

Feb. 14, 1961

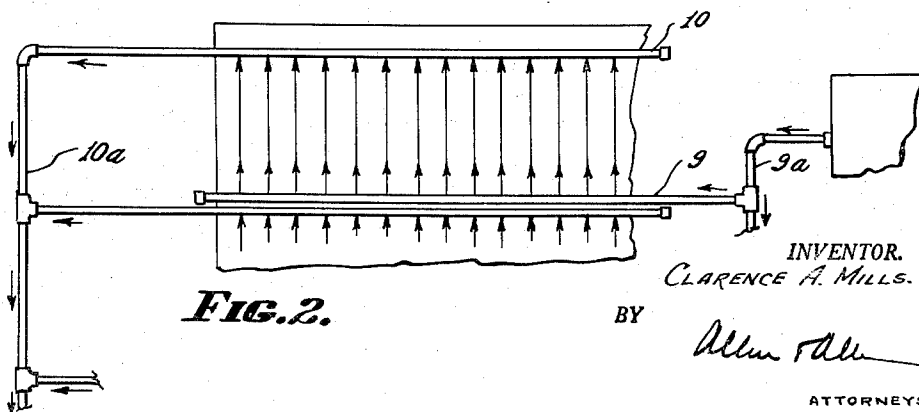
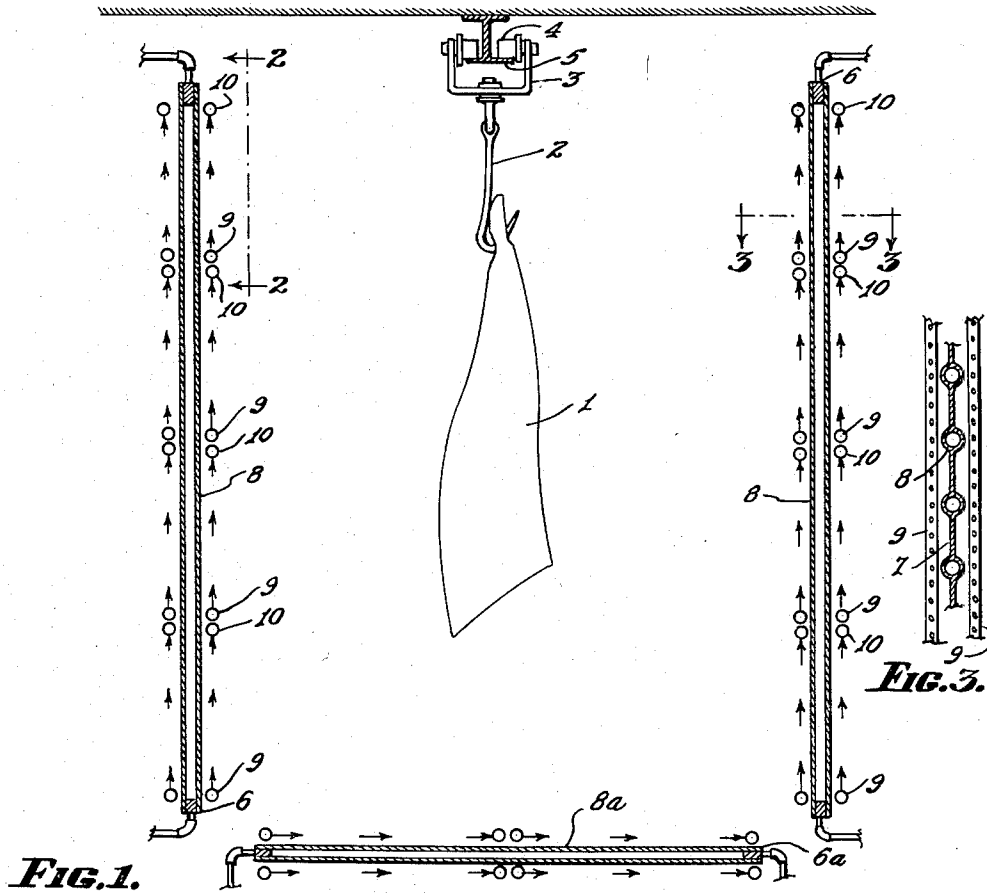
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2,971,350

RADIANT COOLING SYSTEMS

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2 Sheets-Sheet 1



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2 Sheets-Sheet 2

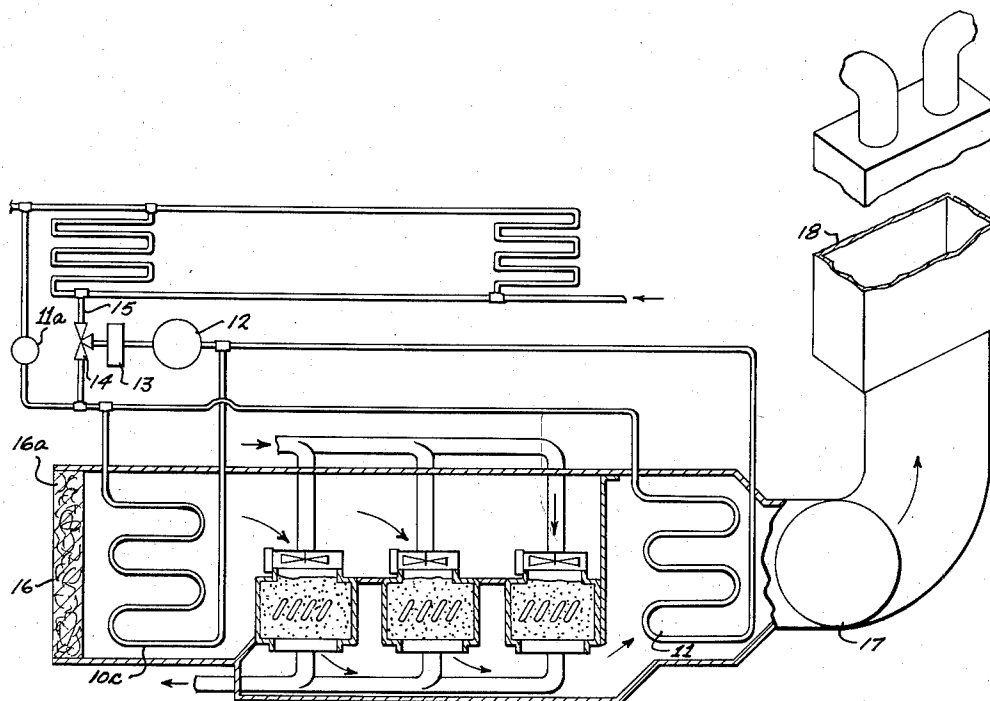


FIG. 4.

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RADIANT COOLING SYSTEMS

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3 Claims. (Cl. 62—272)

In my co-pending application Serial No. 711,209, filed January 27, 1958, I have disclosed a new system of radiant cooling by means of cold plates which absorb ultra long infrared heat rays from articles to be cooled or solidified with controlled crystallization. Normally the articles move along on a conveyor and the cold plates are either vertical for articles suspended from the conveyor carrier such as hams, bacons or other meats or horizontal for articles such as confections. In the latter case the conveyor belt is usually of canvas and polyethylene so as to be penetrable to the ultra long infrared rays whether these rays are generated from the articles themselves or by the heat given off with a change of state as in the case of chocolate coatings when crystallization sets in.

In order to prevent moisture condensation on the cold plates in my copending case I have introduced within the tunnel air conditioned so as to have its dew point below the temperature at which the cold plates are operated. Such currents of air with a controlled dew point will normally extend throughout the interior of the tunnel.

In some cases, as for example in cooling meats the air with controlled dew point if it contacts the meats picks up moisture and that moisture not only restricts the capacity of the air to prevent moisture condensation on the plates but it also dries out the moisture from the meats which moisture is required to produce a satisfactory end product.

This application, which is thus a continuation-in-part of my aforementioned application Serial No. 711,209, filed January 27, 1958, has for its objective not only the use of air with controlled dew point as a means of preventing condensation on the plates, but also the controlling of the disposition of such air to the immediate vicinity of the plates.

Thus it is my object to provide means for controlling the air with predetermined dew point to a thin blanket of air adjacent the cold plate surfaces. The means which I employ does more than provide this blanket of air since it provides a moving current. Merely introducing air is not enough because this air would be quickly dissipated throughout the space within the cooling tunnel. My invention consists in introducing air in a thin sheet and in withdrawing this same air at a spaced position sufficiently distant that a thin blanket of moving air will be in continuous circulation against the surface of the cold plate.

In the drawings I have illustrated diagrammatically a sectional view through a cooling tunnel for suspended meats in which:

Figure 1 is a diagrammatic cross section of a tunnel for cooling meats.

Figure 2 is a sectional view along the lines 2—2 of Figure 1.

Figure 3 is a sectional view along the lines 3—3 of Figure 1.

Figure 4 is a view of the apparatus employed to supply air with a controlled dew point.

Hunks of meat 1 are suspended from pivoted hooks 2 carried by the links 3 of a conveyor having pulleys 4 which ride along a track 5. The pieces of meat are put on the hooks at one end and removed at the other end of the conveyor passing around looped tracks at the ends so that its operation is continuous.

The cooling plates 6, 6a illustrated are the type of hollow sheet metal fabrications having a plurality of interconnected passageway portions in the form of a single sheet of homogeneous metal which may be made for example in accordance with the method disclosed in the Grenell Patent No. 2,690,002, granted Sept. 28, 1954. The cooling plates consist of flat portions 7 between the tubes 8.

Figure 1 shows a sectional view with the tubes 8 bisected longitudinally. Figure 3 illustrates one arrangement for introducing the air having a dew point lower than the temperature to which the circulating cooling fluid cools the plates. The air which has been treated to the predetermined dew point is introduced through a series of spaced pipes 9 having perforations therein. This air is withdrawn through a series of spaced pipes 10.

Figure 2 shows in diagrammatic form how the air is introduced through the pipes 9a and withdrawn through the pipes 10a. It will be obvious that the air treated to reduce its dew point passes as a blanket confined to close proximity to the cold plates. It is, of course, necessary that the blankets of air are withdrawn at spaced intervals because if the air were to be introduced at the bottom of the cooling plates and exposed to a wide space before being withdrawn, it would lose its momentum and mix with the air in the tunnel where its effectiveness in preventing moisture condensation on the plates would be impaired.

Since the air blanket with a predetermined dew point is withdrawn before it has a chance to mix with the air in the enclosure there is no tendency to dry out the moisture in the meat.

Also being kept free of moisture condensation the cooling plates, which are carbon black coated, maintain their maximum efficiency of absorbing the ultra long infrared rays which are given off from the surface and from deep down below the surface of the meats.

In the co-pending application Serial No. 643,869, filed March 4, 1957, I have shown drip gutters for carrying off the condensation on the plates, but with my new improvements there is no necessity for drip gutters because there is substantially no condensation.

As an example of suitable apparatus for preparing an air supply with a controlled dew point, Figure 3 is a reproduction of the apparatus forming one of the figures in my copending application Serial No. 711,209, filed January 27, 1958. It is described in my copending case as follows:

For controlling the dew point of the air admitted to the inlet header, I have indicated the two brine coils 10c and 11 supplied with brine of a predetermined temperature through a one-way flow valve 11a. The brine or other coolant liquid flows to the brine coils, the outlets of which connect with a circulator pump 12. The recirculated coolant liquid passes to a thermostat 13 which controls the flow and temperature of the recirculated liquid to the three way motorized mixing valve 14, from which a certain amount of coolant liquid flows back and mixes with inlet liquid. In the event the temperature control waivers the other branch line permits a return to the coolant liquid supply through the pipe 15.

The air conditioned within the casing introduces air through the air filter 16. After being cooled through the first set of cooling coils during which the dew point as well as the temperature is reduced, the air passes through a dehumidifier unit in which deliquescent chemi-

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cals in trays still further reduce the dew point of the air. This action gives off heat so that the air leaving the dehumidifier unit is too warm for introduction into the cooling conveyor. To again reduce the temperature a desired amount the air passes through the second brine cooling chamber and is then taken into the blower 17 from which it is discharged through the duct 18 into the air distribution pipes from which dehumidified air may be supplied to the spaced pipes 9.

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

1. In combination with a carbon black coated cooling plate for absorbing ultra long infrared heat rays, means for preventing moisture condensation on the plate comprising a pipe having perforations positioned to direct air currents parallel with the surface of the plate and another pipe spaced from the first noted pipe and having perforations to provide intakes for the air from the perforations on the first noted pipe whereby a blanket of air will circulate along and insulate the surface of the cold plate, and means for controlling the dew point of the air in the air blanket to prevent moisture condensation on the plate.

2. In combination with a carbon black coated cooling plate for absorbing ultra long infra red heat rays, a

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combination which effectively prevents moisture condensation on the cooling plate comprising means for directing a thin blanket of air having a predetermined dew point into surface contact with the cooling plate.

3. In combination with a carbon black coated cooling plate for absorbing ultra long infra red heat rays, a combination which effectively prevents moisture condensation on the cooling plate comprising means for directing a thin blanket of air having a predetermined dew point into surface contact with the cooling plate, said means comprising air nozzles for projecting air with the controlled dew point along the surface of the plate and air suction devices spaced from the air nozzles to withdraw the air.

References Cited in the file of this patent

UNITED STATES PATENTS

156,269	Bate	Oct. 27, 1874
697,679	Siebert	Apr. 15, 1902
2,152,291	Starr	Mar. 28, 1939
2,251,617	Pirnie	Aug. 5, 1941
2,405,834	Kleist	Aug. 13, 1946
2,523,957	Kleist	Sept. 26, 1950
2,783,618	Mills	Mar. 8, 1957