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James et al.

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(54) **POST**

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(58) **Field of Classification Search**
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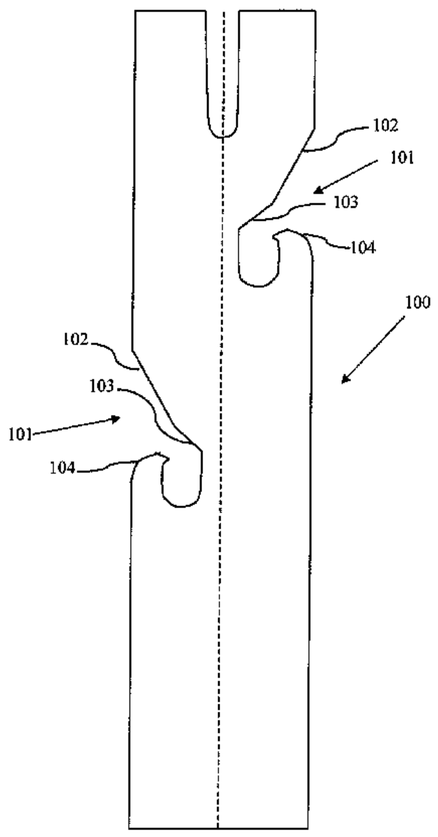
(57) **ABSTRACT**

A post is provided which includes apertures on alternate sides of the post which, in use, receive and retain at least one cable therein, the same number of apertures are on each side of the post wherein each aperture: has a side opening in the form of a mouth, wherein the mouth is at a distal region thereof configured to have a top surface with an angle greater than the angle at a proximate region of the mouth so as to reduce the travel path of, and/or; any frictional contact with; the cable, during ejection from aperture following a collision.

3 Claims, 7 Drawing Sheets



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E04H 17/24	(2006.01)
E04H 17/00	(2006.01)

(52) **U.S. Cl.**
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(58) **Field of Classification Search**
USPC ..... 256/13.1, 47, 48, DIG. 5; 52/300; 404/6
See application file for complete search history.

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FIGURE 1

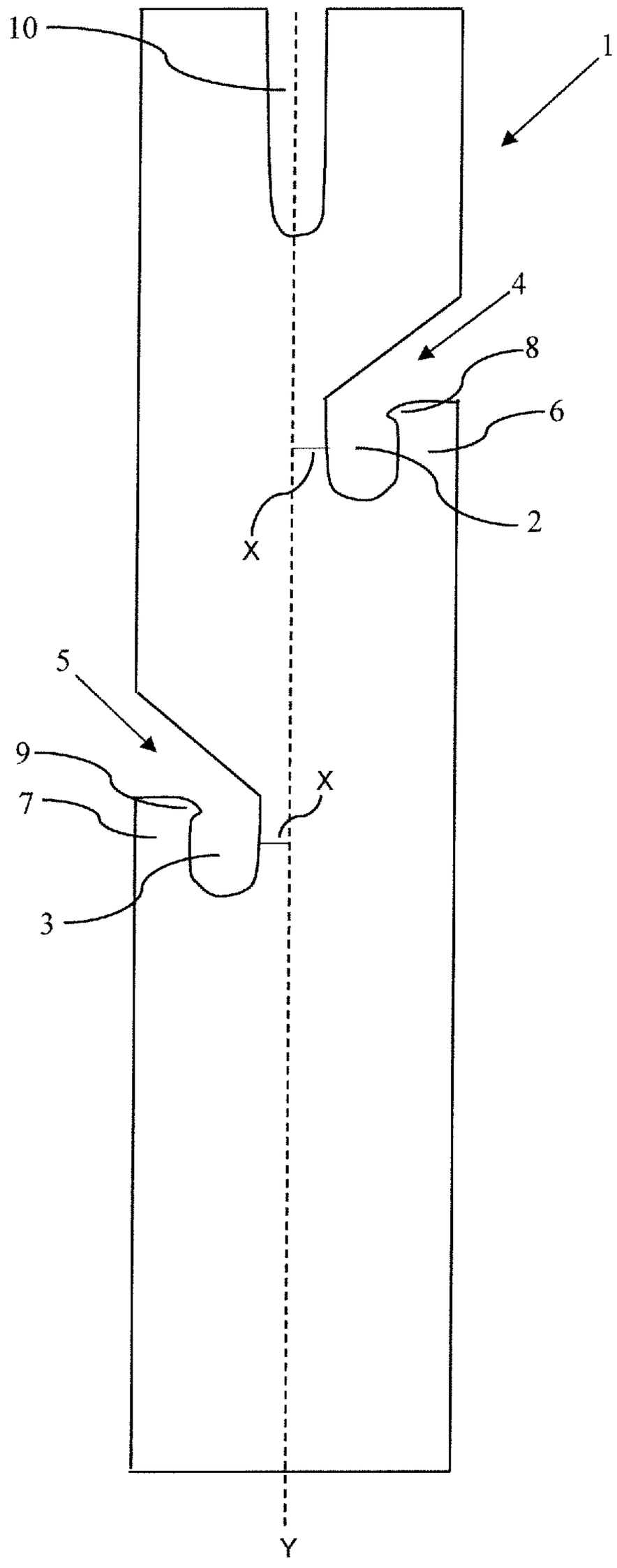


FIGURE 2

PRIOR ART

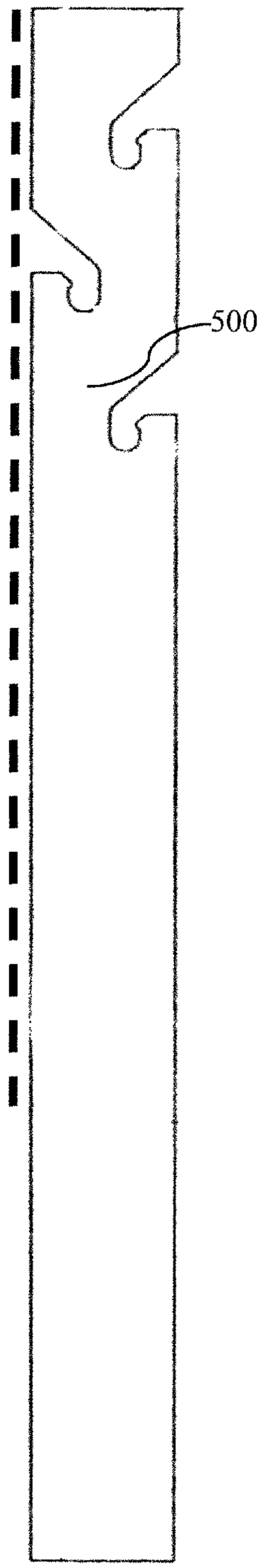


FIGURE 3

PRIOR ART

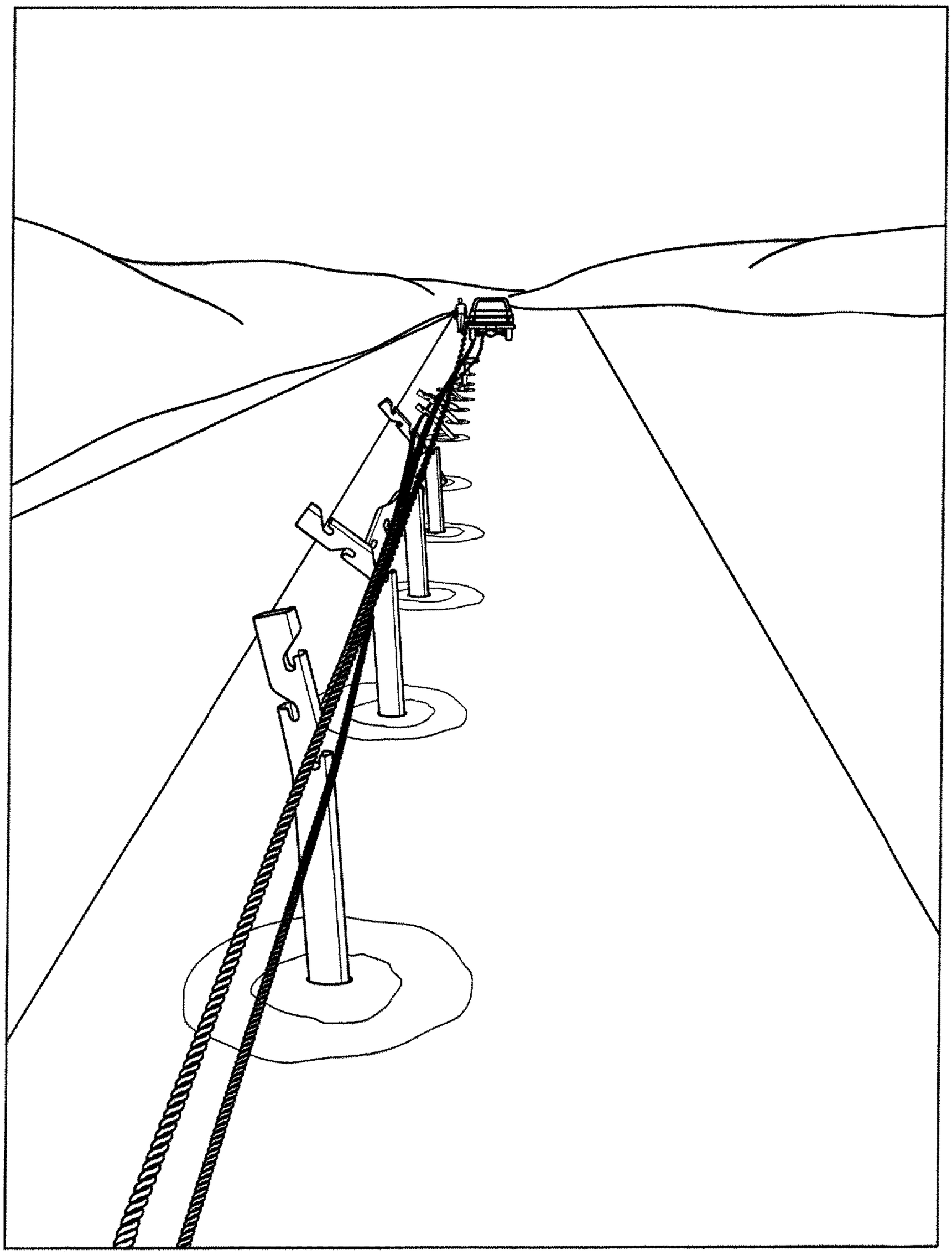


FIGURE 4

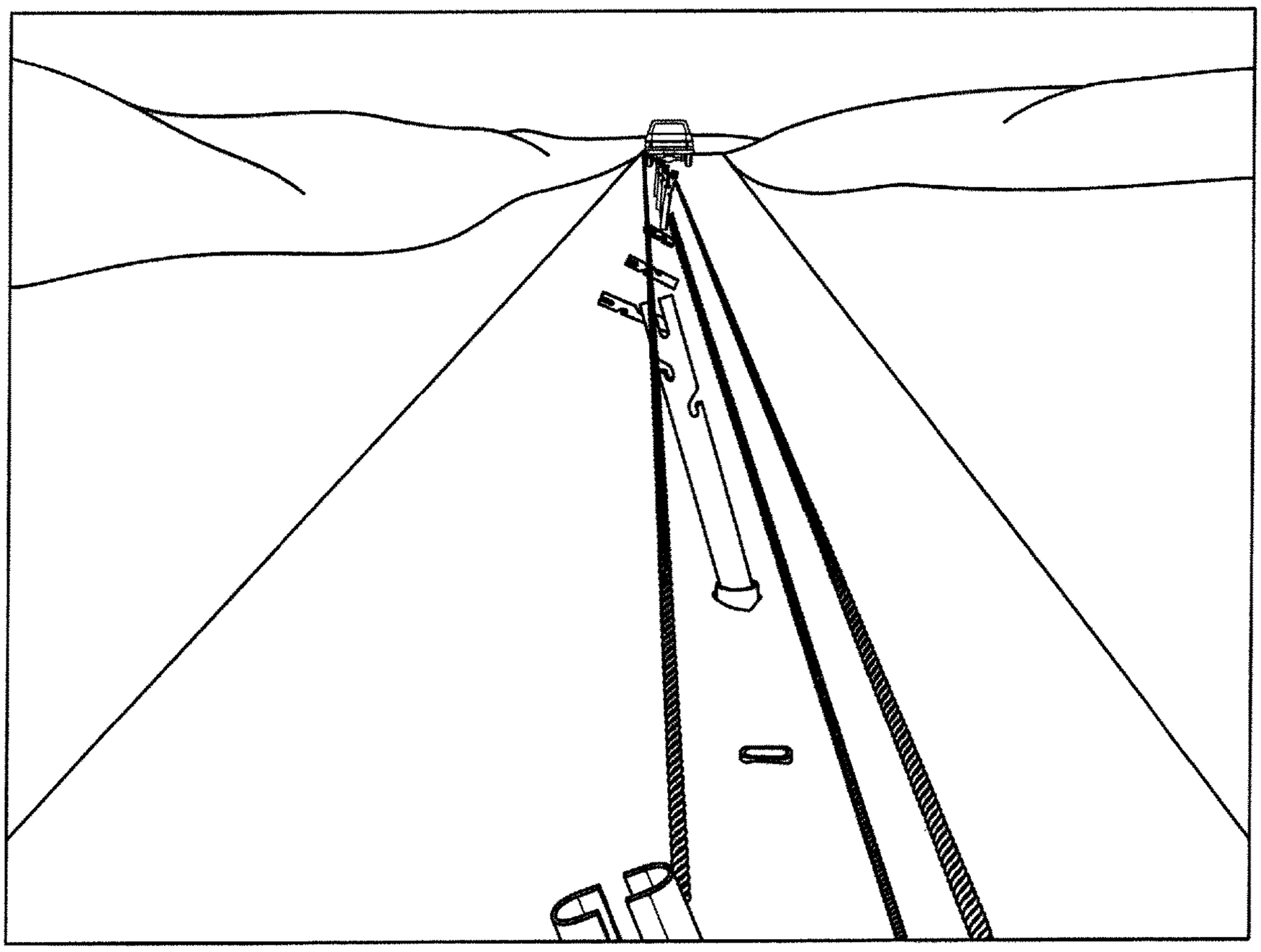


FIGURE 5

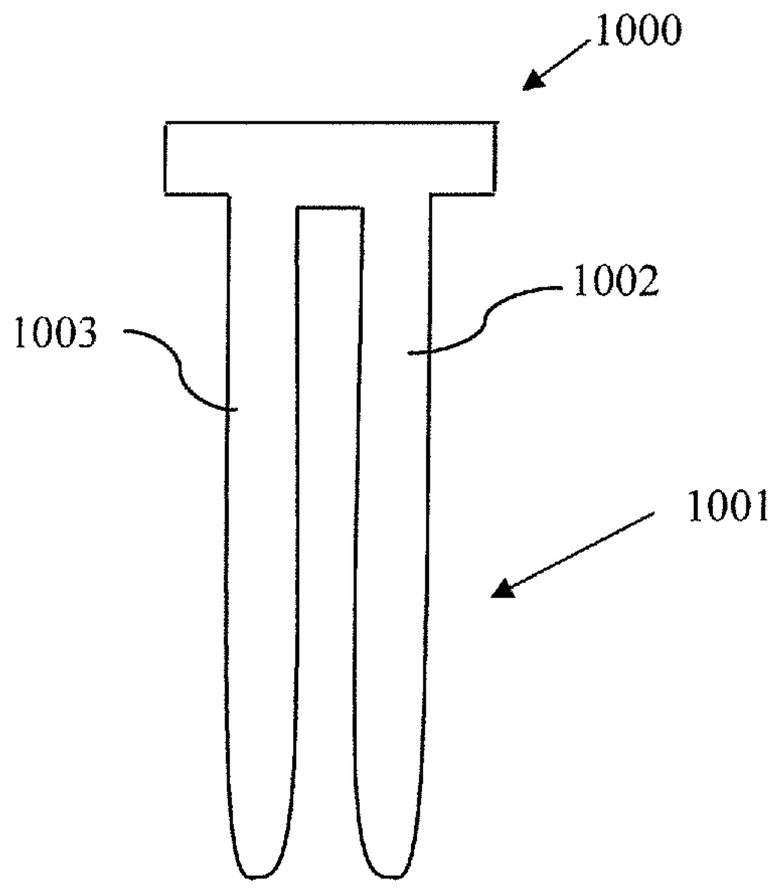


FIGURE 6

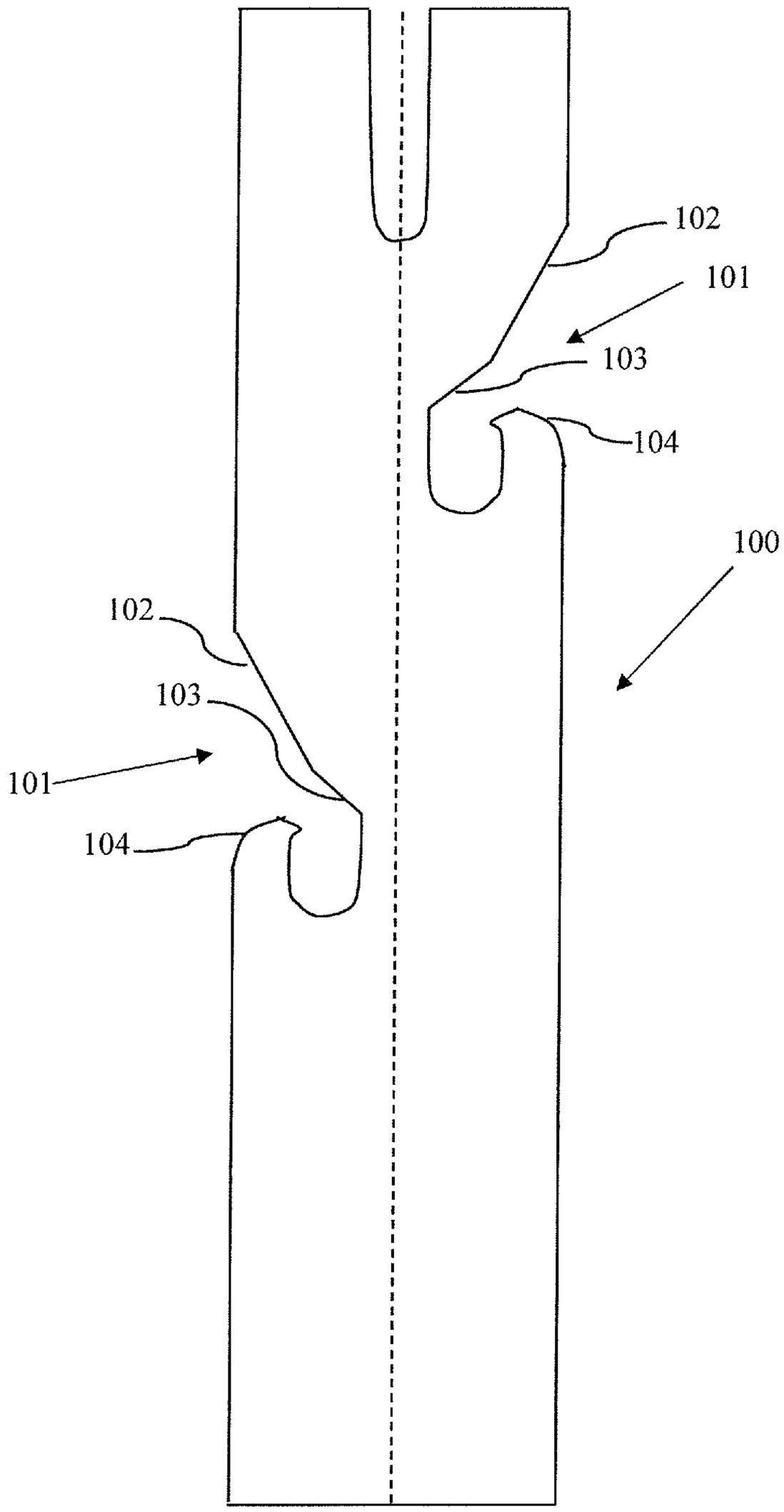
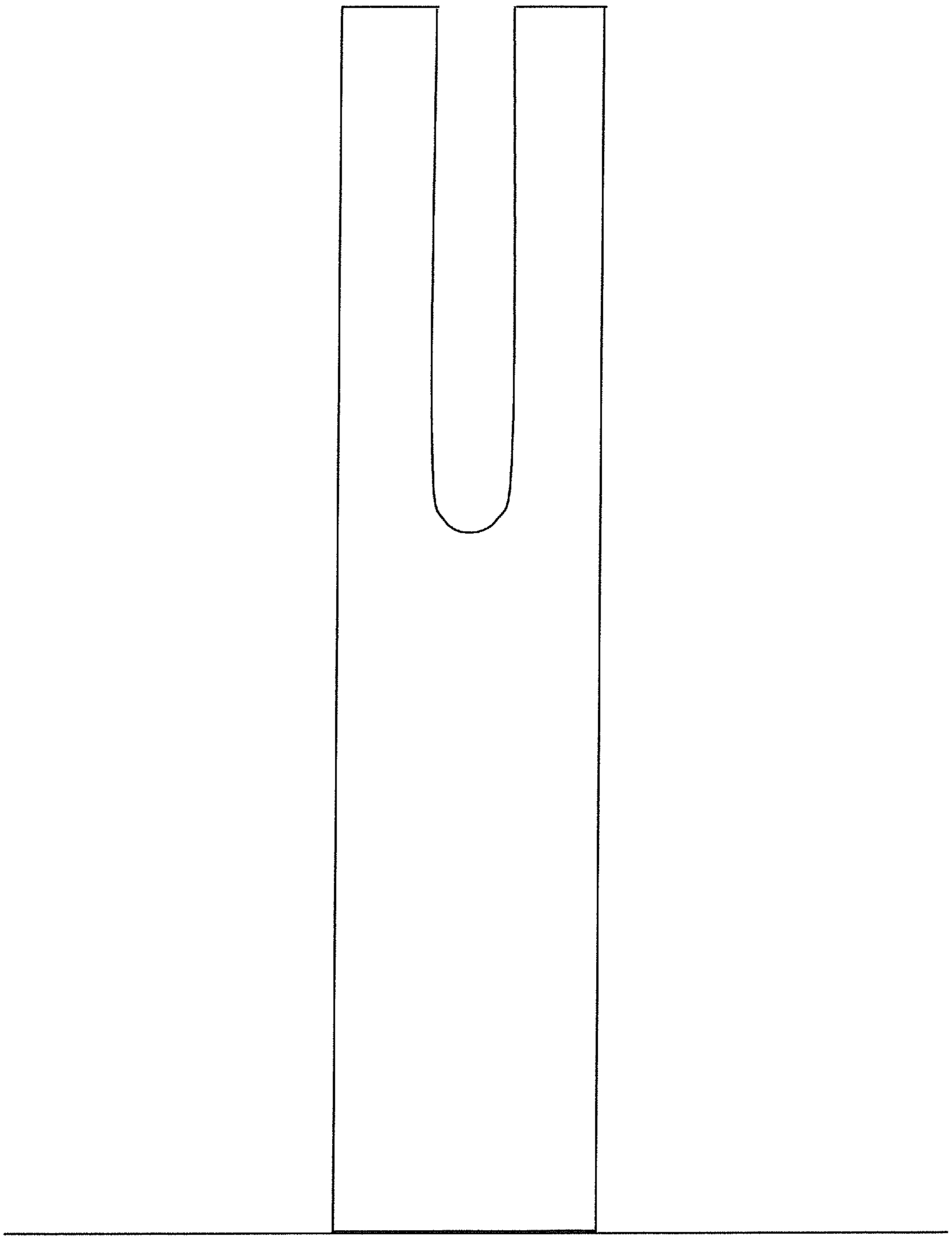


FIGURE 7

PRIOR ART



POST

TECHNICAL FIELD

The present invention relates to a post. In particular, the present invention relates to a post and parts therefor that may be used for, but not limited to, cable barriers. For ease of reference, the present invention will now be described while in use

BACKGROUND

The present invention is designed to further improve upon the applicants earlier cable barrier post covered by NZ Patent No. 546969.

The post in NZ 546969 was itself designed to overcome problems with conventional cable barrier posts for a roading network which have a single aperture (slot) extending downwards though the middle of the barrier post as shown in FIG. **7**. This slot retaining one or more barrier cables within the cable barrier system.

In short, one of the major drawbacks with this conventional single slot construction is that in order to accommodate multiple cables, the length of the slot is relatively long compared to the length of the post. As a consequence sides of the slot have considerably less strength than the remainder of the post. Accordingly, this necessitates constructing the post in a manner that provides sufficient lateral strength to help prevent shearing or buckling of the post in this weakened region. Thus, typically posts have to have a solid construction, or use stronger materials in their construction, to compensate for the reduction of strength and this understandingly adds to their cost.

Furthermore, the location of the slot within these barrier posts makes it difficult to replace, one or more posts, that may be damaged or broken, within an erected cable barrier system. The cables have to be loosened within the cable barrier system and/or a large post hole relative to the size of the post may have to be dug to allow room for manoeuvring the new post into position, in order to insert the post into the already erected cable barrier.

However, whilst the post of NZ 546969 addressed the aforementioned shortcomings with the single slot post, the Applicant has now found that in practice, the post in NZ 546969 also has a number of shortcomings. One such shortcoming is the folding over of the top of the post, following an impact with the barrier. This ends up trapping at least one of the cables within the aperture and thus reduces the energy that can be absorbed if the cables were free to fully flex.

In addition, it also means the post cannot be re-used which is wasteful and expensive.

It would therefore be useful to have a post which improves upon the post in NZ 546969 as well as addresses the issues with the single slot post discussed earlier.

All references, including any patents or patent applications cited in this specification are hereby incorporated by reference. No admission is made that any reference constitutes prior art. The discussion of the references states what their authors assert, and the applicants reserve the right to challenge the accuracy and pertinency of the cited documents. It will be clearly understood that, although a number of prior art publications are referred to herein, this reference does not constitute an admission that any of these documents form part of the common general knowledge in the art, in New Zealand or in any other country.

It is an object of the present invention to address the foregoing problems or at least to provide the public with a useful choice.

All references, including any patents or patent applications cited in this specification are hereby incorporated by reference. No admission is made that any reference constitutes prior art. The discussion of the references states what their authors assert, and the applicants reserve the right to challenge the accuracy and pertinency of the cited documents. It will be clearly understood that, although a number of prior art publications are referred to herein, this reference does not constitute an admission that any of these documents form part of the common general knowledge in the art, in New Zealand or in any other country.

Throughout this specification, the word "comprise", or variations thereof such as "comprises" or "comprising", will be understood to imply the inclusion of a stated element, integer or step, or group of elements integers or steps, but not the exclusion of any other element, integer or step, or group of elements, integers or steps.

Further aspects and advantages of the present invention will become apparent from the ensuing description which is given by way of example only.

SUMMARY

According to a first aspect of the present invention there is a post, which includes:

apertures on alternate sides of the post which, in use, receive and retain at least one cable therein;

characterised in that the same number of apertures are on each side of the post and wherein each aperture:

has an opening on the side of the post on which the aperture is positioned;

wherein the opening is configured to assist in the release of the cable from the aperture, when the post and/or cable is impacted by a suitable force of sufficient magnitude, and wherein the aperture also includes a retaining portion; and wherein the post includes apertures sequentially positioned along alternate sides of the post, so as to create a symmetrically loaded post.

The Applicant has found that utilising the same number of apertures on either side of the post allows it to function as a median barrier as it performs in the same manner no matter on what side it is impacted. The post of NZ 546969 by way of contrast can only be used as a roadside barrier. Furthermore, adopting this requirement that the same number of apertures be on either side of the post also ensures the tops of the posts don't fold over following an impact.

Preferably, the post includes two, four or six apertures on the side of the post.

According a second aspect of the present invention there is provided a post wherein the apertures do not substantially abut and are instead separated a distance X from the medial axis.

According to a third aspect of the present invention there is provided a post substantially as described above wherein the post, wherein in use, the post is hollow and includes a cap comprising:

a top portion; and

a rim that fits seamlessly over the open-ended top of the post and at least one elongated appendage extends substantially inside the post, wherein the cap and appendage are integrally formed as single piece.

According to a further aspect of the present invention there is provided a further preferred embodiment the mouth may for a distal region thereof be configured to reduce:

the travel path of, and/or;

any frictional contact with;

the cable, during ejection from aperture following a collision.

BRIEF DESCRIPTION OF THE DRAWINGS

Further aspects of the present invention will become apparent from the ensuing description which is given by way of example only and with reference to the accompanying drawings in which:

FIG. **1** shows a schematic view of post according to a preferred embodiment of the present invention;

FIG. **2** shows a prior art post according to NZ 546969;

FIG. **3** is a photograph which shows a cable barrier post impact with posts according to the prior art;

FIG. **4** is a photograph of a cable barrier post impact with posts according to the present invention;

FIG. **5** shows a schematic view of a cap and appendage element of unitary construction according to a further element of the present invention;

FIG. **6** shows a schematic view of a further preferred embodiment of post according to the present invention; and

FIG. **7** shows a prior art single slot post.

DETAILED DESCRIPTION

With respect to FIGS. **1** and **2** there is provided a post **1** which is hollow and has two apertures **2** and **3** on either side thereof. The apertures **2** and **3** each have an opening **4** and **5** on the side of the post which permits cables (not shown) in use to be inserted or ejected from the apertures **2** and **3**. The apertures **2** and **3** also have a retaining portion in the form of a wall **6** and **7** which has a lip **8** and **9** at the top thereof which, in use, assists with retaining a tensioned cable within the apertures **2** and **3**.

FIG. **2** differs from FIG. **1** in that it is has an additional aperture **500** which in use creates an asymmetrical loading on the post when tensioned cables are inserted into the apertures.

FIG. **1** shows a post **1** differs from the prior art post of FIG. **2** in that it has the same number of apertures on either side of the post to create a symmetrical loading on the post when tensioned cables are inserted into the apertures. The post **1** in FIG. **1** also has a short slot **10** in the top thereof which extends down the middle of the post **1** which is absent in the post **1** FIG. **2**. The slot **10** extends no more than substantially 10%-15% of the overall length of the post. This is in contrast some to existing posts prior art posts shown in FIG. **7** which have a slot which extends around 30%-40% of the above ground post length as it has to retain all the cables of a cable barrier.

The post **1** of FIG. **1** also differs from the prior art post of FIG. **2** in that the apertures **2** and **3** do not abut the medial axis Y and are instead separated a distance X therefrom. By way of contrast, FIG. **1** the post has a width of 90 mm and the distance X, the apertures are separated from the medial axis Y, is substantially 5 mm.

In relation to FIG. **3** it can be seen how the top of the posts fold over following a vehicle impact with the barrier. This presents a problem as cables get trapped in the apertures if the post folds over reducing the energy that can be absorbed as well as lessening the ability to redirect an errant vehicle.

The applicant has surprisingly found that if the apertures are moved away from abutting the medial axis of the post this increases as shown in FIG. **2** this increases the strength of the post by around 30%. This is evidenced in FIG. **4** where it can be seen that the top of the posts have not folded over at all.

In relation to FIG. **5** there is shown a cap **1000** and appendage element **1001** which has 2 prongs **1002** and **1003**. The appendage element is integrally formed with the cap via a moulding process. The advantage of integrally moulding is two fold:

- increased speed of placing the cap, in post, and importantly the prongs are assured to align with opening in the post, for quick insertion in the prior art the prong(s) could move relative to the cap, as they were loosely clicked together;
- ensuring the prongs do not become separated from the cap, if a collision event happens to the barrier, in a region remote from the post associated with the cap, but yet still receives energy from the impact.

In FIG. **6** there is a portion of a post **100** having a modified aperture **105** on each side of said post. The aperture **105** is accessed via an opening in the form of a mouth **101**. The mouth **101** has a top edge **111** with a quick cable release portion **102** at a distal end thereof which has a steeper angle than the remainder of the top edge **103** proximate the aperture **105** which has a shallower angle. The wall **104** of the mouth **101** has a curved surface to also reduce any frictional contact with the cable during an ejection.

ALTERNATE EMBODIMENTS

It should be appreciated that the post may come in a variety of different shapes and configurations and be made from a variety of materials without departing from the scope of the invention.

In preferred embodiments, the post may be substantially hollow.

The inventor has found that by using a substantially hollow post, with a simple design requirement of aperture placement, this contributes to the lightweight construction and/or expense of manufacture of the barrier post. Additionally, by selecting a more cost effective material, this can also contribute to the cost of manufacture.

Preferably, the post may have an elliptical cross-section.

The aperture(s) may generally come in a variety of different shapes and sizes, provided the apertures have sufficient dimension to receive and retain, and preferably when required, release a segment of the cable.

The number of apertures on the side of the post must be an even number. That is the same number of apertures needs to be on each side of the post.

In general, the side apertures may include a retaining portion which retains the cable within the aperture.

In further preferred embodiments, the retaining portion may include at least one wall portion.

In some embodiments, the retaining portion may be at least one lip that retains or helps retain the cable within the aperture.

Preferably, at least one edge of the lip(s) may be curved.

Preferably, the aperture may project downwards from the mouth of the aperture.

The opening (mouth) of the aperture may have a variety of different configurations without departing from the scope of the present invention.

In some embodiments, the mouth may be configured to help direct a cable into the aperture so the cable can be retained therein.

In further embodiments, the mouth may also be configured to assist the release of the cable from the aperture should a suitable force of sufficient magnitude be applied to the post and/or cable.

In general, the cable and/or post will only move a sufficient distance to cause release of the cable in the area of the cable-barrier which is directly subjected to a suitable force or the region of the cable-barrier immediately adjacent thereto.

Preferably, the force applied to the cable-barrier, may be caused by collision of a vehicle with the cable-barrier or surrounding area. However, it will be appreciated that forces from other areas may be applied to the cable-barrier, without limiting the scope of the present invention.

In further preferred embodiments, the mouth may include a surface or edge which is inclined at an angle which directs the cable either into or out of the aperture depending on which direction a force is moving the post and/or cable.

Preferably, the angle of the top surface or top edge of the mouth may be substantially 45° with respect to the longitudinal axis of the post.

In a further preferred embodiment the mouth may for a distal region thereof be configured to reduce:

the travel path of, and/or;

any frictional contact with;

the cable, during ejection from aperture following a collision.

The mouth may be configured to reduce the travel path and/or frictional contact with the cable during an ejection event in number of different ways.

In one embodiment the angle of the top surface or edge of the mouth may be substantially 45° at a proximate region thereof, and substantially 50° or more at a distal region thereof, with respect to the horizontal. Preferably, the distal region of the top surface or edge of the month may be substantially 60°-70°.

In some embodiments the bottom surface or bottom edge of the mouth may also be configured to reduce frictional contact with the post as the cable exits the aperture.

In one embodiment the bottom surface or bottom edge of the mouth may be convexly curved.

In another embodiment the bottom surface or bottom edge of the mouth may be angled downwardly from the horizontal.

The inventor has found that the above aperture shape is an advantage. In particular, the shape allows for cables to be easily removed from one or more posts in an already erected cable barrier, without the need for collapsing the whole barrier. This can be important, for example where the posts may need to be replaced due to damage from an impact. Additionally, the shape of the aperture(s) provides for release of the cables from one or more barrier posts, at a particular point of impact, rather than releasing the cables from all posts, when an impact occurs.

In preferred embodiments, there may be two elongated appendages that may be situated on opposite sides of the post.

Preferably, the elongated appendage(s) may fit seamlessly against a portion of the internal surface inside of the post.

In preferred embodiments, the elongated appendage(s) may effectively close off the opening to the aperture(s).

Thus, preferred embodiments of the present invention can have a number of advantages which can include:

posts which have a symmetrical loading when in use;

posts which have increased lateral strength;

posts which resist folding over upon an impact into a cable barrier;

posts which ejects a cable more quickly;

caps for posts which can be inserted more quickly and easily; and

caps for posts which can better maintain their integrity during an impact.

Aspects of the present invention have been described by way of example only and it should be appreciated that modifications and additions may be made thereto without departing from the scope thereof as defined in the appended claims.

What we claim is:

1. A road barrier post, comprising:

at least one aperture on alternate sides of the post which, in use, each receives and retains at least one cable therein, wherein each aperture includes:

a top edge extending from a side of the post to each aperture,

wherein the top edge comprises a distal linear surface and a proximal linear surface, said distal linear surface extending to the side of the post and forming a quick cable release portion, and said proximal linear surface forming the remainder of the top edge, the proximal linear surface extending from the distal linear surface toward a longitudinal axis of the post, and

wherein the distal linear surface comprises a first angle relative to a horizontal line transverse to the longitudinal axis, that is greater than a second angle of the proximal linear surface relative to the horizontal line, wherein the first angle and the second angle are positive non-zero angles so as to reduce:

the travel path of or;

any frictional contact with;

the at least one cable during ejection from the aperture following a collision by a vehicle.

2. The post as claimed in claim **1**, wherein in use, the post is hollow and includes a cap that fits seamlessly over the open-ended top of the post and at least one elongated appendage extending from the cap and substantially inside the post, wherein the cap and appendage are integrally formed as a single piece.

3. A barrier which includes a post as claimed in claim **1** together with a plurality of cables supported in the apertures of the post.

* * * * *