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(54) **Mast device**

(57) A mast device comprises an anchoring body with an anchor part (10) and a shaft part (20). A mast body (30) is arranged over the shaft part (20). The anchor part (10) and the shaft part (20) are connected breakably to each other in order to break apart in the undesirable event of a vehicle colliding therewith.

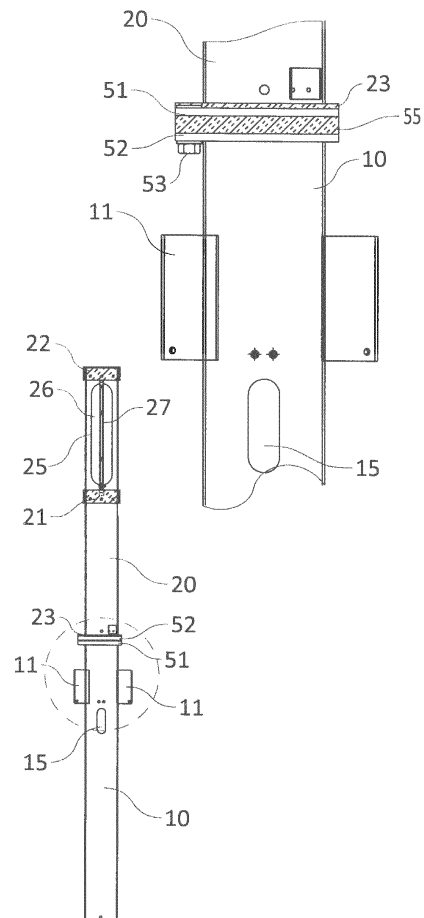


Fig.1

Description

[0001] The present invention relates to a mast device comprising an anchoring body intended and configured to be received in permanently fixed manner in the ground, and a mast body which is hollow at least in a base part thereof and extends from the anchoring body and which extends to greater height above a ground level.

[0002] Such a mast device is applied on a wide scale in public spaces, but can also be applied in private or restricted areas. The mast device is then for instance a part of local street lighting or of a traffic control device, but can for instance also be used as mounting base for camera systems, signposting or traffic signs. For optimal use and functioning of such means it is often unavoidable in practice to arrange the mast device on for instance a roadside verge or a pavement, at least in the vicinity of a traffic lane. This immediately compromises traffic safety. In the light hereof the mast device of the type stated in the preamble provides two parts, i.e. the anchoring body and the mast body, which are breakably connected to each other via a so-called shear coupling. This ensures that, in the undesirable event of a vehicle colliding therewith, the mast body will break off the anchoring body so that less damage will thus be caused to the vehicle and the passengers.

[0003] An optimal operation of such a shear coupling benefits from a direct undiminished transmission of force from the colliding vehicle to the coupling. This requires a certain rigidity of the pole body, which will itself otherwise absorb too much of the collision as a result of for instance plastic deformation. Steel of an adequate wall thickness has been found in practice to be an excellent material for this purpose.

[0004] From an aesthetic viewpoint, but also for the purpose of durability of the mast body, a need is felt in practice to also be able to apply a pole body of another, optionally more plastic material than just steel. The present invention has for its object, among others, to meet this need without compromising, or at least significantly compromising, the traffic safety of the whole.

[0005] In order to achieve the intended objective, a mast device of the type stated in the preamble has the feature according to the invention that the anchoring body comprises substantially above ground level a shaft part over which the mast body is received, that the anchoring body comprises substantially below ground level an anchor part, and that the shaft part and the anchor part are breakably connected to each other. A shear coupling as described above is thus provided primarily between the anchoring body and the shaft body. Both of these can be manufactured from a sufficiently rigid and strong material to guarantee adequate collision safety. The mast body is arranged over the shaft body and can thus be optimally adapted in respect of material and design to standards set therefor in terms of at least functionality, aesthetics and durability. The invention thus combines sufficient traffic safety with these other requirements set for a mast

device in a particularly ingenious and previously unrivalled manner.

[0006] The material of the mast body can in particular differ from that of the shaft body, so that relatively plastic aluminium could for instance be used for the mast body, while the shaft body is manufactured from robust steel. In order to avoid possible build-up of electrochemical potential therebetween a preferred embodiment of the mast device according to the invention has the feature that the mast body and the anchoring body are galvanically separated. With a view to such a galvanic separation a further particular embodiment of a mast device according to the invention has the feature that at least one electrically insulating annular body, particularly a plastic annular body, is provided between the shaft part and an inner wall of the mast body.

[0007] The body cavity of the mast body not infrequently accommodates electric cabling of electrical components carried by the mast body. This relates not only to a control for such components, but often also in particular to an electric power supply of considerable capacity. In order to avoid electrically conductive parts of the mast device, such as in some cases a casing of the shaft body and a casing of the mast body, becoming live they have to be earthed. A particular embodiment of the mast body has for this purpose the feature that the mast body is connected via an electronic rectifier device, particularly via a diode, to a galvanic earthing point. Provided it is correctly connected in the reverse direction thereof, the rectifier thus avoids an electrochemically induced current between the two parts of the mast device, which would otherwise result in unwanted corrosion of one of the two parts.

[0008] A particularly attractive and effective embodiment of the mast device according to the invention is characterized in that the mast body is manufactured at least substantially from aluminium and the anchoring body and the shaft body at least partially from optionally preserved steel, in particular stainless steel. The steel core in the form of the anchoring body and the shaft body breakably connected thereto thus ensure a sufficient collision-friendliness, while the aluminium outer casing of the whole is formed by the mast body and thereby provides for an aesthetically attractive appearance in combination with an excellent corrosion resistance.

[0009] The breakable connection between the anchoring body and the shaft body can be embodied in various ways. The two parts can thus be manufactured integrally while an intentional weakening is arranged therebetween, or individual parts can be coupled breakably to each other. A particular embodiment of the mast body according to the invention is an example of the latter, and is characterized for this purpose in that the anchor part and the shaft part of the anchoring body comprise mutually facing flange parts which are mutually connected by means of a screw bolt connection with an intermediate body lying therebetween. The screw bolt connection between the flanges and the intermediate body thus pro-

vides the intended shear coupling, which will tear off when a transverse load, which is usually released when a vehicle collides therewith above a determined speed and which exceeds a predetermined threshold value, is exerted thereon. The intermediate body is for this purpose manufactured particularly from a plastic, such as for instance nylon, polyethylene, polypropylene or PVC.

[0010] For an effective force transmission of the impact of a collision to the shear coupling a further particular embodiment of the mast device according to the invention has the feature that the shaft part has a length in the order of about 100-200 centimetres, in particular about 170 centimetres, and the body cavity narrows only beyond the shaft part. The shaft body thus ensures support of the mast body to a greater height and at least beyond a probable impact height of a vehicle, so that this mast body will not bend but will instead transmit the momentum of the collision more or less directly to the shear coupling.

[0011] With a view to a practical applicability of the mast device for electrically controlled and/or powered applications, a further particular embodiment of the mast device according to the invention has the feature that the mast body comprises in the base part thereof a removable inspection hatch and that the shaft part comprises at the position of the inspection hatch an inspection opening corresponding therewith which provides access to a hollow chamber in the shaft part.

[0012] The mast device according to the invention can be particularly employed, certainly not exclusively but with considerable advantage, as light mast or as a base for a traffic control device, such as a traffic light or signposting. The invention will be further elucidated hereinbelow on the basis of such an embodiment and with reference to a drawing. In the drawing:

- figure 1 shows a cross-section of an embodiment of an anchoring body for application in a mast device according to the invention;
- figure 2 shows a cross-section of an embodiment of a mast body for application in a mast device according to the invention; and
- figure 3 shows a cross-section of an embodiment of a mast device according to the invention assembled from the anchoring body of figure 1 and the mast body of figure 2.

[0013] The figures are otherwise purely schematic and not always drawn to scale. Some dimensions in particular may be exaggerated to a greater or lesser extent for the sake of clarity. Corresponding parts are generally designated with the same reference numeral.

[0014] Figure 1 shows an anchoring body as is applied in a mast device according to the invention. The anchoring body comprises a tubular anchor part 10 formed from galvanic zinc-plated or otherwise preserved steel. Anchor part 10 is provided with at least one layer of powder coating for further protection against corrosion. A set of wings 11 extends from the anchor part in order to prevent

later rotation in the surrounding ground. Provided for the purpose of a practical guiding of optional cabling for components provided on the mast device is a cable passage 15 in the anchor part in the form of an opening in a wall thereof.

[0015] The anchoring body also comprises a shaft part 20. Provided herein is an inspection opening 25 which provides access to chamber 26 in which is arranged an earthing rail 27 which forms a central earthing point at which electrical components can be earthed when provided on or at the mast device. Inspection opening 25 is in register with a corresponding opening 35 in mast body 30 of figure 2, wherein this latter is closable with an inspection hatch or door for the purpose of further installation and later maintenance. Just as anchor part 10, shaft part 20 comprises a steel tube body which has been provided with a corrosion-resistant zinc layer and powder coating.

[0016] The shaft part typically has a length in the order of 100-200 centimetres, in this example about 170 centimetres, and protrudes wholly or substantially wholly above ground level after assembly. Anchor part 10 penetrates substantially wholly into the ground and then lies substantially wholly under ground level. Provided between the two parts 10, 20 is a so-called shear coupling or connection which ensures that, in the undesirable event of a vehicle colliding therewith, shaft part 20 will break away from anchor part 10. This coupling is also shown enlarged in the figure and comprises a set of flange parts 51, 52 which are each connected on adjacent outer ends of respectively the anchor part and the shaft part to a plastic intermediate body 55 by means of a bolt connection 53, and are thus also mutually connected. In the undesirable event a vehicle collides therewith, the bolts 53 will break or tear away from intermediate body 55, whereby shaft part 20 will break off and so cause less damage to the vehicle and the passenger(s).

[0017] Figure 2 shows a mast body for application in the mast device according to the invention. The mast body is erected entirely in aluminium and comprises on a free outer end a mounting base 37 for a light fitting for the purpose of forming a light mast. In a base part the mast body comprises an inspection opening which is closable with an access door (not further shown here). The mast body comprises a number of successive parts which narrow in stepwise manner. Present therein is a continuous body cavity which provides space for electric cabling or the like. Inspection opening 35 is in register with the corresponding opening 25 in shaft part 20. The base part of mast body 30 has a length which is a little greater than that of the shaft part, so that this part will protrude slightly thereabove but will otherwise be supported by the shaft part when placed thereover, as shown in figure 3.

[0018] Figure 3 shows an embodiment of a mast device according to the invention which is assembled from the anchoring body and mast body shown in figures 1 and 2. The anchoring body is inserted with anchor part 10

into ground 5 and protrudes with shaft part 20 above ground level just above the breaking coupling. Mast body 30 is placed over the shaft part and thus conceals the shaft part wholly from view. A galvanic separation is arranged between the mast body and the shaft part in order to avoid an electrochemical potential building up therebetween. This separation comprises a set of plastic annular bodies or collars 21, 22 which have been provided at different heights on shaft body 20, see figure 1, together with a plastic flange 23 on a base of shaft body 20.

[0019] Steel casings, which are provided all around with eight blind rivet nuts with socket set screws, are arranged at the position of plastic collars 21, 22. This makes it possible to tighten the aluminium mast body in play-free manner from the inside. The steel casings which are covered with plastic collars here ensure a mutually uniform pressure distribution between the two parts. In addition, plastic parts 21, 22, 23 provide a protection against scraping away of the powder coating and zinc layer on the steel of the shaft part.

[0020] Shaft part 20 is galvanically earthed via anchor part 10 which protrudes into the ground, so that earthing rail 27 is earthed. An optional earthing of a light fitting or other electrical component can be connected hereto. The mast body is also connected to earthing rail 27 by means of a wired connection (not further shown). A rectifier is arranged therein in order to avoid an electrochemically induced current being initiated between the material of the mast body and the material of the shaft body. The rectifier here comprises a diode element which is arranged in the reverse direction counter to the direction of current to be avoided. An exceptionally practical mast device is thus realized, which derives its collision-friendliness, and thereby traffic safety, from the anchoring body and can otherwise comply more or less freely with requirements in respect of durability and aesthetic appearance.

[0021] Although the invention has been further elucidated above on the basis of only a single exemplary embodiment, it will be apparent that the invention is by no means limited thereto. On the contrary, many variations and embodiments are still possible within the scope of the invention for a person with ordinary skill in the art.

Claims

1. Mast device comprising an anchoring body intended and configured to be received in permanently fixed manner in the ground, and a mast body which is hollow at least in a base part thereof and extends from the anchoring body and which extends to greater height above a ground level, **characterized in that** the anchoring body comprises substantially above ground level a shaft part over which the mast body is received, that the anchoring body comprises substantially below ground level an anchor part, and that the shaft part and the anchor part are breakably con-

nected to each other.

2. Mast device as claimed in claim 1, **characterized in that** the mast body and the anchoring body are galvanically separated.
3. Mast device as claimed in claim 2, **characterized in that** at least one electrically insulating annular body, particularly a plastic annular body, is provided between the shaft part and an inner wall of the mast body.
4. Mast device as claimed in one or more of the foregoing claims, **characterized in that** the mast body is connected via an electronic rectifier device, particularly via a diode, to a galvanic earthing point.
5. Mast device as claimed in one or more of the foregoing claims, **characterized in that** the mast body is manufactured at least substantially from aluminium and the anchoring body and the shaft body at least partially from optionally preserved steel, in particular stainless steel.
6. Mast device as claimed in one or more of the foregoing claims, **characterized in that** the anchor part and the shaft part of the anchoring body comprise mutually facing flange parts which are mutually connected by means of a screw bolt connection with an intermediate body lying therebetween.
7. Mast device as claimed in one or more of the foregoing claims, **characterized in that** the shaft part has a length in the order of about 100-200 centimetres, in particular about 170 centimetres, and the body cavity narrows only beyond the shaft part.
8. Mast device as claimed in one or more of the foregoing claims, **characterized in that** the mast body comprises in the base part thereof a removable inspection hatch and that the shaft part comprises at the position of the inspection hatch an inspection opening corresponding therewith which provides access to a hollow chamber in the shaft part.
9. Mast device as claimed in one or more of the foregoing claims, **characterized in that** the mast body comprises a light mast from which at least one light fitting extends.
10. Mast device as claimed in one or more of the foregoing claims, **characterized in that** the mast body forms part of a traffic control device, in particular of a traffic light device.

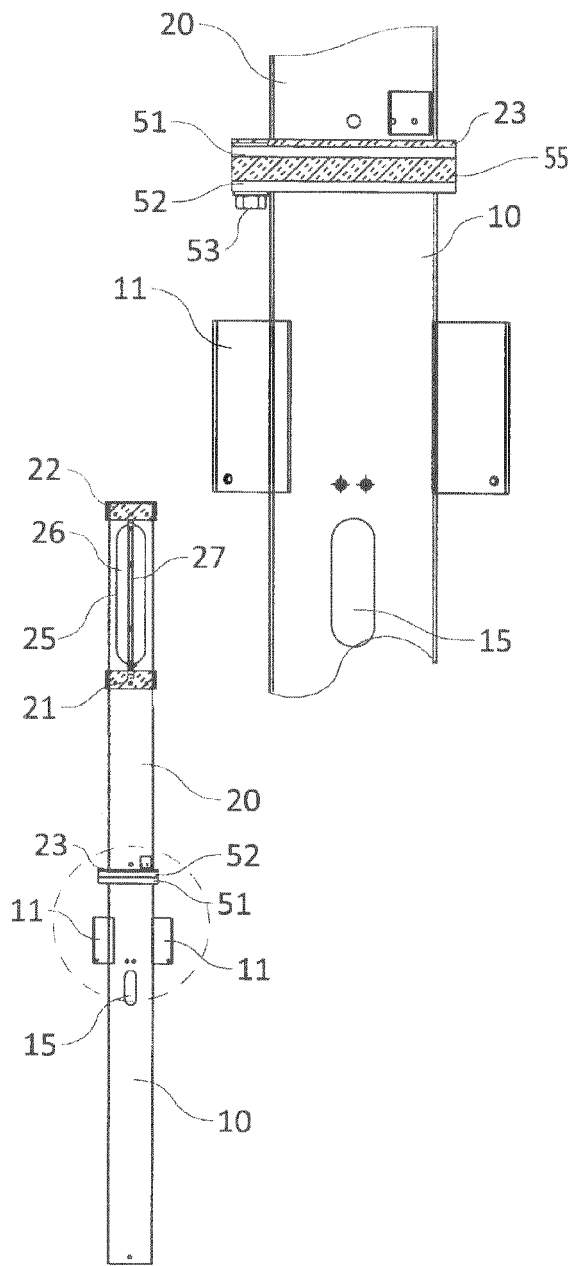


Fig.1

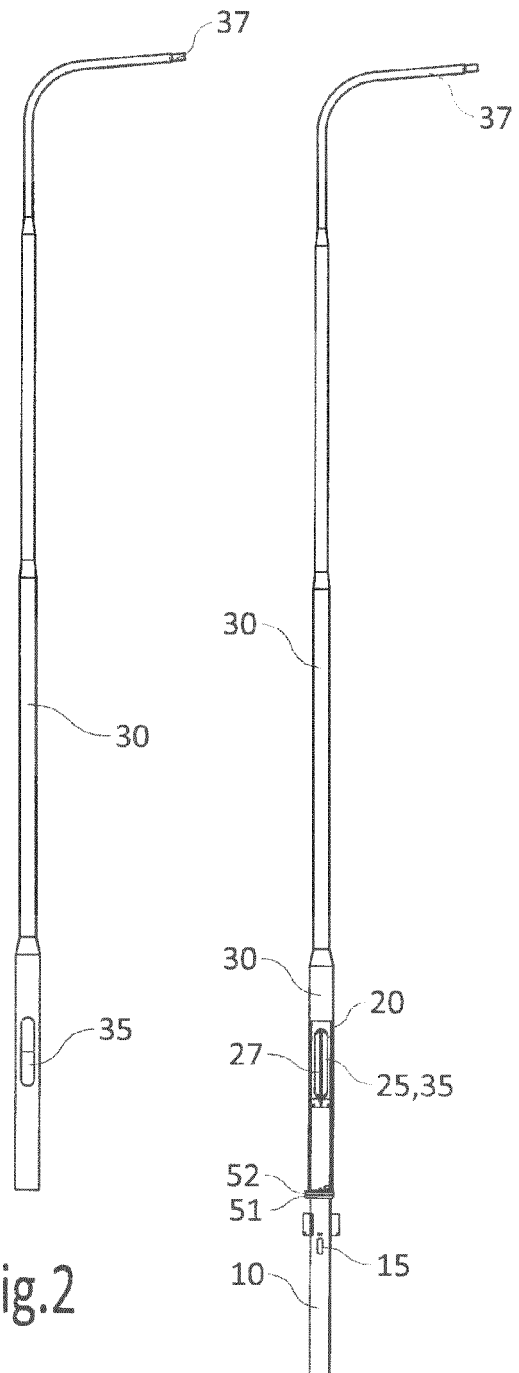


Fig.2

Fig.3



EUROPEAN SEARCH REPORT

 Application Number
EP 15 15 9076

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 5 860 253 A (LAPOINTE JEAN [CA]) 19 January 1999 (1999-01-19)	1-5,7-10	INV. E04H12/00
A	* figures 1-5, 22-24 *	6	E04H12/08 E01F9/018
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			E04H E01F F21S F21V
Place of search		Date of completion of the search	Examiner
Munich		17 July 2015	Decker, Robert
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 15 15 9076

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