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(54) Title: COLUMN BASE DEVICE

(57) Abstract: A slide-off base device (1) of the kind in which a first body/upper base plate (2), which is connected to a column (8), is connected by means of at least one clamping device comprising an upper disc/bridge plate (30), a lower disc/bridge plate (32), a clamping bolt (34) and a nut (40), to a second body/lower base plate (20) connected to a foundation (18), and in which, when the column (8) is being run into by a vehicle, for example, the clamping device(s) (30, 32, 34, 40) is (are) arranged to come loose from the bodies (2, 10), and in which there are placed between the first body/upper base plate (2) and the second body/lower base plate (10) at least two locking bodies/locking plates (44) which are arranged to absorb, in cooperation, a torque occurring in the column (8).
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.
COLUMN BASE DEVICE

This invention relates to a securing device for a column, more specifically a column base of the kind which is arranged to come loose from its foundation if being run into, for example by a vehicle, without resulting in major damage to the vehicle and without injuring persons inside the vehicle.

As part of the work to reduce the number of persons injured in the road traffic, and the extent of the injuries, new regulations and requirements for columns standing by the roadway have become effective. One alternative is to use a so-called slide-off base. A slide-off base normally comprises two horizontal securing elements clamped together by a clamping device, one of them being fixedly connected to the foundation and the other being connected to the mast. The masts, which may be for example light masts or masts for information boards, road signs or similar, are slid off the foundation horizontally in that the clamping device comes loose when they are subjected to a sufficiently great horizontal force relatively near their lower portion. Due to their own moment of inertia of masses the columns are
subjected to rotation about a horizontal axis through the
centre of gravity of the loosened column structure, and are
thereby rotated clear of the vehicle saloon when the vehicle
passes below the column structure pivoting above the vehicle.

In several countries type approval and extensive standardized
practical experiments are required for slide-off bases.

Slide-off bases according to known technique exist in many
designs. A slide-off base comprising two essentially
identical horizontal base plates and three or four clamping
bolts positioned at the corners of the base plates, have
become widely used. One of the base plates is fixedly
connected to the foundation, and the other is fixedly
connected to the column. The base plates are clamped against
each other by the clamping bolts positioned in respective
recesses, the recesses extending from the corners of the base
plates inwards in a direction towards the centre of the base
plates. The side edges of the recesses are V-shaped and
provided with a relatively large opening angle.

When the column is subjected to a sufficiently great
horizontal force just above the slide-off device, the base
plate fixed to the column is displaced horizontally along the
base plate fixed to the foundation. The clamping bolts are
displaced out of their respective recesses in one or both of
the base plates, and the column can thereby rotate freely
about its centre of gravity.

Slide-off bases may be subjected to a torque about the
longitudinal axis of the column. The torque is imparted to
the column through a wind load, for example, especially when
larger signs are involved, mounted unsymmetrically about the
central axis of the column. Slide-off bases according to known technique are arranged to be able to absorb torsional forces only to an insignificant degree. Therefore, it is necessary to use two or more columns when forces of this kind are involved. The use of several columns may involve difficulties in maintaining minimum distances, for example, from columns to roadway, and in addition the possibility for the column to rotate above a vehicle is reduced when only one of the column is being run into.

In most applications of slide-off bases there is a need for electrical cables to be passed through the base and further up through or externally on the column. Experience tells that such cables, when passed through for example a through opening in the base plates, constitute a safety hazard in a collision as the cables are not always torn. Thereby the cables limit the possibility of the column to rotate away from a position in which it may damage the saloon of the vehicle.

The invention has as its object to remedy the drawbacks of known technique.

The object is realized according to the invention through the features specified in the description below and in the following Claims.

By providing the base plates of the slide-off base with a device which is arranged to absorb torques, and which does not resist, or resists only to an insignificant degree, the sliding off of the base plates, it is more often than not sufficient to use one column also for relatively large signs positioned unsymmetrically.
Experiments have shown that a functionally reliable cutting of electrical cables as the base plates are slid apart, may be achieved in that the cable is placed in aligned through openings of the base plates, in which the diameter of the openings does not exceed twice the diameter of the cable.

In the following will be described a non-limiting example of a preferred embodiment which is visualized in the accompanying drawings, in which:

Fig. 1 shows a slide-off base in a side view;

Fig. 2 shows the section A-A of Fig. 1;

Fig. 3 shows the section B-B of Fig. 1;

Fig. 4 shows the section C-C of Fig. 2;

Fig. 5 shows the section D-D of Fig. 2; and

Fig. 6 shows the section D-D of Fig. 2, but here the base plates have been moved relative to each other.

Fig. 7 shows, on a larger scale and in perspective, two base plates that are held together by means of securing devices, each comprising a bolt, bridge plates and a locking plate;

Fig. 8 shows part of the base plates of Fig. 7 in a top plan view, the upper base plate having been displaced in an upward direction in the Figure;
Fig. 9 shows the same as Fig. 8, but the upper base plate has been displaced further, so that it is free from the lower base plate;

Fig. 10 shows, in a manner corresponding to that of Fig. 8, part of the two base plates in a top plan view, but where the upper base plate has been displaced slightly in a direction at an angle up towards the left in the Figure;

Fig. 11 shows the same as Fig. 10, with the upper base plate displaced more, so that it is free from one of the two locking plates shown;

Fig. 12 shows the same as Fig. 11, with the upper base plate displaced even more, so that it is about to come free from the second locking plate;

Fig. 13 shows the same as Fig. 12, with the upper base plate displaced further, so that is free from the lower base plate.

In the drawings the reference numeral 1 identifies a slide-off base according to the invention, comprising an upper base plate 2, which is fixed through a mounting sleeve 4 and bolts 6 to a column 8, and a lower base plate 10, which is fixed, through a spacer 12, foundation plate 14 and foundation bolts 16 to a foundation 18.

In their corner parts, the base plates 2 and 10 are provided with V-shaped recesses 20, see Fig. 3, the opening angle between the sides 22 and 24 of the recesses 20 preferably being less than 90°. The base plates 2 and 10 are also provided with at least one through bore 26, which is arranged
to cut, upon displacement of the base plates 2 and 10, a cable 28 possibly positioned in the bore 26, see Figs. 5 and 6.

An upper bridge plate 30 and a lower bridge plate 32 are placed in a covering manner over, respectively under, each of the V-shaped recesses 20 of the base plates 2 and 10, see Fig. 4. A clamping bolt 34 extends through a bore 36 of the lower bridge plate 32, further within the V-shaped recess 20 and through a bore 38 of the upper bridge plate 30. In a tightened state the clamping bolt 34 and a corresponding nut 40 clamp the base plates 2 and 10 against each other.

A lower sleeve 42 and an upper sleeve 42' are placed to surround the clamping bolt 34 loosely between the bridge plates 30 and 32.

In at least two of the aligned V-shaped recesses 20 of the base plates 2 and 10 there is placed a locking plate 44. The locking plate 44 has been pushed into a complementarily matching locking groove 46 in the sides 22 and 24 of the V-shaped recess. In a vertical direction the locking plate 44 is retained by the bridge plates 30 and 32, in which the locking plate is positioned in a guide groove 46'.

The locking plates 44 are preferably manufactured from a metallic material, for example steel.

When the column 8 with a possibly unsymmetrical sign board, not shown, is subjected to wind forces, the securing connections 30, 32, 34 and 40 of the base plates 2, 10 absorb the bending moment of the column 8 in a manner known in itself. The transverse force of the column 8 is transmitted
between the base plates 2, 10 by means of frictional force, also in a manner known in itself. The torque of the column 8 is absorbed between the base plates 2 and 10 to a certain extent by the frictional force acting between the plates 2, 10. However, this frictional force is not sufficiently great to absorb the torsional moments occurring in the column 8 in a storm. The locking plates 44 prevent the upper base plate 2 from rotating about the axis of the column 8 relative to the lower base plate 10. Influenced by the torque of the column 8, the locking plates 40 are subjected to a compressive force for example between the locking groove 46 of the upper base plate 2 in the first side 22 of the recess 20, and in the locking groove 46 of the lower base plate 10 in the second side 24 of the recess 20. The compressive force will, if it exceeds a certain level, break, alternatively shear, the locking plate 44. The locking plate 44 is supported against breaking under normal operating conditions by the guide grooves 46' of the upper and lower bridge plates 30, 32.

The locking plate 44 being placed in the locking groove 46 of the base plates 2, 10 and the guide grooves 46' of the bridge plates 30, 32, the bridge plates 30, 32 and thereby the clamping bolt 34 are prevented from becoming dislodged relative to the base plates 2, 10. The locking plate 44 is positioned in the grooves 46, 46' with a small clearance, whereby a slight rotation about the longitudinal axis of the column is allowed between the upper base plate 2 and the lower base plate 10 before breaking or cutting of the locking plate occurs.

When the column 8 is subjected to a collision, the upper base plate 2 is first displaced horizontally along the lower base plate 10, whereby the clamping bolts 34 are displaced, in a
manner known in itself, out of the recesses 20. The sleeves 42, 42' that are free to rotate in opposite directions about the clamping bolt 34, cause the frictional force, which will normally arise between the clamping bolts 34 and the sides 22 or 24 of the recesses 20, to be reduced to a substantial degree. This reduction in frictional force contributes to the fact that the release force of the slide-off base 1 is approximately independent of the direction of release.

The locking plates 44 are deformed without this affecting the release force to any substantial degree, as the base plates 2 and 10 move relative to each other.

By using a slide-off base 1 according to the invention, a considerably improved functional reliability is achieved compared to known technique, as the locking plates 44 of the base 1 prevent the base 1 from releasing inadvertently due to a torque, and cables 28, if any, from being cut on release. Additionally, the rolling action of the sleeves 42 against the sides 22 and 24 of the recesses 20 has the effect that the required release force is approximately independent of the direction of collision.

Central details of the structure of the exemplary embodiment and its operation appear from Figs. 7 to 13, in which the base plates 2, 10 are shown without holes for electrical cables to be passed through. Fig. 7 shows the base plates 2, 10 in perspective, and a bridge plate 30 has been removed, so that the locking plate 44 and the grooves 46 in either side of the V-shaped recesses 20 appear clearly.

The base plates 2, 10 are held together in that the base plates are pressed against each other by four bolts 34 and
associated bridge plates 30, 32. Each locking plate 44 helps to prevent relative rotation of the base plates 2, 10, as each locking plate 44 will have to buckle outwards before rotation is possible, and the locking plate 44 has been made very rigid to buckling in that the side edges of the locking plate are guided by grooves 46' in the bridge plates 30, 32. However, the locking plates 44 are to be of little help with respect to preventing the base plates 2, 10 from being displaced relative to each other in a collision. The resistance of the structure against displacement is mainly determined by friction and thereby by the tightening torque of the bolts 34.

If the upper base plate 2 is subjected to a force perpendicular to one side edge of the base plate 2, the base plate 2 will move in the direction as indicated by an arrow in Fig. 8. The ends of the locking plate 44 will be cut and bent as shown in Fig. 8 and 9 as the upper base plate 2 is pushed loose from the lower base plate 10.

If the upper base plate 2 is subjected to a force which moves the upper base plate 2 in a diagonal direction, as shown by an arrow in Fig. 10, two patterns of deformation occur for a locking plate 44, depending on the direction of the locking plate relative to the displacement. The locking plate 44 to the right in Fig. 10, will be cut and deformed approximately like the locking plate 44 in Fig. 8. The locking plate to the left in Fig. 10 is subjected to buckling in a manner corresponding to that if the upper base plate 2 would rotate relative to the lower base plate 10. However, contact between the sleeves 42, 42' surrounding the bolt 34, and the opposite side walls of the upper base plate 2 and lower base plate 10, respectively, as shown in Figs. 11 and 12, displaces the bolt
34 in such a way that the left-hand locking plate 44 is cut and deformed. In Fig. 13 the left-hand bolt 34 with its associated bridge plates 30, 32 and the locking plate 44 are forced completely out of the V-shaped recesses 20 of the base plates 2, 10.

As an alternative or in addition to the locking plates 44, the base may be provided with one or more shear pins positioned in the bore(s) 26, for example.
CLAIMS

1. A column base device (1) of the kind in which a first body/upper base plate (2), which is connected to a column (8), is connected by means of at least one clamping device comprising an upper disc/bridge plate (30), a lower disc/bridge plate (32), a clamping bolt (34) and a nut (40), to a second body/lower base plate (10) connected to a foundation (18), and in which the clamping device(s) (30, 32, 34, 40) is (are) arranged to come loose from the bodies (2, 10) when the column (8) is being run into by a vehicle, for example, characterized in that between the first body/upper base plate (2) and the second body/lower base plate (10) there are placed at least two locking bodies/locking plates (44) which are arranged, in cooperation, to absorb a torque occurring in the column (8).

2. A device according to claim 1, characterized in that the load on the locking bodies/locking plates (44) by a torque in the column (8) is essentially a buckling load.

3. A device according to one or more of the preceding claims, characterized in that each locking body/locking plate (44) is placed together with one clamping bolt (34) in a common recess (20) of the first body/upper base plate (2) and the second body/lower base plate (10).
4. A device according to one or more of the preceding claims, characterized in that the locking body/locking plate (44) is placed in a locking groove (46') in the sides (22, 24) of the recess (20).

5. A device according to one or more of the preceding claims, characterized in that the locking body/locking plate (44) is placed in a supporting manner in a guide groove (46') in at least one of the bridge plates (30, 32).

6. A device according to one or more of the preceding claims, characterized in that, surrounding one or more of the clamping bolts (34) between the bridge plates (30, 32), there are positioned a lower sleeve (42) and an upper sleeve (42').

7. A device according to one or more of the preceding claims, characterized in that the first body/upper base plate (2) and the second body/lower base plate (10) are each provided with at least one corresponding through bore (26), which are arranged, on relative movement of the first body/upper base plate (2) and second body/lower base plate (10), to cut a cable (28) positioned in the bore (26).
Fig. 2
Fig. 3
Fig. 6
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**

**IPC7: E01F 9/018**  
According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

**IPC7: E01F**

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,OK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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<td>A</td>
<td>US 3572223 A (R.L. VIERREGGER), 23 March 1971 (23.03.71)</td>
<td>1-7</td>
</tr>
<tr>
<td>A</td>
<td>US 3967906 A (R.A. STRIZKI), 6 July 1976 (06.07.76)</td>
<td>1-7</td>
</tr>
<tr>
<td>A</td>
<td>US 4926592 A (C.O. NEHLS), 22 May 1990 (22.05.90)</td>
<td>1-7</td>
</tr>
<tr>
<td>A</td>
<td>US 5855443 A (R.K. FALLER ET AL), 5 January 1999 (05.01.99)</td>
<td>1-7</td>
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Further documents are listed in the continuation of Box C.  
See patent family annex.

**Date of the actual completion of the international search**  
27 November 2002

**Date of mailing of the international search report**  
29 -11- 2002

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<td>US 3572223 A</td>
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<td>CA 1022722 A</td>
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<td></td>
<td>DE 2521426 A</td>
<td>27/11/75</td>
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<td>GB 1503003 A</td>
<td>08/03/78</td>
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<td>JP 51135146 A</td>
<td>24/11/76</td>
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<td>US 3951556 A</td>
<td>20/04/76</td>
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<td>US 5855443 A</td>
<td>05/01/99</td>
<td>AU 7495198 A</td>
<td>08/12/98</td>
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<td>WO 9851938 A</td>
<td>19/11/98</td>
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