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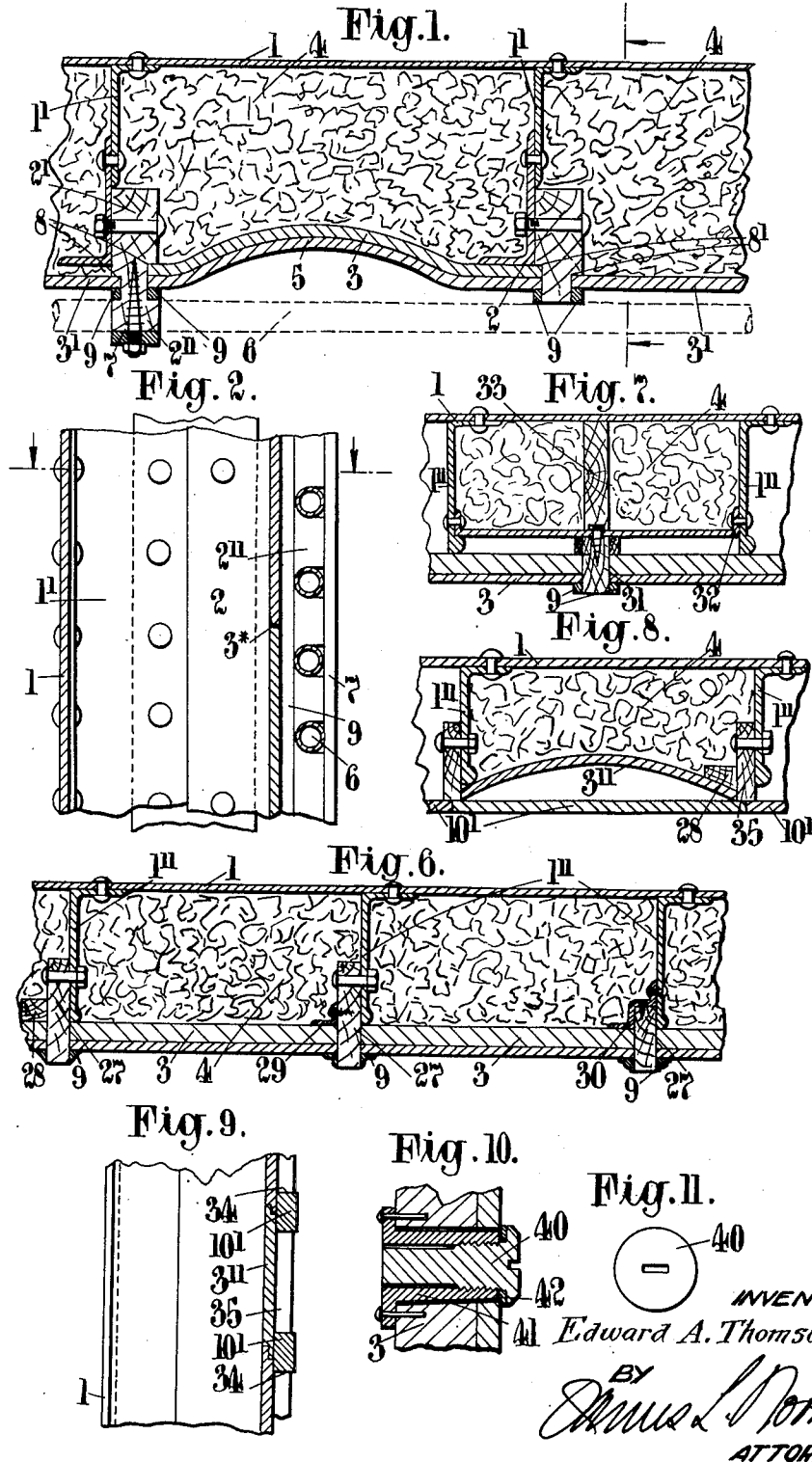
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Filed Oct. 18, 1924

2 Sheets-Sheet 1



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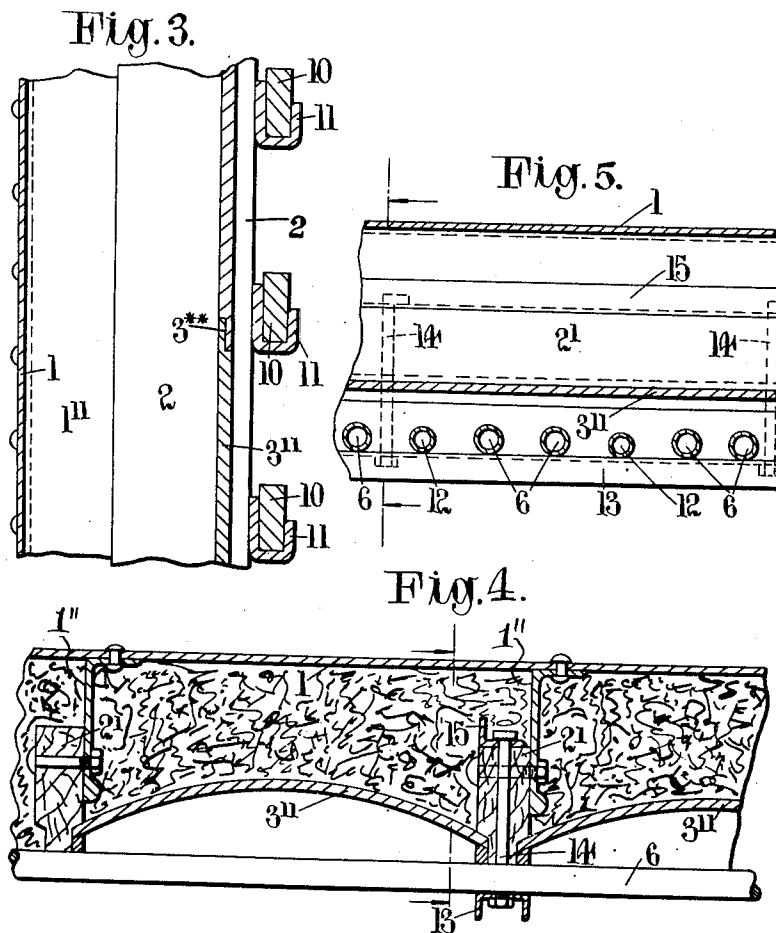
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UNITED STATES PATENT OFFICE.

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HEAT-INSULATION LINING FOR COLD-STORAGE CHAMBERS.

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This invention relates to heat insulation linings for cold storage chambers or holds used for the storage of refrigerator produce, of the kind wherein lining panels are arranged between bearers, grounds, studs or elements of the chamber.

In the heat insulation linings heretofore in use, the wood grounds or studs, which are sometimes secured to the iron frame members of a ship and to which the boards or panels next the interior space of the chamber are secured, are entirely enclosed by such boards or panels, the boards usually being in the form of continuous match-boarding, each board extending over three or more of the wood grounds. Moreover, in cases where panels of cork or like material are employed, they have been arranged in such manner as to entirely enclose the supporting wood grounds. Such arrangements are open to the disadvantage that the wood grounds are liable to rot when so enclosed and, moreover, it has been found difficult to obtain access to the spaces between the grounds by reason of the manner in which the boards or panels have been secured to the wood grounds.

According to the present invention the wood grounds or bearers, which on board ship are generally secured to the iron frame members of the ship, are arranged to project freely beyond the surface of the lining next the interior of the chamber into the interior space of such chamber, and the lining panels are individually attached to and can be individually removed from between the grounds or bearers by moving them in a direction substantially perpendicular to their own planes. For example, the borders of the panels remote from the interior of the chamber may rest on one side in a groove in the corresponding ground and on the other side on a shoulder or projection on the side of the corresponding ground. By this means the wood grounds are always exposed over a considerable portion of their surface to the air in the chamber, so that all risk of dry rot is obviated. Moreover, the wood grounds can be very conveniently employed as pipe brackets, to support the refrigerating pipes, or to support distance battens or air-space battens for preventing the heat or other perishable articles in the chamber from approaching too near the lining of the chamber. Further, by removing the individual panels, access may be readily had to any

part of the space between the inner surfaces of the panels and the outer wall or the skin plating of the vessel, in which space granular heat insulating material is placed.

By the present invention, any particular panel can be readily removed as required, the use of nails being much reduced, and panel linings which have been dismantled for any reason may be used again when reinstating the insulation.

In the accompanying drawing—

Figure 1 is a horizontal section, and

Figure 2 is a vertical section illustrating one form of my improved insulation lining.

Figure 3 is a vertical section illustrating two modified forms of my improved insulation lining.

Figures 4 and 5 are two vertical sections taken at right angles to each other showing the application of my improved heat insulation to the underside of a ship's deck.

Figures 6 and 7 are horizontal sections showing further constructional forms of my improved insulation applied to the frames of a ship.

Figures 8 and 9 are respectively a horizontal and a vertical section illustrating a modification.

Figures 10 and 11 are respectively a transverse section and an end elevation showing another detail of construction.

In Figures 1 and 2, there is shown a form of my improved heat insulating lining, in which certain of the wood grounds 2 form distance battens and others 2' are extended at 2", where they are provided with notches (Figure 2) to receive the refrigerating pipes 6, 6 which are secured in their respective notches by means of retaining straps 7, or light pressed steel forgings. The granular or fibrous insulating medium 4 is retained in position by means of panels made either as shown in the middle of Figure 1 in the form of slabs 3 having double curves to fit the flanges of the ship's frames and provided with an external correspondingly shaped covering 5 of cement or as shown on the right and left-hand sides of Figure 1 in the form of flat panels 3', 3' of wood, reinforced concrete or other suitable material. The said panels 3, 5 and 3' extend at one end into lateral recesses 8, 8 in the grounds and rest at their other ends on shoulders 8', 8' in rebates in said grounds and are secured in position by means of capping pieces or inserted strips 9, 9. These capping pieces may

be secured by screws or nails or bolts to the grounds or studs and may be of sufficient length to secure one, two or more panels as desired. The panels may be formed of a vertical series of plates having male and female edges as indicated at 3* in Figure 2; or the edges may be stepped, as at 3** in Figure 3.

At the parts where no pipes are fitted, the projecting grounds may be utilized to support the air space battens required to prevent the refrigerated produce from being stowed or packed in too close contact with the insulation. These wood grounds or studs 2, 2' (Figures 1 and 2) being partially or wholly exposed to the atmosphere of the chamber or hold, are less liable to decay than when wholly enclosed inside airtight walls, and may be kept under observation.

Figure 3 shows a construction where the curved panels 3'' are fitted where there are no pipes. Here air space battens 10, 10 are supported in cleats 11, 11 attached to the combined wood grounds and distance battens 2.

It is customary in vessels not to insulate the upper side of steel decks owing to difficulties in maintaining this insulation in a dry and efficient condition. The iron bolts that support the brine pipes on the undersides of steel decks, and in the case of chilled beef steamers, the increased number of bolts that support the meat rails, are usually secured direct to the steel beams supporting the decks. As these bolts project beyond the insulation, in the case of weather decks, they conduct the heat downwards into the refrigerated space, and in the case of between decks in which cargo is carried at a higher temperature than in the cargo space below, the same thing occurs and the steel deck of the between deck becomes lower in temperature than is desired, resulting in injury to the cargo stowed or hung close to the deck. To overcome this difficulty, the bolts for supporting the meat rails and brine pipes are preferably arranged to pass through the centre of the wood grounds. By this means, the bolts in question not being in direct contact with the steel structure of the vessel the conduction of heat through them is much reduced. Moreover as the wood grounds extend below the insulation their condition may be observed at any time.

A construction of this kind is shown in Figures 4 and 5 where pipes forming meat rails 12, 12 are supported alongside the refrigerating pipes 6, 6 above channel iron supports 13, 13 which are connected by hanger bolts 14, 14 to angle irons 15 arranged above the grounds 2', 2' and out of contact with the bulb iron beams 1'' supporting the deck.

The space behind the panels may be filled with any of the usual insulating media, and in each panel a hole may be arranged having a thread and a screw plug or stopper, e. g. with rounded threads similar to those used for the stoppers in stone or earthenware bottles, to ascertain the condition of the insulating media behind at any time. An arrangement of this kind is shown in Figures 10 and 11, wherein a flanged screw-threaded plug 40 is fitted into a flanged body or socket 41 secured, e. g. by pins, screws or nails, to the panel 3, a washer 42 being arranged beneath the flange of the plug to ensure a fluid-tight joint. The plug and body may be made of ebonite, wood fibre, hard wood or other suitable material. The body 41 is preferably tapered externally as shown to allow hot bitumen or cement to be run in between its outer surface and the wall of the hole in the panel, when the plug is slightly withdrawn, whereupon the body is pressed into its place while the bitumen is soft. The tapered body may moreover be provided with an external screw thread of opposite hand to that of the plug, so as to assist in preventing the body from turning in the hole in the panel when the plug is being tightened or withdrawn.

In the modification shown in Figure 6, the wood grounds 27, 27 are made of a thickness substantially equal only to the distance between the edges of the panels, the borders of the panels 3 remote from the interior of the chamber resting on one side of the bulbs of the bulb iron frames 1'', 1'', and on the other side on chocks, such as 28, or angle irons 29, or on the outer flanges of Z-section irons 30 which serve also as a support for the grounds. By this means a considerable economy of timber is obtained.

In Figure 7 an arrangement is shown where a ground 31 is supported between the frames 1'', 1'' on an iron bar or strap 32 secured to such frames. The ground 31 is further supported by a chock 33 arranged between the strap 32 and the plating 1 of the vessel. This construction may be adopted in cases where the panels are of materials of moderate strength, such as slab cork. It is also useful for supporting the grounds in the case of deep 'tween decks and holds. This construction moreover enables the amount of timber used for the grounds to be reduced.

In the constructions shown in Figures 8 and 9, the curved panels 3'', 3'' are held in position by means of horizontal air space battens 10', 10', which may be arranged in recesses 34, 34 (Figure 9) in the projecting parts of the wood grounds 35. In this case the capping pieces 9, 9 may be dispensed with.

The panels may be formed of any suitable material or a combination of several ma-

terials which are preferably fire-, water-, and decay-proof.

I claim:

1. Heat insulation linings for cold storage chambers, said linings comprising grounds, panel-supporting surfaces on the sides of said grounds, lining panels arranged between the grounds and resting against said supporting surfaces in such a manner that the grounds project freely beyond the surface of the panels into the interior space of the chamber, and means for retaining the panels on the supporting surfaces so as to be individually detachable from the interior of the chamber by moving them in a direction substantially perpendicular to their own planes.

2. Heat insulation lining for cold storage chambers, comprising lining panels, grounds provided laterally with surfaces for supporting said lining panels, some of such surfaces being formed in grooves in the sides of the grounds which grooves receive one end of lining panels, capping pieces for securing the other ends of said panels on the supporting surfaces which are not formed in grooves, and means for detachably securing the capping pieces in position on the grounds.

3. Heat insulation lining for cold storage chambers, comprising grounds having parts projecting freely beyond the surface of the lining into the interior space of the chamber, said projecting parts being formed into pipe brackets, lateral panel-supporting surfaces on said grounds, lining panels arranged on said surfaces between said grounds, and means for securing the panels to the grounds so that such panels are individually detachable from the interior of the chamber by moving them in a direction substantially perpendicular to their own planes.

4. Heat insulation lining for cold storage chambers, comprising grounds having parts projecting freely beyond the surface of the lining into the interior space of the chamber, the projecting parts being formed into pipe brackets, air space battens and distance battens, pipe securing bolts extending through said grounds in a direction substantially perpendicular to the plane of the lining, lateral panel-supporting surfaces on

said grounds, lining panels arranged on said surfaces between said grounds, and means for securing the panels to the grounds so that such panels are individually detachable from the interior of the chamber by moving them in a direction substantially perpendicular to their own planes.

5. Heat insulation lining for cold storage chambers, comprising grounds provided laterally with surfaces for supporting lining panels, lining panels which are concave towards the interior of the chamber and arranged between the grounds in such manner that the grounds project freely beyond the surface of the panels into the interior space of the chamber, capping pieces bearing against borders of the panels next the interior of the chamber, and means for detachably securing the capping pieces to the grounds in such manner that such capping pieces are individually removable while the panels are in position.

6. Heat insulation lining for cold storage chambers, comprising lining panels, grounds provided laterally with surfaces for supporting said lining panels, some of said surfaces being formed in grooves in the sides of the grounds, said grooves receiving one end of said lining panels, capping pieces for securing the other ends of said panels on the supporting surfaces which are not formed in grooves, means for detachably securing the capping pieces in position on the grounds, and interengaging surfaces on the juxtaposed edges of the panels.

7. Heat insulation lining for cold storage chambers, comprising grounds, panel-supporting surfaces on the sides of said grounds, lining panels arranged between the grounds and resting against said supporting surfaces in such manner that the grounds project freely beyond the surface of the panels into the interior space of the chamber, said panels having screw-threaded holes extending therethrough, means for retaining the panels on the supporting surfaces so as to be individually detachable from the interior of the chamber by moving them in a direction substantially perpendicular to their own planes, and screw plugs for closing the holes in the panels.

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