

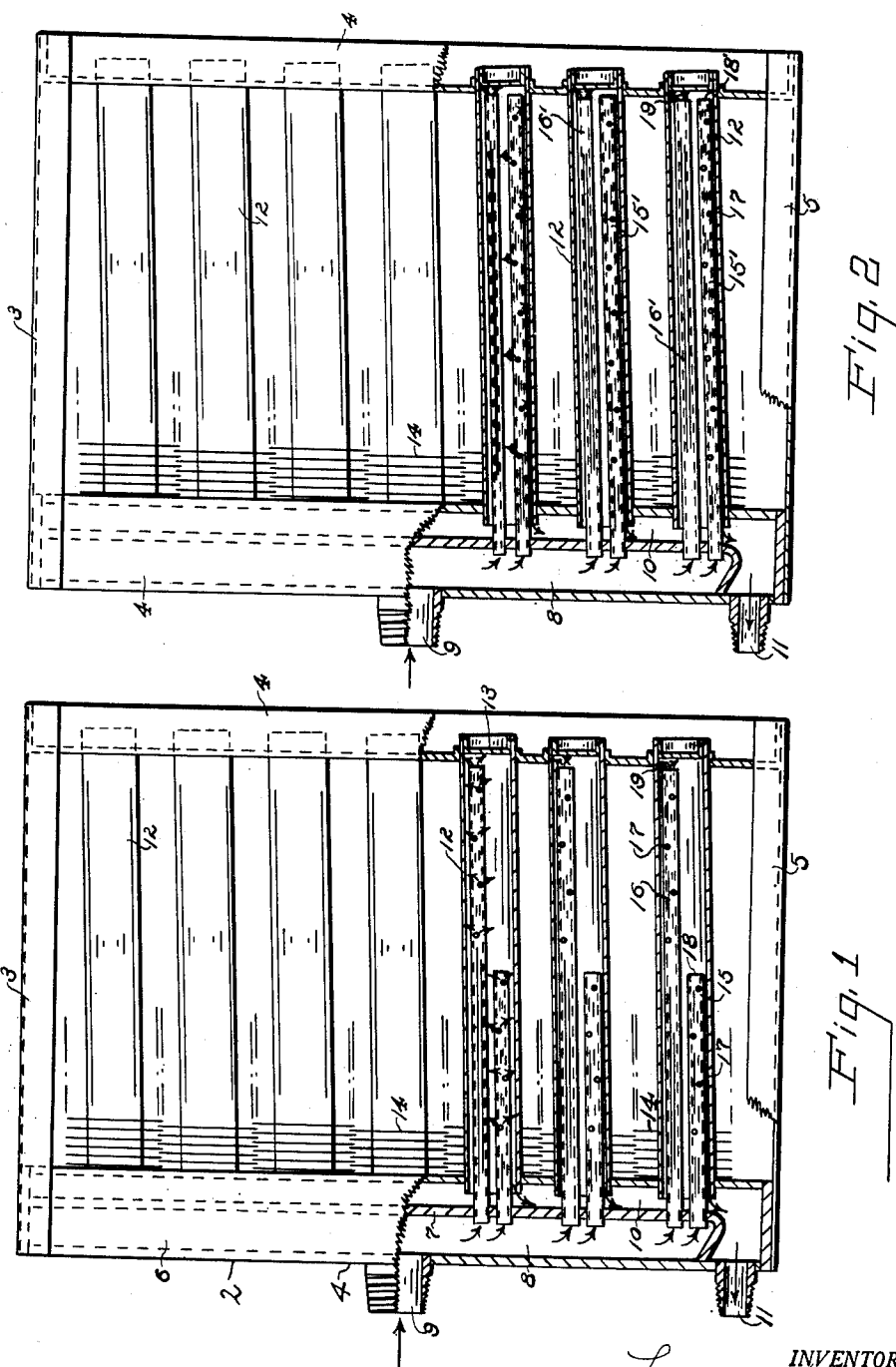
Sept. 1, 1953

L. H. FRITZBERG

2,650,799

HEAT EXCHANGER

Filed Aug. 11, 1950



INVENTOR.
Lawrence H. Fritzberg
BY *H. Reid* Atty.

UNITED STATES PATENT OFFICE

2,650,799

HEAT EXCHANGER

Lawrence H. Fritzberg, Syracuse, N. Y., assignor
to Aerofin Corporation, Syracuse, N. Y., a cor-
poration of New Jersey

Application August 11, 1950, Serial No. 178,785

2 Claims. (Cl. 257—146)

1

This invention relates to heating apparatus adapted to be installed in duct-work comprising a part of an air conditioning or heating system and, more particularly, to a device for heating air or similar fluid by heat exchange relation with steam in which the supply of steam or other heating fluid may be reduced while assuring substantially uniform heating of the air.

The chief object of the present invention is to provide heating apparatus having a plurality of heat exchange tubes, each tube containing distributing tubes so arranged as to permit more uniform distribution of heating fluid under conditions of throttled flow of heating fluid.

An object of the present invention is to provide heating apparatus in which each heat exchange tube contains at least two distributing tubes, one of the distributing tubes having spaced orifices throughout at least a portion thereof and an open end for passage of heating fluid into the heat exchange tube, the other tube having an open end for passage of heating fluid into the heat exchange tube. Other objects of my invention will be readily perceived from the following description.

This invention relates to heating apparatus for heating air or other gaseous fluid which comprises in combination a plurality of return tubes extending across the path of air through the apparatus, a supply header, means for supplying heating fluid to the supply header, a return header connected to the tubes for removing condensate, each return tube containing a plurality of distributing tubes connected to the supply header, one of the distributing tubes having orifices therein spaced longitudinally throughout at least a portion thereof and an open end for passage of heating fluid into the return tube, another distributing tube in the return tube having an open end and being free from orifices throughout at least that portion adjacent the supply header to direct heating fluid to the opposite end of the return tube thereby assuring more uniform distribution of heating fluid throughout the return tube under conditions of throttled flow of heating fluid.

The attached drawing illustrates a preferred embodiment of my invention, in which

Figure 1 is a view partly in elevation and partly in section of a heating apparatus embodying the invention; and

Figure 2 is a view similar to Figure 1 of a modification of the invention.

Referring to the drawing, there is shown heating apparatus comprising a rectangular casing

2

structure 2 including a top wall 3, end walls 4 and a bottom wall 5. Preferably, the casing is designed for placement in an air duct or the like so that the top and bottom walls are substantially horizontal, air flowing in a desired path through the casing.

A header structure 6 is mounted within the casing adjacent an end wall 4. Structure 6 includes a partition 7 separating the structure into a supply header 8 having steam inlet 9 and a return header 10 for removal of condensate. Outlet 11 of the return header 10 is placed below supply header 8 and may be connected to a drain or boiler return for disposal of condensate.

A plurality of tubes 12 extend across the path of air through the apparatus and are connected to the return header 10, each tube 12 being closed at its end opposite its connection to the header 10 by a plug 13 or other means. Each tube 12 may be provided with fins 14 if desired to promote heat transfer.

Each tube 12 contains at least two distributing tubes 15, 16 extending from supply header 8 longitudinally of tube 10 and placed one above the other. Tubes 15, 16 may be held in spaced relation to each other and to tube 12 by any desired means. Preferably, tubes 12 are disposed approximately horizontally above each other but are inclined downwardly toward the return header 10 to permit gravity flow of condensate toward the outlet 11.

Tube 15 extends approximately half-way across the air passage (refer to Figure 1) and is provided with orifices 17 spaced longitudinally thereof and an open end 18 to permit heating fluid to enter the annular spaces between such tube and tube 12. It will be understood open end 18 need not be provided in tube 15 under some conditions of use. Tube 16 extends substantially throughout the length of tube 12 and is placed above tube 15 within tube 12. Tube 16 has an open end 19 and a plurality of spaced orifices 17 extending longitudinally thereof in that portion of tube 16 extending beyond tube 15 to permit heating fluid to enter the annular space between such tube and tube 12. Thus, tubes 15, 16 each feed approximately one-half the length of tube 12. Under conditions of throttled steam flow, the load is divided more uniformly between the tubes 15, 16 thus utilizing their greatest heating capacity and heating air passing through the apparatus more uniformly. Under extreme throttled steam conditions, tube 16 may freeze along the portion thereof without orifices but

3

tube 15 tends to keep it in thawed condition to permit it to function.

In Figure 2, I have shown a modification of the present invention. In this case tube 15' extends substantially the length of tube 12 and is provided with spaced orifices 17 throughout its length and with an open end 18' to feed steam into tube 12. Tube 16' is of similar length and is provided with an open end 19' but is without orifices. Air is heated more uniformly than if only tube 15' were used. Tube 15' tends to prevent tube 16' from freezing under extreme throttled steam conditions and assures thawing thereof if freezing occurs. The construction also improves purging of air from tube 12. Under some circumstances, of course, orifices may be provided in tube 16' if desired.

The present invention provides a heating apparatus which assures more uniform heating of air passing therethrough even under conditions of throttled steam flow. The structure provided tends to prevent freezing of a distributing tube and assures thawing thereof if freezing inadvertently occurs. Such advantages are provided without substantial increase in cost.

While I have described a preferred embodiment of my invention, it will be understood my invention is not limited thereto since it may be otherwise embodied within the scope of the following claims.

I claim:

1. In heating apparatus for heating air or other gaseous fluid, the combination of a plurality of return tubes extending across the path of air through the apparatus, a supply header, means for supplying heating fluid to the supply header, a return header connected to the tubes for removing condensate, each return tube containing two distributing tubes connected to the supply header and extending longitudinally

4

thereof, one distributing tube having spaced orifices throughout its length and having an open end for passage of heating fluid into the return tube, the second distributing tube being free of orifices throughout its length and having an open end for passage of heating fluid into the return tube, said second distributing tube being placed above said first distributing tube within the return tube.

2. In heating apparatus for heating air and other gaseous fluid, the combination of a plurality of finned return tubes extending across the path of air through the apparatus, a supply header, means for supplying heating fluid to the supply header, a return header connected to the tubes for removing condensate, the return header being placed adjacent the supply header and having its outlet placed below the supply header, the return tubes being inclined at an angle toward the return header to promote gravity flow of condensate to the return header, each return tube containing two distributing tubes connected to the supply header which extend longitudinally of the return tube and are inclined at a similar angle, one distributing tube having spaced orifices throughout its length, the second distributing tube being free of orifices throughout its length and having an open end for passage of heating fluid into the return tube, said second distributing tube being placed above said first distributing tube within the return tube.

LAWRENCE H. FRITZBERG.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,098,830	McElgin	Nov. 9, 1937
2,229,032	Ashley	Jan. 21, 1941