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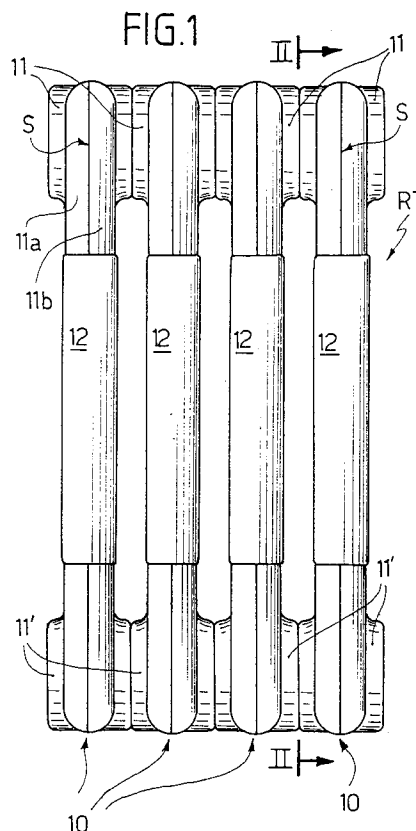
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I-20123 Milano (IT)**(54) **Radiator made of stamped steel plate, particularly for domestic heating systems.**

(57) The radiator comprises a plurality of radiator elements (10), each of which is formed by a pair of oppositely arranged heads (11-11') that are connected by a plurality of pipes (12). Each head, formed by oppositely arranged and electrically welded half-shells, is provided with cylindrical fittings (13-13') for the electrically welded coupling of the pipes (12). In order to facilitate electric welding of the pipes (12) to the fittings (13), the pipes (12) have a different diameter with respect to the fittings (13).

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The present invention relates to a radiator made of stamped steel plate, particularly for domestic heating systems.

More specifically, the invention relates to a radiator made of stamped steel plate of the type that comprises a plurality of elements arranged side by side; each element is formed by a pair of oppositely arranged heads, and each head is formed by respective electrically welded half-shells which are connected by a plurality of pipes, typically a set of three pipes, which are in turn electrically welded to respective cylindrical fittings of the heads.

In known radiators of this type, the heads of each element have cylindrical fittings for the connecting pipes; these fittings have the same inside and outside diameter as the pipes, which are butt-joined to said fittings and connected by means of welding beads formed with various electric welding methods.

Owing to the limited thickness of the plate used for the heads and the pipes, typically between 8 and 15 tenths of a millimeter, the positioning of the end of the pipes with respect to the fittings of both heads is highly critical, since said pipes must be perfectly axially aligned with the respective fittings essentially to ensure correct execution and tightness of the electric weld but also for aesthetic reasons, since an axial offset between the pipes and the respective head fittings, although slight, can be easily noticed and is perceived as a discontinuity that shows poor workmanship.

This considerably complicates the processes for mass-production of said radiators, forcing accurate checks of the gauging of the fittings and of the pipes and of their mutual positioning, entailing considerable production downtimes, use of specialized labor, and high production rejection.

A principal aim of the present invention is to eliminate these and other drawbacks and to provide a radiator made of stamped steel plate that can be manufactured with simplified processes that do not require, in particular, accurate checking of the mutual positioning of the pipes and of the head fittings and are therefore economically advantageous and adapted for mass-production.

Within the scope of this general aim, the invention also has the further object of providing a radiator that has a pleasant aesthetic appearance and does not require any resumption of the production process after electric welding.

According to the present invention, this aim, this object, and other important ones are achieved by providing a radiator made of stamped steel plate having the specific features stated in the appended claims.

Essentially, the invention is based on the concept that the pipes used to connect the heads of

each radiator element have a different diameter with respect to the fittings provided on said heads; in particular, the diameter of the pipes is larger than the diameter of the head fittings or vice versa; the invention is also based on the concept of providing the ends of the pipes, or respectively of the fittings, with tapering circular arc-like coupling regions that provide butt-joining between said pipes and said fittings.

The invention will become apparent from the following detailed description and with reference to the accompanying exemplifying drawings, wherein:

-- figure 1 is a front view of a radiator formed by a set of radiator elements produced according to the present invention;

-- figure 2 is a sectional view, taken along the plane II-II of figure 1;

-- figure 3 is a sectional view, taken along the plane III-III of figure 2;

-- figure 4 is an enlarged-scale detail view of the joint section referenced by the circle IV in figure 3;

-- figures 5 and 6 are respectively a sectional view and an enlarged sectional view, similar to figures 2 and 4 respectively, of a different embodiment that provides the same advantages.

In figure 1, the symbol RT designates a radiator, typically for domestic heating systems, provided by arranging side by side and mutually connecting a plurality of radiator elements, generally designated by the reference numeral 10.

Each radiator element 10 is made of stamped steel plate and comprises two heads 11-11' which are connected by a plurality of pipes, typically a set of three pipes 12, which are arranged side by side and parallel to each other.

Each head 11 is formed by respective symmetrical half-shells such as 11a-11b which are juxtaposed and electrically welded along respective centerlines S. Cylindrical fittings 13-13' are provided on the heads to connect the ends of the pipes 12, which are in turn electrically welded to said cylindrical fittings.

According to the invention and for the specified purposes, the inside and outside diameters of the pipes 12 are different from the corresponding inside and outside diameters of the cylindrical fittings 13. In particular, in the embodiment of figures 1 to 4, the inside and outside radii r_1 - r_2 of the pipes 12 are greater than the corresponding radii r'_1 - r'_2 of the fittings 13 and differ by an amount that is equivalent to 50 to 90% of the thickness "d" of the plate of the pipes and of the fittings, so that the pipe 12, by having an inside diameter that is smaller (by 50 to 10%) than the outside diameter of the fitting 13, cannot be fitted over said fitting.

In order to facilitate the electrically-welded butt-joining of the pipes 12 to the fittings 13, the ends

of said pipes are provided with tapering circular arc-like connecting regions 12a (figure 4) that act as an abutment for the end of the respective fitting 13.

The embodiment of figures 5 and 6, which obviously achieves equal advantages, differs from the embodiment of figures 1 to 4 in that in this case the outside and inside diameters of the pipes 112 of the radiator elements 100 are chosen so that they are smaller than the corresponding outside and inside diameters of the fittings 113 of the heads 110-110' of said elements.

In this case, too, the respective outside and inside radii r_1 - r_2 of the pipes and the radii r'_1 - r'_2 of the fittings differ by an amount that is 50 to 90% of the thickness "d" of the plate, so that the outside diameter of the pipe 112 is in any case greater than the inside diameter of the corresponding fitting 113 to prevent the pipe from entering the fitting.

Furthermore, according to this embodiment, the end of each fitting 113 is provided with a tapering circular arc-like connecting region 113a that acts as an abutment for the end of the pipe 112.

The present invention of course cover all embodiments that achieve the same advantages by using the same inventive concept defined by the appended claims.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. Radiator (RT) made of stamped steel plate, particularly for domestic heating systems, which comprises a plurality of radiator elements (10), each element being formed by a pair of oppositely arranged heads (11-11') that are connected by a plurality of pipes (12), and wherein each head, formed by oppositely arranged electrically welded half-shells, is provided with cylindrical fittings (13-13') for the electrically welded coupling of said pipes (12); characterized in that the pipes (12) that connect the heads (11-11') have a different diameter with respect to the fittings (13) provided on said heads.

2. Radiator according to claim 1, characterized in that the pipes (12) that connect the heads (11-11') have larger inside and outside diameters

than the corresponding inside and outside diameters of the fittings (13) provided on said heads.

3. Radiator according to claims 1 and 2, characterized in that the ends of the pipes (12) that connect the heads (11-11') have tapering circular arc-like connecting regions (12a) that act as an abutment for the end of the respective fitting (13).

4. Radiator according to claim 1, characterized in that the pipes (112) that connect the heads (111-111') have inside and outside diameters that are smaller than the corresponding inside and outside diameters of the fittings (113) provided on said heads.

5. Radiator according to claim 4, characterized in that the end of each fitting (113) of the heads (111-111') is provided with a tapering circular arc-like connecting region (113a) which acts as an abutment for the end of the respective pipe (112).

6. Radiator according to claim 1 and claim 2 or 4, characterized in that the outside and inside radii (r_1 - r_2) of the pipes (12-112) are greater, or respectively smaller, than the corresponding outside and inside radii (r'_1 - r'_2) of the fittings (13-113) of the heads (11-111) by an amount that is between 50 and 90% of the thickness (d) of the plate that forms said pipes and said heads.

7. Radiator made of stamped steel plate, particularly for domestic heating systems, according to the preceding claims and substantially as described and illustrated and for the specified purposes.

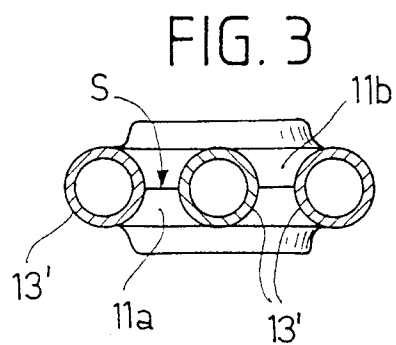
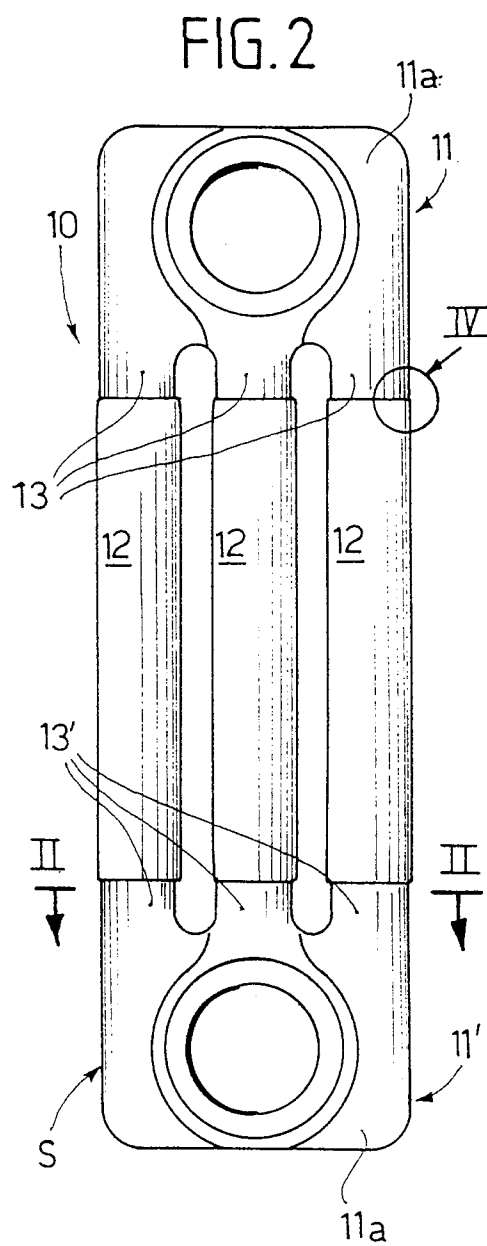
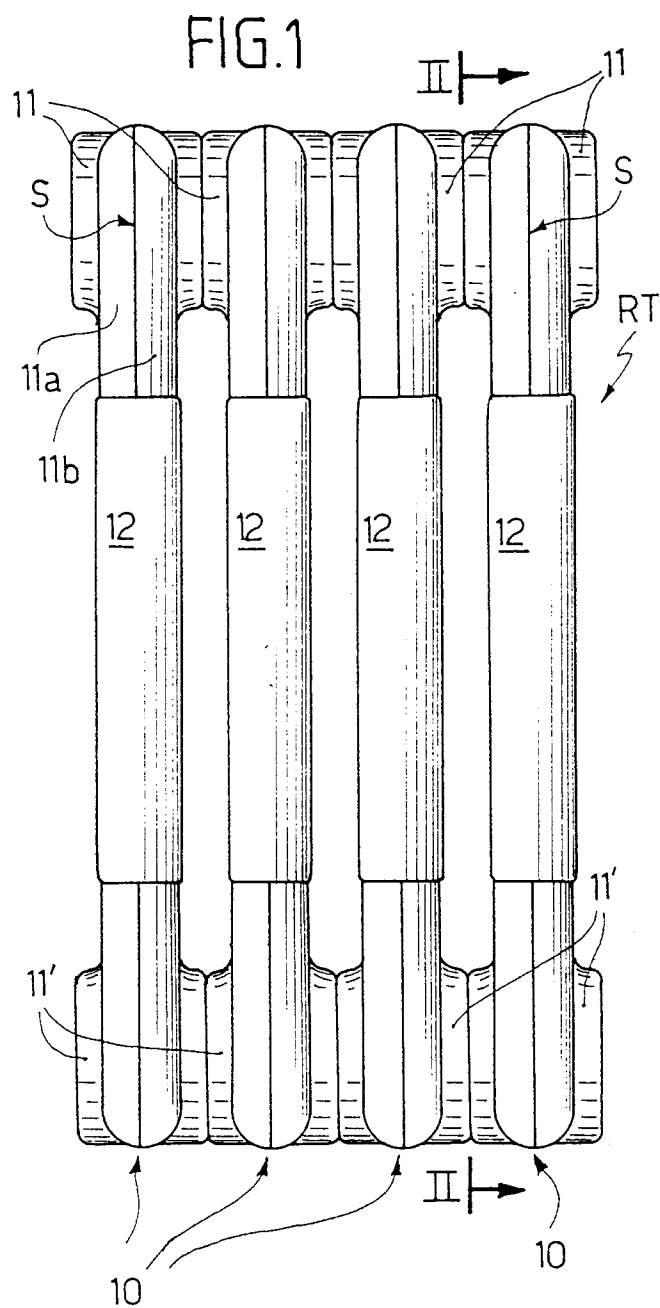


FIG. 5

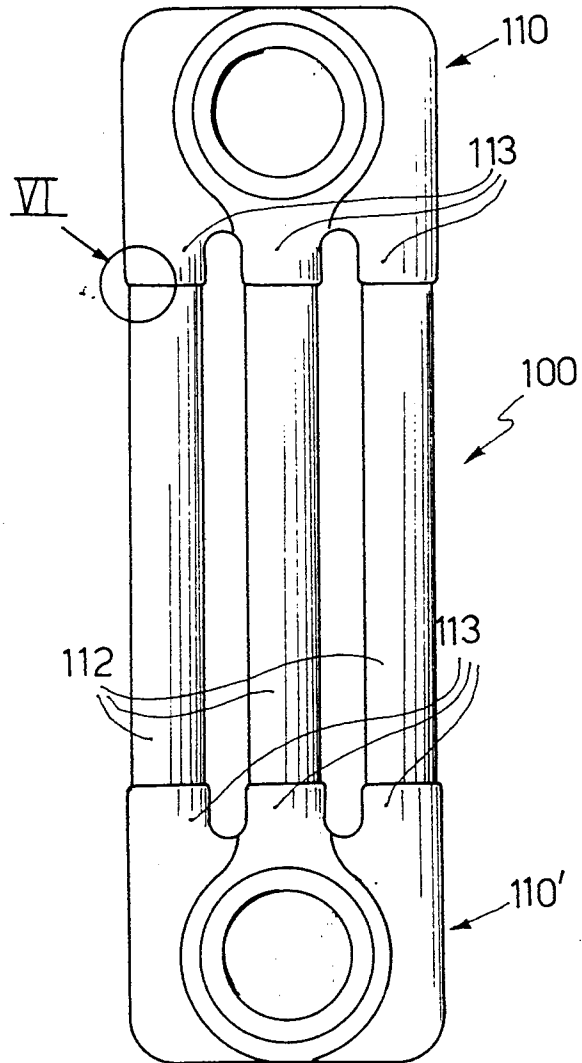


FIG. 4

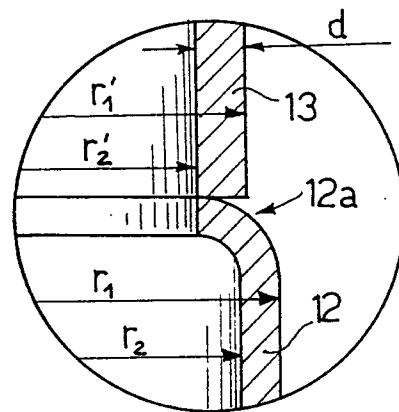
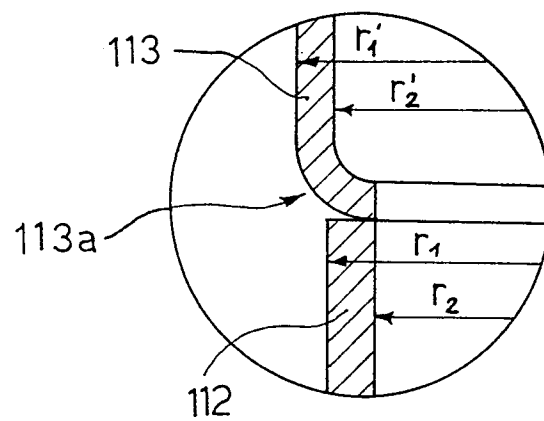


FIG. 6





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EUROPEAN SEARCH REPORT

Application Number

DOCUMENTS CONSIDERED TO BE RELEVANT			EP 95104069.0
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 6)
X	EP - A - 0 477 522 (KERMI) * Fig. 2,3,6 *	1-3, 5-7,	F 28 F 9/26
A		4	
A	FR - A - 1 223 503 (FOSTER) * Fig. 9 *	1-7	
			TECHNICAL FIELDS SEARCHED (Int. Cl. 6)
			F 28 F
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 03-07-1995	Examiner HUBER
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			