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(54) **Roadside guard cable fence**

(57) Side guard fence of the type, which incorporates a plurality of posts (5) arranged at a mutual distance along the edge of a carriage way and being substantially vertically anchored, and substantially horizon-

tal, longitudinal fence members (6) attached to the posts and arranged at mutually spaced apart distances from each other in the vertical direction, whereby the posts (5) are positioned in the slope (4) outside the carriage way (1) and supporting reserve (3) if any.

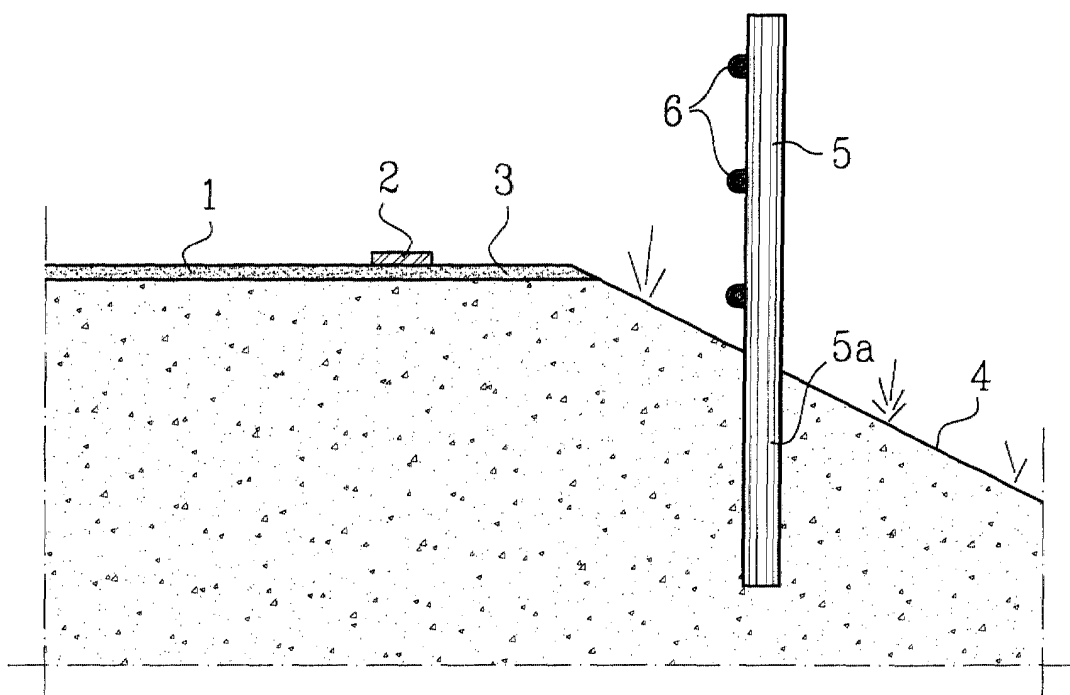


FIG. 1

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Description

[0001] The present invention refers to a safety fence of the type, incorporating a plurality of posts, arranged at a mutual distance from each other and adapted to be mounted substantially vertically in the ground or in another base, and at least two substantially horizontal fence members attached to the posts, and preferably consisting of steel ropes or wires.

[0002] Road fences of this kind are earlier known in different designs and they are often positioned between the carriage ways of highways having carriage ways separated from each other by a central reserve. Such road fences have been very successful and they have actively contributed to a substantial reduction of accidents between opposing vehicles on such roads.

[0003] Another big risk for accidents is vehicles travelling off the road towards the sides thereof. In order to reduce the risk at such instants of accidents with vehicles travelling off the road it has been put down large costs in removing trees, rocks and the like along the roads, but this has not always proven itself to give the intended effect.

[0004] In order to prevent that a vehicle at incidents of accidents ends up outside the carriage way, particularly at positions where there is a particular risk for subsequent injuries, as for instance at water courses, areas with large level differences, etcetera, it has also been arranged lateral road fences along particularly dangerous portions of the road. Hereby it has primarily been used fences, which has earlier been developed for the central reserve, the posts of which thereby as a rule have been arranged in foundations directly adjacent the asphalt-paved carriage way, i.e. at the asphalt edge or just outside this, in the so called supporting reserve.

[0005] This means that it has not been possible to use the supporting reserve between the road embankment or the carriage way and the slope situated outside the supporting reserve, e.g. by bicyclists, or by other slow-travelling vehicles, and neither as a temporary parking area at engine failures or the like.

[0006] The purpose of the present invention now is to offer a side guard fence of the type in question, which provides a solution of these problems, and this has been achieved in that the side guard fence has been given the features defined in claim 1.

[0007] Another purpose of the invention is to provide a simple and reliable arrangement for anchoring the horizontal members of the fence to the posts thereof and this has been achieved with the features defined in claim 8 of the accompanying claims.

[0008] Hereinafter the invention will be further described with reference to embodiments shown in the accompanying drawings.

Fig. 1 shows schematically in a partial cross section a post of a side guard fence according to the invention, seen in a view in the longitudinal direction of a

carriage way, which also is shown only partly.

Fig. 2 is a diagrammatic perspective view of a portion of a side guard fence according to the invention. Fig. 3 shows in a view corresponding to Fig. 1, alternative positioning of the post of the side guard fence with fence members supported by schematically shown retaining members.

Fig. 4a shows a portion of a post equipped with a retaining member, as seen from the side.

Fig. 4b is a front view of the post with a retaining member and a horizontal fence member supported therein.

Fig. 5a is a perspective view of a portion of a post with another type of retaining member, and

Fig. 5b is a separate part incorporated in the retaining member according to Fig. 5a.

Fig. 6a is a perspective view of a portion of a post having a further type of retaining member.

Fig. 6b is a separate part incorporated in the retaining member according to Fig. 6a.

Fig. 7a is a perspective view of a further post with another type of retaining member according to the invention.

Fig. 7b illustrates a post with a retaining member according to Fig. 7a, as seen from above.

Fig. 8a is a perspective view corresponding to Fig. 6a, showing a similar post but having a slightly amended retaining member, and

Fig. 8b shows in perspective the retaining member used in Fig. 8a.

[0009] In Fig. 1 is schematically shown a portion of a paved, e.g. asphalt-paved carriage way 1, which at its outer edge is bordered by an edge line 2 and outside this by a supporting reserve 3, which still is substantially horizontal. Outside the supporting reserve adjoins a slope 4, having an inclination, which partly is determined by the terrain, but which preferably is 1:6 or bigger. In contrast to what has earlier been used, a series of posts 5 (only one of which is visible in the drawing figure) has been positioned outside the carriage way 1, as well as outside the supporting reserve 2, and they have instead been positioned in the slope 4 at a distance from the supporting reserve, which distance is at most three metres. The post 5 is preferably anchored directly in the ground material of the slope without use of pre-fabricated foundations or foundations cast on site, and they can preferably be rammed down or positioned in pre-made holes, whereby the portion 5a of the post anchored in the hole shall have a depth of at least 60 centimetres.

[0010] The post 5 supports together with the other posts incorporated in the fence, a number of substantially horizontally arranged fence members 6, in the embodiment shown 3 parts, which are positioned at mutually equal vertical distances, and which in the embodiment illustrated can be made as steel ropes or wires, even if it also is possible to imagine horizontal fence members in form of thin belts or rods.

[0011] In Fig. 2 is schematically shown in perspective a series of posts 5 of the type in question, anchored in a slope 4 outside the supporting reserve 3 at a road and having three horizontal fence members 6 arranged at substantially equal distances from each other in vertical direction.

[0012] Fig. 3 shows in a view corresponding to Fig. 1 positioning of the post 5 at a certain distance from the supporting reserve, whereby in the embodiment shown is used three horizontal fence members 6, in equivalence with Fig. 1, whereas at a post 5' intimated with dash and dot lines, which is positioned in the slope farther away from the supporting reserve, it may be needed a larger number of horizontal fence members 6'. The mutual distance between the adjacent strings 6' is just about the same as the distance between the strings 6. In this manner it is ascertained that vehicles travelling off the road at high speeds will be caught by means of the upper horizontal fence members, whereas vehicles driving off at lower speed and/or at a low angle to the fence, will hit the lower fence members.

[0013] Fig. 4a and 4b illustrate an appropriate type of retaining member for a horizontal fence member 6, which here is illustrated as a steel rope. The retaining in this case is constituted by an inclined slot 7, cut obliquely from above and downwards in the wall of the post 5, which slot in Fig. 4a is shown from the side and in Fig. 4b from the front, whereby a steel rope 6 is inserted in the slot 7, which in this perspective is shaped almost as a horseshoe. Due to this design of the retaining member, a force caused by a collision in the longitudinal direction of the rope will result in that the rope 6 is retained due to the force component urging the rope against the wall of the slot. At collision the car is caught by the horizontal fence members or the steel ropes and when the car hits a post, this will be bent in the direction of travel for the car and the steel ropes and the posts are separated from each other.

[0014] Fig. 5a and 5b illustrate another design of post and retaining members. In Fig. 5a is shown a post 5 provided with a longitudinal slot 5a, and which has a number of substantially keyhole shaped openings 8 situated above each other, and which pair by pair serve to receive a cleat-formed hook 9, which has bigger portions 10 at its ends. These bigger portions 10 have a size allowing them to pass through the upper, wider part of each keyhole 8, whereas they after having been moved down in the more narrow part of each keyhole opening, can not be pulled out of the openings 8. When the fence is hit by a car these retaining members act in a manner corresponding to the slot 7 according to Figs. 4a and 4b, whereby the forces acting perpendicularly to the post cause the hook 9 and the walls of the holes 8 to be deformed thus that their interconnection is interrupted.

[0015] It shall be observed that the post according to Fig. 4a and Fig. 5a have both been shown with only one retaining member 7 and 8, 9 respectively, but in accord-

ance with what is earlier said, it is evident that each post has a number of retaining members arranged in vertical direction, and which at least correspond to the number of horizontal fence members 6, which are needed to be used in every individual case.

[0016] In Figs. 6a and 6b is shown an embodiment of a retaining member at a post 5, which member is constituted by a number of slots 11 shaped as a reversed figure one, in which is insertable a cleat-like hook 12, having ends 13 bent out in opposite directions.

[0017] At forces which act in the longitudinal direction of the fence members also in this case the result will be that the fence members can move in relation to the retaining members 11, 12 and to the posts, whereas forces generated when a car hits a post and the post is bent in the direction of travel of the car, at the same time as the car is caught by the horizontal fence members will result in that the ends 13 of the hook or the walls of the hole 11 are deformed and the hook comes loose from the post.

[0018] In Figs. 7a and 7b is shown a further embodiment where the tubular post 5 has two axially extending slots 14, where the horizontal fence members or steel ropes 6 are positioned. The mutual distance between the steel ropes 6 is decided by spacer members 15, which are positioned in one or both slots.

[0019] Fig. 8a illustrates schematically a post 5 having the same type of holes 11 for retaining members 12' as the post in Fig. 6a but the retaining members in this embodiment differ slightly from those according to Fig. 6b.

[0020] When the horizontal fence members 6, in form of steel ropes are mounted in the retaining members, these steel ropes are wound off from tractor-borne rollers on which very long and therefore heavy strands of the rope are stored. With the hook member shown in Fig. 6b, the rope must be wound off and positioned on the ground along the series of posts, and then it is necessary for operators to walk along the fence to be, and fit a hook member 12 around the rope 6 for every post and then to lift the rope up to the hole 11 in the post with a substantial weight from the rope. This is a heavy and tiring job, and it is also quite time-consuming, in view of the large number of retaining positions.

[0021] The hook member 12' in the embodiment according to Fig. 8b, has a further bend 16 positioned adjacent one of its ends 13. With aid of this additional bend 16 it is possible to position the retaining member or the hook 12' in the hole 11 in the post 5 such as shown in the lower hole 11 in Fig. 8a. With hooks 12' thus positioned in all slots 11 in all posts 5 for a distance corresponding to the length of the steel rope 6 on a storage roller, it is possible to lay the steel rope 6 directly in the hook 12' such as shown in the upper position of the slot 11 in Fig. 8a. It might be required some manual work in guiding the steel rope to come to rest in the hook member 12', but the heavy work for lifting the hooks with the weight of the steel rope is eliminated. From the position shown in the upper part of Fig. 8a it is a comparatively

easy work to swing up the free end of the hook 12' and insert it in the upper part of the slot 11 and thereupon to let it slide down until it is positioned in the same manner as the retaining member 12, shown with dash and dot lines in Fig. 6a.

[0022] The invention is not limited to the embodiments illustrated in the accompanying drawing figures and described with reference thereto, but modifications and variants are possible within the scope of the accompanying claims.

Claims

1. Side guard fence of the type, which incorporates a plurality of posts (5) arranged at a mutual distance along the edge of a carriage way and substantially being vertically anchored, and substantially horizontal, longitudinal fence members (6) attached to the posts and arranged at mutually spaced apart distances from each other in the vertical direction, **characterized therein**, that the posts (5) are positioned in the slope (4) outside carriage way and supporting reserve (3) if any.
2. Side guard fence as claimed in claim 1, **characterized therein**, that the inclination of the slope (4) is bigger or equal to 1:6.
3. Side guard fence as claimed in claim 1, **characterized therein**, that the posts (5) are mounted without foundations directly in the ground material of the slope (4), by means of ramming or by lowering in holes intended therefore.
4. Side guard fence as claimed in anyone of the preceding claims, **characterized therein**, that the posts (5) have an anchoring depth in slope of at least 60 cm.
5. Side guard fence as claimed in anyone of the preceding claims, and where there are more than two horizontal fence members (6), **characterized therein**, that the mutual distance between two adjacent horizontal fence members (6) attached to the posts (5) is substantially equal and substantially constant.
6. Side guard fence as claimed in anyone of the preceding claims, **characterized therein**, that the fence has a varying number of horizontal fence members (6) in dependency of the distance at which the posts (5) have to the carriage way (1).
7. Side guard fence as claimed in anyone of the preceding claims, **characterized therein**, that the horizontal members of the fence are constituted by steel ropes (6).
8. Side guard fence as claimed in anyone of the preceding claims, **characterized therein**, that the horizontal fence members (6) of the fence are anchored to the posts (5) by means of retaining members (7;8;9;11,12;12';14) adapted to retain the horizontal fence members (6) at forces caused by collision in the longitudinal direction of the fence members, but to release the horizontal fence members (6) when acted upon by forces generated at collision against a post (5).
9. Side guard fence as claimed in claim 8, **characterized therein**, that the retaining members are constituted by downwardly angled slots (7) provided in the posts (5) in which slots the horizontal fence members (6) are received.
10. Side guard fence as claimed in claim 8, **characterized therein**, that the retaining members are constituted by hooks (9;12;12') inserted in slots (8; 11) in the posts, and through which hooks the horizontal fence members (6) are passed, and which are adapted to come loose from the slots at collision forces, by deformation of the hooks (9;12;12') and/or the edges of the slots (8;11).
11. Side guard fence as claimed in claim 10, **characterized therein**, that the hook (12') has two ends (13) bent in opposite directions, adapted to be positioned inside the slots (11) in the mounted position of the hook, the hook (12') near one of its ends (13) being provided with an additional bend (16) permitting the retaining member (12') to be hung in the slot (11) with one end 13 outside the slot (11) during positioning of the horizontal fence member (6) in the retaining member (12').
12. Side guard fence as claimed in claim 8, **characterized therein**, that the retaining members are constituted by substantially vertical slots (14) provided in the posts (5), in which slots the horizontal fence members are received, and the mutual distance between which is determined by spacing members (15) fitted in at least one of said slots (14).

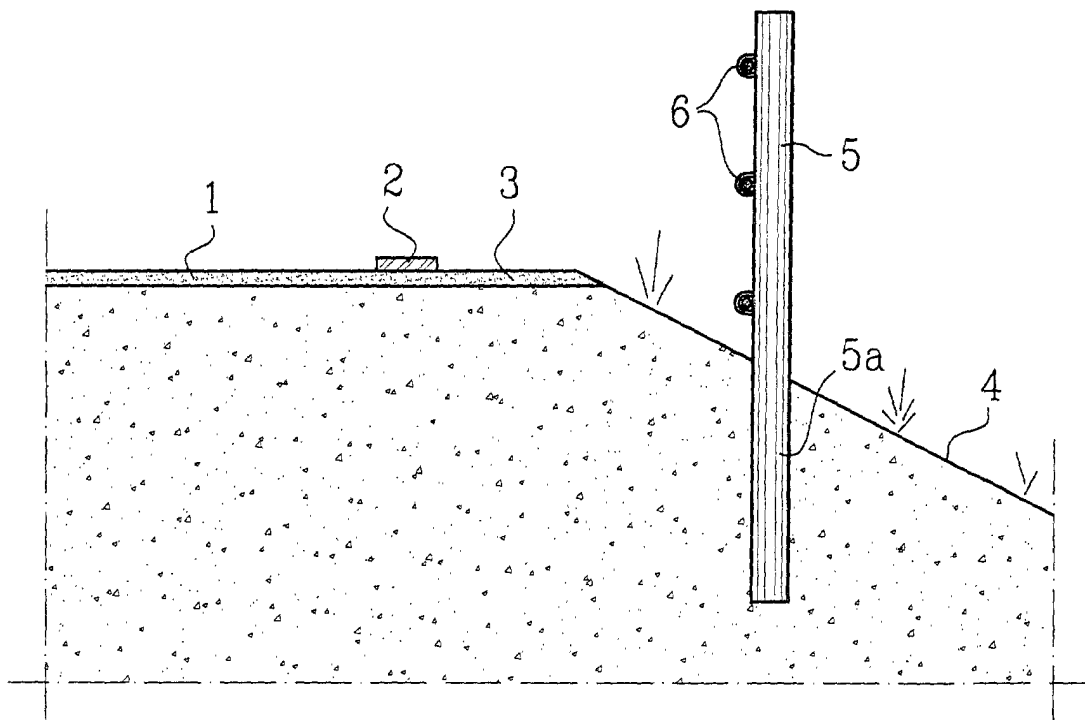


FIG. 1

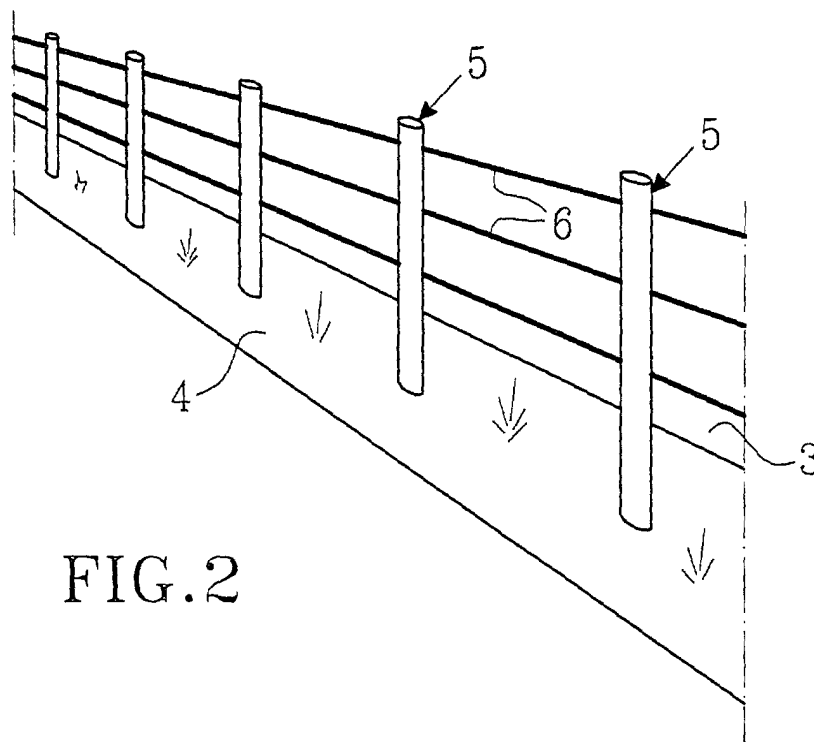


FIG. 2

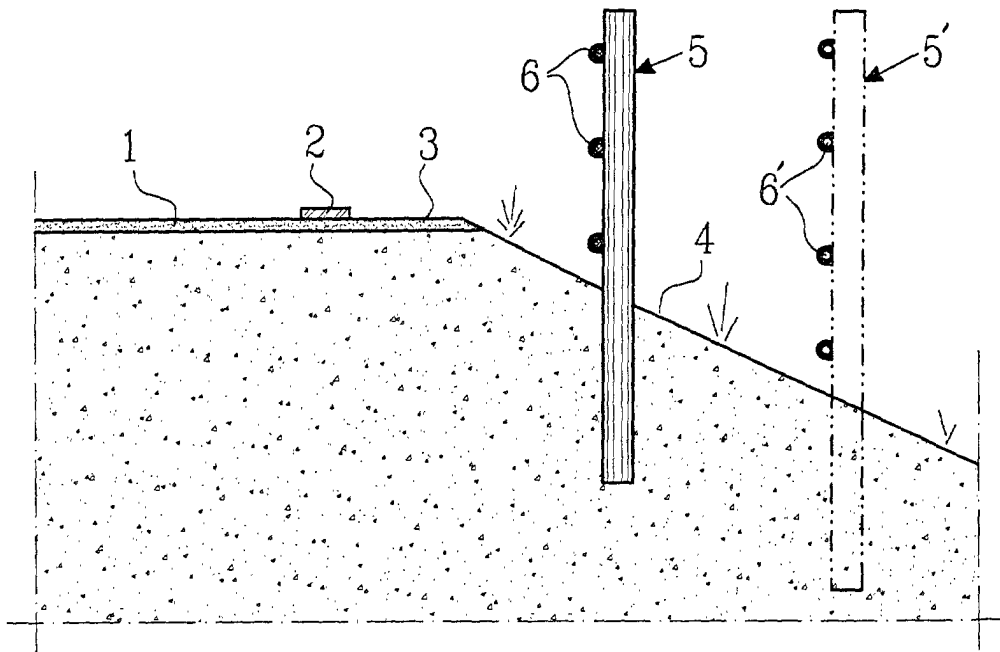


FIG. 3

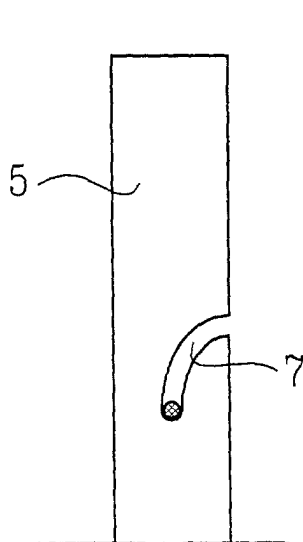


FIG. 4a

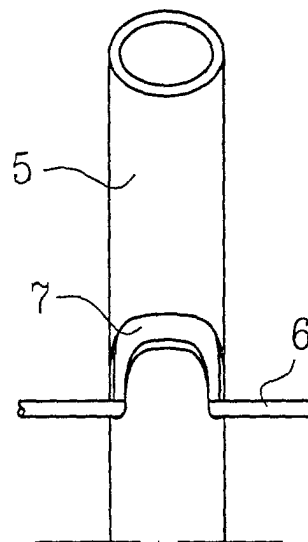


FIG. 4b

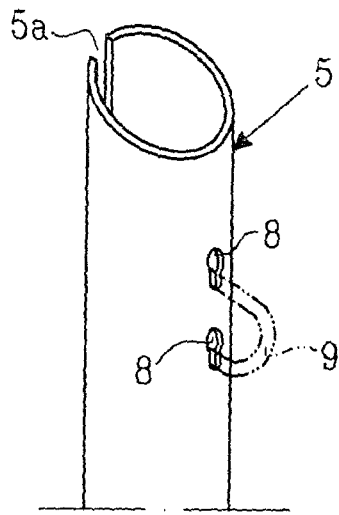


FIG. 5a

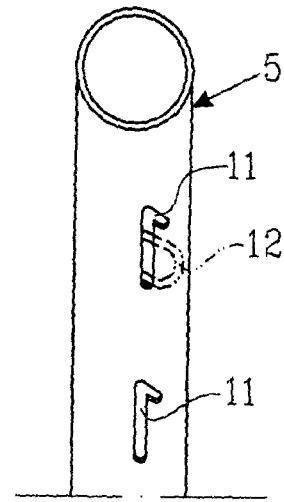


FIG. 6a

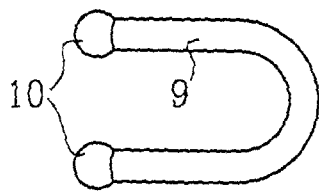


FIG. 5b

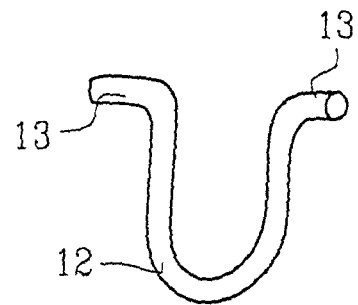


FIG. 6b

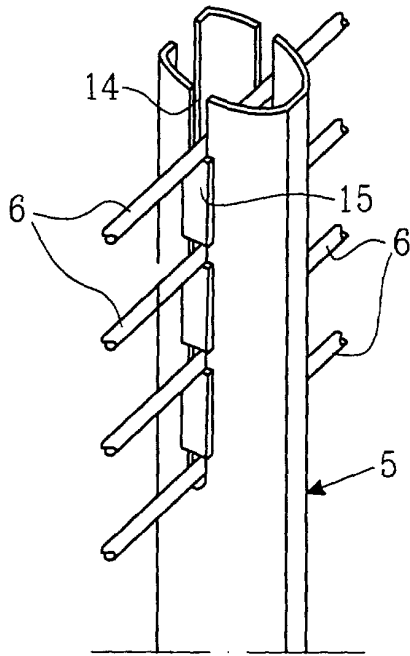


FIG. 7a

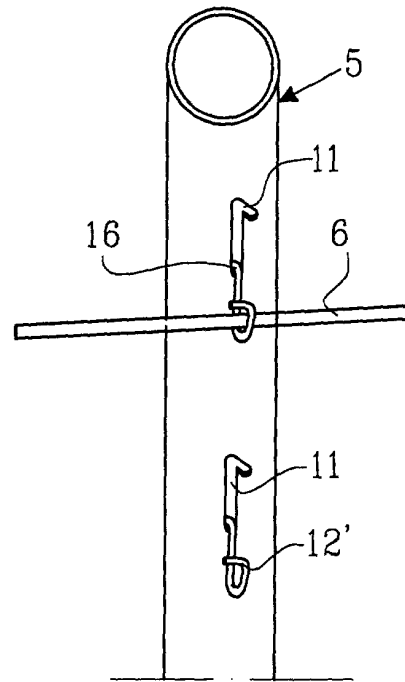


FIG. 8a

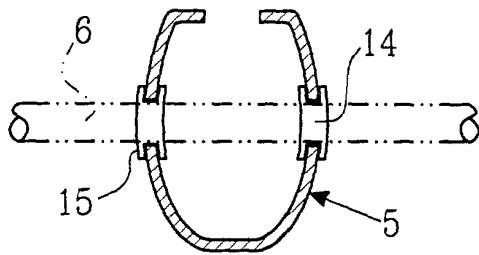


FIG. 7b

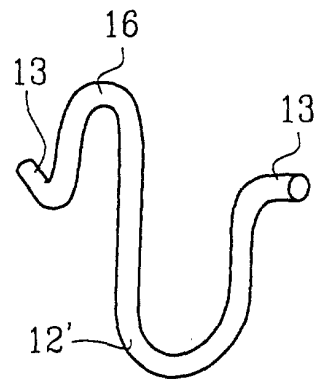


FIG. 8b