Oct. 28, 1952 I. A. THORNS 2,615,308

SECTIONALIZED PORTABLE ICE STAGE

Filed Oct. 21, 1949 2 SHEETS—SHEET 1

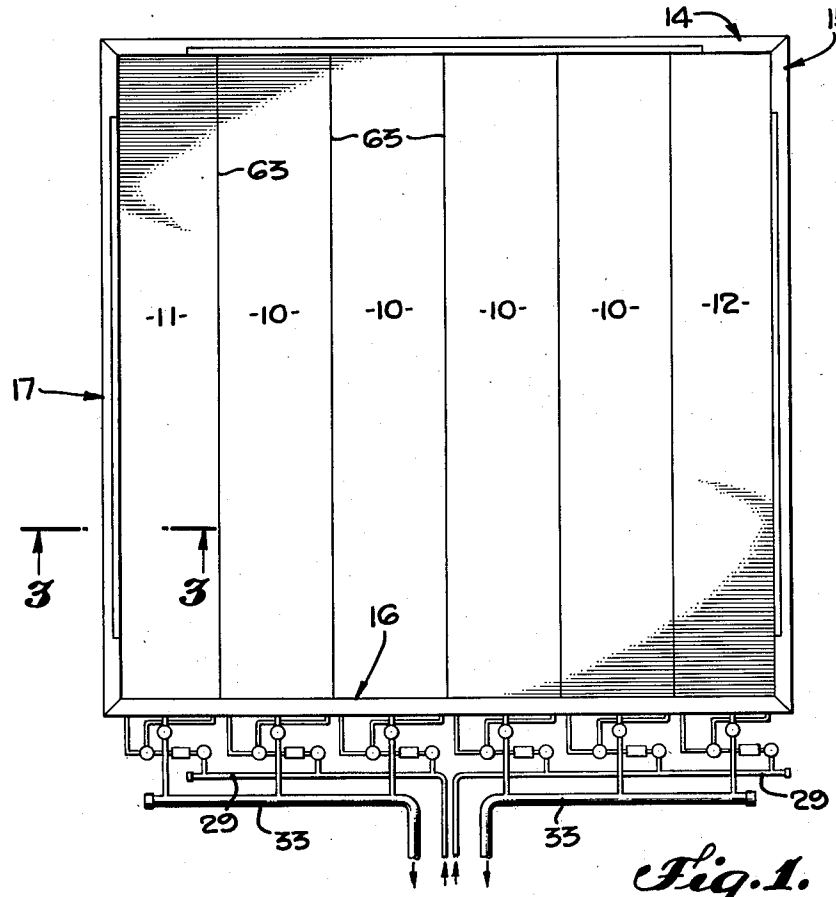


Fig. 1.

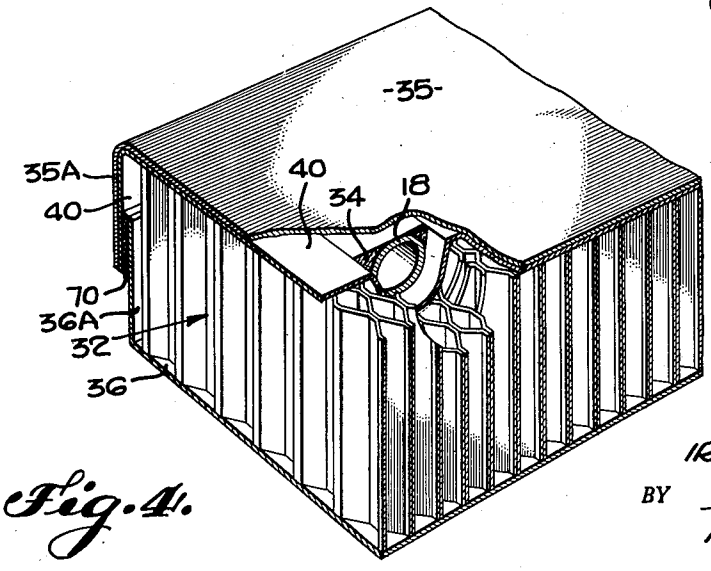


Fig. 4.

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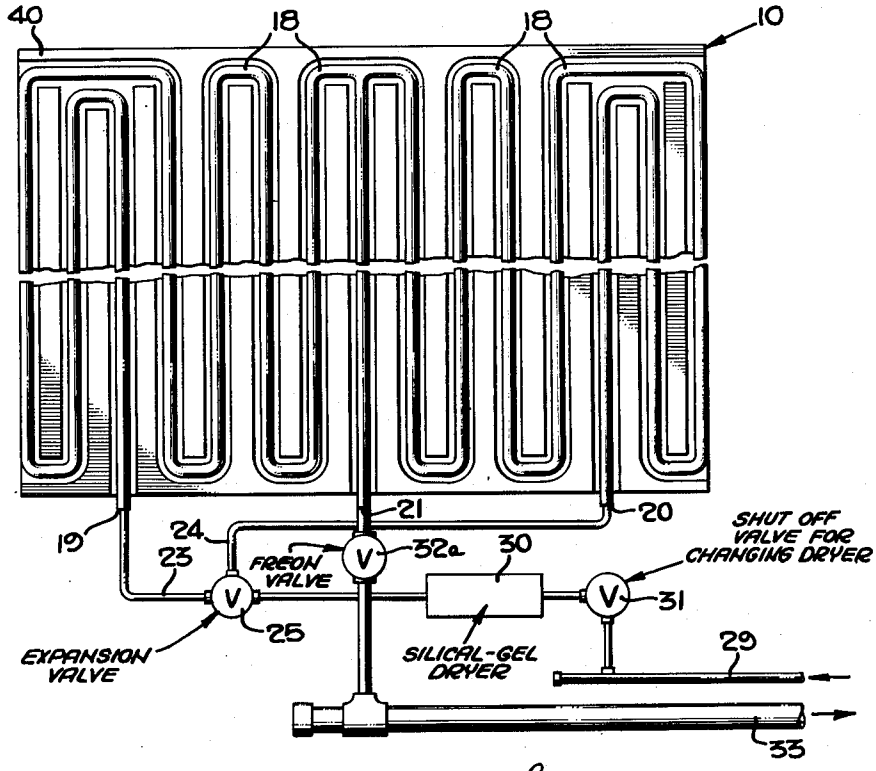


Fig. 2.

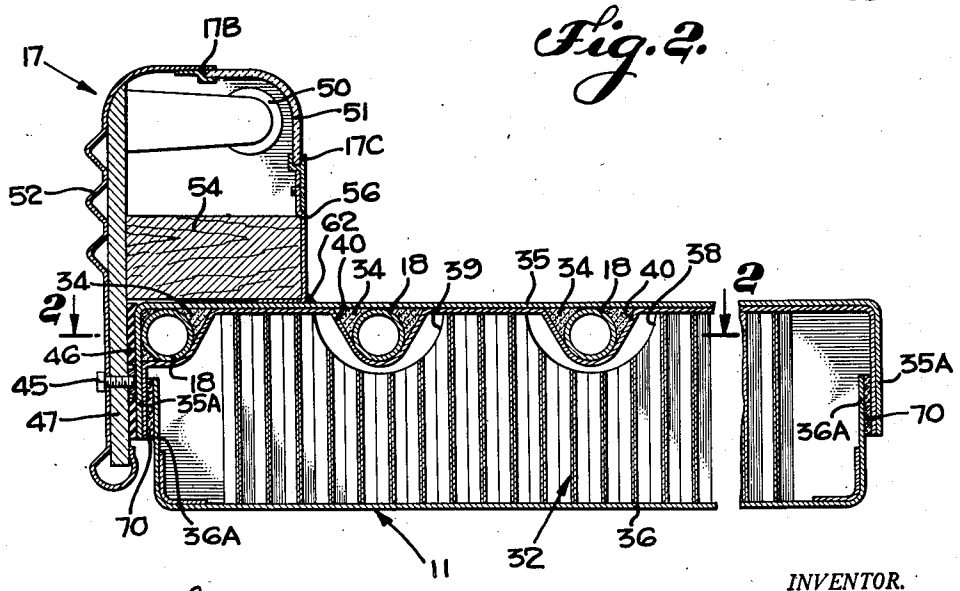


Fig. 3.

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Patented Oct. 28, 1952 2,615,308

UNITED STATES PATENT OFFICE

2,615,308

SECTIONALIZED PORTABLE ICE STAGE

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Application October 21, 1949, Serial No. 122,693

1 Claim. (Cl. 62—12)

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The present invention relates to an improved construction for walls, ceilings and floors wherein it is desired to either heat or cool such elements, and relates particularly to an insulated portable ice skating rink.

An object of the present invention is to provide an improved insulated structural element with fluid conduits extending therethrough to either heat or cool such elements, as desired, when used either as a floor, wall or ceiling.

Another object of the present invention is to provide an improved structural element for the purpose enumerated in the preceding object, characterized by its simplicity, lightness, inexpensiveness and the presence of a large number of small air spaces in the elements to provide good heat insulating properties.

Still another object of the present invention is to provide an improved structural element having the characteristics mentioned in the above two objects, and which serves to provide a portable ice skating rink having a plurality of similar sections, each of which may be easily and readily assembled to conduct refrigerant fluid such as Freon gas, liquid ethylene glycole, Prestone, etc., through all of the sections.

Yet another object of the present invention is to provide an improved protable ice skating rink comprising a plurality of easily assembled sections, the sections being easily adapted for securing on the outer edge thereof an illuminated rail.

Still another object of the present invention is to provide an improved portable ice skating rink, characterized by its capacity to withstand heavy loads but which yet has high heat insulating properties.

Another object of the present invention is to provide an improved portable ice rink construction of great flexibility which uses readily dismantlable floor sections, any number of which are adapted to be quickly set up to provide a rink with the required area, the sections being interchangeable and incorporating the same fluid conduits and fluid inlets and outlets which are readily connected together for the flow of fluid through the assembled sections.

Another object of the present invention is to provide an improved portable ice rink construction which is capable of producing a sheet of ice on the upper or prime surface thereof within a relatively small time, this result being obtainable with my new construction which, due to the insulating efficiency of the sealed insulated panel provided, a minimum amount of material has to be chilled before the ice is formed.

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Another object of the present invention is to provide an improved portable ice stage, the sections of which include insulating material having a large number of air spaces, with the air spaces sealed from the atmosphere.

Still another object of the present invention is to provide an improved ice stage having features mentioned in the next preceding object, characterized further by the fact that such insulation is encased within a bottom cover plate and a top cover plate, with the edges of such cover plates overlapping, and insulating resilient material between such edges to allow thermal expansion of the cover plates and yet sealing at all times the insulation from the atmosphere.

Still a further object of the present invention is to provide an improved panel of the type specified, which includes two inverted cover members with their overlapping edges having the resilient insulating material therebetween to seal the interior space defined by such cover members, the interior sealed space being filled with heat insulating material for transmitting stresses from one cover plate to the other, and such insulation having a coiled pattern extending therethrough with the ends of such coil extending through the covers.

Yet another object of the present invention is to provide an improved panel of the type mentioned above, one or more of which may be arranged as a unit and served by single relatively small compressor units so that the size of the ice stage, for example, may be varied at will by adding or taking away sections and their associated power plants or compressor units.

Yet a further object of the present invention is to provide an improved panel of the character described which is portable together with its associated insulating material, the insulating material being sealed from the atmosphere to prevent the formation of frost within the insulating material.

Yet a further object of the present invention is to provide an improved panel of the type described in which adjacent metal faces are insulated, one from the other, and serve as a casing for internally disposed insulation and coils.

Still another object of the present invention is to provide an improved technique for producing panels of the type mentioned in the next preceding object, characterized by the fact that no welding or riveting of adjacent face plates to each other is required.

Still another object of the present invention is to provide an improved portable ice rink so

constructed that the entire pan produced by assembled sections is watertight, this result being accomplished by the use of an improved rink rail construction embodying doubly sealed rubber gasket constructions.

Still another object of the present invention is to provide an improved ice rink which incorporates an insulated honeycomb construction of kraft paper for not only insulating the ice from the floor upon which the honeycombed paper rests, but also to transmit all of the stresses from the top of the rink to the floor.

The features of the present invention which are believed to be novel are set forth with particularity in the appended claim. This invention itself, both as to its organization and manner of operation, together with further objects and advantages thereof, may be best understood by reference to the following description taken in connection with the accompanying drawings in which:

Figure 1 is a top plan view of an ice skating rink embodying features of the present invention,

Figure 2 is a sectional view taken on a line corresponding to the line 2—2 of Figure 3, but of an intermediate section of the ice skating rink shown in Figure 1,

Figure 3 is a sectional view taken substantially on the line 3—3 of Figure 1, and

Figure 4 is a perspective view of a portion of one of the rink sections shown in Figure 1.

While specific reference is made herein to a portable ice rink construction, it will become apparent that the individual sections of such rink, described hereinafter, may find utility in other environments such as in refrigerated railroad cars, trucks and other installations wherein such sections may be used either as floor, wall or ceiling elements to heat or cool the adjacent space, depending upon whether or not heating fluid or cooling fluid is pumped through the conduits of such sections.

Referring to the specific construction shown in the drawings, the ice rink shown therein includes, in Figure 1, the four intermediate sections 10 and opposite end sections 11, 12 which define a rectangular area of different dimensions, depending upon the number of such intermediate sections 10. The outer periphery of the area thus defined is enclosed by the rails 14, 15, 16 and 17 which are bolted to adjacent sections and to each other at their adjoining ends to press the sections 10, 11 and 12 together. Each one of the sections 10, 11 and 12 have a fluid conduit 18 extending therethrough, as shown in Figure 2. The fluid conduit 18, adapted for the passage of dried cold gas therethrough, includes two inlet openings 19, 20 and a single outlet opening 21.

The inlet openings 19, 20 are connected respectively through pipes 23, 24 to the valve 25, the inlet opening of which is connected to the inlet pipe 29 through the serially connected drier 30 and valve 31. The outlet pipe 21, on the other hand, is connected to the valve 32*a* and the outlet manifold 33.

It is noted that the conduit 18 takes a serpentine, sinuous path through the section and extends from the inlet opening 19, first to the left of the section 10 and then generally to the right of the section, taking 15 passes in all before the fluid leaves the outlet 21. It is noted further that the outlet 21 serves as a joint outlet for the fluid entering the inlet openings 19, 20.

Each of these sections 10 are approximately 42½ inches wide by 3 inches thick and approximately 20½ feet long, so that a portable ice stage having an area of approximately 20 feet by 21 feet may be formed by assembling six sections.

The refrigerant conduit 18 is supported on a paper honeycomb construction 32 and is in heat conducting relationship through the thermal mastic metallic material 34 with the upper aluminum plate or pan 35, upon which water is initially sprayed to produce ice.

The honeycombed paper construction 32 preferably consists of an expanded kraft paper honeycomb to which is bonded an aluminum floor plate 36 adapted to rest directly on the wooden floor or other type of floor upon which the ice rink is disposed, with closed air spaces provided by the honeycomb construction separating the floor plate 36 from the pan 35, the upper exposed surface of the pan 35 constituting the prime surface. These honeycomb paper panels 32 are routed out as indicated at 38 and 39 to accommodate the refrigerant tubes 18. Preferably, such composite panels are assembled in the following manner, first, the honeycomb panel is routed as indicated at 38 and 39 in Figure 3, to accommodate the tubes 18, the routing being sufficiently deep so that the upper surface of the later inserted refrigerant tube 18 is practically flush with the upper surface of the honeycomb construction 32, but not too deep to prevent the weight of the tubes 18 from being transmitted directly to the paper honeycombed construction. After this routing operation both sides of the honeycombed material is coated with glue and the routed side is covered with fabric such as cheesecloth 40. Then this cheesecloth is coated with glue. Thereafter the adjacent sides of the pan 35 and floor plate 36 are each glued. All glued surfaces are then cured by subjecting them to a temperature of 220° F. for a period of approximately one hour. After this curing process the tube 18, welded to form the pattern shown in Figure 2, is laid in the routed out portions indicated at 38 and 39 in Figure 3, and on top of the previously glued cheesecloth 40.

It is noted at this time that the pan 35 and floor plate 36 each have their four edges bent upwardly in a direction perpendicular to their plates to form small shallow dished structures, the walls of the pan 36 having the general reference numeral 36A, and the walls of the member 35 having the reference numeral 35A.

Continuing, the pan 35 and floor plate 36 are then placed in position with the walls 36A disposed within and separated from the outer walls 35A along the perimeter of the assembly. While in this position a thermal mastic insulating cement 70, such as "Prestite," is pressed between the spaced walls 35A, 36A and the entire assembly is then subjected to a temperature of approximately 300° F. for twenty minutes, while forces are being exerted on the honeycomb material 32 by applying force between the pan 35 and floor plate 36. In this process the "Prestite" material 70 is hardened and provides a heat insulation barrier between the bottom plate 36 and top plate 35 along the perimeter of the section. This material 70 serves also to bond the members 35, 36 one to the other. Further, these two sections 35, 36, the interior of which is sealed from the atmosphere by the thermal mastic cement 70, is under subatmospheric pressures, since, during the aforementioned process wherein the assembly is maintained at 300° F., some of the air originally

in the interior of the assembly expands and moves out of the interior; subsequently, when the assembly has cooled the air contracts to produce the subatmospheric pressure within the sealed section.

Thereafter the section is disposed in a position inverted with respect to the position shown in Figure 2, and thermal mastic material 34 is heated and pumped under pressure into the space defined by the lower side of the pin 35, the cheesecloth 40 and conduit 18 to thereby provide a path of good heat conduction between the conduit 18 and the pan 35.

This thermal mastic material 34 serves not only to provide a good heat path from the coil 18 to the top plate 35, but is disposed between the pipe ends 19, 20 and 21, on the one hand, and between the adjacent glued cheesecloth 40, on the other hand, to thereby seal the space surrounding the coil 18 from the atmosphere.

The individual sections 10 thus made may be used as shown in Figure 1, or may be used to line the walls or ceiling of an enclosure for heating or cooling the same as desired. One advantage of this particular construction is that the inlet and outlet openings for each section are both on one end of the section, so that all of the plumbing and pipe fitting may be accomplished at one end of the assembled sections, leaving the other end entirely free of pipes extending therefrom.

In assembling the sections 10, they are laid side by side in abutment, and the joint between adjacent sections is first sealed with a thermal mastic cement 63 to make the butt joints watertight. The cracks between such adjacent sections are sealed, refrigerant is passed through the assembled sections to cool the same, and simultaneously water is sprayed on top of the pan 35 to produce the desired layer of ice on top of the pan.

Desirably, the individual sections 10 and end sections 11 and 12 are clamped together by the rink rail members 14, 15, 16 and 17.

As shown in Figure 3, the rink rail member 17 is bolted to the end section 11 by means of bolts 45 which extend through the outer skirt 47 of the rail 17 and are threaded into nuts welded to the downwardly extending apron portion 35A of the pan 35, with resilient material such as rubber 46 disposed between the aprons 35A and 47. In similar fashion, the opposite rail member 15 is bolted at specified points along the side of the opposite end section 12. Further, in similar manner, the end rails 14 and 16, of the same physical dimensions and construction as the rails 15 and 17, are bolted to the ends of each of the intermediate sections 10 as well as the respective ends of the end sections 11 and 12, with similar resilient material 46 disposed between such sections and the corresponding rails 14, 16. These rails 14, 15, 16 and 17, constructed as shown in Figure 2, are adapted to rest on the adjacent end sections and are made hollow to incorporate lighting tubes 50 for purposes of illumination.

Thus, lights 50 of the tubular type may either be of the incandescent or fluorescent type, energized in conventional manner, with their longitudinal axes extending parallel to the longitudinal axes of the rails and being protected by a plastic transparent bendable cover member 51, the opposite side edges of which may be bent and inserted into the sockets or grooves 17B, 17C in the rail structure.

The rail itself includes also a wooden beam 54 extending the full width or length of the desired

rink, as the case may be, and is bolted or fastened by other means to the skirt member 47 which is covered with a decorative stainless steel or aluminum cover sheet 52, having one of its ends adapted to resiliently encompass the lower end of the skirt member 47, and its upper end fabricated to form the socket 17B. This decorative cover member 52 may be bolted to the end section 11 by the bolts 45. Also a decorative material such as stainless steel or polished aluminum is the cover member 56, the lower end of which partially encircles the wooden beam 54 and is disposed between such beam 54 and the pan member 35, the upper end of such decorative cover 56 being fabricated to provide the aforementioned socket or groove 17C receiving the transparent cover member 51.

Preferably, the junction point of the metal cover plate 56 with the pan member 35 is made watertight by placing a thermal mastic cement 62 therebetween, in the same manner as is the thermal mastic cement 63 disposed over the joints between adjacent sections 10, 11 and 12.

It is observed in Figure 1 that there is provided a pair of refrigerant inlet manifolds 29 and a pair of refrigerant outlet lines 33; and these lines may be coupled through flexible rubber hose fittings to the refrigerant equipment It is observed further that only one of each half of the ring may be refrigerated at any one particular time, or both halves may be refrigerated at the same time. Because of this particular arrangement of inlet and outlet refrigerant pipes, it is possible to use, for the intended purpose of maintaining ice on the complete rink, a relatively small capacity inexpensive refrigerating equipment which may be alternately valved to one pair of pipes 29, 33 and then to the other pipes 29, 33.

Alternatively, there may be a relatively small machine provided connected to one pair of lines 29, 33, and a second relatively small machine connected to the other pair of lines 29, 33. By thus providing two refrigerant machines instead of one refrigerant machine, the refrigerant units are relatively small and conveniently portable, and provide a flexible arrangement in which either half or both halves of the rink may be refrigerated.

It is apparent that once the equipment is assembled, as described above, it may be conveniently and quickly disassembled by removing the bolts 45, uncoupling the various pipe fittings and simply moving the sections 10, 11 and 12 apart one from the other, breaking the seal provided by the thermal mastic cements 62, 63.

Although I prefer, as described hereinabove, to utilize form fitting cheesecloth between the top plate 35 and honeycomb material 32, as a modification such cheesecloth may, in fact, be substituted by a metal sheet of corrugated appearance, shaped in the form of the cheesecloth 40 shown in Figure 2, to serve in like manner as a sealing member for the entire upper surface of the honeycomb material 32.

It is noted that all of the stress is transmitted from the top plate 35 to the bottom plate 36 through insulation 32.

It is observed further that the thermal mastic insulating material 70 filling the space between adjacent side walls of the pans 35, 36 allows relative movement of such elements without breaking the seal therebetween when, for example, the pan 35 is lowered in temperature with respect to the floor plate or pan 36. In

other words, the thermal mastic cement 70 provides a good seal for the space defined within the pans 35, 36 and yet allows unequal thermal expansion between such elements 35, 36. Further, since the interior space between pans 35, 36 is below atmospheric pressure, for reasons described above, the pans 35, 36 tend to move towards one another, and are held together without rivets or welding therebetween.

Although I prefer by far to utilize the honeycomb material 32 as the insulation medium and the means whereby forces are transferred from the top plate 35 to bottom plate 36, other insulating materials may be substituted therefor such as, for example and not as a limitation: "Celotex," "Styrofoam," "Temlok," "Firtex," cellular rubber board, cork insulating board.

While the particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from this invention in its broader aspects and, therefore, the aim in the appended claim is to cover all such changes and modifications as fall within the true spirit and scope of this invention.

I claim:

In a portable rink construction of the character described, comprising: a plurality of sections disposed in side by side relationship, each of said sections comprising a honeycombed paper parallelepiped with air spaces extending the full thickness thereof, a metallic pan on one side and a floor plate on the other side of said parallelepiped to close off said air spaces, said honeycombed paper being effective to transmit forces directly from said pan to said floor plate, a refrigerant pipe pattern disposed within the confines of said parallelepiped and in heat conducting relationship to said pan, pans of adjacent sections being disposed in side by side relationship to form a straight line joint therebetween, a thermal mastic cement disposed over said joint to seal the space otherwise present between adjacent sections, a rail extending along the perimeter of said sections and being releasably fastened to the outer sides of the end sections and to each one of the adjacent ends of the sections, and a thermal mastic cement between said rail and the adjacent pan to seal the junction therebetween against water leakage.

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