June 17, 1969 R. E. BAKER 3,450,073

PRESERVATIVE INJECTION MACHINE

Filed June 21, 1967 Sheet 1 of 2

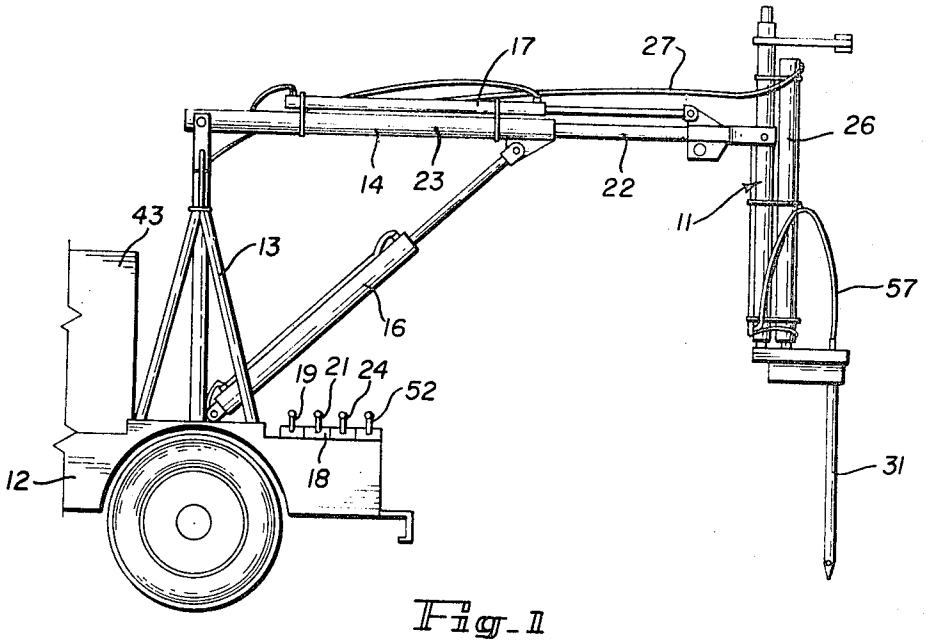


Fig_1

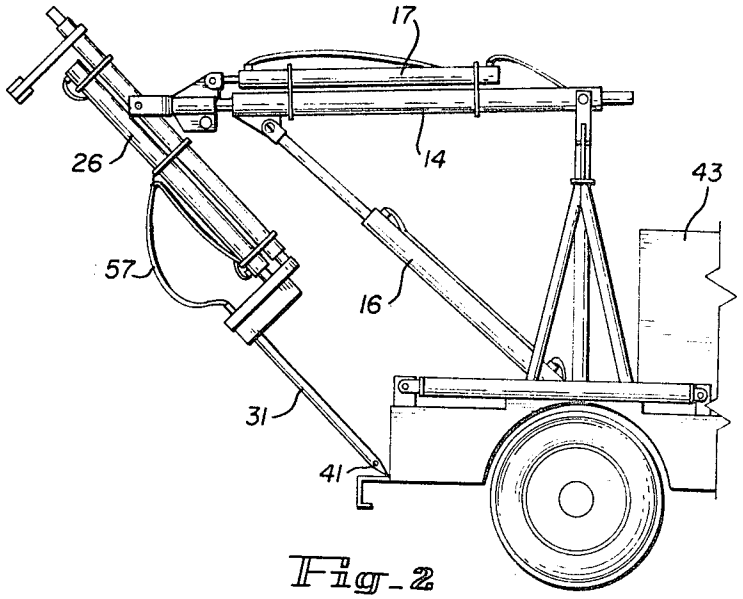


Fig_2

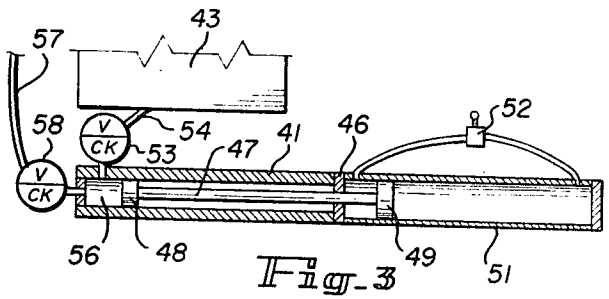


Fig_3

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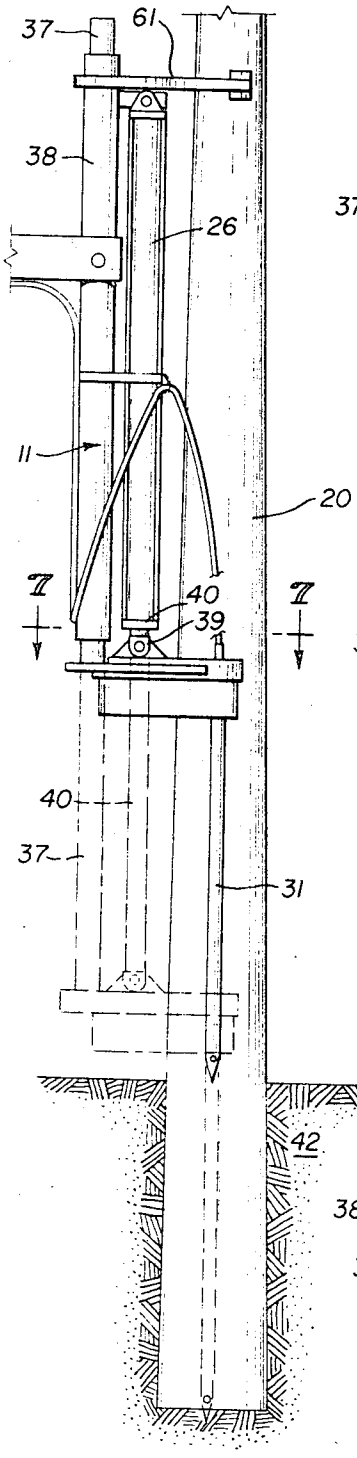


Fig_4

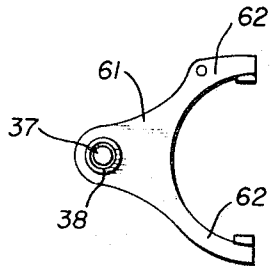


Fig_5

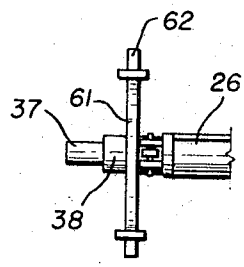


Fig_6

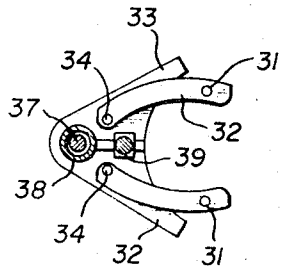


Fig_7

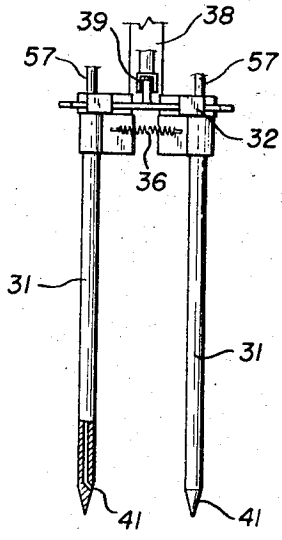


Fig_8

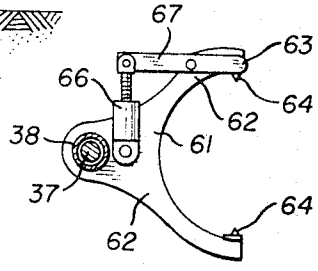


Fig_9

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3,450,073

PRESERVATIVE INJECTION MACHINE

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Int. Cl. B27k 3/02
U.S. Cl. 111—6 12 Claims

ABSTRACT OF THE DISCLOSURE

A device for the pressured application of preservative compounds to erected utility poles at below ground levels through use of vehicle mounted boom and hoist components for positioning and holding an injector attachment in position against an upright pole as probe elements of said attachment are power driven into the ground alongside the pole for conducting preservative materials through the probe elements under influence of a pressure increasing apparatus, with an embodiment in which a hydraulic power source is used for all manipulative and processing operations.

Background of the invention

In order to avoid excessive replacement of wood utility poles, most all poles now used are treated with various compounds before they are placed in service. Even though wood poles have been treated, however, it has been noted that they are still subject to deterioration. Under some ground conditions the poles deteriorate faster than in other conditions. In general, the most severe damage to buried poles occurs in a zone extending from the ground line down a distance of 3 to 5 feet. The bottom end of the pole which may extend several feet beyond such zone is in most installations not as severely deteriorated.

In order to extend the service life of utility poles, it would, accordingly, seem advisable to increase the protection available in the described deterioration zone. From service records it has also been determined that it is sometimes worthwhile to represerve poles that have once been used at on-site locations and that have been removed for later reinstallation at a new site. Poles that have been in service for a period of years are, accordingly, sometimes represerved before they are reinstalled on another service line. This represervation step can materially increase the overall service life of the pole and can contribute to a lower overall upkeep and maintenance cost. The present invention is intended to provide a mechanism and system for the in-place represervation of wooden utility poles.

Summary of the invention

As an alternative to removal or the uncovering of utility poles so that preservative can be reapplied to the poles in the high deterioration zone, the present invention provides a mechanism which may be engaged to a pole at an on-site location to drive a probe element downwardly into the ground in positions of close proximity to the pole. With probe penetration to the desired depth a preservative compound is delivered through the probes to be expelled outwardly into the utility pole and the surrounding ground with such injection operation being continuable as the probe is being retracted upwardly and out of the ground to apply additional preservative at other elevations.

In addition to the described system for the represervation of utility poles, the invention provides a mechanism suitable for practice of the invention. The mechanism includes pole engaging elements and means for holding the pole engaging elements in desired position about a utility pole as force is exerted to extend the probe elements downwardly away from the pole engaging components and into the ground closely adjacent to the buried pole. High pressure apparatus is further provided for the delivery and expulsion of preservative compounds out of the probe injectors. Separate boom and hoist apparatus may be provided for holding the pole engaging elements against the pole or the pole engaging elements can be provided as a separate attachment to be anchored on the pole as necessary to withstand the probe injecting forces. For a unit utilizing a hydraulic power source, a pressure boost cylinder is provided for injecting the preservative at a pressure in excess of the available hydraulic operating pressure.

Brief description of the drawings

The features of mechanisms that are useful in the practice of the invention are shown in the accompanying figures, in which

FIG. 1 is a partial side elevation showing components of the invention in an assembled relationship,

FIG. 2 is a side elevation showing the components of the invention in a non-operative or carry position.

FIG. 3 is a cross-sectional elevation through a preservative pressurizing cylinder,

FIG. 4 is a side elevation with parts shown in alternate position illustrating a pole engaging attachment made in accordance with this invention,

FIG. 5 is a top plan view taken along the line **5—5** of FIG. 4 showing a pole gripping element,

FIG. 6 is a sectional elevation taken along the line **6—6** of FIG. 5,

FIG. 7 is a top plan view in partial section taken along the line **7—7** of FIG. 4 to show a probe mounting element,

FIG. 8 is an elevation taken along the line **8—8** of FIG. 7 showing further features of the probe components and the mount therefor, and

FIG. 9 is a top plan view taken similar to FIG. 5 showing a modified pole gripping element.

Description of the preferred embodiments

FIGS. 1 and 2 illustrate an overall configuration for an embodiment of this invention in which the pole treatment attachment **11** is operatively supported by a boom hoist mechanism mounted on a service truck **12**. The hoist apparatus includes an upright standard **13**, an outwardly extending boom **14**, and a boom hoist cylinder **16**. Through cooperative use of these elements the attachment **11** may be moved up, down, in or out as necessary to bring the attachment into contact with an in-place utility pole. For this preferred embodiment, a hydraulic power source is used, and, accordingly, the extension or retraction of the hydraulic cylinders is controlled by individual valves of the control bank **18**. If the 4-way valve **19** is connected to the boom hoist cylinder **16**, the boom **14** will be raised and lowered by manipulation of the control valve **19**. With the control valve **21** connected to a boom extension cylinder **17**, telescoping boom extension **22** can be moved reciprocally in and out of the boom support tube **23**.

With the attachment **11** engaged against the utility pole **20**, as shown in FIG. 4, the 4-way valve **24** which is interconnected to the probe drive cylinder **26** on attachment **11** by the lines **27** can be extended or retracted by manipulation of the valve **24**. In use the cylinder **26** will initially be retracted as the attachment is moved into engagement with an untreated pole **20**. A pair of probes **31** will then be disposed above the ground line but in close proximity to the sides of the utility pole. The probes **31** are mounted on pivotally movable arms **32** engaged to probe carrier **33** by means of the pivots **34**, and a spring **36** is biased to hold the arms **32** and probes **31** inwardly. With such arrangement the probes will be brought into close engagement with the sides of the

poles whenever the arms **32** are forcibly moved into engagement therewith.

Probe carrier **33** is attached to a shaft **37** which is adapted to move reciprocally within the cylindrical support housing **38** of attachment **11**. A clevis **39** on shaft **40** of probe drive cylinder **26** is attached to the platform of the probe support **33** so that such platform may be moved reciprocally with respect to the support housing **38** and the barrel of the probe drive cylinder **26**. If the boom hoist cylinder **16** and the boom components are rigidly held in position, extension of the probe drive cylinder **26** will cause extension of the shafts **37** and **40** with consequent movement of the probe support **33** and probes **31**.

By this action the probes **31** can be extended downwardly into the ground in position alongside the utility pole. When the probe has been sufficiently extended, preservative materials may be injected through the hollow central passage **40** of the probes **31** for expulsion through the openings **41**. By this operation a desired quantity of preservative materials may be injected under high pressure into the earth structure **42** surrounding the utility poles. Necessarily, a quantity of such preservative will be directed against the pole itself to provide direct contact with the pole. Desirably the preservative to be used will be of liquid form. Where a liquid is used, the hydraulic power source that is already available for hoist and probe drive operations can be used to power the forcible injection of the preservative. A supply of preservative retained in a tank **43** may be introduced into the pump half **44** of a double element injector mechanism **46** which utilizes a common shaft **47** interconnecting a pump piston **48** and a drive piston **49** operating in a hydraulic cylinder component **51** of said injector mechanism **46**.

If the hydraulic cylinder component **51** is connected through a 4-way control valve **52**, the hydraulic power available on the vehicle can be selectively used to move the piston **49** reciprocally in the cylinder **51**. A ball check valve **53** is provided in a supply line **54** from the preservative tank **43** to the pump cylinder **44**. Ball check valve **53** permits the introduction of preservative into the pump chamber **56** as the pistons **49** and **48** are retracted. On reverse movement of the pistons the preservative in the pump chamber **56** will be pressurized as the ball check valve **53** is moved to a closed position. The pressurized fluid preservative will be expelled through the line **57** connected to the probes **31**. A ball check valve **58** in the preservative pressure line **57**, of course, operates to prevent a back flow from such pressurized line **57** when the pistons **48** and **49** are moving in an opposite direction. Since the diameter of the piston **48** is less than the diameter of the piston **49**, the injection pressure available for expulsion of the preservative out of the probes **31** can be greater than the operating pressure for the hydraulic system.

The use of the hydraulic power source to pump and distribute the preservative compound or to superpressurize the expulsion operations for injection of the preservative present a beneficial combination that may in some instances be necessary for the successful use of the combined apparatus illustrated in FIGS. 1 and 2. The application of pressure to the preservative discharge lines **57** as the probe cylinder **26** is being actuated to move the probe into the ground is recommended, since the application of less than full preservative injecting pressure can help to keep small granular materials from clogging the injector openings **41** in the probes **31**.

Since the described embodiment of the invention is intended for the use and benefit of utility companies and since it is recognized that many utilities already have trucks equipped with boom and hoist apparatus, it should be understood that the injector mechanism **11** may be provided as a separate attachment that could be positioned at utility poles by different types of hoist mechanisms. Where the attachment is to be used with a cable or non-rigid type of hoist mechanism, the upper guide collar **61** which is attached to the housing **38** can provide means for secure engagement of the attachment **11** to utility poles that are to be treated. As shown in FIG. 9, the fork arms **62** of collar **61** which are of a shape and design to surround the utility pole can be provided with a mechanically or hydraulically actuated dog **63** to forcibly bring gripper teeth **64** into contact with the utility pole **20** to hold the attachment **11** in position on the pole as the probe cylinder is actuated to drive the probe into the ground. A cylinder **66** connected to the lever arm **67** or a similar mechanical device can be used for this purpose.

With the described modifications the pole itself becomes the anchor for the forcible introduction of the probes into the ground at the base of the pole. When the unit is provided as a separate attachment as described, the preservative can be pressurized by a separate pump mechanism or by an injector mechanism **46** of the type shown. Since hydraulic power is widely used for truck boom manipulations, an already available power source could be used to derive the required preservative injector pressure.

While separate embodiments of the invention have been shown and described, it should be apparent that the invention is adaptable to various modifications and changes. All modified configurations coming within the scope of the appended claims are considered to be a part of this invention.

I claim:

1. A device for applying wood preservative materials to in-place poles disposed in earth structures comprising a supporting housing, means for holding said housing in position on the pole, a probe carrier on said housing for movement along said pole, a probe unit including at least one probe on said carrier extending downwardly therefrom for penetration of the earth structure adjacent the pole, said probe providing a flow passage for introduction of the preservative materials, and pressure apparatus for forcibly ejecting preservatives from said probe.

2. A device as set forth in claim **1** wherein said probe carrier moves reciprocally along said pole.

3. A device as set forth in claim **1** wherein said means comprises pole engaging elements on said housing.

4. A device as set forth in claim **3** wherein said pole engaging elements are movable toward and away from the center of the pole and further comprising powered apparatus for forcibly engaging said elements with the pole.

5. A device as set forth in claim **1** wherein said probe carrier is a multi-piece component with separate pieces being positioned to closely engage separate sides of said poles which may be of a varying size.

6. A device as set forth in claim **5** wherein a plurality of probes are present and are positioned on said separate pieces of said probe carrier.

7. A device as set forth in claim **1** wherein said means comprises a hoist apparatus for forcibly holding the housing in place at said pole.

8. A device as set forth in claim **7** and further comprising a hydraulic system for positioning said hoist.

9. A device as set forth in claim **8** and further comprising a hydraulic powered system for pressurizing said preservative.

10. A device as set forth in claim **1** and further comprising a hydraulic powered system for pressurizing said preservative.

11. A device as set forth in claim **10** and further comprising a pump for pressurizing said preservative, and means interconnecting said pump and hydraulic system for driving said pump.

12. A device as set forth in claim **11** wherein said preservative pump is of a reciprocating piston type and wherein said hydraulic system includes a hydraulic cylinder for reciprocating said pump piston.

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U.S. Cl. X.R.

21—7, 62, 63, 73; 111—89; 175—21, 19