Oct. 10, 1933. R. N. TRANE 1,929,540

HEAT EXCHANGER

Filed Nov. 27, 1931 2 Sheets-Sheet 1

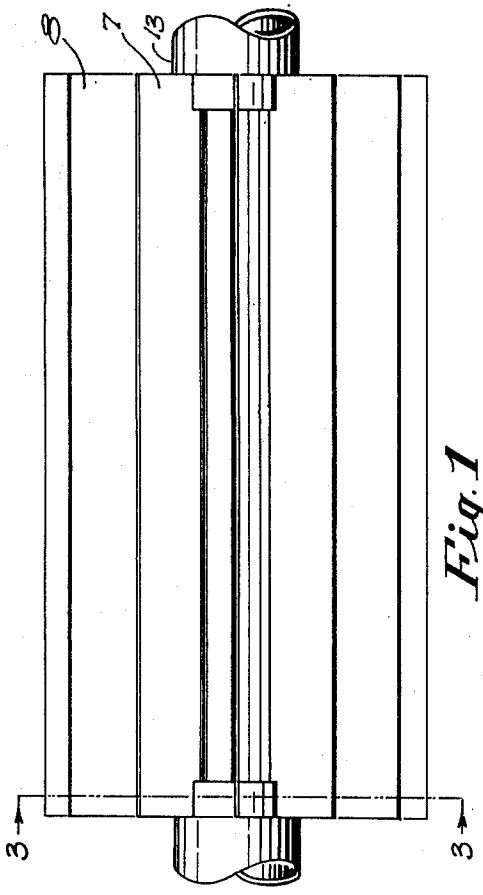


Fig. 1

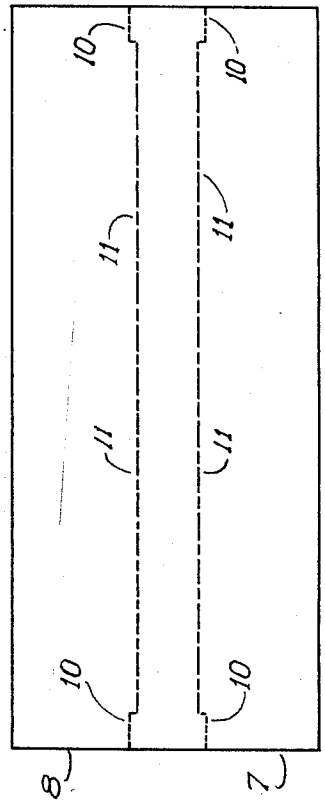


Fig. 4

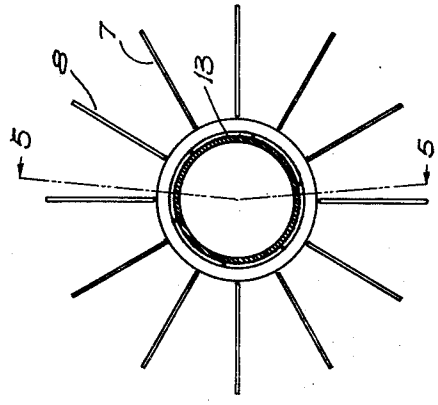


Fig. 2

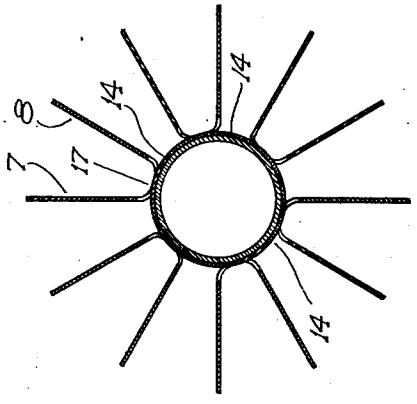


Fig. 3

Inventor
Rudolph Trane

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HEAT EXCHANGER

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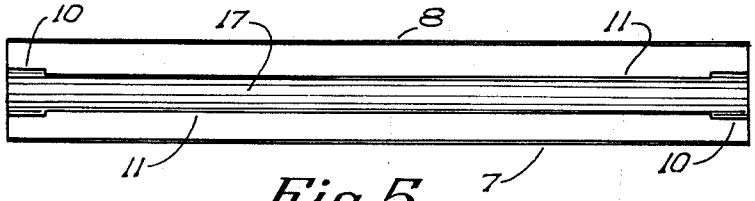


Fig. 5

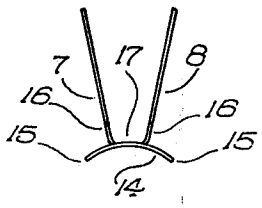


Fig. 6

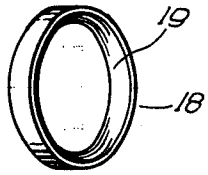


Fig. 7

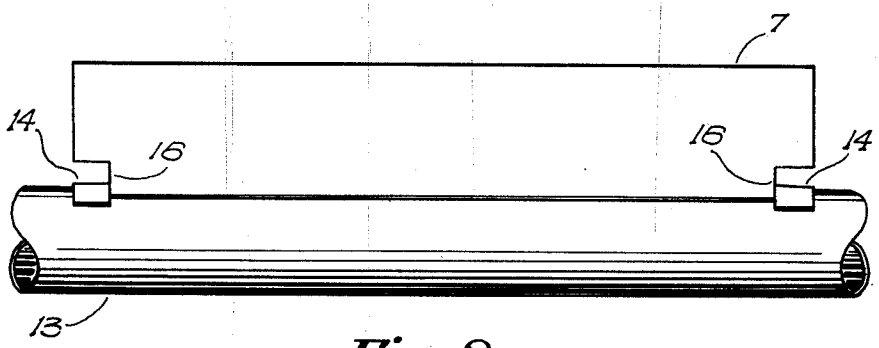


Fig. 8

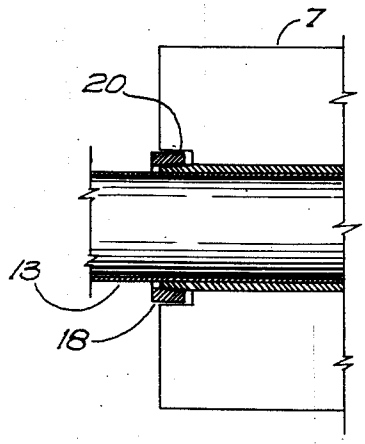


Fig. 9

Inventor

Reuben N. Trane

Patented Oct. 10, 1933 1,929,540

UNITED STATES PATENT OFFICE

1,929,540

HEAT EXCHANGER

Reuben N. Trane, La Crosse, Wis.

Application November 27, 1931
Serial No. 577,572

1 Claim. (Cl. 257—262)

My invention relates to heat exchangers and more particularly to that type of a heat exchanger wherein fins are mounted longitudinally upon a heat tube. Heat exchangers with fins running longitudinally along the heat tubes may be used to advantage in all cases where the flow of the air or liquid to be heated or cooled is in the same direction as the axis of the tube.

One of the chief objects of my invention is to provide an improved method of making a heat exchanger comprising tubes and fins mounted longitudinally on the tubes. Heretofore longitudinal fins have been attached to the tubes by means of solder or welding, and one of the objects of my invention is to attach the longitudinal fins to the tubes without the use of welding or solder.

The foregoing and many other objects, features and advantages of my invention are set forth in the following specification where I describe what I consider the preferred, a swell as several modified, embodiments of my invention. These are illustrated in the accompanying drawings where Figure 1 is a vertical side elevation of the assembled heat exchanger.

Figure 2 is an end elevation of the assembled heat exchanger.

Figure 3 is an end elevation of the heat exchanger with ring removed.

Figure 4 is the metal blank before stamping and bending to form the fin.

Figure 5 is a top view of the fin after the same has been cut and bent.

Figure 6 is an end elevation of the fine shown in Figure 5.

Figure 7 is a perspective view of one form of a stamped or forged ring used in conjunction with the fins in the foregoing view.

Figure 8 is a side elevation of the tube and of a fin placed thereon before being permanently mounted.

Figure 9 shows a modified form of the slot and ring taken on the line 5—5 of Figure 2.

Referring to Figure 4, a blank sheet of metal is cut along the dotted lines 10 to form the flange 14. The metal is then bent along the dot and dash lines 11 to form a channel section wherein it is designed that the two flanges 7 and 8 will act as heat conducting fins while the bed of the channel section 17 will present the point of contact between the fins 7 and 8 and the tube 13. The bed of the channel section 17 is arcuate to conform with the periphery of the heat exchange tube 13 so as to effectuate a better heat exchange, and the channel section bed 17 being arcuate presents a greater resistance to the crumpling of the fin when pressure is applied to force the fin into close heat conducting contact with the tube.

Another function of the flange 14 is to act as a spacer between the fins circumferentially of the tube so that the units of fins are properly and equally spaced. The edge 15 of the flange 14 will abut a similar edge 15 of the flange on an adjacent unit of fins. The position of these flanges when positioned on the tube 13 is clearly shown in Figure 3.

The bottom portion of the slot 16 is the flange 14 which is a continuation of the bed portion 17 of the channel section and is also arcuate conforming to the circumference of the tube 13. Thus, pressure upon the bottom portion of the slot will cause the channel section bed 17 to hug more closely the heat exchange tube.

In permanently mounting the longitudinal fins upon the heat exchange tube 13 the channel sections are placed upon the tube with the bed portion 17 and the flange 14 resting upon the tube. The flanges 14 space the channel sections circumferentially of the heat tube. A ring 18 with a bevelled portion 19, as shown in Figure 7, is slipped upon the tube and into the slot 16 and the progressive movement of the ring 18 pinches the flange 14 into permanent heat conducting relationship with the heat exchange tube 13. The flange 14 being arcuate in form and a continuation of the bed portion 17, it is evident that the bed portion 17 is held in close contact with the heat tube.

Considerable strength is added to the structure due to the fact that the fins form a channel section with a curved bed portion which resists crumpling.

A modified form of my invention is shown in Figure 9, which shows the slot 20 in the fin slightly bevelled so that when the channelled fin section is placed upon the tube as described before and the ring 18 forced into the slot, the fin will be firmly held in heat conducting contact with the heat exchange tube. It will be noticed that in this construction the ring 18 will bear upon a portion of the flanges 7 and 8, which must be stiff and strong enough to withstand the pressure of the ring 18 without crumpling. The strength of the flanges 7 and 8 is materially increased by the channel construction and the arcuate formation of the bed 17 of the channel.

A heat exchange unit as above described is a sturdy, efficient unit with very excellent heat

transfer qualities and is simple and economical to manufacture.

While I have described the foregoing preferred embodiments of my invention, I contemplate that many changes may be made without departing from the scope or spirit of my invention.

I claim:

A heat interchanger comprising a heat exchange tube, stiff metallic channel shaped sections, the flanges of which act as heat transfer fins and form longitudinal air passages, and the arcuate bed of which section is mounted on said tube by a ring permanently holding a flange integral with said bed in heat conducting contact with said tube, said integral flange being wider than said bed and acting to space the channel sections on said tube.

REUBEN N. TRANE.