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(54) Industrial process of manufacture of modular radiator elements in injected aluminium, symetrically shaped

(57) Industrial process for manufacture of modular radiator elements (1) in injected or die-cast aluminium of the kind made up of a tubular column (2) which is finished off at the top and botton with crosswise bosses (4), each of which is hidden inside an extension (3A,3B) fitted onto the respective end. These two extensions can be symmetrical and U-shaped, or of any other configuration. The invention also comprises the radiator elements (1).

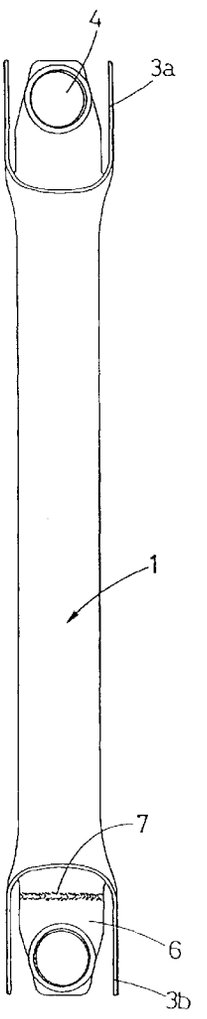

Fig. 1

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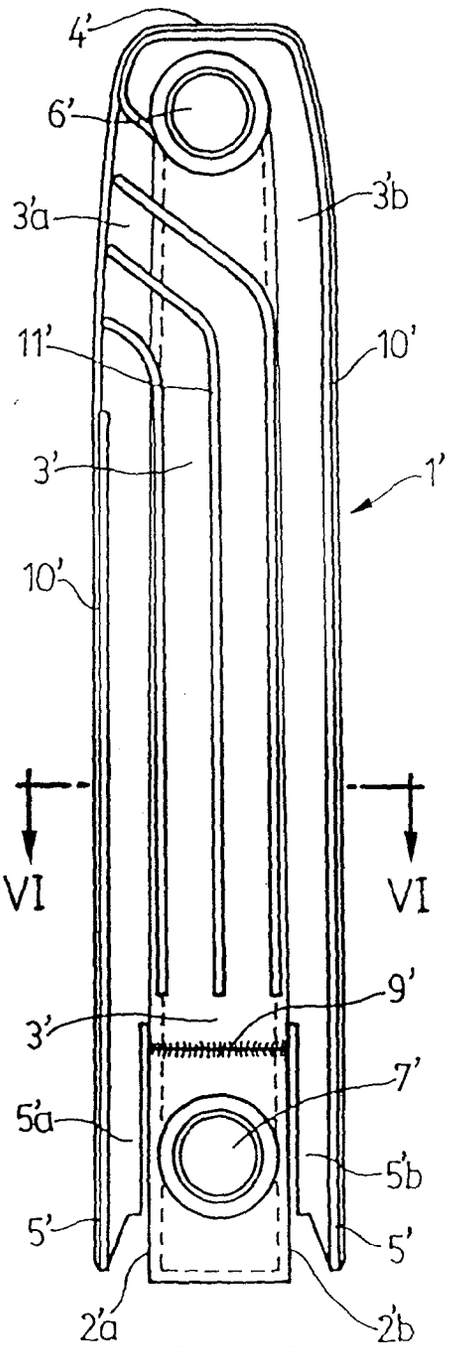

Fig. 5

Description

The invention is concerned with an industrial process for manufacture of modular radiator elements in injected (or die cast) aluminium.

According to one aspect of this invention, the said radiator elements are symmetrically shaped and are ideal for use for making radiator panels for use in hot-water heating installations. The invention also refers to the radiator element obtained with the process as per the invention.

Currently on the market, there are radiator elements which can be assembled, as a block, moulded in injected or die-cast aluminium and comprising a tubular column which is finished off at the top end and at the base with two crosswise bosses, threaded inside, via which each of the modular elements can be coupled and made to communicate, using connection couplings, with another two elements identical to them and positioned on their opposite sides.

The system habitually adopted for manufacture of these block radiator elements consists of stamping or moulding the tubular column together with the bosses of the ends, and then in welding a stopper over the hole for removing the core used to shape the inside duct of the column.

The piece removed from the shaping mould does indeed fit the outer wall of one of the two end bosses, with a hole which exactly matches and is coaxial to the inside duct of the tubular column, the shaping of which obviously implies use of a casting core which, once this casting is complete, is removed through this hole.

As has already been stated, a stopper is welded outside this hole, and this stopper spoils the looks, because of its thickness and, more specifically, because of the strip of welding all round its circumference, of the cleanliness of lines and shape of the boss to which the stopper in question is applied.

In view of this question of looks, it is appropriate that, in radiator panels, all bosses with stoppers are positioned at the bottom, as far out of sight as possible.

It is becoming more and more frequent to use radiators intended for heating the bathroom for additional functions, such as hanging and drying bath towels.

This function is achieved by arranging a series of tubular elements, inside which the heating water circulates, horizontally.

When trying to achieve this arrangement using injected aluminium elements, the unsightly series of stoppers welded onto each of the radiator elements would be left fully on view, on one of the sides of the radiator in question.

The aim of this invention is, in one aspect, to conceive a new process of manufacture for these modular radiator elements, of the kind comprising a tubular column which is finished off with two end bosses, hidden in their respective covers In a "U"-shape, with the concavity facing outwards.

The process as per the invention consists of eliminating the aforesaid stopper, so that radiator elements can be made with the end bosses with an exactly symmetrical shape and with lines which are perfectly linked up and clean, and which therefore have no limitation in terms of their looks as far as their modes of use are concerned.

The process as per one aspect of the invention comprises the following operative phases:

a) injection stamping or moulding (or die-casting) of a first semi-manufactured element in a single piece of aluminium, comprising a tubular column, at the ends of which two identical, symmetrical covers or extensions have been fitted, which are "U"-shaped, inside one of which a boss which communicates with the inside duct of the column is fitted and hidden, and this cuts off at its other end right inside the other "U"-shaped cover;

b) injection stamping or moulding (or die-casting) of a second semi-manufactured element, in a single piece of aluminium, comprising a boss which is exactly identical to that of the first semi-manufactured element, and fitted with a perfectly identical coupling, in terms of its shape and size, to the section of the tubular column of the first semi-manufactured element;

c) welding of the coupling of the second semi-manufactured element onto the terminal section of the tubular column of the first semi-manufactured element, so that a ready-finished piece is obtained, made up of a tubular column finished off with two end bosses with perfectly symmetrical shapes.

The strip of welding joining the two semi-manufactured elements no longer detracts from the looks of the finished piece, since it is in a completely hidden position, in other words inside one of the "U"-shaped covers or extensions of the first semi-manufactured element, in which the aforesaid boss of the second semi-manufactured element is hidden. Unlike what is the case with current radiator elements, as has already been stated, in which the strip of welding of the stopper enclosing the hole for removal of the mould core is on the outside of one of the bosses, the only one which is not covered by either of the two aforesaid "U"-shaped covers or extensions.

According to another aspect, this invention provides for the radiator elements not to have any limitations for configuration; thus, these radiator elements do not have to be symmetrical and, therefore, can be asymmetrical, and the end extensions or covers of the tubular column can have any different configuration as required. Similarly, this tubular column can be flat or be fitted with front and/or side fins, improving the radiation of heat from the radiator element into the atmosphere.

Achieving the radiator elements with a non-symmetrical shape does not make the manufacturing proc-

ess any more complicated.

The industrial process for manufacture of modular radiator elements in injected aluminium comprises the known operations relating to injection moulding or stamping of a first semi-manufactured component of a single piece of aluminium, comprising a tubular column, the ends of which are fitted with their respective extensions, and the inside of one extension is fitted with a boss which communicates with the inside duct of the column, and the other end of this column is cut off inside the other extension, and injection moulding or stamping of a second semi-manufactured component or a single piece of aluminium, which is made up of a boss fitted with a coupling of identical shape and size to the section of the tubular column of the first component.

The industrial process with which this invention is concerned is characterized by the operation of welding the coupling of the second semi-manufactured component at the free end of the tubular column of the first semi-manufactured component.

As per the invention, in the injection moulding or stamping operation of the first component, the tubular column fitted with front and/or side fins is made up.

The invention also comprises the modular radiator element in injected aluminium obtained via the process as per the invention.

These and other characteristics are made clearer by the detailed description which follows, to assist which two sheets of sketches are attached, showing a practical case of application which is cited solely as an example and is not limitative of the scope of this invention.

In the sketches:

Fig. 1 shows the symmetrical radiator element, as per the first aspect of the invention, obtained with the process of manufacture as per the invention;

fig. 2 shows the first of the two semi-manufactured elements obtained during the course of the process of manufacture as per the invention;

fig. 3 shows the second of the two semi-manufactured elements obtained during the course of the process of manufacture as per the invention;

fig. 4 is a perspective view. as per the second aspect of the invention, illustrating the two semi-manufactured components making up the radiator element, separately;

figure 5 is an elevated side view illustrating the two components joined by welding; and

figure 6 is a cross-section of the radiator element considered along the VI-VI plane of figure 5.

With reference to the above figures 1 to 3, the radiator element obtained, as per one aspect, with the process as per the invention, is made up of the two semi-manufactured elements welded together.

The first semi-manufactured element (1) comprises a block piece of aluminium, moulded or stamped by injection or die-casting, made up of a tubular column (2), to the ends of which two identical, symmetrical covers or extensions (3a and 3b) have been fitted, and these are "U"-shaped; inside one of them (3a), there is a boss (4) fitted and hidden, which communicates with the inside duct of the column (2), which, at its other end, is cut off right inside the other "U"-shaped cover or extension (3b).

The second semi-manufactured element (5) comprises a block piece of aluminium, mcuided or stamped by injection or die-casting, comprising a boss (4a), perfectly identical to that of the first semi-manufactured element and fitted with a coupling (6) which is perfectly identical, in terms of its shape and size, to the section of the tubular column (2) of the first semi-manufactured element (1).

As is demonstrated in fig. 1, the strip of welding (7) joining the coupling (6) of the second semi-manufactured element (5) to the column (2) of the first semi-manufactured element (1), is inside the cover or extension (3b) of the first semi-manufactured element and, consequently, in a spot hidden from view, taking into account the fact that all the bosses of the modular elements jointly making up the assembled radiator panel are hidden inside the respective "U"-shaped covers or extensions, which to the contrary do not cover the respective front side, which faces the middle of the room, nor the rear, which faces the wall onto which the panel is installed.

With reference to figures 4 to 6, the radiator element obtained, according to another aspect, with the process as per this invention, comprises the previous stages with regard to effecting stamping or injection moulding of a first semi-manufactured component (1') of a single piece of aluminium, and stamping or injection moulding of a second semi-manufactured component (2') of a single Dice of aluminium.

The first semi-manufactured component (1') comprises a tubular column (3'), through which the heating fluid, normally hot water, travels; this tubular column (3') displays an extension (4') at one end, which defines, as in the case illustrated, two upper, side flanges, bent. whilst the opposite end displays an extension (5') which defines, as in the case illustrated, two lower side flanges, straight, the end extensions (4' and 5') of which can have any configuration as required and respectively hide the connected boss (6'), which communicates with the inside duct of the column (3') and which forms a single piece with the said first semi-manufactured component (1'), and the boss (7') of the second semi-manufactured component (2') which is described below.

The second semi-manufactured component (2') is made up of a single piece of aluminium, stamped or injection moulded, comprising the said boss (7'), fitted with a coupling (8'), of an exactly identical shape and size to the section of the tubular column (3') of the first semi-manufactured component (1').

The process of this invention, as per this other aspect, comprises effecting the welding (9') which joins to coupling (8') of the second semi-manufactured compo-

nent (2') to the free end of the tubular column (3') of the first semi-manufactured component (1'), as is illustrated in figure 5.

The resulting radiator element, of a single piece of aluminium, is thereby obtained.

As is shown in figures 4 to 6, when the stamping or injection moulding is done of the first semi-manufactured component (1'), it can be fitted with front fins (10') provided on side extensions (3'a, 3'b) positioned on the main lengthways plane of the tubular column (3'), and/or side fins (11'), in a suitable number for said column (3').

It is of course provided that one or both of the front fins (10') can be extensions without a solution of continuity or cut off, in relation to the end extensions (4' and 5'). Moreover, the side fins (11') can be straight or curved lengthways (as is illustrated in figures 4 to 6), or in any combination.

Likewise, the body of the second semi-manufactured component (2') can be finished off with the free end sealed in any manner, as illustrated or other, but always matching the configuration and size of the first semi-manufactured component (1'), so that it preferably does not protrude from this end. As can be observed, the front (2'a) and rear (2'b) edges of the second semi-manufactured element (2') face each other and are separated by the edges of the respective flanges (5'a and 5'b) of the lower extension (5'), (see figure 5).

The invention is also concerned with the resulting radiator element obtained by way of this other aspect of the said process as per the invention.

As is usual, to make up the corresponding radiator, a number as required of radiator elements as per this invention are coupled together. Depending on the number of radiator elements, the corresponding radiator will be longer or shorter, according to the measurements of the premises or site where the radiator in question is to be installed.

It should he mentioned that the tact that the radiator can optionally be fitted with front and/or side fins increases its output and, therefore, that of the corresponding radiator.

As per the invention, the extensions or covers of the radiator element can be symmetrical and "U"-shaped (3a, 3b), as is illustrated in figures 1 to 3 or can have any other configuration as required, preferably different (4', 5'), as is illustrated in figures 4 to 6, and similarly, the number of front and/or side fins to be fitted to the tubular column (3') - in the application of figures 4 to 6 - can be any as appropriate and of any shape as required, the foregoing regardless of the specific application illustrated.

Claims

1. Industrial process for manufacture of modular radiator elements in injected or die-cast aluminium, symmetrically shaped, characterized by the fact that it comprises the following operative phases:

   a) injection stamping of a first semi-manufactured element (1) in a single piece of aluminium, made up of a tubular column (2), at the ends of which two identical, symmetrical extensions (3a and 3b) have been fitted, "U"-shaped, inside one of which (3a) there is a boss (4) fitted and hidden, which communicates with the inside duct of the column (2), which, at its other end, is cut off right inside the other, "U"-shaped extension (3b).
   b) injection stamping of a second semi-manufactured element (5), of a single piece of aluminium, made of a boss (4a), perfectly identical to that of the first semi-manufactured element, and fitted with a coupling (6), which is perfectly identical, in terms of its shape and size, to the section of the tubular column (2) of the first semi-manufactured element.
   c) welding of the mouth (6) of the second semi-manufactured element (5) onto the terminal section of the tubular column (2) of the first semi-manufactured element (1).

2. Radiator element obtained with the process described in the first claim.

3. Industrial process for manufacture of modular radiator elements in injected aluminium, comprising injection stamping of a first semi-manufactured component (1') of a single piece of aluminium, made up of a tubular column (3'), at the ends of which it is fitted with respective extensions (4' and 5'), and there is a boss (6') inside one extension (4'), which communicates with the inside duct of the column (3'), the opposite end of which is cut off inside the other extension (5'), and injection stamping of a second semi-manufactured component (2') of a single piece of aluminium, made up of a boss (7') fitted with a coupling (8'), of identical shape and size to the section of the tubular column (3') of the first semi-manufactured component (1'), characterized by the fact that the welding of the coupling (8') of the second semi-manufactured component (2') is made to the free end of the tubular column (3') of the first semi-manufactured component (1').

4. Industrial process for manufacture of modular radiator elements in injected aluminium, as per claim 3, characterized by the fact that, in the injection stamping operation of the first component (1'), the tubular column (3') is made up fitted with front (10') and/or side (11') fins.

5. Modular radiator element of a single piece of injected aluminium, obtained as per the process of the

above claims 3 and 4.

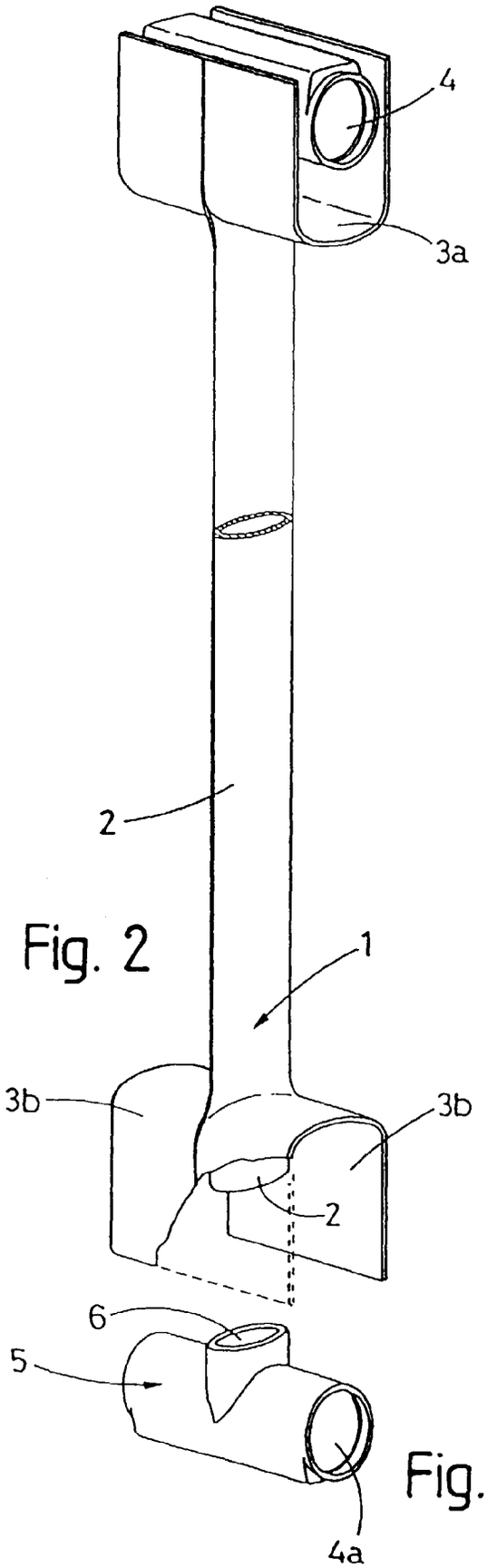

Fig. 2

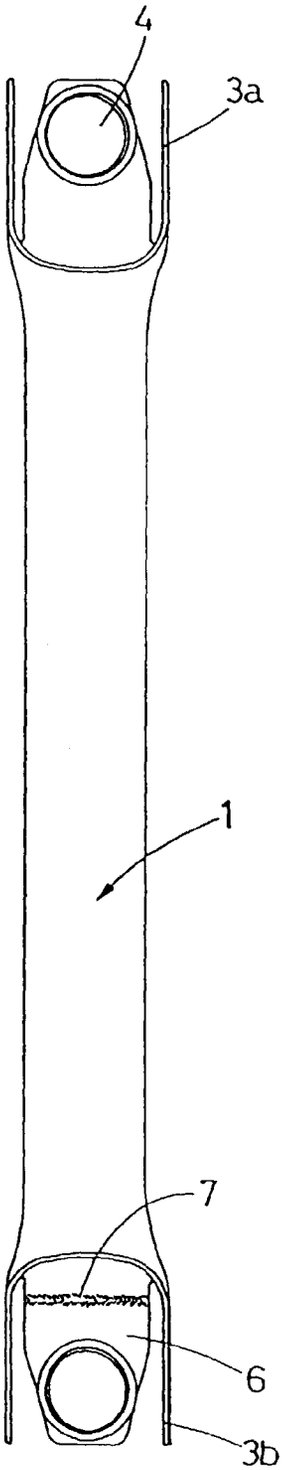

Fig. 1

Fig. 3

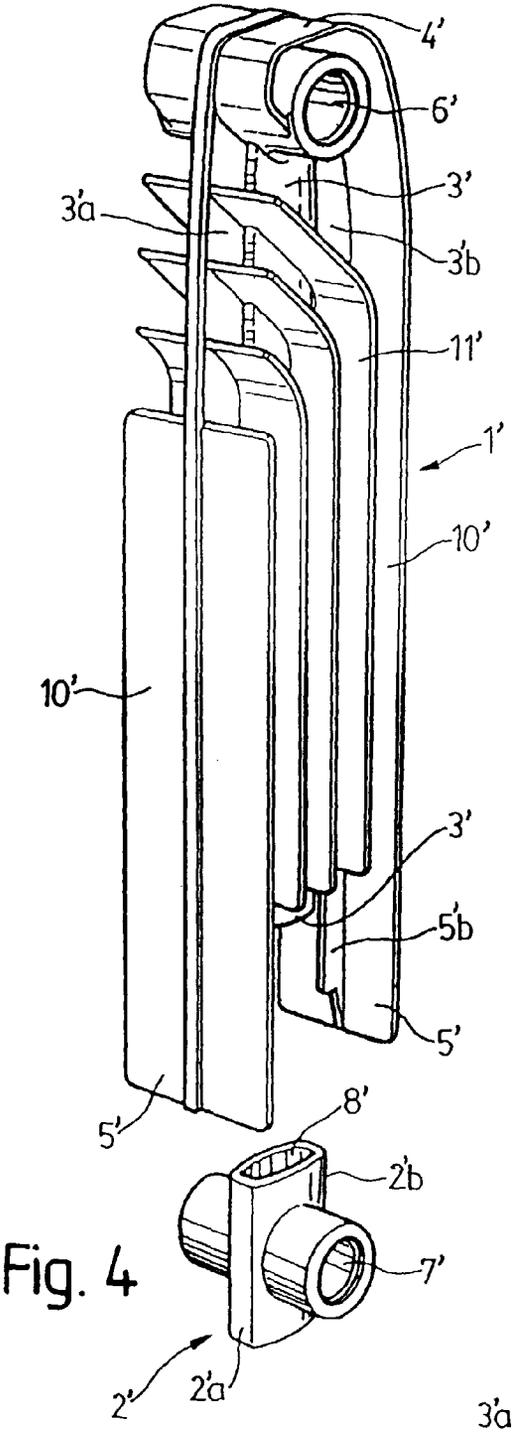

Fig. 4

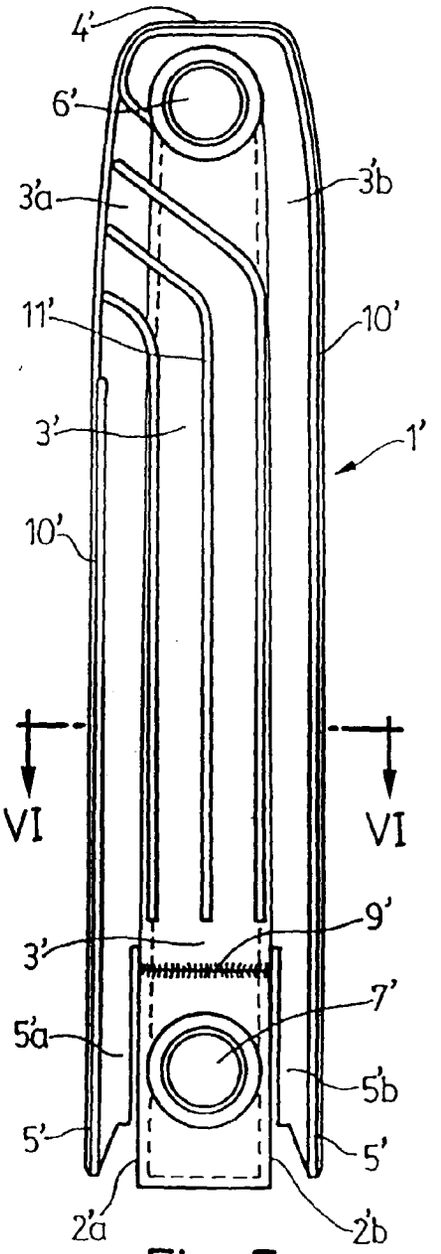

Fig. 5

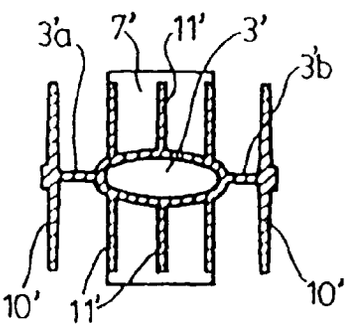

Fig. 6