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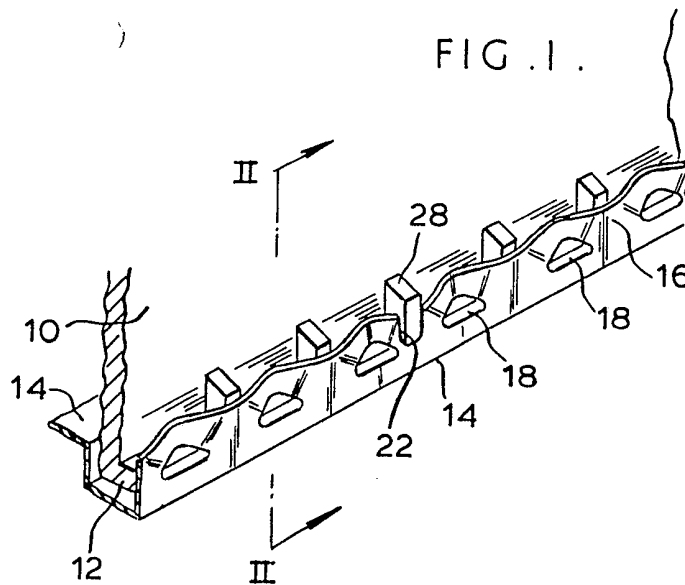
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GB A 2037204 GB 1471734  
GB A 2034018

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B3J

(54) An assembly of two parts

(57) Two parts 10 and 14 eg. a tube plate and a header tank, are joined by a crimped joint. The part 10 has a flange 12, and the part 14 has an edge 16 with slots 18 in it. The deformable material of the edge 16 above the slots 18 is crimped inwards over the flange. To prevent the part 14 bowing when the edge 16 is formed, a slit 22 is made in each of the long edges.



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FIG. 1.

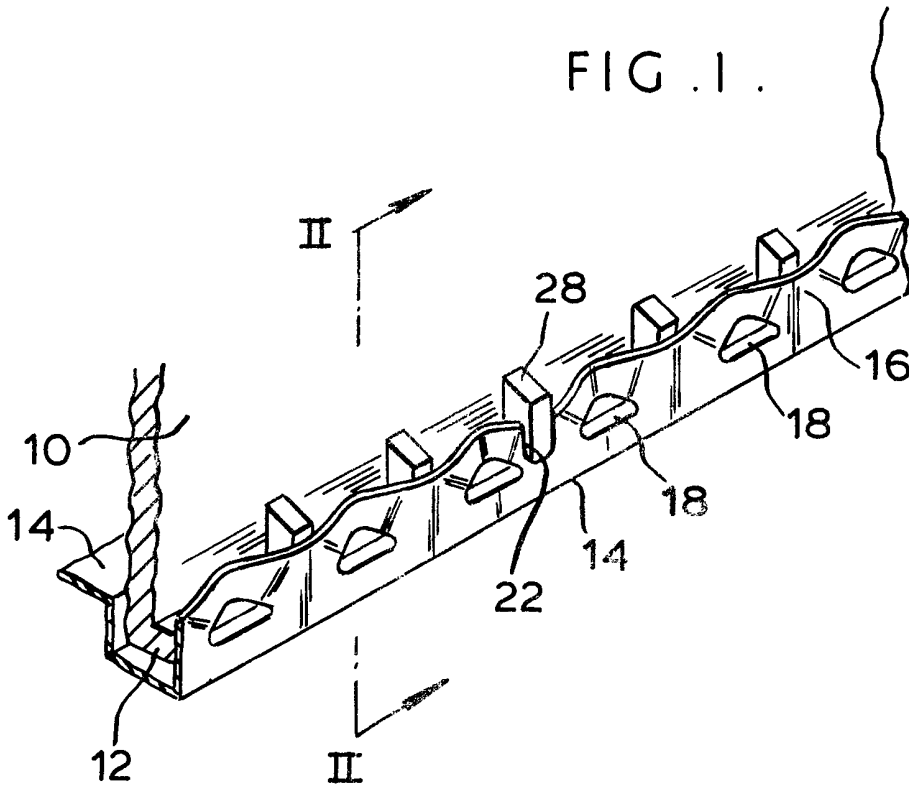


FIG. 2.

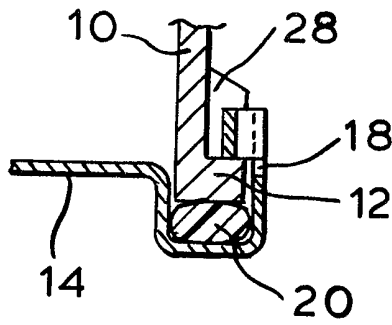
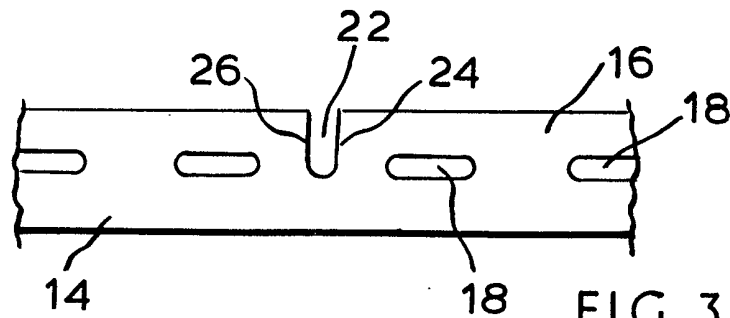


FIG. 3.



## SPECIFICATION

**An assembly of two parts**

5 This invention relates to an assembly of two parts with a joint between the parts. The assembly may, for example, be an assembly of a tube plate and a header tank of an automotive cooling radiator. The invention is not however restricted to this application, but one aspect of the invention does provide a tube plate for a heat exchanger.

An assembly of this type is described in the specification of U.K. Patent No. 2 037 204 B to which reference should be made. From the drawings of that specification, in particular Figures 1 and 6, it can be seen that the outer edge 16 of the tube plate 2 is of a substantial depth. In production of this component, it is found that, on account of its shape, it takes up a slightly concave shape, with the concavity facing its partner plate at the other end of the radiator. These tube plates are then fitted at opposite ends of a heat exchanger core, and finally header tanks are fitted to the tube plates. The fitting of the header tanks straightens the tube plates, and therefore stresses the core, putting the outer core tubes in tension and the inner tubes in compression. These stresses can make the radiator susceptible to leaks.

According to the present invention, there is provided an assembly comprising a first part having a flange and a second part having a deformable edge zone wherein the edge zone before deformation has a continuous straight outer edge and after deformation has a continuous undulating outer edge with alternating deformed and undeformed zones, the deformed zones providing a joint between the parts and the undeformed zones providing stiffening; the edge zone has first slots spaced from the outer edge and extending in their longitudinal direction parallel to the outer edge and at least one second slot extending through the outer edge and having its longitudinal direction substantially normal to the outer edge, and the edge zone is deformed in a direction, transverse to the plane of the edge zone to produce the joint.

45 The presence of the second slot relieves the stresses in the outer edge of the deformable edge zone, so that the second part lies flat.

The first part may be a header tank for an automotive radiator, and the second part may be a tube plate. If the header tank is of plastics and has webs bracing the flange against the tank wall, the width and positioning of the or each second slot may be such that the sides of the slot lie either side of a web, so that there are no projecting corners of the deformable edge zone.

The invention also provides a tube plate for a heat exchanger, the plate having a planar region in which tubes may be secured and an upstanding edge zone around the planar region, the edge zone having first slots spaced from its outer edges and extending in their longitudinal direction parallel to the outer edges and second slots extending through the outer edge and having their longitudinal direction substantially normal to the outer edge, and the regions of the edge zone between the first slots and the outer

edges being adapted to be deformed in a direction transverse to the plane of the edge zone to allow the plate to be joined to a header tank.

The invention will now be further described, by way of example, with reference to the accompanying drawings, in which:

*Figure 1* is a perspective view of part of an assembly in accordance with the invention;

*Figure 2* is a section along the line II-II from *Figure 1*; and

*Figure 3* shows the edge of the tube plate before crimping.

Figures 1 and 2 show a header tank 10 which may be made of plastics and which has a peripheral flange 12. A tube plate 14 has a deformable upstanding edge zone 16. The edge zone is provided with horizontal slots 18, and the joint is assembled by crimping the regions of the edge zone 16 above the slots 18 inwardly so that they lie above the flange 12. A seal 20 is compressed between the flange 12 and the plate 14. This process is carried out in the manner described in Patent Specification 2 037 204 B.

In order to avoid bowing of the tube plate 4, a slot 22 is made in the top of the edge zone 16. This relieves the stresses in this area and helps to ensure that the tube plate stays flat. The slot 22 is positioned so that, when the joint is crimped, the sides 24 and 26 of the slot fit neatly either side of a web 28 which supports the flange 12 on the tank 10. This avoids protruding corners of the edge zone 16. The slot 22 should not be any wider than necessary, to avoid unnecessary weakening of the edge zone. The bottom of the slot 22 is rounded to avoid stress build up.

The depth of the slot should not be any greater than the distance from the top of the edge zone to the bottom of the slots 18, also to avoid weakening the edge zone 16. The width may be about 2mm, and is preferably not less than this value.

A single slot in each long side of the tube plate may be sufficient to ensure that the plate stays flat. Alternatively there may be a number of slots along each side.

## CLAIMS

1. An assembly comprising a first part having a flange and a second part having a deformable edge zone wherein the edge zone before deformation has a continuous straight outer edge and after deformation has a continuous undulating outer edge with alternating deformed and undeformed zones, the deformed zones providing a joint between the parts and the undeformed zones providing stiffening; the edge zone has first slots spaced from the outer edge and extending in their longitudinal direction parallel to the outer edge and at least one second slot extending through the outer edge and having its longitudinal direction substantially normal to the outer edge, and the edge zone is deformed in a direction, transverse to the plane of the edge zone to produce the joint.

2. An assembly as claimed in Claim 1, wherein the or each second slot has a rounded bottom.

3. An assembly as claimed in Claim 1 or Claim 2, wherein the or each second slot extends only as far as the first slots.
4. An assembly as claimed in any preceding claim, wherein the first part is a header tank of an automotive radiator and the second part is a tube plate.
5. An assembly as claimed in Claim 4, wherein the or each second slot is the same width as, and registers with, a web on the header tank which braces the flange against a tank wall.
6. A tube plate for a heat exchanger, the plate having a planar region in which tubes may be secured and an upstanding edge zone around the planar region, the edge zone having first slots spaced from its outer edges and extending in their longitudinal direction parallel to the outer edges and second slots extending through the outer edge and having their longitudinal direction substantially normal to the outer edge, and the regions of the edge zone between the first slots and the outer edges being adapted to be deformed in a direction transverse to the plane of the edge zone to allow the plate to be joined to a header tank.
7. An assembly of two parts, substantially as herein described with reference to and as illustrated in the accompanying drawing.
8. A tube plate substantially as herein described with reference to and as illustrated in the accompanying drawing.