

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: **87200395.9**

(51) Int. Cl.³: **A 63 C 19/12**

(22) Date of filing: **04.03.87**

(30) Priority: **13.03.86 NL 8600650**

(43) Date of publication of application:
23.09.87 Bulletin 87/39

(84) Designated Contracting States:
AT BE CH DE ES FR GB GR IT LI LU NL SE

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(54) **Wind/heat barrier.**

(57) Means for keeping down the energy consumption for cooling spaces open at their sides like indoor artificial skating-rinks and outdoor artificial skating-rinks. The means is a wind/heat barrier surrounding the space or the ground, consisting of a system of tubes arranged at a distance from one another through which a refrigerant flows and which acts as a heat exchanger.

The barrier at its top preferably contains a device dispersing moist over the tube situated underneath. The tubes are preferably provided with a coating with a high emission coefficient for longwave heat radiation.

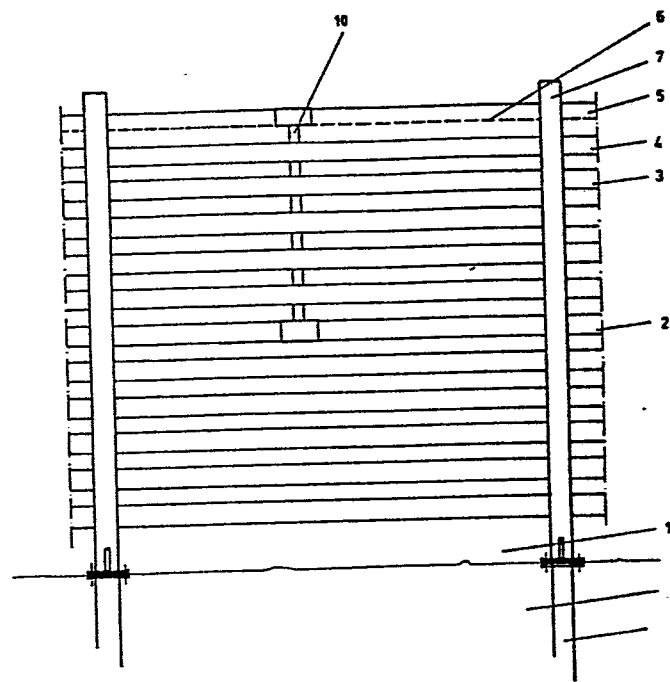


FIG. 1

Wind/heat barrier.

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The invention relates to means for minimising the energy consumption needed for cooling of floor surfaces of spaces being open at least at their sides, like indoor artificial skating-rinks and of grounds totally exposed to the open air, such as outdoor artificial
5 ice-rinks.

In order to cool and keep cool the floor-surface of such spaces and grounds till below the temperature of the open-air, much energy is needed. In order to minimize the energy consumption as much as possible, it is important to minimize the amount of cold required
10 owing to convection via wind and rain. Consequently the temperature of evaporation at which the remaining amount of cold required is generated can go up as well as the energetic efficiency of the refrigerator. Additional saving of energy is its consequence. Moreover the outward radiation of heat should be stimulated as much
15 as possible.

As a matter of fact the amount of energy required should be kept down by opposing heating up by absorption of solar radiation; in case of outdoor artificial skating-rinks over which no roof is present, white paint can be provided in the ice or on the concrete floor, to
20 which the ice floor is applied.

Concerning the convective amount of cold required, this is caused to a great extent by the wind. At outdoor artificial skating-rinks known measures taken against the action of wind are, a dam around the skating-rink as the case may be combined with shields
25 along the rink. The drawbacks hereof are the for the skaters often annoying whirls of air occurring above the skating rinks, whereas the wind abating effect aimed at is obtained to a very limited extent only.

The invention aims at supplying means to minimize the convective
30 amount of cold required and takes care of the emission of the heat of the condenser out of the refrigerator into the atmosphere at the lowest possible condensation temperature as well. Owing to the wind-abating effect of the means the skating climate is improved. The means according to the invention is for that purpose characterized
35 in that it consists of a barrier or parts of barrier to be assembled to form one unit, surrounding the space or the ground, consisting of

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or containing a system of tubes arranged at a distance from one another, acting as a heat exchanger in cooperation with a refrigerant to be led through it. Such barrier has a height which can vary from 1 meter till more than 10 meters.

5 To obtain an optimal screening against the wind, the barrier is pervious to wind for about 40% to 60% of the surface. With "optimal" is meant in this respect sufficiently restraining wind, no troublesome whirls of air occurring at the inside.

10 The assembly of tubes may consist of vertically or horizontally arranged tubes. Through the tubes a refrigerant, originating from the space's or ground's refrigerator is flowing. This refrigerant thus yields its condensation heat from the refrigerator to the open air. The refrigerant in general consists of a medium with sufficiently low solidification temperature to prevent damage to the tube system owing
15 to freezing.

By means of choosing the shape of the tubes, the things mentioned can be optimized as the case may be, by providing the tubes with fins etc.

20 The heat exchange may be considerably improved according to a further feature of the invention, by providing the top of the barrier with a device for yielding moist extending in its direction of length. For example a tube provided with holes in its walls or an at its top open gutter, water flowing over its edge. Water out of such a device thus flowing over the tubes situated underneath, will
25 evaporate which owing to the heat of evaporation needed will lead to additional cooling of the tube.

As the case may be, the underside of the barrier is provided with a gutter in which water possibly flowing from the top downward over the outer side of the tubes is collected and may be
30 recirculated.

The yield of heat of the tubes can still be increased more according to another feature of the invention, by providing them with a coating with a high coefficient of emission for long-wave heat radiation. E.g this coating is a white paint bringing along
35 additional advantages in connection with the solar reflection. It may be noted that the presence of water at the tubes stemming from the moist dispenser present at the top of the barrier, in itself provides a high emission-coefficient.

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When the outside temperature is lower than the temperature at which the space and the ground respectively should be kept, the refrigerator will be out of use. Under these circumstances cold can be led to a cold buffer or to a place where cold is needed like the floor of an inside skating-rink as well by means of the refrigerant in the tubes.

The invention will be explained more fully with reference to the drawings wherein:

Fig.1 is a schematic front view of an embodiment of a part of a barrier according to the invention and

Fig.2 a perspective view of a part of such a barrier.

The part of the barrier of fig.1 consists of horizontally arranged tubes 2, 3 and 4 through which cooling-water or anti-freeze flows. These tubes are supported by uprights 7, which when used are fixed on foundation poles 8, which are fastened in the ground 9. At its top the part of the barrier is provided with a tube 5, provided with holes 6. This tube 5 is the shower-tube through which water is led, flowing out of the outlet openings 6 over the tubes 2, 3, 4, etc. Situated underneath as supply pipe for the shower tube, one of the other horizontally arranged tubes may be used at regular distances, vertical connection tubes being set up in order to obtain a uniform water supply.

In the embodiment drawn, the distance between the tubes 2, 3 and 4 equals the diameter of these tubes as a result of which the barrier is pervious for 50%.

Tubes as indicated with 2, 3 and 4 can be present along the total height of the barrier. A barrier may be closed at its lower side as well.

Fig.2 shows a barrier according to fig.1 in a perspective view; the barrier as drawn here is not closed at its lower side.

Claims

1. Means for minimizing the energy consumption needed for cooling of floor surfaces of spaces being open at least at their sides, like indoor artificial skating-rinks and of grounds totally exposed to the open air such as outdoor artificial skating-rinks,
5 characterized in that it consists of a barrier or parts of a barrier to be assembled to constitute one unit surrounding the space or the ground, consisting of or at least containing a system of tubes (2,3,4) arranged at a distance from one another, acting as a heat exchanger in cooperation with a cooling medium to be led through it.

10 2. Means according to claim 1,
characterized in that the barrier is provided at its top with a device for yielding moist extending in its direction of the length.

15 3. Means according to claim 2,
characterized in that the device is a tube (7) provided with holes (6) in its wall.

4. Means according to claim 2,
characterized in that the device is a gutter open at its top.

20 5. Means according to one of the preceding claims,
characterized in that the barrier is provided with a coating having a high emission coefficient for long-wave heat radiation.

6. Means according to claim 5,
characterized in that the coating is white.

25 7. Means according to one or more of the preceding claims,
characterized in that the tubes (2,3,4), when in use, form parts of a circuit containing a device for storing cold or caring for cooling of another space, floor or the like.

8. A space or ground open at its sides,
characterized in that it is provided with means according to one or more of the preceding claims.

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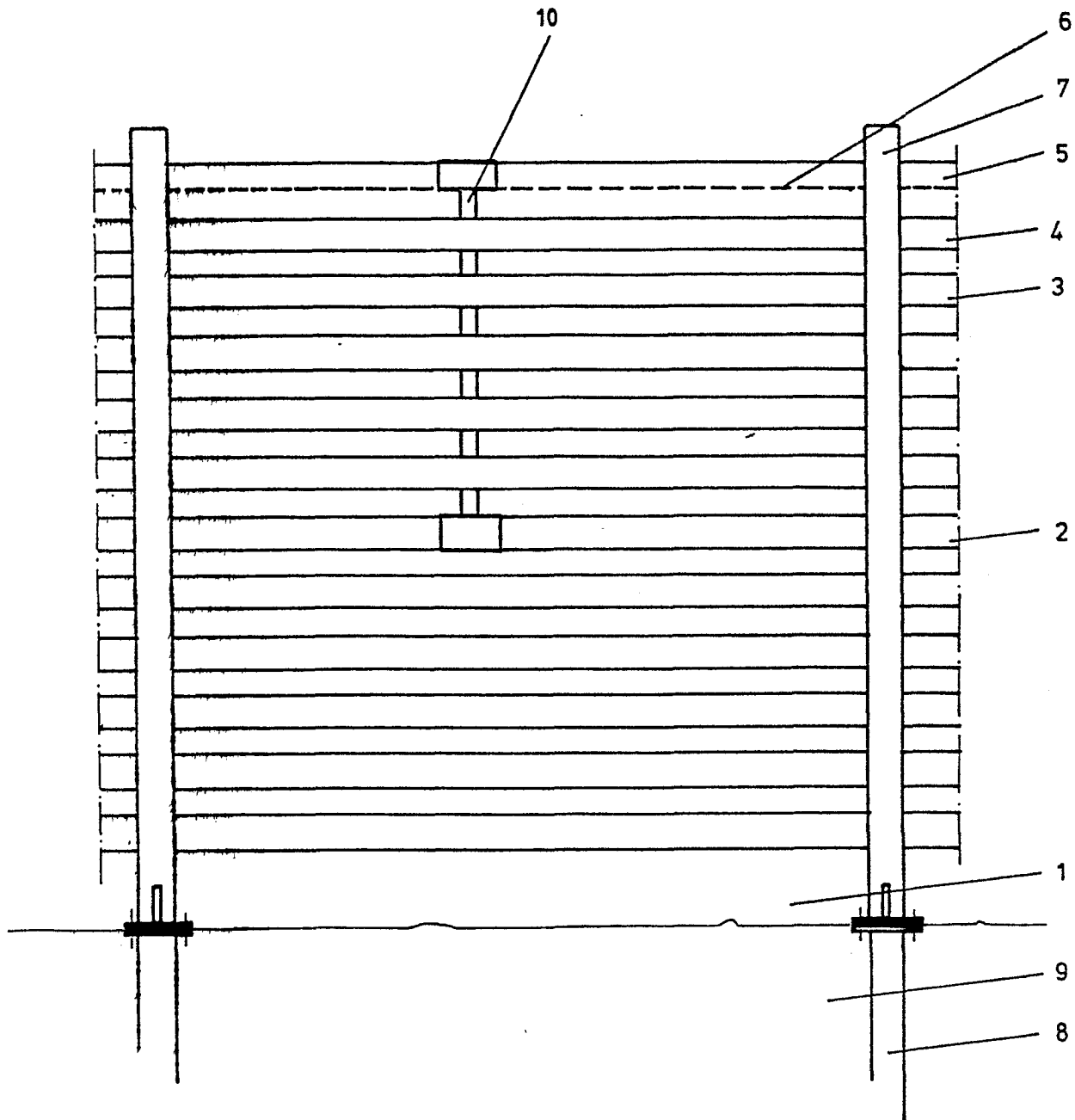


FIG. 1.

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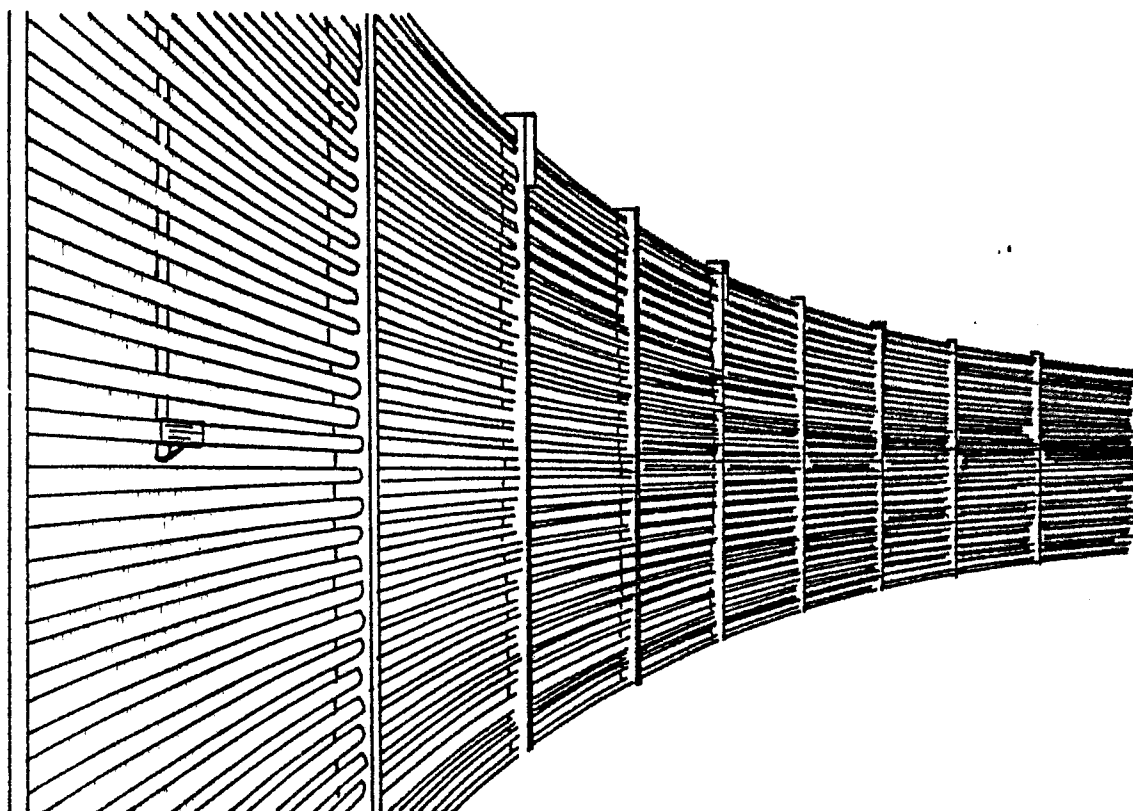


FIG. 2.