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(54) REMOVABLE BASE FOR VERTICAL STREET FURNITURE ELEMENTS

ENTFERNBARE BASIS FÜR VERTIKALE STRASSENEINRICHTUNGSELEMENTE

SOCLE DÉMONTABLE POUR ÉLÉMENTS VERTICAUX DE MOBILIER URBAIN

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Description

OBJECTIVE OF THE INVENTION

[0001] The present invention, as is indicated by the title of this report, refers to a support or base on which to mount the vertical elements of street furniture such as lamp posts, traffic signs, advertising posts, etc., and which has the special feature of two interlocking parts, one over the other, that by employing a simple system of pressure elements prevents the movement of one part against the other.

[0002] More specifically, this present model for a base consists of a part that is anchored to the ground by one of the traditional methods used for this purpose, to which is attached an upper part that in turn supports the street furniture element that is to be installed. The geometry of the two parts, which is described below, allows by means of a brake inside of a closed to box to hold the parts firmly together. The dismantlement of the box being only possible by the application of a certain force to the street furniture such as may be caused when struck by a vehicle. In this way, upon the occurrence of an accident of this type, the energy from the crash is absorbed by the brake, which has a small piece which is broken by the strong impact, releasing the upper part of the base, allowing for the street furniture element to move and fall, thus preventing more serious damage to the impacting vehicle.

FIELD OF APPLICATION

[0003] Given the characteristics of the invention that is advocated and described below, its principal application will be focused on the manufacture of all types of street furniture.

BACKGROUND

[0004] The vertical elements of street furniture, especially lamp posts, traffic signals, posts or billboards, totem signs, etc., because of their abundance within an urban environment pose a significant danger to vehicular traffic. In the event of the loss of control of a vehicle, unfortunately, can result in a collision with one of the vertical elements of the said street furniture.

[0005] Also, the resistance that these elements must develop against forces that could cause them to fall is especially high, given that in some cases they are very tall while at the same time being very slender. This fact implies that in the event of an impact by a vehicle against the element, most of the impact energy is absorbed by the vehicle in such a way that the occupants can be seriously injured or killed. Current statistics indicate that collisions against passive elements of road safety devices make up about 2.5% of all accidents, but account for about 5% of traffic deaths.

[0006] In other cases, the element is deformed by the

collision so that it ends up leaning at an angle with respect to its initial vertical position while its base remains fixed, in such a way that the element then becomes a "launch pad" for the colliding vehicle. This is a common occurrence especially in the case of traffic signs.

[0007] Another fact that aggravates the consequences of such accidents is that automobiles are not designed to withstand collisions against slender elements, that is because the automobile's frame is not able to withstand the impact without deforming.

[0008] In order to minimize the consequences of the collision of a vehicle against these elements a multitude of solutions have been developed, for example, the manufacture of lamp posts made from resins that have lower impact resistance, the installation of special protective devices at the bases of these vertical elements (barriers or buffers), designing lamp posts with long horizontal arms to distance the base of the element away from the roadway, etc. All of these systems offer partial solutions to the problem, in addition to incurring extra costs for the installation of the street furniture, but it continues to be desirable to develop a system that impedes the vertical element from causing damage to a vehicle that collides with it.

[0009] The proprietor of this reports is also aware of the existence of an anchoring system consisting of two parts that fit together at each corner of the foundation element, the parts in fact nest together, and present a limited degree of shear resistance (EP1657379 B1). This system is known commercially as Inneo. When a vehicle collides with a vertical post, each pair of parts disengages, freeing the base of the post in such a manner that the post is ejected without causing serious damage to the vehicle. However, this device does not distinguish between a slight impact (due to a car being parked, for example) or a strong impact, causing the base to come free in all cases. In addition, the breakage of some of the bolts that fasten together the nested parts requires that the entire foundation be replaced.

[0010] Document US-A-2003 0205006 describes a sign support that utilizes set screws to lock the sign support pipe within the breakaway base or connector component, thereby precluding twisting or turning of the pipe within the base and corresponding misalignment of the sign.

[0011] The device described in this report allows the street furniture's vertical element to come free only when subjected to a certain magnitude of impact, this is due to the provision of a piece that acts as a brake and which must be broken in order for the upper part of the base to come free. The structure of this device in the form of a box is configured as a high resistance element which strong impacts will not deform. There is another advantage of this invention that is of added functionality, the device precludes the theft of the electrical cables from lamp post or poles. The proprietor of this report knows of no other anchoring device for the vertical elements of street furniture that resolves the cited problems in the

manner as described in this report.

DESCRIPTION OF THE INVENTION.

[0012] The detachable base for the vertical elements of street furniture, the object of this report, consists of two nesting parts, one on top of the other, anchored to the ground by whatever traditional method (thus also serving as the foundation for the vertical element); while the upper part is nested into the lower part by a pair of tracks or flanges.

[0013] The relative movement between the upper and lower parts is restrained by the action of a brake formed by a plate which is attached by a bolt and nut to the upper part of the base. The said plate has a recessed area at both ends, where a nylon pellet fits into a slot and also fits between a pair of ridges that are located on the undersides of the two flanges of the base's bottom part.

[0014] In this way, the nylon pellets lock into place and are thus the elements that impede the upper part of the base from sliding over the bottom part. The brake is attached with a nut to the upper part of the base and is tightened by means of a torque wrench capable of applying a torque of at least 20 KN/m2. With collisions of low impact, such as a bump from a car being parked, for example, the two parts of the base cannot slide as the impact is resisted by the nylon pellets. However, a vehicle moving at high velocity imparts such a force on the parts of the base that it causes the nylon pellets to deform and to overload the stops, allowing the upper part of the base to slide and that the vertical element is ejected without causing damage to the vehicle.

[0015] The bolt on the plate above the upper part of the base will cause a pressure from the upper part of the base on to the lower part, leaving the nylon pellets confined between the ribs of the flanges of the lower part of the base and the recesses in the brake plate.

[0016] Both the upper and lower parts of the base have openings or holes that allow for the passage of electrical cables, tubes, etc., and to allow for the proper functioning of the street furniture elements.

[0017] The fact that the upper part slides over the lower part by a predetermined distance implies that upon impact, it is the structure of the base itself what absorbs the moment arm caused by the distance between the forces that act at the instant of impact (one higher up, on the vertical post, and the other on the base.)

[0018] The upper and lower parts, when they are assembled one above the other, form a box that serves as a support base suitable for elements of great height or that are subject to high stresses, since the anchorage of the post to the removable base does not influence the functioning of the device. By the configuration of the above mentioned elements, only loads applied laterally at points close to the base can induce relative movement of one part over the other, in such a manner that any other forces will cause the collapse of the structure's device before the flanges slide between them.

[0019] Both the lower and upper parts of the box feature plates at their sides that impede access to the inside of the box, the lower side plates of the box also serve as additional reinforcement for the structure. In addition, the upper edge of the reinforcement plates of the lower part of the box marks the limit that the device can be buried so that it functions properly.

[0020] In order to stabilise the vertical street furniture element, each corner of the base has a flat pellet whose dimensions allow it to fit into a slot between the flanges between the upper and lower parts. Thus, the action of the said flat pellets prevents any unwanted movement whatsoever and ensures the correct horizontal alignment of the piece that supports the street furniture element.

[0021] As the device is configured, when the street furniture element is impacted only the nylon pellets of the brake are broken, the rest of the device are undamaged. To re-erect the element only the nylon pellets need to be replaced, which ultimately saves on road maintenance costs.

[0022] Another advantage of this device, is the provision of a series of elements that act as guides or conduits enabling the cables to pass through them and with the subsequent attachment of the cables, in such a way that the cables are gathered together inside the box and are not accessible unless the device is disassembled, which requires the entire disassembly of the vertical element and of the base.

[0023] The configuration of the device consisting of two nesting parts by means of the flanges also allows for great freedom of design, and can allow for a wide variety of shapes and designs. It is only necessary to ensure that the flanges are aligned in the direction of the anticipated impact.

DESCRIPTIONS OF THE ILLUSTRATIONS

[0024]

Fig. 1. In this illustration an exploded view of the device reveals its components. In this view the scale of the components of the box have been increased, and appear larger with respect to the lamp post. Visible in this view are all of the components of the invention, with the exception of the mounting bolts and/or nuts.

Fig. 2. The lower part of the box is presented in this illustration, which is drawn with one of the reinforcing plates shown at the far side of the box, while the plate at the front side of the box has been omitted for easier viewing of the device. Two views are presented, one looking down from above and the other looking up at the bottom of the box from which can be seen the arrangement of the recesses to accommodate the nylon pellets that act as a brake for the assembly in the event of an impact.

Fig. 3. The brake assembly is presented in this illustration along with the upper part of the box (without reinforcement), where the brake stud is inserted through the hole of the upper part and which has been threaded to accept a nut that will close the assembly. This assembly is what slides along the flanges of the lower part of the box in the event of an impact and the breaking of the nylon pellet, leaving its confinement space.

Fig. 4. Shown in this illustration are all of the parts of the street furniture assembled (in this case a lamp-post) and ready for use, with the area of the box, or base, shown in greater detail.

Fig. 5. In this illustration a cross-section along the long axis of the device is presented. In this cross-section are visible the relative positions of the wings with respect to the flanges, the space between them will be filled with the stabilising pellets, as well as the position of the brake with respect to the two components of the box.

Fig. 6. This is a cross-section through the short axis of the box and closer to the end of the box than in Fig. 5, the brake plate is shown cut through, in such a way that the nylon pellet can be seen confined in the existing recess at the end of the brake plate and the protrusions on the lower surface of the flange. In addition, the confinement of the nylon pellet is also shown in a cross sectional detail.

Fig. 7. Shown in this illustration is the box assembled without the two closing reinforcements on the side of the box, in such way that it is possible to see the wiring inside of the box and the ends of the wire ready for connection. Also in this view can be seen more clearly the placement of the stabilising pellets at the four corners of the box.

DESCRIPTION OF THE PREFERRED CONFIGURATION

[0025] The present invention is illustrated using the following example, this being done as a mean of illustration only and not intending to limit the scope thereof.

[0026] The device consists of a detachable base for the support of a street light (10) conforming to the modifications described in this report. The device is configured in the form of a base or box, which primarily consists of an upper part (1), formed by a flat metal plate which has pairs of wings (2) at its ends, in the shape of an "L"; and a lower part (3), with a cross-section in the form of a "U", which in its upper part has a pair of flanges (4) arranged horizontally.

[0027] The upper part of the box (1) has a hole (11) at its centre, intended for the insertion of a stud (7) that is part of the brake (5). The said brake (5) is a part formed

by a rectangular plate (6) which has a stud (7) at its centre, of a length at least as long as the distance between flanges of the lower part (4) and the upper part of the base. The brake plate (6) has also recesses (8) at its ends, designed to accommodate the nylon pellets (12) that serve to calibrated the strength of the base. The upper part of the box (1) itself, has a space or gap between the wings (2) in which the brake plate (6) can be accommodated.

[0028] Thus, the plate (6) of the brake (5) is housed between the wings (2) of the upper part of the box (1), the said plate located below the height of the flanges (4) of the lower part of the box (3). Passing the stud (7) through the hole (11), and by using a nut (9) the whole assembly can be compressed: by tightening the stud (7), the plate (6) will put pressure on the lower part of the flanges (4), subsequently putting pressure on the four stabilising pellets (13). The nut (9) is tightened with a torque wrench until the pressure exerted by the brake (5) on the flanges (4) is 20 KN/m².

[0029] The lamp post (10) is bolted to the top of the base (1), through four holes (14) provided for this purpose. The bottom of the base (3) is anchored to the ground by means of four studs (15) through the holes (16) provided for this purpose.

[0030] In the event of a strong impact, the lamp post (10) will drag the upper part of the box (1), whose wings (2) will in turn force the movement of the brake (5) until it causes the nylon pellets (12) to break against the ribs (17) arranged on the flanges (4). Once this occurs, there is nothing to prevent the upper part (1) from sliding over the lower part (3), freeing the lamp post, which will be propelled by the force of the collision.

[0031] The lower part of the base (3) is provided with a hole (18) for the passage of electrical services. Along with this hole (18) there is a welded screw (19), that serves for the subsequent fastening of the cables during the installation of the box. A hole (20) on the upper part of the box (1) that coincides with the top of the screw (19) completes the passage of the cable (25) for fastening. By providing a connector (26) inside of the box, the opposite ends of the cable can be anchored to the screw (19) and the hole (20) by means of a flange, in such a way so as to allow fastening of the two and thus making the electrical connection. Upon impact, the connection (26) will break without damaging the rest of the cable, thus preventing damage to the electrical wiring.

[0032] Both the lower part of the box (1) and the upper part (3) are provided with plates (23 and 24) that close off the sides of the box. On the upper part of the box the closure plates (24) have the purpose of closing off the assembly and to prevent dirt from entering into the interior of the device, while the lower portion of the box has side plates (23) that also act as a structural reinforcements. Furthermore, the upper edge of the reinforcing plate (23) of the lower part of the box marks the limit that the device can be buried to for its proper functioning. In addition, the reinforcing plate of the upper part of the box (22)

prevents deformation of the same.

[0033] The stopping pellets (13) have a safety screw that mechanically joins the two cover plates (24) of the upper part of the box. Thus, under an impact, the stopping pellets will not at any time be forced out, rather a pair will remain attached to the underside of the base (3) and the other pair will remain attached to the upper part (1).

[0034] The nature of the present invention has been sufficiently described, as well as the manner of its proper operation, it should be stated that given its essential characteristics, it can be used in ways that differ from the method described in the example given above and which can afford similar protection, provided always that the device is not altered, changed or modified in its fundamental principle.

Claims

1. A REMOVABLE BASE FOR THE VERTICAL ELEMENTS OF STREET FURNITURE **characterised in that** it consists of an upper part (1) formed by a flat metal plate which has a pair of wings at each end (2), in the shape of an "L" and of a lower part (3) in the form of a "U", which in its upper part has a pair of flanges (4) arranged horizontally which also have ribs (17) arranged symmetrically with respect to the transverse axis of the said flanges (4), a group of stop pads (13), a pair of pellets (12) made from nylon or of material with similar properties, a brake (5) formed by a rectangular plate (6) which has a stud (7) at its centre and the vertical element of a street furniture item (10) that is joined to the upper piece (1) by an anchor plate (21), and **in that** the upper part (1) has the pair of wings (2) with an "L" cross-section on the interior of the part (1), and the lower part (3) that in its upper portion has the pair of flanges (4) arranged horizontally, so that by positioning one part over the other, the wings (2) and the flanges (4) have their faces parallel to each other, thereby forming a box, separated by a space equal to the width of the stop pads (13) which are inserted into each of the box's four corners; where the wings (2) of the upper part (1) are suspended in the central area, in a width equal to that of the brake plate (6); having the stud (7) of the brake (5) of a length at least 3 cm longer than the existing length of the lower face of the flanges (4) and the upper face of the upper part (1) of the box; having the plate (6) of the brake (5) with respective recesses (8) at the ends that are provided with the pellets (12) made from nylon or of material with similar properties, which are embedded in the said recesses (8) and ribs (17).
2. A REMOVABLE BASE FOR THE VERTICAL ELEMENTS OF STREET FURNITURE, following claim 1, **characterised by** the stud (7) arranged so that its end protrudes above the upper part of the base

(1) with a threaded nut (9) that secures the whole assembly.

3. A REMOVABLE BASE FOR THE VERTICAL ELEMENTS OF STREET FURNITURE, in accordance with claim 2, is **characterised in that** the nut (9) can be tightened by means of a torque wrench until the pressure on the brake (5) and exerted on the flanges (4) reaches a torque resistance of 20 kN/m² as applied by the torque wrench.
4. A REMOVABLE BASE FOR THE VERTICAL ELEMENTS OF STREET FURNITURE, in accordance with claim 1, is **characterised by** both the bottom of the box (3) as well as the upper part of the box (1) which are provided with respective reinforcing plates (22 and 23) and with a closing plate (24), which also serves as the upper edge of the reinforcing plate of the lower box (23) marking the limit to which the device can be buried for it to function properly.
5. A REMOVABLE BASE FOR THE VERTICAL ELEMENTS OF STREET FURNITURE, according to claims 1 and 4 is **characterised by** a security screw for the stopping pads (13), which links them to the closure plate (24) of the upper part of the base (1).
6. A REMOVABLE BASE FOR THE VERTICAL ELEMENTS OF STREET FURNITURE, in accordance with claim 1 is **characterised by** the upper part of the box (1) and the lower part of the box (3) provided with respective anchor points for a wiring connection.

Patentansprüche

1. ABNEHMBARER SOCKEL FÜR DIE VERTIKALEN ELEMENTE VON STADTMÖBEL. Dieser zeichnet sich durch ein oberes Teil (1) aus einer flachen Metallplatte mit einem "L"-förmigen Flügelpaar an jedem Ende (2) und einem unteren "U"-förmigen Teil (3), an dessen Oberseite zwei horizontal angeordnete Trägerplatten (4) mit symmetrischer zur Querachse der besagten Trägerplatten (4) verlaufenden Verrippung (17) angebracht sind, aus. Zudem besteht der Sockel aus einer Gruppe von Stopp-Pads (13), einem Pelletpaar (12) aus Nylon oder einem Material mit ähnlichen Eigenschaften, einer aus einer rechteckigen Platte (6) mit mittigem Stift (7) geformten Bremse (5) und dem vertikalen Element des Straßenmöbels (10), das mit einer Verankerungsplatte (21) an das Oberteil (1) mit dem "L"-förmigen Flügelpaar (2) an der Innenseite (1) befestigt ist; das Unterteil (3) weist an der oberen Seite zwei horizontal angeordnete Trägerplatten (4) auf, so dass sich nach dem Übereinanderlegen von einem Teil auf das andere eine Box ergibt. Die Flügel (2) und die Trägerplatten (4) sind parallel zueinander ausgerichtet

und werden von einem Abstand getrennt, der der Breite der Stopp-Pads (13) entspricht, die in jede der vier Boxenecken eingelegt werden; die Flügel (2) der Oberseite (1) sind im zentralen Bereich in einer gleichmäßigen Breite zur Breite der Bremsplatte (6) aufgehängt; der Stift (7) der Bremse (5) ist mindestens 3 cm länger als die Unterseite der Trägerplatten (4) und die Oberseite des oberen Teils (1) der Box; die Platte (6) von Bremse (5) hat jeweils Ausschnitte (8) an beiden Enden für die Pellets (12) aus Nylon oder einem Material mit ähnlichen Eigenschaften, die in die Ausschnitte (8) und die Verrippung (17) eingelegt werden.

2. EIN ABNEHMBARER SOCKEL FÜR DIE VERTIKALEN ELEMENTE VON STADTMÖBEL gemäß Anspruch 1 **zeichnet sich dadurch aus**, dass der Stift (7) so angeordnet ist, dass sein Ende über den oberen Sockelteil (1) mit einer Gewindemutter (9), die den Aufbau zusammenhält, herausragt.

3. EIN ABNEHMBARER SOCKEL FÜR DIE VERTIKALEN ELEMENTE VON STADTMÖBEL gemäß Anspruch 2 **zeichnet sich dadurch aus**, dass die Mutter (9) mit einem Drehmomentschlüssel angezogen werden kann, bis der Druck auf die Bremse (5) und somit auf die Trägerplatten (4) gemäß dem Drehmomentschlüssel einen Drehwiderstand von 20 kN/m2 ausübt.

4. EIN ABNEHMBARER SOCKEL FÜR DIE VERTIKALEN ELEMENTE VON STADTMÖBEL gemäß Anspruch 1 **zeichnet sich dadurch aus**, dass er über einen Boxenboden (3) und einen oberen Boxenteil (1) verfügt, die mit Verstärkungsplatten (22 und 23) und einer Abschlussplatte (24), die zudem als Oberkante der Verstärkungsplatte der unteren Box (23) dient und die Begrenzung markiert, in der die Vorrichtung zugunsten ihrer Funktion eingegraben wird, ausgestattet sind.

5. EIN ABNEHMBARER SOCKEL FÜR DIE VERTIKALEN ELEMENTE VON STADTMÖBEL gemäß Anspruch 1 und 4 **zeichnet sich dadurch aus**, dass sie über eine Sicherheitsschraube für die Stopp-Pads (13) verfügt, die sie mit der Abschlussplatte (24) des oberen Sockelteils (1) verbindet.

6. EIN ABNEHMBARER SOCKEL FÜR DIE VERTIKALEN ELEMENTE VON STADTMÖBEL gemäß Anspruch 1 **zeichnet sich dadurch aus**, dass die Boxenoberseite (1) und die Boxenunterseite (3) jeweils mit Ankerpunkten für die Verkabelung ausgestattet sind.

Revendications

1. UNE BASE AMOVIBLE POUR LES ÉLÉMENTS VERTICAUX D'UNE PIÈCE DE MOBILIER URBAIN **caractérisée en ce qu'elle** est constituée d'une partie supérieure (1) formée par une plaque métallique plate pourvue de deux ailettes en forme de « L » à chaque extrémité (2) et d'une partie inférieure (3) en forme de « U », elle-même pourvue en sa partie supérieure de deux sections d'appui (4) disposées horizontalement et présentant des nervures (17) disposées symétriquement par rapport à l'axe transversal desdites sections d'appui (4), d'un groupe de tampons d'arrêt (13), de deux pastilles (12) fabriquées en nylon ou dans un matériau ayant des propriétés similaires, d'un frein (5) formé par une plaque rectangulaire (6) pourvue d'un goujon (7) en son centre et de l'élément vertical d'une pièce de mobilier urbain (10) qui est relié à la partie supérieure (1) par une plaque d'ancrage (21), et en cela que la partie supérieure (1) est pourvue de deux ailettes (2) avec une section transversale en forme de « L » à l'intérieur de ladite partie supérieure (1), et que la partie inférieure (3) qui est pourvue en sa partie supérieure de deux sections d'appui (4) disposées horizontalement, de sorte que par le positionnement d'une partie sur l'autre, formant ainsi une boîte, les faces des ailettes (2) et des sections d'appui (4) sont parallèles les unes aux autres, séparées par un espace égal à la largeur des tampons d'arrêt (13) qui sont insérés dans chacun des quatre coins de la boîte ; les ailettes (2) de la partie supérieure (1) étant en suspension dans la partie centrale, sur une largeur égale à celle de la plaque de frein (6) ; le goujon (7) du frein (5) ayant une longueur d'au moins 3 cm supérieure à la longueur existant de la face inférieure des sections d'appui (4) à la face supérieure de la partie supérieure (1) de la boîte ; la plaque (6) de frein (5) présentant un évidement (8) à chaque extrémité, chacun pourvu d'une pastille (12) fabriquée en nylon ou dans un matériau aux propriétés similaires, les pastilles étant insérées dans lesdits évidements (8) et nervures (17).

2. UNE BASE AMOVIBLE POUR LES ÉLÉMENTS VERTICAUX D'UNE PIÈCE DE MOBILIER URBAIN, selon la revendication 1, **caractérisée en ce que** le goujon (7) est disposé de sorte que son extrémité fait saillie au-dessus de la partie supérieure de la base (1) avec un écrou fileté (9) qui fixe tout l'assemblage.

3. UNE BASE AMOVIBLE POUR LES ÉLÉMENTS VERTICAUX D'UNE PIÈCE DE MOBILIER URBAIN, conformément à la revendication 2, **caractérisée en ce que** l'écrou (9) peut être serré au moyen d'une clé dynamométrique jusqu'à ce que la pression sur le frein (5) comme celle exercée sur les sec-

tions d'appui (4) atteigne une résistance au couple de 20 kN/m² appliqué par la clé dynamométrique.

4. UNE BASE AMOVIBLE POUR LES ÉLÉMENTS VERTICAUX D'UNE PIÈCE DE MOBILIER URBAIN, conformément à la revendication 1, **caractérisée en ce que** la partie inférieure de la boîte (3) ainsi que la partie supérieure de la boîte (1) sont chacune pourvues d'une plaque de renfort (22 et 23) et d'une plaque de fermeture (24), qui sert également de bord supérieur à la plaque de renfort de la partie inférieure de la boîte (23), indiquant la limite à laquelle le dispositif peut être enterré pour un fonctionnement optimal.

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5. UNE BASE AMOVIBLE POUR LES ÉLÉMENTS VERTICAUX D'UNE PIÈCE DE MOBILIER URBAIN, conformément aux revendications 1 et 4, **caractérisée en ce qu'une** vis de sécurité pour les tampons d'arrêt (13) relie ces derniers à la plaque de fermeture (24) de la partie supérieure de la base (1).

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6. UNE BASE AMOVIBLE POUR LES ÉLÉMENTS VERTICAUX D'UNE PIÈCE DE MOBILIER URBAIN, conformément à la revendication 1, **caractérisée en ce que** la partie supérieure de la boîte (1) et la partie inférieure de la boîte (3) sont chacune munies de points d'ancrage pour un raccord de câblage.

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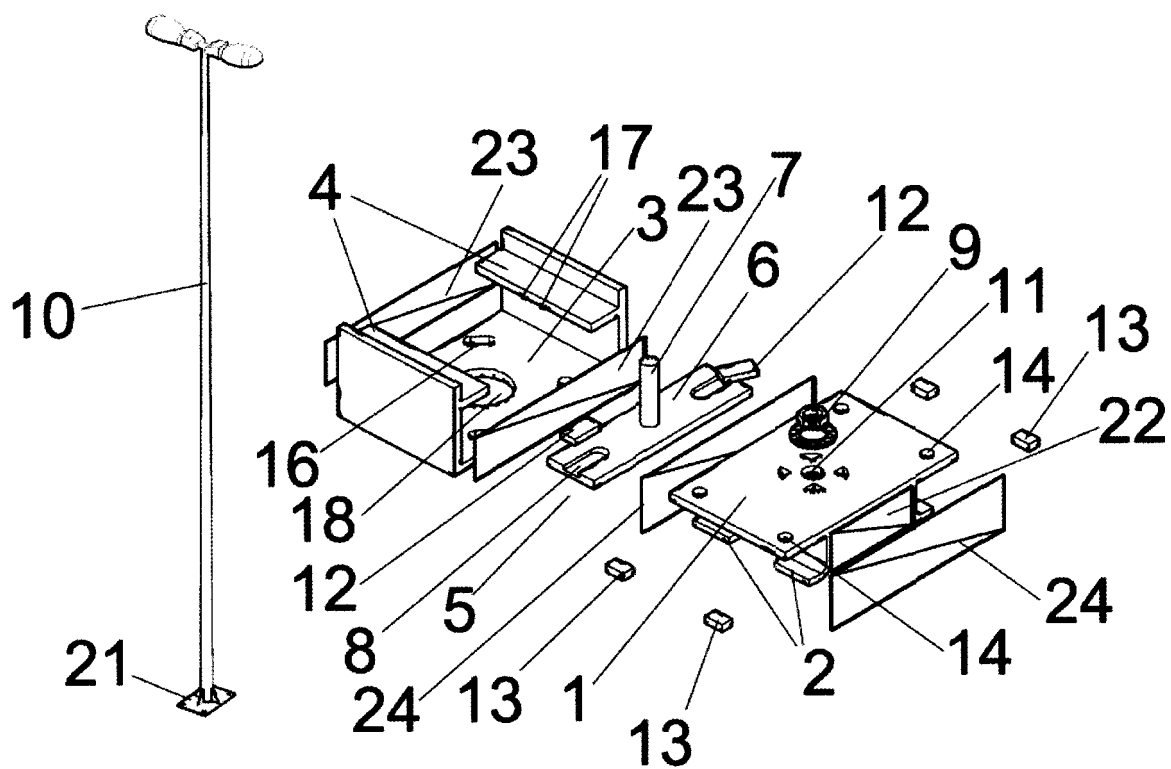


Fig.1.

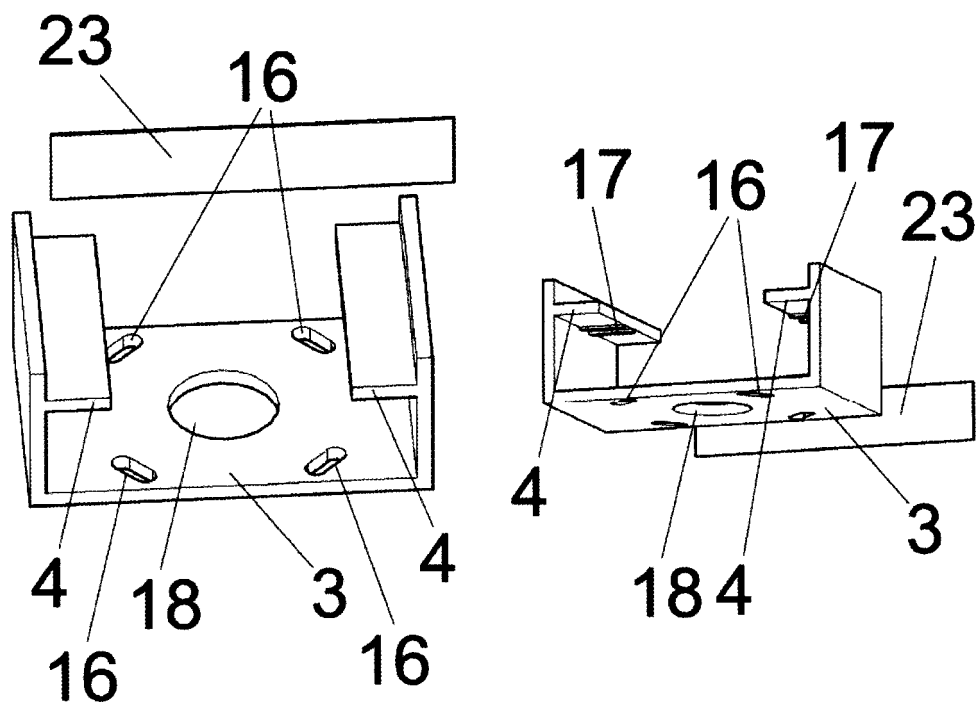


Fig.2.

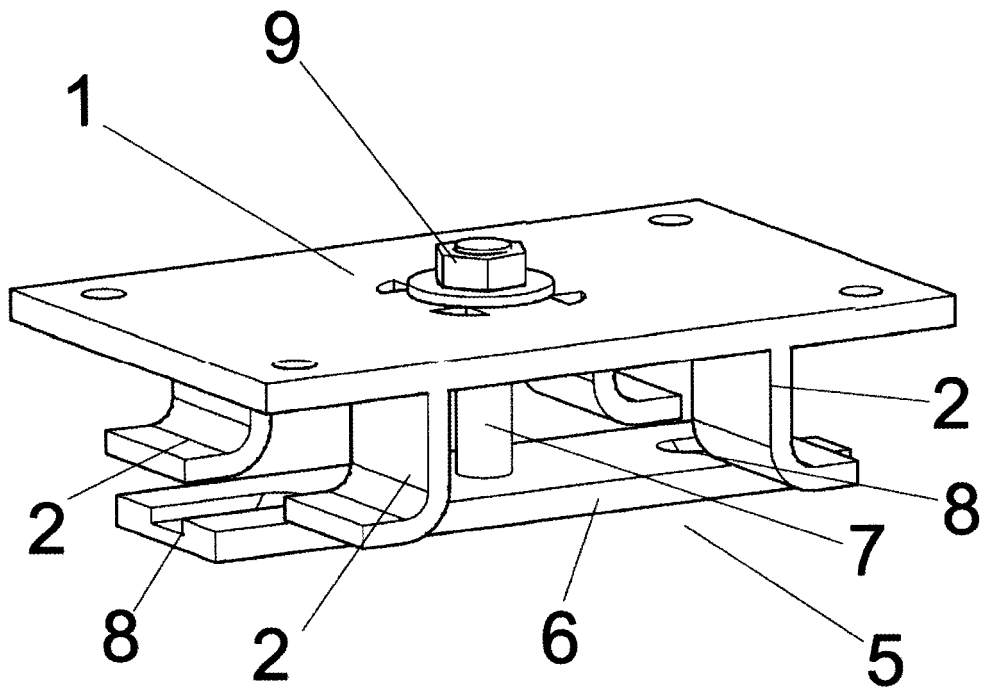


Fig.3.

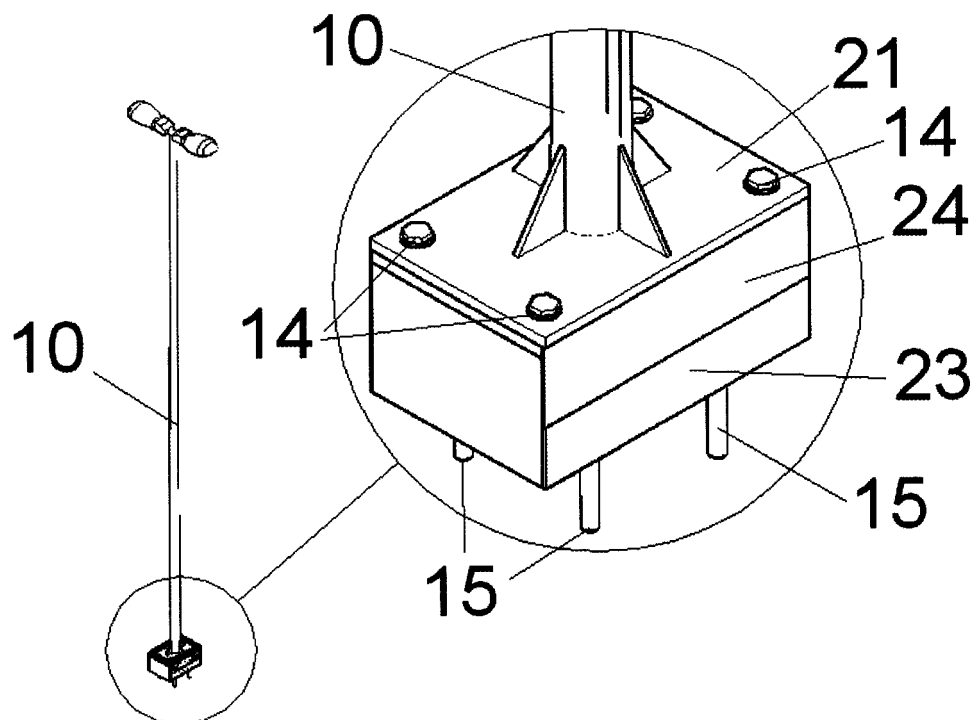


Fig.4.

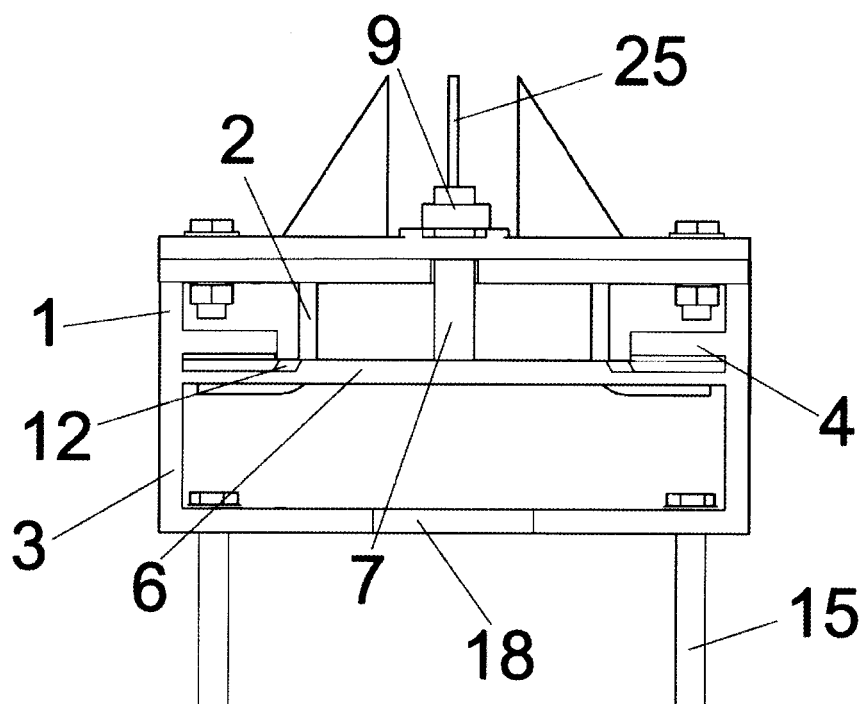


Fig.5.

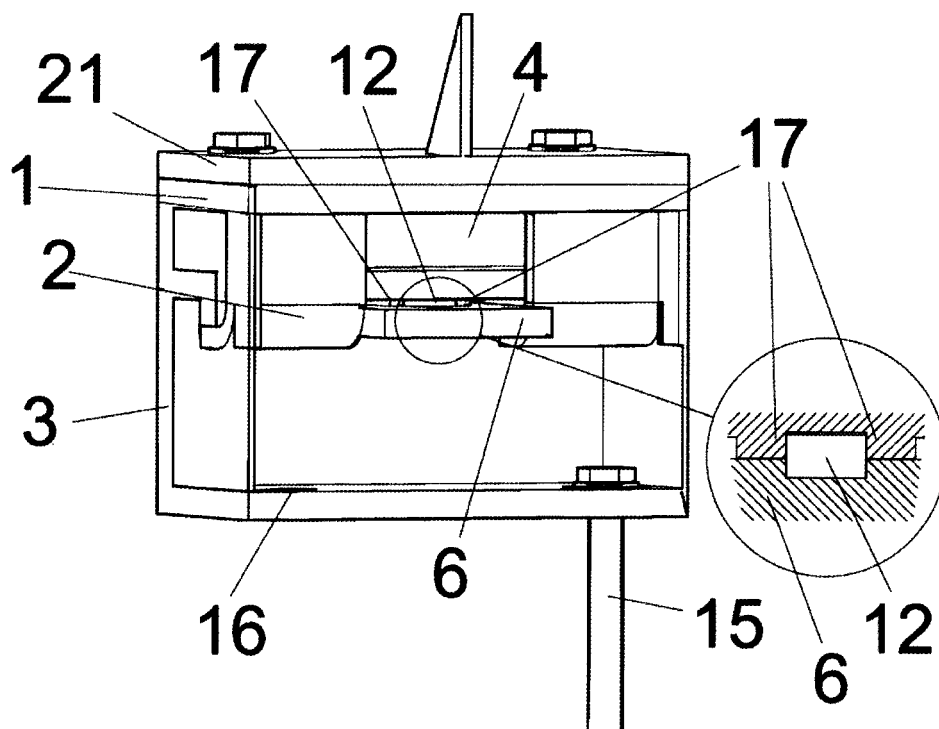


Fig.6.

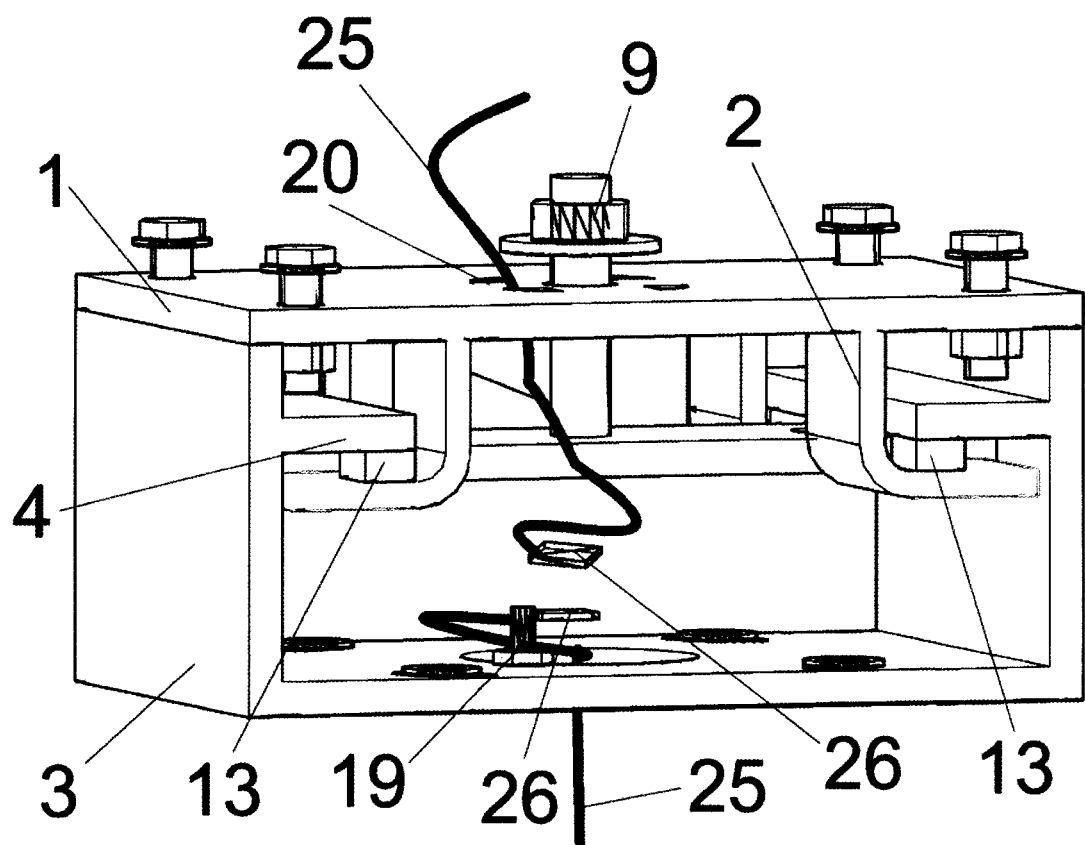


Fig.7.

REFERENCES CITED IN THE DESCRIPTION

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