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(54) **PROTECTOR FOR CHEMICALLY TREATED
WOODEN UTILITY POLE AND
SURROUNDING ENVIRONMENT**

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(57) **ABSTRACT**

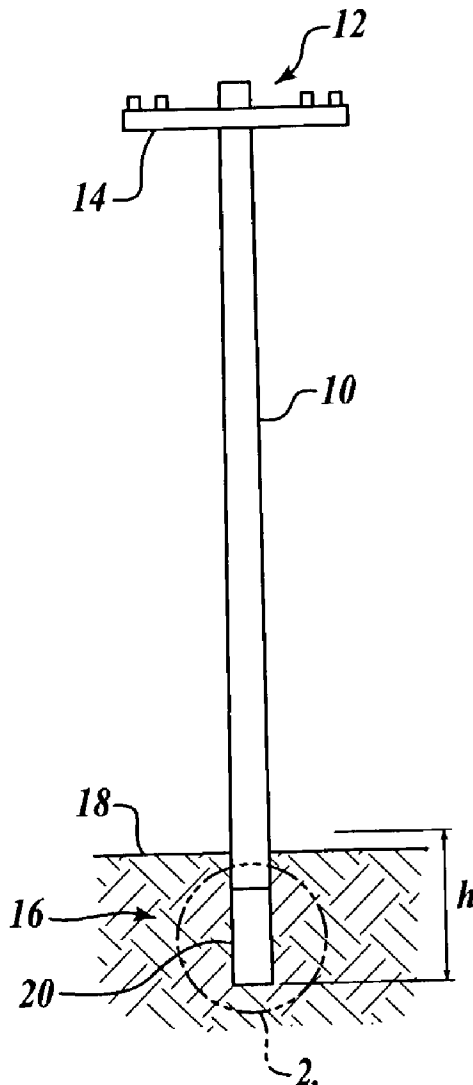
The invention provides a utility pole that comprises an upper end and a lower end, with the lower end having a butt end. The butt end of the pole is encased in a substantially non-corrodible metallic cladding, that is formed from a sheet of the metal, so that the cladding protects the buried end of the pole from attack by microorganisms in the surrounding soil, when the pole end is buried. Further, the metallic cladding substantially prevents migration of any biocidal chemicals from the pole into the surrounding environment. In certain embodiments, the metallic cladding may also be connected, through a ground conductor, to form an electrical grounding means for the pole.

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Related U.S. Application Data

(60) **Provisional application No. 60/385,112, filed on May 30, 2002.**



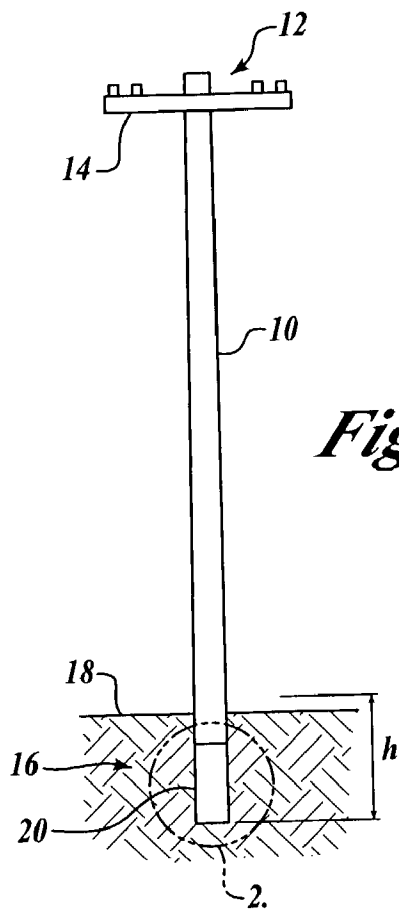


Fig. 1.

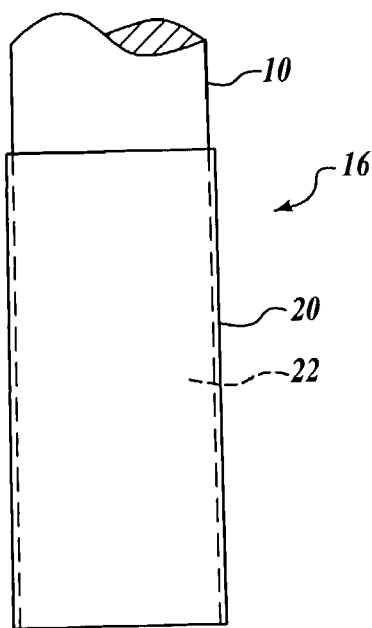


Fig. 2.

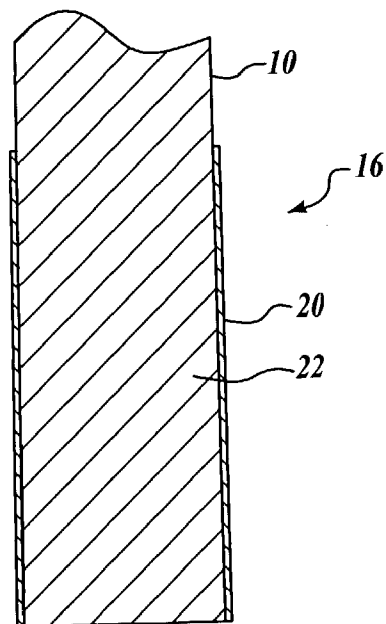


Fig. 3.

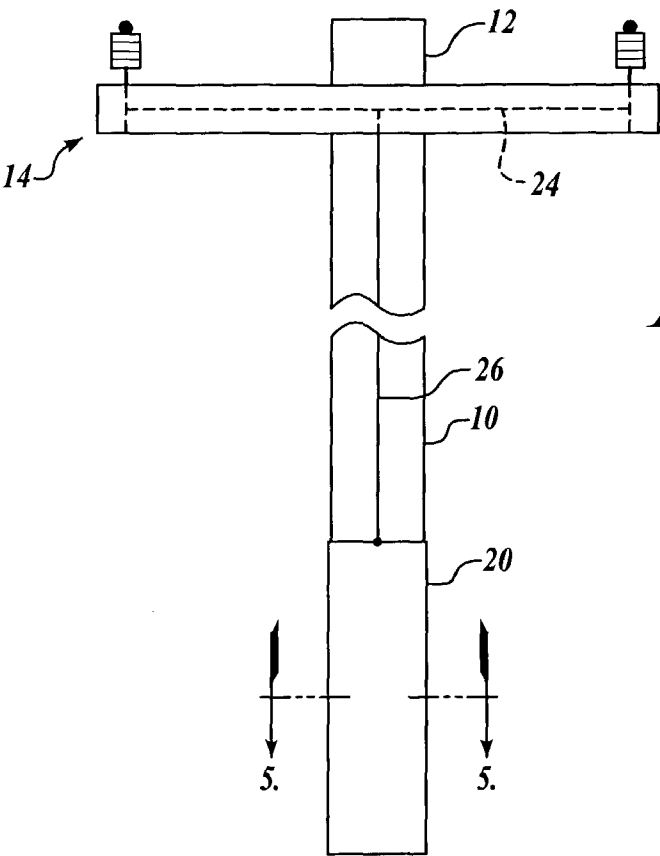


Fig. 4.

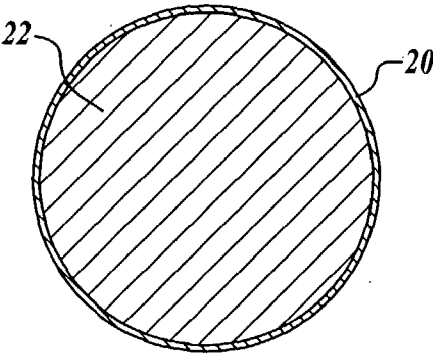


Fig. 5.

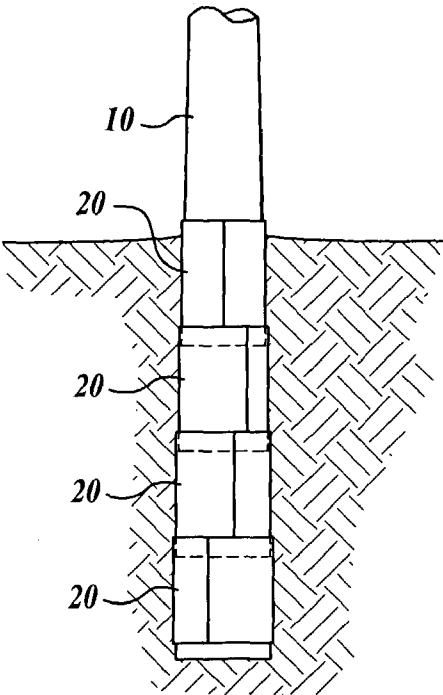


Fig. 6.

PROTECTOR FOR CHEMICALLY TREATED WOODEN UTILITY POLE AND SURROUNDING ENVIRONMENT

RELATED APPLICATIONS

[0001] This application claims priority from U.S. application Serial No. 60/385,112 filed May 30, 2002.

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TECHNICAL FIELD

[0003] This invention relates to the fields of utility poles used to support electrical and telecommunication lines, and also to the protection of the environment, when these poles are treated with a leachable chemical compound. In particular examples, portions of chemically treated wooden utility poles that are to be buried are provided with a partial casing to protect the wood, prevent migration of chemicals from the wood into the environment, and to provide the possibility of being used as an electrical grounding means.

BACKGROUND OF THE INVENTION

[0004] A modern industrial society requires a reliable electrical supply, and also a reliable means of telecommunication. Typically, electrical supply is by means of electrical cables, that are either run underground or supported overhead on utility poles. Similarly, telecommunications cables are either underground, or supported on utility poles, frequently the same poles that carry the electrical power supply cables. These utility poles can be made from a variety of materials, including concrete, steel, and wood. The use of wooden poles continues to be a standard, and literally millions of these poles are used throughout North America.

[0005] Wooden utility poles are subject to deterioration in the environment through contact with moist earth that harbors microorganisms that attack and cause the wood to rot or otherwise deteriorate. In order to prevent such premature deterioration, wooden utility poles are commonly treated with chemicals. These chemicals are biocides, intended to kill those microorganisms that are likely to attack the wood, and are also potentially toxic to humans in sufficiently high dosage. However, while these chemicals have proved to be effective in prolonging the useful life of utility poles, they may also pose an environmental hazard in that there is a possibility that biocidal chemicals would migrate from the wood into the surrounding earth. As a consequence, it would be desirable to find ways preventing the leaching of biocidal chemicals from the wood into the environment.

SUMMARY OF THE INVENTION

[0006] The invention provides a utility pole that comprises an upper end and a lower end, with the lower end having a butt end. The butt end of the pole, the portion of the pole that is to be buried, is covered with a substantially non-corrod-

ible metallic cladding, that is formed from a sheet of the metal, so that the cladding protects the butt end of the pole from attack by microorganisms in the surrounding soil. Further, the metallic cladding substantially prevents migration of any biocidal chemicals from the pole into the surrounding environment. In certain embodiments, the metallic cladding may also be connected, through a ground conductor, to form an electrical grounding means.

[0007] Additional aspects and advantages of this invention will be apparent from the following detailed description of preferred embodiments, which proceeds with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. 1 is a schematic diagram of an embodiment of the invention illustrating a utility pole equipped with a substantially non-corrodible metallic cladding at its butt end;

[0009] FIG. 2 is an enlarged view of the butt end of the utility pole of FIG. 1;

[0010] FIG. 3 is a cross-sectional view of the butt end of the pole of FIG. 2;

[0011] FIG. 4 is a schematic diagram illustrating an embodiment of the invention wherein the non-corrodible metallic cladding is electrically connected to form an electrical ground;

[0012] FIG. 5 is a cross section through FIG. 4 at 5-5, as shown; and

[0013] FIG. 6 is a partial side view of an embodiment of the invention showing a utility pole, with butt end buried in the earth, and with multiple sheets of cladding of a non corrodible metal.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0014] In accordance with the invention, utility poles, especially wooden utility poles, are provided with a casing or cladding that surrounds the butt end of the pole to reduce or prevent attack from agents in the environment, such as microbes, fungi, moisture, and the like. Further, the casing substantially prevents any migration of biocidal chemicals from the utility pole to the environment, by providing a barrier.

[0015] Preferably, the metal used in the cladding that surrounds and encases the butt end of the pole should be substantially non-corrodible. The term "substantially non-corrodible" means that when the metal is placed in the environment in which the pole butt end is buried, namely in the earth, the metal does not corrode through in a time frame that should be within the expected lifespan of the pole. However, the metal may be subject to formation of a thin film (for example, an oxidation film) on its surface, localized etching, and other surface deterioration, without a significant degree of perforation through the cladding during the reasonably expected lifetime of the utility pole. It should also be understood that the metallic cladding should be of a sufficient thickness to prevent through corrosion, as discussed below, since metal thickness also effects the ability of the cladding to retain its integrity for the duration for the lifespan of the pole.

[0016] The cladding, in accordance with an embodiment of the invention, may cover the butt end of the pole and extend upward along the length of the pole, to the point of penetration of the pole into the earth, or beyond. In other embodiments, the cladding may not extend along the entire submerged or buried portion of the utility pole. Preferably, the cladding does not encapsulate or seal off the lower sawn off end of the pole, which is exposed to prevent or reduce wood degradation.

[0017] To the extent that the cladding covers buried surface area of the pole, that would normally be in close contact with the environment, the cladding acts as a shield between the environment and the buried pole portion. Thus, the cladding potentially prevents migration of biocidal treatment chemicals, impregnated in the wooden utility pole, from the pole into the environment.

[0018] The term “substantially prevents migration of chemicals” means that the migration of chemicals is reduced by at least about 50% relative to the rate of migration without the cladding around the butt end of the utility pole. Clearly, 100% cessation of chemical migration may ordinarily not be preventable because of some moisture seepage between the pole and the cladding, and communication of this seeped water back into the environment. Thus, in accordance with the invention, there is a substantial prevention of migration, but not always a total prevention of migration.

[0019] The invention may be better understood with reference to the appended figures. Referring to FIGS. 1, 2 and 3, a utility pole 10 has an upper end 12 to which is affixed structure 14 for supporting utility and/or electrical cables. The pole 10 has a lower end 16, that is submerged or buried within the earth 18. A butt end 22 of the pole 10 is clad with a sheet of non-corrodible metal 20. The metal sheath extends along a length h of the pole. The length h may extend from the buried butt end 22 of the pole to the point at which the pole 10 enters the earth 18, and beyond, as shown in FIG. 1.

[0020] FIG. 6 shows another embodiment in which the cladding 20 is applied in multiple layers, on above the other, with some overlap at adjacent edges possible, so that narrower strips of metal can be used rather than one broad strip that extends from pole base to point of earth entry or exit.

[0021] Referring to FIGS. 4, and 5, a ground wire 24 on the support structure 14 is connected by a ground connector 26 to the cladding 20. This connection of the cladding 20 to the ground wire 24 effectively permits the cladding 20 to act as an electrical grounding means for the utility pole 10. More than one layer of cladding can be used, as shown in FIG. 5, for example. Clearly, the cladding 20 is useful, even without connection through the ground conductor to the ground wire to act as an electrical grounding means, as explained above.

[0022] The preferred cladding material is copper, tin, or alloys of these metals, but other non corrodible metals may also be used. Copper is particularly preferred. Copper is useful not only because it is non corrodible, as defined herein, but also because it is a good electrical conductor. So, it allows use of the cladding as an electrical grounding element.

[0023] The cladding should preferably be of a sufficient thickness to retain its integrity under environmental condi-

tions for the expected lifespan of the utility pole, which is typically around 100 years for treated wooden poles. This will eliminate the need for costly retrofits at later stages. In the case of a copper cladding, the cladding should have a thickness in the range from about 0.0216 inches (0.55 mm) to about 0.0108 inches (0.275 mm) for a lifespan of 100 years, and preferably about 0.0108 inches (0.275 mm). Of course, other cladding thickness may be used for other desired useful lives of the pole, for example thickness of in the range from about 0.001 (0.0254), to about 0.250 (6.35) inches (mm) and the like within or outside this range.

[0024] It will be obvious to those having skill in the art that many changes may be made to the details of the above-described embodiments without departing from the underlying principles of the invention. The scope of the present invention should, therefore, be determined only by the following claims.

1. A utility pole comprising:

- (a) an upper end and a lower end, the lower end comprising a butt end; and
- (b) a substantially non corrodible, snug fitting, metal cladding, the cladding surrounding the butt end of the pole;

wherein, when the butt end of the pole is buried, the metal cladding substantially prevents migration of chemicals from the pole into surroundings, and the metallic cladding protects the butt end of the pole from attack by microorganisms.

2. The utility pole of claim 1, wherein the metallic cladding comprises copper or tin.

3. The pole of claim 1, wherein the metallic cladding has a thickness ranging from about 0.025 mm to about 6.35 mm.

4. The pole of claim 2, wherein the cladding comprises copper, and the cladding has a thickness from about 0.025 mm to about 6.35 mm.

5. The pole of claim 4, wherein the cladding is in the range from about 0.275 to about 0.55 mm thick.

6. The pole of claim 1, further comprising a grounding element extending from the upper end of the pole to the cladding so that the cladding is an electrical ground for the pole.

7. A utility pole comprising:

- (a) an upper end and a lower end, the lower end comprising a butt end; and
- (b) a snug fitting, metal cladding comprising copper or tin, the cladding having a thickness in the range from about 0.025 mm to about 6.35 mm, the cladding surrounding the butt end of the pole; and
- (c) a grounding element extending from the upper end of the pole to the cladding so that the cladding is an electrical ground for the pole;

wherein, when the butt end of the pole is buried, the metal cladding substantially prevents migration of chemicals from the pole into surroundings, and the metallic cladding protects the butt end of the pole from attack by microorganisms.

8. The pole of claim 7, wherein the cladding comprises copper.

9. The pole of claim 7, wherein the cladding comprises tin.

10. A utility pole comprising:

- (a) an upper end and a lower end, the lower end comprising a butt end; and
- (b) a substantially non corrodible, snug fitting, metal cladding, the cladding surrounding the butt end of the pole, the cladding of sufficient thickness to retain integrity over an expected lifespan of the pole;

wherein, when the butt end of the pole is buried, the metal cladding substantially prevents migration of chemicals from the pole into surroundings, and the

metallic cladding protects the butt end of the pole from attack by microorganisms in soil.

11. The pole of claim 10, wherein the metal comprises copper or tin.

12. The pole of claim 10, further comprising a grounding element extending from the upper end of the pole to the cladding so that the cladding is an electrical ground for the pole.

13. The pole of claim 10, wherein the metallic cladding comprises copper and the thickness of the cladding is in the range about 0.025 mm to about 6.35 mm

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