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(54) **U-shaped gutter element and assembly**

(57) The present disclosure concerns roof gutters, more particularly prefabricated modular U-shaped gutter elements for placement along roof edges or eaves.

The gutter element is provided having a generally U-shaped cross-sectional profile defining two legs (2, 2'), closed by a base (3); a first and a second longitudinal edge (4, 4'); and, a first and a second termination (5, 5'); characterized in that the gutter's cross-sectional profile has at least one seating portion (6, 6') on each leg, cor-

responding to seating surfaces on the gutter element, which portions define overlaying construction lines (7, 7') intersecting each other (8) on the closed side of the U-shaped profile at an angle α between 2 and 30 degrees; and, at least one of the first and second termination is tapered and/or widened allowing for a telescopic connection between similar elements.

Such elements lend themselves for easy on-site assembly of both right and left downsloping gutters.

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Description

[0001] The present disclosure concerns roof gutters, more particularly prefabricated modular U-shaped gutter elements for placement along roof edges or eaves.

[0002] Gutters are often installed starting from prefabricated fixed length elements. Such elements need to be assembled on-site so as to reach the necessary length. This is commonly performed by shoving the ends of adjacent elements forcibly into each other, The overlapping ends deform and form a telescopic joint. This results in less than optimal aesthetics, and also in an unsatisfactory water tightness.

[0003] Elements are therefore often placed end-to-end using connecting hardware that is either inserted inside the gutter, or else encloses adjacent elements externally. These two options are respectively illustrated in e.g. EP2048302 and FR2850413.

[0004] The need for connectors implies the manufacture and on-site availability of yet another piece of hardware. A better alternative is to preform narrowed or widened terminations on each gutter element, allowing for watertight telescopic joints without additional deformation and without the need for connecting hardware.

[0005] However, this alternative creates a new issue.

[0006] It has first to be emphasized that gutters need to slope down toward downspouts for proper drainage. The direction of the downslope, either right or left, is imposed by the location of the downspouts. Moreover, the polarity of a telescopic connection between elements is also imposed, as water should always flow from an inner into an outer element; otherwise, some water will leak between the walls of the telescoping parts and spill from the gutter.

[0007] Usual gutters have an asymmetrical cross-sectional profile with only one of both edges suitably formed for mounting against a vertical building wall. The other edge is then intended to be on the far side of the wall. Narrowing or widening gutter elements having such a profile "polarizes" the elements, making them suitable for either right or left running downslopes, but not for both. One would therefore need two different types of elements, one for right and one for left running downslopes, again an impractical situation.

[0008] The object of the present invention is to provide a single type of U-shaped gutter element, capable of forming watertight telescopic joints, while also adapted for assembly in both right and left sloping configurations.

[0009] According to a first embodiment, a gutter element made of sheet metal is provided having a generally U-shaped cross-sectional profile defining two legs (2, 2'), closed by a base (3); a first and a second longitudinal edge (4, 4'); and, a first and a second termination (5, 5'); characterized in that the gutter's cross-sectional profile has at least one seating portion (6, 6') on each leg, corresponding to seating surfaces on the gutter element, which portions define overlaying construction lines (7, 7') intersecting each other (8) on the closed side of the U-

shaped profile at an angle α between 2 and 30 degrees; and, at least one of the first and second termination is tapered and/or widened allowing for a telescopic connection between similar elements.

5 **[0010]** Said seating surface typically consists of a generally flat area suitable for attaching the element flush against a supporting surface such as a vertical building wall. This seating surface can however also bear ridges or grooves for aesthetic purposes or for enhancing the rigidity of the element.

10 **[0011]** Amongst the different possibilities, the gutter elements will typically be either:

- narrowed on one end;
- 15 - widened on one end;
- widened on one end and narrowed on the other end.

[0012] The first option is preferred because a visually more attractive result is obtained thanks to the avoidance of protuberances along the length of the gutter.

20 **[0013]** This flaring and/or swaging of the ends should preferably be performed over about 10 to 20 cm, so as to allow an adequate telescopic overlap of connecting elements with a reasonably snug fit to lower the risks of leaks.

25 **[0014]** The angle α between the seating portions on both legs ensures that the gutter will, if flooded during heavy rains, spill over on the far side of the building.

[0015] The preferred metal to be used in the manufacture of the gutter elements is Zn or Zn alloy such as the Ti-Cu-Zn alloys commonly used in the building industry.

30 **[0016]** The gutter element may have a symmetrical cross-sectional profile with respect to an axis (9) crossing the base (3). Symmetry results in an identical aspect of the gutter when mounted against a vertical wall, whether used in a right or in a left downsloping configuration.

35 **[0017]** Advantageously, the gutter element has longitudinal edges formed by hem-like closures (10, 10') folded towards the inside of the U-shaped cross-sectional profile. This provision enhances the mechanical stability of the elements while the edges remain clear of the seating plane.

40 **[0018]** According to another embodiment, a gutter system is defined comprising at least one gutter element, further comprising one or more sheet metal stiffeners (11) having a first and a second hook (12, 12') cooperating with the first and second edge (4, 4') of the gutter element. Preferably, a plurality of stiffeners are used per single gutter element.

50 **[0019]** The stiffeners may further comprise an essentially linear portion (13) between the first and second hook (12, 12'), said portion being entirely inscribed inside the U-shaped cross-sectional profile. This renders these stiffeners essentially invisible once the gutter is mounted.

55 **[0020]** The stiffeners are advantageously provided with a portion (14) forming a surface mating with an inner seating surface on one of the gutter's legs (6, 6'). This area of the stiffeners may be provided with one or more

guiding holes suitable for attaching the gutter to a vertical wall using e.g. screws or nails. Such stiffeners thus serve the additional purpose of reinforcing and strutting the gutter at its fixation points.

[0021] According to another embodiment, a building-mounted gutter assembly is provided, wherein the gutter element is attached with an outer seating surface against a vertical wall (16), thereby defining a building-side gutter edge (17) and an outward-side gutter edge (18), the outward-side edge being located below the level of the building-side edge. A level difference of at least 6 mm is preferred, which corresponds to the requirements of European norm EN 612.

[0022] The invention is illustrated in Figures 1 to 4.

[0023] Figure 1 shows the U-shaped cross-sectional profile of a gutter element, in particular:

- (2, 2') the two legs of the profile;
- (3) the base of the profile, connecting the two legs;
- (4, 4') the first and second longitudinal edges;
- (6, 6') the seating portions, which also define seating surfaces on the gutter element;
- (7, 7') the constructional lines overlaying the seating portions;
- (8) the point of intersection between the constructional lines, defining angle α ;
- (9) the axis of symmetry, which crosses the base of the profile;
- (10, 10') the hem-like closures forming the longitudinal edges.

[0024] The seating surfaces defined by the seating portions of the, U-shaped cross-sectional profile are present on the inside as well as on the outside of the gutter element. This is because the wall thickness of a gutter is negligible compared to its typical cross section. Obviously, it is the outer seating surface that is relevant when attaching the element to a vertical wall. The inner seating surface is relevant with respect to specific features of the stiffeners, as the stiffeners are normally located inside the gutter element.

[0025] Figure 2 is a 3D view of the system including a gutter element and a stiffener, emphasizing a possible embodiment of the seating surfaces on each leg. Are shown:

- (1) a gutter element;
- (5, 5') the first and a second termination of the gutter element;
- (6, 6') the seating surfaces on the gutter element (hatched);
- (11) a stiffener.

[0026] Stiffeners are typically made of sheet metal, preferably of galvanized or stainless steel. They may optionally comprise a mesh-like structure, in particular on their linear portion (13). This allows for an easier inflow of water into the gutter while minimally affecting the me-

chanical strengths.

[0027] Figure 3 is a cross-sectional view showing the cooperation between gutter element and stiffener. Are shown:

- (12, 12') the hooks of the stiffener cooperating with the edges of the gutter;
- (13) the linear portion of the stiffener, bridging the width of the gutter;
- (14) the portion on the stiffener's profile mating with a seating portion on one of the gutter's legs;
- (15) a guiding hole in the stiffener suitable for use by penetrating gutter attaching means.

[0028] The guiding hole in the stiffener facilitates the mounting operations greatly, even if the gutter element itself is not provided with corresponding piercings. The gutter element indeed consists of a relatively thin sheet of zinc or zinc alloy, and is easily pierced by a screw or a nail when pushed through the guiding hole.

[0029] Figure 4 is a cross-sectional view of the gutter element and a stiffener when positioned against a vertical wall. Are shown:

- (16) a vertical wall, which is part of the building;
- (17) the building-side edge of the gutter;
- (18) the outward-side edge of the gutter; the difference (h) between the level of both edges is shown using construction lines.

[0030] The lower relative level of the outward edge guarantees that any spillover will primarily occur away from the walls, thus avoiding the risks of infiltration of moist into the building.

Claims

1. A gutter element (1) made of sheet metal having
 - a generally U-shaped cross-sectional profile defining two legs (2, 2'), closed by a base (3);
 - a first and a second longitudinal edge (4, 4'); and,
 - a first and a second termination (5, 5');

characterized in that

 - the gutter's cross-sectional profile has at least one seating portion (6, 6') on each leg, corresponding to seating surfaces on the gutter element, which portions define overlaying construction lines (7, 7') intersecting each other (8) on the closed side of the U-shaped profile at an angle α between 2 and 30 degrees; and,
 - at least one of the first and second termination is tapered and/or widened allowing for a telescopic connection between similar elements.
2. The gutter element according to claim 1, wherein the

cross-sectional profile is symmetrical with respect to an axis (9) crossing the base (3).

- 3. The gutter element according to claims 1 or 2, wherein the longitudinal edges are formed by hem-like closures (10, 10') folded towards the inside of the U-shaped cross-sectional profile. 5

- 4. A gutter assembly comprising at least one gutter element according to any one of claims 1 to 3, further comprising one or more sheet metal stiffeners (11) having a first and a second hook (12, 12') cooperating with the first and second edge (4, 4') of the gutter element. 10
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- 5. The gutter assembly according to claim 4, wherein the stiffeners comprise an essentially linear portion (13) between the first and second hook (12, 12'), said portion being entirely inscribed in the U-shaped cross-sectional profile. 20

- 6. The gutter assembly according to claims 4 or 5, wherein the stiffeners are provided with a portion (14) forming a surface mating with a seating surface on one of the gutter's legs (6,6'). 25

- 7. The gutter assembly according to claim 6, wherein said stiffener portion (14) mating with a seating surface on one of the gutter's legs (6, 6') is provided with a guiding hole (15) suitable for use by penetrating means for attaching the gutter to a vertical wall. 30

- 8. Building-mounted gutter assembly according to any one of claims 4 to 7, wherein the gutter element is attached with a seating surface against a vertical wall (16), thereby defining a building-side gutter edge (17) and an outward-side gutter edge (18), the outward-side edge being located at least 6 mm below the level of the building-side edge. 35
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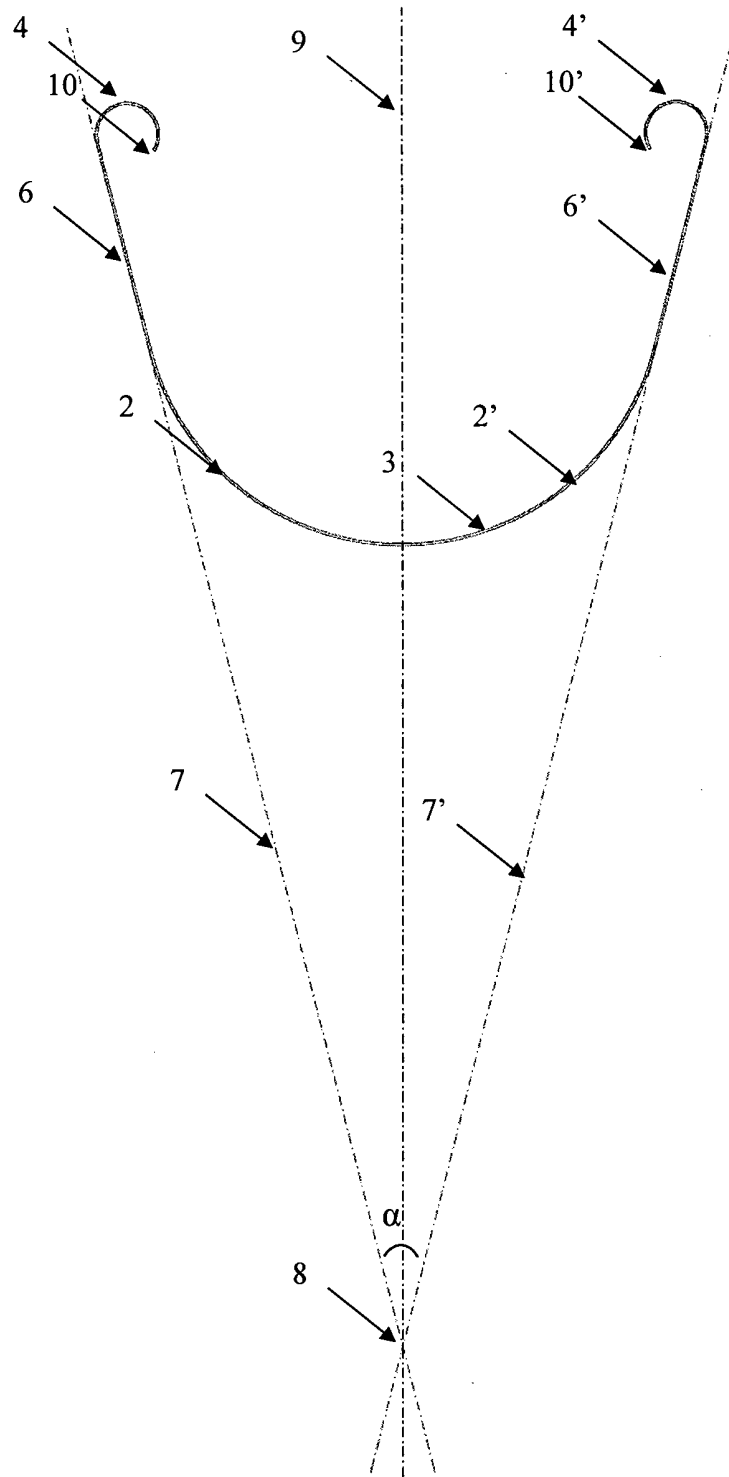


Fig. 1

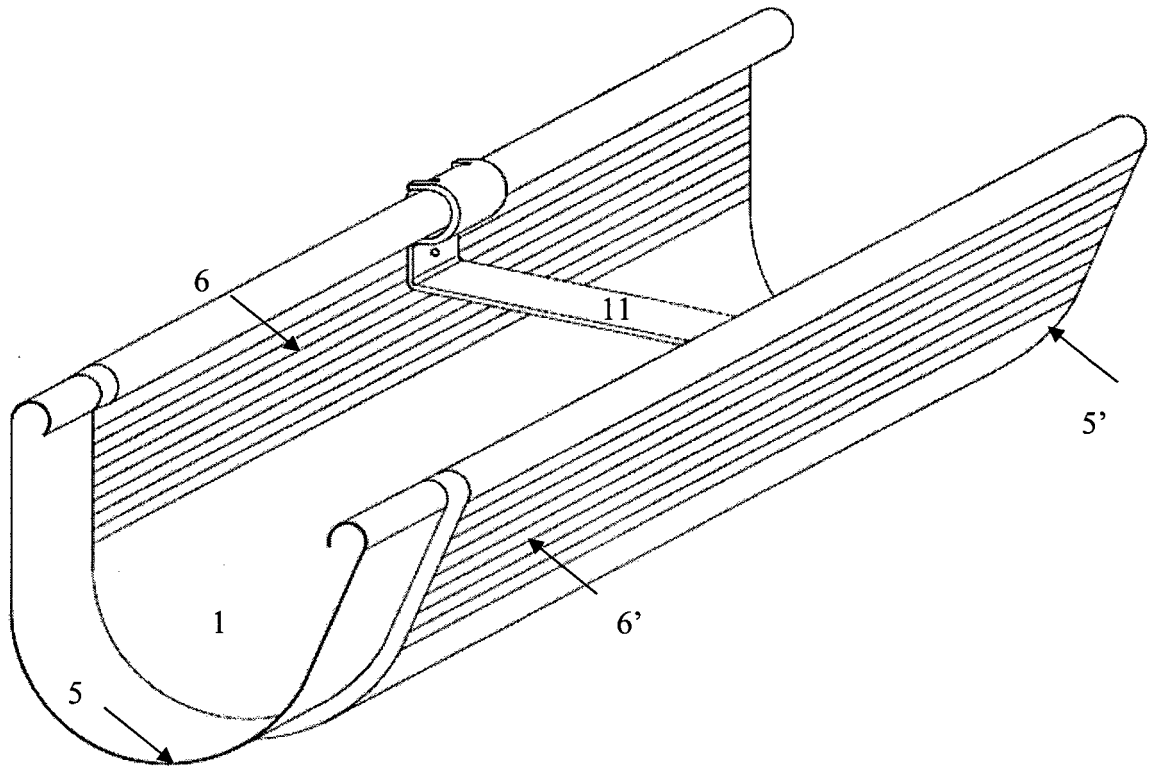


Fig. 2

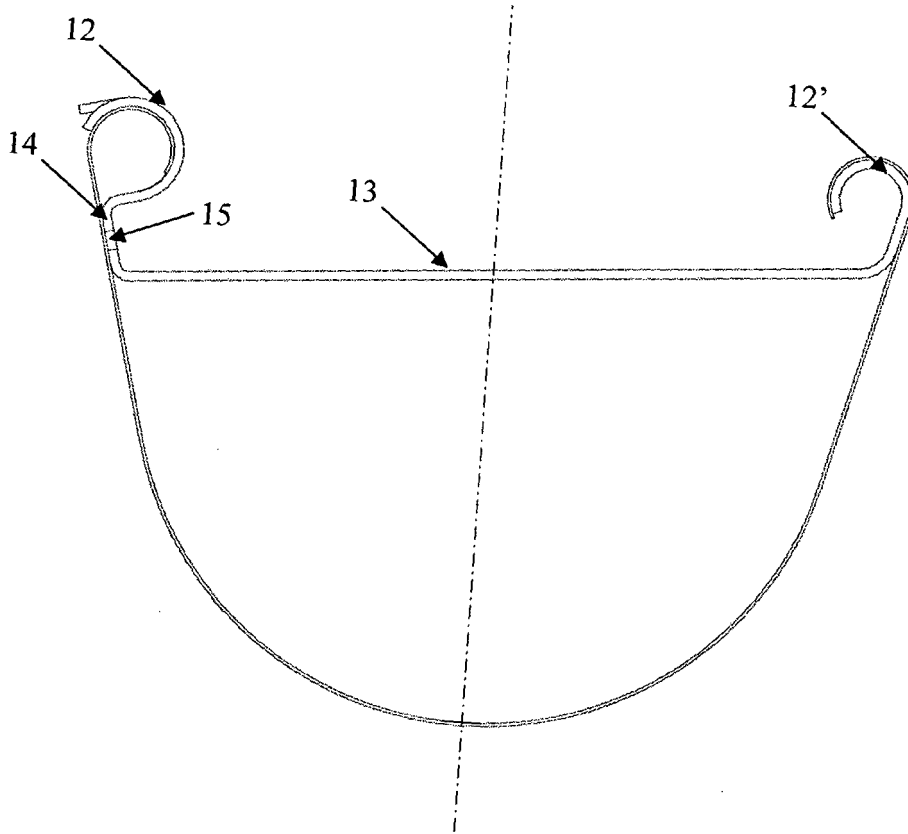


Fig. 3

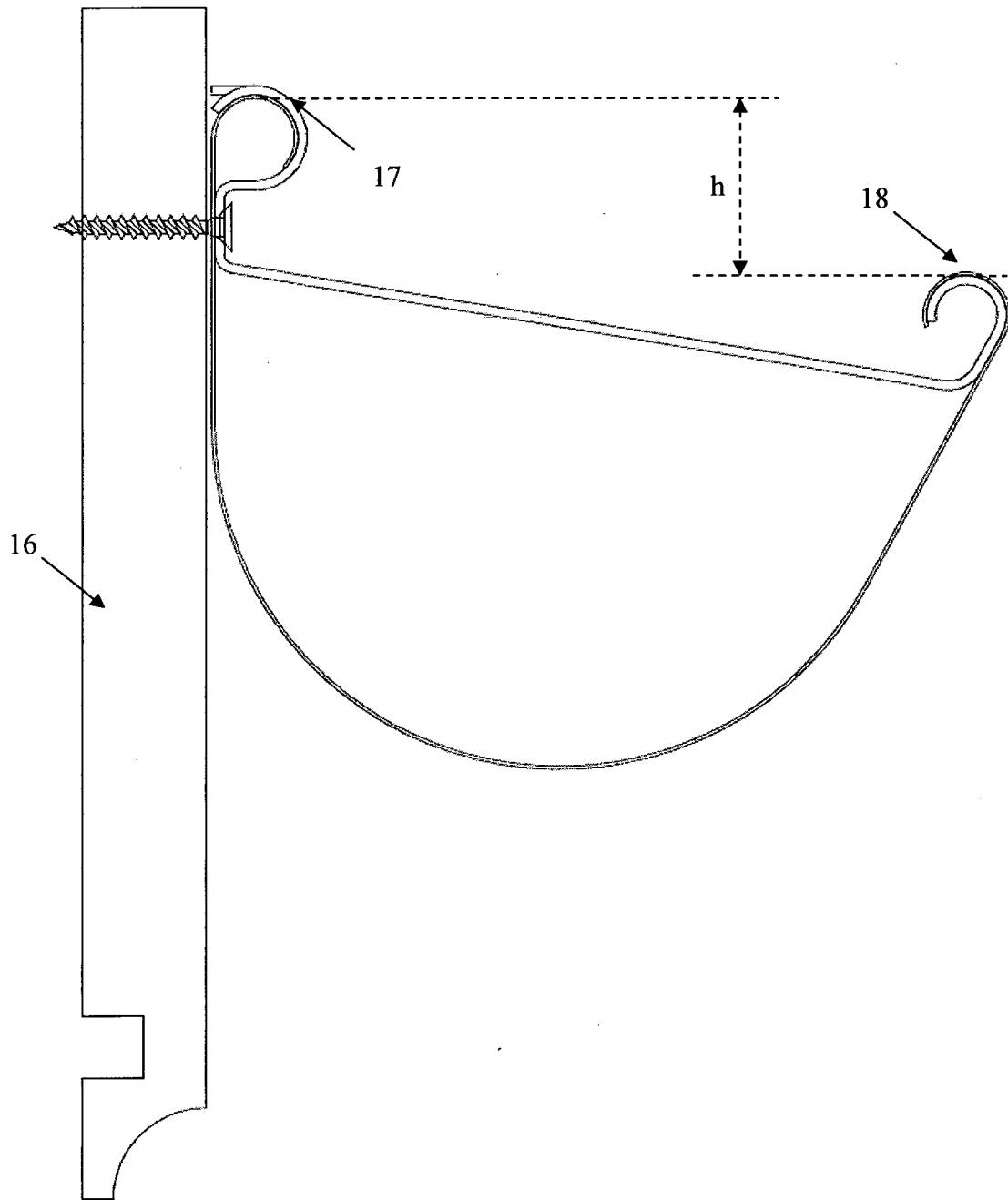


Fig. 4



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Application Number
EP 14 29 0183

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ANNEX TO THE EUROPEAN SEARCH REPORT
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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