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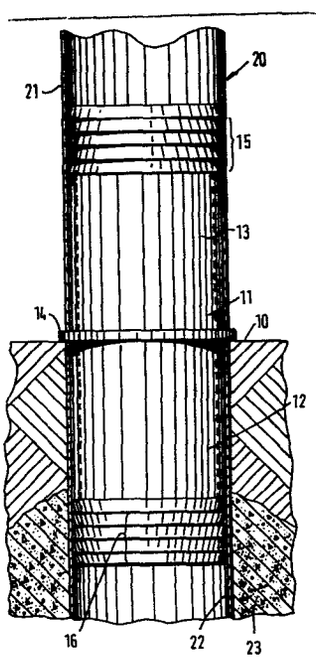
(54) Improvements in or relating to methods and apparatus for supporting tubular posts.

(57) Disclosed is a method of supporting a road traffic sign post (20) in which a lower sleeve portion (22) of the post (20) is embedded in the ground and secured therein by concrete (23), an interference fit tubular adaptor (1, 11) is driven into the sleeve (22) to provide a predetermined length of adaptor extending from the sleeve and the upper post portion (21) driven into the projecting portion (3, 13) of the adaptor (1, 11) so that the upper end of the sleeve and lower end of the post are in an abutting relationship. The adaptor (1, 11) is required to be weaker than the upper portion (21) of the post (20) in order that it will fracture or bend along a line between the abutting ends of the upper portion (21) and sleeve (20) in event of being hit, by for example, a car. The adaptor (1, 11) may have an outwardly directed flange (4, 14) to determine the extent of penetration into the sleeve (22) and post (21), and outwardly directed chevrons (15, 16) at the ends to provide «lead-in» portions. The impact strength of the adaptor (1, 11) is predetermined by controlling its wall thickness or providing lines of weakness such as a groove or lines of holes (7).



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TITLE:

"IMPROVEMENTS IN OR RELATING TO METHODS AND APPARATUS FOR SUPPORTING TUBULAR POSTS"

The present invention relates to improvement in methods and apparatus for supporting tubular posts and like structures.

Tubular post structures are frequently used to carry road signs and are positioned adjacent carriageways. The method of supporting such structures generally involves setting the base of the post in concrete contained in a hole formed in the ground. As a result of their placement these posts are often damaged by vehicles colliding with them, and since the posts are rigid and set in concrete such collisions often cause severe damage to the vehicle, e.g. through breaking off or folding at or above the point of impact and falling backwards onto the roof of the vehicle. In such circumstances the posts themselves are generally damaged to such an extent that they have to be replaced. Such replacement is a relatively expensive procedure requiring the removal of the damaged post, its concrete base and setting a replacement post in fresh concrete.

The need for the posts to be rigid arises as a result of the structural strength requirements of British Standard B.S. 873 Part 7 (Road Traffic Signs and Internally Illuminated Bollards - specification for parts and fittings). These

posts have, of course, to be erected in such a manner that they are not knocked over by minor impacts or blown over by high winds.

Various proposals have been made to reduce the damage to sign posts and vehicles as a result of the vehicle hitting the post.

Thus British Patent No. 958,657 describes a street post or runway marker comprising a tubular post mounted on a rubber base. British patent No. 1,123,202 describes a post that is detachably secured to a ground embedded plate.

In British patent No. 1,483,485 there is disclosed a traffic bollard comprising a centre post surrounded by a hollow casing and it is provided that the post is connected to a base via a portion weaker than the base or post such that it bends or breaks following a collision.

An anchoring base for a roadside post is described in U.K. patent application 2,063.339A consisting of a cup shaped bottom component, a weight for supporting the post, and placed in the cavity of bottom component, the weight and the bottom component being held togehter by means of a breakable vertical connecting pin located co-axially of the post.

I have now developed a simple and inexpensive method and device for supporting such posts that reduces damage both to a vehicle colliding with the post and to the post itself with the result that the latter generally will not

need replacement and also provides a structure that conforms to the aforesaid British Standard.

The present invention may be used to join together any two members that have, or can include, tubular end portions that are required to be in abutting or substantially abutting relationship and in which the joined structure is required to shear or bend at the said abutting ends when one member is subjected to a heavy impact. However, for convenience of description only the invention is described with respect to a post and a sleeve which is normally required to be embedded in the ground.

In my method a hollow sleeve first member is sunk into the ground and secured in position, for example by concrete, with the top at ground level. An adaptor which is an interference fit, is then inserted part way into the sleeve so that a portion of the adaptor extends upwardly therefrom. The second member, e.g. a tubular post, is then fitted over the extending portion of the adaptor and is again an interference fit.

Accordingly, therefore, the present invention provides a method for joining two members having tubular end portions to provide a joined structure that is required to extend susbstantially vertically above the ground comprising:

sinking a hollow sleeve first member into the ground; securing the sleeve in the ground; driving an interference fit

adaptor part-way into the sleeve to provide a portion of the adaptor extending upwardly of the sleeve; driving the hollow end of a second member over the said upwardly extending portion of the adaptor whereby the ends of the members are brought into substantially abutting relationship; the structural strength of the adaptor being significantly lower than that of the second member at least around a line adjacent the abutting ends of the said members whereby causing the adaptor to bend or fracture along the said line when the second said member is subjected to a heavy impact.

From another aspect the invention provides an adaptor for use with the said method and comprising a first portion dimensioned to be an interference fit in the first said member and a second portion dimensioned to be an interference fit in the second said member, the adaptor being formed from a material that is more malleable or is weaker, at least around a line lying between the abutting ends of the said members, than the material from which the said second member is formed.

A characteristic feature of the adaptor, which is preferably annular in cross-section is that it will shear or bend, at the junction of the post and sleeve, with minimal damage to the second member, as a result of an impact on the said member. The material from which the adaptor is formed therefore should be weaker at least in area adjacent the post

and/or more malleable than the material forming the post and the sleeve. To assist in shearing a line of weakness may be introduced around the periphery of the adaptor adjacent the junction between the sleeve and second member. Such a line of weakness may, for example, be introduced by forming a groove around the adaptor or by drilling a series of holes around its periphery, i.e. the adaptor may be perforated. Preferably the strength or malleability of the adaptor is predetermined by controlling the wall thickness thereof.

The materials from which the adaptor may be formed include plastics materials such as polypropylene, polyvinylchloride or nylon or metallic materials such as aluminium. Other materials may of course be used provided that they have an area of relative weakness adjacent the junction between the tubular portions of the structures being joined.

The choice of material will depend upon the specific application. Thus for use with posts carrying road signs, in which a sleeve is embedded in the ground, a plastics material that will not rot or corride may be preferred.

The adaptor preferably includes outwardly extending flange around its periphery to define the extent to which it projects into the tubular structures and to ensure that the designed minimum length of adaptor projects into each tube.

The adaptor preferably has the same cross-sectional

shape as the tubular portions of the member and sleevein order to meet the strength requirements, the most preferred cross-sectional shape being circular. It may however, be acceptable to use an adaptor of a non-circular cross-section e.g., hexagon shaped to engage in circular section tubular members. The adaptor may include outwardly extending projections, e.g., a plurality of rows of gripping chevrons to provide lead-in portions, however, such chevrons should be formed only at the end portions of the adaptor.

The members to be joined need not be tubular along their whole length, it is required only that they have tubular end portions to receive the adaptor. Furthermore the tubular end portions need not be of circular cross-section, for example, they may have a rectangular cross-section, as in a traffic bollard.

In the context of the present specification the term "ground" is intended to include "roadway", "track", "footpath" and "runway".

Embodiments of the invention will now be described with reference to the accompanying drawings in which:

Figure 1 is a diagrammatic representation of a cross-section of an adaptor for use in the present invention,

Figure 2 is a diagrammatic respresentation in section of a portion of a traffic sign post according to the present invention.

Referring to Figure 1, an adaptor generally indicated at 1 includes a lower portion 2 of circular cross-section and an upper portion 3 of the same cross-section separated by an outwardly extending flange portion 4. For convenience the flange is midway between the top 5 and bottom 6 ends of the adaptor. The adaptor has a length of 21 cm, an external diameter of 6.85cm and a wall thickness of 9.25mm. The flange has a thickness of 1 cm and projects 1 cm from the adaptor wall.

A line of weakness is introduced immediately adjacent the flange 4 by forming a series of holes 7 around the periphery of the adaptor just above the flange. The ends 5 and 6 are chamfered to allow ease of insertion into hollow tubular structures.

In use, for supporting a tubular post carrying a traffic sign, a mild steel sleeve of 40 cm length and 6.8 cm internal diameter is concreted into a hole in the ground to form a secure base. The adaptor 1 is then driven into the sleeve until the flange 4 lies on top of the sleeve. A post carrying a road sign and of length 2 m and 6.8. cm internal diameter, is then driven onto the upper portion 3 of the adaptor. A secure structure is obtained which is sufficiently strong to withstand normal pressures which may be applied perpendicularly to the upper end portion of the post, for example, pressure applied by wind directed against the flat

surface of the sign being carried by the post. The structure meets the strength requirements of the aforesaid British Standard. However, in the event of a vehicle hitting the post the impact will cause the adaptor to shear along the line of weakness where the tube ends meet, thus minimising damage to both post and vehicle. Because only minimal damage occurs to the post it may be replaced in position once the broken ends of the adaptor have been removed from the sleeve and the end of the post, and a new adaptor fitted thus effecting a relatively rapid and cheap repair.

As mentioned earlier the material forming the adaptor may be more malleable than that of the post so that, in similar circumstances, the impact will cause the adaptor to bend at the junction of the post and sleeve, i.e. it acts as a hinge, again minimising damage to the post and the colliding vehicle. Such an arrangement has the advantage that it would avoid the possibility of the post falling "backwards" onto a colliding vehicle which would happen if the point of impact were low and the post relatively high.

The strength of the adaptor, e.g. along a line of weakness in respect of the force or impact required to cause it to shear or bend can be predetermined to suit particular applications. Most conveniently the impact strength of the adaptor is achieved by controlling the thickness of the adaptor wall, in general the thicker the wall the greater the

impact needed to fracture the adaptor or cause it to hinge along a line between the ends of the posts. The wall thickness may be constant along the full length of the adaptor. There may be circumstances when it would be acceptable for a post used adjacent a carriageway to be severely damaged by a colliding vehicle but at the same time causing less damage to the vehicle than would the same post set in concrete. Such a post would have the effect of reducing the speed of the colliding vehicle without causing severe damage to the vehicle.

Figure 2 is a section through the lower end of a traffic sign post. The post generally indicated at 20 has an upper tubular steel portion 21 extending above ground level 10 and at the top end of which is carried a road sign (not shown). A lower tubular steel portion 22 extends below ground level and is firmly secured in position by a mass of concrete 23. The internal diameter of tubular portions 21 and 22 is 6.8 cm and a wall thickness of 8 mm. The adaptor joining portion 21 and 22 of post 20 is indicated at 11 and consists of a lower tubular portion 12 and upper tubular portion 13, separated by flange 14. The length of the adaptor is 21 cm, the external diameter is 6.85 cm and it has a wall thickness of 10.25 mm. Flange 14 is 1 cm thick and extends 1 cm outwardly of the adaptor wall. The upper 3 cm of portion 13 and the lower 3 cm of portion 12 of adaptor 11 contains four rows of chevrons

15 and 16 to provide lead-in portions.

Because the tube 20 is formed by rolling and welding a seam projects into the tube along the full length thereof. The presence of the chevrons 16 on portion 12 enables the adaptor to be lined up concentrically with portion 22 of the tube, the chevrons being compressed by the projecting seam. The adaptor can then be driven home into the tube. Similarly the presence of chevrons 16 on portions 21 of tube 20 enables the tube 15 to be aligned with the upper portion 13 of adaptor 11 before it is driven down onto the adaptor.

The post 20 meets the requirements of the British Standard. If the post is hit by a motor vehicle it fractures across a line immediately above flange 14 and falls forwardly away from the colliding vehicle.

The invention also has the advantage that it permits the use of "snap" connectors in any electrical cabling that might extend along the post. Such a "snap" connector would be positioned to be adjacent the area of weakness in the adaptor so that, following an impact causing the adaptor to shear or bend, the connector would "snap" apart and the upper portion of the post would be electrically isolated from the mains supply.

CLAIMS:

1. A method for joining two members (21,22) having tubular end portions to provide a joined structure (20) that is required to extend substantially vertically above the ground characterised in that it comprises:

sinking a hollow sleeve first member (22) into the ground; securing the sleeve in the ground; driving an interference fit adaptor (1,11) part-way into the sleeve (22) to provide a portion (13) of the adaptor (1,11) extending upwardly of the sleeve (22); driving the hollow end (21) of a second member over the said upwardly extending portion (13) of the adaptor (1,11) whereby the ends of the members (21,22) are brought into substantially abutting relationship; the structural strength of the adaptor (1,11) being significantly lower than that of the second member (21) at least around a line adjacent the abutting ends of the said members thereby causing the adaptor (1,11) to bend or fracture along the said line when the second said members (21) is subjected to a heavy impact.

2. A method according to claim 1 characterised in that the said sleeve (21) is secured in the ground by concrete (23) and the upper end of the sleeve is at substantially ground level.

3. A method according to claim 1 or 2 characterised in that the said second member (21) is a tubular post and is used to support a road traffic sign.

4. An adaptor (1,11) when used in the method of any one of claims 1 to 3 characterised in that it comprises: a first portion (2,12) dimensioned to be an interference fit in the first said member (22) and a second portion (3,13) dimensioned to be an interference fit in the second said member (21), the adaptor (1,11) being formed from a material that is more malleable or is weaker, at least around a line lying between the abutting ends of the said members (21,22), than the material from which the said second member (21) is formed.

5. An adaptor according to claim 4 characterised in that it has the same cross-sectional shape as each of the said first (22) and second (21) members.

6. An adaptor according to claim 4 or 5 characterised in that it has an annular cross-section.

7. An adaptor according to any one of claims 4, 5, or 6 characterised in that it includes a flange (4,14) extending outwardly around the periphery thereof to ensure that a predetermined minimum length of adaptor extends into each said member.

8. An adaptor according to any one of claims 4 to 7 characterised in that the line of weakness is introduced by forming a groove around the periphery of the adaptor (1,11) the said groove being positioned to lie substantially

between the abutting ends of the said members (21,22) in the joined structure (20).

9. An adaptor according to any one of claims 4 to 7 characterised in that the line of weakness is introduced by forming a series of radially directed holes (7) being positioned to lie substantially between the abutting ends of the said the members (21,22) in the joined structure (20).

10. An adaptor according to claim 6 wherein the malleability or strength of the adaptor is predetermined by controlling the wall thickness thereof.

11. An adaptor according to any one of claims 4 to 10 characterised in that it is formed from a plastics or metallic material.

12. An adaptor according to claim 11 characterised in that the plastics material is polypropylene, polyvinyl-chloride or nylon.

13. An adaptor according to claim 11 characterised in that the metallic material is aluminium.

14. An adaptor according to any one of claims 1 to 12 characterised in that a portion of each end of the adaptor (1,11) includes a plurality of rows of chevrons (15,16) having the same outside diameter as the remainder of the adaptor to provide a lead-in portion.

15. A road traffic sign post (20) characterised in that it comprises two tubular members (21,22) joined by the method of claims 1, 2 and 3.

16. A road traffic sign post according to claim 15 characterised in that the tubular members (21,22) are formed of steel and are of circular cross-section.

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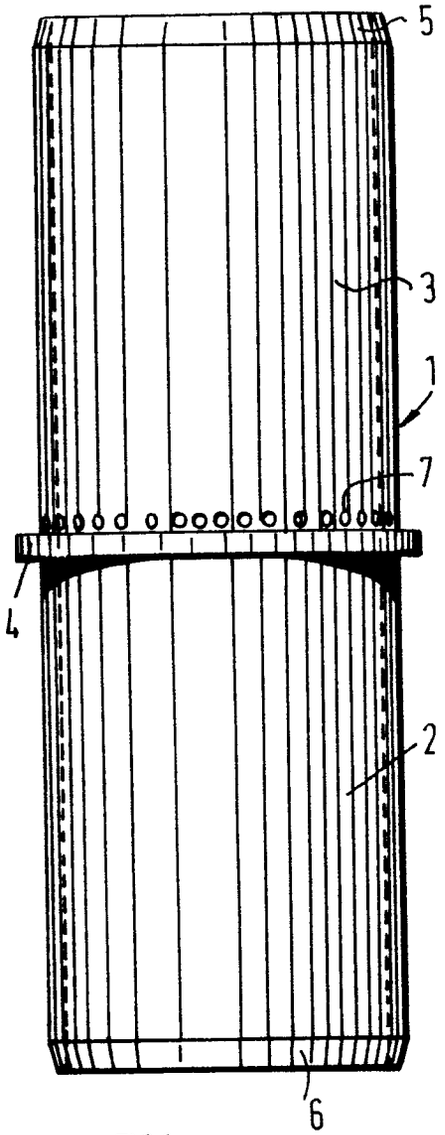

FIG.1.

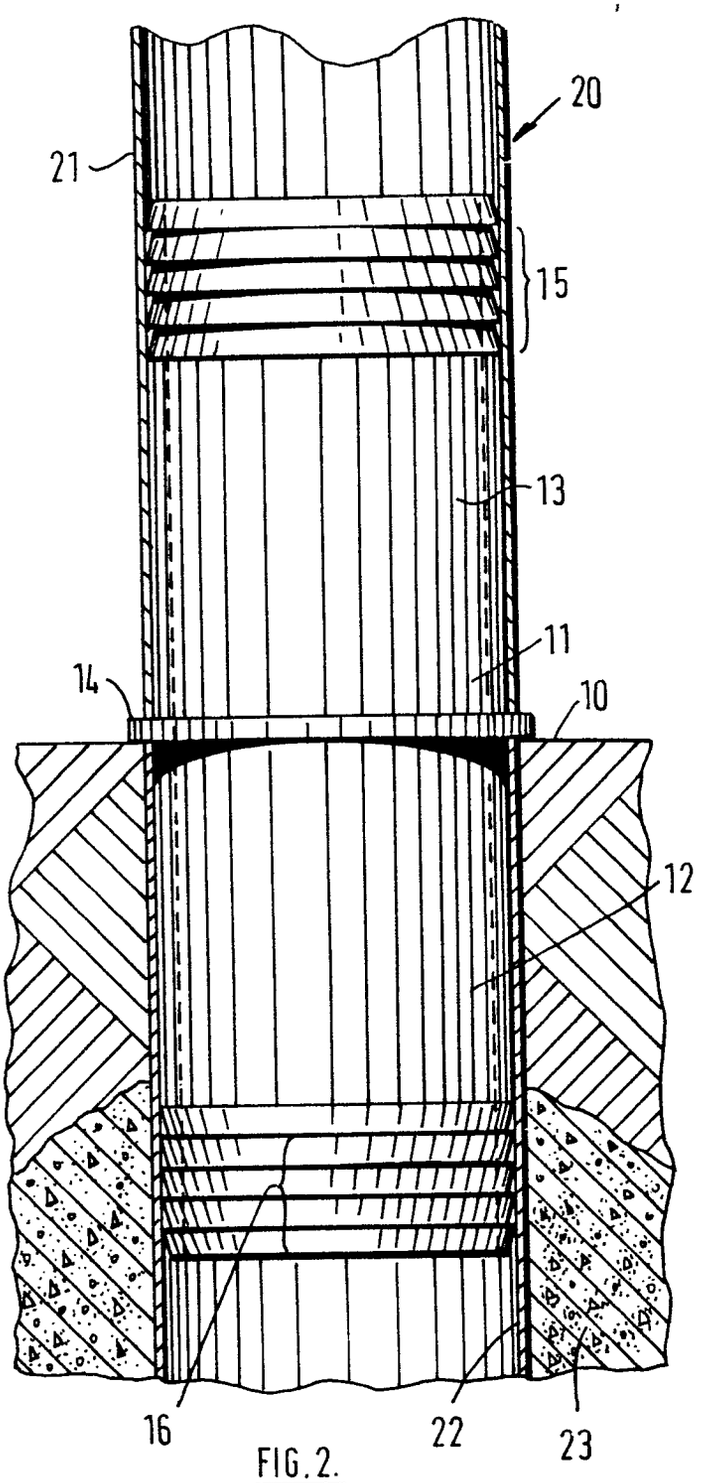

FIG.2.