Nov. 11, 1947. G. N. ESKRA 2,430,631

HEAT TRANSFER FIN

Filed Sept. 11, 1944

Fig. 1.

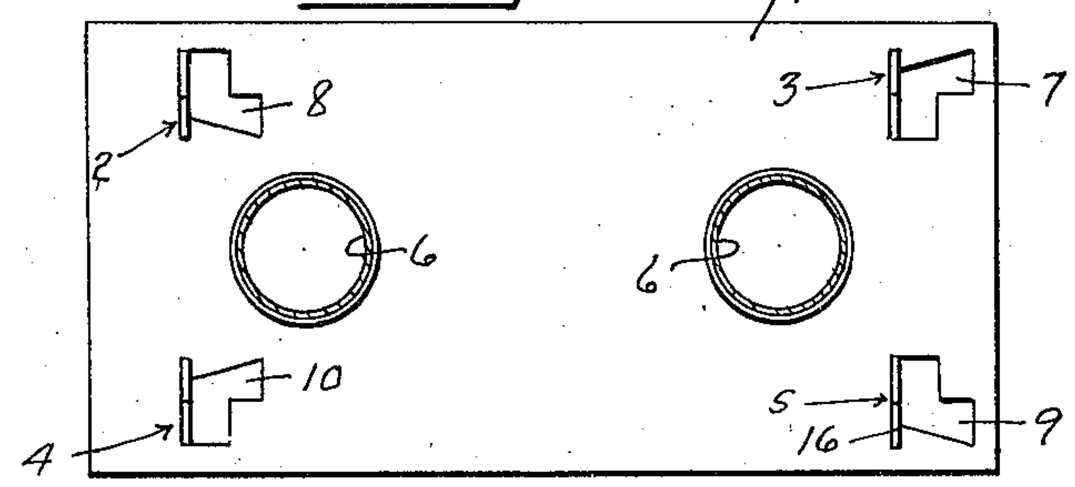


Fig. 2.

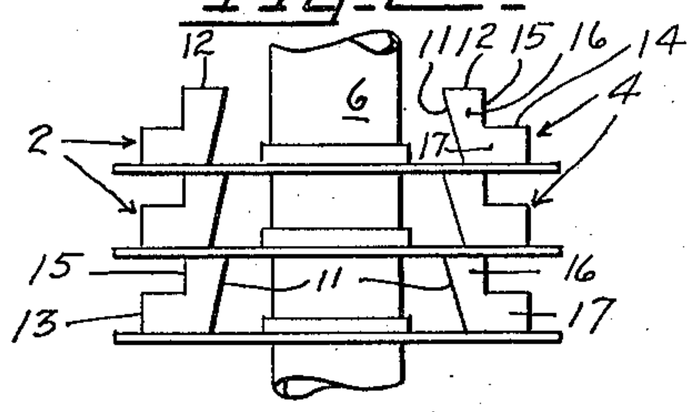


Fig. 3.

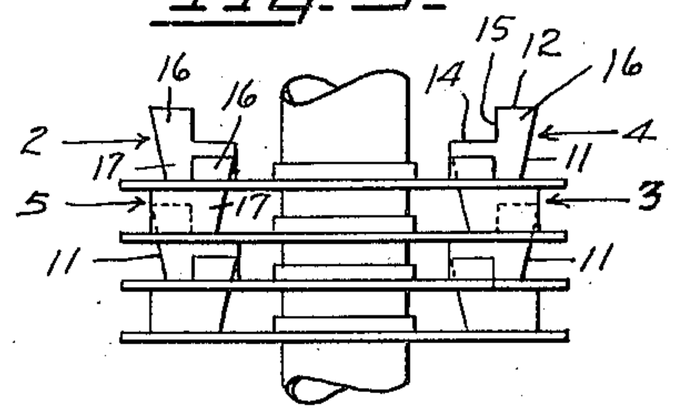


Fig. 4.

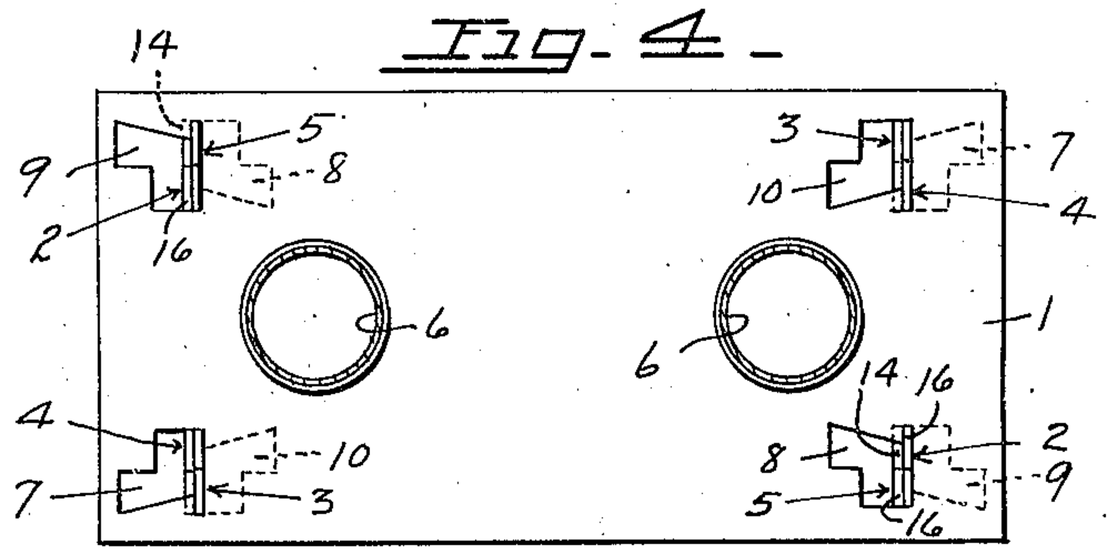


Fig. 5.

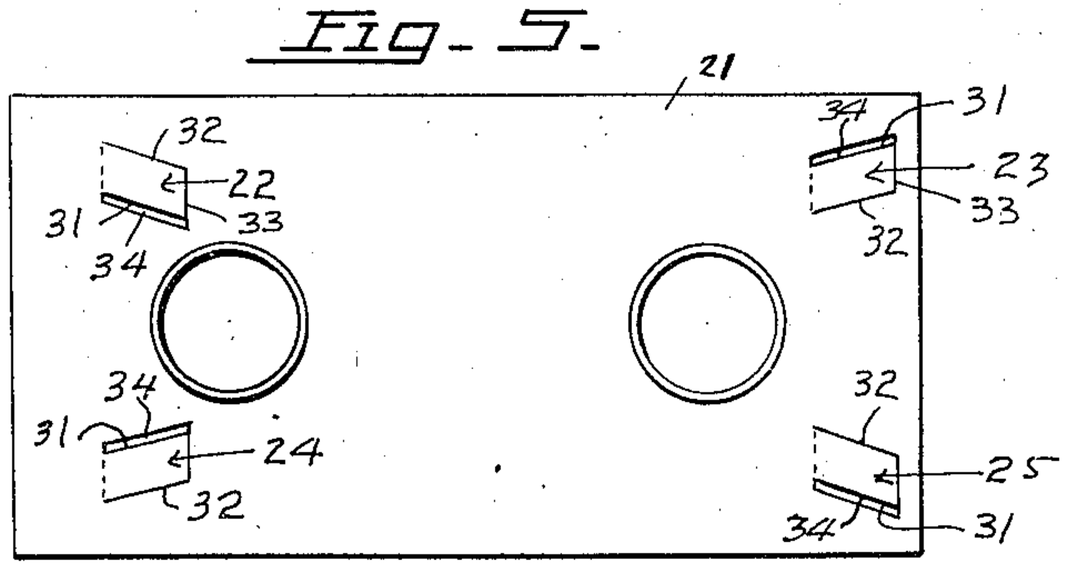


Fig. 6.

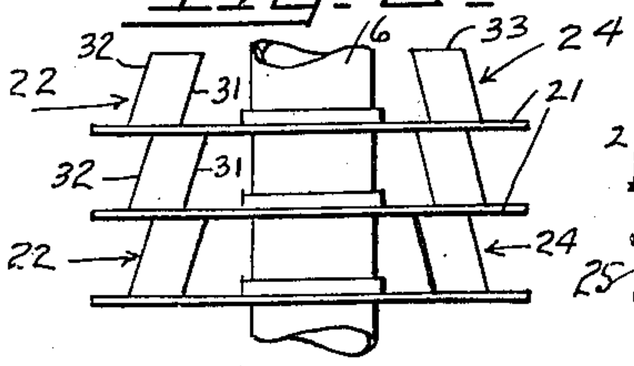
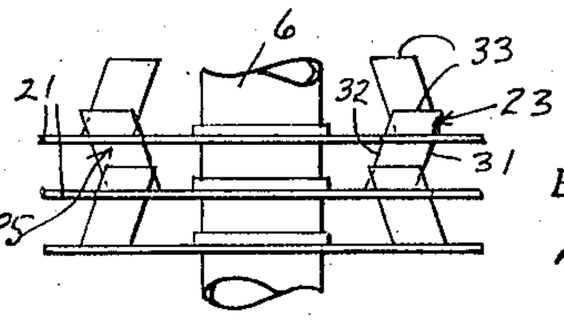


Fig. 7.



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HEAT TRANSFER FIN

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2 Claims. (Cl. 257—262)

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This invention relates to a heat transfer plate or fin for use on tubes or pipes.

Heat transfer fins used on pipes or tubes, as in refrigeration or heating systems or radiators are generally in the form of flat plates and are provided with openings for such pipes. The plates are in spaced relation on the tubes. Usually two or more pipes extend through each of the plates holding the latter aligned in a row thereon, although some plates are apertured for merely a single pipe. Insofar as this invention is concerned it is applicable to plates having one or more apertures for tubing or the like.

One of the objects of this invention is the provision of improved plate structure in which spacing lugs stamped from each plate will function to space the plates of adjacent pairs thereof in a row from each other either a greater or a lesser distance apart according to the end to end relation of alternate plates in the row.

Another object of the invention is the provision of identical plates and spacers stamped therefrom in which the spacers may be formed by a simple die and which spacers on one plate of each adjacent pair thereof are adapted to cooperate with the openings from which the spacers of the other plate are struck to provide one spacing between plates while the same spacers on one plate of each adjacent pair are adapted to cooperate with the body of the other plate exclusive of the said openings in said other plate to provide a different spacing between adjacent plates in a row.

Other objects and advantages will appear in the description and drawings.

In the drawings,

Fig. 1 is a plan view of one end of a row of plates on a pair of pipes, the latter being in section.

Fig. 2 is a fragmentary end elevational view of several plates in the row of plates of Fig. 1.

Fig. 3 is a fragmentary end elevational view of several plates in a row on pipes in which alternate plates as seen in Fig. 2 are reversed end for end to provide a closer spacing than that of Fig. 1.

Fig. 4 is a plan view of one end of a row of plates arranged as seen in Fig. 3, the pipes being in section.

Fig. 5 is a plan view of a single plate showing a modified structure for spacing-lugs, the latter being shown before bending to about a right angle relative to the body of the plate.

Fig. 6 is an end view of plates in a row, which plates are completely formed from the blank of Fig. 5.

Fig. 7 is an end view of plates, similar to those shown in Figs. 5, 6, but with alternate plates reversed end for end from the position shown in Fig. 5.

Before entering a detailed description of the plates whether of the form shown in Fig. 1 or in Fig. 5, it is pertinent to note that the spacers at

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diagonally opposite corners of the rectangular plates are identical in shape and position, while the spacers in longitudinal alignment with each other longitudinally of each plate, or those along each pair of adjacent edges of the plate, are the same in contour but are differently arranged.

In detail, referring to Fig. 1, each plate 1 is formed with a pair of spacing lugs generally designated 2, 4, adjacent one edge thereof and with a pair of spacing lugs generally designated 3, 5, adjacent the opposite edge. Apertures are provided for pipe or pipes 6. All plates in a row are of the same shape and size and are identical with each other so that their edges are in alignment when aligned on the pipe. Where two or more pipes are used, which is the most common arrangement, the plates will not tend to rotate on the pipes or relative to each other, hence the spacers or spacing lugs need merely function to provide the proper spacing between plates.

The lugs are stamped from each plate in the usual way and project from one side thereof whereby an opening is provided adjacent each lug corresponding in outline to the outline of the lug stamped therefrom. It is understood that each lug is integral with the plate along one edge of each such opening. Openings 8, 10 are therefore respectively adjacent lugs 2, 4, while openings 7, 9 are respectively adjacent lugs 3, 5.

The lugs 2 to 5 inclusive, are identical in shape and size. Lugs 2, 4 along one end edge of the plate are coplanar and lugs 3, 5 are coplanar, but the lugs 2, 4 have their flat sides in opposed relation to the sides of lugs 3, 5.

For purpose of description, the base of each spacing lug is the edge that is joined with the plate. From one end of said base one edge 11 of each lug extends slantingly upwardly and outwardly (Figs. 2, 3) relative to said base and the outermost edge 12 of each lug is parallel with the base. The edge 13 of each lug opposite the edge 11 is at right angles to the base and a right angle shoulder is cut out of the lug between the adjacent ends of edges 12, 13 providing an edge 14 that is parallel with the base and one end of which joins an end of edge 13, and also providing an edge 15 parallel with edge 13 that joins one end of edge 12. An ear 16 bounded by edges 11, 12, 15 is thus on each lug outwardly of the base portion 17 of each lug.

Due to the inclination of edges 11 of lugs 2, 4 which are on the opposed adjacent edges of said lugs, the latter are generally inclined edgewise toward each other, while on the other hand the inclined edges of lugs 3, 5 are on the opposite outer edges of said lugs; therefore said lugs generally incline edgewise outwardly from each other, or oppositely relative to lugs 2, 4. Thus when plates 1 are aligned on pipes 6 so that the corresponding lugs are also in alignment, it will

be seen that the outermost end edges of the lugs on each plate will engage the body of the plate adjacent thereto and the plates will be spaced apart the full lengths of the respective lugs (Fig. 2).

If, however, one of the plates of each adjacent pair is reversed end for end, or if alternate plates in the row are so reversed, then the lugs on said plates so reversed will be edgewise inclined oppositely to the plates adjacent thereto and the ears 16 will pass through the openings in the adjacent plates that are adjacent thereto until shoulders 14 engage the body of the adjacent plate (Figs. 3, 4). In this instance the spacing between plates will be much less than before such reversal.

Generally most requirements in any particular art, such as in the refrigeration art, are met by one of two standard spacings of the heat transfer fins, and with my construction as above described, a single standard plate structure will meet either one or the other of such requirements without necessitating two different types of plates.

In Figs. 5 to 7 is shown a modified form of the invention in which plate 21 is formed with apertures for pipe 6 the same as in the case of plate 1, but the lugs 22, 24 and lugs 23, 25 that positionally correspond to lugs 2, 4 and 3, 5, are formed with parallel side edges 31, 32 that are inclined relative to the base edge of each lug (Figs. 6, 7). These lugs do not have shoulders as in the previously described structure, but each terminates in an outermost edge 33 that is parallel with the base edge of each lug.

The lugs 22, 24 are edgewise inclined toward each other, while lugs 23, 25 are inclined edgewise away from each other. The edge 31 of each lug is the edge that forms an acute angle with plate 21, or are the adjacent edges of lugs 22, 24 and the opposite outermost edges of lugs 23, 25.

When the plates are aligned on pipe with the correspondingly formed lugs in alignment, the outermost edges 33 of each lug on each plate will engage the body of the plate adjacent thereto (Fig. 6), but upon end to end reversal of one of each adjacent pair of plates, or the end to end reversal of alternate plates in a row will bring the outermost end portions of the lugs in a position over the openings from which the lugs that are adjacent thereto on the adjacent plate. To permit partial projection of such lugs through said openings, the openings are made slightly wider than the lugs with the added width being along edges 31 of said lugs as best seen in Fig. 5, as at 34. This added width allows the lugs to pass through the openings upon said reversal as seen in Fig. 7, thus permitting a lesser spacing of plates than in the arrangement of Fig. 6.

The structure of Figs. 1 to 4 is preferable, and in all the figures the thickness of the plates as shown is greatly exaggerated for clarity inasmuch as said plates are usually of relatively light gauge metal.

It is to be understood that the drawings and description are merely illustrative of the invention and are not to be considered restrictive thereof, inasmuch as it is obvious that any number of spacing lugs may be provided, and certain variations in shape are possible.

I claim:

1. A radiation element including a plurality of tubes and rectangular elongated parallel plates of corresponding size and shape extending around at least two tubes, each plate having flat punched out spacing lugs adjacent each corner projecting from the same side of each plate and in engagement with the plate adjacent thereto and with the flat sides of each lug in planes substantially normal to the plane of the plate, the outermost end edges of said lugs of each plate being straight and in a plane parallel to that of the plate, the said outermost edges of the pair of lugs at one end of each plate being offset in direction longitudinally thereof relative to the base ends in direction toward a medial line extending longitudinally of the plate and the outermost edges of the pair of lugs at the opposite end of each plate being offset in direction longitudinally thereof relative to the base ends in direction away from said medial line, the lugs on one plate of each such pair being formed and positioned to project partially through the openings from which the corresponding lugs on the adjacent plate were punched in one position of the said adjacent pair of plates relative to each other and the said outermost edges of the lugs of one plate of each adjacent pair being formed and positioned to engage the solid portion of the other plate of each such pair upon turning one of the plates of said adjacent pair 180° in its plane relative to the said one position.

2. A radiation element including a plurality of tubes and rectangular elongated parallel plates of corresponding size and shape extending around at least two tubes, each plate having flat punched out spacing lugs adjacent each corner projecting from the same side of each plate and in engagement with the plate adjacent thereto and with the flat sides of each lug in planes substantially normal to the plane of the plate, the outermost end edges of said lugs of each plate being straight and in a plane parallel to that of the plate, the said outermost edges of the pair of lugs at one end of each plate being offset in direction longitudinally thereof relative to the base ends in direction toward a medial line extending longitudinally of the plate and the outermost edges of the pair of lugs at the opposite end of each plate being offset in direction longitudinally thereof relative to the base ends in direction away from said medial line the lugs on one plate of each such pair will project partially through the openings from which the corresponding lugs on the adjacent plate were punched in one position of the said adjacent pair of plates relative to each other and the said outermost edges of the lugs of one plate of each adjacent pair being formed and positioned to engage the solid portion of the other plate of each such pair upon turning one of the plates of said adjacent pair 180° in its plane relative to the said one position, and a shoulder formed on each lug at a point intermediate its inner end and said outermost free edge providing a positive stop for engaging the flat side of one of the plates of each adjacent pair when said plates are urged with the said lugs on one of each adjacent pair extending partially through the said openings.

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