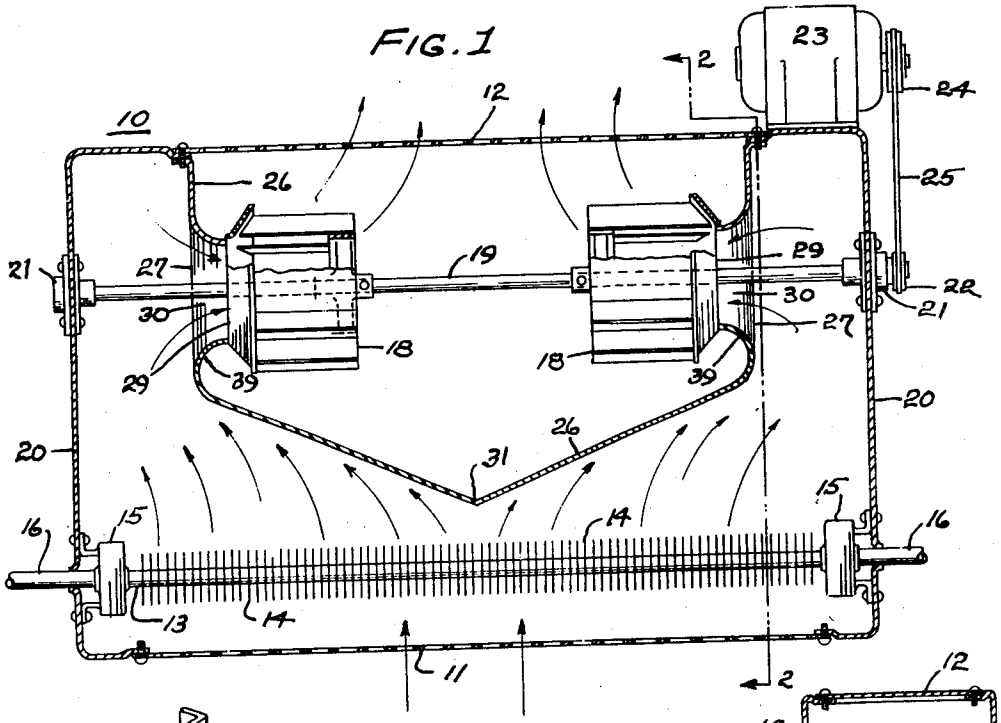
April 11, 1950 W. F. HAGEN 2,503,667

HEAT EXCHANGER

Filed Dec. 29, 1948

FIG. 1



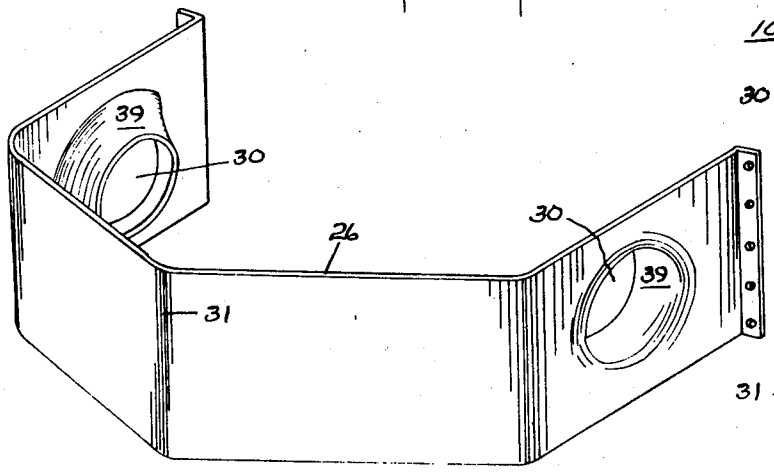


FIG. 3

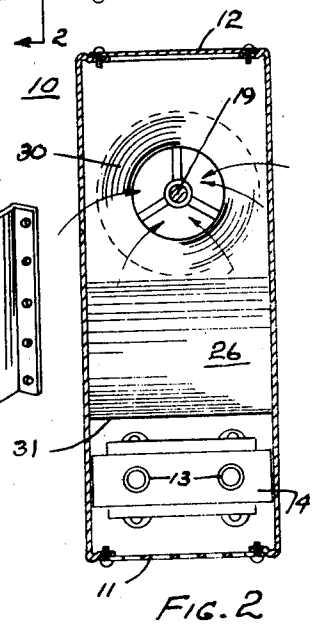


FIG. 2

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HEAT EXCHANGER

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3 Claims. (Cl. 257—137)

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This invention relates to those types of heat exchange units which include centrifugal fans for moving air therethrough.

A widely used type of heat exchange unit is an air heater having a relatively long and relatively narrow, rectangular casing containing a pair of centrifugal fans having a common driving shaft, and containing an extended surface heater extending lengthwise of the unit. The casing of such a unit has an air inlet opening in one side and an air outlet opening in another side with the heater mounted between the air inlet opening and the fans. The fans which have been used in such a unit in the past have had the usual scroll shaped casings around the fan wheels, and which have extended across substantial portions of the air passage between the heater and the fan inlets, and which have prevented the air passing over the heater from contacting intermediate surfaces thereof. Another disadvantage of such a unit is the cost of the two fan casings.

This invention overcomes the disadvantages described in the foregoing by omitting the scroll shaped casings around the fan wheels, and by using instead, a metal sheet having circular openings from which the walls forming the inlet passages of the fan wheels extend; which has its longitudinal center adjacent the heater at a point adjacent its longitudinal center, and which has portions extending from that point along diverging lines to the inlet passages of the fans. The sheet also has portions contacting the side walls of the casing and contacting the wall containing the outlet opening around the outlet opening. The sheet performs the combined functions of so guiding the air into the fan inlets that all of the surfaces of the heater are contacted by the air entering the fans, and of forming an outlet passage connecting the fan wheels with the air outlet of the unit.

An object of the invention is to reduce the cost of heat exchange units containing centrifugal fans.

Another object of the invention is to improve the performance of a heat exchanger in a heat exchange unit.

Another object of the invention is to pass the air drawn by a pair of centrifugal fans in a heat exchange unit, in contact with all of the surfaces of the heat exchanger in the unit.

The invention will now be described with reference to the drawing, of which:

Fig. 1 is a view, in cross section, of an air heating unit embodying this invention;

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Fig. 2 is a sectional view along the lines 2—2 of Fig. 1, and

Fig. 3 is a perspective view of the air guiding sheet used in the unit of Figs. 1 and 2.

The rectangular, sheet metal casing of the air heating unit 10 has the lower air inlet grill 11 and the upper air outlet grill 12. An air heater comprising the two tubes 13 with the extended surface fins 14 thereon, and having the end headers 15, extends longitudinally of the unit above the inlet grill 11 and parallel thereto. The pipes 16 supply steam into, and return condensate from, the headers.

The fan wheels 18 which preferably are of the type disclosed in the H. F. Hagen Patent No. 2,117,416, are mounted on the shaft 19 which extends longitudinally within the unit above the heater, and have their inlets 29 facing the opposite end walls 20 of the unit. The shaft is supported in the bearings 21 attached to the end walls 20, and has on one end, external the casing, the pulley 22. The electric motor 23 is supported on the top of the unit, and has a shaft with the pulley 24 thereon, and which rotates through the belt 25 and the pulley 22, the shaft 19 and the fan wheels 18.

The air guiding metal sheet 26, a perspective view of which is shown by Fig. 3, has the circular openings 27 adjacent its ends and has its walls 39 around the openings formed, as by spinning, to provide the curved walls of the inlet passages 30 for the fan wheels 18.

For installation in the unit, as illustrated by Figs. 1 and 2, the sheet is bent at its longitudinal center along a transverse line to form the apex 31 which may be spaced about ten inches above the upper surface of the heater. The portions of the sheet between the apex and the passages 30 extend from the apex along diverging lines. The upper edges of the sheet contact the upper wall of the unit at the edges of the air outlet grill 12. The side edges of the sheet contact the side walls of the unit. The air entering the unit after passing over the heater is deflected at the apex 31 into the fan inlets as illustrated by the arrows, indicating air flow, of Fig. 1. The air passes over all surfaces of the heater.

The sheet, by contacting the upper and side walls of the unit, limits the air entering the fan wheels to that passing over the heater. The sheet, together with the side walls of the unit, form an enclosure around the fan wheels, causing all of the air delivered thereby to be discharged through the outlet grille 12.

The sheet 26 is preferably formed from a single

metal sheet with the walls for the fan inlet passages 30 formed by spinning. The sheet is easily bent in a single operation to form the apex 31, and is easily installed in the unit. The construction not only is relatively inexpensive but its use results in a unit having an improved performance over that of the prior units which used centrifugal fans having scroll shaped casings.

While one embodiment of the invention has been described for the purpose of illustration, it should be understood that the invention is not limited to the exact apparatus and arrangement of apparatus illustrated, as modifications thereof may be suggested by those skilled in the art, without departure from the essence of the invention.

What is claimed is:

1. A heat exchange unit comprising a rectangular casing having an air inlet opening in one wall and an air outlet opening in another wall, a heat exchanger within the casing adjacent the inlet opening, a rotary fan shaft within the casing between the heat exchanger and the outlet opening, a pair of fan wheels on said shaft, said wheels having oppositely disposed inlets, and means forming a partition having inwardly turned portions forming inlet passages into said inlets of said wheels, having other portions extending from adjacent said heater along diverging lines to said inwardly turned portions, and having other portions contacting said one wall on opposite sides of said outlet opening.

2. A heat exchange unit comprising a rectangular casing having an air inlet opening in one wall and an air outlet opening in another wall, a heat exchanger within the casing adjacent the inlet opening, a rotary fan shaft within the casing between the heat exchanger and the outlet opening, a pair of fan wheels on said shaft, said wheels having oppositely disposed inlets, and a metal sheet having inwardly turned portions forming inlet passages into said inlets of said wheels, and having other portions extending from its center along diverging lines to said inwardly turned portions, and having other portions contacting said one wall on opposite sides of said inlet opening.

3. A heat exchange unit comprising a relatively long and relatively narrow, rectangular casing having an air inlet opening in one wall and having an air outlet opening in another wall, a longitudinally extending heat exchanger within said casing, said exchanger extending parallel to said inlet opening, a rotary fan shaft extending between the end walls of said casing parallel to said heat exchanger, a pair of fan wheels on said shaft, said wheels having oppositely disposed inlets, and a metal sheet having inwardly turned portions forming inlet passages into said wheels, having other portions extending from its center along diverging lines to said inwardly turned portions, having other portions contacting said one wall on opposite sides of said outlet opening, and having other portions contacting side walls of said casing.

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