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## (54) A safety post and the method for its construction

(57) The invention presents a safety post, such as a reflector, traffic sign, lamp, traffic light or signal post or pole to be used at a roadside in the vicinity of traffic, and a method for constructing the post in question. The post consists of a tube (1) with a hollow interior (2), propped up in the ground, the tube (1) being a substantially thin-walled shell structure, the bending resistance of which is adjusted so that the tube bends, yields and/or breaks even with minimal lateral force, the bending resistance of the safety post is then improved by adding granular filling material (3) inside the hollow interior of the tube, and thus the safety post is adjusted to withstand loads submitted to it in its normal use, while in a collision it bends, yields and/or breaks without causing damage to the colliding vehicle.

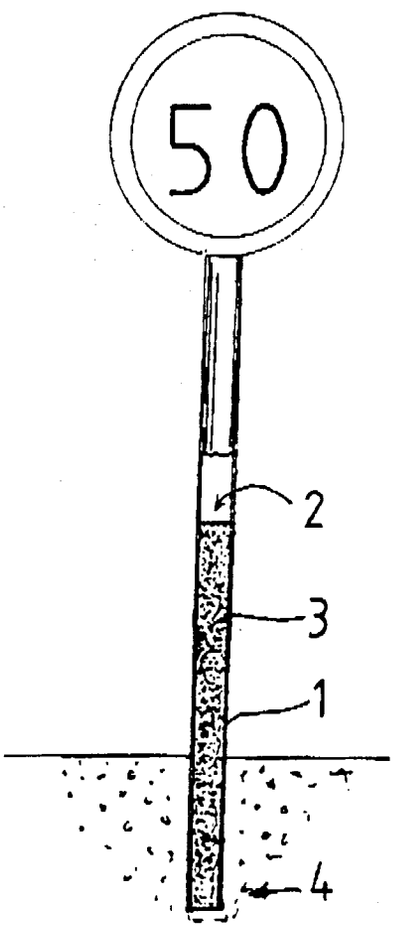


Fig 1

EP 0 735 194 A2

## Description

The target of this invention is a safety post defined in the introduction of claim 1 of this patent application. Another target of this invention is the method for constructing the safety post as defined in claim 10 of this patent application.

Posts and poles, such as reflector posts, traffic sign posts, lamp posts, traffic signal posts or sign posts used at roadsides in the vicinity of traffic are well-known. This kind of a post or pole is usually made of metal or wood propped up in the ground. The problem with these types of posts is that, in the vicinity of traffic they create a safety risk. Metal tubes and wooden posts are rigid, and because of their stiff characteristics, even in a relatively mild collision the post causes damage to the vehicle, and possibly even to the driver or passengers. Another problem is the high price of metal posts, and the maintenance costs, and poor durability of wooden posts. To improve durability, a wooden post must be pressure-impregnated, which poses an environmental problem, especially when it is time to discard and destroy the post. A plastic tube would be a suitable raw material for a post, but in practice the flexibility of an economical model would be substantially lower than that of a metal tube, while a sufficiently strong, plain plastic tube, suitable for above mentioned purposes, would be far too expensive. For example, the US publication 4.078.867 describes a post which consists of a thin-walled, propped up plastic tube with the stiffness adjusted so that the tube bends very little when submitted to lateral force. The tube is filled with sand only to ground level which does not increase the bending resistance of the tube.

The purpose of this invention is to eliminate the above mentioned problems.

Specifically, the purpose of this invention is to present a novel type of safety post which is safe in a collision and does not damage a vehicle colliding with the post.

Furthermore, the purpose of this invention is to present an inexpensive safety post which is simple to use, and easy to erect.

Moreover, the purpose of this invention is to present a safety post which enables plastic or another low-priced and durable building material to be used.

Finally, the purpose of this invention is to present an economical and simple method for constructing a safety post.

The characteristic properties of the safety post of this invention are described in claim 1 of this patent application. Furthermore, the characteristic method for constructing the safety post of this invention is described in claim 10.

According to this invention, in order to improve the bending resistance of the tube, the hollow interior of the safety post is filled with granular filling material extending upward from the prop-up site, so that the tube is, at least, partially, filled with the above mentioned filling material which is arranged in such a way that the safety post withstands loads in normal use, but in a collision, yields and/or breaks without causing damage to the vehicle colliding with the safety post.

Reflectors, traffic signs, traffic lights, lamps and other signals can be mounted onto the top of the tube.

Similarly, in the method of this invention, when the tube is propped up in the ground, the hollow interior of the tube is filled, at least partially, with granular material from the site of erection. The filling material extends upwards from the ground prop-up site, and is arranged so that it improves the bending resistance of the tube; and as a result, the post withstands loads in normal use, but in a collision bends, yields and/or breaks without causing damage to the vehicle colliding with the safety post.

The advantage of this invention is that it improves traffic safety. In the event of a collision the safety post is safe, because of the lighter structure. The shell of the post bends, yields and/or breaks under the force of impact; it "explodes" and releases its inner packing into the surroundings, without producing an unnecessarily strong impact resistance and causing great damage.

Furthermore, the advantage of this invention is that it is more economical than currently used posts. The raw material is inexpensive and the lightness of the tube and ease of erection make this invention cheap and easy to use.

In addition, due to this invention, economical thin-walled plastic tubes can be used as safety posts, because the filling material arranged inside the post renders the post sufficiently strong and rigid.

An additional advantage of this invention is that the tube can first be erected and, then filled with soil found at the erection site, or its close vicinity.

In one embodiment of the safety post, the volume weight of filling material is essentially the same order of magnitude as mineral soil. The filling material may consist of stone chips, gravel, sand, fine sand, clay sand and/or clay. In some embodiments of this invention, the filling material may also consist of metal filings.

In another embodiment of the safety post, the tube is a thin-walled plastic, metal or ceramic tube.

In another embodiment of the safety post, the hollow interior of the tube is partially filled with filling material. In such cases, the filling material is mostly arranged at the prop-up site of the tube, i.e. at the area, where the tube is most likely to bend. The top end of the post can be left hollow and light to reduce the bending stress while the prop-up site is multi-reinforced with filling material such as sand.

In another embodiment of the safety post, the bottom end of the post is directly dug into the ground. Alternatively, the safety post may include a special post erection foot, to which the tube is mounted.

In another embodiment of the safety post, the tube consists of a stopper which blocks the bottom end of the post. The tube may include a lid which covers the top end of the tube. Moreover, the post can be assembled

from several, successive, joined tubes.

In the following section, the invention is described in detail by referring to the enclosed drawing, in which

Figure 1 shows one of the first embodiments of the safety post of this invention, partly in cross-section.

Figure 2 shows one of the second embodiments of the safety post of this invention, partly in cross-section and

Figure 3 shows one of the third embodiments of, partly in cross-section.

Figure 1 shows the safety post of this invention constructed as a traffic sign post. The post consists of a vertical tube (1 ) with a hollow interior (2), propped up in the ground. The tube (1) is a thin-walled plastic shell-structure, and its bending resistance is adjusted so that the tube bends, yields and/or breaks, when submitted even to minimal lateral force. The hollow interior (2) of the tube (1) has been filled with granular material (3), which increases the bending resistance of the tube (1). Thus, the tube is adjusted to withstand loads in normal use, and in a possible collision it bends, yields and/or breaks without causing damage to the colliding vehicle. Characteristically, the filling material (3) is massive. The volume weight of the filling material (3) is, preferably, and essentially, the same order of magnitude as that of mineral soil. Suitable filling materials (3) may include gravel, sand, fine sand, clay sand and/or clay.

As Figure 1 shows, the hollow interior (2) of the tube (1) is only partially filled with the filling material (3) so that the filling material mostly remains at the prop-up site of the tube (1) and extends up in the tube (1) for some distance. The bottom end (4) of the tube (1 ) is buried into the ground. A traffic sign is mounted to the top end of the tube (1).

Figure 2 shows a reflector post, i.e. so called mounted cats' eyes, which are usually set up at regular intervals along the roadside. The reflector sign post resembles the embodiment of Figure 1, but in this embodiment, the tube (1) is equipped with a stopper (6) to block the bottom end (4) of the tube. This stopper (6) prevents the filling material inside the tube from becoming damp as a consequence of humidity of the soil. If a special substance is used as the filling material, it will spoil or harden as a consequence of humidity rising from the ground. In addition, the tube (1 ) consists of a lid (7) which covers the top end (8) of the tube (1). By removing the lid (7), the amount of the filling material (3) can be checked and adjusted, if necessary.

Figure 3 shows the lower end of a lamp post, which in addition to the structure discussed in Figure 1, also consists of a post erection foot (5) buried into the ground, and into which the tube (1) is mounted. In addition, the tube (1) is equipped with a stopper (6) which blocks the lower end (4) of the tube. This stopper (6) prevents the filling material (3) from flowing into the recess in the post erection foot (5) to which the lower end of the tube is attached. In addition, tube 1 consists of two successive tubes: $1^1$ and $1^2$, which are joined together by their ends. There can be more than two tubes joined together. After the first tube has been erected, it can be filled with sand, after which the second tube is joined to the first, and is in turn, filled with sand etc.

For example, the safety post presented in Figures 1 and 2 is erected in the following manner: first, a hole is dug into the ground, and the thin-walled plastic tube (1) is driven down into the hole. The wall strength (1) of a plastic tube is designed so that it will bend even with minimal force. Then, at the site of erection, granular material, such as sand, is poured into the hollow (2) of the tube (1). This increases the bending resistance of the tube (1) so that it withstands normal loads, such as wind, and static as well as dynamic loads caused by parts mounted to it etc. When the post is exposed to a greater than normal dynamic load, for example, a car colliding into the post, the post bends, yields or breaks easily, because granules formed by the filling material can move freely in relation to each other and the tube, and consequently the colliding vehicle is not damaged.

The above examples of the present invention are provided only for illustrative purposes, and not intented to limit the scope of the present invention. In light of the present disclosure, numerous embodiments within the scope of the claims will be apparent to experts in this field.

## Claims

1. A safety post, such as a post used at the roadside in the vicinity of traffic, for example, a reflector post, traffic sign post, lamp post, traffic light post or signal post or pole, consists of a tube (1) with a hollow interior (2), propped into the ground, the tube (1) being preferably a very thin-walled structure, the bending resistance of which is adjusted so that the tube bends, yields and/or breaks even with minimal lateral force, **wherein** the bending resistance of the safety post is improved by adding granular filling material (3) inside the hollow interior of the tube, which material extends upwards from the prop-up site of the tube so that the tube is, at least, partially, filled with the above mentioned filling material, and therefore, the safety post is adjusted to withstand loads encountered during its normal use, and in the event of a collision it bends, yields and/or breaks without causing damage to the colliding vehicle.

2. The safety post of claim 1, **wherein** the volume weight of the filling material (3) is essentially the same order of magnitude as mineral soil.

3. The safety post of claims 1 or 2, **wherein** the filling

material (3) consists of gravel, sand, fine sand, clay sand and/or clay.

**4.** The safety post of any of claims 1-3, **wherein** the tube (1) is synthetic material such as plastic.

**5.** The safety post of any of claims 1-4, **wherein** the hollow interior (2) of the tube (1 ) is partially filled with the filling material (3).

**6.** The safety post of any of claims 1-5, **wherein** the bottom end (4) of the tube (1 ) is buried in the ground.

**7.** The safety post of any of claims 1-5, **wherein** the safety post consists of a post erection foot (5) propped up in the ground and to which the tube (1) is mounted.

**8.** The safety post of any of claims 1-7, **wherein** the tube (1 ) has a stopper (6) which blocks the lower end (4) of the tube; and/or the tube (1) consists of a lid (7) which covers the top end (8) of the tube.

**9.** The safety post of any of claims 1-8, **wherein** the tube consists of successive tubes ($1^1$, $1^2$) joined together.

**10.** A method for constructing a safety post, such as a reflector post, traffic sign post, lamp post, traffic signal post or sign post or pole, to be used at a roadside in the vicinity of traffic, which safety post consists of a tube (1) with a hollow interior (2), and in which method, a substantially thin-walled shell-structured tube (1 ) is propped up in the ground, and in which the bending resistance of the tube is adjusted so that the tube bends, yields and/or breaks, when submitted even to minimal lateral force, **wherein** after the tube (1) has been propped up in the ground, its hollow interior (2) is filled, at least partially, at the tube erection site, with granular filling material (3), which material extends upwards from the tube prop-up site, thus improving the bending resistance and adjusting the safety post to withstand loads in normal use, while in the event of a collision, to bend, yield and/or break without causing damage to the colliding vehicle.

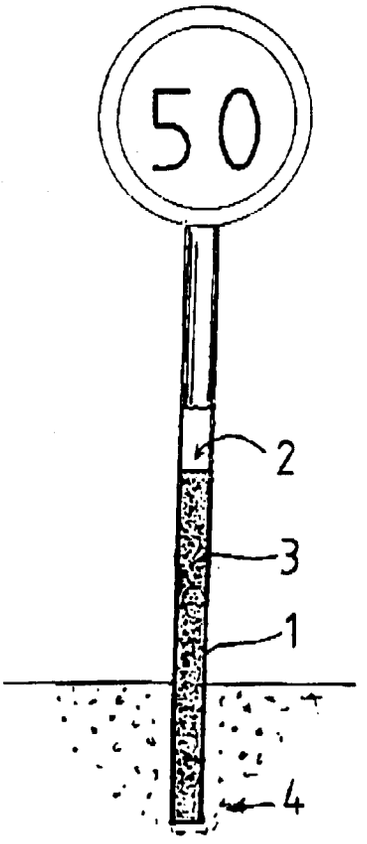


Fig 1

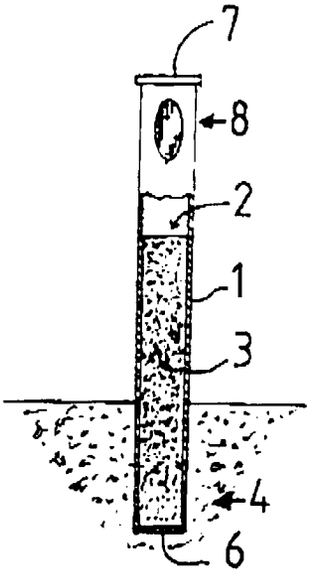


Fig 2

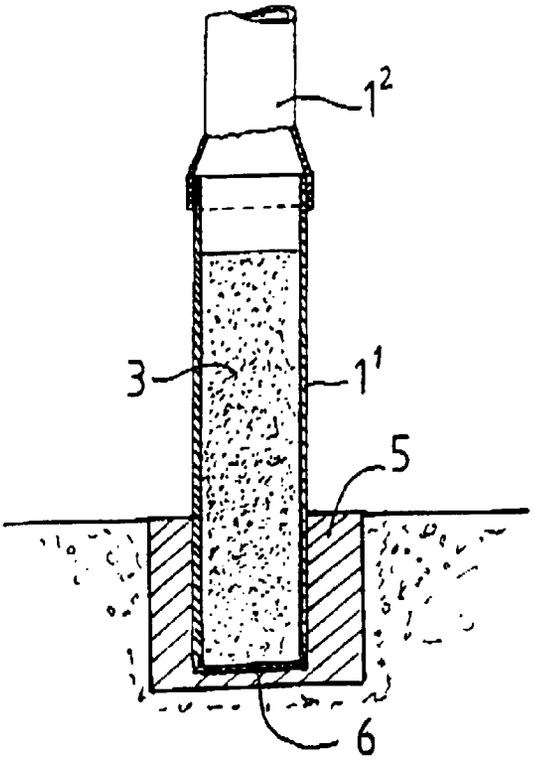


Fig 3