contraction of said tanks, said support means including a bottom support on each tank along the longitudinal center line of a respective freight room, and longitudinally spaced upper vertical supports carried by each outer wall of each tank and a respective vertical wall of the associated freight room, each of said vertical supports includ-

4

ing a pair of support elements, said support elements having abutting sloping surfaces with variable lines of contact, certain of said abutting sloping surfaces sloping downwardly and inwardly and others of said abutting sloping surfaces being of convex formation.

4. A transport for tanks comprising freight rooms having completely insulated walls, tanks supported in said freight rooms in completely insulated relation to said freight room walls, and cooperating support means carried by said freight room walls and walls of said tanks supporting said tanks in all conditions of expansion and contraction of said tanks, said support means including a bottom support on each tank along the longitudinal centerline of a respective freight room, and longitudinally spaced upper vertical supports carried by each outer wall of each tank and a respective vertical wall of the associated freight room, each of said vertical supports including a pair of support elements, said support elements having abutting sloping surfaces with variable lines of contact, one support element of each pair of support elements being of a zig-zag configuration and the other support element of each pair of support elements including a plurality of vertically spaced curved guides.

References Cited in the file of this patent

UNITED STATES PATENTS

2,858,136	Rind	Oct. 28, 1958
2,896,416	Henry	July 28, 1959
2,905,352	Henry	Sept. 22, 1959
2,954,003	Farrell et al.	Sept. 27, 1960
2,992,622	Maker	July 18, 1961

FOREIGN PATENTS

220,768	Australia	Mar. 13, 1959
746,567	Germany	Aug. 12, 1944