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(54) Method for manufacturing a bed for an ironing device, a bed for an ironing device and an ironing device provided with such a bed

(57) The invention relates to a method for manufacturing a chest (1) for an ironing device, heatable with steam or liquid, in which the chest (1) is composed of two opposite plates (2, 3) having a different thickness, in which the method comprises providing perforations in the thinnest plate (3) distributed across the entire surface thereof, pre-bending said plates (2, 3), welding said two plates (2, 3) to one another at the locations where said perforations are provided, resulting in weld points (4), and forming hollow spaces (5) between said weld points (4) by introducing a pressurized liquid between the plates (2,3) which are connected to one another by weld points (4). Furthermore, the invention relates to a chest (1) heatable with steam or liquid manufactured by means of such a method and an ironing device provided with such a chest (1).

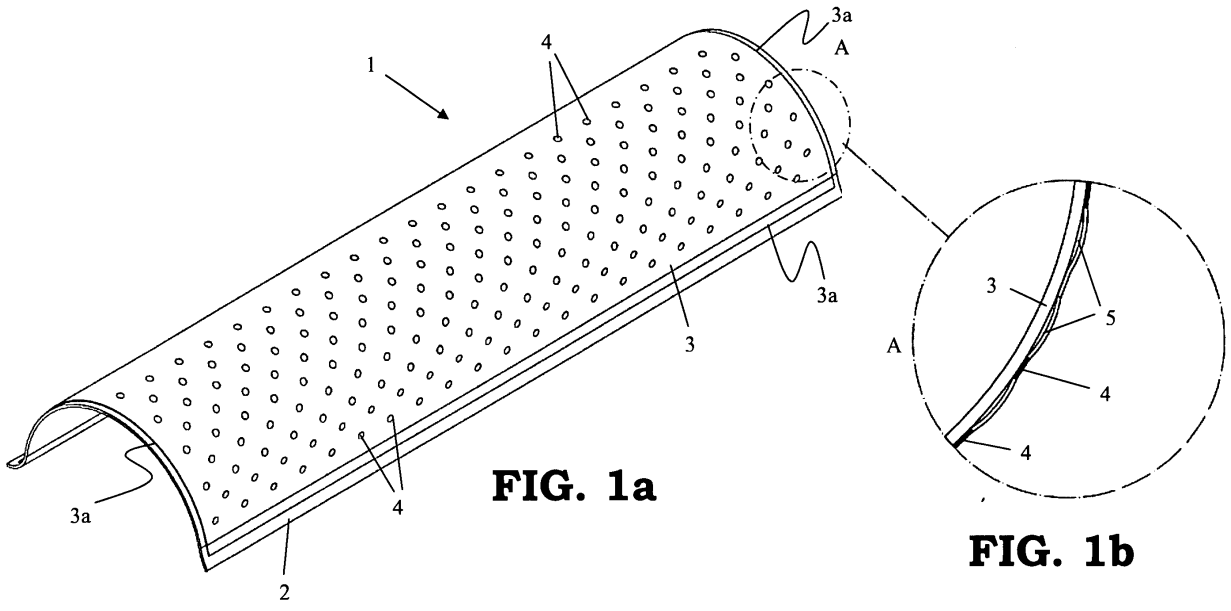

FIG. 1a

FIG. 1b

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Description

[0001] The invention relates on the one hand to a method for manufacturing a chest for an ironing device, heatable with steam or liquid, for example oil. On the other hand, the invention relates to a chest heatable with steam or liquid for an ironing device. Furthermore, the invention relates to an ironing device provided with such a chest.

[0002] Up until now, various ways have been known for manufacturing chests heatable with steam or liquid.

[0003] Thus, for example, GB 873 881 discloses a chest which can be heated by means of a liquid, preferably saturated steam, and which is manufactured by placing a semicylindrical inner plate and an outer plate which is locally deformed at various locations on top of one another and attaching them to one another in such a manner that a multicellular space is provided between the two plates, in which all cells are permanently connected to one another. The outer plate, which was pre-formed in such a manner that it is provided with rows of protrusions (= punched plate), is bent and is attached to the inner plate in such a manner that the protrusions come into contact with this inner plate and that the two plates are securely connected to one another by welding through the craters which have been formed by said protrusions in the outer plate. Furthermore, the longitudinal sides of the outer plate are bent inwards and are welded to the corresponding part of the inner plate with which it comes into contact. In this case, the deformed outer plate is half as thick as the semicylindrical inner plate.

[0004] However, the drawback of this method is that punching the thinnest outer plate is a complex processing step.

[0005] A further method for manufacturing chests heatable with steam or liquid comprises pre-bending a plate having a thickness between 15 and 20 mm, and welding angle-shaped metal platelets having a thickness of 10 mm onto this plate and onto one another.

[0006] However, the drawback of this method is that it is very labour intensive. In addition, it results in each case in a chest where the volume between the metal platelets and the plate is relatively large. The space which is formed by welding metal platelets onto said plate and onto one another thus has to be divided into at least 2 chambers which are completely separated from one another since the volume formed by said metal platelets must not, according to standards, be greater than 25 litres. In addition, strong welds have to be produced, which results in deformation of the chest and requires intense finishing, such as straightening and milling of the chest.

[0007] EP 0 573 402 A1 describes a method for manufacturing chests heatable with liquid. In this case, flexible stainless steel plates are welded to one another by laser welding with the aid of a weld seam along their periphery and with the aid of a series of weld points distributed over their surface. After welding, hollow spaces are formed between said weld points by introducing a pressurized liquid between the plates which are connected to one another by weld points.

[0008] A drawback of this method is that this method is not suitable for manufacturing chests for an ironing device which can be heated using pressurized steam, with this pressure normally being between 6 and 13 bars. The weld seams may fail under the effect of the steam. The flexible stainless steel plates are also subject to strong corrosion. In addition, impure steam causes pitting corrosion.

[0009] EP 1 120 488 A2 therefore describes such a method for manufacturing chests heatable with steam or liquid in which the weld points are made stronger. However, this solution does not entirely solve said problem completely. In practice, chests which are manufactured according to this method and are heated with steam have a limited operational life.

[0010] FR 2 652 016 A1 describes a method for connecting a heat exchanger to a cylindrical vessel for drinks or liquids which undergo biochemical reactions. In this case, a thin stainless steel plate is provided with perforations and welded onto the vessel at the locations where said perforations have been provided. However, the heat exchanger which is thus produced is only suitable for liquids to flow through at a limited pressure. A chest heatable with liquid or steam has to be able to operate at an operating pressure of approximately 10 to 12 bars. Legislation indicates that, to this end, a minimum bursting pressure is required which is at least 10 times the operating pressure. It is not possible to produce such a chest by using the method from FR 2 652 016 A1. In addition, steam can certainly not flow through such a heat exchanger, as it is subject to strong corrosion and pitting corrosion.

[0011] It is therefore an object of the invention to provide a simple, cost-effective and time-saving method for manufacturing a chest for an ironing device, heatable with steam or liquid. In addition, said method has to result in a chest in which the latter no longer has to be straightened or milled after welding, and only has to be polished. Finally, it should produce a chest with fewer separate chambers.

[0012] This object of the invention is achieved by providing a method for manufacturing a chest for an ironing device, heatable with steam or liquid, in which the chest is composed of two opposite plates having a different thickness, in which the method comprises the following steps:

- pre-bending said plates;
- welding said two plates to one another at the locations where said perforations are provided, resulting in weld points;
- forming hollow spaces between said weld points by introducing a pressurized liquid between the plates which are connected to one another by weld points;

in which the two plates are selected such that, when the hollow spaces are formed, the plate with the smallest

thickness (= thinnest plate) is deformable and the plate with the greatest thickness (= thickest plate) remains substantially undeformed, in which the plate with the smallest thickness has a thickness of at least 2 mm, in which this is provided with 75 to 110 perforations per square metre and in which, when said two plates are welded to one another, this is done at the locations where said perforations are provided.

[0013] In this manner, a less labour-intensive, cost-effective and simple method is obtained for manufacturing a chest heatable with steam or liquid. In addition, a chest which has been manufactured in this way requires less space and the thickest plate over which the cloth passes during ironing is virtually completely straight (= flat), as a result of which further processing steps in the form of straightening or milling are superfluous, and the chest only has to be polished. Furthermore, due to the smaller volume per unit area of the chest, the chest requires less compartmentalisation.

[0014] By providing the smallest plate with a thickness of at least 2 mm, both plates are subject to less corrosion and pitting corrosion. Providing 75 to 110 perforations per square metre results in a stronger weld joint, with the forces which occur when liquid or steam flows through the chest being distributed across the various weld points and thus prevents cracks in the weld seams.

[0015] In a preferred method according to the invention, said liquid, which is provided between the plates which are connected to one another by the weld points in order to deform the hollow spaces, is water.

[0016] The use of water has the advantage that it is a clean liquid and, in addition, it is readily available and safe to use.

[0017] The weld points are preferably formed automatically by means of a semi-automatic welding machine (by MIG or MAG welding).

[0018] By using a semi-automatic welding machine, the chest can be manufactured in a cost-effective way. In addition, such a semi-automatic welding machine makes it possible to produce more solid weld points in an automatic manner.

[0019] Even more preferably, when welding at the locations where the perforations have been provided, the plates are welded together along the periphery of these perforations. Furthermore, when welding along the periphery of the perforations, at least a part of this periphery is preferably welded twice in order to produce a particularly strong weld joint. More specifically, this periphery can then preferably be double-welded through an angle of 6° and, in this case, the weld seam can diverge slightly.

[0020] It is a further object of this invention to provide a chest heatable with steam or liquid which can be manufactured in a simple, cost-effective and time-saving manner, with the thickest plate of the chest over which the cloth is passed during ironing being, in addition, as straight as possible after the manufacturing of the chest and the chest taking up as little volume as possible.

[0021] This object of the invention is achieved by providing a chest heatable with steam or liquid for an ironing device, which is composed of two opposite plates of a different thickness, which are welded to one another by means of weld points, in which hollow spaces are formed between the plates which are connected to one another by weld points, in which the plate with the smallest thickness is provided with perforations, in which the plates are welded to one another at the locations where these perforations are provided and in which the chest is manufactured by means of a method according to the invention as described above.

[0022] In a preferred embodiment of a chest according to the invention, the ratio between the thicknesses of the plates is between 1:2.5 and 1:5.

[0023] The plate with the smallest thickness (= thinnest plate) has a thickness of at least 2 mm. In this case, the thickness of the thinnest plate has to be such that it cannot corrode. In addition, it has to be deformable so that it is possible to form hollow spaces between the weld points. Preferably, this plate with the smallest thickness has a thickness of between 2.5 mm and 5 mm.

[0024] The plate with the greatest thickness (= thickest plate) preferably, but without being limited thereto, has a thickness of at least 5 mm and at most 20 mm. The thickness of this thickest plate has to be such that it hardly deforms during the introduction of a pressurized liquid between the plates and the weld points and to this end therefore has to have a certain thickness. Preferably, however, this is not made excessively thick, so that the chest remains flexible and can always bear against an ironing roller, even when the coating of this ironing roller wears down. Making this excessively thick obviously makes such a chest less advantageous from an economic point of view, due to the high consumption of material.

[0025] The perforations are preferably round perforations and preferably have a diameter of between 15 mm and 35 mm. These perforations are furthermore preferably arranged in a diamond shape with respect to one another, in such a manner that these perforations follow lines which extend at an angle to the edges of the plate with the smallest thickness.

[0026] Preferably, the plates are made from steel, so that these are subject to less corrosion and pitting corrosion when steam flows through them.

[0027] Finally, it is an object of the invention to provide an ironing device which is provided with a chest which has the above-described advantages.

[0028] This object is achieved by providing an ironing device which is provided with a chest heatable with steam or liquid according to the invention as described above.

[0029] The present invention is now explained in more detail with reference to the following detailed description of some preferred embodiments of a chest heatable with steam or liquid which is manufactured by means of a method according to the invention. The aim of this description is only to give an illustrative example and to indicate further advantages and details of this invention, and can therefore by no means be interpreted as a lim-

itation of the area of application of the invention or of the patent rights sought in the claims.

[0030] In this detailed description, reference numerals are used to refer to the attached drawings, in which:

- *figure 1a* shows a perspective top view of a first embodiment of a chest heatable with steam or liquid which is manufactured by means of a method according to the invention;
- *figure 1b* shows a detail of A as indicated in figure 1a;
- *figure* 2 shows a detail of a second embodiment of a chest heatable with steam or liquid in bottom view;
- *figure 3* diagrammatically shows how a weld point of a chest heatable with steam or liquid according to the invention can be realized.

[0031] As is illustrated in figure 1a, the chest (1) heatable with liquid, or preferably (saturated) steam, is composed of two plates (2, 3) of different thickness, referred to below as the thickest and the thinnest plate (2, 3), which are situated opposite one another and which are connected to one another by means of weld points (4) distributed across their surface. The ratio between the thicknesses of the plates (2, 3) in this case is preferably between 1:2.5 and 1:5.

[0032] Between these weld points (4), hollow spaces (5) are provided which are formed between the two plates by deforming the thinnest plate (3) and in which steam or another liquid, such as oil, can be provided in order to heat the chest (1). In this case, the distance between the weld points (4) depends on a number of factors such as the diameter of the chest (1), the desired height of the hollow spaces (5) and the spatial positioning of the weld points (4) with respect to one another. These weld points (4) may, for example, be arranged in the shape of a diamond, a square, a rectangle, etc. with respect to one another and may optionally be arranged along lines, these lines extending either at right angles or at an angle to the edges (3a) of the plate with the smallest thickness (3). In this case, the thickest plate (2) is designed to be as flat as possible.

[0033] As is illustrated in figure 1a, the thinnest plate (3) is welded onto the thickest plate (2) along its edges (3a).

[0034] When the chest (1) is installed in an ironing device (not illustrated in the figures), the thickest plate (2) is then the top plate along the top of which the cloth passes during ironing. In the installed position, the thinnest plate (3) is situated at the bottom.

[0035] Manufacturing such a chest (1) takes place in the manner described below.

[0036] First, the thinnest plate (3) is provided with perforations distributed across the entire surface thereof. These perforations can, as already described above, be made in the thinnest plate (3) in different configurations (spatial positioning). Subsequently, the plates (2, 3) are pre-bent.

[0037] Thereafter, the two plates (2, 3) are welded to one another at the locations where the perforations are present, resulting in the formation of weld points (4). These weld points (4) are preferably, as illustrated in figure 3, provided by welding the thinnest plate (3) to the thickest plate (2) along the periphery of the corresponding perforations. Here, a part of this periphery is preferably double-welded at an angle (a) of 6°. In this way, the thinnest plate (3) is welded to the thickest plate (2) in a very secure manner. Welding these plates (2, 3) to one another is preferably carried out automatically by means of a semi-automatic welding machine (= robot). However, it is also possible to weld the two plates (2, 3) to one another manually at the perforations, for example by using a welding wire and gas.

[0038] After the two plates (2, 3) have been welded to one another, a liquid, preferably water, which is pressurized, is introduced between these plates (2, 3) which are connected to one another by weld points (4), the pressure of the liquid being such that hollow spaces (5) are formed between the plates (2, 3) and the weld points (4) by deforming the thinnest plate (3) (see detail A in figure 1b). It is therefore important that the weld points (4) [and consequently also the perforations in the thinnest plate (3)) are provided at such a distance apart that, at a certain pressure of the liquid, only the thinnest plate (3) and not the thickest plate (2) will deform when the pressurized liquid is introduced between the plates (2, 3) which are connected to one another by weld points (4) (or in other words, the thickest plate (2) remains as flat as possible and only the thinnest plate (3) is curved].

[0039] When the contact angle between the ironing roller (not illustrated in the figures) and the chest (1) (= ironing path) is greater than 180°, the thickest plate (2) of the chest (1) can be constructed from two or more parts which pivot with respect to one another (not illustrated in the figures).

Example

[0040] A thinnest plate (3), made from steel, with a bending radius of 260 mm and a thickness of 4 mm which is provided with perforations across its surface, and a thickest plate (2), made from steel, with a bending radius of 250 mm and a thickness of 10 mm [ratio thinnest plate (3) / thickest plate (2) of 1:2.5] are welded to one another at the perforations by means of a semi-automatic welding machine, resulting in weld points (4). Every 4 perforations / weld points (4) form a diamond, and are arranged at a distance of 90 mm apart. The perforations have a diameter of 25 mm and are welded along their entire periphery, with an overlap through an angle (a) of 6°, in which the weld seam diverges slightly.

[0041] The thinnest plate (3) is furthermore welded onto the thickest plate (2) along its edges (3a) (as is illustrated in figure 1a). In this case, a rim having a width of 50 mm is left between the edge of the corresponding edges of the thinnest and the thickest plate (2, 3).

[0042] Between the thickest and the thinnest plate (2,

3) and the weld points (4), water which has been pressurized to a pressure of 100 bar is introduced in such a manner that the thinnest plate (3) is deformed and that hollow spaces (5) with a maximum height of 3 mm are formed in the process between the weld points (4), and the thickest plate (2) remains essentially flat.

Claims

1. Method for manufacturing a chest (1) for an ironing device, heatable with steam or liquid, in which the chest (1) is composed of two opposite plates (2, 3) having a different thickness, which comprises the following steps:

   - pre-bending said plates (2, 3);
   - welding said two plates (2, 3) to one another, resulting in weld points (4);
   - forming hollow spaces (5) between said weld points (4) by introducing a pressurized liquid between the plates (2, 3) which are connected to one another by weld points (4);

   in which the two plates (2, 3) are selected such that, when the hollow spaces are formed, the plate with the smallest thickness (3) is deformable and the plate with the greatest thickness (2) remains substantially undeformed;
   characterized in that the plate with the smallest thickness (3) has a thickness of at least 2 mm, **in that** this is provided with 75 to 110 perforations per square metre and **in that**, when said two plates (2, 3) are welded to one another, this is done at the locations where said perforations are provided.

2. Method according to Claim 1, **characterized in that** said liquid, which is provided between the plates (2, 3) which are connected to one another by the weld points (4) in order to deform the hollow spaces (5), is water.

3. Method according to Claim 1 or 2, **characterized in that** the weld points (4) are formed automatically by means of a semi-automatic welding machine.

4. Method according to one of the preceding claims, **characterized in that** when welding at the locations where the perforations have been provided, the plates are welded together along the periphery of these perforations.

5. Method according to Claim 4, **characterized in that** when welding along the periphery of the perforations, at least a part of this periphery is welded twice.

6. Method according to Claim 5, **characterized in that** this periphery is double-welded through an angle of 6°.

7. Chest heatable with steam or liquid for an ironing device, which is composed of two opposite plates (2, 3) of a different thickness, which are welded to one another by means of weld points (4), in which hollow spaces (5) are formed between the plates (2, 3) which are connected to one another by weld points (4), **characterized in that** the plate with the smallest thickness (3) is provided with perforations, **in that** the plates (2, 3) are welded to one another at the locations where these perforations are provided and **in that** the chest (1) is manufactured by means of a method according to one of the preceding claims.

8. Chest according to Claim 7, **characterized in that** the ratio between the thicknesses of the plates (2, 3) is between 1:2.5 and 1:5.

9. Chest according to Claim 7 or 8, **characterized in that** the plate with the smallest thickness (3) has a thickness of between 2.5 mm and 5 mm.

10. Chest according to one of Claims 7 to 9, **characterized in that** the plate with the greatest thickness (2) has a thickness of at least 5 mm.

11. Chest according to one of Claims 7 to 10, **characterized in that** the plate with the greatest thickness (2) has a thickness of at most 20 mm.

12. Chest according to one of Claims 7 to 11, **characterized in that** the perforations are round perforations and have a diameter of between 15 mm and 35 mm.

13. Chest according to one of Claims 7 to 12, **characterized in that** the perforations are arranged in a diamond shape with respect to one another, in such a manner that these perforations follow lines which extend at an angle to the edges (3a) of the plate with the smallest thickness (3).

14. Chest according to one of Claims 7 to 13, **characterized in that** the plates are made from steel.

15. Ironing device, **characterized in that** it is provided with a chest (1) heatable with steam or liquid according to one of Claims 7 to 14.

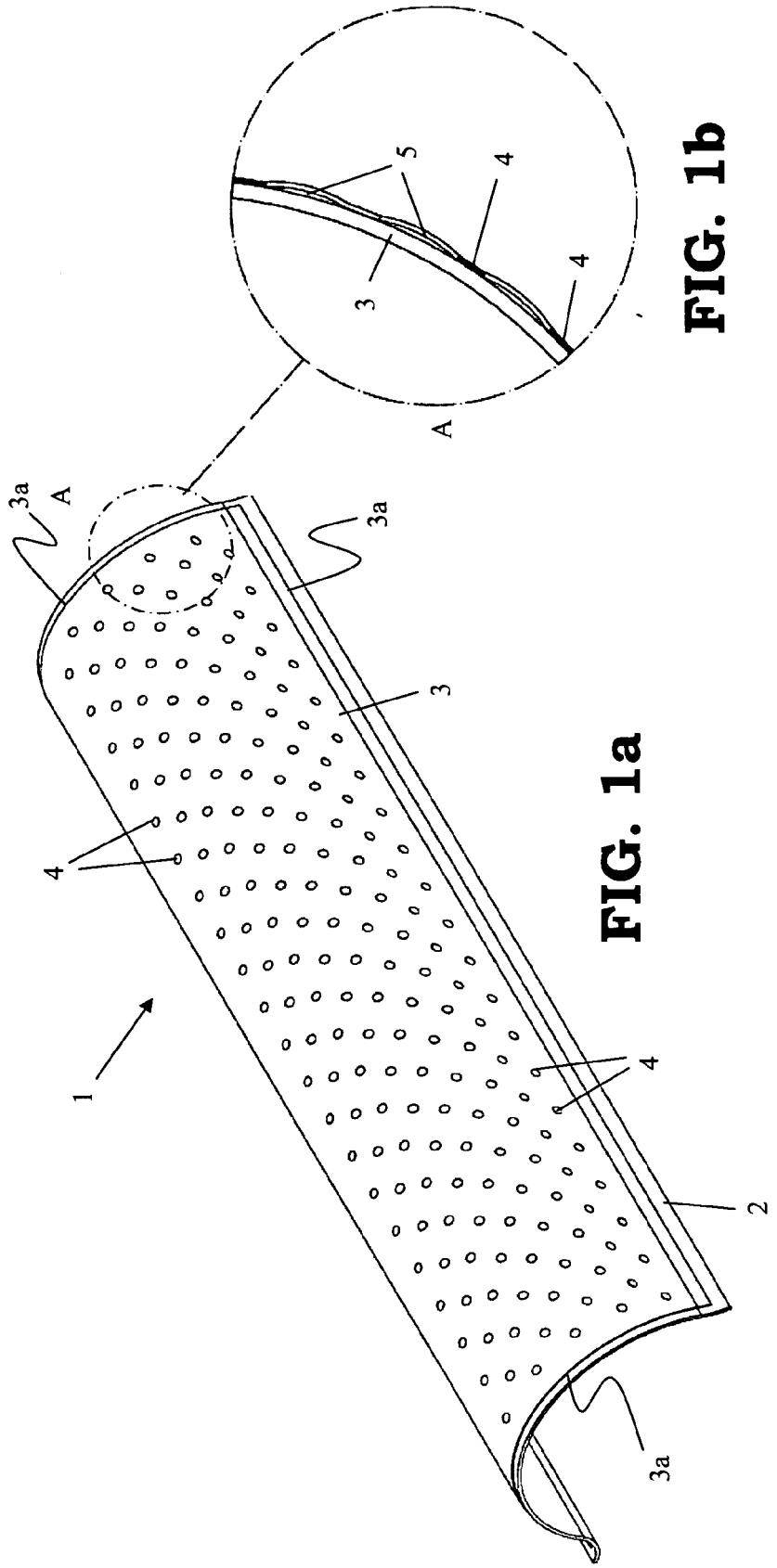

FIG. 1b

FIG. 1a

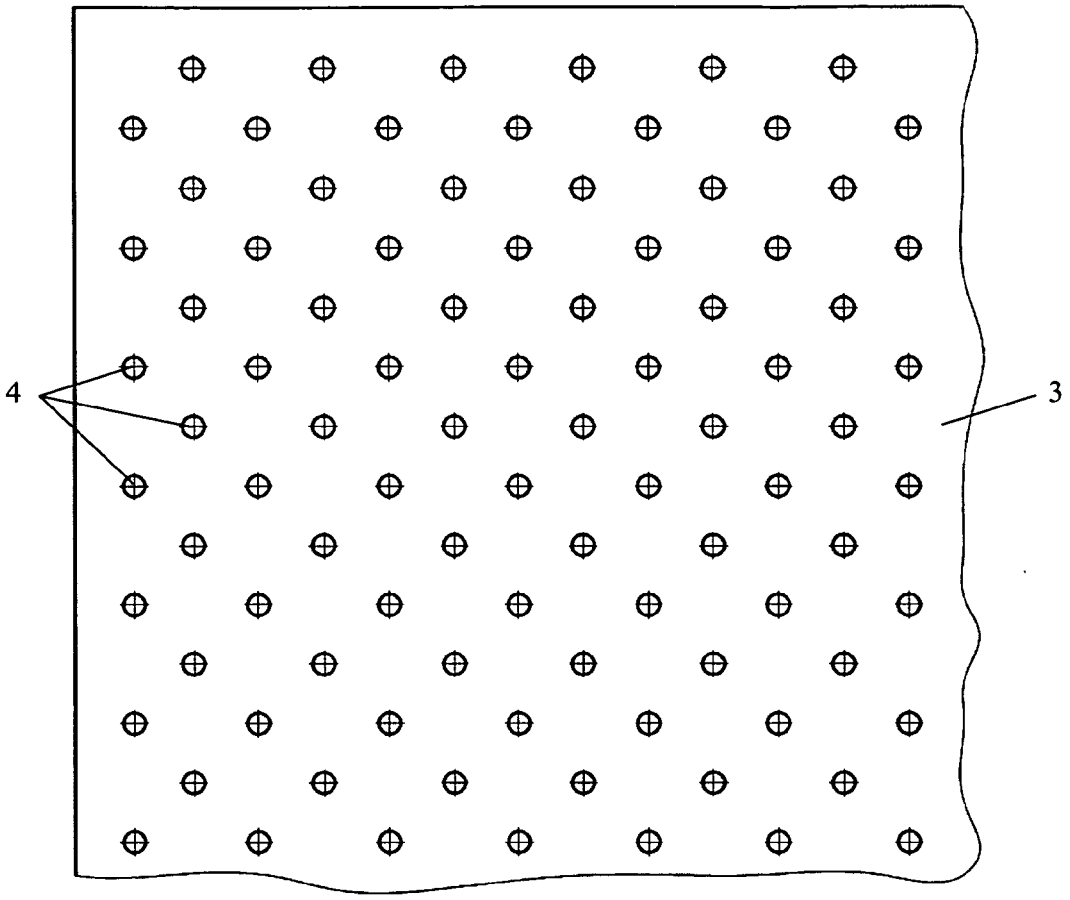

FIG. 2

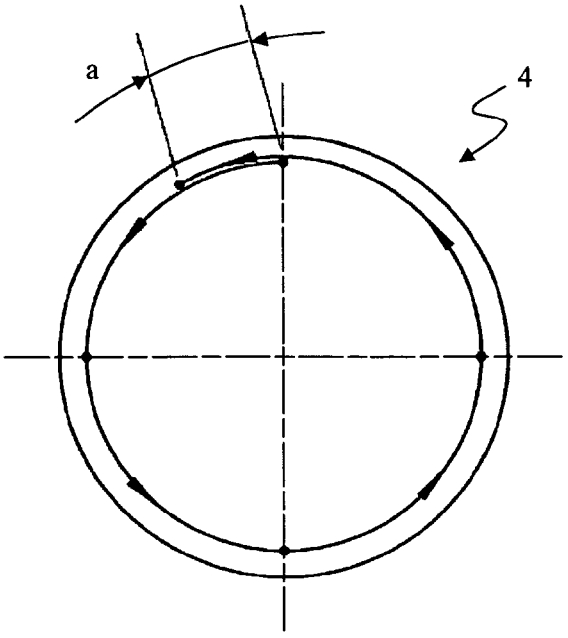

FIG. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 10 00 3973

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D06F
E04C
B21D
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	26 August 2010	Pollet, Didier

CATEGORY OF CITED DOCUMENTS

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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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