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Amended claims in accordance with Rule 137(2) EPC.

(54) **Tubing element for a heat exchanger means**

(57) The present invention relates to a tubing element (10, 10') for a heat exchanger means (100, 100'), the tubing element (10, 10') being at least partially a rigid elongated heat exchanger tubing having at least a first end (20) and at least a second end (30) and having a first side wall (40) and a second side wall (50), the first side wall (40) and the second side wall (50) being arranged substantially parallel to each other and the distance (d) between the first side wall (40) and the second side wall (50) being considerably smaller than the width (W) of the first side wall (40) and the second side wall

(50) resulting in a substantially overall flat tubing structure, the tubing element (10, 10') having a plurality of fins (60, 60') on at least one of the outer surfaces (42, 52) of the first side wall (40) and/or of the second side wall (50). Furthermore, the present invention relates to a heat exchanger means, the use of a tubing element (10, 10'), the use of a heat exchanger means (100, 100') and the method of manufacturing of a tubing element (10, 10') to manufacture at least partially a heat exchanger means (100, 100').

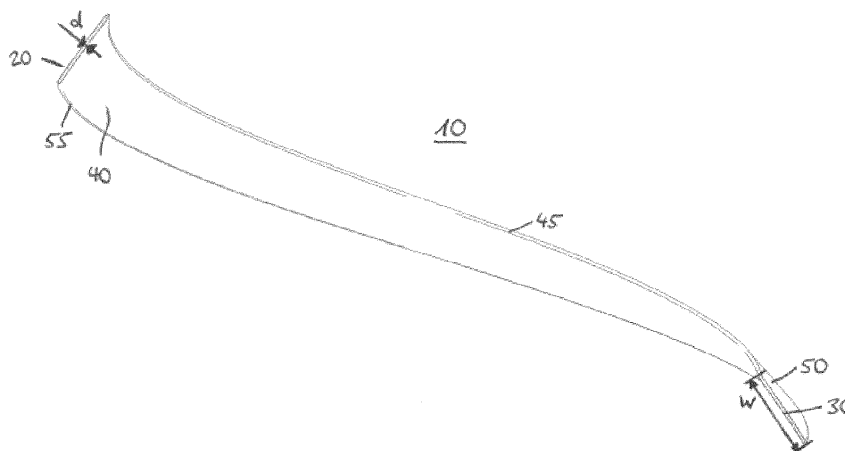


FIG. 1

Description

[0001] The present invention relates to a tubing element for a heat exchanger means, a heat exchanger means, the use of a tubing element to manufacture at least partially a heat exchanger means, the use of a heat exchanger means to exchange heat and the method of manufacturing of a tubing element.

[0002] In the technical field of heat exchangers such as evaporators, condensers, radiators and coolers there have been many attempts to provide compact and energy efficient heat exchangers.

[0003] For instance, EP 1 840 494 A2 discloses a heat exchanger, whereby the heat exchanger comprises a profile having two flat tubes with several channels and whereby the tubes are connected by means of a bar. The profile is a one-piece profile and may consist of aluminium or an aluminium alloy.

[0004] Moreover, DE 20 2008 006 379 U1 discloses an aluminium or aluminium alloy profile, which can be used for tubes for heat exchangers. The profile has a central channel and several further channels arranged around the central channel.

[0005] DE 2 209 325 discloses a tube for heat exchangers having a helical structure. Furthermore, DE 2 209 329 discloses heat exchanger tubes having ribs on the inner side and the outer side of the tube.

[0006] Additionally GB 1 390 782 discloses a heat-exchange tubing having spaced metal fins projecting inwardly of the tubing from the wall sections of the tubing and extending longitudinally of the tubing.

[0007] Further, EP 0 640 803 A1 relates to heat transfer coil, where a second piece of tubing is wound around the first piece of tubing while the first piece is straight and where the first piece of tubing is then formed to define the overall coil shape and then the first and second pieces of tubing internally sized by internal pressurization to also force the two pieces of tubing to intimate contact with each other.

[0008] However, it is still desirable to improve the already known technical solutions in the field of heat exchangers.

[0009] It is therefore an object for the present invention to improve a tubing element for a heat exchanger means, a heat exchanger, the use of a tubing element to manufacture at least partially a heat exchanger means, the use of a heat exchanger to exchange heat and a method of manufacturing of a tubing element, in particular in that the efficiency of the heat exchange is increased and that the overall structure of the tubing element and the heat exchanger is improved and simplified and allows a more compact structure of a heat exchanger.

[0010] The above object is solved according to the present invention by a tubing element for a heat exchanger means with the features of claim 1. Accordingly, a tubing element for a heat exchanger means is provided, the tubing element being at least partially a rigid elongated heat exchanger tubing having at least a first end and at

least a second end and having a first side wall and a second side wall, the first side wall and the second side wall being arranged substantially parallel to each other and the distance between the first side wall and the second side wall being considerably smaller than the width of the first side wall and the second side wall resulting in a substantially overall flat tubing structure, the tubing element having a plurality of fins on at least one of the outer surfaces of the first side wall and/or of the second side wall.

[0011] Such a tubing element for a heat exchanger means may be an elongated heat exchanger microchannel tube. Such an elongated heat exchanger microchannel tube may have a first and a second open end. There may be relatively large parallel opposite side walls of the microchannel tube with generally flat surfaces, which are joined with relatively small opposite edge walls between the side walls. These edge walls may be convexly curved.

[0012] Heat transfer vapor or fluid may fill a heat exchanger microchannel tube and may flow from one end of the microchannel tube to the other end. The term microchannel is also known as microport.

[0013] A second medium such as air may flow around the outer sides of the tubing element and may transport the heat from the tube away or vice versa.

[0014] By providing a plurality of fins on at least one of the outer surfaces of the first side wall and/or of the second side wall the surface for heat exchange is increased. Thus, also the efficiency of the heat exchanger may be significantly improved.

[0015] Moreover, it is possible that the width of the first side wall and the second side wall is approximately at least 10 times larger than the distance between the first side wall and the second side wall and/or that the first side wall and second side wall are connected respectively on both sides by a rounded connection wall.

[0016] Additionally, it is possible that the tubing element is at least partially tilted and/or sloped and at least partially helically wound and/or twisted so as to form at least a part of a helical structure, whereby preferably the helical structure has an overall cylindrical structure and/or that the helical structure is formed in a cylindrical shape.

[0017] Furthermore, it is possible that the tubing element has a plurality of fins on both of the outer surfaces of the first side wall and of the second side wall. By providing a plurality of fins on both of the outer surfaces of the first side wall and of the second side wall the advantage is achieved that the surface used for the heat exchange may be increased very easily and that the volume needed for the tubing element is not increased substantially.

[0018] It is also possible that the fins are at least partially covered by covering wall and/or that the fins are monoblock fins.

[0019] The fins may be substantially perpendicularly arranged on at least one of the outer surfaces of the first side wall and/or of the second side wall.

[0020] Alternatively, the fins are inclined arranged on the at least one of the outer surfaces of the first side wall and/or of the second side wall, whereby exemplarily the angle between the fins and the outer surface is chosen within a range of approximately 15° to 85°.

[0021] Additionally, the fins merely extend along the whole width of at least one of the outer surfaces of the first side wall and/or of the second side wall and/or are curved.

[0022] Furthermore, the fins may be arranged along a curve extending along the whole width of at least one of the outer surfaces of the first side wall and/or of the second side wall and/or are curved, whereby between the fins being arranged along a curve is a pitch and/or gap.

[0023] It is possible that the fins and/or the curve of fins and at least one of the connection walls are arranged such to each other that they enclose an angle. The angle may be substantially perpendicular. Alternatively, the angle may be chosen within range of about 15° to about 60° and is preferably chosen within a range of about 20° to about 25°. An angle of about 45° between the fins or the curve of fins and at least one of the connection walls is considered to be substantially neutral, in particular as a neutral arrangement with respect to the interference with e.g. fans or the like, which might be connected or used together with a heat exchanger means comprising such a tubing element.

[0024] The fins and/or the curve of fins may be formed slightly concave or convex. In particular, the slightly concave or convex shape of the fins may be achieved by an offset of the center part of the middle section of the fins and/or the curve of fins with respect to the endpoints of the fins and/or the curve of fins within a range of about 0.5 mm to about 5 mm, preferably of about 1 mm to about 2 mm, most preferred of about 1.5 mm.

[0025] It is preferred that the fins are arranged such that the medium flowing against the fins flows against a concave formed part of the fin.

[0026] The fins may have a height chosen within a range of about 0.5 mm to about 5.0 mm, preferably about 2-3 mm.

[0027] Further, it is possible that the fins are arranged in a plurality of rows, preferably substantially parallel rows and/or preferably along at least a part of the length of the tubing element.

[0028] The tubing element may comprise at least one microchannel. Preferably several microchannels with a round or circular cross-section and/or several microchannels with an angular cross-section, exemplarily several microchannels with a triangular cross-section and/or several microchannels with quadrangular cross-section are provided.

[0029] At least some of the microchannels may be arranged with an off-set to each other, whereby exemplarily all microchannels are arranged with an off-set to each other.

[0030] The off-set may result in several chamfers and/or grooves within the first side wall and/or the second

side wall.

[0031] Furthermore, the tubing element may comprise at its a first end and at its second end a collecting portion which is reducing the width of the first side wall and the second side wall to a smaller width.

[0032] Moreover, the present invention relates to a heat exchanger means with the features of claim 10. Accordingly, a heat exchanger means is provided, the heat exchanger means having at least one tubing element according to any of claims 1 to 9.

[0033] Additionally, the heat exchanger may comprise several tubing elements and that the tubing elements are forming as a substantially overall cylindrical structure having a central longitudinal axis and that the tubing elements are spirally curved around the central longitudinal axis and interleaved in the structure.

[0034] The heat exchanger means may be a radiator or a cooler or a condenser or an evaporator.

[0035] Additionally, the present invention relates to the use of a tubing element to manufacture at least partially a heat exchanger means with the features of claim 13. Accordingly, a tubing element is used to manufacture at least partially a heat exchanger means according to claim 10 or 11 exemplarily by tilting and/or sloping and at least partially helically winding and/or twisting the tubing element so to form at least a part of a helical structure.

[0036] Moreover, the present invention relates to the use of a heat exchanger means to exchange heat with the features of claim 14. Accordingly, a heat exchanger means is used, whereby the heat exchanger means is a heat exchanger means according to claim 10 or 11, to exchange heat, exemplarily to use a heat exchanger means as a radiator or as a cooler or as a condenser or as an evaporator.

[0037] Furthermore, the present invention relates to a method of manufacturing of a tubing element with the features of claim 15. Accordingly, a tubing element according to any of claims 1 to 9 is manufactured, whereby exemplarily the tubing element is received by using an extrusion process of a heat transfer material, whereby preferably the extrusion process is a single extrusion process and/or whereby preferably the heat exchanger material is at least partially aluminium or copper or an alloy thereof.

[0038] Further details and advantages of the present invention shall be described hereinafter with respect to the drawings:

Fig. 1: A perspective view of tubing element according to the present invention in a first embodiment;

Fig. 2: A perspective view of a tubing element according to a first embodiment of the present invention;

Fig. 3: A further perspective view of the tubing element shown in Figure 2 showing the

- angles for the slope and the tilt of the tubing element;
- Fig. 4: The perspective view shown in Figure 3 with further details;
- Fig. 5: A perspective view of a tubing element according to the present invention and as shown in Figure 2 together with connecting elements;
- Fig. 6: A side elevation of the tubing element as shown in Figures 2 to 5;
- Fig. 7: A perspective view of a heat exchanger comprising a plurality of tubing elements;
- Fig. 8: A perspective view of a tubing element according to the present invention in a second embodiment;
- Fig. 9: A perspective view in detail of embodiment shown in Figure 8.
- Fig. 10 a, b: The perspective view of a draining plate and the respective tubing element thereto; and
- Fig. 11: A perspective view of a further embodiment of a heat exchanger comprising the draining plate and the tubing element according to Figures 10a, b.

[0039] Figure 1 shows the perspective view of a first embodiment of the tubing element 10, however, without fins 60 or fins 60'.

[0040] The tubing element 10 is a rigid elongated heat exchanger tube having a first end 20 and a second end 30. There are relatively large parallel opposite side walls 40 and 50 with generally flat surfaces. The opposite parallel arranged side walls 40, 50 of the tubing element are joined with relatively small opposite edge walls 45, 55, which are rounded connection walls 45, 55. The tubing element 10 is partially tilted and sloped and also helically wound and twisted so as to form at least a part of a helical structure.

[0041] The distance d between the first side wall 40 and the second side wall 50 is considerably smaller than the width W of the side walls 40, 50.

[0042] There are relatively large parallel opposite side walls 40 and 50 with generally flat surfaces. The opposite parallel arranged side walls 40, 50 of the tubing element are joined with relatively small opposite edge walls 45, 55, which are rounded connection walls 45, 55. The tubing element 10 is partially tilted and sloped and also helically wound and twisted so as to form at least a part of a helical structure.

[0043] The opposite side walls 40 and 50 of the heat

exchanger microchannel tube 10 are oppositely disposed in general parallel planes in the helix within the tube 10 there may be one or more media flow channels, which are formed between the oppositely disposed side walls 40, 50. A heat transfer vapor or fluid such as water or oil or refrigerant fills the heat exchanger microchannel tube 10 and flows from one end 20 of the microchannel tube 10 to the other end 30. Preferably, the resulting helix of the microchannel tube 10 is formed in a cylindrical shape.

[0044] Figure 2 shows a perspective view of a first embodiment of the tubing element 10. On both outer surfaces 42, 52 of the first side wall 40 and the second side wall 50 several fins 60 are arranged.

[0045] The fins 60 may be monoblock fins and are inclined arranged respective to the outer surface 42, 52 of the first side wall 40 and a second side wall 50. The angle between the fins and the outer surface 42, 52 is substantially perpendicular in this example. The fins 60 merely extend along the whole width W of the outer surfaces 42, 52 of the first side wall 40 and the second side wall 50.

[0046] As can be seen e.g. in Figure 5 and 6, the fins 60 are slightly curved.

[0047] Figure 3 shows the defining angles, i.e. angle α_1 defining a slope and angle β_1 defining the tilt. Furthermore, Figure 3 shows the defining axes X , Y and Z and also the radius r . The heat exchanger microchannel tube 10 may be longitudinally curved around the central axis X into a helix. This axis X is shown in Figure 3 and is the central axis X of the overall and imaginary cylindrical shape of the helix.

[0048] As can be seen in Figure 3, the fins 60 follow the slope and the tilt.

[0049] Angle α_1 defining the slope is defined as the angle α_1 between axis X and Z . Angle β_1 defining the tilt is defined as to angle β_1 between axis X and Y . As can be seen in Figure 3, the radius r is the distance from axis X to the intersection point of axis Y and axis Z .

[0050] As can be further seen from Figure 4, the fins 60 have two defining angles γ and δ . The angle γ is the angle which is enclosed by the fins 60 and the connection walls 45, 55 as also shown in Figures 2, 5 and 8. The angle δ is the angle of the fin 60 and the outer surface 42, 52 of the first side wall 40 or the second side wall 50.

[0051] As can be seen from the further detail shown in Figure 4, the first distance a between two adjacent fins 60 may be larger than a second distance b of these adjacent fins 60. The first distance a may be used in the entry section of the gap defined by two adjacent fins 60, i.e. the section for the entry of a heat transfer media flowing through the fins. So, the fins 60 are substantially parallel.

[0052] The fins 60 according to the embodiment shown in Figures 2 to 6 are substantially perpendicular arranged on the outer surfaces 42, 52 of the first side wall 40 and of the second side wall 50.

[0053] This is, however, not mandatory. Alternatively, the fins 60 may be inclined arranged on the at least one

of the outer surfaces 42, 52 of the first side wall 40 and/or of the second side wall 50, whereby exemplarily the angle between the fins 60 and the outer surface 42 or 52 may be chosen within a range of approximately 15° to 85°.

[0054] The fins 60 merely extend along the whole width W of the outer surfaces 42, 52 of the first side wall 40 and/or of the second side wall 50 and are slightly curved.

[0055] Further, the fins 60 are arranged in a plurality of parallel rows substantially along the whole length of the tubing element 10.

[0056] The fins 60 and the connection walls 45, 55 are arranged such to each other that they enclose an angle γ .

[0057] However, this angle γ may be substantially perpendicular. Alternatively, this angle γ may be chosen within range of about 15° to about 60° and may be preferably chosen within a range of about 20° to about 25°. An angle γ of about 45° between the fins 60 at least one of the connection walls 45, 55 is considered to be substantially neutral, in particular as a neutral arrangement with respect to the interference with e.g. fans or the like, which are connected or used together with a heat exchanger means comprising such a tubing element 10.

[0058] The fins 60 are formed slightly concave or convex, which is, however, not mandatory. In particular, the slightly concave or convex shape of the fins 60 may be achieved by an offset of the center part of the middle section of the fins 60 with respect to the endpoints of the fins 60 within a range of about 0.5 mm to about 5 mm, preferably of about 1 mm to about 2 mm, most preferred of about 1.5 mm. In the embodiment shown in Figure 2, the offset of the center part of the middle section of the fins 60 with respect to the endpoints of the fins 60 is about 1 mm.

[0059] The fins 60 are arranged such that the medium flowing against the fins flows against a concave formed part of the fin.

[0060] Furthermore, the fins 60 according to the embodiment shown in Figure 2 have a height of about 2.5 mm. Generally, the fins 60 may have a height chosen within a range of about 0.5 mm to about 5.0 mm, preferably about 2-3 mm.

[0061] At the ends 20, 30 of the tubing element 10 collecting elements 25, 35 are provided, which reduce width of the tubing element 10 to a broader diameter, i.e. the diameter of the tubular connectors of circular cross-sections 27, 37.

[0062] Figure 7 is a perspective view of a heat exchanger means 100 comprising a plurality of a first set of interlaced sloped helical microchannel tubing elements 10 with adjacent sloped and twisted similarly helically formed tubing elements 10 and a respective second set S2 inside of the first set S1. By this, a compact structure together with an increased surface for heat exchange is received.

[0063] Figure 8 is a perspective view of the second embodiment of the tubing element according to the present invention. The second embodiment of the tubing element 10' is merely the same as the one shown in Fig-

ures 2 to 6. However, a different kind of fins is used, i.e. fins 60'. The fins 60' are arranged along a curve extending substantially the whole width W of at least one of the outer surfaces 42, 52 of the sidewall 40 and sidewall 50 and as can be seen from Figure 9, between each fins 60' arranged along one curve a gap is provided. The fins 60' are arranged in a plurality of rows which are arranged parallel.

[0064] The fins 60' are according to the embodiment shown in Figure 8 perpendicularly arranged on the outer surfaces 42, 52 of the first side wall 40 and of the second side wall 50.

[0065] Alternatively, the fins 60' may be inclined arranged on at least one of the outer surfaces 42, 52 of the first side wall 40 and/or of the second side wall 50, whereby exemplarily the angle between the fins 60' and the outer surface 40, 50 is substantially perpendicular.

[0066] Furthermore, the fins 60' are arranged along a curve extending along the whole width W of the outer surfaces 42, 52 of the first side wall 40 and/or of the second side wall 50 and are also curved, whereby between the fins 60' being arranged along a curve is a gap 62.

[0067] It is possible that the fins 60' and the curve of fins 60' and the connection walls 45, 55 are arranged such to each other that they enclose an angle γ .

[0068] However, this angle γ may be substantially perpendicular. Alternatively, this angle γ may be chosen within range of about 15° to about 60° and may be preferably chosen within a range of about 20° to about 25°.

An angle γ of about 45° between the fins 60 at least one of the connection walls 45, 55 is considered to be substantially neutral, in particular as a neutral arrangement with respect to the interference with e.g. fans or the like, which may be connected or used together with a heat exchanger means comprising such a tubing element 10. The fins 60' and the curve of fins 60' is formed slightly concave. In particular, the slightly concave shape of the fins 60' is achieved by an offset of the center part of the middle section of the fins 60' and the curve of fins 60' with respect to the endpoints of the fins 60' and the curve of fins 60' within a range of about 0.5 mm to about 5 mm, preferably of about 1 mm to about 2 mm, most preferred of about 1.5 mm.

[0069] The fins 60' are arranged such that the medium flowing against the fins 60' flows against a concave formed part of the fins 60'.

[0070] Furthermore, the fins 60' according to the embodiment shown in Figure 8 have a height of about 3 mm. Generally, the fins 60' may have a height chosen within a range of about 0.5 mm to about 5.0 mm, preferably about 2-3 mm.

[0071] The curves of fins 60' are arranged in a plurality of substantially parallel rows along the tubing element.

[0072] Figure 9 is showing in detail embodiment of a tube 10' with fins 60' as shown in Figure 8 and having a plurality of microchannels 70 with a square cross-section.

[0073] Figure 10a shows in a perspective view a draining plate 80 which is helically wound such that it can be

attached to the helically wound heat exchanger micro-channel tube 10 as shown in Figure 10b.

[0074] As can be further seen from Figure 11, several draining plates 80 and heat exchanger tubes 10 may be arranged to a heat exchanger means 100 comprising a plurality of interlaced sloped and tilted helical microchannel tubing elements 10 and draining plates 80 between each of the pair of adjacent tubing elements 10.

[0075] The use of draining plates 80 is preferred in cases where the heat exchanger means 100 is an evaporator.

Claims

1. Tubing element (10, 10') for a heat exchanger means (100, 100'), the tubing element (10, 10') being at least partially a rigid elongated heat exchanger tubing having at least a first end (20) and at least a second end (30) and having a first side wall (40) and a second side wall (50), the first side wall (40) and the second side wall (50) being arranged substantially parallel to each other and the distance (d) between the first side wall (40) and the second side wall (50) being considerably smaller than the width (W) of the first side wall (40) and the second side wall (50) resulting in a substantially overall flat tubing structure, the tubing element (10, 10') having a plurality of fins (60, 60') on at least one of the outer surfaces (42, 52) of the first side wall (40) and/or of the second side wall (50).
2. Tubing element (10, 10') according to claim 1, **characterized in that** the width (W) of the first side wall (40) and the second side wall (50) is approximately at least 10 times larger than the distance (d) between the first side wall (40) and the second side wall (50) and/or that the first side wall (40) and second side wall (50) are connected respectively on both sides by a rounded connection wall (45, 55).
3. Tubing element (10, 10') according to claim 1 or 2, **characterized in that** the tubing element (10, 10') is at least partially tilted and/or sloped and at least partially helically wound and/or twisted so as to form at least a part of a helical structure, whereby preferably the helical structure has an overall cylindrical structure and/or that the helical structure is formed in a cylindrical shape.
4. Tubing element (10, 10') according to any of the preceding claims, **characterized in that** the tubing element (10, 10') has a plurality of fins (60, 60') on both of the outer surfaces (42, 52) of the first side wall (40) and of the second side wall (50).
5. Tubing element (10, 10') according to any of the preceding claims, **characterized in that** the fins (60, 60') are at least partially covered by covering wall (80) and/or that the fins are monoblock fins (60, 60').
6. Tubing element (10, 10') according to any of the preceding claims, **characterized in that** the fins (60, 60') are substantially perpendicularly arranged on at least one of the outer surfaces (42, 52) of the first side wall (40) and/or of the second side wall (50).
7. Tubing element (10, 10') according to any of claims 1 to 5, **characterized in that** the fins (60, 60') are inclined arranged on the at least one of the outer surfaces (42, 52) of the first side wall (40) and/or of the second side wall (50), whereby exemplarily the angle between the fins (60, 60') and the outer surface (42, 52) is chosen within a range of approximately 15° to 85° and/or that the fins (60, 60') and/or the curve of fins (60') and at least one of the connection walls (45, 55) are arranged such to each other that they enclose an angle.
8. Tubing element (10, 10') according to any of the preceding claims, **characterized in that** the fins (60) merely extend along the whole width (W) of at least one of the outer surfaces (42, 52) of the first side wall (40) and/or of the second side wall (50) and/or are curved.
9. Tubing element (10') according to any of the preceding claims, **characterized in that** the fins (60') are arranged along a curve extending along the whole width (W) of at least one of the outer surfaces (42, 52) of the first side wall (40) and/or of the second side wall (50) and/or are curved, whereby between the fins (60') being arranged along a curve is a pitch and/or gap and/or that the fins (60, 60') are arranged in a plurality of rows, preferably substantially parallel rows and/or preferably along at least a part of the length of the tubing element (10').
10. Heat exchanger means (100, 100') having at least one tubing element (10, 10') according to any of the preceding claims.
11. Heat exchanger means (100, 100') according to claim 10, **characterized in that** several tubing elements (10, 10') and that the tubing elements (10) are forming an overall substantially cylindrical structure having a central longitudinal axis (X) and that the tubing elements (10, 10') are spirally curved around the central longitudinal axis (X) and interleaved in the structure.

12. Heat exchanger means (100, 100') according to claim 10 or 11,
characterized in that
 the heat exchanger means (100, 100') is a condenser or an evaporator or a radiator or a cooler. 5
13. The use of a tubing element (10, 10') to manufacture at least partially a heat exchanger means (100, 100') according to claim 10 or 11, exemplarily by tilting and/or sloping and at least partially helically winding and/or twisting the tubing element (10, 10') so as to form at least a part of a helical structure. 10
14. The use of a heat exchanger means (100, 100') according to claim 10 or 11 to exchange heat, exemplarily to use the heat exchanger means (100, 100') as a radiator or as a cooler as a condenser or as an evaporator. 15
15. Method of manufacturing of a tubing element (10, 10') according to any of claims 1 to 9, whereby exemplarily the tubing element (10, 10') is received by using an extrusion process of a heat transfer material, whereby preferably the extrusion process is a single extrusion process and/or whereby preferably the heat transfer material is at least partially aluminium or copper or an alloy thereof. 20 25

Amended claims in accordance with Rule 137(2) EPC. 30

1. Tubing element (10, 10') for a heat exchanger means (100), the tubing element (10, 10') being at least partially a rigid elongated heat exchanger tubing having at least a first end (20) and at least a second end (30) and having a first side wall (40) and a second side wall (50), the first side wall (40) and the second side wall (50) being arranged substantially parallel to each other and the width (W) of the first side wall (40) and the second side wall (50) is approximately at least 10 times larger than the distance (d) between the first side wall (40) and the second side wall (50) resulting in a substantially overall flat tubing structure, the tubing element (10, 10') having a plurality of fins (60, 60') on at least one of the outer surfaces (42, 52) of the first side wall (40) and/or of the second side wall (50), wherein the fins (60) have a defining angle Y' enclosed by the fins (60) and a connection wall (45, 55). 35 40 45 50
2. Tubing element (10, 10') according to claim 1,
characterized in that
 the first side wall (40) and second side wall (50) are connected respectively on both sides by a rounded connection wall (45, 55). 55
3. Tubing element (10, 10') according to claim 1 or 2,

characterized in that

the tubing element (10, 10') is at least partially tilted and/or sloped and at least partially helically wound and/or twisted so as to form at least a part of a helical structure, whereby preferably the helical structure has an overall cylindrical structure and/or that the helical structure is formed in a cylindrical shape.

4. Tubing element (10, 10') according to any of the preceding claims,

characterized in that

the tubing element (10, 10') has a plurality of fins (60, 60') on both of the outer surfaces (42, 52) of the first side wall (40) and of the second side wall (50).

5. Tubing element (10, 10') according to any of the preceding claims,

characterized in that

the fins (60, 60') are at least partially covered by covering wall (70, 80) and/or that the fins are monoblock fins (60, 60').

6. Tubing element (10, 10') according to any of the preceding claims,

characterized in that

the fins (60, 60') are perpendicularly arranged on the at least one of the outer surfaces (42, 52) of the first side wall (40) and/or of the second side wall (50).

7. Tubing element (10, 10') according to any of claims 1 to 5,

characterized in that

the fins (60, 60') are inclined arranged on the at least one of the outer surfaces (42, 52) of the first side wall (40) and/or of the second side wall (50), whereby exemplarily the angle between the fins (60, 60') and the outer surface (42, 52) is chosen within a range of approximately 35° to 55° and/or that the fins (60, 60') and/or the curve of fins (60') and at least one of the connection walls (45, 55) are arranged such to each other that they enclose an angle.

8. Tubing element (10, 10') according to any of the preceding claims,

characterized in that

the fins (60) merely extend along the whole width (W) of at least one of the outer surfaces (42, 52) of the first side wall (40) and/or of the second side wall (50) and/or are curved.

9. Tubing element (10') according to any of the preceding claims,

characterized in that

the fins (60') are arranged along a curve extending along the whole width (W) of at least one of the outer surfaces (42, 52) of the first side wall (40) and/or of the second side wall (50) and/or are curved, whereby between the fins (60') being arranged along a curve

is a pitch and/or gap and/or that the fins (60, 60') are arranged in a plurality of rows, preferably parallel rows and/or preferably along at least a part of the length of the tubing element (10').

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10. Heat exchanger means (100) having at least one tubing element (10, 10') according to any of the preceding claims.

11. Heat exchanger means (100) according to claim 10,

characterized in that

several tubing elements (10, 10') and that the tubing elements (10) are forming an overall substantially cylindrical structure having a central longitudinal axis (X) and that the tubing elements (10, 10') are spirally curved around the central longitudinal axis (X) and interleaved in the structure.

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12. Heat exchanger means (100) according to claim 10 or 11,

characterized in that

the heat exchanger means (100) is a condenser or an evaporator or a radiator or a cooler.

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13. The use of a tubing element (10, 10') to manufacture at least partially a heat exchanger means (100) according to claim 10 or 11, exemplarily by tilting and/or sloping and at least partially helically winding and/or twisting the tubing element (10, 10') so as to form at least a part of a helical structure.

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14. The use of a heat exchanger means (100) according to claim 10 or 11 to exchange heat, exemplarily to use the heat exchanger means (100) as a radiator or as a cooler as a condenser or as an evaporator.

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15. Method of manufacturing of a tubing element (10, 10') according to any of claims 1 to 9, whereby exemplarily the tubing element (10, 10') is received by using an extrusion process of a heat transfer material, whereby preferably the extrusion process is a single extrusion process and/or whereby preferably the heat transfer material is at least partially aluminium or copper or an alloy thereof.

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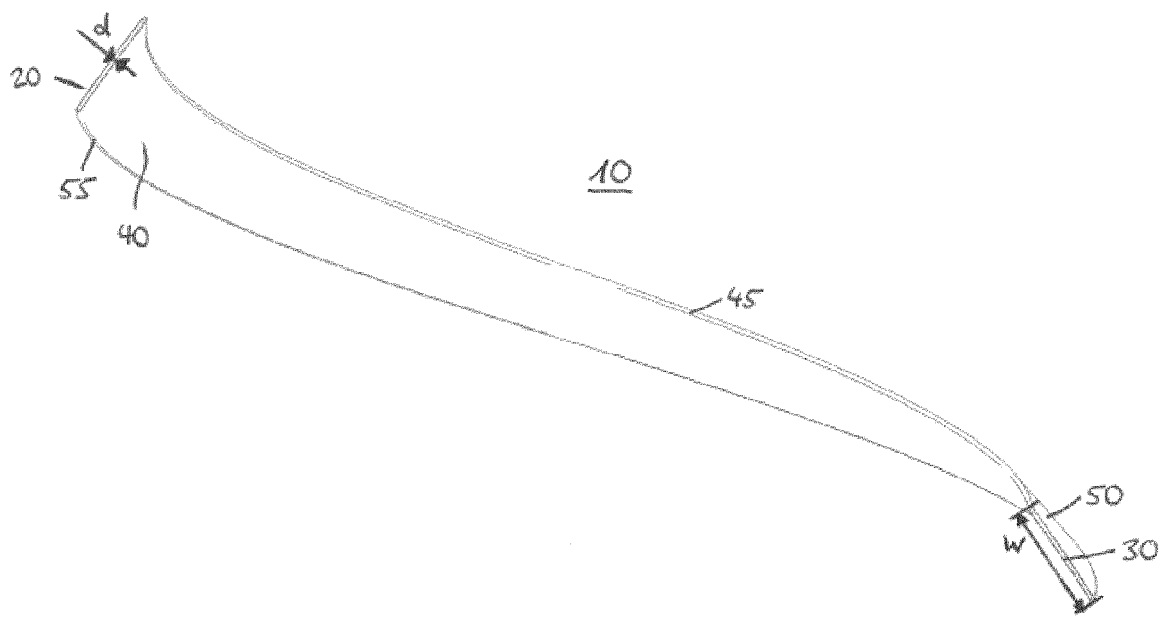


FIG. 1

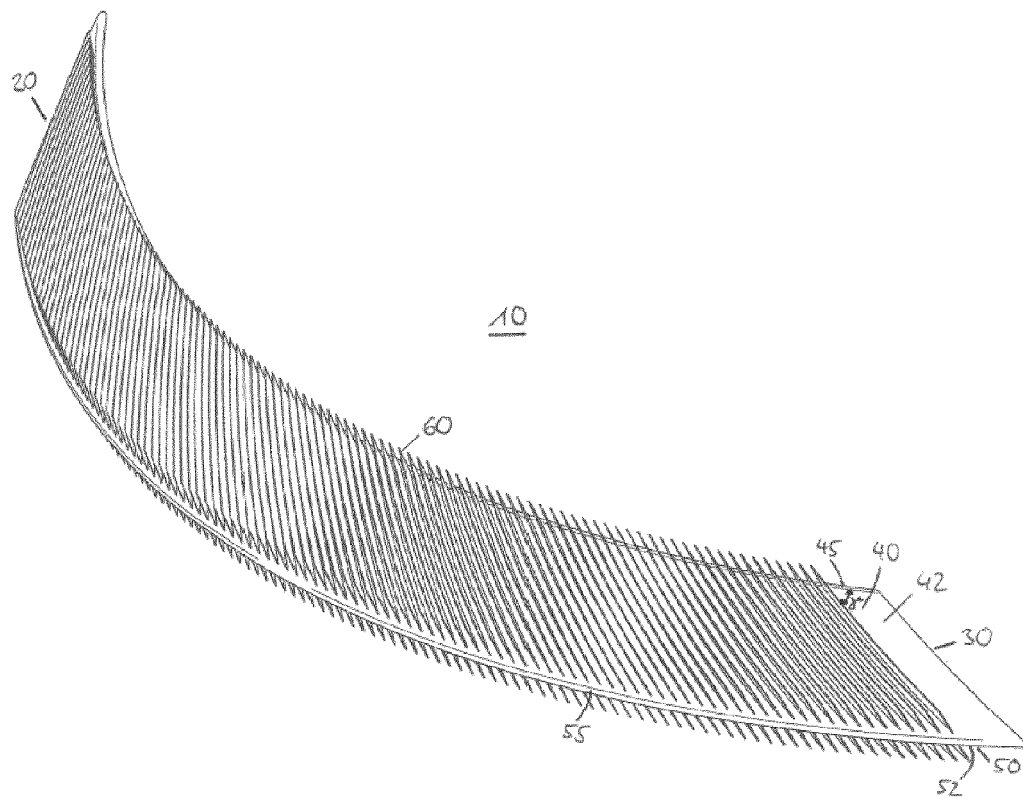


FIG. 2

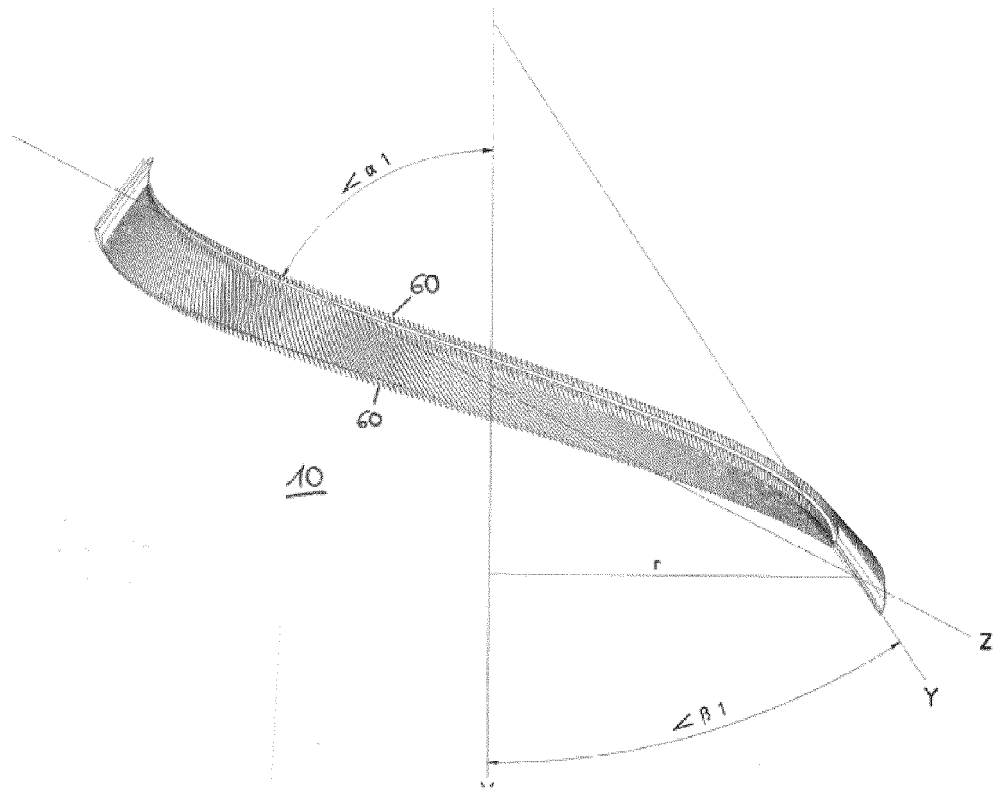


FIG. 3

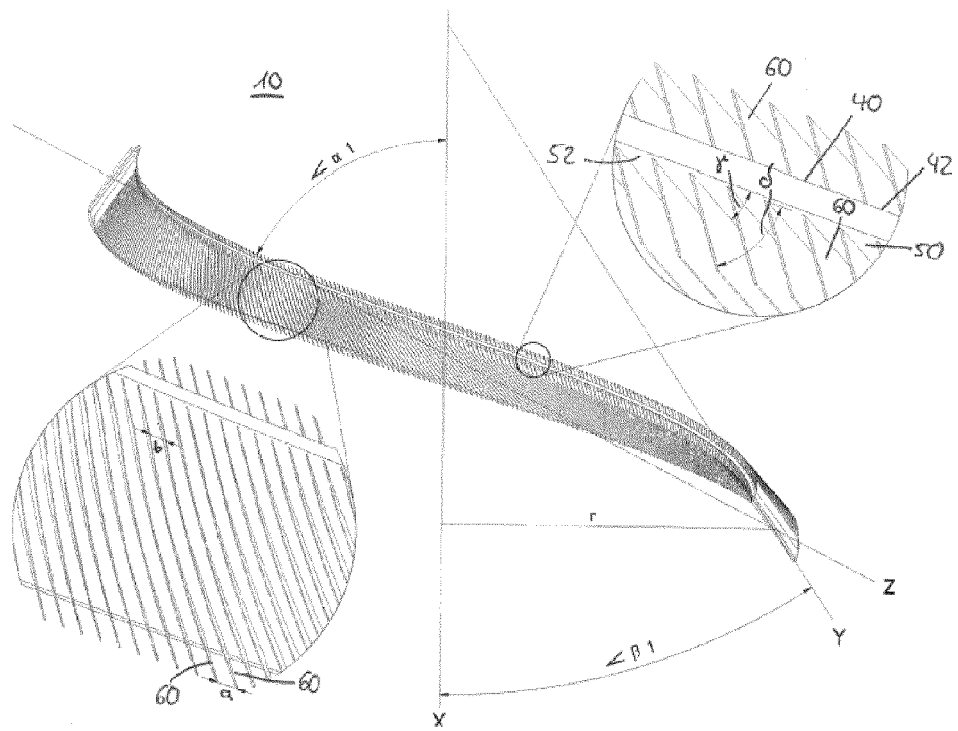


FIG. 4

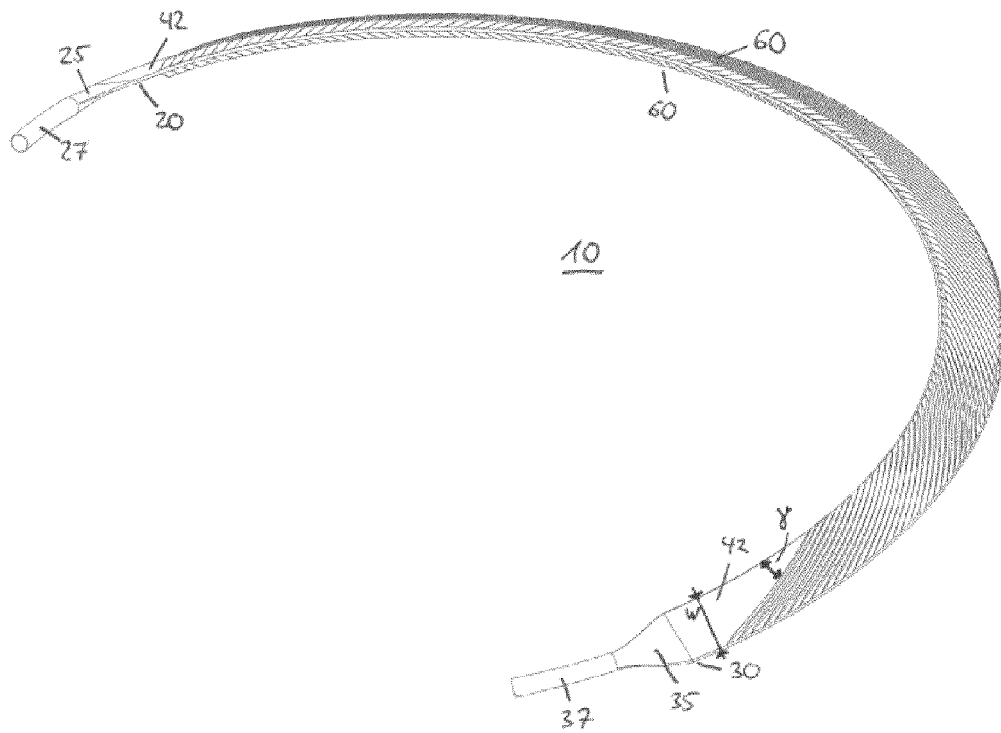


FIG. 5

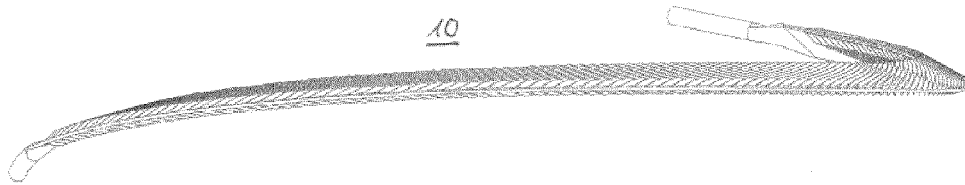


FIG. 6

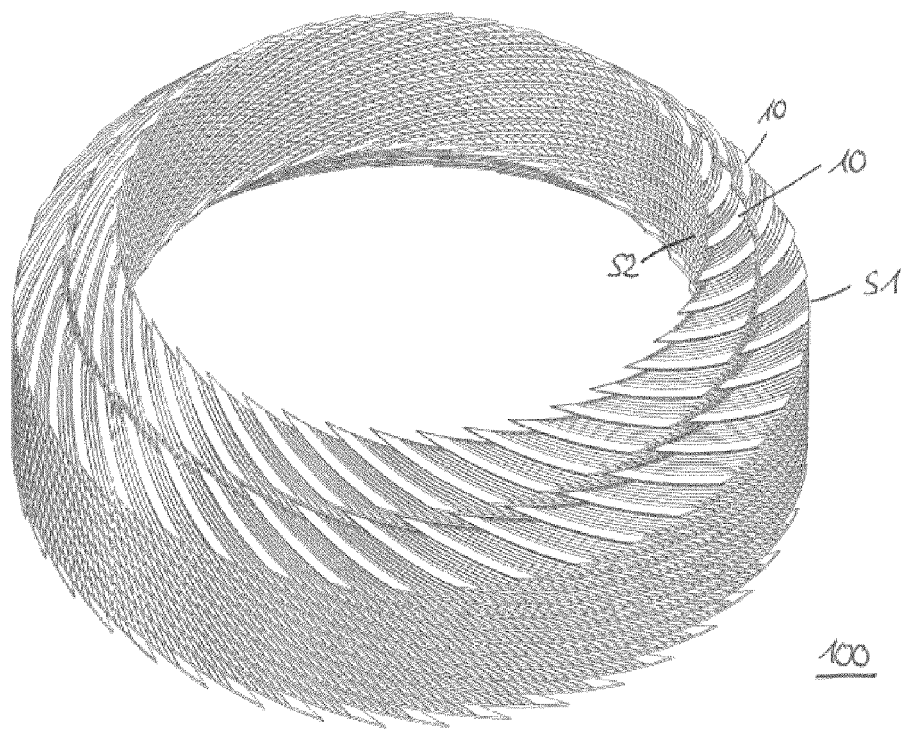


FIG. 7

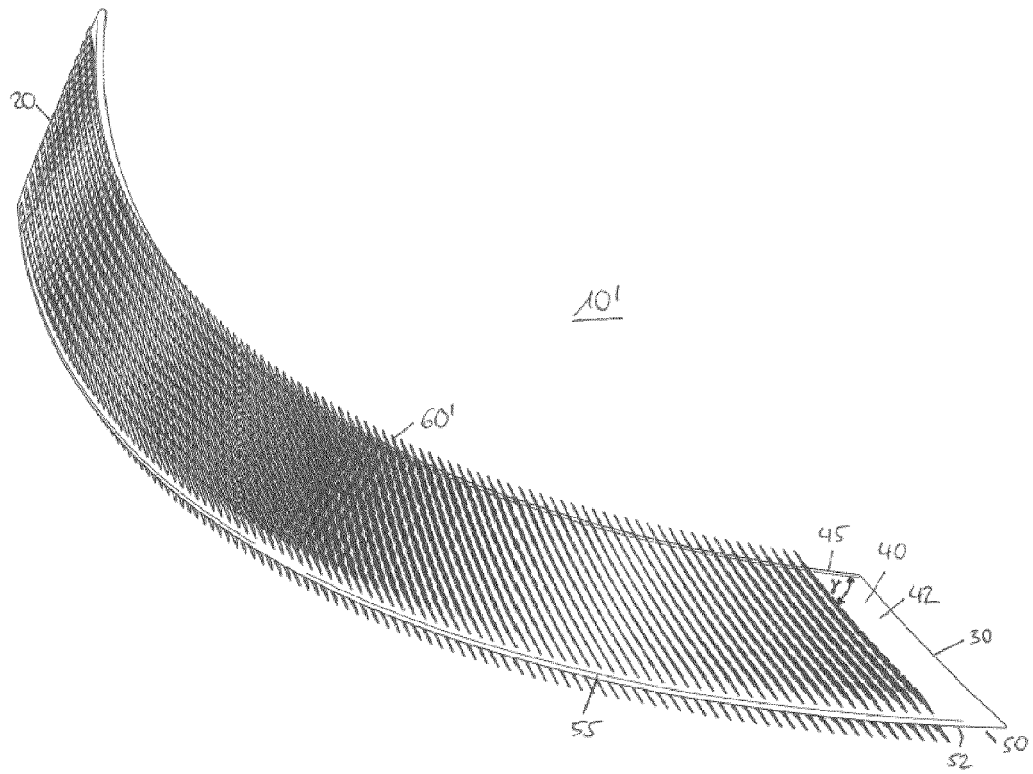


FIG. 8

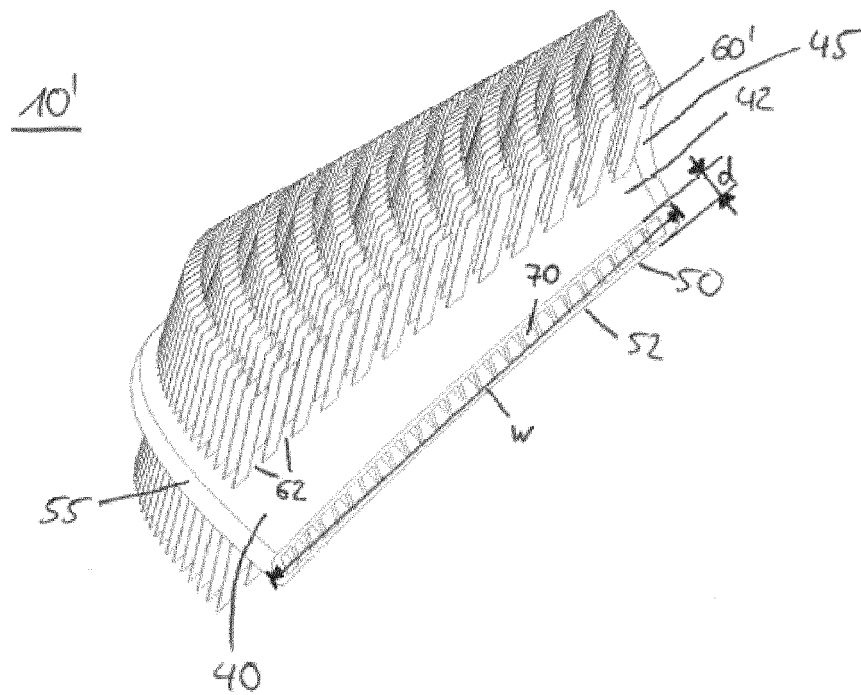


FIG. 9

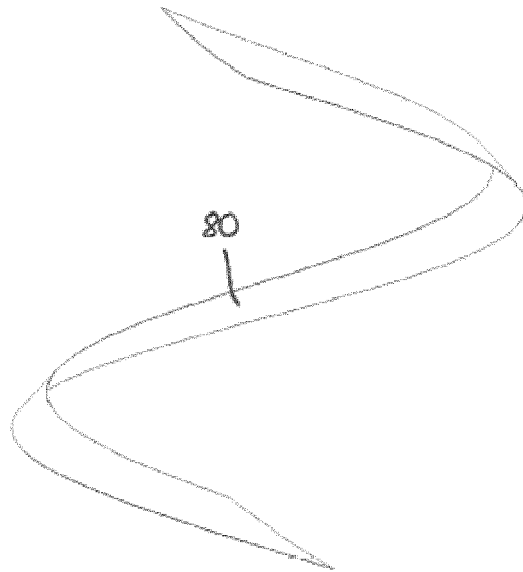


FIG. 10a

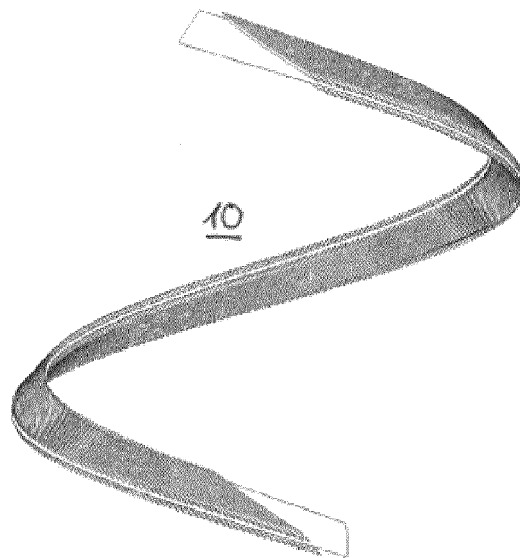


FIG. 10b

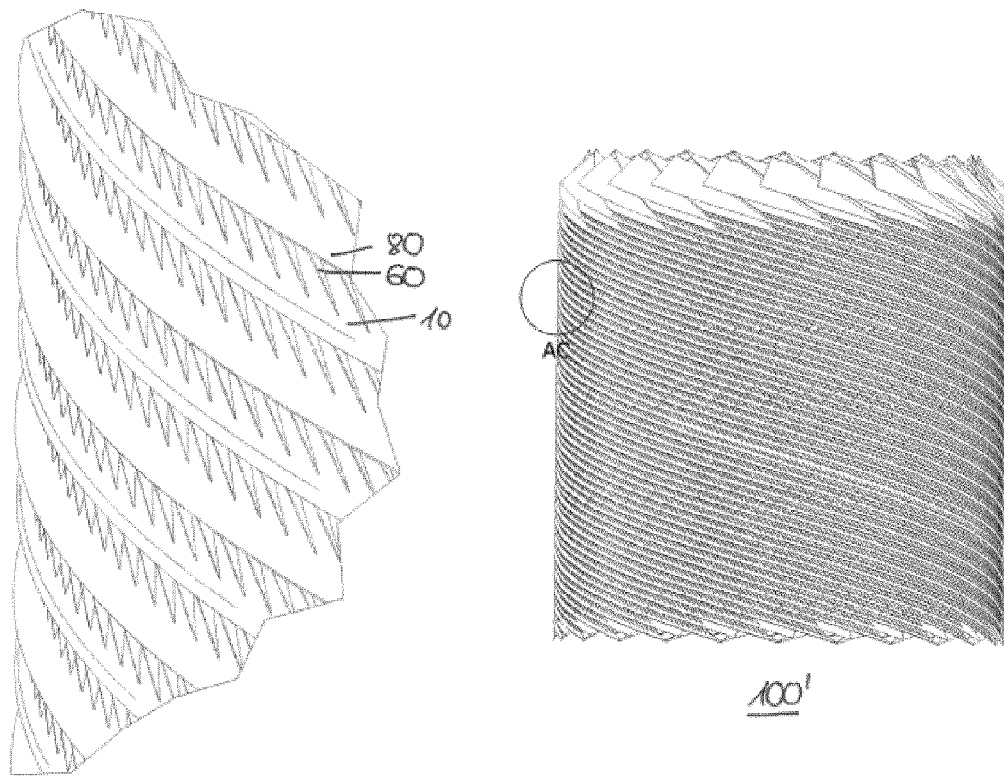


FIG. 11



EUROPEAN SEARCH REPORT

Application Number
EP 12 19 5014

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC) F28D F28F
Place of search Munich		Date of completion of the search 11 June 2013	Examiner Martínez Rico, Celia
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EPO FORM 1503 03.82 (F04C01)

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ON EUROPEAN PATENT APPLICATION NO.**

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The members are as contained in the European Patent Office EDP file on
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11-06-2013

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DE 3815647 A1	22-12-1988	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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