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(54) **FOUNDATION FOR SUPPORTING A POST AND ARRANGMENT FOR IMPROVED SAFETY IN CONNECTION TO SUPPORT STRUCTURES FOR ROAD EQUIPMENT**

FUNDAMENT ZUM STÜTZEN EINES PFOSTENS UND ANORDNUNG FÜR VERBESSERTE SICHERHEIT IN VERBINDUNG MIT STÜTZSTRUKTUREN FÜR STRASSENAUSRÜSTUNG

FONDATION POUR SUPPORTER UN POTEAU ET AGENCEMENT POUR AMÉLIORER LA SÉCURITÉ LIÉE À DES STRUCTURES DE SUPPORT POUR UN ÉQUIPEMENT ROUTIER

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## Description

### Technical field

**[0001]** The present invention relates generally to a foundation to be used for supporting a post, for example a road lighting post, a post for a road sign or the like. Further, the invention relates to an arrangement for improved safety in connection to support structures for road equipment, such as lighting posts, etc.

### Background art

**[0002]** In connection to road signs, road lighting and other permanent road equipment, the development over the years has resulted in EN-standards related to collision safety for road equipment and its support structures. The road equipment referred to in this application concern posts of different kind, which are attached to the ground by a foundation of metal. Foundations for supporting posts normally are made of concrete or metal and have an elongate extension and a cross-section which may differ depending on the design (round, square, hexagonal, octagonal, square at the base and transient to octagonal at the top etc.).

**[0003]** The European standard EN 12767 concerns a test method for road equipment and its support structures and specifies performance requirements and defines levels in passive safety to reduce the severity of injury to occupants of vehicles impacting head-on with the permanent road equipment support structures. The method is applicable to all types of support structure, but in practice, light posts and masts supporting signs are the most common applications. Collisions by vehicles with fixed objects starting at such low driving speed as 35-50 km/h and of course higher speed, entail a risk of fatal injury or permanent disability to car occupants. To avoid these types of injuries, two solutions exist. One option is to design the area around the road equipment to avoid any risk of impact, such as a stationary object can be protected with a road restraint system. This type unfortunately induces itself a risk. Another option is to reduce the magnitude of the consequences in case of impact, for example by weakening the structure. EN 12767 describes a method, based on a real impact test, which evaluates and classifies the effect of this weakening option. Depending on the post and its support structure, and how the total design behaves at the impact test, it will be classified in either of three levels of passive safety according to injury of the occupants of the colliding vehicles. These classes are NE, LE and HE which means Non, Low or High Energy absorption. In some road types, where there is no or low probability that a post, which upon a collision leaves its foundation, will hit another vehicle or person, the lowest class NE may be enough.

**[0004]** The support structure and the post may together contribute to the energy absorption such as the energy absorption is taken care of by the support structure (foun-

ation) and the post together. At a non-energy absorption design (NE), the post may be allowed to leave the foundation and by that the post do not contribute to the total energy absorption. If the foundation more or less is arranged into the ground, i.e. not protruding enough above the ground surface to take up collision force, the NE-design do not contribute to absorb energy from the collision. To provide this energy absorption, to lower speed of the vehicle after the crash, but in a safe manner, the support structure should be a LE- or HE-classed structure.

**[0005]** A solution from another field than the invention but with some features in common with the invention is presented in FR 2 629 176 A1 and concerns a foundation/support for a Christmas tree. The support comprises a circumferential wall extending in an upright manner from the ground or floor on which is intended to stand on, and the circumferential wall encloses an interior space arranged to receive and accommodate the end of the tree. The support further comprises centering means arranged at a bottom of the support, inside the interior space and further three adjusting means at the top of the wall, arranged to adjust the tree to an upright position and to hold the tree in this position by a clamping force. The adjusting means comprises an enlarged surface or tongue-like pressing surface which extends a distance in the upright direction. This solution is not intended for or useful as a foundation for supporting a post for road equipment.

### Summary of invention

**[0006]** An object of the present invention is to provide a foundation for supporting a post for road equipment and an arrangement for improved safety in connection to support structures for road equipment, such as road lighting posts road signs or the like, wherein the foundation and the arrangement design meet the demands of the highest class HE in EN 12 767. These objects of are achieved by the independent claims of the application.

**[0007]** According to an aspect, a foundation which is made of metal and is arranged for supporting a post in a substantially upright manner in a using position, is disclosed. The foundation has an elongate extension direction which is similar with an axial direction of a post, in the using position, which position refers to when the post is supported by the foundation. The foundation comprises a circumferential wall, which extends in the elongate extension direction and which comprises an upper end and a lower end, which is opposite the upper end. The foundation further comprises an interior space arranged to receive and accommodate an end portion of a post (normally the lower end portion of the post). The interior space of the foundation is formed by that the wall encloses the interior space, and the circumferential wall has a thickness at the upper end thereby providing an upper circumferential top surface, which faces in the elongate extension direction (i.e. facing upwards in the using po-

sition), wherein the top surface is arranged to limit the movement of a post in a radial direction, transverse to the elongate extension direction. The foundation further comprises centering means, arranged at the wall between the upper end and lower end of the wall, and protruding in the radial direction, inwards into the interior space, wherein the centering means are arranged to center an end portion of a post in the interior space. Further, the foundation comprises at least one adjusting means, arranged at the wall between the upper end of the wall and the centering means, wherein the adjusting means protrudes in the radial direction, inwards into the interior space. The adjusting means is arranged to adjust a post accommodated in the interior space relative the wall in the radial direction, by the adjusting means being movable in the radial direction, and thereby impacting an outside of a post accommodated in the interior space of the foundation. The foundation further comprises at least one flexible tongue, extending at least in the elongate extension direction of the foundation and each is positioned in position, and radially inside, of one adjusting means, wherein the tongue is arranged to flex radially inwardly when the corresponding adjusting means is moved radially inwardly so that the adjusting means abuts the flexible tongue.

**[0008]** Such a solution provides a possibility to center and then adjust a post into the foundation which is an advantage since the solution allows a certain degree of mis-alignment of the foundation relative the vertical upright using position of the post. The at least one adjustment means is preferably a plurality of adjustment means, and the at least one flexible tongue is preferably a plurality of flexible tongues, but in some applications just one adjustment means and flexible tongues may be enough. The adjustment means are preferably adjustment screws which are possible to screw inwards/outwards relative the wall of the foundation. Each screw may be arranged in a nut which in turn is arranged in a hole in the wall of the foundation. The screw is thereby adjustable in its axial direction relative the nut, such as it may be screwed towards the flexible tongue and further until the flexible tongue abuts the outside of the wall of the post. The screws are preferably arranged symmetrically around the wall and thereby around the post when accommodated into the foundation. The screws around the foundation are easily used to adjust the post to the vertical using position, where the screws then are tightened such as the tongues/screws locks the post in the using position. Further, the flexible tongues, which each are positioned in position of a corresponding adjusting means (that is more or less in line with and at the same height as one adjusting means), provides a protection of the surface of the post, wherein the surface will not be damaged by the end of the adjusting means, for example a screw end, when the adjusting means is tensioned (screwed) against the post. Preferably, the flexible tongues are made of metal, for example a sheet metal tongue. The flexibility of the tongue provides the protec-

tion in any position since the tongue is long enough to reach the surface of the post in any position and will flex until it reaches the surface of the post upon tensioning the adjusting means to the post. Since the post is adjusted into the foundation, such as it will reach a vertical upright position (which of course is a wanted position for example for a lighting post), the distance between the post and the inside of the wall of the foundation may differ and by that the flexible tongue has an extension at least in the elongate extension direction of the foundation, the tongue always may serve as a protection between the adjustment means and the surface of the post. Another advantage with the adjustment means, which protrudes in the radial direction, inwards into the interior space, is that if a stop edge, a stop protrusion or the like, is arranged on the outside of the post, in a position which is below the adjustment means in the using position of the foundation (when supporting a post), the adjustment means prevents the post from leaving the foundation when a vehicle collides with the post. Prior art solutions do not disclose a foundation of metal, adjustable to set a post to a vertical upright position and a protection from surface damage of the post when adjusting means are used to adjust the post position.

**[0009]** The foundation further comprises a cover ring, arranged to rest on the top surface of the foundation and further arranged to fit around an outside of a post. The cover ring is slidable on the top surface of the foundation to follow the motion of a post accommodated in the interior space when adjusted in the radial direction by the adjustment means. Such a solution provides a cover which covers the gap between the post and the top surface of the foundation. The inner edge of the cover ring preferably has the same cross-section the cross-section of the post, only some millimeters larger, to fit around the post. For example, if the post has a round cross-section, the inner edge of the cover ring is round to fit the post and if the post has an octagonal cross-section, the inner edge of the cover ring is octagonal to fit the post, etc. The outer edge of the cover ring preferably is circular or a shape which corresponds to the cross-section of the upper edge of the foundation. The cover ring may be of metal or other material.

**[0010]** According to an embodiment, the cover ring has a width, sufficient to cover a gap between a post accommodated in the interior space and the top surface of the foundation, in any adjustment position of a post accommodated in the interior space, from a minimum adjustment to a maximum adjustment when adjusted by the adjustment means in the radial direction. Such a solution provides a cover ring which always covers the gap between the post and the inner edge of the top surface of the post, which inner edge faces the post. Since the inner edge of the cover ring has a shape which corresponds to the shape of the post, and since the width of the cover ring between its inner edge and outer edge is adapted to cover the gap in any possible position of the post relative the foundation (in the radial adjusting direction), the

opening to interior space, i.e. the open top of the foundation in which the post is inserted, always is covered by the cover ring, independent of to which position the post is adjusted by the adjustment means.

**[0011]** According to an embodiment, the cover ring comprises the at least one flexible tongue. Preferably, the cover ring comprises a plurality of flexible tongues. To provide the cover ring with the flexible tongues is a smart solution since it both provides the protection between the respective adjustment means and the surface of the post via the flexible tongues, and additionally provides a locking function of the cover ring to the foundation. Further, since the cover ring follows the post during adjustment by the adjustment means the flexible tongues do not need to flex that much, compared to a solution where for example the tongues are arranged at the inner edge of the top surface (and protruding downwards from the top surface) or arranged on the inside of the wall (and protruding upwards in direction towards the top surface). When the post is adjusted to an upright using position in the foundation, the cover ring follows the post by sliding on the top surface, and when the post is correctly adjusted, the adjustment means are tightened (screwed) against the post, and the flexible tongues thereby are clamped between the outer ends of the adjustment means and the surface of the post. The cover ring is thereby locked to the foundation and impossible to remove, without loosening the adjustment means. No prior art solutions disclose a cover ring with tongues as protection for the surface of the post or a cover ring which is lockable to the foundation upon adjusting the post.

**[0012]** According to an embodiment, the top surface comprises the flexible tongue/tongues. This is an alternative solution for arranging the flexible tongues.

**[0013]** According to an embodiment, the circumferential wall comprises the flexible tongue/tongues. This is yet an alternative solution for arranging the flexible tongues.

**[0014]** According to an embodiment, the flexible tongue comprises a first protrusion protruding transverse the elongate extension direction of the foundation, wherein the first protrusion is arranged as a stop for a corresponding second protrusion arranged at an outside of an end portion of a post accommodated in the interior space. The first protrusion of the flexible tongue may for example be like a bent sheet metal part protruding from an outer end of the flexible tongue, preferably protruding outwards in direction towards the circumferential wall. At the embodiment presented above, where the flexible tongues protrude downwards (from the top surface or from the cover ring), the first protrusion is arranged at the lower outer end (free end of the tongue). When an adjustment means, for example a screw, is screwed towards the flexible tongue in direction towards the post, the flexible tongue finally abuts the outer surface of the post and the first protrusion at least partly protects the screw downwards. The first protrusion thereby also is arranged as a stop for the corresponding stop arranged

on the outside of the post.

**[0015]** According to an embodiment, the flexible tongue comprises at least one third protrusion protruding transverse the elongate extension direction of the foundation, and having an extension in the elongate extension direction, wherein the at least one third protrusion is arranged as side protection of the adjustment means when the adjusting means abuts the flexible tongue. When the adjustment means have been used for adjust the post, the flexible tongue is clamped between the post and the end of the adjustment means and in this position the at least one third protrusion protects the side of the adjustment means. Preferably, the flexible tongue has two such third protrusions, one on each side, such as the adjustment means is protected between the third protrusions and the first protrusion. The third protrusions also strengthen the flexible tongue and may also guide the adjustment means as well as lock the cover ring such is cannot rotate, if the tongues are provided on the cover ring and if it is a round shape of the post and cover ring.

**[0016]** According to an aspect, an arrangement for improved safety in connection to support structures for road equipment is disclosed. The arrangement comprises a post and further a foundation according to any of the preceding claims, which foundation is arranged for supporting the post in a substantially upright manner in a using position. The post comprises at least one second protrusion, arranged at an outside of an end portion of the post, wherein the at least one second protrusion is arranged as a stop, to prevent the post from leaving the interior space of the foundation (upon a collision), in the extension direction of the foundation, i.e. in an axial direction of the post (upwards), when the end portion of the post is accommodated in the foundation. The at least one second protrusion of the post is aligned with and positioned below at least one adjusting means of the foundation, and by that, the post is prevented from leaving the interior space of the post. The at least one second protrusion may for example be one or more screws, one or more heels, a protruding edge around the periphery of the post or a joint between an end part of the post and the lower end of a post. No prior art provides a complete arrangement where a post may be inserted and adjusted in the foundation and where a protection of the post surface at the positions of the adjustment means is provided, and where stop protrusions of the post interacts with adjustment means of the foundation to prevent the post from leaving the foundation.

**[0017]** According to an embodiment, the at least one second protrusion of the post is arranged at a first distance from an outermost end of the end portion of the post, wherein the first distance is shorter than a second distance from the outermost end of the end portion of the post to the adjusting means of the foundation, when the post is accommodated in the foundation in the using position.

**[0018]** According to an embodiment, the first distance and the second distance are chosen to form a third dis-

tance, which is a distance between the at least one second protrusion of the post and the adjusting means of the foundation, wherein the post, by that is allowed to move the third distance inside the foundation, in the elongate extension direction of the foundation. This is an advantage since it is possible to adapt and test a preferred length of the third distance, to control the behavior of the arrangement upon a collision. The post design, the foundation design and the third distance together set the collision behavior characteristics and the third distance may be used to fit the total classification of the post which is far better than existing solutions.

**[0019]** According to an embodiment, the at least one second protrusion is a screw. Preferably, the screw comprises a relatively large screw head which functions as a stop in cooperation with the adjustment means/flexible tongue of the foundation, to prevent the post from leaving the foundation in the event of a crash by a vehicle to the post.

**[0020]** According to an alternative embodiment, the at least one second protrusion is a bent sheet metal part instead of a screw. The bent sheet metal part may be arranged near a lower end of the post and preferably protrudes outwardly, in direction towards the inside of the wall of the foundation.

**[0021]** According to an embodiment, the at least one second protrusion is a plurality of second protrusions corresponding to the number of adjustment means of the foundation. Preferably, plurality of second protrusions are arranged symmetrically around the periphery of the post in correlation with the positions of the adjustment means.

#### Brief description of drawings

**[0022]** The invention is now described, by way of example, with reference to the accompanying drawings, in which:

Fig. 1 shows a side view of an arrangement which comprises a post and a foundation according to the invention.

Fig. 2 shows a side view of a foundation according to the invention.

Fig. 3 shows a side view of the upper part of the foundation of Fig. 2 with a lower end of a post accommodated into the foundation. A part of the wall which faces the viewer is removed to better visualize the interior of the foundation and the post accommodated therein. The post comprises protrusions in the form of screwheads numbered as "103".

Fig. 4a shows a similar view of the foundation with a post like Fig. 3, but with an alternative solution of the protrusions "103" in the form of bent sheet metal parts.

Fig. 4b shows a detailed view of the foundation and post of Fig. 4a, obliquely from above.

Fig. 5a is a view of an upper end of the foundation of Fig. 2, and a cover ring which is arrangeable around a post and on top of the foundation as a cover. The post has in this example an octagonal cross-section and the foundation also has an octagonal cross-section at least at its upper end.

Fig. 5b is a zoomed view of the cover ring of Fig. 5a.

Fig. 5c is a zoomed view of the upper end of the foundation when a post and a cover ring is mounted to it. A part of the wall facing the viewer is removed to show the interior.

Fig. 5d is a view of the foundation where a post with octagonal cross-section is introduced into the foundation and where the cover ring (arranged to fit around the post) is applied around the post and ready to be attached to the foundation.

Fig. 6 shows the foundation but where the post has a circular cross-section and the cover ring has a corresponding shape of its inner edge.

#### Description of embodiments

**[0023]** In the following, a detailed description of a foundation and an arrangement according to the invention is disclosed in detail, in respect of embodiments and in reference to the accompanying drawings. All examples herein should be seen as part of general description and therefore possible to combine in any way in general terms.

**[0024]** Fig. 1 shows a side view of an arrangement which has an improved safety concerning collision safety in the field of road equipment and its support structures. The arrangement comprises a post 100 and a foundation 1 which is arranged for supporting the post 100 in a substantially upright manner in a using position. The foundation 1 has an elongate extension direction  $z$  which is similar with an axial direction of a post 100 in the using position. The foundation of course has a width and a depth which below both are described as a radial direction  $r$  (referring to the radius of the post) which is a substantially transverse direction relative the elongate extension direction  $z$ .

**[0025]** Fig. 2 shows a side view of a foundation 1 of Fig. 1. The foundation 1 comprises a circumferential wall 2 with an upper end 2a and a lower end 2b, referring to the using position. To be able to use the foundation 1 as a support for a light post 100 or the like, the foundation comprises one or more holes 8/ recesses, which may be used for cables etc.

**[0026]** Fig. 3 shows a side view of the upper part of the foundation 1, wherein a lower end 101 of a post 100 is

accommodated into an interior space 3 of the foundation 1. The wall 2 is made of sheet metal and may have different shapes within the scope of this invention. In the figures, the wall 2 is a bent sheet metal or a number of sheet metal parts joined together, and the shape is transitioning from a square cross-section at the lower end 2b, to an octagonal cross-section at the upper end 2a of the wall 2 (see Fig. 2). The wall 2 extends in the elongate extension direction z and encloses the interior space 3. The interior space 3 is arranged to receive and accommodate the end portion 101 of the post 100. The circumferential wall 2 has a thickness at the upper end 2a, which in the preferred embodiment is arranged as an upper circumferential top surface 4, which faces upwards in the elongate extension direction z (see further Fig. 5a-d).

**[0027]** A number of centering means 6 are arranged at the wall 2, between the upper end 2a and lower end 2b of the wall 2. The centering means 6 protrudes in the radial direction r, inwards into the interior space 3, and the centering means 6 are arranged to center the end portion 101 of the post 100 when arranged in the interior space 3 of the foundation 1. The centering means 6, may be a number of inclined brackets which are attached to the wall 2 and which are arranged to guide the end 101 of the post 100 towards the axial center of the foundation 1, wherein the end 101 is centered into the interior space 3 of the foundation 1. Preferably, the inclined brackets 6 (centering means 6) are attached with their lower ends at a bottom 9, which bottom 9 is arranged as a circular and reinforcing, ring-shaped bracket, which except functions like a fixation of the centering means 6, also functions as a reinforcement of the wall 2 of the foundation 1.

**[0028]** Further, a plurality of adjusting means 7 are arranged at the wall 2 between the upper end 2a of the wall 2 and the centering means 6, preferably close to the upper end 2a. The adjusting means 7 protrudes in the radial direction r, inwards into the interior space 3, and are arranged to adjust a post 100 accommodated in the interior space 3, relative the wall 2 in the radial direction r. This is done by that the adjusting means 7 are movable in the radial direction r, and thereby impacting an outside 102 of a post 100 accommodated in the interior space 3 of the foundation 1. This provides a possibility to center and then adjust the post 100 into the foundation 1. The adjustment means are preferably screws 7 which are possible to screw inwards/outwards relative the wall 2 of the foundation 1. Each screw 7 may be arranged in a nut (see Fig. 5c) which in turn is fixedly arranged to a hole in the wall of the foundation 1 (see Fig. 5d). The screw 7 is thereby adjustable in its axial direction r relative the nut. The adjustment means/screws 7 are preferably arranged symmetrically around the wall 2 and thereby around the post 100 when accommodated into the foundation 1. The screws 7 around the foundation 100 are easily used to adjust the post 100 to a vertical using position, where the screws 7 then are tightened such as locking the post in the using position.

**[0029]** The post 100 comprises at least one second

protrusion 103, preferably a plurality of second protrusions 103, and preferably the plurality corresponds to the number of adjustment means 7. The second protrusions 103 are arranged at the outside 102 of the end portion 101 of the post 100, and are arranged as a stop, to prevent the post 100 from leaving the interior space 3 of the foundation 1 in the extension direction z of the foundation 1, i.e. in an axial direction of the post 100, when the end portion 101 of the post 100 is accommodated in the foundation 1. The second protrusions 103 of the post 100 are aligned with and positioned below the adjusting means 7 of the foundation 1, at a first distance d from an outermost end 101a of the end portion 101 of the post 100. The adjusting means 7 are as mentioned above arranged close to the upper end 2a of the foundation 1, which is at a second distance e from the outermost end 101a of the end portion 101 of the post 100 when the post 100 is accommodated in the foundation 1. The first distance d, from the outermost end 101a to the second protrusion 103 is shorter than the second distance e from the outermost end 101a to the adjusting means 7. This provides a possibility to adapt a third distance d-e, between the second protrusion 103 of the post 100 and the adjusting means 7 of the foundation 1. The third distance d-e is tested and adapted such as the crash behavior of the post 100 together with the foundation 1 (the arrangement) gets a wanted behavior and thereby a wanted class, i.e. a HE-classed arrangement. By arranging this third distance d-e, the post 100 is allowed to move the third distance d-e inside the foundation 1 in the elongate extension direction z of the foundation 1, which is positive for achieving the crash-behavior and achieve the HE-class arrangement including the foundation 1 and the post 100. The post 100 and the foundation 1 each has a resilient design to achieve the HE-class.

**[0030]** Fig. 4a shows a similar view of the foundation 1 with a post 100 arranged into the interior space 3, like in Fig. 3, but with an alternative solution of the second protrusions 103 in the form of bent sheet metal parts. The bent sheet metal part 103 preferably is a plurality of bent sheet metal parts 103, arranged in corresponding positions of the adjustment means 7, such as each is aligned with one adjustment means 7 and with a outwardly bent part which is arranged as a stop for cooperation with the respective adjustment means 7. The second protrusions may be arranged near the outermost end 101a of the post 100 at the first distance d from the outermost end 101a, which in the same way as described above, allows to design the third distance d-e between the second protrusions 103 and the adjustment means 7.

**[0031]** Fig. 4b shows a detailed view of the foundation 1 and post 100 of Fig. 4a, obliquely from above. The centering means 6 are as described above designed like inclined brackets 6. Preferably, the centering means 6 are U-shaped and attached with its shanks to the wall 2 and with an inclining shape from top towards the bottom 9 in a narrowing manner, such as the end 101 of the post 100 is guided towards the center of the foundation 1, and

thereby gets centered when introduced into the interior space 3 of the foundation 1. The centering means 6 are attached with their lower ends at the circular and reinforcing, ring-shaped bracket/bottom 9.

**[0032]** Fig. 5a is a view of the upper end 2a of the wall 2/foundation 1 of Fig. 2, and the figure also shows a cover ring 10, which is arrangeable around a post and on the top surface 4 of the foundation 100, as a protecting cover to the interior space 3. Fig. 5b is a zoomed view of the cover ring 10. Fig. 5c is a zoomed view of the upper end 2a of the foundation 100 when an octagonal post 100 and the cover ring 10 is mounted to it. A part of the wall 2 facing the viewer is removed to show the interior space 3 of the foundation. Fig. 5d is a view of the foundation 1 where the post 100 with the octagonal cross-section is introduced into the foundation 1 and where the cover ring 100 is applied around the post and ready to be attached to the foundation 1. The post 100 has in this example as mentioned an octagonal cross-section as well as the foundation 1, at least at its upper end 2a. The cover ring 10 has an inner edge which is arranged to fit around the post 100, wherein in this example the inner edge of the cover ring 10 also has an octagonal shape.

**[0033]** The top surface 4 is arranged to limit a movement of the post 100 in the radial direction  $r$ , that is transverse to the elongate extension direction  $z$ . This means that when the post 100 is arranged into the foundation 1, and the outermost end 101a of the post 100 is centered by the centering means 6 of the foundation 1, the maximum possible adjustment of the post in the radial direction  $r$ , i.e. to set the distance relative the wall 2 and by that the angle between the centered end 101 of the post 100 and the axis of the post 100 relative the vertical, is limited by the top surface 4.

**[0034]** In the preferred embodiment, a plurality of flexible tongues 11 are arranged at the underside of the cover ring 10 and extend downwards in the elongate extension direction  $z$  of the foundation 1. The flexible tongues 11 are positioned in position with a corresponding adjustment means/screws 7 and are arranged radially inside of the corresponding adjustment means 7. The cover ring 10 is positioned around the end 101 of the post before the post is introduced into the foundation 1, as can be seen in Fig. 5d. Then, when the post 100 is arranged into the foundation 1, the cover ring 10 is lowered and positioned on the top surface 4 of the foundation 1 such as a respective flexible tongue 11 comes into position with a corresponding adjustment screw 7. The flexible tongues 11 thereby are introduced between the outer surface 102 of the post 100 and the end of the screws 7 as a protection, which prevents damages on the surface 102 of the post 100, caused by the screw ends 7, and also provides a larger frictional surface onto which pressure is applied via the screws 7. The flexible tongues 11 are arranged to flex radially inwardly when the corresponding adjusting means/screw 7 is moved radially inwardly so that it abuts the flexible tongue 11. The flexible tongue 11 may be positioned in alternative positions in

alignment with the screws 7, like on the underside of the top edge 4 or on the inside of the wall 2, but with the flexible tongues 11 positioned on the underside of the cover ring 10, the cover ring 10 gets fixedly attached to the foundation 1 at the same time as adjusting the post 100 into the foundation 1 to the vertical using position, and locking the same to the foundation 1. The flexible tongue 11 may comprise a first protrusion 12, which protrudes transverse the elongate extension direction  $z$  of the foundation 1, i.e. outwards towards the wall 2. The first protrusion 12 is arranged as a stop for a corresponding second protrusion 103 arranged at an outside 102 of the end portion 101 of the post 100, accommodated in the interior space 3, and which is mentioned above in relation to Fig. 3. Further, the flexible tongue 11 may comprise at least one third protrusion 13, preferably two, which third protrusions 13 protrude transverse the elongate extension direction  $z$  of the foundation 1, and which have an extension in the elongate extension direction  $z$ , wherein the third protrusions 13 are arranged as side protection on respective sides of the adjustment means 7, when the adjusting means 7 abuts the flexible tongue 11. The third protrusions 13 also have a reinforcing function for the flexible tongue 11.

**[0035]** The cover ring 10 has a width  $b$  which is sufficient to cover a gap  $c$  between the post 100, when accommodated in the interior space 3, and the top surface 4 of the foundation 1. This applies to any adjustment position of the post 100 accommodated in the interior space 3, from a minimum adjustment to a maximum adjustment, when adjusted by the adjustment means 7 in the radial direction  $r$ . The inner edge of the cover ring 10 is as mentioned adapted to the outer shape of the post 100, and the cover ring 10 follows the post 100 when adjusted wherein it slides on the top surface 4, and when the post is in a correct vertical using position, the screws 7 are tightened and the cover ring 10 is fixed to the foundation 1 via the flexible tongues 11. And in this position, the cover ring 10 covers the gap  $c$ , wherein the interior space 3 is protected at least from dirt, but also from water at a certain degree. The cover ring 10 preferably is produced by metal but other kinds of material may be used.

**[0036]** As discussed above, the second protrusions 103 (screwheads 103) arranged on the post 100 acts as stops, which prevent the post 100 from leaving the foundation 1 upon a collision by a vehicle. In such occasion, the post 100 may move upwards until the screwheads 103, aligned with and positioned below corresponding adjustment screws 7 and their flexible tongues 11, stop against the first protrusion 12 of a respective flexible tongue 11 (the latter in position of adjustment screws 7) and an upward motion of the post 100 is stopped. Such an arrangement, comprising the inventive foundation 1 and the post 100 is very effective to minimize injuries of the occupants of the colliding vehicles and fulfils the demands of a HE-classed arrangement for support structures for road equipment.

**[0037]** Fig. 6 shows the foundation 1 but where the

post 100 has a circular cross-section. The cover ring 10 has a corresponding shape of its inner edge which corresponds to the outer surface 102 of the post 100. The cover ring 10 comprises the flexible tongues 11 and is arranged to rest on the top surface 4 and to cover the gap c as described above.

## Claims

1. A foundation (1), arranged for supporting a post (100) in a substantially upright manner in a using position, wherein the foundation (1) having an elongate extension direction (z) similar with an axial direction of the post (100) in the using position, the foundation (1) comprising:

- a circumferential wall (2) extending in the elongate extension direction (z) and comprising an upper end (2a) and a lower end (2b) opposite the upper end (2a),

- an interior space (3) arranged to receive and accommodate an end portion (101) of the post (100), wherein the interior space (3) is formed by that the circumferential wall (2) encloses the interior space (3), wherein the circumferential wall (2) has a thickness at the upper end (2a) thereby providing an upper circumferential top surface (4) facing in the elongate extension direction (z), wherein the upper circumferential top surface (4) is arranged to limit the movement of the post (100) in a radial direction (r), transverse to the elongate extension direction (z),

- centering means (6) arranged at the circumferential wall (2) between the upper end (2a) and lower end (2b) of the circumferential wall (2) and protruding in the radial direction (r), inwards into the interior space (3), wherein the centering means (6) are arranged to center an end portion (101) of the post (100) in the interior space (3),

- at least one adjusting means (7) arranged at the circumferential wall (2) between the upper end (2a) of the circumferential wall (2) and the centering means (6), wherein the adjusting means (7) protrudes in the radial direction (r), inwards into the interior space (3), wherein the adjusting means (7) is arranged to adjust the post (100) accommodated in the interior space (3) relative the circumferential wall (2) in the radial direction (r), by the adjusting means (7) being movable in the radial direction (r), and thereby impacting an outside (102) of the post (100) accommodated in the interior space (3) of the foundation (1),

- at least one flexible tongue (11), extending at least in the elongate extension direction (z) of the foundation (1) and positioned in position and radially inside of the at least one adjusting

means (7), wherein the at least one flexible tongue (11) is arranged to flex radially inwardly when the corresponding adjusting means (7) is moved radially inwardly so that the adjusting means (7) abuts the at least one flexible tongue (11), **characterized by** the foundation being made of metal and the foundation (1) further comprising a cover ring (10), arranged to rest on the upper circumferential top surface (4) and further arranged to fit around an outside (102) of the post (100), wherein the cover ring (10) further is slidable on the upper circumferential top surface (4) of the foundation (1), to follow the motion of the post (100) accommodated in the interior space (3) when adjusted in the radial direction (z) by the adjustment means (7).

2. Foundation (1) according to claim 1, wherein the cover ring (10) having a width (b), sufficient to cover a gap (c) between a post (100) accommodated in the interior space (3) and the top surface (4) of the foundation (1), in any adjustment position of a post (100) accommodated in the interior space (3), from a minimum adjustment to a maximum adjustment when adjusted by the adjustment means (7) in the radial direction (r).

3. Foundation (1) according to claim 1 or 2, wherein the cover ring (10) comprises the at least one flexible tongue (11).

4. Foundation (1) according to claim 1 or 2, wherein the top surface (4) comprises the at least one flexible tongue (11).

5. Foundation (1) according to claim 1 or 2, wherein the circumferential wall (2) comprises the at least one flexible tongue (11).

6. Foundation (1) according to any of the preceding claims, wherein the at least one flexible tongue (11) comprises a first protrusion (12) protruding transverse the elongate extension direction (z) of the foundation (1), wherein the first protrusion (12) is arranged as a stop for a corresponding second protrusion (103) arranged at an outside (102) of an end portion (101) of the post (100) accommodated in the interior space (3).

7. Foundation (1) according to claim 6, wherein the at least one flexible tongue (11) comprises at least one third protrusion (13) protruding transverse the elongate extension direction (z) of the foundation (1), and having an extension in the elongate extension direction (z), wherein the at least one third protrusion (13) is arranged as side protection of the adjustment means (7) when the adjusting means (7) abuts the flexible tongue (11).

8. An arrangement for improved safety in connection to support structures for road equipment, the arrangement comprising:

- a post (100),
- a foundation (1) according to any of the preceding claims arranged for supporting the post (100) in a substantially upright manner in a using position,

wherein the post (100) comprises at least one second protrusion (103), arranged at an outside (102) of an end portion (101) of the post (100), wherein the at least one second protrusion (103) is arranged as a stop, to prevent the post (100) from leaving the interior space (3) of the foundation (1) in the extension direction (z) of the foundation (1), i.e. in an axial direction of the post (100), when the end portion (101) of the post (100) is accommodated in the foundation (1), by that the at least one second protrusion (103) of the post (100) is aligned with and positioned below at least one adjusting means (7) of the foundation (1).

9. Arrangement according to claim 8, wherein the at least one second protrusion (103) of the post (100) is arranged at a first distance (d) from an outermost end (101a) of the end portion (101) of the post (100), wherein the first distance (d) is shorter than a second distance (e) from the outermost end (101a) of the end portion (101) of the post (100) to the adjusting means (7) of the foundation (1), when the post (100) is accommodated in the foundation (1) in the using position.

10. Arrangement according to claim 9, wherein the first distance (d) and the second distance (e) are chosen to form a third distance (d-e) between the at least one second protrusion (103) of the post (100) and the adjusting means (7) of the foundation (1), wherein the post (100) is allowed to move the third distance (d-e) inside the foundation (1) in the elongate extension direction (z) of the foundation (1).

11. Arrangement according to any of claims 8-10, wherein the at least one second protrusion (103) is a screw.

12. Arrangement according to any of claims 8-10, wherein the at least one second protrusion (103) is a bent sheet metal part.

13. Arrangement according to any of claims 8-12, wherein the at least one second protrusion (103) is a plurality of second protrusions (103) corresponding to the number of adjustment means (7) of the foundation (1).

## Patentansprüche

1. Fundament (1), das zum Stützen eines Pfostens (100) auf eine im Wesentlichen aufrechte Art in einer Gebrauchslage angeordnet ist, wobei das Fundament (1) eine Längserstreckungsrichtung (z) hat, die in der Gebrauchslage einer axialen Richtung des Pfostens (100) ähnlich ist, wobei das Fundament (1) Folgendes umfasst:

- eine Umfangswand (2), die sich in der Längserstreckungsrichtung (z) erstreckt und ein oberes Ende (2a) und ein dem oberen Ende (2a) gegenüberliegendes unteres Ende (2b) umfasst,

- einen Innenraum (3), der zur Aufnahme und Unterbringung eines Endabschnitts (101) des Pfostens (100) angeordnet ist, wobei der Innenraum (3) dadurch gebildet ist, dass die Umfangswand (2) den Innenraum (3) umschließt, wobei die Umfangswand (2) eine Dicke an dem oberen Ende (2a) hat, wodurch eine obere Umfangsfläche (4) bereitgestellt wird, die in die Längserstreckungsrichtung (z) weist, wobei die obere Umfangsfläche (4) dazu angeordnet ist, die Bewegung des Pfostens (100) in einer quer zu der Längserstreckungsrichtung (z) verlaufenden radialen Richtung (r) zu begrenzen,

- Zentrierungsmittel (6), die an der Umfangswand (2) zwischen dem oberen Ende (2a) und dem unteren Ende (2b) der Umfangswand (2) angeordnet sind und in der radialen Richtung (r) nach innen in den Innenraum (3) ragen, wobei die Zentrierungsmittel (6) zur Zentrierung eines Endabschnitts (101) des Pfostens (100) in dem Innenraum (3) angeordnet sind,

- mindestens ein Verstellmittel (7), das an der Umfangswand (2) zwischen dem oberen Ende (2a) der Umfangswand (2) und den Zentrierungsmitteln (6) angeordnet ist, wobei das Verstellmittel (7) in der radialen Richtung (r) nach innen in den Innenraum (3) ragt, wobei das Verstellmittel (7) dazu angeordnet ist, den in dem Innenraum (3) untergebrachten Pfosten (100) bezüglich der Umfangswand (2) in der radialen Richtung (r) zu verstellen, indem das Verstellmittel (7) in der radialen Richtung (r) beweglich ist und dadurch auf eine Außenseite (102) des in dem Innenraum (3) des Fundaments (1) untergebrachten Pfostens (100) einwirkt,

- mindestens eine flexible Zunge (11), die sich mindestens in die Längserstreckungsrichtung (z) des Fundaments (1) erstreckt und in Position und radial innerhalb des mindestens einen Verstellmittels (7) positioniert ist, wobei die mindestens eine flexible Zunge (11) dazu angeordnet ist, sich radial nach innen zu biegen, wenn das entsprechende Verstellmittel (7) radial nach in-

- nen bewegt wird, so dass das Verstellmittel (7) an der mindestens einen flexiblen Zunge (11) anliegt, **dadurch gekennzeichnet, dass** das Fundament aus Metall hergestellt ist und das Fundament (1) ferner einen Abdeckungsring (10) umfasst, der so angeordnet ist, dass er auf der oberen Umfangsfläche (4) ruht, und ferner so angeordnet ist, dass er um eine Außenseite (102) des Pfostens (100) passt, wobei der Abdeckungsring (10) ferner auf der oberen Umfangsfläche (4) des Fundaments (1) verschiebbar ist, um der Bewegung des in dem Innenraum (3) untergebrachten Pfostens (100) zu folgen, wenn er von dem Verstellmittel (7) in der radialen Richtung (r) verstellt wird.
2. Fundament (1) nach Anspruch 1, wobei der Abdeckungsring (10) eine Breite (b) hat, die zum Abdecken eines Spalts (c) zwischen einem in dem Innenraum (3) untergebrachten Pfosten (100) und der oberen Fläche (4) des Fundaments (1) in einer beliebigen Verstellposition eines in dem Innenraum (3) untergebrachten Pfostens (100) von einer minimalen Verstellung zu einer maximalen Verstellung, wenn er von dem Verstellmittel (7) in der radialen Richtung (r) verstellt wird, ausreicht.
  3. Fundament (1) nach Anspruch 1 oder 2, wobei der Abdeckungsring (10) die mindestens eine flexible Zunge (11) umfasst.
  4. Fundament (1) nach Anspruch 1 oder 2, wobei die obere Fläche (4) die mindestens eine flexible Zunge (11) umfasst.
  5. Fundament (1) nach Anspruch 1 oder 2, wobei die Umfangswand (2) die mindestens eine flexible Zunge (11) umfasst.
  6. Fundament (1) nach einem der vorhergehenden Ansprüche, wobei die mindestens eine flexible Zunge (11) einen ersten Vorsprung (12) umfasst, der quer zu der Längserstreckungsrichtung (z) des Fundaments (1) vorragt, wobei der erste Vorsprung (12) als ein Anschlag für einen entsprechenden zweiten Vorsprung (103) angeordnet ist, der an einer Außenseite (102) eines Endabschnitts (101) des in dem Innenraum (3) untergebrachten Pfostens (100) angeordnet ist.
  7. Fundament (1) nach Anspruch 6, wobei die mindestens eine flexible Zunge (11) mindestens einen dritten Vorsprung (13) umfasst, der quer zu der Längserstreckungsrichtung (z) des Fundaments (1) vorragt und eine Verlängerung in der Längserstreckungsrichtung (z) hat, wobei die mindestens eine dritte Vorsprung (13) als ein Seitenschutz des Verstellmittels (7) angeordnet ist, wenn das Verstellmittel (7) an der flexiblen Zunge (11) anliegt.
8. Anordnung für verbesserte Sicherheit in Verbindung mit Stützstrukturen für Straßenzubehör, wobei die Anordnung Folgendes umfasst:
    - einen Pfosten (100),
    - ein Fundament (1) nach einem der vorhergehenden Ansprüche, das zum Stützen des Pfostens (100) auf eine im Wesentlichen aufrechte Art in einer Gebrauchsposition angeordnet ist, wobei der Pfosten (100) mindestens einen zweiten Vorsprung (103) umfasst, der an einer Außenseite (102) eines Endabschnitts (101) des Pfostens (100) angeordnet ist, wobei der mindestens eine zweite Vorsprung (103) als ein Anschlag angeordnet ist, um zu verhindern, dass der Pfosten (100) den Innenraum (3) des Fundaments (1) in der Erstreckungsrichtung (z) des Fundaments (1), d. h. in einer axialen Richtung des Pfostens (100), verlässt, wenn der Endabschnitt (101) des Pfostens (100) in dem Fundament (1) untergebracht ist, indem der mindestens eine zweite Vorsprung (103) des Pfostens (100) auf mindestens ein Verstellmittel (7) des Fundaments (1) ausgerichtet und darunter positioniert ist.
  9. Anordnung nach Anspruch 8, wobei der mindestens eine zweite Vorsprung (103) des Pfostens (100) mit einem ersten Abstand (d) von einem äußersten Ende (101a) des Endabschnitts (101) des Pfostens (100) angeordnet ist, wobei der erste Abstand (d) kürzer als ein zweiter Abstand (e) von dem äußersten Ende (101a) des Endabschnitts (101) des Pfostens (100) zu dem Verstellmittel (7) des Fundaments (1), wenn der Pfosten (100) in der Gebrauchsposition in dem Fundament (1) untergebracht ist.
  10. Anordnung nach Anspruch 9, wobei der erste Abstand (d) und der zweite Abstand (e) so gewählt sind, dass sie einen dritten Abstand (d-e) zwischen dem mindestens einen zweiten Vorsprung (103) des Pfostens (100) und dem Verstellmittel (7) des Fundaments (1) bilden, wobei sich der Pfosten (100) über den dritten Abstand (d-e) innerhalb des Fundaments (1) in der Längserstreckungsrichtung (z) des Fundaments (1) bewegen kann.
  11. Anordnung nach einem der Ansprüche 8 - 10, wobei der mindestens eine zweite Vorsprung (103) eine Schraube ist.
  12. Anordnung nach einem der Ansprüche 8 - 10, wobei der mindestens eine zweite Vorsprung (103) ein gebogenes Blechteil ist.
  13. Anordnung nach einem der Ansprüche 8 - 12, wobei

der mindestens eine zweite Vorsprung (103) eine Vielzahl von zweiten Vorsprüngen (103) ist, die der Anzahl von Verstellmitteln (7) des Fundaments (1) entsprechen.

## Revendications

1. Fondation (1), conçue pour supporter un poteau (100) de manière sensiblement verticale dans une position d'utilisation, la fondation (1) ayant une direction d'extension allongée (z) similaire à une direction axiale du poteau (100) dans la position d'utilisation, la fondation (1) comprenant :

une paroi circumférentielle (2) s'étendant dans la direction d'extension allongée (z) et comprenant une extrémité supérieure (2a) et une extrémité inférieure (2b) opposée à l'extrémité supérieure (2a),

un espace intérieur (3) conçu pour recevoir et loger une partie d'extrémité (101) du poteau (100), l'espace intérieur (3) étant formé par la paroi circumférentielle (2) qui entoure l'espace intérieur (3), la paroi circumférentielle (2) ayant une épaisseur au niveau de l'extrémité supérieure (2a), fournissant ainsi une surface supérieure circumférentielle (4) orientée dans la direction d'extension allongée (z), la surface supérieure circumférentielle (4) étant conçue pour limiter le mouvement du poteau (100) dans une direction radiale (r), transversale à la direction d'extension allongée (z),

un moyen de centrage (6) disposé au niveau de la paroi circumférentielle (2) entre l'extrémité supérieure (2a) et l'extrémité inférieure (2b) de la paroi circumférentielle (2) et faisant saillie dans la direction radiale (r), vers l'intérieur dans l'espace intérieur (3), le moyen de centrage (6) étant disposé pour centrer une partie d'extrémité (101) du poteau (100) dans l'espace intérieur (3),

au moins un moyen de réglage (7) disposé au niveau de la paroi circumférentielle (2) entre l'extrémité supérieure (2a) de la paroi circumférentielle (2) et le moyen de centrage (6), le moyen de réglage (7) faisant saillie dans la direction radiale (r), vers l'intérieur dans l'espace intérieur (3), le moyen de réglage (7) étant conçu pour régler le poteau (100) logé dans l'espace intérieur (3) par rapport à la paroi circumférentielle (2) dans la direction radiale (r), le moyen de réglage (7) étant mobile dans la direction radiale (r), et impactant ainsi un extérieur (102) du poteau (100) logé dans l'espace intérieur (3) de la fondation (1),

au moins une languette flexible (11), s'étendant au moins dans la direction d'extension allongée

(z) de la fondation (1) et placée en position et radialement à l'intérieur de l'au moins un moyen de réglage (7), l'au moins une languette flexible (11) étant conçue pour fléchir radialement vers l'intérieur lorsque le moyen de réglage (7) correspondant est déplacé radialement vers l'intérieur de sorte que le moyen de réglage (7) vient en butée contre l'au moins une languette flexible (11), **caractérisé en ce que** la fondation est en métal et la fondation (1) comprend en outre un anneau de recouvrement (10), conçu pour reposer sur la surface supérieure circumférentielle (4) et conçu en outre pour s'adapter autour de l'extérieur (102) du poteau (100), l'anneau de recouvrement (10) pouvant en outre glisser sur la surface supérieure circumférentielle (4) de la fondation (1) afin de suivre le mouvement du poteau (100) logé dans l'espace intérieur (3) lorsqu'il est réglé dans la direction radiale (z) par le moyen de réglage (7).

2. Fondation (1) selon la revendication 1, l'anneau de recouvrement (10) ayant une largeur (b) suffisante pour couvrir un espace (c) entre un poteau (100) logé dans l'espace intérieur (3) et la surface supérieure (4) de la fondation (1), dans toute position de réglage d'un poteau (100) logé dans l'espace intérieur (3), d'un réglage minimum à un réglage maximum lorsqu'il est réglé par le moyen de réglage (7) dans la direction radiale (r) .
3. Fondation (1) selon la revendication 1 ou 2, l'anneau de recouvrement (10) comprenant l'au moins une languette flexible (11).
4. Fondation (1) selon la revendication 1 ou 2, la surface supérieure (4) comprenant l'au moins une languette flexible (11).
5. Fondation (1) selon la revendication 1 ou 2, la paroi circumférentielle (2) comprenant l'au moins une languette flexible (11).
6. Fondation (1) selon l'une quelconque des revendications précédentes, l'au moins une languette flexible (11) comprenant une première saillie (12) faisant saillie transversalement à la direction d'extension allongée (z) de la fondation (1), la première saillie (12) étant disposée comme une butée pour une deuxième saillie (103) correspondante disposée à l'extérieur (102) d'une partie d'extrémité (101) du poteau (100) logé dans l'espace intérieur (3).
7. Fondation (1) selon la revendication 6, l'au moins une languette flexible (11) comprenant au moins une troisième saillie (13) faisant saillie transversalement à la direction d'extension allongée (z) de la fondation (1), et ayant une extension dans la direction d'exten-

- sion allongée (z), l'au moins une troisième saillie (13) étant disposée comme protection latérale du moyen de réglage (7) lorsque le moyen de réglage (7) vient en butée contre la languette flexible (11).
- 5
8. Agencement pour une sécurité améliorée en liaison avec des structures de support pour un équipement routier, l'agencement comprenant :
- 10
- un poteau (100),
- une fondation (1) selon l'une quelconque des revendications précédentes, destinée à supporter le poteau (100) de manière sensiblement verticale en position d'utilisation,
- 15
- le poteau (100) comprenant au moins une deuxième saillie (103), disposée à l'extérieur (102) d'une partie d'extrémité (101) du poteau (100), l'au moins une deuxième saillie (103) étant disposée comme une butée, pour empêcher le poteau (100) de quitter l'espace intérieur (3) de la fondation (1) dans la direction d'extension (z) de la fondation (1), c'est-à-dire dans une direction axiale du poteau (100), lorsque la partie d'extrémité (101) du poteau (100) est logée dans la fondation (1), moyennant quoi l'au moins une deuxième saillie (103) du poteau (100) est alignée avec au moins un moyen de réglage (7) de la fondation (1) et positionnée en dessous.
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9. Agencement selon la revendication 8, l'au moins une deuxième saillie (103) du poteau (100) étant disposée à une première distance (d) d'une extrémité extérieure (101a) de la partie d'extrémité (101) du poteau (100), la première distance (d) étant plus courte qu'une deuxième distance (e) entre l'extrémité extérieure (101a) de la partie d'extrémité (101) du poteau (100) et le moyen de réglage (7) de la fondation (1), lorsque le poteau (100) est logé dans la fondation (1) en position d'utilisation.
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10. Agencement selon la revendication 9, la première distance (d) et la deuxième distance (e) étant choisies pour former une troisième distance (d-e) entre au moins une deuxième saillie (103) du poteau (100) et le moyen de réglage (7) de la fondation (1), le poteau (100) étant autorisé à se déplacer sur la troisième distance (d-e) à l'intérieur de la fondation (1) dans la direction d'extension allongée (z) de la fondation (1).
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11. Agencement selon l'une quelconque des revendications 8 à 10, l'au moins une deuxième saillie (103) étant une vis.
- 55
12. Agencement selon l'une quelconque des revendications 8 à 10, l'au moins une deuxième saillie (103) étant une pièce de tôle pliée.
13. Agencement selon l'une quelconque des revendications 8 à 12, l'au moins une deuxième saillie (103) étant une pluralité de deuxièmes saillies (103) correspondant au nombre de moyens de réglage (7) de la fondation (1).

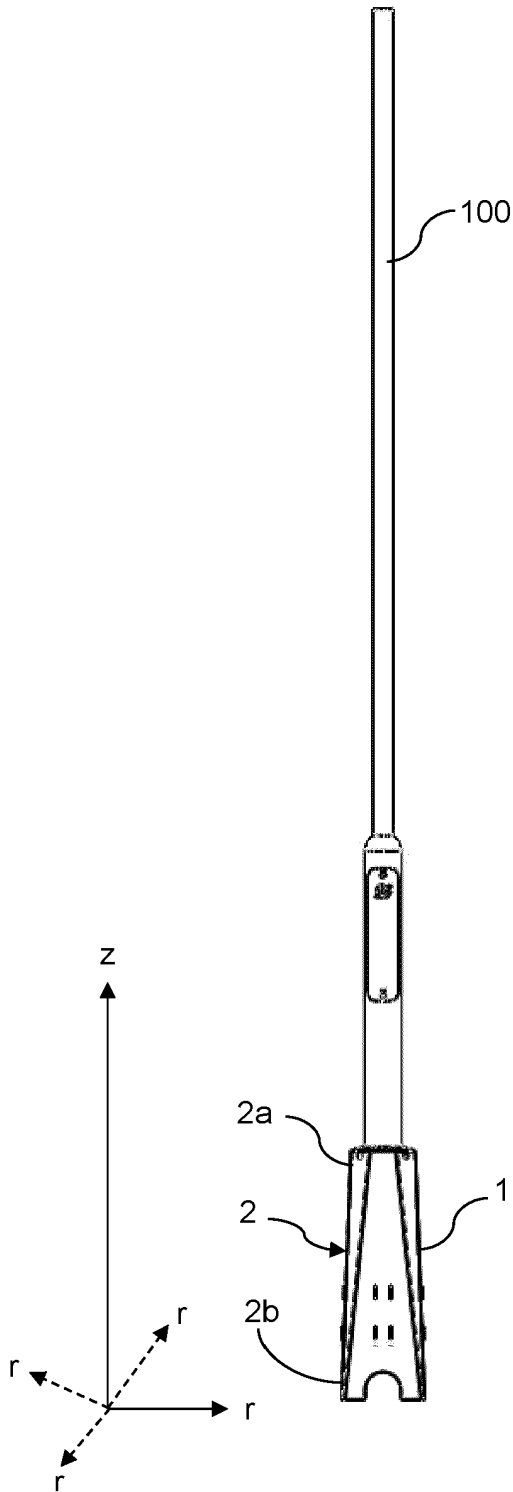


Fig. 1

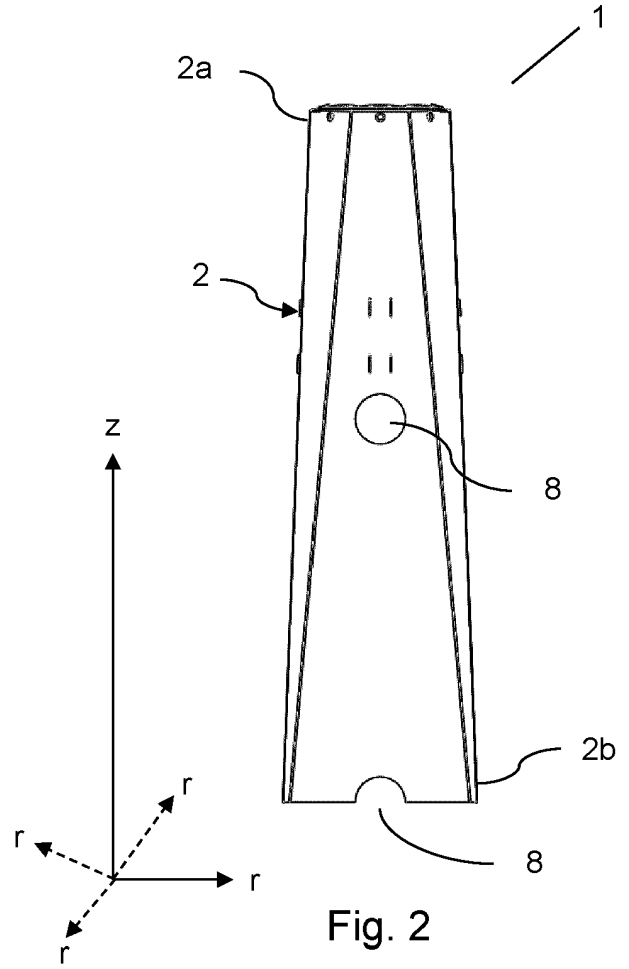


Fig. 2

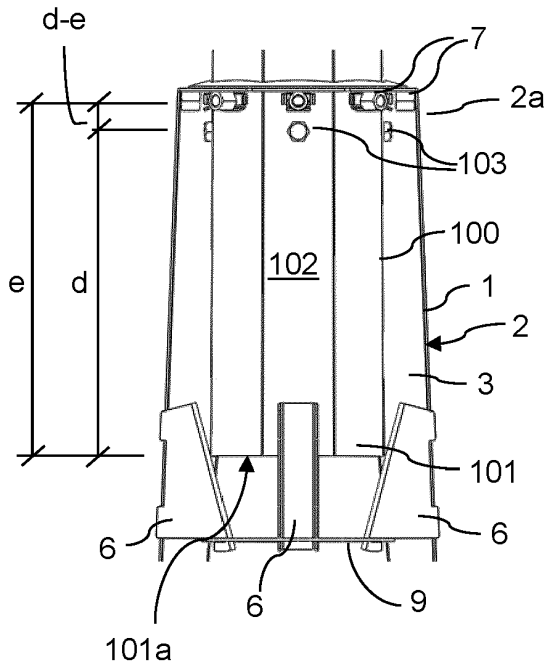


Fig. 3

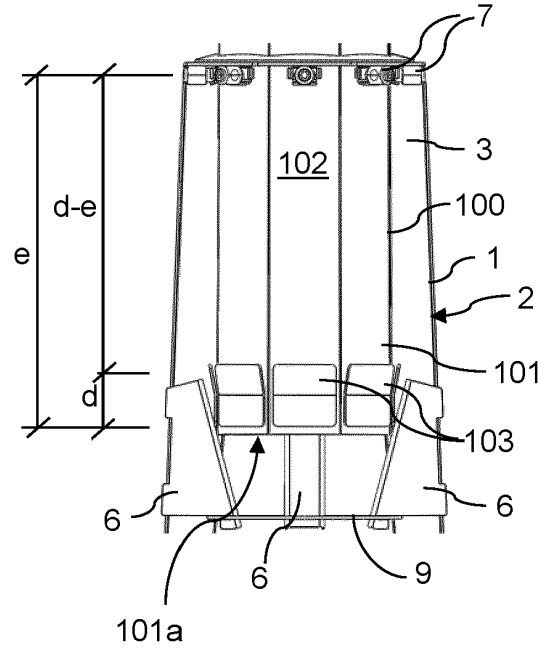


Fig. 4a

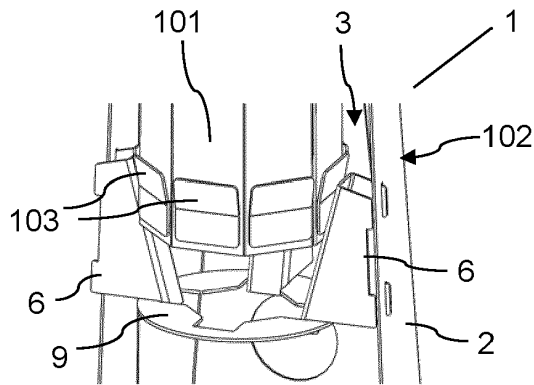


Fig. 4b

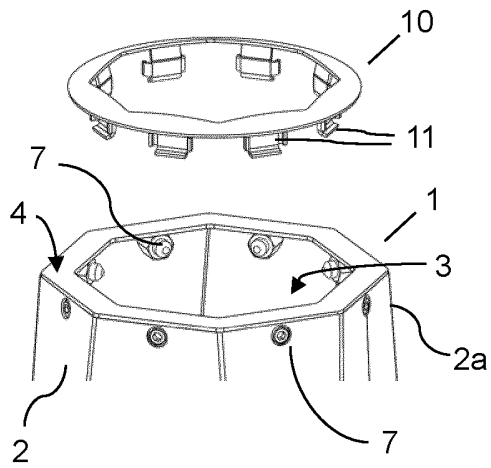


Fig. 5a

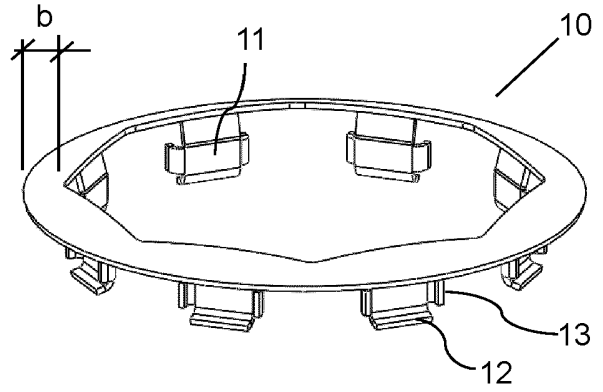


Fig. 5b

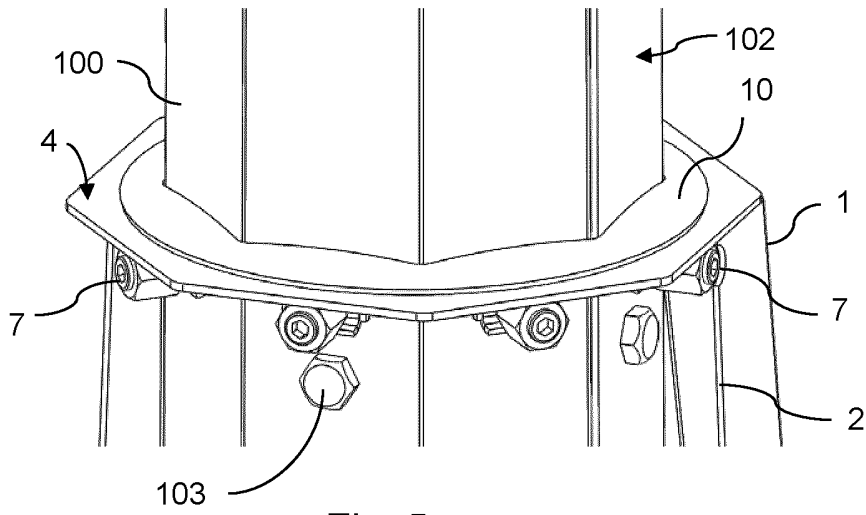


Fig. 5c

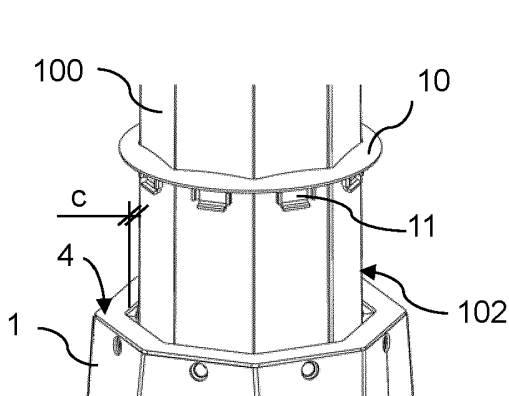


Fig. 5d

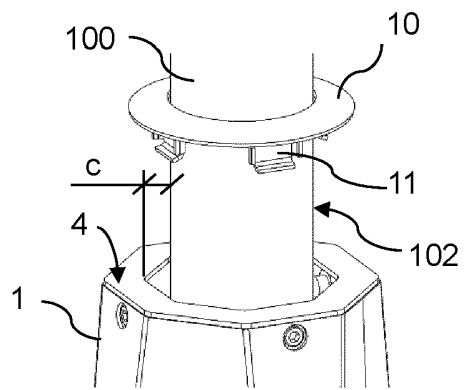


Fig. 6

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

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