June 29, 1937. C. H. FOLMSBEE 2,085,090

REFRIGERATED TANK CAR

Filed Nov. 3, 1934 3 Sheets-Sheet 1

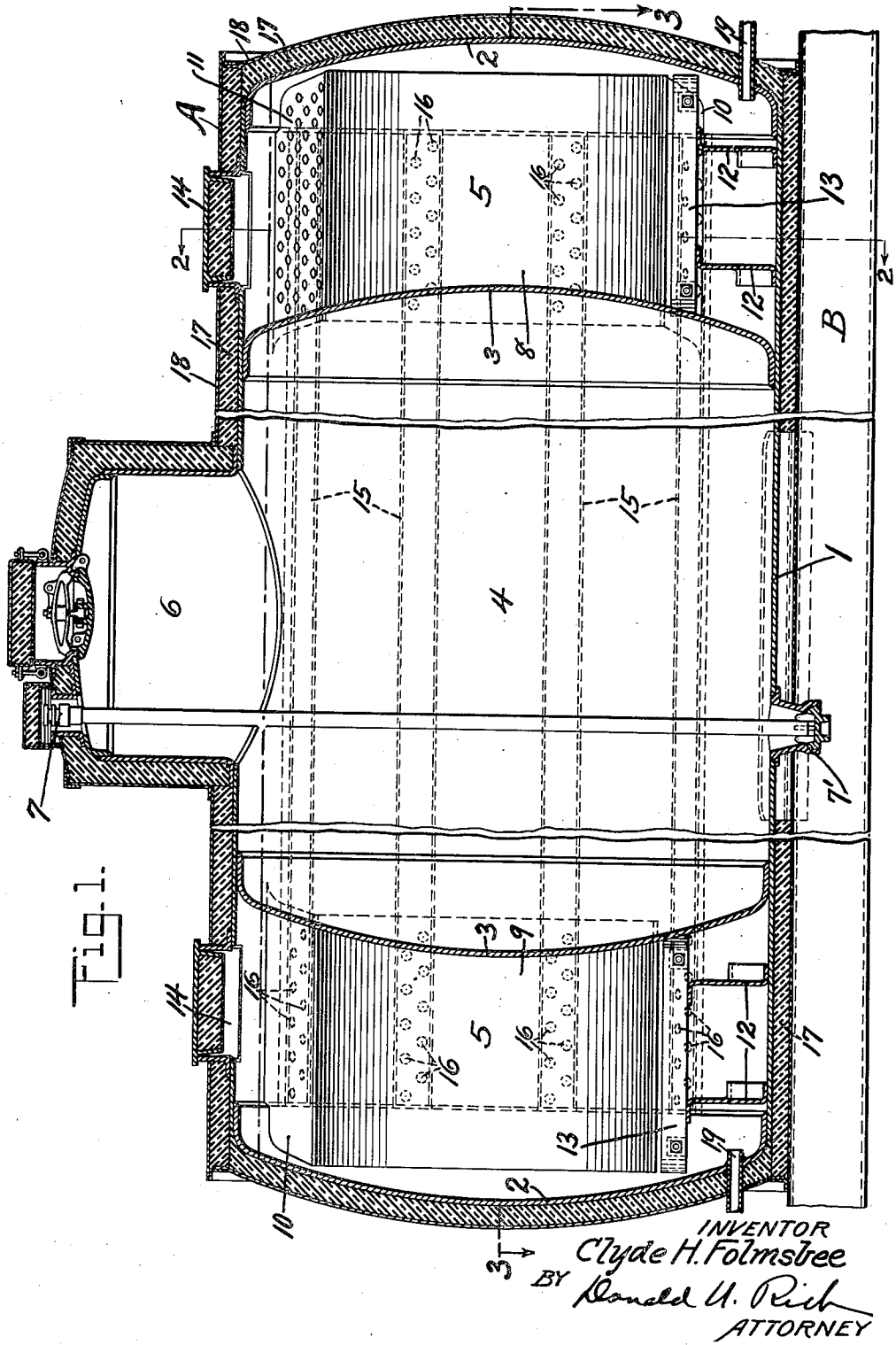

Fig. 1.

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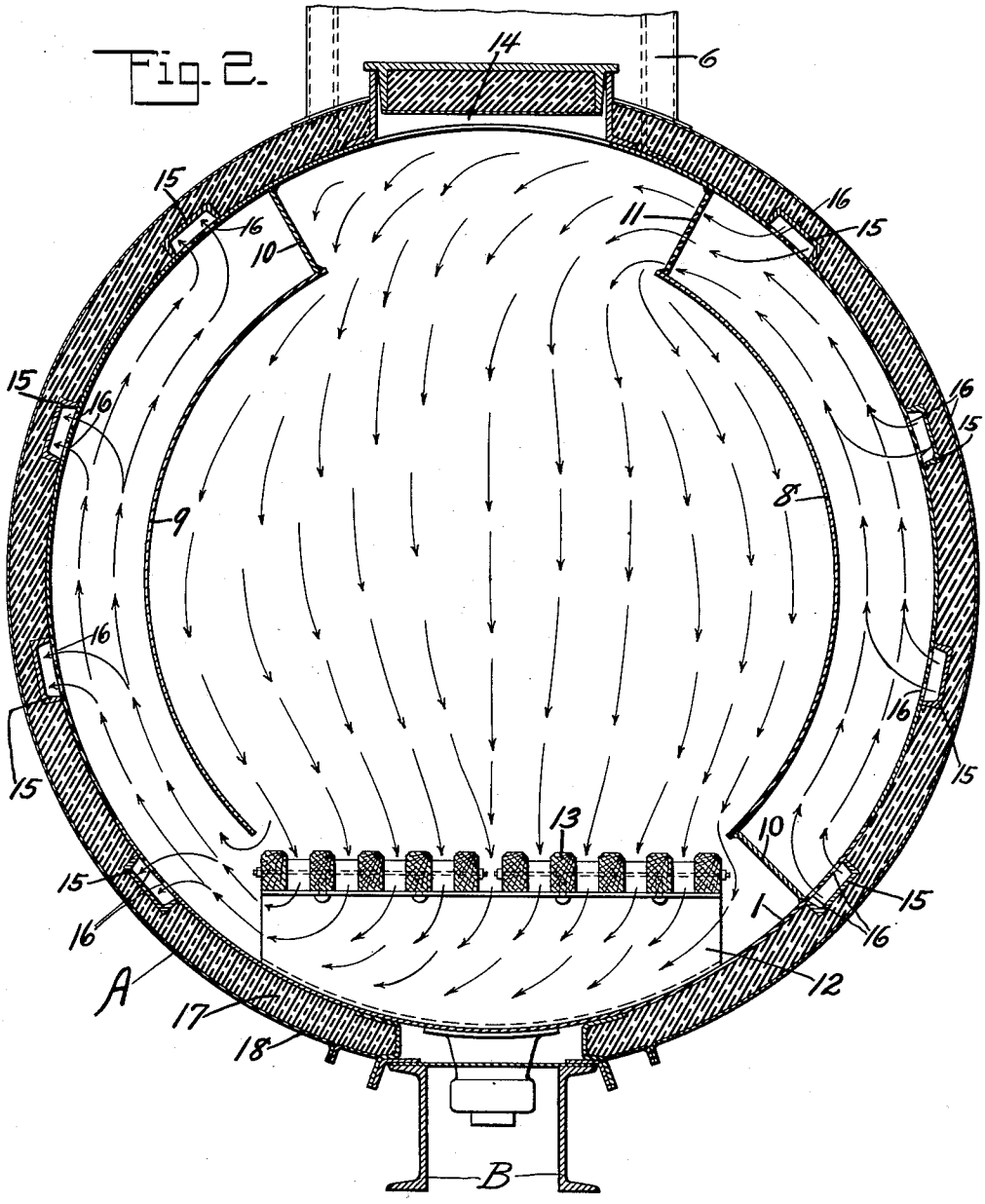
Fig. 2.



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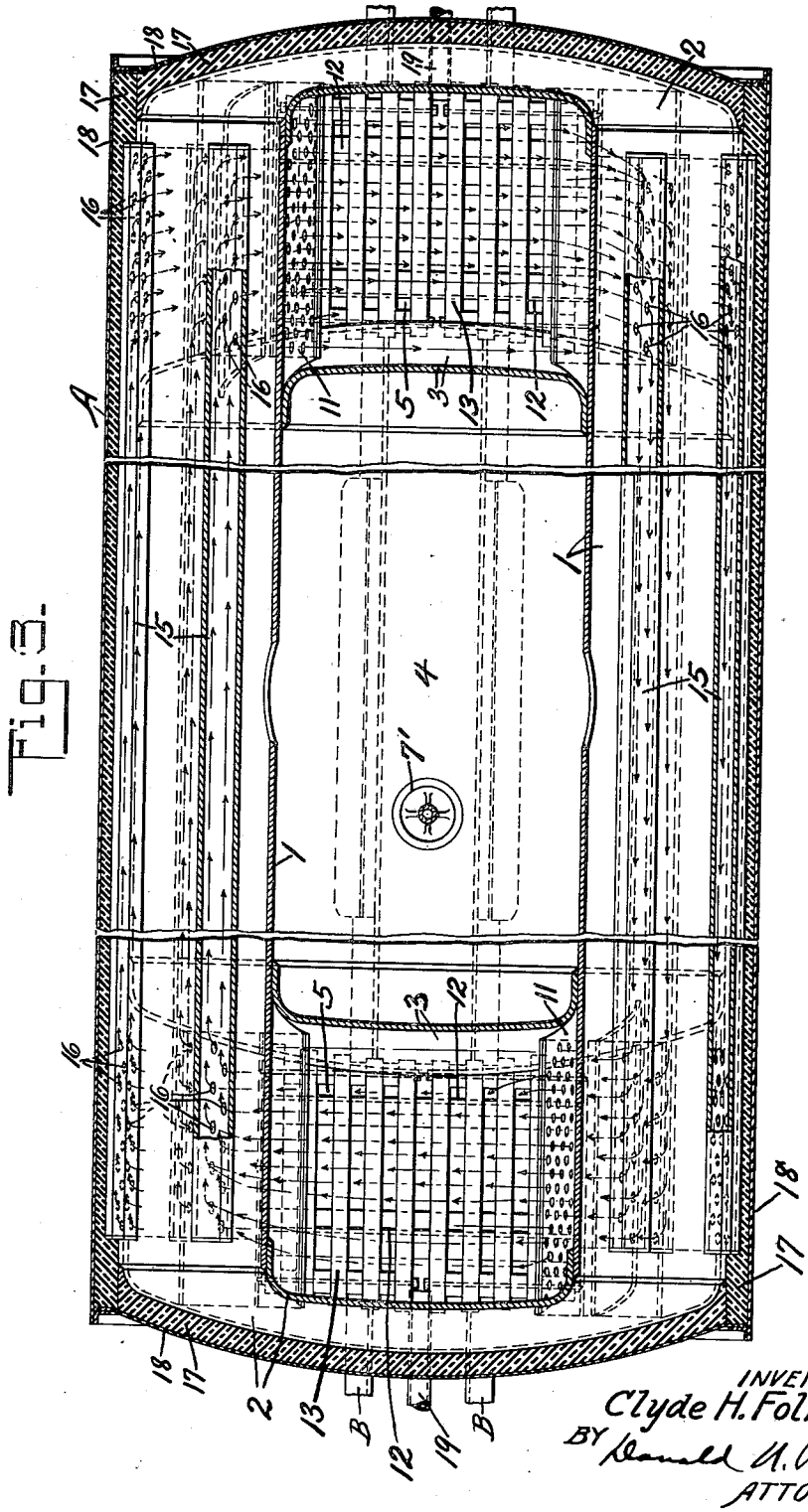

Fig. 3.

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UNITED STATES PATENT OFFICE

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REFRIGERATED TANK CAR

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Application November 3, 1934, Serial No. 751,353

10 Claims. (Cl. 62—15)

This invention relates in general to insulated and refrigerated cars and in particular to tank cars used to transport liquid cargos. The drawings and description present the invention in the preferred form although it is to be understood that various modifications thereof may be made which will fall within the scope of the claims.

It is an object of this invention to provide a tank car having a tank which is covered with a heat insulation.

It is a further object of this invention to provide a thermal insulated tank with ice bunkers.

Another object of the invention is the provision of a thermal insulated tank having ice bunkers at each end connected together by air passages.

Other objects will be apparent to one skilled in the art after a study of the accompanying description taken in connection with the drawings, in which

Figure 1 is a sectional view taken along the longitudinal center of the tank;

Fig. 2 is a cross sectional view taken on the line 2—2 of Fig. 1 and showing the air flow in the ice bunker; and

Fig. 3 is a sectional view taken on line 3—3 of Fig. 1 and showing the complete air circuit.

In the drawings the insulated tank structure A is shown supported on the usual center sills B which in turn are supported by trucks, not shown.

The tank itself is composed of a cylindrical shell 1, formed of any suitable substance such as stainless or other steel, aluminum or nickel clad steel, closed at the extreme ends by ends 2 welded or otherwise attached to the shell. Bulkheads 3 are provided within the shell and together with the shell form a lading containing space 4 in the intermediate portion of the tank, and together with the shell and ends form an ice compartment 5 at each end of the tank. The central or lading portion 4 is provided with the usual dome 6 and its fixtures and with discharge valve 7 and sump 7'.

In each ice compartment is placed a pair of plates 8 and 9 spaced from the cylindrical shell and of such a length and shape as to extend between and be welded to the respective end 2 and bulkhead 3. A solid plate 10 is welded to the bottom edge of plate 8, and another similar plate is welded to the top edge of plate 9; these plates extending between and being welded to the respective end and bulkhead. A perforated plate 11 is welded to the top edge of plate 8 and to the end and bulkhead thus providing a compartment closed except for the perforated plate 11 and shell, as later described. The space between the lower edge of plate 9 and the shell is left entirely open as shown in Fig. 2. It is to be noted that the compartments at the opposite end of the car are identical in construction except that the perforated plate and open space appear at opposite sides of the car as is clearly shown in Fig. 3.

Supports 12 are placed in the bottom of the ice compartment and members 13 are attached thereto to provide an ice rack upon which the ice inserted through the hatch 14 is supported.

A plurality of inwardly facing channels 15 having closed ends extend along, and have their flanges welded to, the shell thereby forming air ducts along the shell exterior. The portions of the shell inclosed by the flanges and adjacent the ice compartment are perforated at 16 in order to allow air or other cooling medium to flow through the channels between the compartments. It is obvious that these channels are effective as stiffening elements as well as serving the purpose of air ducts and that various other rolled, formed or extruded members could be used.

The entire shell, air ducts and ends are inclosed by the thermo-insulative blanket 17 protected and held in place by the outer casing 18. Piercing each end, insulating blanket and outer shell are pipes 19 provided as drains for the ice compartment.

In operation the ice compartments are filled with ice which chills the air causing it to fall in each compartment and being blocked everywhere except at the lower end of plate 9 the air flows through this opening out through perforations 16, along the tank side in channels 15, until it reaches the opposite end of the car where having absorbed heat from the tank and expanded it rises and the only place of escape is out through the perforated plate 11 into the ice compartment where it is again chilled. It is thus seen that a forced or series circulation of air through the connected channels and bunkers is obtained by proper placement of baffles so as to take advantage of the natural air convection currents all as shown by the arrows in Figs. 2 and 3.

The channels have been shown for convenience as horizontal but they may be placed at some angle to further aid the flow of air. This and further modifications of the structure are possible without departing from the scope of the appended claims.

What is claimed is:

1. A refrigerated tank car comprising ends, bulkheads, and a shell connecting said ends and

bulkheads to form end cooling compartments and at least one central lading compartment, a plurality of members extending along, and connected to the outer side of the shell, and perforations in the walls of the cooling compartments to connect the cooling compartments with the members for interchange of cooling medium therethrough.

2. A refrigerated tank car comprising ends, bulkheads, and a shell connecting said ends and bulkheads to form end cooling compartments and at least one central lading compartment, a plurality of channel shaped members extending along, and having their flanges welded to, the outer side of the shell, and perforations through the walls of the cooling compartment between the flanges of each member to permit interchange of cooling medium between the cooling compartments.

3. A refrigerated tank car comprising ends, bulkheads, and a shell connecting said ends and bulkheads to form end cooling compartments and at least one central lading compartment, a plurality of channel shaped members extending along, and having their flanges welded to, the outer side of the shell, perforations through the walls of the cooling compartment between the flanges of each member, and baffle plates so arranged adjacent the perforations as to cause the flow of cooling medium between the cooling compartments through the members.

4. In a refrigerated tank car having cooling bunkers in the ends thereof and lading space between the bunkers the combination of a plurality of spaced cooling passages on either side of the car connecting said cooling bunkers, and a plurality of baffle plates so arranged in the cooling bunkers as to cause the flow of cooling medium through the passages on either side of the car in opposite directions.

5. In a refrigerated tank car having cooling bunkers in the ends thereof and a lading space between the bunkers the combination of a plurality of passages on either side of the car outside the lading space and a plurality of baffles so arranged and connected in the cooling bunkers as to cause the flow of cooling medium through the passages on either side of the car in opposite directions and over the ends of the lading space.

6. In a refrigerator car having ice bunkers in the ends thereof and lading space between the bunkers, the combination of a plurality of longitudinal cooling passages connecting the ice bunkers, and baffle plates in the ice bunkers so arranged as to cooperate with said passages to direct air in a circuit over the ice in each bunker and through one of the passageways connecting such bunker to the other bunker.

7. In a refrigerator car having ice bunkers in the ends thereof and lading space between the bunkers, the combination of a plurality of longitudinal cooling passages extending alongside of the lading space and connecting the ice bunkers, and baffle plates in the bunkers so arranged as to direct the air over the ice in each bunker and into passages leading to the other bunker.

8. In an insulated tank car formed with ice bunkers in the ends thereof and lading space between the bunkers, the combination of a plurality of longitudinal cooling passages extending along the outer sides of the lading space and connecting the ice bunkers, and baffle plates in the ice bunkers so arranged as to direct the air over the ice in each bunker and into the passages leading to the other bunker.

9. A tank car comprising, a shell, ends attached to the shell, bulkheads within the shell and spaced from the ends to thereby provide end ice compartments and at least one central lading compartment, baffles in said end compartments, a plurality of members having passages extending along, and bracing, the side of the tank and connecting the end compartments, the baffles in said end compartments being so arranged as to cooperate with said passages to direct air in a circuit over ice in said end compartments and through said passages connecting said compartments.

10. A car comprising ends, bulkheads, a shell connecting the ends and bulkheads to form end cooling compartments and an intermediate lading compartment, said shell including perforate portions extending between the ends and bulkheads, and duct means connecting the perforate portions to permit passage of air between said cooling compartments.

CLYDE H. FOLMSBEE.