

Aug. 7, 1951

N. A. PENNINGTON

2,563,415

HEAT EXCHANGER FOR AIR CONDITIONING

Original Filed Jan. 12, 1946

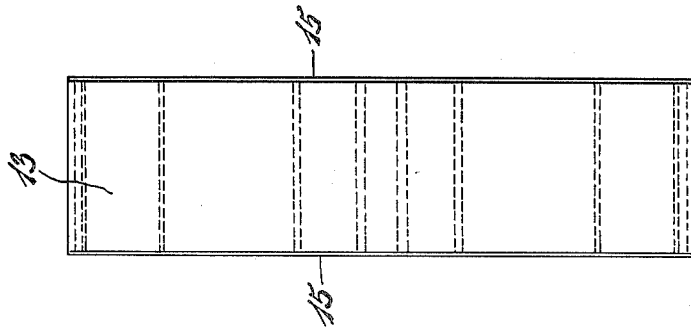


Fig. 2.

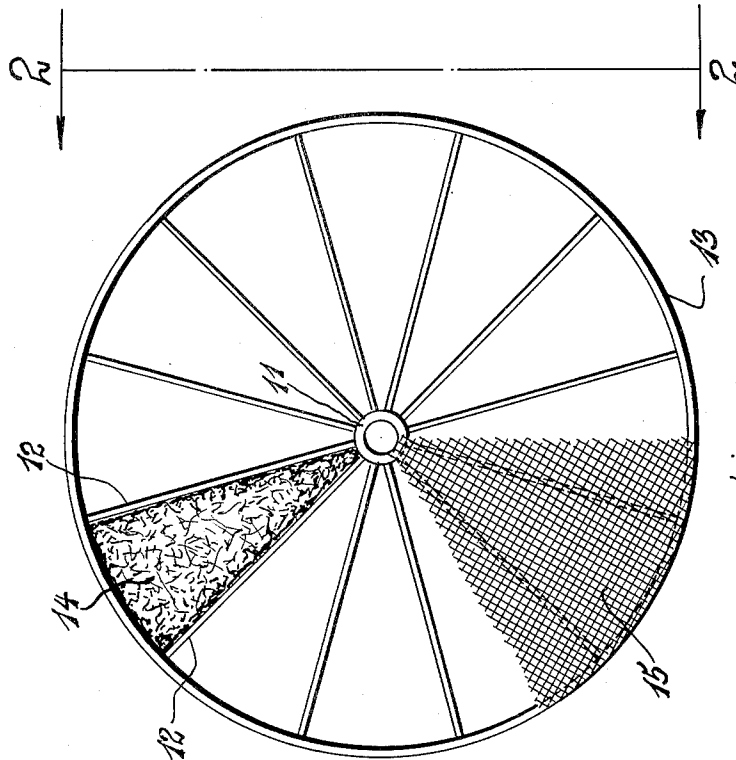


Fig. 1.

NEAL A. PENNINGTON,
INVENTOR,

BY *Roger Sherman Hoar*
ATTORNEY

UNITED STATES PATENT OFFICE

2,563,415

HEAT EXCHANGER FOR AIR CONDITIONING

Neal A. Pennington, Tucson, Ariz., assignor of one-fifth to Robert H. Henley, Tiptonville, Tenn., and one-fourth to Roger Sherman Hoar, South Milwaukee, Wis.

Original application January 12, 1946, Serial No. 640,792, now Patent No. 2,464,766, dated March 15, 1949. Divided and this application October 20, 1948, Serial No. 55,594

3 Claims. (Cl. 257-6)

1

My invention relates to new and useful improvements in rotatable heat-exchangers for use in air-conditioning apparatus for effecting heat transfer between the air in two air-passages across both of which passages the pad rotates.

This present application is a divisional of my Patent No. 2,464,766 issued March 15, 1949, for improvements in air-conditioning apparatus, which copending patent fully describes the type of apparatus in which the present invention is primarily intended to be used.

The principal object of my present invention is to devise efficient heat-exchangers, capable of transferring a very large percentage of the difference in sensible heat between two streams of air.

In addition to my principal object, above stated, I have worked out a number of novel and useful details, which will be readily evident as the description progresses.

My invention consists in the novel parts and in the combination and arrangement thereof, which are defined in the appended claims, and of which one embodiment is exemplified in the accompanying drawings, which are hereinafter particularly described and explained.

Throughout the description the same reference number is applied to the same member or to similar members.

Figure 1 is an elevation, showing one face of my heat-exchanger.

Figure 2 is a side elevation, showing the rim of my heat-exchanger, taken along the line 2-2 of Figure 1.

The details of my heat-exchanger will now be described, with particular reference to the two figures.

This heat-exchanger consists of a casing and packing. The casing comprises a hub 11, spokes 12, and a rim 13. Each of the sectors, thereof, bounded by the spokes and the rim, is stuffed with a packing 14 of some non-hygroscopic air-permeable non-rusting substance, highly heat-absorbent (i. e., high heat-conductivity, high-specific heat, and proper surface), such as metal wool, of which I have tried various sorts, including copper wool, but prefer aluminum wool. The hub 11, spokes 12, and rim 13, of the casing of my heat-exchanger, are all of substantially the same width in the direction parallel to the axis of rotation of the heat-exchanger. This, plus the fact that the packing completely fills each of the sectors, helps to hold the packing substantially in place in the casing, in spite of gravity, air-flow, and rotation, and regardless of the

2

plane of rotation. But the above-mentioned uniformity of width is primarily for the purpose of preventing air-flow radially outward from the heat-exchanger, or from one to the other of the two air-passages across which my heat-exchanger is designed to rotate. In order to prevent this undesired air-flow, it is further necessary that hub 11, spokes 12, and rim 13, be imperforate.

From the above description, it should be evident that my packing 14 must satisfy two somewhat conflicting requirements: that is to say, it must be stuffed into the sectors of the casing sufficiently loosely so as to be freely air-permeable, and yet sufficiently compactly so as to be self-sustaining and hence substantially immovable with respect to the casing.

If desired for further assurance of this immovability, a fine-mesh or coarse-mesh screen, or the equivalent, can be secured to each face of the casing. Such screenlike means is shown at 15 in Figure 1, and is merely indicated as 15 in Figure 2.

Inasmuch as the rules for determining the proper thickness of my heat-exchanger are stated and discussed in detail in my said Patent No. 2,464,766, of which this present patent is a divisional, they are not repeated here.

The same is true of the one-to-one correspondence between the absorption of heat, and the giving up of heat, by each infinitesimal portion of each filament of my packing, which feature is the secret of the distinctive efficiency of my heat-exchanger. This is aided by the random direction of the filaments of the material employed by me.

Having now described and illustrated one form of my invention, I wish it to be understood that my invention is not to be limited to the specific form or arrangements of parts herein described and shown.

I claim:

1. A rotatable heat-exchanger for an air-conditioning unit, comprising: a wheel-like casing, having spokes, a hub, and a rim, all imperforate, and all of substantially the same width in an axial direction, said spokes dividing the casing into sectors; a packing of filamentous springy metallic material highly heat-absorbent, completely filling each of the sectors of said casing, the filaments of said packing lying in random directions, said packing being packed into each sector with such compactness as to be freely air-permeable and yet be so self-sustaining as to be substantially immovable with respect to the cas-

ing during the rotation of the casing even in a vertical plane; and screen-like means secured to the casing at each face thereof, to retain the packing therein.

2. A rotatable heat-exchanger according to claim 1, characterized by the fact that the filamentous material is metal wool.

3. A rotatable heat-exchanger according to claim 2, characterized by the fact that the metal wool is aluminum wool.

NEAL A. PENNINGTON.

REFERENCES CITED

The following references are of record in the file of this patent:

Number	Name	Date
1,240,656	Benson	Sept. 18, 1917
1,604,235	Odom	Oct. 26, 1926
1,746,598	Ljunstrom	Feb. 11, 1930
1,762,320	Wood	June 10, 1930
1,916,332	Rogers	July 4, 1933
2,120,764	Newton	June 14, 1938
2,187,470	Collins	Jan. 16, 1940
2,427,714	Cooper	Sept. 23, 1947

UNITED STATES PATENTS

FOREIGN PATENTS

Number	Country	Date
291,402	Great Britain	Dec. 13, 1928