June 10, 1941. W. R. CLARKE 2,245,069

HEAT TRANSFER UNIT

Filed Nov. 20, 1940

Fig. 1

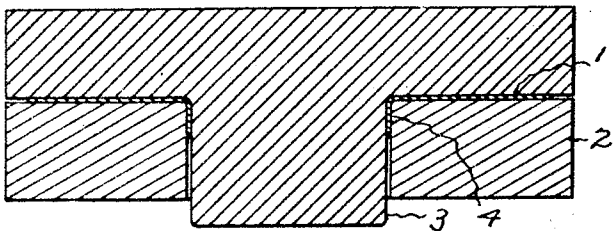


Fig. 2

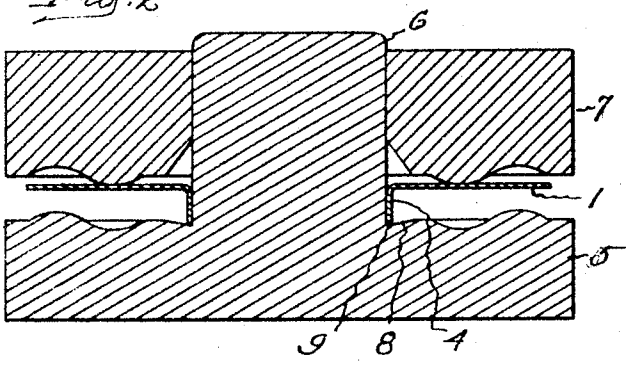


Fig. 3

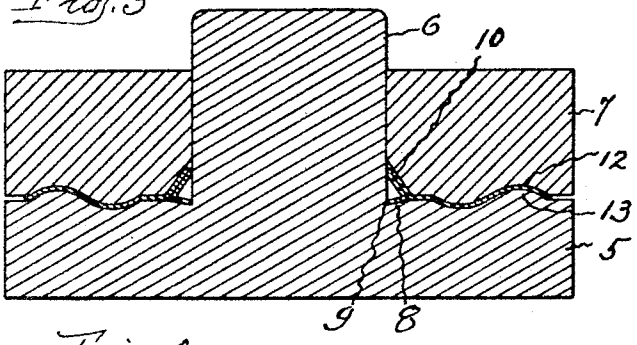


Fig. 4

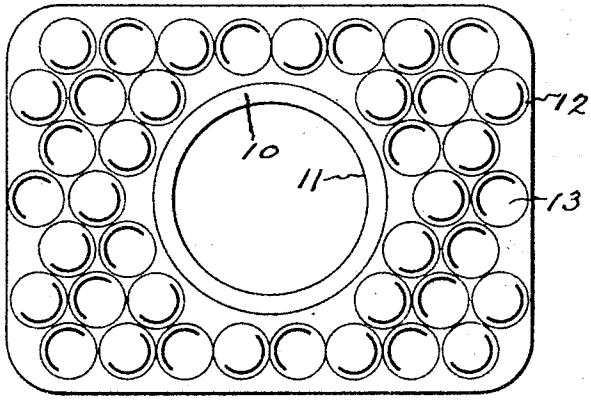


Fig. 5

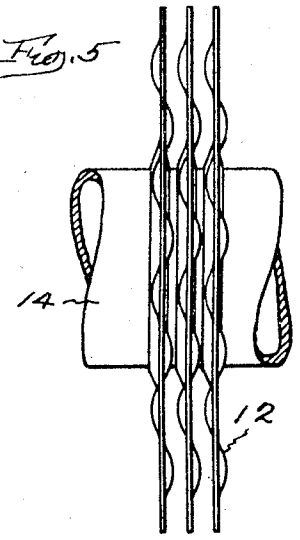
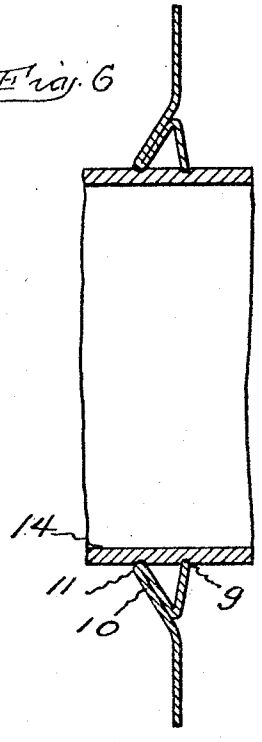


Fig. 6



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2,245,069

HEAT TRANSFER UNIT

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Application November 20, 1940, Serial No. 366,377

4 Claims. (Cl. 257—262)

This invention relates to the production of heat transfer units for use in refrigerating, heating, and air conditioning systems, which units comprise a central tubular metallic core with a plurality of thin sheet metal fins spaced thereon and secured thereto to provide extended radiating surfaces.

Fins for units of this type must make and permanently retain close and secure contact with the surfaces of the tubes in order to ensure strength and efficient heat conducting capacity to resist accidental strain and expansion and contraction of the elements under varying changes of temperature to which they are subjected in use. Many fins are commonly made of metal, usually sheet copper, about fifteen one thousandths of an inch thick, and the inner edges of such thin fins by themselves will make but small and frail engagement with the surfaces of the tubes.

The object of this invention is the construction of a unit having thin fins which are simple to form and which can be easily slipped upon and secured to tubes with an efficient and permanent heat conducting engagement. In practicing the invention a flat sheet of good heat conducting metal is cut to shape and size and centrally perforated. The edge of the perforation is flanged to a diameter approximately the exterior diameter of the tube upon which the fin is to be secured. This blank is then compressed in such manner as to fold the flange upon itself and produce a ring having two spaced edges which will fit the tube. After the required number of fins thus formed are located on the tube, the tube in a well known manner is expanded from the interior so as to tighten the grip of the edges of the flange rings upon the tube.

In the accompanying drawing

Fig. 1 shows a perforated and flanged blank between a punch and die.

Fig. 2 shows the flanged blank between a pair of opened dies preparatory to having the flange folded.

Fig. 3 shows the same with the dies closed and the flange folded to form the gripping rings.

Fig. 4 shows a face view of a completed fin.

Fig. 5 shows several of the fins on a tube.

Fig. 6 on enlarged scale shows in section portions of a tube and a fin, illustrating the manner in which the inner rings of the fin grip the surface of the tube.

In the method illustrated a blank 1 preferably thin copper, which has been cut and perforated, is fed over a die 2 and by a punch 3 the edge of the perforation drawn to form the flange 4. The flanged blank is then placed over the die 5, being positioned by the hub 6, and is compressed by the die 7. The working face of the die 5 close to the hub is preferably slightly beveled as at 8 to retain the edge 9 of the flange from slipping and the working face of the die 7 is adjacent to the hub recessed to permit the flange to fold upon itself and form a closed loop 10. The edge 11 of the loop and the edge 9 of the flange form two spaced rings having inner diameters which will fit the exterior diameter of the tube on which the fins are to be located.

After the required number of these fins have been properly spaced on the tube 14, the tube is expanded from the interior in the well known manner and the edges 9 and 11 of the folded fins caused to grip and lock themselves onto the surface of the tube.

The inner edges of fins formed as described have a double engagement with the tube which not only ensures efficient heat conductivity and reduction of liability of the fins from slipping from proper location, but the strut formation strengthens the inner edges of the fins and allows of a certain amount of yielding under expansion and contraction without breaking the joint between the fin edges and tube surface.

These fins may be separately shaped or fed to a series of punches and dies arranged in succession, and the units may be assembled singly or in a battery according to the style of radiator to which they are to be applied.

The radiating surfaces of the fins may be plain, or may be provided with protuberances 12 and corresponding cavities 13 which can be formed by giving the working faces of the dies 5 and 7 the required shapes as shown in Fig. 3.

The invention claimed is:

1. A heat transfer unit comprising a metallic tubular core and metallic radiating fins spaced apart on said core, said fins having perforations through which the core passes and having about the perforations two-ply walls that extend from the planes of the fins obliquely in one direction and single ply walls that extend from the planes of the fins obliquely in another direction, said walls being continuous and having thin edges which are angularly spaced from each other and embedded in the surface of said core.

2. The unit described in claim 1 in which the radiating fins have a plurality of lateral protuberances and conforming cavities for stiffening the fins and increasing their radiating surfaces.

3. A heat transfer unit comprising a metallic

tubular core and metallic radiating fins spaced apart on said core, said fins having perforations through which the core passes and having about the perforations walls that are bent so as to extend obliquely outward from the planes of the fins in one direction, then obliquely inward toward the planes of the fins and then obliquely outward from the planes of the fins in another direction, said walls having thin edges which are angularly spaced from each other and embedded in the surface of said core.

4. A thin metallic fin for a heat transfer unit which has a perforation for receiving a tubular core and has about the perforation a wall composed of two plies of metal that extend from the plane of the fin obliquely in one direction, and a wall composed of a single ply of metal that extends from the plane of the fin obliquely in another direction, said walls having thin annular edges which are angularly spaced from each other that are adapted to be embedded in the surface of a core.

WALTER R. CLARKE.