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(71) Applicant: **Easy Sanitairy Solutions B.V.**
7581 EZ Losser (NL)

(72) Inventor: **Keizers, Jurgen Hendrik Peter Joseph**
7581 AL Losser (NL)

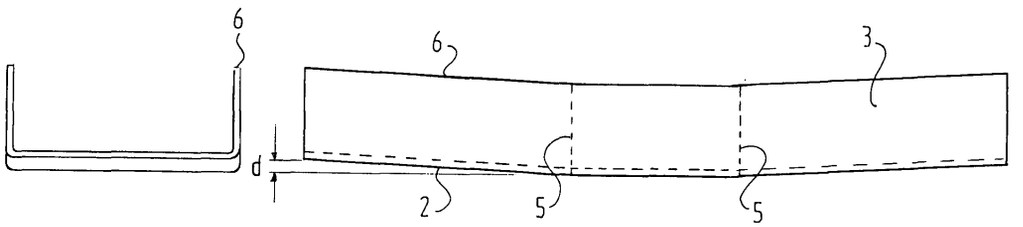
(74) Representative: **'t Jong, Bastiaan Jacobus et al**
Arnold & Siedsma
Advocaten en Octrooigemachtigden
Sweelinckplein 1
2517 GK Den Haag (NL)

(54) Method for arranging a bend in a plate

(57) The invention relates to a method for arranging a bend in a plate, which method comprises the steps of:

- providing a steel plate;
- folding the plate into a U-shaped gutter (1), wherein the plate comprises a bottom surface (2) and two parallel upright side surfaces (3,4);
- locally heating at least one continuous area of at least one of the upright side surfaces to substantially above 700°C.

FIG. 1B



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Description

[0001] The invention relates to a method for arranging a bend in a plate. The invention relates particularly to the arranging of a bend in a plate folded into a U-shaped gutter. Such gutters are applied in particular as drains in for instance bathrooms. It is important in such gutters that the top side of the gutter lies flush with the floor, while there must be a fall in the gutter to enable excess liquid to be drained to an outlet pipe.

[0002] It is known in the prior art to provide such a bend in a plate by folding it into a U-shaped gutter and then cutting into the side surfaces, subsequently bending the plate, whereafter the cut parts are welded together again. The drawback of this method is that firstly it requires many operations and it moreover requires much effort to make the welds properly liquid-tight and furthermore prevent the weld corroding after a period of time.

[0003] Another option for providing a bend in such a plate is to press the plate into the correct shape in a press tool. The drawback here however is that the dies required for such a press tool entail high cost, which is disadvantageous when relatively small numbers of different dimensions are being produced.

[0004] It is therefore an object of the method according to the invention to obviate the above stated problems.

[0005] This object is achieved with a method according to the invention, which method comprises the steps of:

- providing a steel plate;
- folding the plate into a U-shaped gutter, wherein the plate comprises a bottom surface and two parallel upright side surfaces;
- locally heating at least one continuous area of at least one of the upright side surfaces to substantially above 700°C.

[0006] By locally heating at least one continuous area of at least one of the upright side surfaces to substantially above 700°C the steel plate will contract at the position of the heating after cooling, thereby shortening the side surface, which is compensated by bending of the bottom surface of the plate.

[0007] It can be established experimentally how much heat must be supplied and for how long in order to obtain the desired bending.

[0008] A continuous area is understood to mean an area at a distance from the edges of the side surfaces. Contraction will also occur when two plate parts are welded, but it is precisely this which is not meant by a continuous area. The advantage of this method according to the invention is precisely that no slit has to be made whereby two edges are created which are then welded together again. It is precisely by only heating the position locally that the contraction occurs by which a bend is created.

[0009] In a preferred embodiment of the method, a continuous area on each side surface is heated locally, and the two areas for heating lie opposite each other relative to the longitudinal axis of the gutter. A uniform bending is hereby obtained with a bending axis perpendicular to the longitudinal axis of the gutter. The bending can be well controlled when both areas are heated simultaneously.

[0010] In another preferred embodiment of the method according to the invention, the local heating takes place by applying a weld. A large amount of heat can be easily applied in a small area using a weld. This preferably takes place by means of laser welding since the energy can be regulated easily therewith.

[0011] The weld preferably runs substantially perpendicularly of the bottom surface.

[0012] In another embodiment of the method according to the invention, a drain is arranged in the bottom surface for draining a liquid such as water. It is precisely due to this bending method that it is possible to keep the top side of the gutter flat, while the bottom surface has a fall oriented toward the drain. The at least one heated continuous area in the at least one side surface is therefore arranged close to the drain such that the bottom surface slopes toward the drain.

[0013] In yet another embodiment, the method according to the invention comprises the step of folding over the free longitudinal edge of at least one of the side surfaces. Due to the folding a round, finished edge is obtained which is not too sharp and which is moreover completely flat and can therefore lie flush with a floor or the like.

[0014] In another embodiment, the method according to the invention comprises the step of shaping the steel plate such that after the local heating the free longitudinal edge of the side surfaces is substantially straight. An additional folding operation is hereby avoided.

[0015] These and other features of the invention are further elucidated with reference to the accompanying drawings.

[0016] Figures 1A to 1D show the different steps of a first embodiment of a method according to the invention.

[0017] Figures 2A to 2D show a second embodiment of a method according to the invention.

[0018] Figure 1A shows a steel plate 1 which has been folded into a U-shaped gutter. This U-shaped gutter 1 has a bottom surface 2, a first side surface 3 and a second side surface 4.

[0019] In figure 1B two vertical welds 5 are arranged in side surfaces 3, 4, each in a continuous area, whereby, after cooling of the weld, contraction occurs in side surface 3, 4 and whereby the outer ends of bottom surface 2 bend upward through a distance D.

[0020] Due to the upward bending the upper edge 6 of side surfaces 3, 4 is also bent. In order to now make the upper edge 6 of side surfaces 3, 4 straight, the upper edge 6 is folded over, thereby creating a straight upper

edge 7.

[0021] Figure 2A shows a second embodiment of the method according to the invention. Here too a plate 10 is once again bent to form a U-shaped gutter with a bottom surface 11 and two side surfaces 12. The upper edge 13 of side surfaces 12 is provided with two chamferings. A trap 14 is further arranged in the middle of bottom surface 11 so that for instance a liquid entering the gutter can be drained.

[0022] In figure 2B welds 15 are once again arranged in side surfaces 12. Owing to these welds 15 there occurs contraction, whereby the ends of bottom surface 11 bend upward. Due to the chamferings arranged on upper edge 13 of side surfaces 12, a straight upper edge 16 is formed by this upward bending of bottom surface 11.

[0023] For finishing of straight upper edge 16, this upper edge 16 can optionally be folded over so that a rounded edge 17 results. This is shown in figures 2C and 2D.

Claims

1. Method for arranging a bend in a plate, which method comprises the steps of:

   - providing a steel plate;
   - folding the plate into a U-shaped gutter, wherein the plate comprises a bottom surface and two parallel upright side surfaces;
   - locally heating at least one continuous area of at least one of the upright side surfaces to substantially above 700°C.

2. Method as claimed in claim 1, wherein a continuous area on each side surface is heated locally, and wherein the two areas for heating lie opposite each other relative to the longitudinal axis of the gutter.

3. Method as claimed in claim 1 or 2, wherein the local heating takes place by applying a weld.

4. Method as claimed in claim 3, wherein the weld runs substantially perpendicularly of the bottom surface.

5. Method as claimed in any of the foregoing claims, wherein a drain is arranged in the bottom surface for draining a liquid such as water.

6. Method as claimed in claim 5, wherein the at least one heated continuous area in the at least one side surface is arranged close to the drain such that the bottom surface slopes toward the drain.

7. Method as claimed in any of the foregoing claims, comprising the step of folding over the free longitudinal edge of at least one of the side surfaces.

8. Method as claimed in any of the foregoing claims, comprising the step of shaping the steel plate such that after the local heating the free longitudinal edge of the side surfaces is substantially straight.

FIG. 1A

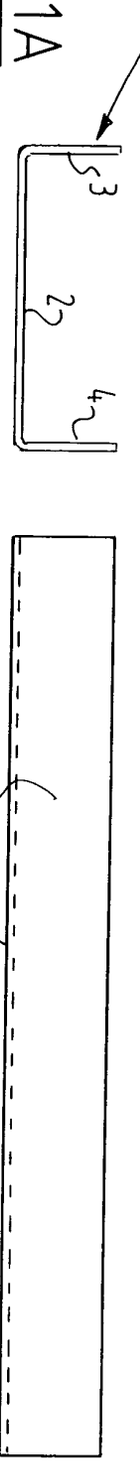


FIG. 1B

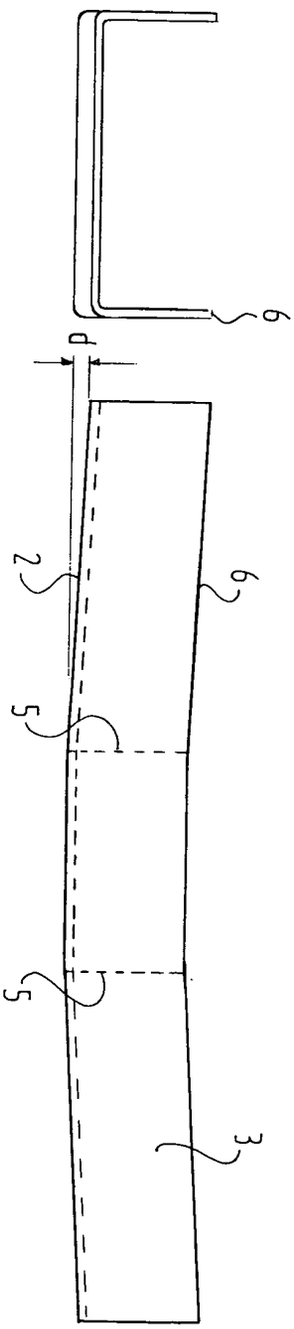


FIG. 1C

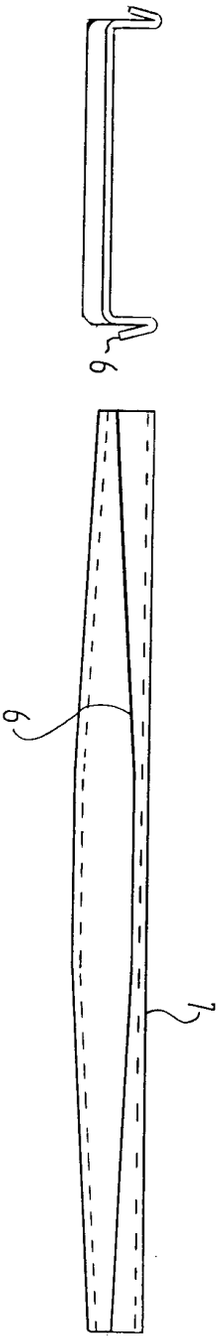


FIG. 1D

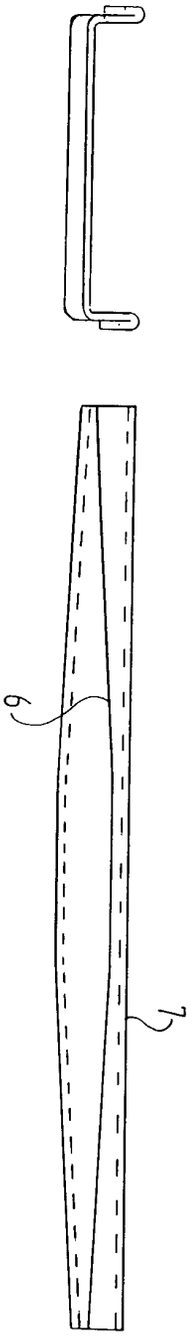


FIG. 2A

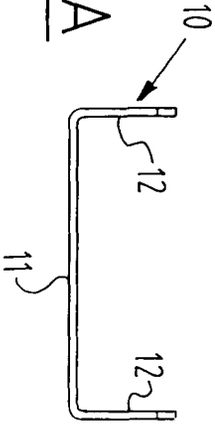
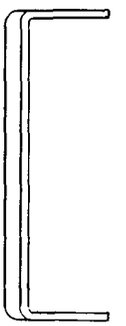


FIG. 2B



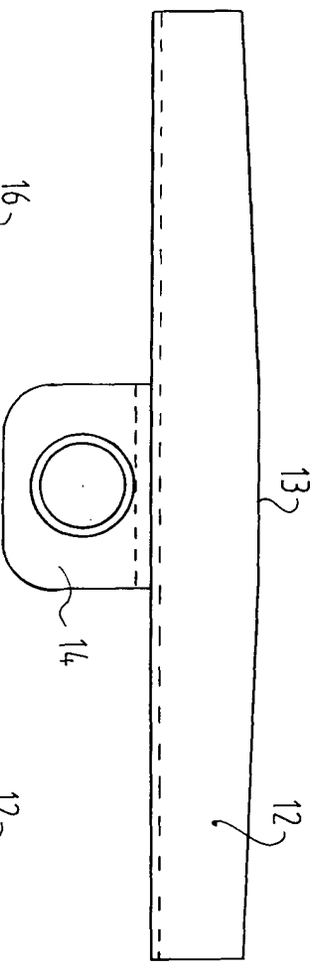
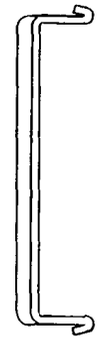


FIG. 2C



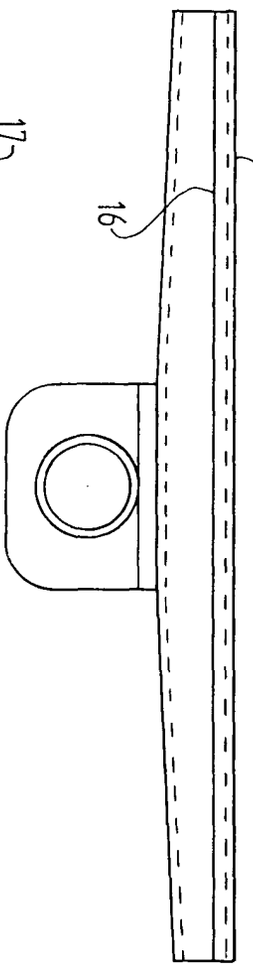
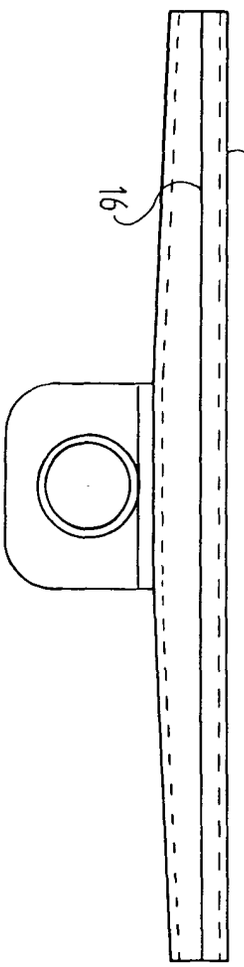


FIG. 2D



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EUROPEAN SEARCH REPORT

Application Number
EP 05 07 6167

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	PATENT ABSTRACTS OF JAPAN vol. 2003, no. 09, 3 September 2003 (2003-09-03) & JP 2003 136149 A (NIPPON KOKAN LIGHT STEEL KK), 14 May 2003 (2003-05-14) * abstract * -----	1,3,4	B21D11/20
X	JP 2003 136149 A (NIPPON KOKAN LIGHT STEEL KK) 14 May 2003 (2003-05-14) * the whole document * -----	1,3,4	
A	WO 01/73231 A (NIELSEN CLAUS DYRE) 4 October 2001 (2001-10-04) * the whole document * -----	5,7	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B21D
E03C
E03F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	5 August 2005	Ris, M

CATEGORY OF CITED DOCUMENTS

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05-08-2005

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