Sept. 8, 1942. H. VETTER 2,295,142

RINK CONSTRUCTION

Filed Oct. 25, 1940 2 Sheets-Sheet 1

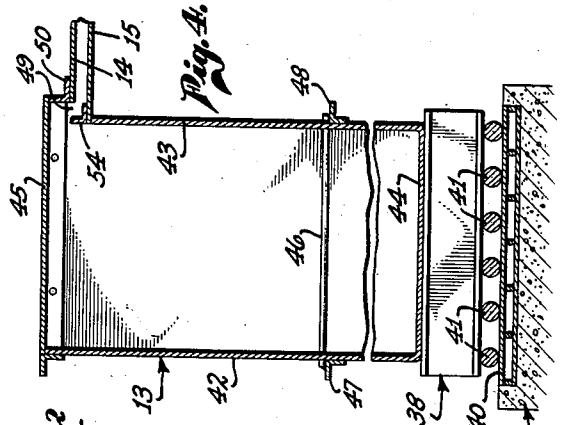


Fig. 4.

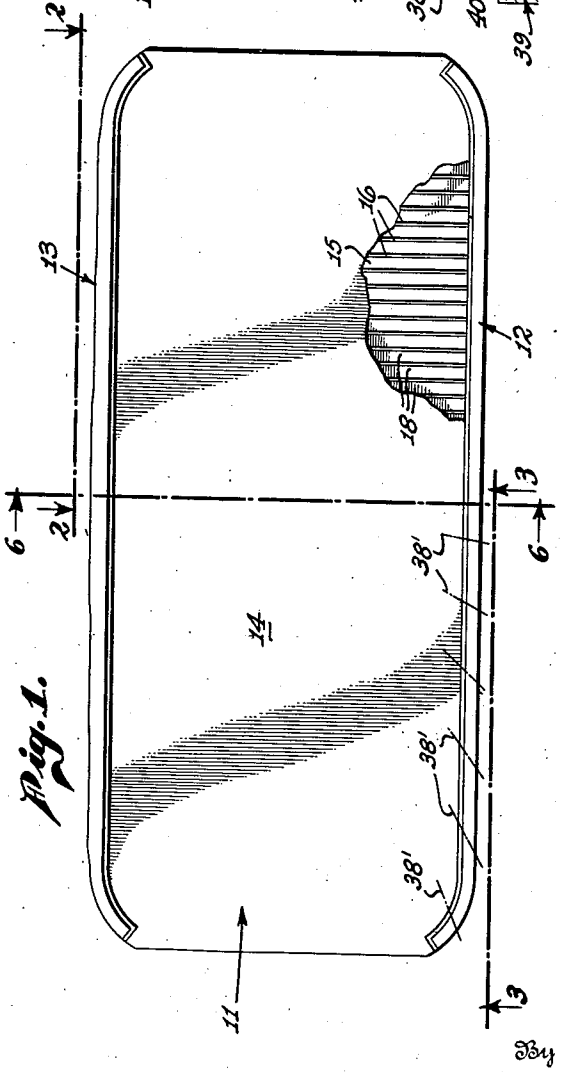


Fig. 1.

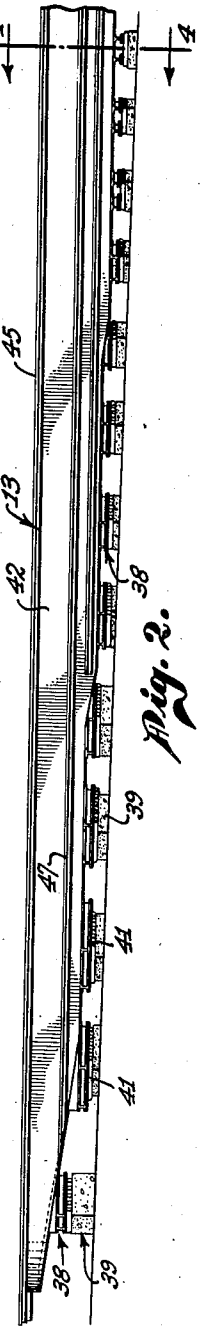


Fig. 2.

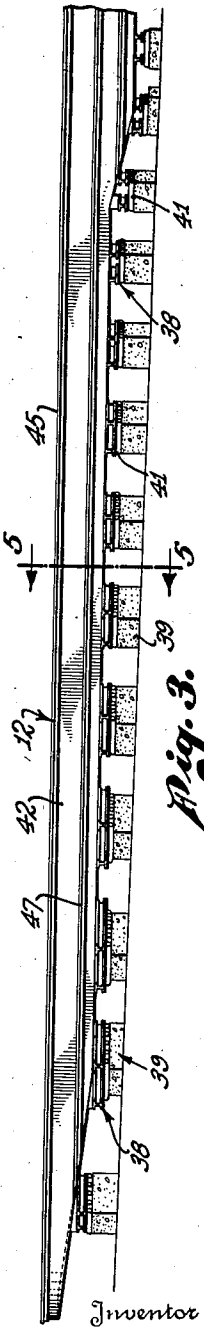


Fig. 3.

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RINK CONSTRUCTION

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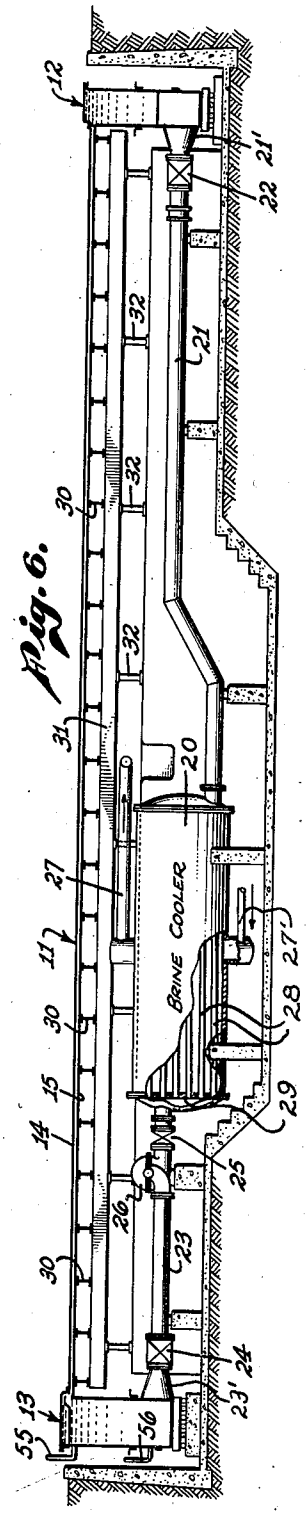


Fig. 6.

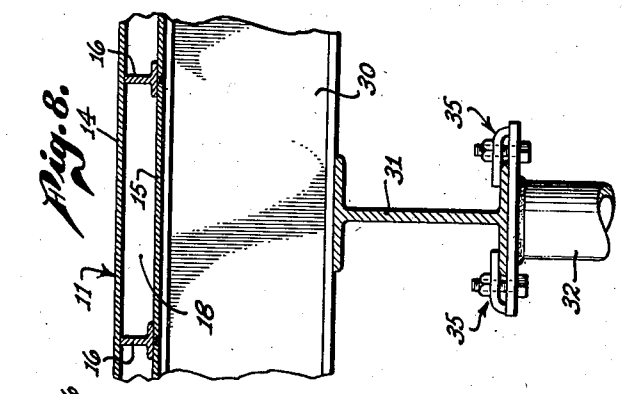


Fig. 8.

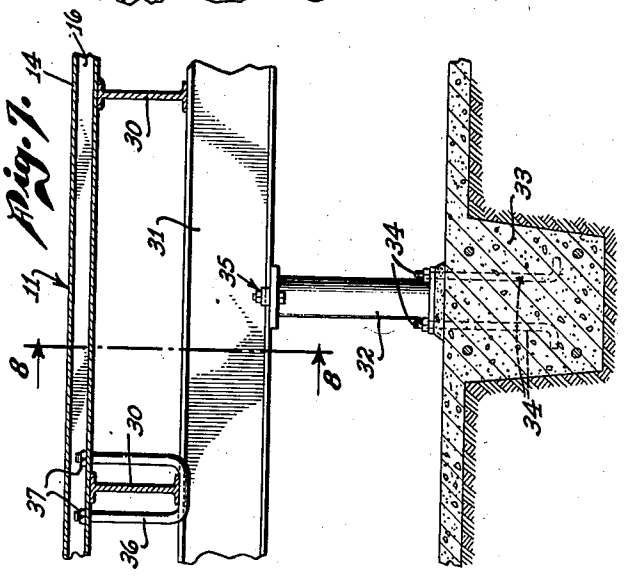


Fig. 7.

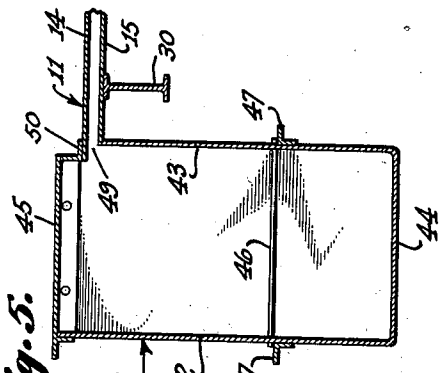


Fig. 5.

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2,295,142

UNITED STATES PATENT OFFICE

2,295,142

RINK CONSTRUCTION

Herman Vetter, Los Angeles, Calif.

Application October 25, 1940, Serial No. 362,725

13 Claims. (Cl. 62—12)

This invention relates generally to ice skating rinks and the construction thereof, particularly ice rinks embodying a hollow metal floor adapted to support a thin sheet of ice and through which brine is circulated.

In ordinary construction of ice rinks which embody a hollow floor adapted to support a sheet of ice, the brine which is circulated through the floor is supplied thereto by means of a main distribution or feed header pipe disposed along one side of the floor and a main return or drain header pipe disposed along the opposite of the floor. Ordinarily the main pipes are connected to the floor by a plurality of smaller pipes. Usually the floor and these headers are independently supported and the pipes connecting the two are provided with expansion joints to compensate for the expansion and contraction of the parts. This construction is relatively expensive to install and maintain. The initial expense is caused by the large amount of piping and the multiplicity of expansion joints necessary with this type of construction. It has also been found that the expansion joints are not reliable and are a frequent source of trouble.

It therefore is a primary object of this invention to provide a construction for an ice rink which embodies a hollow floor and integral headers at opposite sides of the floor thereby eliminating practically all of the ordinary piping required and eliminating all expansion joints between the headers and the floor.

In ice rinks embodying a hollow floor there is a great deal of expansion and contraction during freezing and de-icing of the rink and it is another object of this invention to provide a new and improved means of supporting the floor to compensate for this expansion and contraction and it is a particular object to provide means for supporting the headers to compensate for the expansion and contraction.

It is a further object of this invention to provide a construction wherein the headers are proportioned in size according to the amount of floor which any particular part of the header services. It is also an object to provide a construction which is economical to operate. To accomplish this it is an object to provide a construction wherein the path of the circulated brine is relatively short.

It is a still further object of this invention to provide a brine circulation system in conjunction with the floor which tends to prevent the formation of air pockets in the circulated brine in the floor and which eliminates the necessity of utilizing an entirely closed brine circulation system thereby making possible the circulation of brine with the utilization of only minimum hydraulic pressure.

These and other objects will be apparent from the drawings and the following description thereof. Referring to the drawings which are for illustrative purposes only:

Fig. 1 is a diagrammatic plan view of an ice rink embodying the invention;

Fig. 2 is a fragmentary side elevation of the return header of the rink of Fig. 1 taken on line 2—2 of Fig. 1;

Fig. 3 is a fragmentary side elevation of a feed header of the rink of Fig. 1 taken on line 3—3 of Fig. 1;

Fig. 4 is a cross sectional elevation through the return header on line 4—4 of Fig. 2;

Fig. 5 is a cross section of the feed header taken on line 5—5 of Fig. 3;

Fig. 6 is a cross section, largely diagrammatic of the rink and associated apparatus on line 6—6 of Fig. 1;

Fig. 7 is a fragmentary sectional elevation of the floor and supporting elements; and

Fig. 8 is a fragmentary sectional elevation on line 8—8 of Fig. 7.

More particularly describing the invention, the construction is primarily designed for use as an ice skating rink although the construction may be used for some other purposes. Reference numeral 11 generally indicates the floor of the rink which is adapted to support a thin layer of ice. At each side and integral with the floor are two headers, a feed header 12 and a return header 13. The floor itself is comprised of an upper plate or sheet of metal 14, a lower plate or sheet 15 and a plurality of transverse partition elements 16 which are in the form of inverted T beams as best illustrated in Fig. 8. These beams 16 are secured to the upper and lower floor plates by means of welding as shown in Fig. 8. This construction provides a hollow floor having a plurality of transverse passageways 18 for the circulation of brine.

At each side the floor is in direct communication with the interior of the aforementioned headers 12 and 13 so that liquid may be circulated from the feed header through the floor to the return header from which it may be drained and cooled and subsequently recirculated to the feed header. Thus, as shown in Fig. 6 a brine cooler 20 is shown located beneath the floor and connected to the feed header 12 by means of a conduit 21 having an expansion

joint 22. Between the brine cooler and the return header 13 is another conduit indicated by numeral 23 having expansion joints 24 and 25 located on opposite sides of a pump 26. The necessary machinery for operating the brine cooler may be located externally of the rink itself and the brine cooler supplied with the necessary fluid by means of the conduit 27'. A portion of the brine cooler is broken away to expose the tubes 28 which are mounted in headers 29, one at each end of the cooler. The refrigerant to be cooled enters through pipe 23 and passes through the tubes 28 to the opposite end of the cooler. The refrigerant fluid is admitted to the cooler by pipe 27' and is removed through pipe 27 after circulating between the tubes 28. Any suitable cooling means can be used in place of that shown. Preferably the ends of the conduits 21 and 23 are flared or conical at 21' and 23' to reduce turbulence in the headers.

It is apparent that this construction provides a rink which may be operated economically insofar as maintaining the desired low temperature of the floor is concerned inasmuch as the path of brine circulation is very short. It is also obvious that this construction eliminates the necessity of numerous expansion joints as ordinarily required.

The floor 11 is supported on longitudinal beams 30 which rest on transverse beams 31. The beams 31 are supported on a plurality of posts or tubular supports 32 which rest upon any suitable foundation such as the concrete base 33 shown in Fig. 7. The posts may be anchored to the base by means of anchor bolts 34. At their upper ends the posts are provided with the clamping means 35 adapted to engage the base of the beams 31 for securely holding these in place. Any suitable means may be provided for maintaining the longitudinal beams 30 in the proper position on the cross beams 31.

In order to anchor the floor to the supporting means and at the same time permit of limited horizontal movement of the floor as may be caused by expansion and contraction thereof, a plurality of yokes or U-bolts 36 are provided which are bolted to the floor at their upper ends and which extend down and around the beams 30 intermediate the cross beams 31 at suitable intervals. The bolts 36 are of greater width than the greatest width of the beams 30 in order to permit a slight horizontal movement of the floor. In assembly, the nuts 37 on the bolts are only tightened sufficiently to prevent the floor buckling except in the region of the center of the rink where they may be more securely tightened.

It is a particular feature of this invention that means are provided for supporting the two headers on opposite sides of the floor so that the expansion and contraction of the floor may be compensated for by the supporting means permitting horizontal movement of the headers. In order to accomplish this, the headers are provided at spaced points along their under surfaces with sets of beams indicated generally by numeral 38. Each set of beams is approximately disposed in alignment with lines radiating from the center of the floor to the respective sets of beams. Underneath each set of beams is provided a concrete foundation which may take the form of a base or pier unit as generally indicated by numeral 39 in Fig. 4. Preferably each of these concrete piers is provided with a metal grill work 40 adapted to form a bearing surface for a plurality of rollers 41 which are disposed between each of the sets of beams 38 and the respectively associated concrete piers. Each set of rollers 41 is disposed at right angles to the particular beams 38 with which it is associated. For purposes of illustration the broken lines 38' appearing on Fig. 1 indicate the approximate location and longitudinal axis of certain of the sets of beams 38.

With this construction it is apparent that the headers 12 and 13 are provided with a supporting means which permits the movement of the headers horizontally to compensate for expansion and contraction of the various elements of the rink construction. It is also apparent that the movable elements embodied in the supporting means are so positioned as to be disposed in the proper position to most readily permit of the movement of the headers at the respective points of support.

It is another feature of this invention that the headers be proportioned in size to accommodate the particular capacity of the floor served. The particular longitudinal shape of the headers is illustrated in Figs. 1, 2 and 3 while the cross sectional shape at given points is shown in Figs. 4 and 5 as well as in Fig. 6. Each header is comprised of an outer wall 42 and an inner wall 43, a bottom 44 and a top 45. Suitable transverse braces 46 are provided which may be welded at their ends to the outer sides of the side walls or secured to longitudinal reenforcement angle irons 47 and 48. At its upper end each header is provided with an opening 49 which affords direct communication with the interior of the floor. The top 45 is joined to the upper part of the floor by an angle member 50 and the inner wall 43 is joined to the lower plate of the floor as indicated in Figs. 4 and 5. In the return headers the wall 43 and bottom sheet of the floor extend under the top of the header while in the feed header this construction is reversed as indicated in Fig. 5.

The shape of the headers is proportioned so that they decrease in size from the center outwardly, that is, from the point at which the header receives or discharges brine from or to the brine cooling and circulating means. Thus at any given point along the header the cross sectional area of the header is sufficient to carry enough brine to serve the remainder of the floor from that point to the end of the header.

In the form of the invention shown the return headers are constructed to have a greater capacity than the feed headers. At the outlet of the brine passages 18 into the return header 13 there is provided a baffle or dam means 54 which serves as a means for restricting the discharge of brine from the various brine passages of the floor into the brine header. With this construction it is possible to utilize only a relatively low hydraulic pressure for maintaining the feed header and the floor full of brine, permitting the brine to spill over and escape from the floor over the damming or baffle means 54 into the return header wherein the brine is normally carried at a level slightly below the floor. By having the return header larger than the feed header fluctuations in the level of the brine in the return header can be kept at a minimum. The use of the baffle means 54 serves to prevent the possibility of any air pockets forming within the brine at some point in the floor to interfere with the proper and efficient cooling. Also for the purpose of removing air from the brine the upper portion of the return header may be connected

by a conduit 55 (fragmentarily shown in Fig. 6) with the upper portion of a brine expansion tank or reservoir (not shown) preferably located above the header which may be open to the atmosphere. The lower end of this tank may be connected to the return header by means of a pipe 56. Any other suitable means can be used to provide for the expansion of the brine during periods of shut down however.

It is contemplated that various changes and modifications can be made without departing from the scope of the invention and it is intended to cover such changes as come within the claims.

I claim as my invention:

1. In ice rink construction, a hollow floor adapted to support a sheet of ice; means for supporting said floor, said means allowing limited horizontal movement of said floor as caused by expansion and contraction; an enclosed header at each side of said floor integral therewith, the interior of said headers being in communication with the interior of said floor; and means for supporting said headers to allow movement thereof caused by expansion and contraction of said floor and said headers including stationary foundation means and movable elements between said headers and said foundation means.

2. In ice rink construction, a hollow floor adapted to support a sheet of ice; means for supporting said floor, said means allowing limited horizontal movement of said floor as caused by expansion and construction; an enclosed header at each side of said floor integral therewith, the interior of said headers being in communication with the interior of said floor; stationary foundation means under each header; and a plurality of movable elements between the respective headers and said foundation means at points spaced longitudinally along said headers.

3. In ice rink construction, a hollow floor adapted to support a sheet of ice; means for supporting said floor to allow limited horizontal movement of said floor as caused by expansion and contraction; an enclosed header at each side of said floor integral therewith, the interior of said headers being in communication with the interior of said floor; stationary foundation means under each header; and a plurality of sets of rollers between the respective headers and said foundation means at points spaced longitudinally along said headers, the rollers of each set having their axes of rotation at approximately right angles to lines extending radially from the center of said floor through said points.

4. In ice rink construction, a hollow floor adapted to support a sheet of ice; means for supporting said floor, said means allowing limited horizontal movement of said floor as caused by expansion and contraction; an enclosed header at each side of said floor integral therewith, the interior of said headers being in communication with the interior of said floor; stationary foundation means under each header; a plurality of sets of beams under said headers, each set of beams extending transversely of the header approximately in the direction of lines extending radially from the center of said floor and through said points; and a set of rollers between each set of beams and said foundation means, said rollers being approximately at right angles to the respective associated beams.

5. A construction as defined in claim 4 wherein the foundation means comprises a plurality of spaced concrete units having a metal bearing surface for the rollers.

6. In ice rink construction, a hollow floor adapted to support a sheet of ice; means for supporting said floor, said means allowing limited horizontal movement of said floor as caused by expansion and contraction; an enclosed header at each side of said floor integral therewith, the interior of said headers being in communication with the interior of said floor; and means for supporting said headers to allow movement of said headers caused by expansion and contraction of said floor and said headers including stationary foundation means and movable elements between said headers and said foundation means; and means for circulating brine through said floor and headers including conduit means communicating with the respective headers having expansion joints therein.

7. In ice rink construction, a hollow floor adapted to support a sheet of ice; means for supporting said floor, said means allowing limited horizontal movement of said floor as caused by expansion and contraction; an enclosed header at each side of said floor integral therewith, the interior of said headers being in communication with the interior of said floor; means for supporting said headers to allow movement of said headers caused by expansion and contraction of said floor and said headers including stationary foundation means and movable elements between said headers and said foundation means; a brine cooler and circulator means mounted beneath said floor; a pipe leading from each header to said cooler and circulator means; and an expansion joint in each pipe.

8. In ice rink construction, a hollow floor having a plurality of open ended brine passages; a feed header at one side of said floor; a return header at the opposite side of said floor having means providing open communication with the atmosphere; said headers being integral with said floor and in communication with said brine passages, the major portion of said return header being disposed below the floor whereby the brine passages empty into the upper part of the return header means for supplying brine to said feed header; means for draining brine from said return header at a point below the floor, said return header being of greater capacity than said feed header whereby said feed header may be maintained full and said return header only partially full at a level below said floor; and means between said brine passages and said return header restricting escape of brine from said passages.

9. In ice rink construction, a hollow floor having a plurality of open ended brine passages; a feed header at one side of said floor; a return header at the opposite side of said floor having means providing open communication with the atmosphere; said headers being integral with said floor and in communication with said brine passages at their upper ends throughout their lengths; baffle means forming a dam at the end of said brine passages adjacent said return header restricting the flow of brine from the passages into the return header; means for supplying brine to said feed header; and means for draining brine from said return header at a point below the floor.

10. In ice rink construction, the combination of a hollow floor having integral headers; means for supporting the floor and headers for horizontal movement to compensate for expansion and contraction; a brine cooling and circulating means beneath said floor intermediate said head-

ers, and conduit means connecting said headers with said brine cooling and circulating means, said conduit means including flexible portions on opposite sides of said brine cooling and circulating means.

11. In ice rink construction, a hollow floor; spaced supporting beams horizontally disposed under said floor; and a plurality of spaced yokes secured to said floor and extending under said beams.

12. A construction as defined in claim 11 in which the yokes are of greater width than the beams under which said yokes extend.

13. In ice rink construction, a hollow floor; spaced supporting beams horizontally disposed under said floor; a plurality of spaced yokes secured to said floor and extending under said beams; an enclosed header at each side of said floor integral therewith, the interior of said headers being in communication with the interior of said floor; and means for supporting said headers to allow movement thereof caused by expansion and contraction of said floor and said headers including stationary foundation means and movable elements between said headers and said foundation means.

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