(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 277 830**
A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **88300933.4**

(51) Int. Cl.4: **B 21 D 53/08**

(22) Date of filing: **04.02.88**

(30) Priority: **04.02.87 GB 8702429**

(43) Date of publication of application:
10.08.88 Bulletin 88/32

(84) Designated Contracting States: **DE GB**

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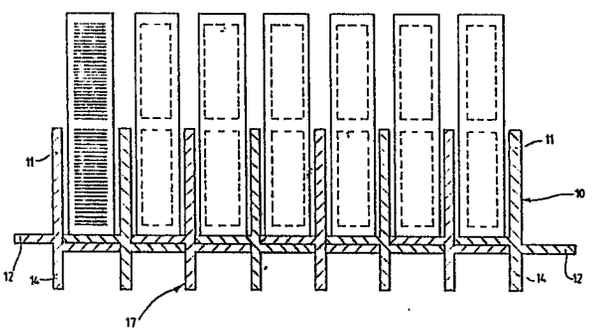
(54) Storage tray and method of manufacturing same.

(57) The radiator (5) of an automobile comprises typically an upper hot water inlet tank (2) and a lower cold water outlet tank (3), connected together by a plurality of vertical cooler tubes (1) so that water can flow from the upper to the lower tank and dissipate any excess heat through the cooler tubes. The efficiency with which the excess heat is dissipated can be increased by locating a series of approximately equally spaced radiating fins (4) between each pair of cooler tubes (1). In the invention, a tray, to store groups of fins, comprises at least two sections, each of which consists of at least a base element (12) and an upstanding element (11), capable of being fitted together so that one or more fins can be stored between any two successive upstanding elements (11). Each fin storage tray section (10) is preferably substantially identical to each successive section, so that only one such section is needed to assemble a whole range of fin storage trays. Consequently, the cost of providing one tray for each type of automobile radiator is overcome, since, in the present invention, only one such section is needed to provide a range of trays.

Fig.8.



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Description

Storage tray and method of manufacturing same

This invention relates to a storage tray and a method of manufacturing same, but more particularly, to a tray for storing a plurality of plates or fins.

The radiator of an automobile comprises typically an upper hot water inlet tank and a lower cold water outlet tank, connected together by a plurality of vertical cooler tubes so that water can flow from the upper to the lower tank and dissipate any excess heat through the cooler tubes. The efficiency with which the excess heat is dissipated can be increased by locating a series approximately equally spaced radiating fins between each pair of cooler tubes. Traditionally, the end of each fin is welded to one of the cooler tubes so as to maximise the heat flow from the hot water to the surrounding air space.

Although it would be possible to locate and fix each radiating fin individually, i.e. locate one fin in position, weld it to a pair of cooler tubes and then similarly locate a second fin and so on, such a method is unduly complicated, time consuming and, consequently, extremely costly.

A more efficient method is to locate all the fins, formed as a group, in position simultaneously. This can be achieved by means of a storage tray. Such a storage tray comprises a moulded plastics base provided with a plurality of upstanding parallel walls so that one group of fins may be temporarily stored between adjacent walls. In this manner a storage tray, filled with radiating fins, is located adjacent to a collection of cooler tubes with one edge of each group of fins in contact with one cooler tube so each respective group of fins can be welded efficiently to the respective tube.

According to the present invention a metallic or non-metallic storage tray comprises at least two sections, each of which consists of at least a base element and an upstanding element, capable of being fitted together so that a fin or a group of fins can be placed between any two successive upstanding elements.

Each section is preferably formed so that successive sections may be readily assembled, and that the separation of the upstanding elements may be set easily.

Each section may be relatively rigid and dimensionally stable, and may comprise at least one generally L-shaped extrusion having a solid base and an upstanding retaining wall.

In a preferred embodiment, each section which is to be assembled to form a storage tray is substantially identical. This has the advantage that only one section is needed to assemble a range of trays.

According to a second aspect of the invention apparatus for manufacturing automobile radiators incorporates a metallic or non-metallic fin storing tray.

A method of manufacturing automobile radiators comprises arranging radiating fins in a metallic or non-metallic storing tray as defined above, fitting one end of each fin to a cooler tube of the radiator and attaching upper and lower water tanks to the end of respective cooler tubes.

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

Figure 1 is a front elevation of a traditional car radiator;

Figure 2 is an enlarged sectional end elevation of a single tray section;

Figure 3 is an end elevation of a second embodiment of a single section;

Figure 4 is a sectional end elevation through an assembled storage tray;

Figure 5 is a somewhat diagrammatic view of a stack of storage trays;

Figure 6 is a plan view of a storage tray partly filled with a group of fins;

Figure 7 is a side elevation of the tray of Figure 6; and

Figure 8 is a somewhat diagrammatic cross-sectional end elevation of a fin storage tray.

In Figure 1, five vertical cooler tubes 1 are shown sealed, at their upper inlet ends, to a warm water inlet tank 2 and, at their lower outlet ends, to a cold water outlet tank 3.

A plurality of very thin radiating fins 4 are shown in the drawings in a substantially horizontal plane, each fin being attached at one end to a cooler tube 1 and at its other end to an adjacent cooler tube.

Although the fins of Figure 1 are shown as being planar, they do, in certain circumstances, have an undulating profile.

In a more modern version of the traditional car radiator 5 of Figure 1, the fins located between each pair of cooler tubes are formed, from a single strip, into a zig-zag arrangement wherein each fin has a predominantly horizontal component. More particularly, and in accordance with the present invention, the "folds" of the zig-zag arrangement are not characterised in a sudden change of direction but are smoothly curved (in a manner somewhat similar to a mathematical sine curve).

One modern version of a car radiator is assembled by locating groups of fins in channels of a multi-channel tray having the desired number of groups (in this case, four); a vertical cooler tube is located between each pair of fin groups; the assembly is clamped together and the tray removed; whereupon the clamped assembly is treated in such a manner as to fix the fins to the cooler tubes. Finally, the warm and cold water tanks are fixed to the rigid pipe/fin assembly.

Hitherto, a fin storage tray has been manufactured as a single plastics extrusion or in the form of a single metal casting. The disadvantage with such prior art trays is that, once formed, it is not possible to change the spacing between each group of fins. In addition, each plastics tray or metal tray requires an extremely expensive extrusion head or casting respectively for each type of car (or vehicle) radiator. More specifically, there will need to be a minimum of one tray for each type of engine (presuming, of

course, that each engine requires a different car radiator).

Referring now to Figure 2, an extruded single section 10 of a fin storage tray comprises an upright wall 11, a horizontal base portion 12 and a short location wall 13.

As will be appreciated from the drawing, a short base portion 14 projects vertically from the underside of the upright wall 11.

The single fin storage tray section 10 is conveniently manufactured by extrusion of plastics, aluminium or aluminium alloy from an extrusion head. Such a tray section 10 is advantageous in that only one extrusion head is needed and a complete tray can be assembled easily. In contrast with prior art trays, only one type of tray section 10 is needed for each type of car radiator. In other words, whereas the prior art requires several different trays to be used in the assembly of a range of vehicle radiators, the present invention requires only one extrusion head for a range of different trays to be manufactured. Further features of the tray section of Figure 2 will become apparent in the following description.

Referring now to Figure 3, an extruded elongate section 20 of a fin storage tray comprises a tall upright wall 21, a horizontal base portion 25, a short location wall 23 and a plurality of short upright walls 22 spaced, approximately equally, along the base portion 24. As will be appreciated from Figure 3, a short base portion 24 projects vertically from the underside of each upright wall 21 and 22 so that the base of the assembled storage tray rests slightly above the ground.

The advantage of an elongate fin storage tray section 20 over and above an ordinary fin storage tray section 10 will become apparent with reference to Figure 5 of the accompanying drawings. As will be seen upon close inspection, groups of fins are located between adjacent pairs of short upright walls 22 so that the uppermost portions of each fin projects well beyond the uppermost extremity of each upright wall but below the uppermost extremity of each tall upright wall 21. Thus, utilising the elongate design of Figure 3, it is possible to store quite tall fins in a fin storage tray and to stack such filled fin storage trays one upon the other without damaging any of the somewhat fragile fins contained therein.

As will be appreciated with reference to Figure 4, each fin storage tray section 10 is aligned with each adjacent fin storage tray section 10 until the location wall 13 abuts a recess 15 formed in each upright wall 10. Each pair of fin storage tray sections 10 are then held in their abutting position, with each upright wall 11 substantially parallel and each base portion 12 in a substantially horizontal plane. Each section is then fixed together by means of spotwelds (although they could be similarly fixed by fusion welding, adhesives, or mechanically fixed by means of rivets or clips). It will now become apparent from Figure 2 that the base portion 12 is stepped so that the upper face of the base of adjacent sections is at substantially the same height. Clearly, with reference to Figure 4, the lower face of the base of adjacent sections is at the same horizontal level also. Referring again to Figure 2, it will be seen that the lefthand portion of the upright wall 11 is not strictly planar but is inclined slightly to the vertical at its lefthand side so as to reinforce the upright wall 11 at the point where the recess 15 is most significant. Similarly, the righthand portion of the location wall 13 is also inclined to the vertical so that, when the fin storage tray is assembled, the lowermost portion of the upright wall 11 is effectively strengthened by the addition of the two components. Although it is possible to connect one fin storage tray section 10 to another fin storage tray section at the interface between the recess 15 and the location wall 13, it is preferable to fix the two sections together at the interface between the underside of the lefthand portion of the horizontal base 12 and the upper face of the righthand portion of the horizontal base 12.

Referring now to Figure 6 of the accompanying drawings, it will be appreciated that during the manufacture of an automobile radiator, it is necessary to feed groups of fins into successive channels 16 of the assembled tray 17 more particularly, each group of fins is despatched from a fin producing machine, and is fed through a chute and into one end of a channel 16 of the assembled tray 17. Whilst the tray is stationary, the group of fins is propelled along the channel until it reaches the end or, in certain circumstances, a datum point. Once the group of fins has been located in a channel of the assembled tray 17, the fin producing machine manufactures another group of fins ready for despatch to the storage tray. In the meantime, an indexing mechanism grips the short base portion 14 on the base of each fin storage tray section 10 so that the entire tray can be moved, by means of a gear arrangement, in a short incremental step. In particular, the indexation mechanism will translate the tray in a direction transverse to the direction of each channel, by a distance equal to the separation of each channel. Consequently, when the fin producing machine is ready to despatch another group of fins, it is a simple matter to move the group of fins along the chute and into the next channel 16 of the assembled fin storage tray 17. As will be appreciated from the drawings, in certain circumstances, it may prove more effective to have a completely solid short base portion 14 (as illustrated by Figure 2) and in other circumstances, it may prove more effective to have a short base portion 14 having a foot-like projection 18 (as illustrated by Figure 3).

Referring now to Figures 6 and 7, it will be seen that each fin storage tray 17 does not have continuous upright walls. As will be appreciated especially from Figure 7 of the drawings, the upright walls 11 are removed at one end of the tray so that the horizontal base portion 12 of each fin storage tray section 10 remains to provide a series of horizontally projecting fingers 19. It is then possible to handle the tray by means of the fingers 19 without substantially disturbing any of the fins or groups of fins contained within the tray.

Referring now to Figure 8 of the accompanying drawings, in which a somewhat diagrammatic fin storage tray is seen to contain a plurality of fin groups. In this embodiment, it is a requirement that

each fin is substantially rectangular (but not necessarily planar) and the fin is provided with a series of slits arranged in a pair of rectangles as seen in the drawings. Each of these slits is provided by the fin forming machine to help the dissipation of heat from each fin. However, since the particular arrangement of slits in the respective fins is not the purpose of the present invention, they will not be described in any further detail.

Further examples and embodiments of fin storage tray sections 10 may be found in United Kingdom Application No. 8702429 filed on the 4th February 1987 in the name of the present applicant, the specification of which is hereby incorporated into the present description.

The invention is not restricted to the details of the foregoing embodiments. The invention extends to any novel one, or any novel combination, of the features disclosed in this specification and/or drawings, or to any novel one, or any novel combination, of the steps of any method or process disclosed herein.

Claims

1. A tray for storing fins or groups of fins is characterised in that it comprises at least two sections each of which consists of at least a base element and an upstanding element, capable of being fitted together so that one or more fins can be stored between any two successive upstanding elements.

2. A storage tray according to Claim 1, characterised in that successive sections can be readily assembled.

3. A storage tray according to Claim 1 or Claim 2, characterised in that the spacing between the upstanding elements can be set easily.

4. A storage tray according to any preceding claim characterised in that each storage tray section incorporates a recessed portion and a projecting portion arranged so that, in use, two sections can be placed together so that the projecting portion abuts the recessed portion.

5. A storage tray according to Claim 4, characterised in that the recess is formed in the upstanding element and the projecting portion projects from the base element.

6. A storage tray according to any preceding claim characterised in that, the base element is adapted so that the fin supporting face of each channel formed between successive upstanding elements is at the same horizontal level as each such successive face.

7. A storage tray according to any preceding claim characterised in that, each fin storage tray section is substantially identical to each successive section.

8. Apparatus for manufacturing automobile radiators, said apparatus incorporating a storage tray according to any preceding claim.

9. A method of manufacturing automobile radiators comprising arranging a group of fins in a storage tray, according to any one or more of Claims 1 to 7, fitting one end of each fin to one cooler tube and, the other end of each fin to a successive cooler tube and attaching hot and cold cooling fluid tanks to the ends of the respective cooler tubes.

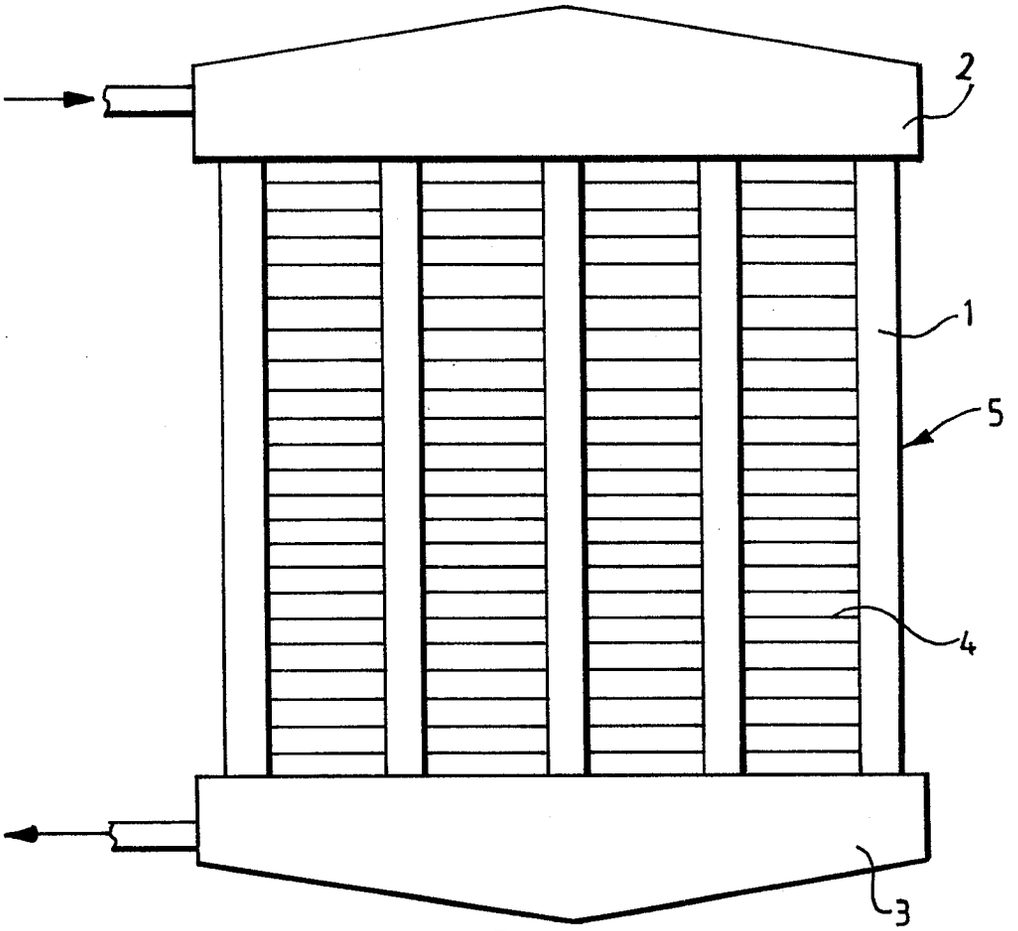


Fig.1.

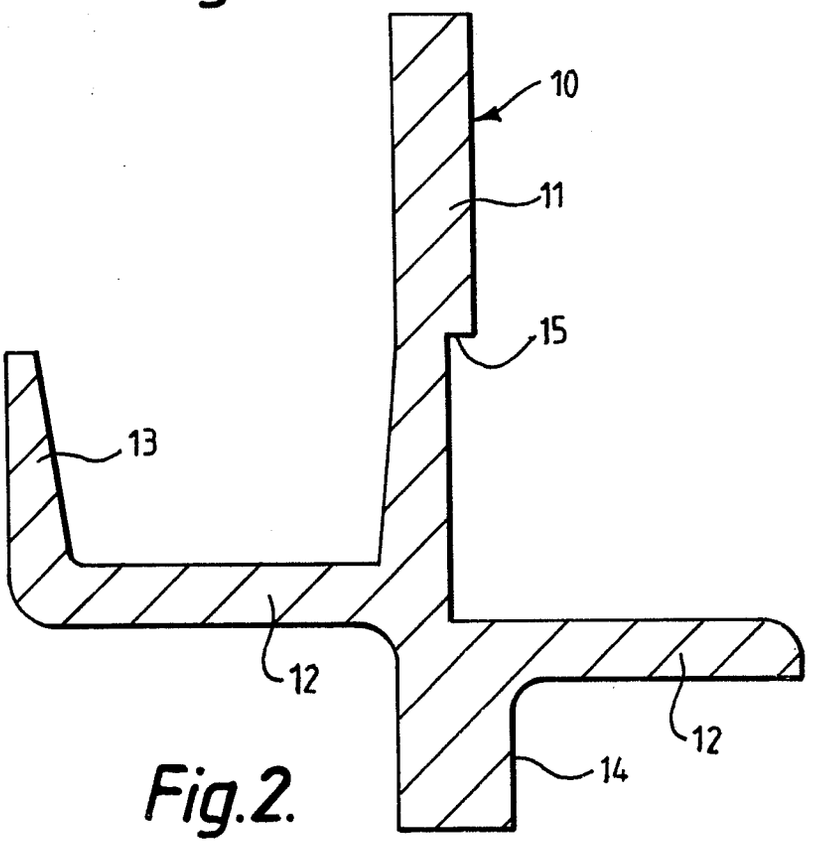


Fig.2.

Fig.3.

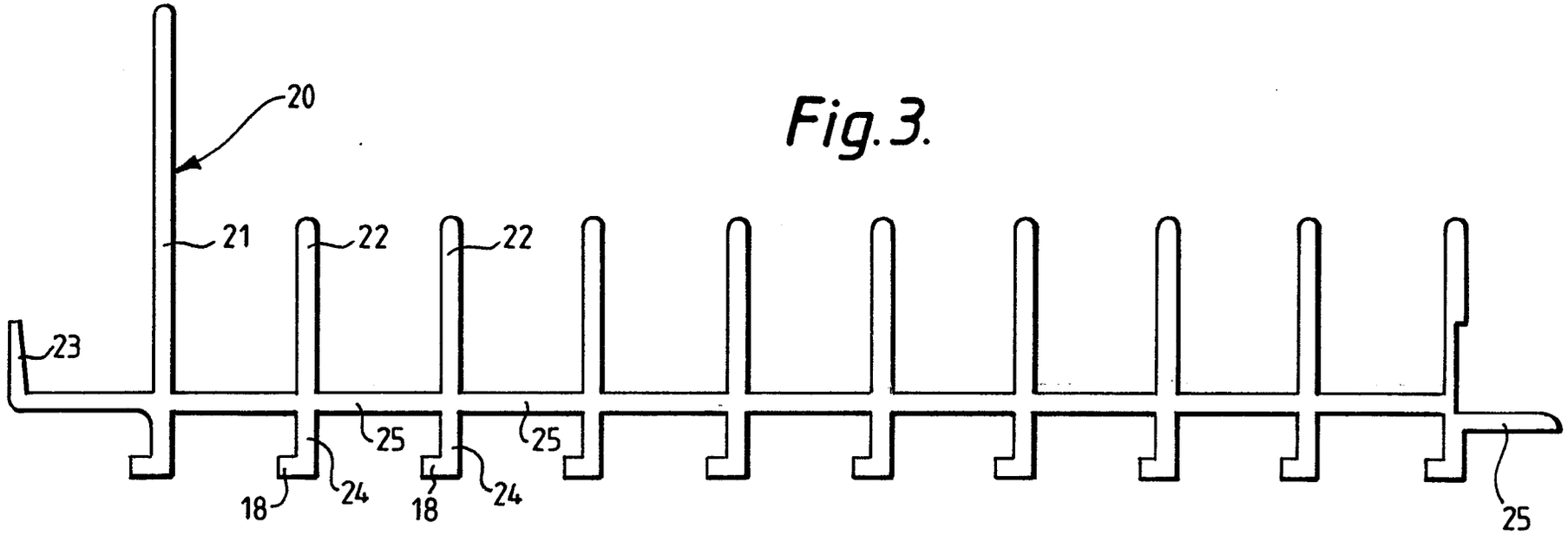
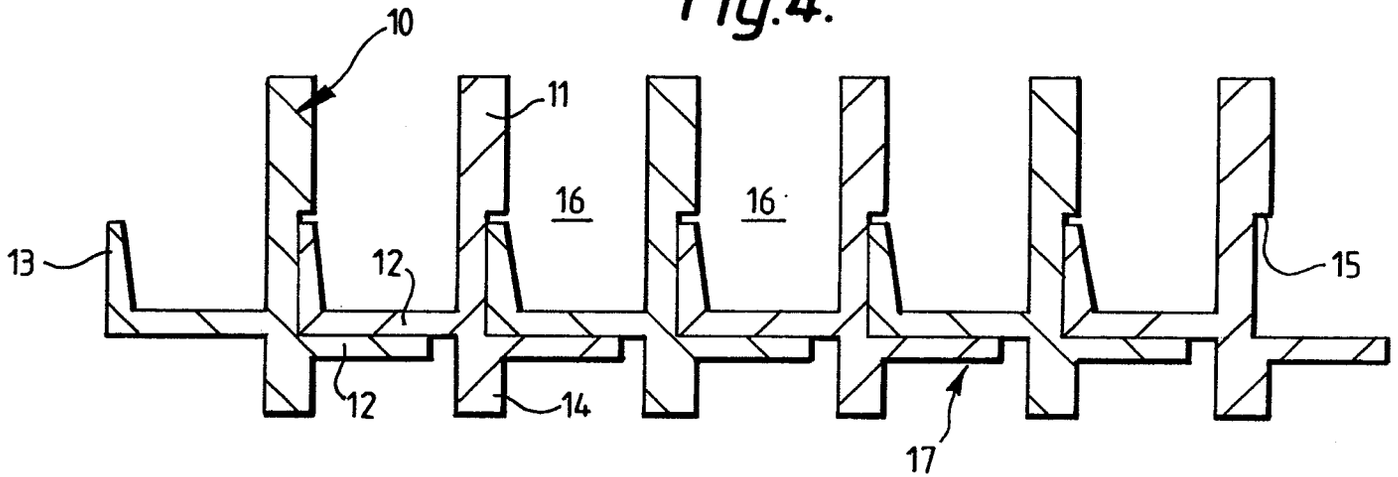


Fig.4.



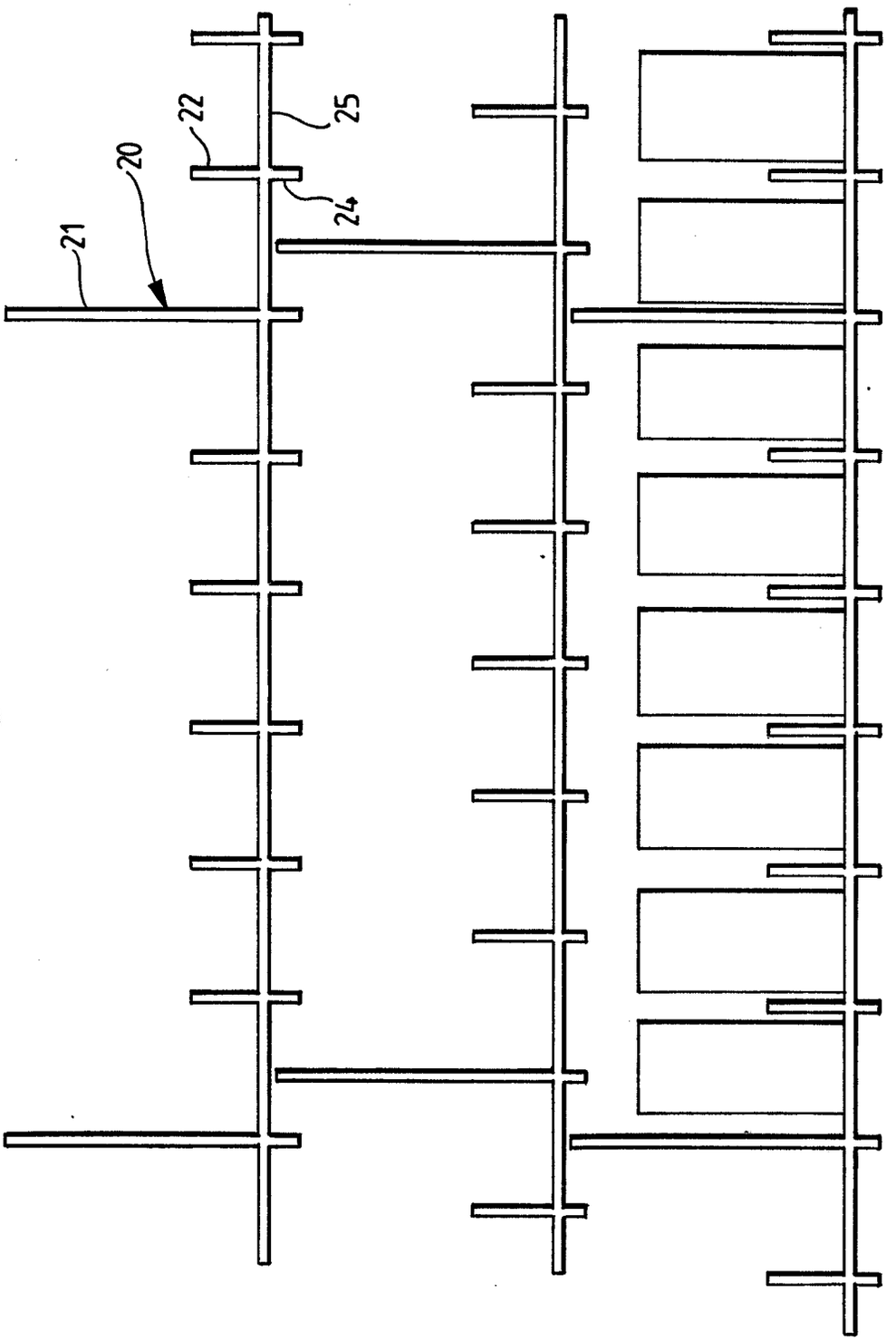


Fig.5.

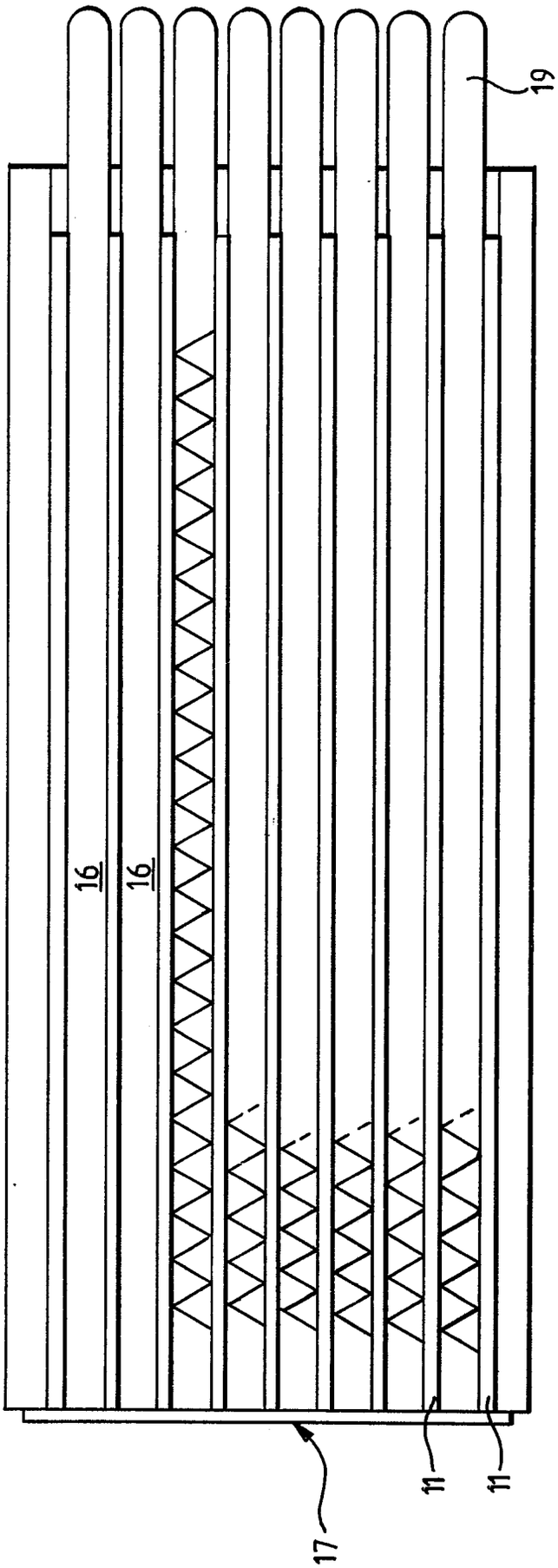


Fig.6.

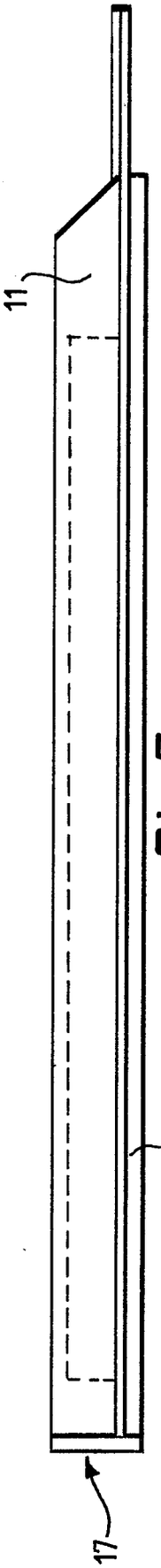


Fig.7.

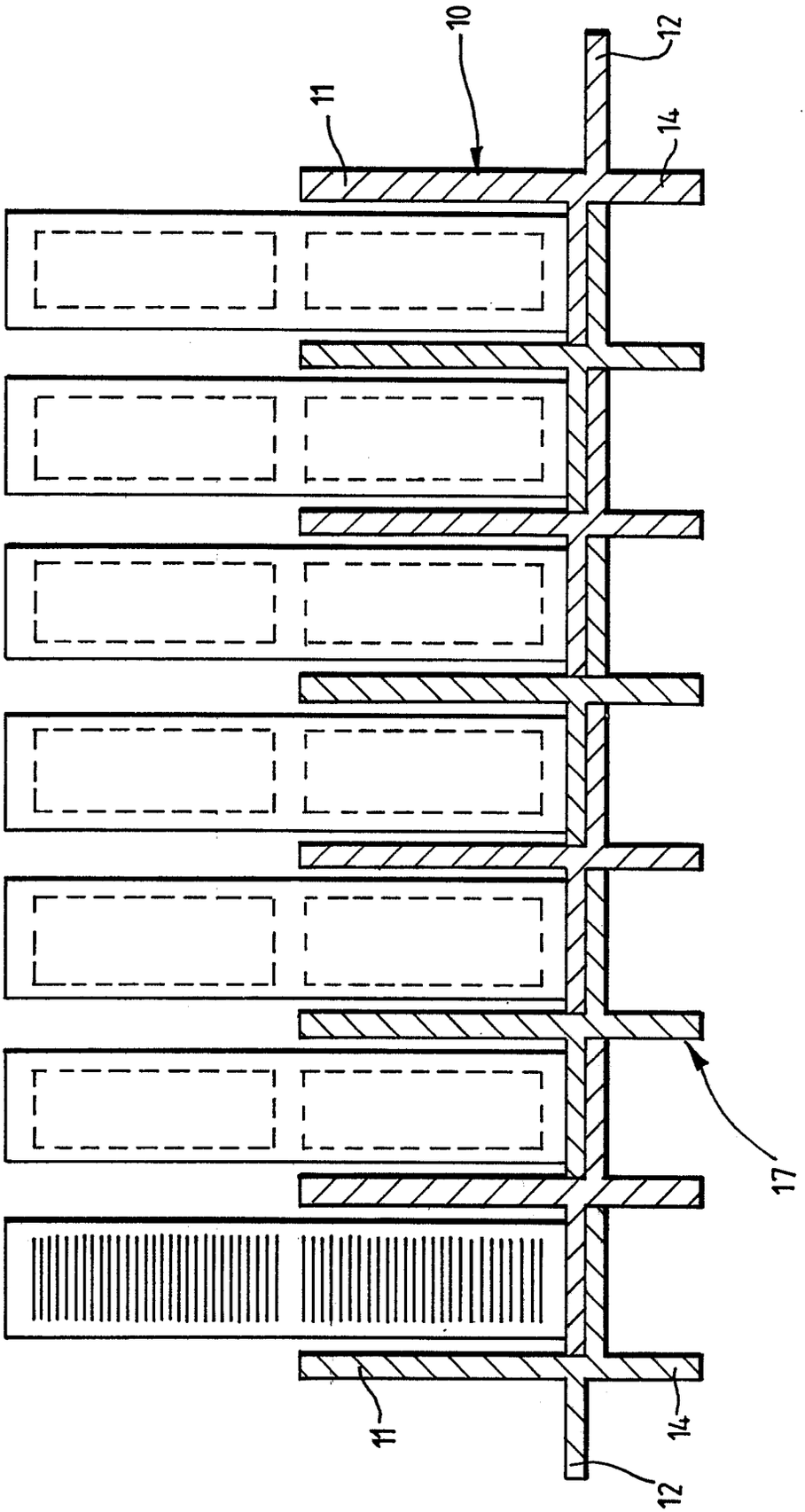


Fig.8.