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**Natelli, Jr.**

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(45) **Date of Patent:** **Sep. 4, 2001**

(54) **REINFORCED POLE WITH APPARATUS AND METHOD FOR ANCHORING**

5,878,540 3/1999 Morstein .  
6,098,361 \* 8/2000 Roten et al. .... 52/298

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20842

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885158 11/1971 (CA) .  
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(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

\* cited by examiner

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(21) Appl. No.: **09/404,579**

(22) Filed: **Sep. 24, 1999**

(57) **ABSTRACT**

**Related U.S. Application Data**

(63) Continuation-in-part of application No. 09/317,830, filed on May 25, 1999.

(51) **Int. Cl.**<sup>7</sup> ..... **E04C 3/36**

(52) **U.S. Cl.** ..... **52/730.1; 52/736.1; 52/720.3; 52/736.3; 52/745.21; 52/740.4; 52/170**

(58) **Field of Search** ..... 52/170, 297, 296, 52/730.1, 730.4, 736.3, 736.4, 745.18, 745.21, 740.1–740.5, 720.3, 298; 109/82, 83, 85

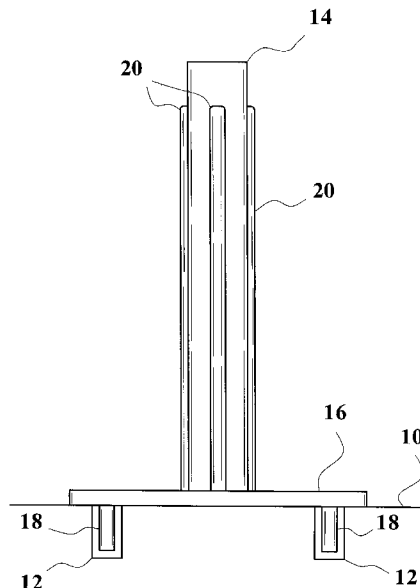
A pole, such as for a parking meter, that is reinforced by a hardening compound applied to its surface, preferably in vertical strips, to prevent theft, and a method of anchoring the pole or other upright object. The hardening compound is preferably a solder that is applied to the external surface of the pole by welding. Once it cools, this hardening compound cannot be cut with an ordinary hacksaw. For esthetic purposes, and to prevent rust to the pole, a PVC pipe with a slightly greater diameter than the pole is placed over and around the pole. In a preferred embodiment, the pole is welded to a base plate, with hollow metal cylinders welded to and extending from an opposite surface of the plate. Holes are drilled (or otherwise formed) in a concrete (or other solid) surface, epoxy is inserted into the holes, the metal cylinders are inserted into the holes, and when the epoxy hardens the cylinders and base plate are bonded to the concrete. The base plate and cylinders can also be used to anchor other upright objects to a concrete surface. In the preferred embodiment, circular transverse holes are made in the top of the pole using a plasma cutter, and expander jaws are then welded to the interior of the pole, to securely attach the head of the parking meter to the pole.

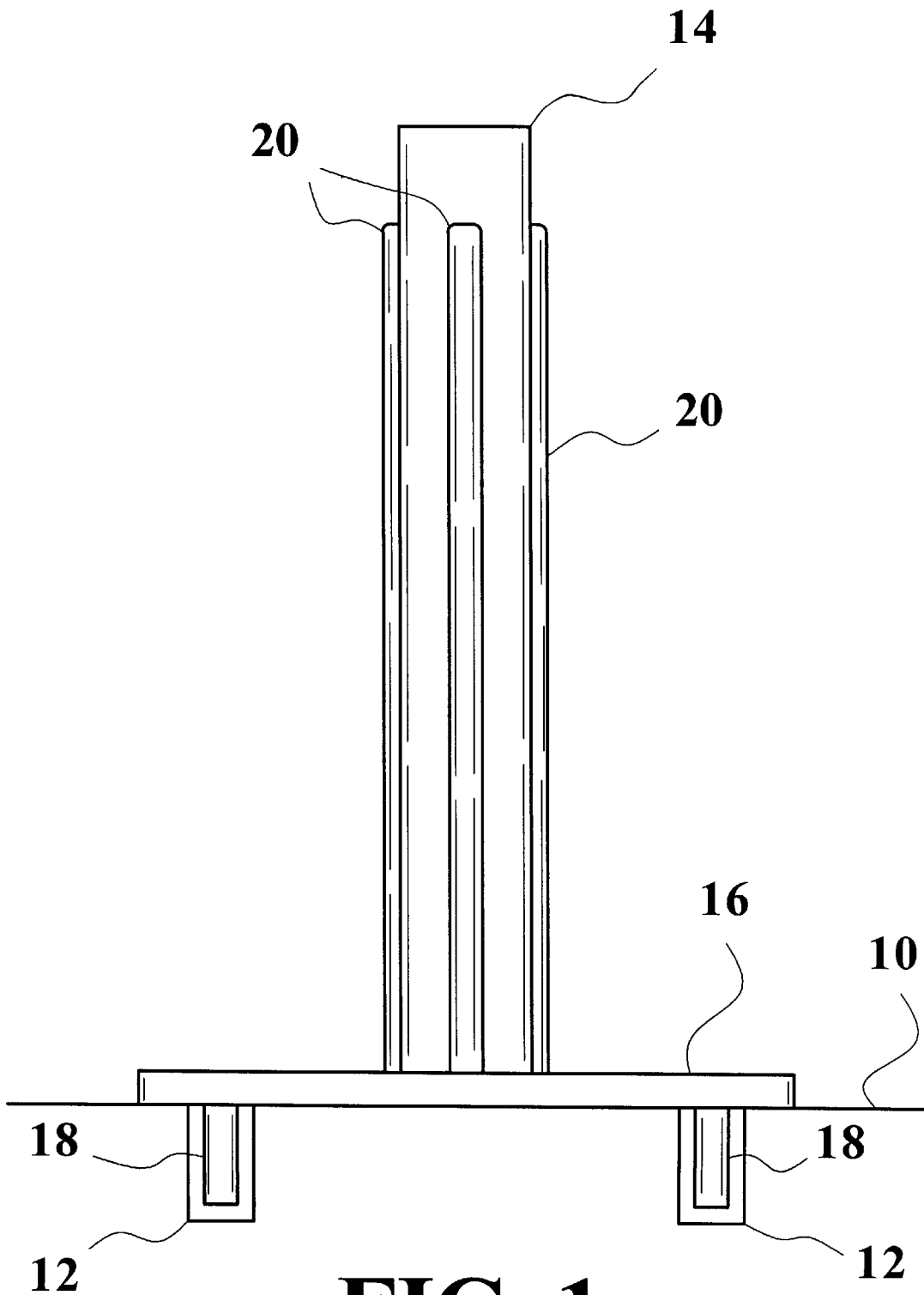
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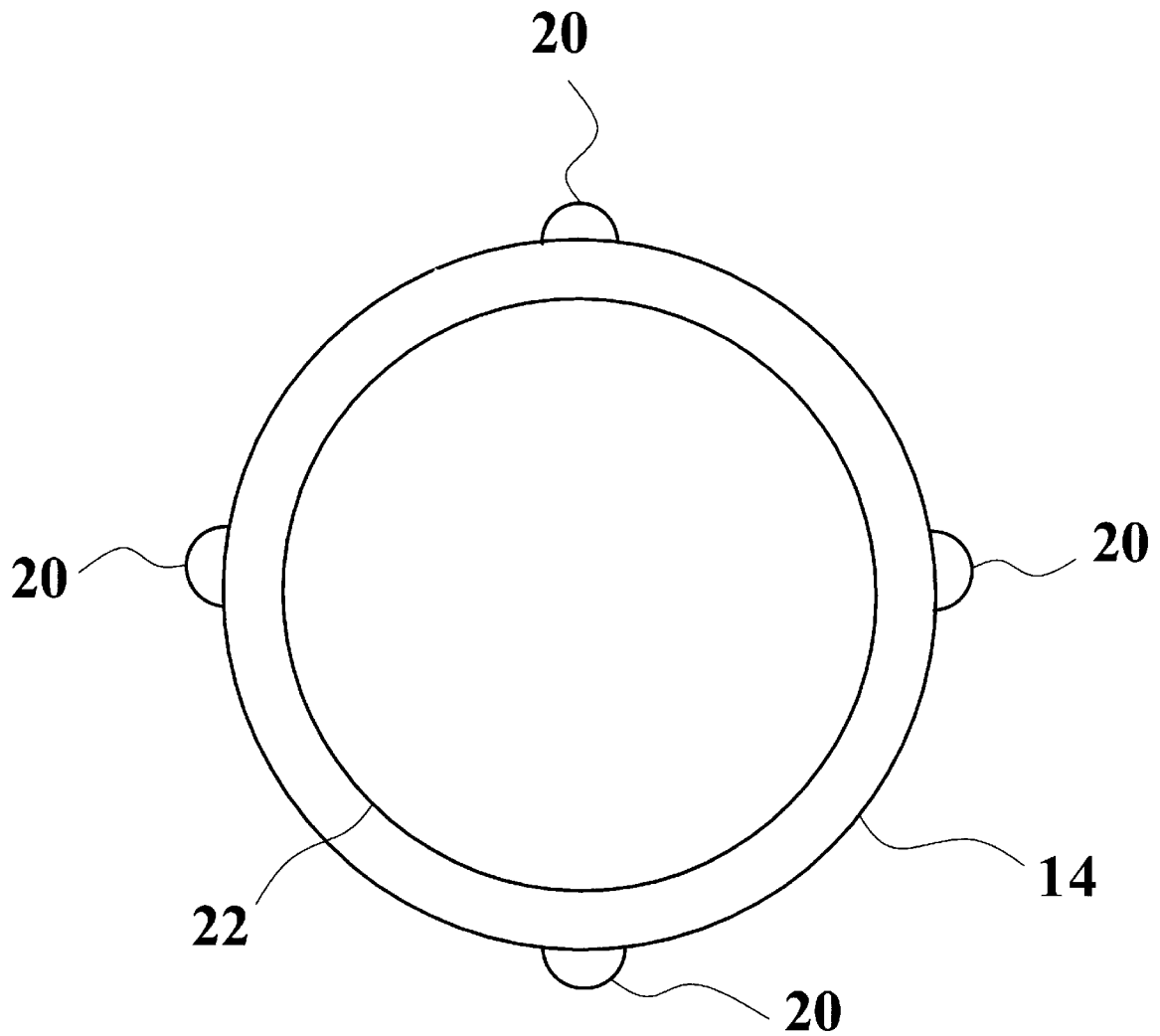
265,106 9/1882 Lee .  
D. 396,655 \* 8/1998 Anderson ..... D10/42  
1,842,547 1/1932 Hammel .  
3,349,531 10/1967 Watson .  
3,972,529 8/1976 McNeil .  
4,798,273 \* 1/1989 Ward II ..... 194/350  
4,986,406 1/1991 Winsor .  
5,666,774 9/1997 Commins .  
5,803,223 9/1998 Lucas .  
5,806,262 9/1998 Nagle .  
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**12 Claims, 12 Drawing Sheets**

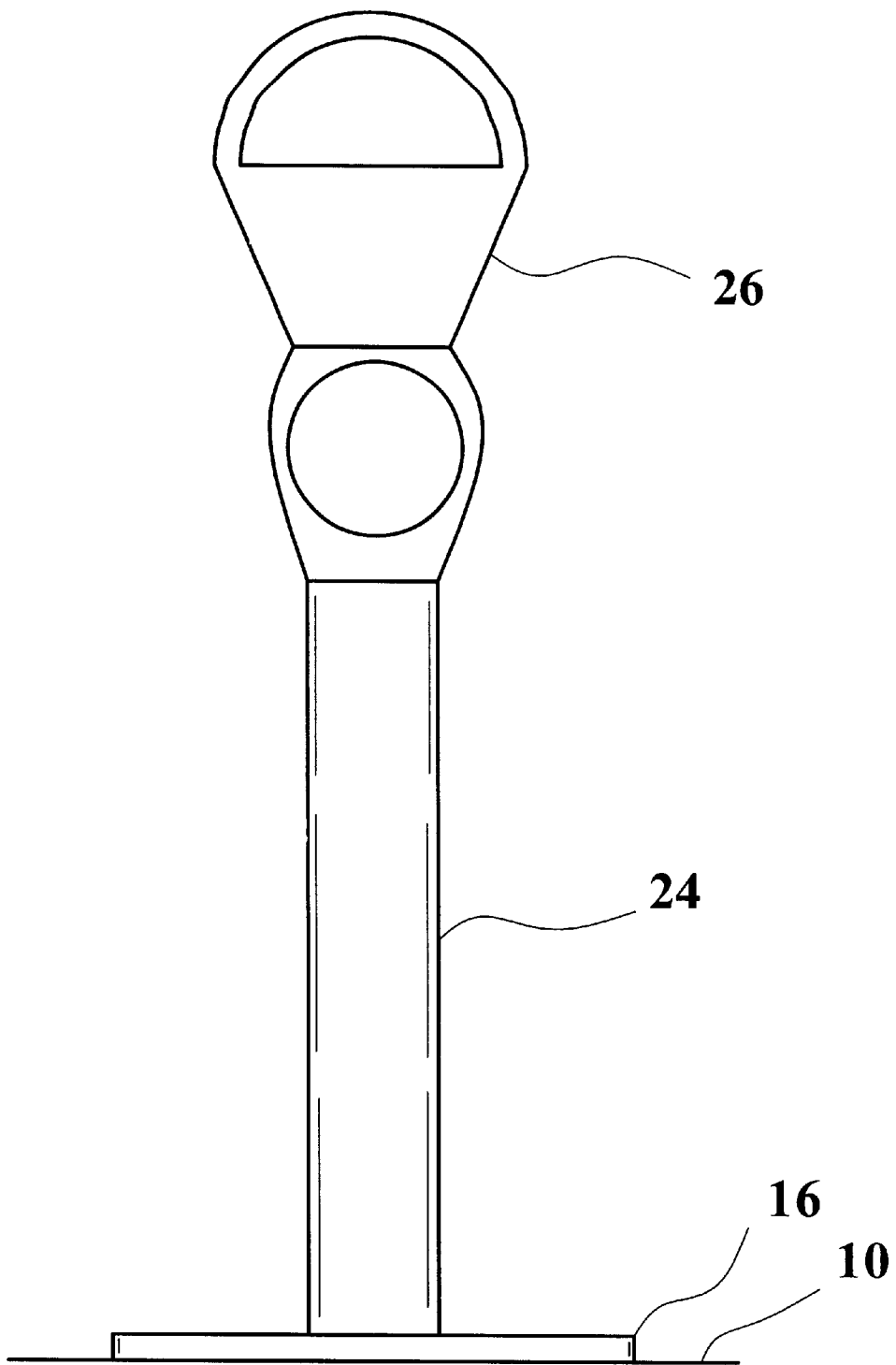




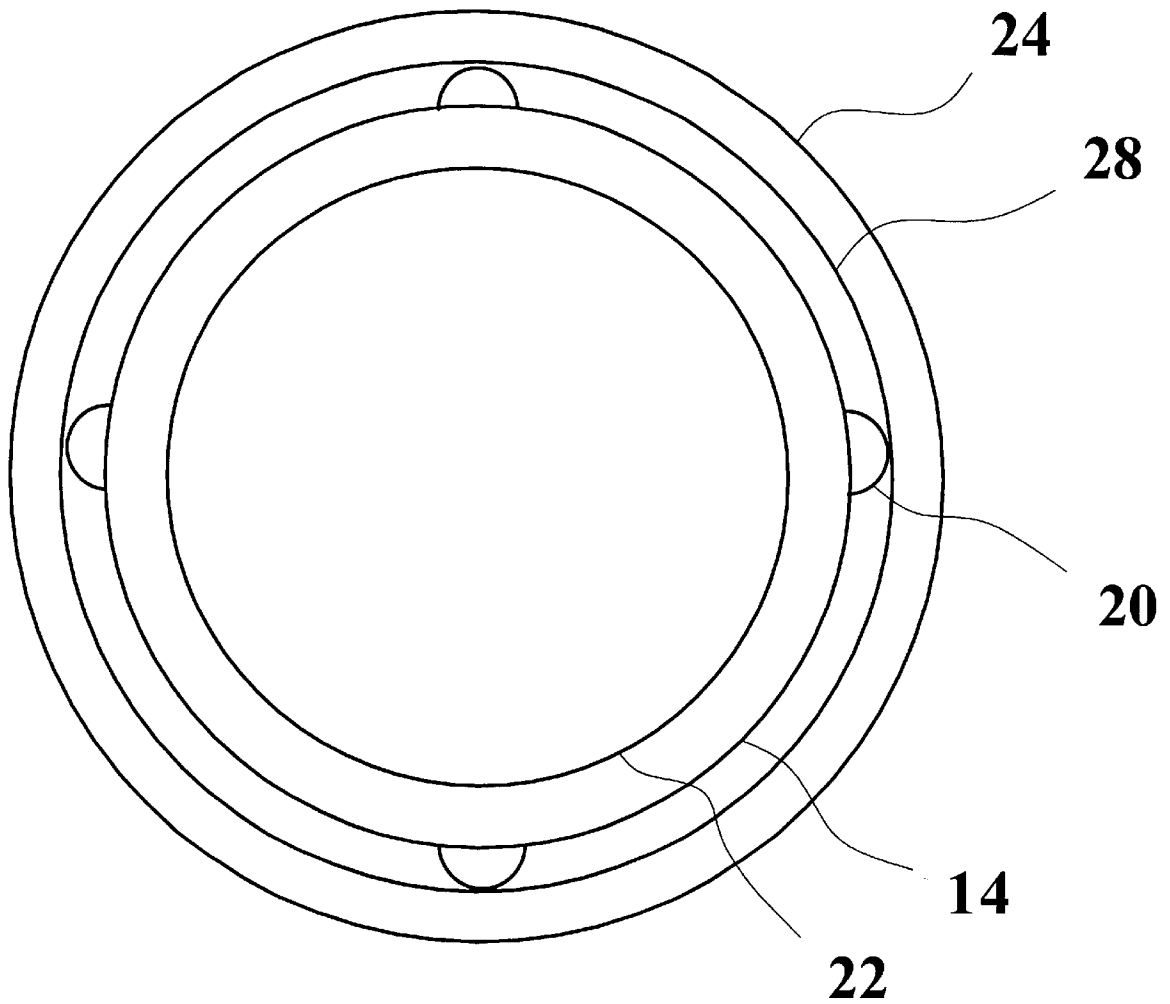
**FIG. 1**



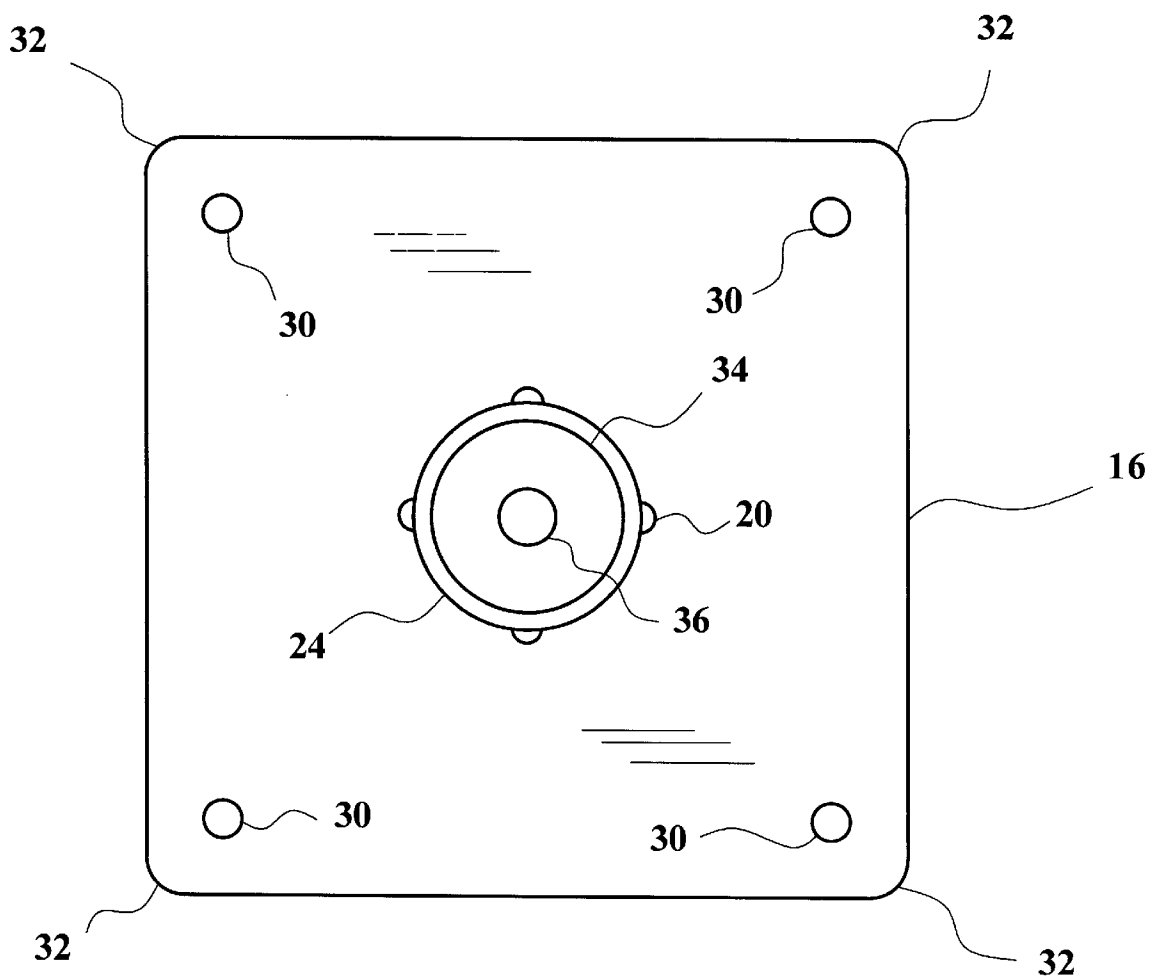
**FIG. 2**



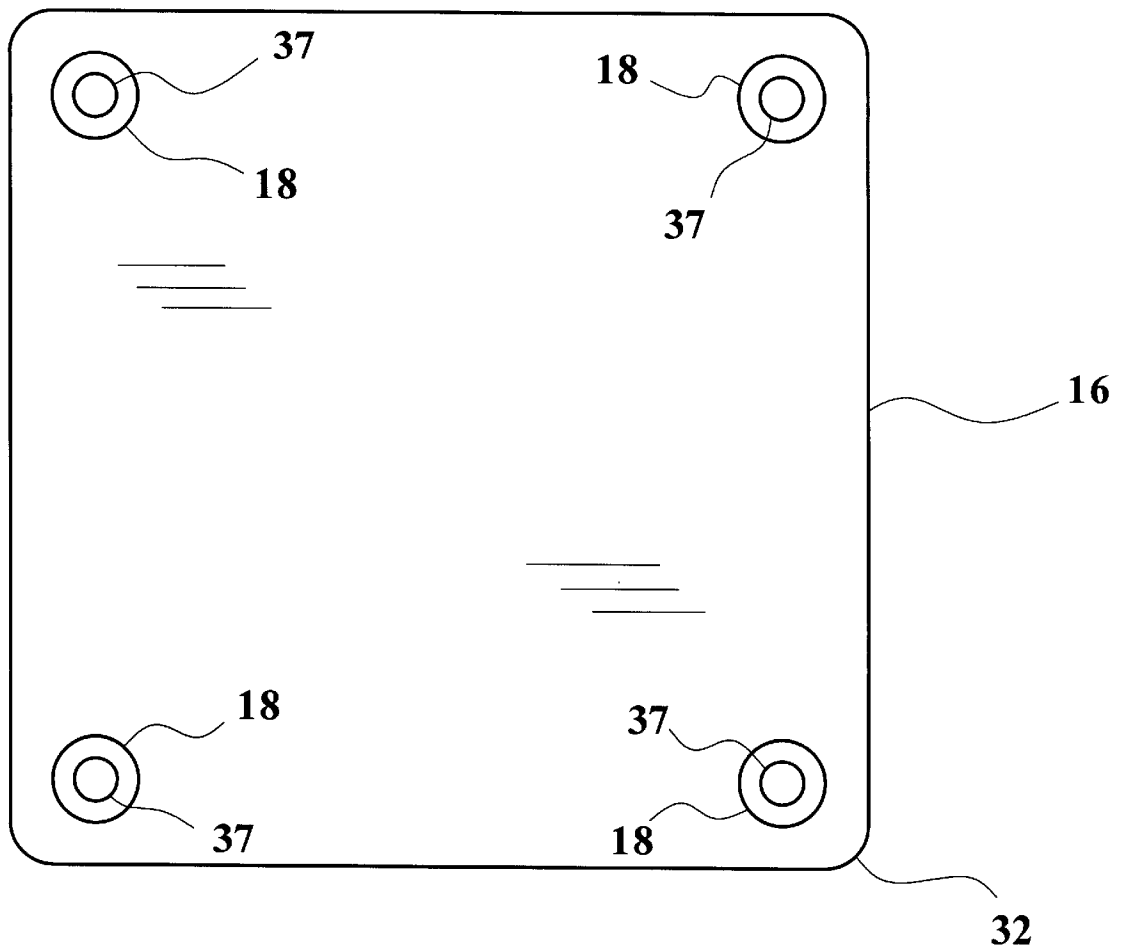
**FIG. 3**



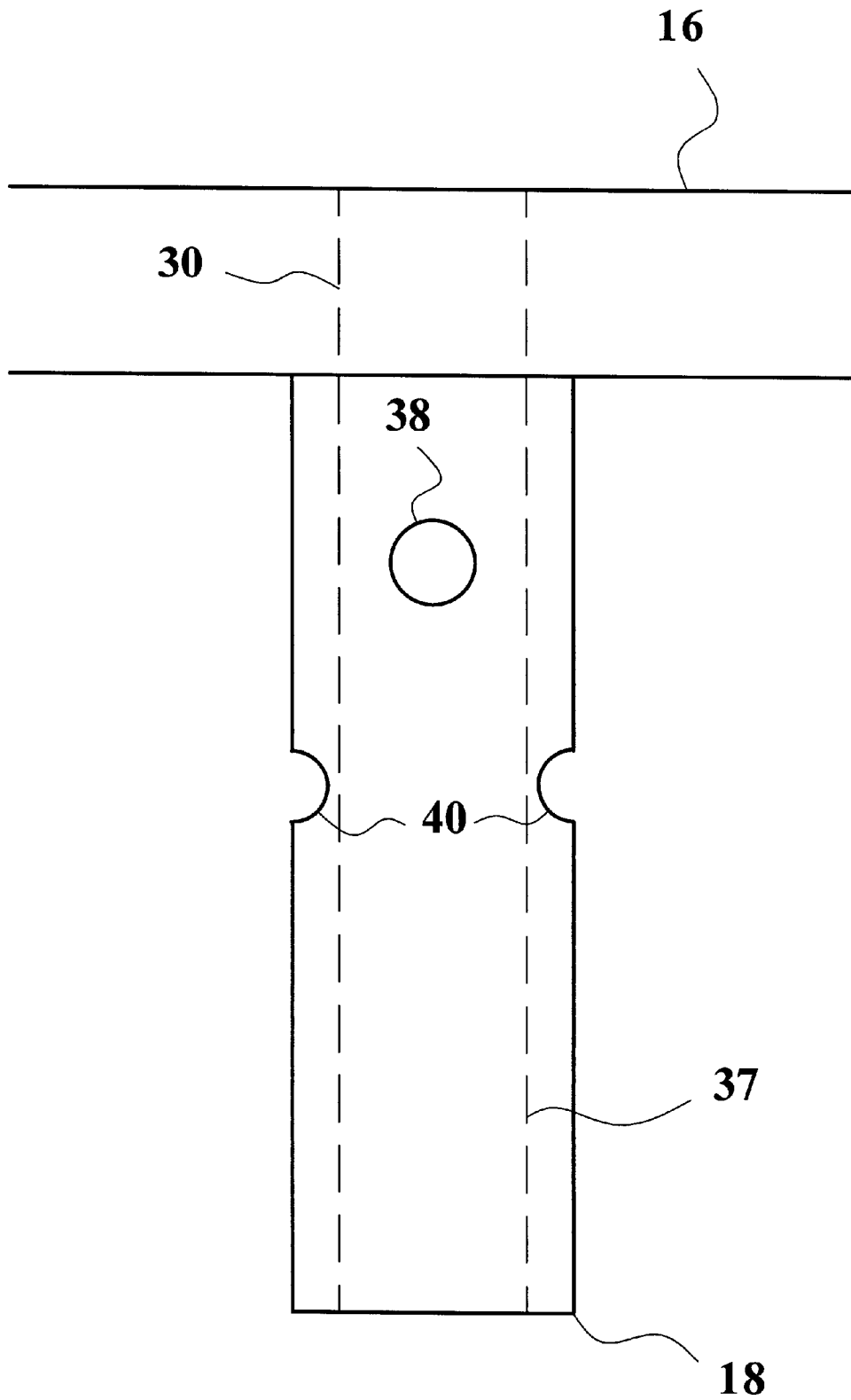
**FIG. 4**



**FIG. 5**

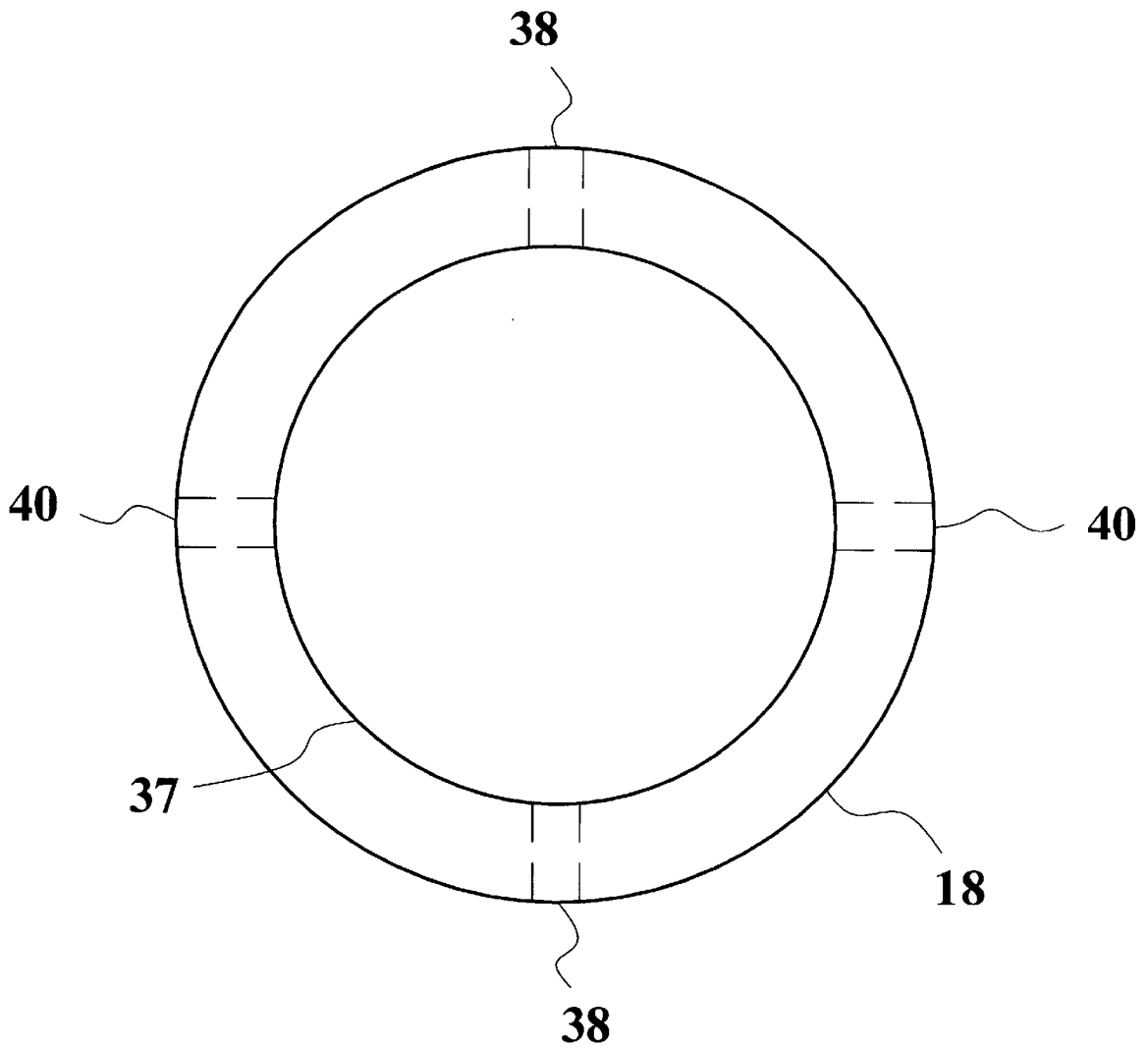


**FIG. 6**



**FIG. 7**





**FIG. 8**

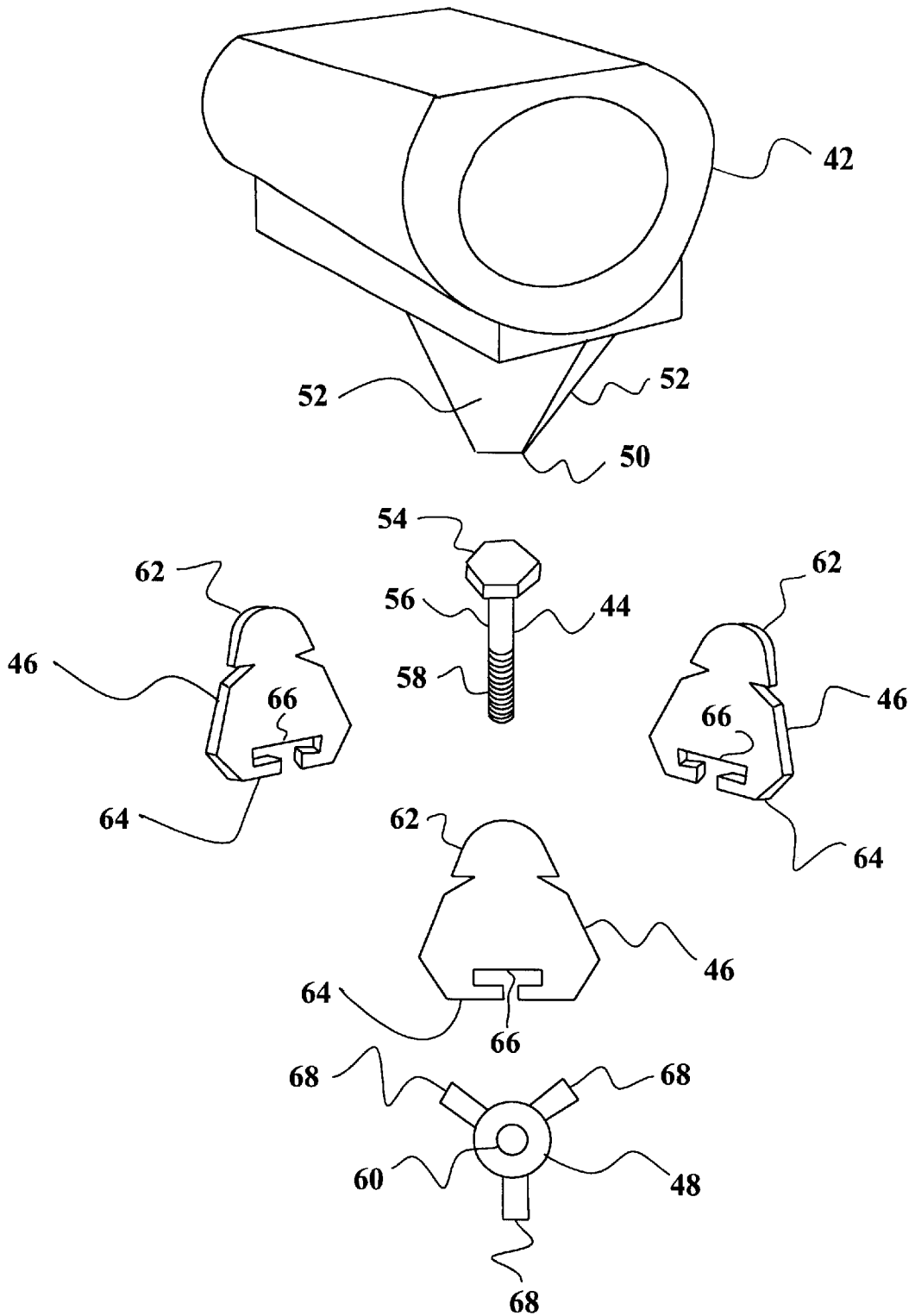
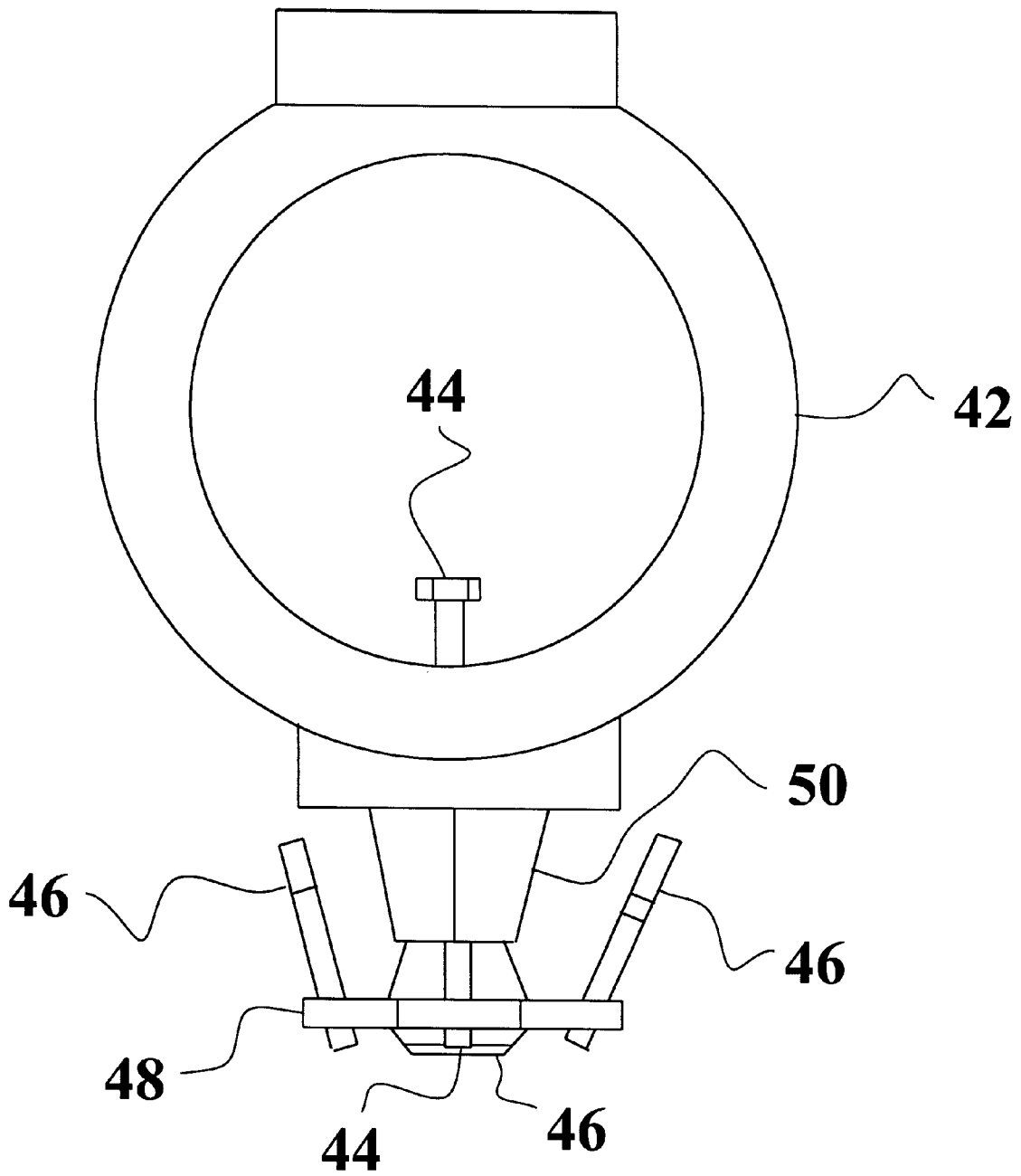


FIG. 9



**FIG. 10**

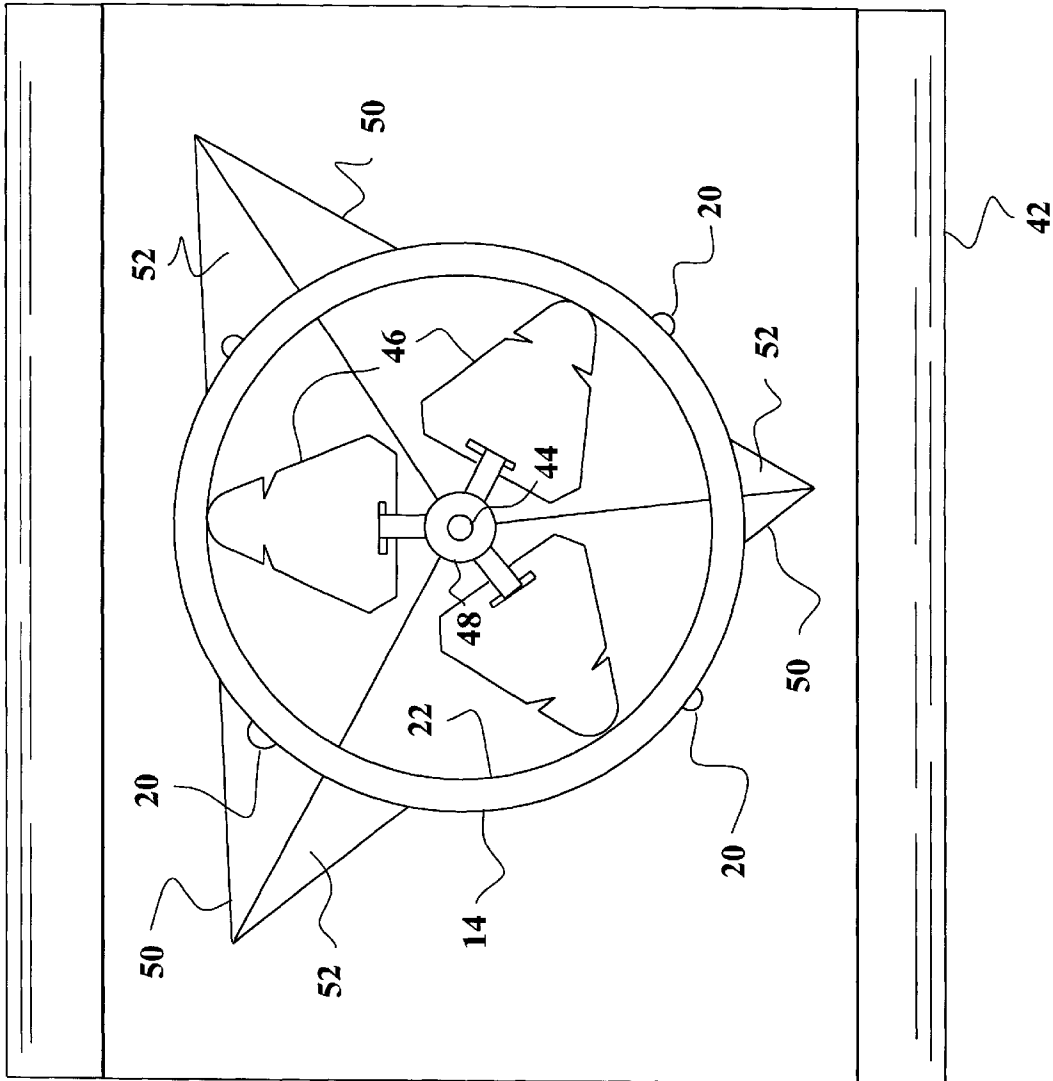


FIG. 11

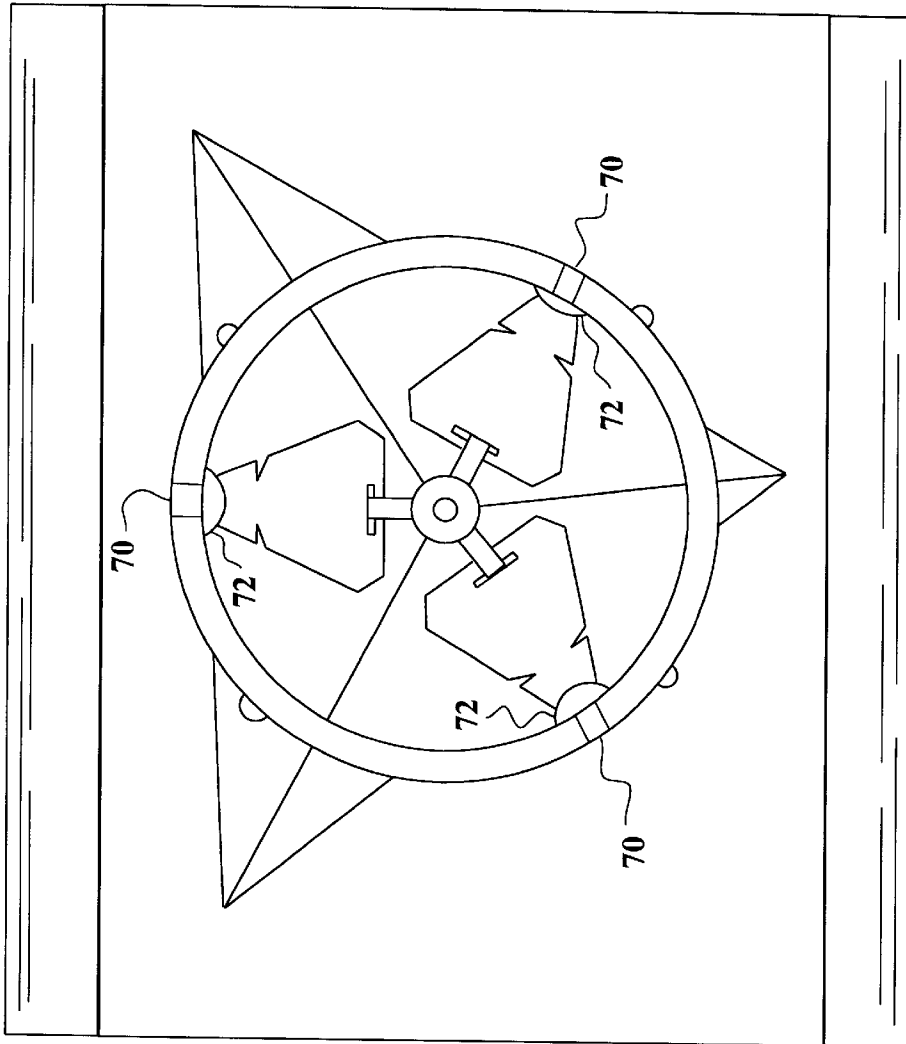


FIG. 12

## REINFORCED POLE WITH APPARATUS AND METHOD FOR ANCHORING

### CROSS REFERENCE TO RELATED APPLICATION

This application is a Continuation-In-Part of Utility patent application Ser. No. 09/317,830, filed May 25, 1999.

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

The present invention relates to poles, such as for parking meters, that are reinforced to prevent theft, and an apparatus and method for anchoring the parking meter poles in concrete.

#### 2. Description of the Prior Art

Theft of coins from parking meters has become a serious problem in many cities. Thieves have gotten around previous anti-theft devices by sawing through the pole holding the meter, and taking the meter's head, coins and all, with them. In some cities, there have been large numbers of "decapitated" parking meters.

U.S. Pat. No. 265,106, issued on Sep. 26, 1882, to Robert Bristow Lee, discloses a device for forming lattice pillars, in which wire is wrapped around a cylindrical object in a spiral pattern. The instant invention is distinguishable, in that the hard-facing is welded to the pole in vertical strips.

U.S. Pat. No. 1,842,547, issued on Jan. 26, 1932, to Victor F. Hammel, discloses a cylindrical structure, in which a post or pole is supported by helically arranged bars or rods. Again, the instant invention is distinguishable, in that the hard-facing is welded to the pole in vertical strips.

U.S. Pat. No. 3,349,531, issued on Oct. 31, 1967, to George H. Watson, discloses a frangible connector assembly for stanchions, poles, and standards, which may be used in parking meter poles, in which an anchoring bolt is embedded in concrete. The instant invention is distinguishable, in that in it the anchoring tubes are attached to the concrete by epoxy.

U.S. Pat. No. 3,972,529, issued on Aug. 3, 1976, to Walter F. McNeil, discloses reinforced tubular metallic materials, having recesses cut along their outer surfaces, into which graphite fiber strips are inserted. The instant invention is distinguishable, in that in it a hardening compound, rather than graphite fiber, is applied over the surface of the parking meter poles, rather than in recesses.

U.S. Pat. No. 4,986,406, issued on Jan. 22, 1991, to B. Drew Winsor, discloses an anti-theft parking meter anchoring device, for anchoring a parking meter head to the top of a support post, by means of a locking pin that passes through transverse holes in the bottom of the parking meter head and the top of the support post. The instant invention is distinguishable, as it uses welding to secure the parking meter head on the support post, and does not require a locking pin.

U.S. Pat. No. 5,666,774, issued on Sep. 16, 1997, to Alfred D. Commins, discloses an adjustable support system for joining structural members, in which a threaded rod is secured in concrete by grout or epoxy. The instant invention is distinguishable, in that in it tubes or rods are welded to the base plate, need not be threaded, and in a preferred embodiment have hollow interiors to allow more effective bonding to the hardened epoxy.

U.S. Pat. No. 5,803,228, issued on Sep. 8, 1998, to Tom Lucas, discloses parking meter assemblies designed to pre-

vent theft of coins in the parking meters, by means of reinforced steel sheets around the coil receptacle. The instant invention is distinguishable, in that it reinforces the pole to which the head of the parking meter is attached, and strengthens the connection of the pole to the head by welding.

U.S. Pat. No. 5,806,262, issued on Sep. 15, 1998, to Gordon A. Nagle, discloses a post and a method of emplacing the post in concrete. The instant invention is distinguishable, in that it uses epoxy to bind the metal cylinders in the base plate to a concrete surface.

U.S. Pat. No. 5,826,387, issued on Oct. 27, 1998, to Allan P. Henderson and Miller B. Patrick, discloses a pier foundation under high unit compression, in which metal rods are embedded in concrete, but without the use of epoxy, as in the instant invention.

U.S. Pat. No. 5,878,540, issued on Mar. 9, 1999, to Jerome Neil Morstein, discloses a utility pole base pan with drain, involving the embedding of metal bolts in concrete, without the use of epoxy, as in the instant invention.

Canadian Patent No. 885,158, issued on Nov. 9, 1971, to Joseph D. George, discloses a matter of installing poles in a concrete surface, in which grout is used rather than epoxy.

French Patent No. 2,624,903, published on Jun. 23, 1989, to Louis Daniel Champy and Christian Biaille, discloses a reinforced concrete base unit for a one-piece pylon, again involving the embedding of metal in concrete without the use of epoxy.

None of the above inventions and patents, taken either singly or in combination, will be seen to describe the instant invention as claimed.

### SUMMARY OF THE INVENTION

The present invention is a pole, such as for a parking meter, that is reinforced by a hardening compound applied to its surface, preferably in vertical strips, and a method of anchoring the pole. The hardening compound is preferably a solder that is applied to the external surface of the pole by welding. Once it cools, this hardening compound cannot be cut with an ordinary hacksaw. For esthetic purposes, and to prevent rust to the pole, a PVC pipe with a slightly greater diameter than the pole is placed over and around the pole. In the preferred embodiment, the pole is welded to a metal plate, with hollow metal cylinders welded to and extending from an opposite surface of the plate. Holes are drilled in a concrete surface, epoxy is inserted into the holes, and the metal cylinders are inserted into the holes before the epoxy hardens. This makes it possible for the pole to be securely attached to the concrete surface, without the need for digging several feet below the surface. Furthermore, in the preferred embodiment, circular transverse holes are made in the top of the pole using a plasma cutter, and expander jaws are then welded to the interior of the pole, to securely attach the head of the parking meter to the pole.

Accordingly, it is a principal object of the invention to prevent parking meter theft.

It is another object of the invention to prevent theft of any object attached to a pole.

It is a further object of the invention to provide a convenient means for attaching parking meters to a concrete surface.

Still another object of the invention is to provide a means for securely attaching any upright object to a concrete surface.

Still a further object of the invention is to provide a means for more securely attaching the head of a parking meter to its supporting pole.

It is an object of the invention to provide improved elements and arrangements thereof in an apparatus for the purposes described which is inexpensive, dependable and fully effective in accomplishing its intended purposes.

These and other objects of the present invention will become readily apparent upon further review of the following specification and drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevational view of the preferred embodiment of the invention, before the PVC pipe and parking meter head are attached.

FIG. 2 top plan view of the steel pipe reinforced by the hard-facing.

FIG. 3 is a front elevational view of the preferred embodiment of the invention, after the PVC pipe and parking meter head have been attached.

FIG. 4 is a top plan view of the reinforced steel pipe surrounded by the PVC pipe.

FIG. 5 is a top plan view of the preferred embodiment of the invention, before the PVC pipe and parking meter head are attached.

FIG. 6 is a bottom plan view of the preferred embodiment of the invention.

FIG. 7 is a detail view of one of the tubes attached to the base plate.

FIG. 8 is a bottom plan view of one of the tubes attached to the base plate.

FIG. 9 is a perspective view of a lower housing of the parking meter head a bolt, three expander jaws, and an expander nut, before they are assembled.

FIG. 10 is a front elevational view of the lower housing of the parking meter head, a bolt, three expander jaws, and an expander nut, after they have been assembled.

FIG. 11. is a bottom plan view, looking upwards from a horizontal cross-section of the pole, showing how the expander jaws are positioned when they have been fully expanded by turning the bolt.

FIG. 12 is a bottom plan view, showing the holes made through the pole, and the welds between the top portions of the expander jaws and the interior of the pole.

Similar reference characters denote corresponding features consistently throughout the attached drawings.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention is designed primarily to prevent theft from parking meters, though it may also have other applications.

FIG. 1 is a front elevational view of the preferred embodiment of the invention, before the polyvinyl chloride ("PVC") pipe and parking meter head are attached. The invention is retained on a concrete surface 10, into which holes 12 have been drilled. (Alternatively, the invention could be retained on another solid surface, such as rock or brick, or the holes could be formed by another method, such as the use of molds when the concrete is first poured.) A pipe 14 is welded to the top of a base plate 16. Tubes 18 are welded to the bottom of the base plate. Preferably, the pipe, base plate and tubes are all made of mild steel. (Alternatively, bolts or other anchoring members could be used in place of tubes, and other means of bonding or attachment could be substituted for welding.) A hard-facing compound is applied to the surface of the pipe, preferably in

vertical strips by arc welding. The hard-facing compound is preferably an alloy containing carbon, chromium, molybdenum, manganese, silicon, boron and vanadium, having a Rockwell hardness number of at least 60. (Such hard-facing compounds are commercially available.) The strips of hard-facing should run from the bottom end of the pipe to almost the top of the pipe, but should end a short distance from the top to allow the parking meter head to be inserted over the pipe. The strips of hard-facing are difficult to cut through without the use of conspicuous special equipment that would attract the attention of authorities, thus preventing theft of coins in the parking meter by cutting through the pipe and taking the head to a private location where the coins can be removed.

FIG. 2 is a top plan view of the steel pipe 14 reinforced by the strips of hard-facing 20, showing the pipes hollow interior 22. Preferably, there should be at least four evenly spaced strips, to prevent a thief from being able to cut through a large angle of the pipe.

FIG. 3 is a front elevation view of the preferred embodiment of the invention, after the PVC pipe 24 and parking meter head 26 have been attached. Alternatively, two parking meter heads may be attached to the same pole (not shown in the drawings). The purpose of the PVC pipe is to improve the appearance of the parking meter, to prevent damage from chains used with bicycle locks, and to provide a maintenance-free surface. Alternatively, a pipe made of any other suitable waterproof substance could be used.

FIG. 4 is a top plan view, showing the metal pipe 14 with its hollow interior 22 and the strips of hard-facing 20, surrounded by the PVC pipe 24. Preferably, the interior surface of the PVC pipe should just touch the hard-facing, leaving a small gap 28 between the metal pipe and the PVC pipe. Optionally, one of the following three methods may be used to bond the interior surface of the PVC pipe to the hard-facing: (1) the metal pipe with the hard-facing is heated in an oven or by a blow torch, before placing the PVC pipe over it; (2) the PVC pipe is placed over the metal pipe before the hard-facing has cooled; or (3) a solvent is applied to the interior surface of the PVC pipe before it is placed over the metal pipe and the hard-facing.

FIG. 5 is a top plan view of the preferred embodiment of the invention, before the PVC pipe and parking meter head are attached, showing four holes 30 that are drilled through the base plate 16 above the centers of the tubes welded to the other side of the plate. Also shown is a metal disk 34 that is welded inside the metal pipe near its top end. The disk has a threaded hole 36 through which a bolt (not shown in the drawings) is inserted to retain the parking meter head on the pole. Preferably, the corners 32 of the base plate should be rounded.

FIG. 6 is a bottom plan view of the preferred embodiment of the invention, showing the hollow interiors 37 of the tubes 18 welded to the base plate 16. Preferably, one tube should be adjacent to each corner of the base plate. Preferably, the base plate should be square, but rectangular, triangular, polygonal, circular and other shapes of base plates are within the scope of the invention.

FIG. 7 is a detail view of one of the tubes 18 attached to the base plate 16. The hollow interior 37 of the tube and the hole 30 through the base plate are indicated by broken lines. Also shown are transverse holes 38 and 40 drilled through the tube, at right angles to the axis of the tube and to each other. FIG. 8 is a bottom plan view of one of the tubes attached to the base plate, with the transverse holes 38 and 40 drilled through the tube at right angles indicated by broken lines.

When setting up the parking meter, the binder and catalyst of epoxy glue are mixed and then injected into the holes in the concrete (or other solid surface), and the tubes (or other anchoring elements) are then inserted into the holes. The hollow interiors and transverse holes of the tubes, and the holes in the base plate, serve to increase the surface area to which the epoxy can bind, thus increasing the strength of the bond between the metal and concrete. The holes in the base plate also allow air to escape from the tubes. The epoxy should be smoothed off at the tops of the holes in the base plate before it hardens, so that the epoxy filled holes will not be readily apparent. This method makes it possible to securely attach a parking meter (or other upright object, such as a stop sign or lamp post) to concrete, without having to drill several feet down (which could interfere with utility lines). Another advantage of this method is that parking meters have a low enough center of gravity that other means of support are not necessary while the epoxy hardens. With larger objects, such as lamp posts, external support may be necessary while the epoxy hardens.

In the preferred embodiment of the invention, the attachment of the head of the parking meter to the pole is reinforced by welding. FIGS. 9 through 11 illustrate the way that parking meter heads are generally retained on their supporting poles in parking meters currently in use.

FIG. 9 is a perspective view of a lower housing 42 of the parking meter head, a bolt 44, three expander jaws 46, and an expander nut 48, before they are assembled. An upper housing and cap assembly (not shown in the drawings) are attached to the lower housing to complete the parking meter head. The lower housing has a bottom portion 50 with preferably three outward sloping surfaces 52 (only two of which are visible in FIG. 9). The bolt has a head 54 and a shaft 56 with male threading 58 that can engage female threading (not shown in the drawings) in the hole 60 in the expander nut. The expander jaws are preferably flat metal objects with narrow tops 62 and wide bottoms 64, with notches 66 in the bottoms. The expander nut has one projection 68 for each expander jaw. Parking meters currently on the market have three expander jaws; but this aspect of the invention can apply to parking meters (or other objects with similar connecting features) with any number of expander jaws. The number of outwardly sloping surfaces on the bottom portion of the lower housing should preferably be equal to the number of jaws.

FIG. 10 is a front elevational view of the lower housing, a bolt, three expander jaws, and an expander nut, after they have been assembled, but before the jaws have been expanded. The expander jaws are attached to the expander nut by fitting the projections of the expander nut into the notches of each of the expander jaws. The bolt is then inserted through a hole (not shown in the drawings) in the bottom center of the lower housing, brought in contact with the expander nut, and turned so that the male threads on the bolt engage the female threads in the hole of the expander nut, thus retaining the expander nut on the bolt. The lower housing, with the expander jaws which are retained on the expander nut which is retained by the bolt on the housing, is then placed over the top of the pole. Then the bolt is turned again to expand the jaws.

FIG. 11 is a bottom plan view, looking upwards from a horizontal cross-section of the steel pipe or other pole, showing how the expander jaws are positioned when they have been fully expanded by turning the bolt. As the bolt is turned, the expander nut and the jaws attached to it are pulled toward the bottom portion of the lower housing, thus bringing the jaws in contact with its outwardly sloping

surfaces, so that the tops of the jaws are pushed outward until they contact the interior surface of the pole. The bolt is then tightened so that the jaws are firmly wedged between the interior surface 22 of the pole 14 and the outwardly sloping surfaces of the bottom portion of the lower housing. In parking meters currently in use, friction between the jaws and these surfaces is usually the only means by which the head is retained on the pole. Thus, it is easy for thieves to pry the head off the pole.

FIG. 12 is a bottom plan view, showing the holes 70 made through the pole, and the welds 72 between the top portions of the expander jaws and the interior of the pole. Preferably, a plasma-arc cutter is used to make the holes. (Plasma-arc cutters and welders use gasses that are superheated until they are in a plasma state, where electrons are stripped off nuclei of atoms in the gasses, so that normally insulating gasses become conductors of electricity. Plasma-arc cutters can form holes in metal more quickly and accurately than conventional metal cutting torches.

The same plasma-arc equipment may be used for both cutting and welding metal.) After a hole is made in the pipe near an expander jaw, a plasma-arc welder, or a MIG (Metal Inert Gas) welder or any other suitable welding equipment, may be used to weld the top of the jaw to the interior surface of the pipe. The jaw may also be welded to the bottom of the lower housing. Metal in a welding wire may be melted by the welder to complete the weld. The hole may be then be filled in with more metal from the welding wire or solder. Of course, once the PVC pipe is placed over the pole, the holes will not be visible anyway.

It is to be understood that the present invention is not limited to the sole embodiment described above, nor is it limited to parking meters, but also encompasses other objects to which any aspect of the invention could apply, and any and all embodiments within the scope of the following claims.

I claim:

1. a reinforced pole, comprising:

a metal pole;

a hard-facing applied in strips to a surface of the pole, said hard-facing having a hardness greater than that of the pole itself, and said hard-facing containing metallic elements;

a base plate resting on a ground surface, said base plate having an upper surface on which the pole is retained; and

a plurality of anchoring members that are retained on a lower surface of the base plate.

2. The reinforced pole according to claim 1, wherein:

the base plate and the anchoring members are made of metal; and

the pole and anchoring members are welded to the base plate.

3. The reinforced pole according to claim 2, wherein the ground surface is concrete, holes are drilled into the concrete, and the anchoring members are inserted into the holes.

4. The reinforced pole according to claim 3, wherein the anchoring members are retained in the holes by epoxy.

5. The reinforced pole according to claim 4, wherein the anchoring members are tubes with hollow interiors.

6. The reinforced pole according to claim 5 wherein there are holes in sides of the anchoring members, said holes passing from an exterior surface of the anchoring member to its hollow interior.

7. A method of permanently securing a structure to a hollow pole, comprising the steps of:



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attaching expander jaws to an expander nut by means of projections on the expander nut that fit into notches in the expander jaws;  
 inserting a bolt through a hole in a structure;  
 bringing the bolt into contact with the expander nut, and turning the bolt so that male threads on the bolt engage female threads in the expander nut, thereby retaining the expander nut on the bolt;  
 placing the structure, with the bolt, expander nut and expander jaws, on an open end of the pole;  
 turning the bolt again, thereby pulling the expander nut and the expander jaws attached to it towards the structure, thus bringing the expander jaws into contact with outwardly sloping surfaces of the structure, so that the expander jaws are pushed outward until they contact an interior surface of the pole; and  
 welding at least one expander jaw to the interior surface of the pole.  
**8.** A method of permanently securing a structure to a hollow pole according to claim 7, wherein, before an expander jaw is welded to the interior surface of the pole, at least one transverse hole is made in the pole adjacent to the

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expander jaw, whereby the welding may be performed using welding equipment that is exterior to the pole.  
**9.** A method of permanently securing a structure to a hollow pole according to claim 8, wherein the structure is part of a parking meter head.  
**10.** A method of permanently securing a structure to a hollow pole according to claim 9, wherein the transverse hole is made using a plasma-arc cutter.  
**11.** A method of permanently securing a structure to a hollow pole according to claim 10, wherein a transverse hole is made adjacent to each expander jaw, and each expander jaw is welded to an interior surface of the parking meter.  
**12.** A parking meter, comprising:  
 a pole with a hollow interior;  
 a head with a lower portion having outwardly sloping surfaces;  
 expander jaws wedged between the outwardly sloping surfaces of the lower portion of the head and an interior surface of the pole;  
 wherein at least one expander jaw is welded to the interior surface of the pole.

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