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(54) **Universal hooking system for the lifting of concrete products.**

(57) Anchor bolt hooking system to fix into a concrete product, of the blade type (2) with external end endowed with at least two opposite lateral shoulders, substantially orthogonal (20), and with at least one hooking hole (22) on the outside of the fixing surface of the concrete product, in order that in said hole (22), by means of a "U" carved joint (1202), a hooking ring of the product (12) can be inserted endowed with means (1202) that prevent the rotation in said hole to force it to remain always in line with the axis of said anchor bolt, characterized in that said ring, in the orthogonal direction to said "U" joint (1202), has a widening (120) that forms a stop (1203) with said supporting shoulders (20) of said anchor bolt (2) at least on one side.

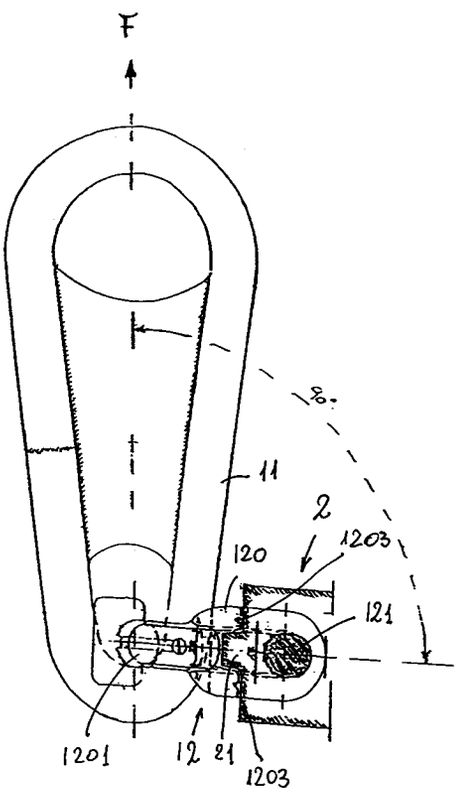

FIG. 3

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This invention has for object a universal hooking system for the lifting of concrete products.

At the present state of the art different hooking systems for the lifting of concrete products are known, which consist in anchor bolts that are fixed into the concrete product, the extremity of which protrude from the surface of the product (eventually reentering by means of recess) with a respective hooking head that may be:

- of stake type as in the solution Arteon e.g. PCT/FR93/00934; PCT/FR89/00365; FR-93-09892; FR-89-08767;
- or blade type as in the solutions FRIMEDA IT-987738; or IT-1086195.

In particular, in the solution FRIMEDA IT-1086195 anchor bolts or clamps fixed into the cement as above mentioned, are described and claimed, which have, over a central hook hole, a raised central bridge head over said hole, and on one side and/or the other an overhanging stop tooth that protrudes over said raised central bridge and in which this tooth has a supporting surface for the ring to hold upright, the surface of which is oriented perpendicularly to the axis of the anchor.

The stop surface of this tooth (ref.14 in the claim) is therefore parallel to the axis of the anchor, as indicated in the respective drawings as well.

This parallelism is reported both in the case of a lateral tooth (Fig.3 IT-1086195,) than that of a central tooth (Fig.11 of the IT-1086195).

The central tooth solution (Fig.11) is the most disadvantageous one, so much so that it does not even fall within the main claim nor is it reported in the main priority document DE 2704435 (P-2704435.5-25).

However, independently from the position of the tooth, a solution so conceived, involves the fact that its stop surface, oriented orthogonally to the longitudinal axis (parallel to said axis), determines a heavy stress which is also orthogonal to the longitudinal axis, therefore at pure cutting edge, consequently said tooth may be easily cut off.

Furthermore in this solution the sidewalls have the form of tilted shoulders and do not contribute to supporting the hooking ring to maintain it upright.

The lateral tooth solution is better than the central tooth one, but presents the drawback that the lateral tooth can be easily burred, that is deformed on the outer side, not having other support than that of the concrete edge that fixes it immediately under the surface.

The aim of the present invention is to obviate the above-mentioned drawbacks.

This and other aims are being reached as claimed by means of an anchor bolt hooking system to fix into the concrete product, of the blade type endowed on the external end with at least two opposite lateral shoulders, substantially orthogonal, and with at least one hooking hole on the outside of the surface of the insertion into the concrete product, in order that in said hole a hooking ring of the product can be inserted by joint with a "U" carving, endowed with means that prevent its rotation in said hole so as to force it to remain always in line with the axis of said anchor bolt, characterized in that said ring has in the orthogonal direction to said "U" joint carving, a shoulder widening that forms a stop with said supporting shoulders of said anchor bolt at least on one side.

In this way the ring must remain necessarily upright at least on the side of the stop on the respective shoulder, while it may be rotated in the opposite direction.

Advantageously, said shoulder widening is made on both sides therefore the supporting shoulders are operable be it on one side and on the other.

This solution is interesting for side lifting with a straight ring on one side and orientable on the other, obviously with greater traction efficacy.

In this way the ring is necessarily forced to remain upright in both the directions.

Both these solutions have, in any case, the advantage of also being able to use simple anchorage anchor bolts, ending on the upper side in a rectilinear orthogonal way, that is also without teeth, thereby saving in material and building complexity.

Obviously nothing prevents having a central tooth over said hole in order that it joins into a correspondent recess of said hooking ring.

Advantageously in such a case, to obviate heavy stresses to the cut, tilted lateral surfaces have been provided, forming substantially a central trapezoidal isosceles protrusion tooth, the greater base of which extends laterally with shoulders on one side and on the other with a rectilinear stroke orthogonal to the axis of the anchor bolt and along the entire width.

In this way, thanks to said tilted surfaces of the central protruding trapezoidal tooth, the stress force by rotation of the ring is contrasted by said tilted surface with a stress caused substantially by compression, whereupon the shearing by cutting may be avoided.

These and other advantages will appear from the following description of preferential solutions for realisation, with the help of enclosed drawings where the execution details are not to be considered limiting but only supplied as an example.

Fig. 1 is a view of the hooking system of a loose hooking ring to the anchor bolt, formed by two rings, the first an openable hooking to the anchor bolt and the second closed in order to be hooked by the hoisting hook of a crane, for example.

Fig. 2 is a side view of the system of Fig. 1, where one clearly notes the joint tooth of the anchor bolt inside said first openable hooking ring, so that it is forced to remain always upright, while the second ring can rotate.

Fig.3 is a view of Fig. 2 in which the second ring has been rotated so that it undergoes a traction of the concrete product substantially parallel to its surface, while said openable first ring is forced to remain always upright, that is orthogonal to the surface of the concrete product (parallel and in line with the axis of the anchor bolt).

Figures 4 and 5 represent the frontal and side view of the anchor bolt fixing according to the present solution.

Making reference to the drawings we note that 1 indicates the loose ensemble ring and 2 the anchor bolt.

The anchor bolt 2 is of blade type and the feet are divaricated for the fixing into the concrete and has internal holes (24) for the passage of iron in the concrete and carvings (23) for the clamping between irons fixed into the concrete.

This conformation, as from known technique, helps to maintain the anchor bolt steadily fixed into the concrete of the product that must be lifted.

The anchor bolt has an upper extremity that generally comes out from the surface of fixation into the concrete (in a shell so that it does not protrude) which has an ovoid hole (22) in order to favour the insertion of the latch hook of the ring that for this purpose can also advantageously be in elongate section, thereby improving the traction resistance and helping to resist against the rotation in said hole.

Finally the anchor bolt terminates on the upper surface with a central tooth, having a trapezoidal form (21) while the shoulders (20) remain orthogonal to the axis of the anchor bolt (2), serving as further support for the first hooking ring.

The loose ensemble ring (1) includes an openable ring (12) that hooks, with a rotatable latch (121) within a semicircular sheath (120), both the anchor bolt by means of its hole (22) and a second handle ring (11) that instead can rotate on the first.

The first openable hooking ring (12) contains the rotatable latch (121) within a semi-annular sheath (120), opened on the lower side with a notch (1202) of width equal to the thickness of the blade of the anchor bolt, in order that it can be inserted when latch (121) is drawn in, and so that the hole of the sliding sheath of the latch and the hooking hole of the anchor bolt (22) coincide.

Once in this position, said latch may be rotated passing through the hole of the anchor bolt (22), thereby hooking it.

We note that the sheath (120) has a toroidal upper semi-ring narrower on the upper side (1201) that for 180° can allow the free rotation of the second ring (11) that will be able to be hooked by a crane over the concrete surface of the product.

According to the present solution, the sheath of the first ring (21) has:

- besides a recess for the perfect embedding of the isosceles trapezoidal force of said tooth (21),
- also two opposite lateral stops (1203) that rest on the surfaces of said shoulders (20) of said anchor bolt.

In this way the anchor bolt is maintained upright against lateral stresses much more effectively, by force of traction "F" (Fig.3).

The anchor bolt illustrated in Fig. 3 is shown with the tooth, but it is obvious that according to the present invention, the fundamental characteristic is the presence of shoulder shaped orthogonal stop endings (20), and the tooth (21) can be also totally absent.

In fact the anchor bolt (2) can also end rectilinearly orthogonally like all the traditional anchor bolts, the stop widenings on the shoulders (120) equally performing their function.

This demonstrates the universality of the solution that may so be used on different kinds or types of anchor bolts.

Claims

1. Anchor hooking system to fix into a concrete product to lift it, utilising:

- an anchoor blade (2) inside the concrete (26), with external end endowed with at least two opposite lateral shoulders, substantially orthogonal (20), and having at least one hooking hole (22) out from the fixing surface of the concrete product, in order that a lift hooking ring (1) can be inserted in said hole (22) :
- an articulate hooking ring device (1) of the type having:
  - a handle hook (11) and
  - an openable latch hooking ring (12);
- the first one being meshed with the first, and the second one being able to hook said anchcor blade (2) by said hooking hole (22);
- wherein said hooking ring has an articulated "U" joint carving (1202) to be inserted on the head of said anchor blade (2) to prevent the rotation, forcing it to remain always in line with the axis of said anchor blade (2), characterized in that said openable latch hooking ring (12) has in the orthogonal direction of said

"U" joint carving (1202), a widening (120) that forms a shoulder of abutment (1203) with said supporting shoulders (20) of said anchor blade (2) at least on one side.

2. An articulated hooking ring device (1) according to claim 1, of the type having:
- a handle hook (11) and
- an openable latch hooking ring (12);
- the first one being meshed with the first, and the second one being able to hook a product to be lifted by sliding an open ring latch (121);
- wherein said hooking ring has an articulated "U" joint carving (1202) to be inserted on a head of an anchor blade (2) to prevent the rotation, forcing it to remain always in line with the axis of said anchor blade (2), characterized in that said openable latch hooking ring (12) has in the orthogonal direction of said "U" joint carving (1202), a widening (120) that forms a shoulder of abutment (1203) to prevent rotation even to the otrhogonal side.

3. A system according to claim 1, characterized in that said widening (120) in said latch hooking ring (12) is made in upsidedown "U" shape on both sides to prevent rotation in both sides.

4. An articulated hooking ring device (1) according to claim 1. end 2., characterized in that said widening (120) in said latch hooking ring (12) is made in upsidedown "U" shape on both sides to prevent rotation in both sides.

5. Hooking system according to claim 1, characterized in that said ring has in said "U" joint recess, a recess extension for receiving a central trapezoidal tooth (21) between the shoulders (20) of said anchor blade.

6. Hooking ring according to claim 1, characterized in that it has in said "U" joint recess, a recess extension for receiving a central trapezoidal tooth (21) between the shoulders (20) of said anchor blade.

7. Hooking ring according to the system of claim 1, characterized in that it is of the loose type, with an openable first ring (12) to be hooked in said anchor bolt (2) and a second ring inserted on the first (11) and rotatable within it, where said first ring (12) has an annular sheath (120) with a semi-annular hole where a latch (121) slides and a lower notch (1202) that allows the joint of a lower thickening of said sheath (121) to insert itself over said anchor bolt (2) and allow said latch (121) to pass within said hole of the anchor bolt (22) and form the "U" joint (1202) to hold said first ring upright (12) in one direction and which widens in an orthogonal direction (121) in said zone at least on one side forming a stop (1203) in order to rest on one shoulder (20) of said anchor bolt.

8. Hooking ring according to the system of claim 1, characterized in that it is of the loose type, with an openable first ring (12) to be hooked in said anchor bolt (2) and an second ring inserted on the first (11) and rotatable within it, where said first ring (12) has an annular sheath (120) with a semi-annular hole where a latch (121) slides and a lower notch (1202) that allows the joint of a lower thickening of said sheath (121) to insert itself over said anchor bolt (2) and allow said latch (121) to pass within said hole of the anchor bolt (22) and form the "U" joint (1202) to hold said first ring upright (1 2) in one direction and which widens in orthogonal direction (121) in said zone, on one side and on the other forming a stop (1203) in order to rest on the correspondent shoulder (20) of said anchor bolt on both sides.

9. An anchor blade (2) in an anchor hooking system as claimed in claim 1. having a central fitting tooth (21) to fit into said "U" joint carving (1202), characterized in that said central tooth (21) over said hole (22) in said anchor bolt (2), has the lateral surfaces tilted (211), substantially forming a trapezoidal central isosceles protrusion, of which the greater base extends laterally with shoulders (20) on one side and on the other by a rectilinear stroke orthogonal to the axis of the anchor bolt and along its entire width and on these shoulders rest corresponding lateral thickenings (1203) of said first ring (12).

10. An anchor blade (2) as claimed in claim 1, characterized in that:
- said central fitting tooth (21) has a trapezoidal form (211);
- it extends from the greater base with two rectilinear lateral shoulders (20) orthogonal to the axis of the anchor bolt (2).

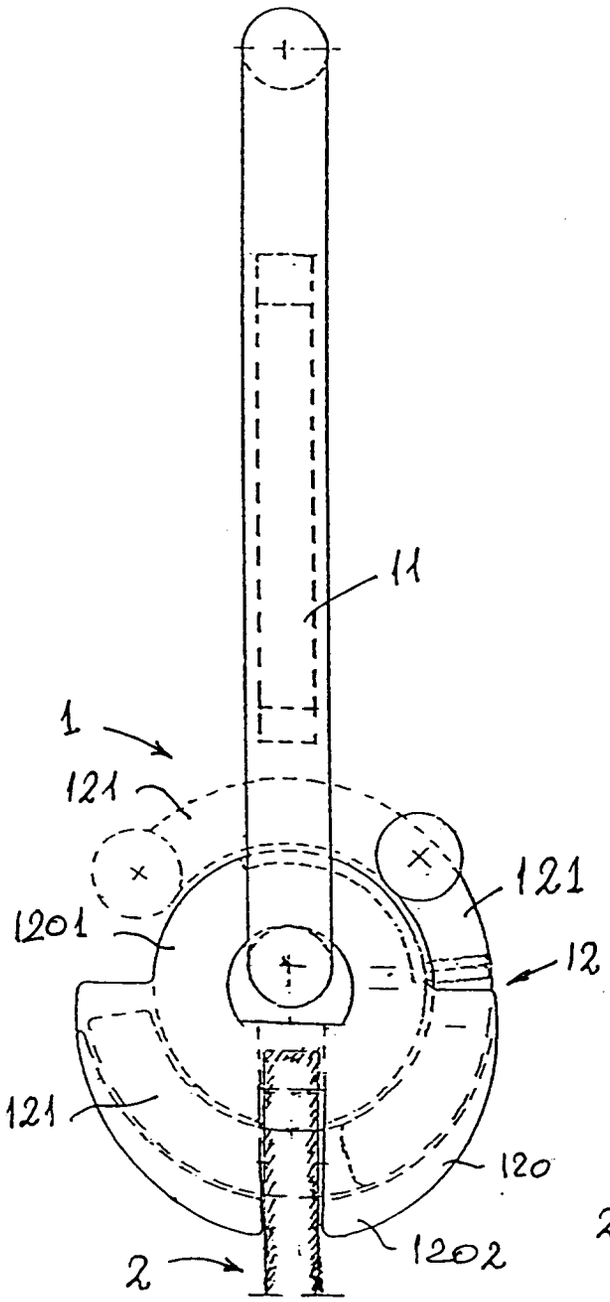

FIG.1

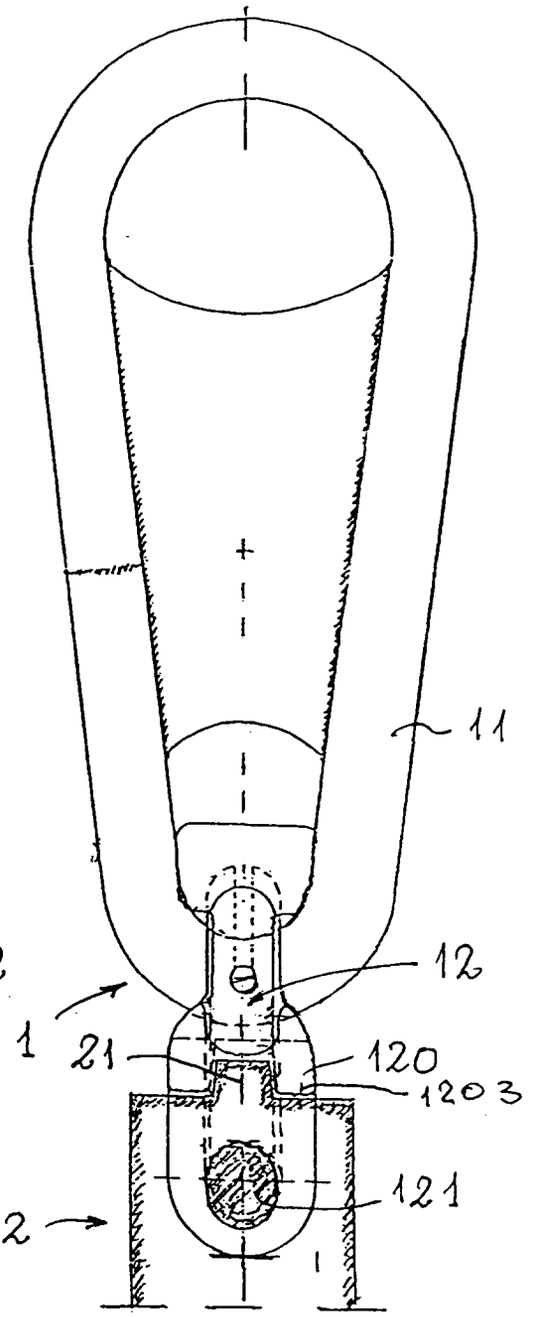

FIG.2

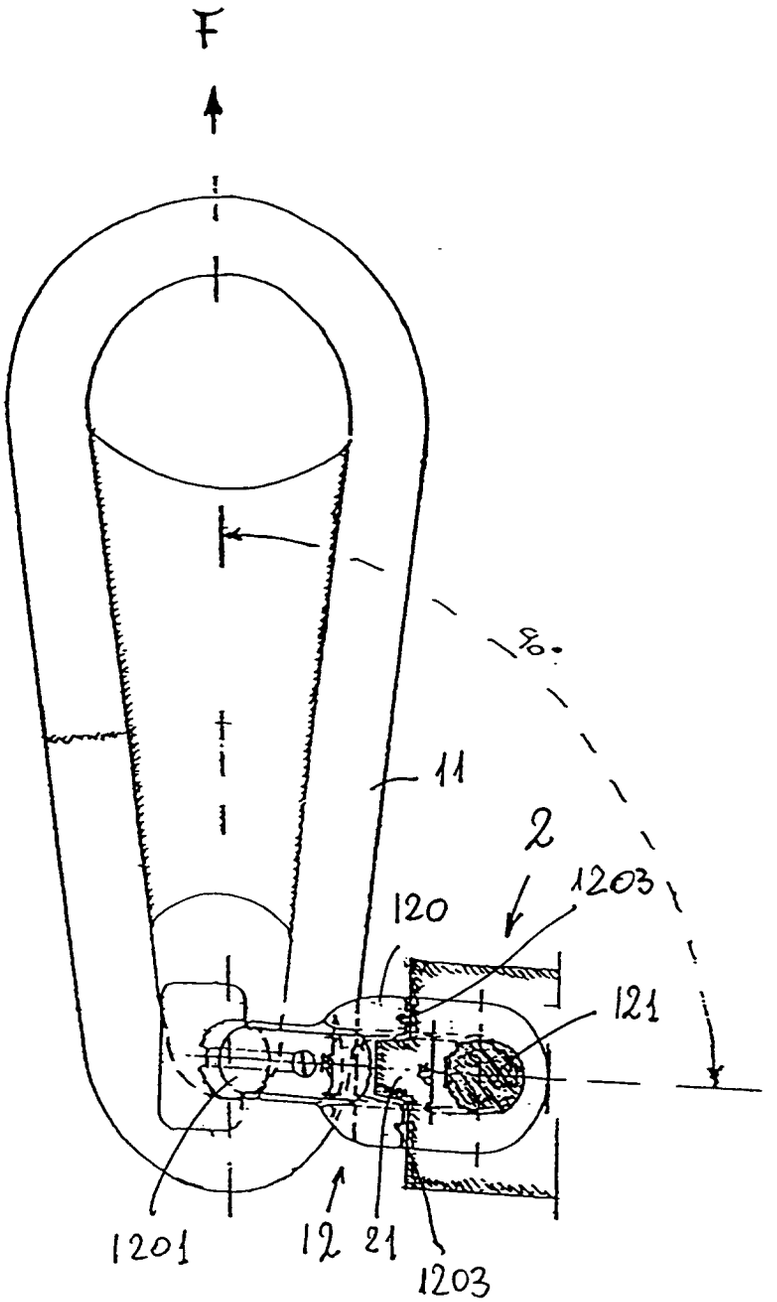

FIG. 3

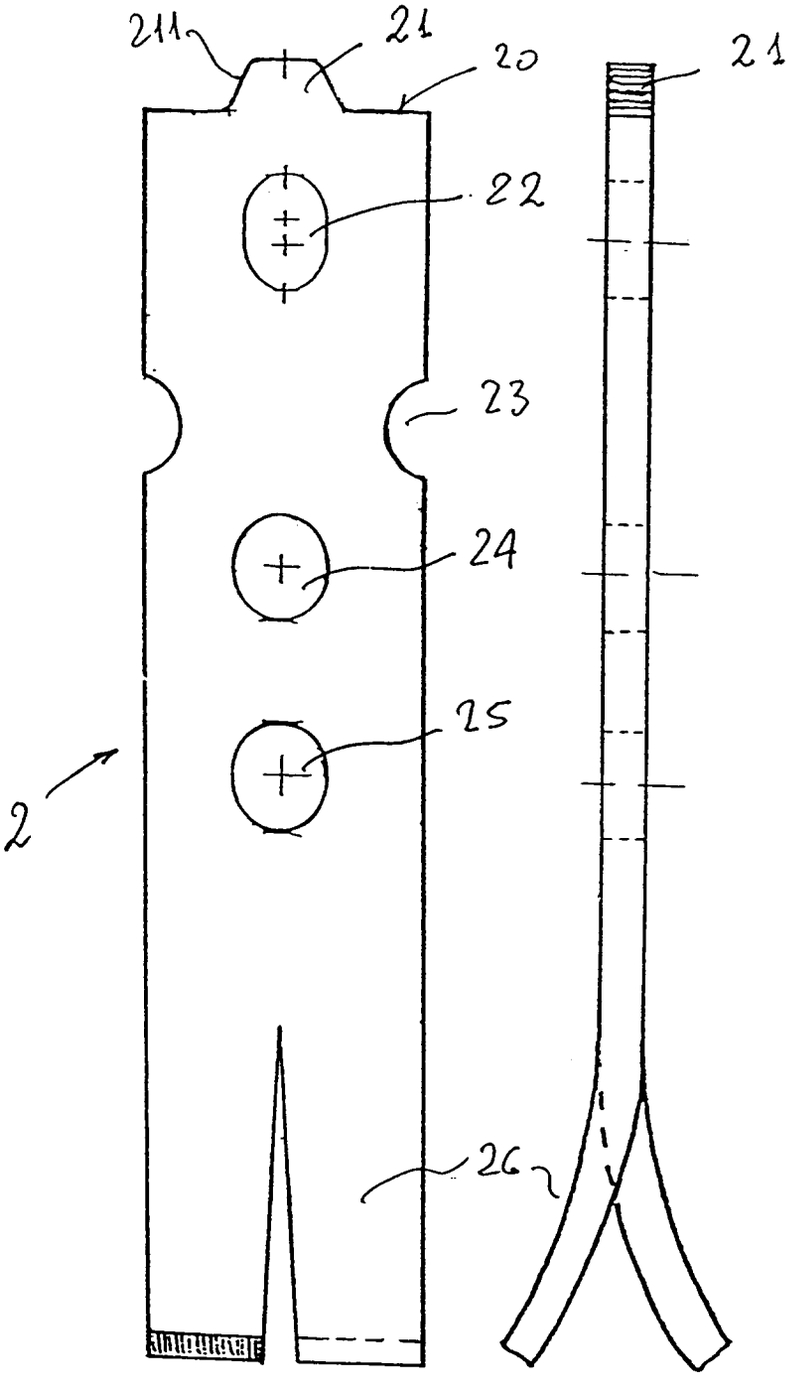

FIG.4 FIG.5