

July 18, 1933.

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1,918,335

CONTAINER FOR LIQUEFIED GASES

Original Filed Nov. 21, 1927

Fig. 1

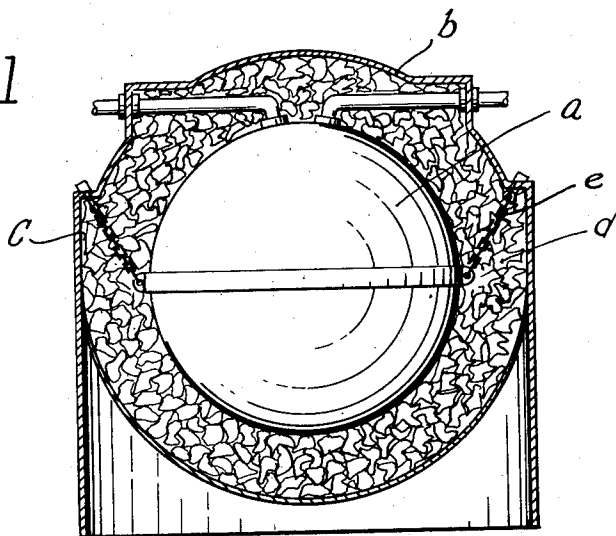
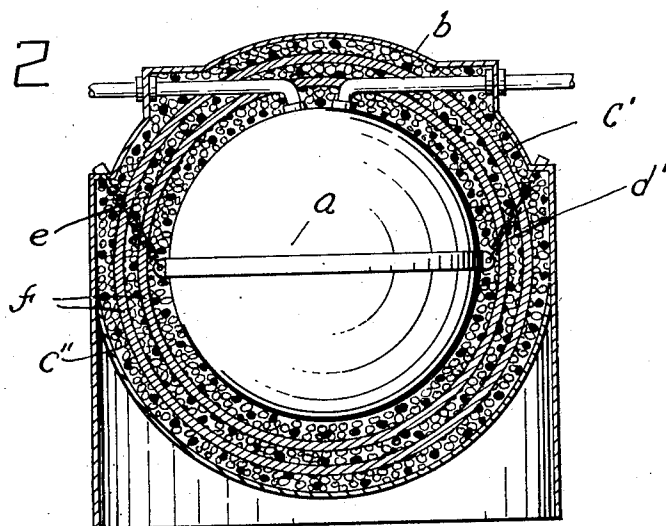


Fig. 2



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CONTAINER FOR LIQUEFIED GASES

Original application filed November 21, 1927, Serial No. 234,914, and in Germany December 27, 1926.
Divided and this application filed May 21, 1929. Serial No. 364,956.

This invention relates to containers for liquefied gases and particularly to containers in which liquefied gas may be stored.

The invention has for its object generally the provision of a container of the character indicated, which is efficient, economical, and readily manufactured.

More specifically, it is an object to provide a container of the character indicated which has an improved construction and disposition of the insulating material disposed around the liquid containing vessel.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

This application is a division of my co-pending application Serial No. 234,914, filed November 21, 1927.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts, which will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention reference should be had to the following detailed description taken in connection with the accompanying drawing, in which:

Fig. 1 is a view mainly in vertical cross section showing a container constructed in accordance with the invention; and

Fig. 2 is a view similar to Fig. 1, but illustrating a modified arrangement of insulating material.

Tests have been made and the data plotted in order to ascertain the nature of the temperature gradient of various insulating materials, together with the rate of evaporation for liquefied gases when insulated with various insulating materials. The plotted curves when drawn for such insulating materials as kieselguhr, infusorial earths, slag wool, mineral wool, and the like, if arranged in the order of their respective insulating values, are found to be in the order of their relative porosities, the material having the highest porosity corresponding to the material having the highest insulating value.

The curves which exhibit the lower porosi-

ties, for example that drawn for slag wool, exhibits a characteristic whereby it starts with a relatively high insulating value, then quickly drops and thereafter remains quite constant. Kieselguhr on the other hand, which has a relatively high porosity, does not show this characteristic and maintains a relatively constant value of the insulation for all thicknesses.

In the practice of the present invention, insulating envelopes are provided in containers for liquefied gases and the like, in which the envelope is constructed of porous insulating material that has the desired uniform insulating characteristic. The container in general comprises an inner vessel for holding the liquefied gas and an outer casing enclosing a space about and supporting the inner vessel. The inner vessel is preferably spherical in shape, though other shapes may be employed which provide a relatively high value of the ratio of cubic content to surface employed. The casing will in general be similar in shape to the inner vessel; as a consequence, the enclosed space is bounded by a large amount of surface which is inclined (i. e. has its tangent planes making oblique or acute angles with the vertical). The upper inclined surface of the inner vessel and the lower inclined surface of the casing are utilized as supports for the insulating material which is loosely laid-in in the space about the inner vessel so as to avoid packing and to trap air in the interstices. In this manner, the original porosity of the insulating material is preserved and the resultant insulating effect is that had from the low thermal conductivities of both the insulating material and of the air retained in the pores and openings of the insulating envelope. The insulating material employed may have any suitable form, for example, it may be granular or in small pieces and laid-in in layers about the inner vessel. Also, it may or may not have the layers separated and supported by non-conducting insulating material of different structural properties, such as cellophane. The effect of thus building up the insulating material so as to provide small closed spaces in which air is caught, is

to condense or contract the air by the refrigerating effect of the liquid in the inner vessel whereby stagnant bodies of chilled air in the interstices surround the inner vessel.

- 5 When placing the insulating material in the space about the liquid containing vessel, it is preferred that this material be not laid-in so tightly that the average specific gravity of the space when filled is in excess of that of the raw unused insulating material. The insulating material in the lower part of the container can sustain its own weight of material and the weight of the material in the upper part without becoming displaced.
- 15 Referring now to the drawing and particularly to Fig. 1, *a* denotes an inner vessel adapted for holding the liquefied gas. This vessel is disposed within an outer shell or casing *b*, so that there is an intervening space
- 20 *c* which is filled with insulating material *d*. This insulating material is of the porous inorganic character above indicated, and is disposed about the inner vessel *a* so that it will thus support itself, and forms a plurality of interstices whereby the refrigerating effect of the liquid in vessel *a* upon the air caught in these interstices causes the air to contract, thereby providing an atmosphere of strongly condensed stagnant air permeating the space in and about the inorganic insulating material *d*. Casing *b* supports vessel *a* through chains *e*.

- In the form of the container shown in Fig. 2, the insulating material is indicated at *d'*.
- 35 Here the insulating material instead of being of the homogeneous porous character as indicated in Fig. 1, comprises built up layers of different materials, the bodies of one material being indicated at *e'* and act as carriers for supporting the particles of material *e*, which are designed to have higher insulating characteristics. Interposed separating layers of non-conducting insulating material are shown at *f*.

- 45 Since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the

above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

Having described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a container for liquefied gases, the combination comprising an inner vessel for holding the liquefied gas, an outer casing enclosing a space about and supporting said vessel, the enclosing walls of said space being curved and having portions inclined at angles such as to serve as supports for inserted material, and porous heat insulating material having a relatively constant insulating characteristic inserted and disposed in said space about said vessel; said material being mainly supported by the upper wall of said vessel and the lower space enclosing walls of said casing and laid-in to form a plurality of interstices in said space which trap air providing an atmosphere of relatively dense still air whereby the lower portions of said material sustain their own weight and that of the portions thereabove without becoming displaced.

2. In a container for liquefied gases, the combination comprising an inner vessel for holding the liquefied gas, an outer casing enclosing a space about and supporting said inner vessel, the enclosing walls of said space being curved and having portions inclined at angles such as to serve as supports for inserted material, and heat insulating material inserted and disposed in said space about said vessel and consisting of alternate layers of relatively porous inorganic material in granular form alternating with layers of non-inflammable non-conducting material; said layers being mainly supported by the upper wall of said vessel and the lower space enclosing walls of said casing and laid-in to enclose a plurality of interstices whereby the refrigerating effect of the gas within said inner vessel creates an atmosphere of relatively dense air which pervades the space about said inner vessel.

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