

June 29, 1965

N. K. MOSES

3,191,864

SPIKE HOLE INSERT

Filed July 26, 1961

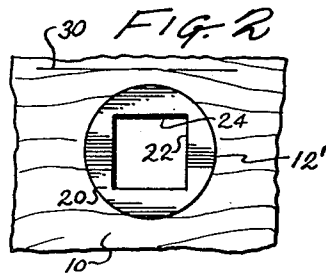
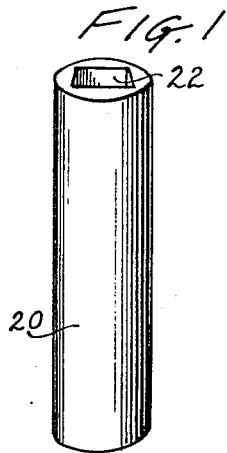
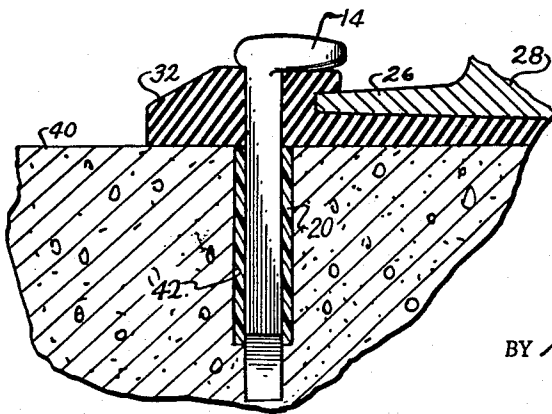
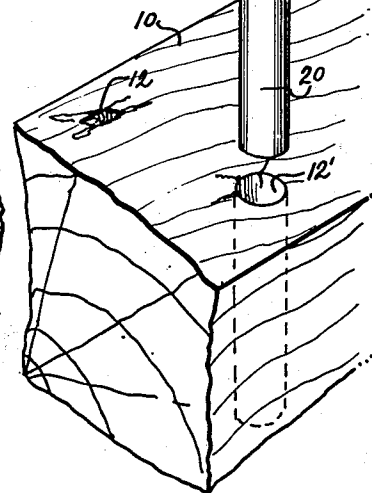
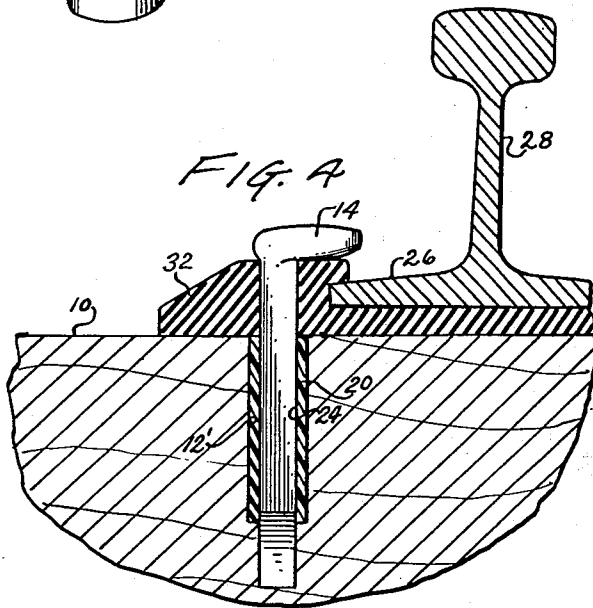
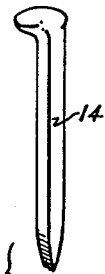


FIG. 3



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SPIKE HOLE INSERT

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Filed July 26, 1961, Ser. No. 127,046
10 Claims. (Cl. 238-371)

The present invention relates to rail fastenings and, more particularly, to a method of making and rail fastening for holding spikes in a rail supporting base.

The usual fastening for rails comprises spikes driven into wooden ties. Usually a tie plate or rubber rail seat is provided between the base flange of the rail and the tie, the spikes being driven through holes in the tie plate or rubber rail seats with some of the spikes having their heads overlapping the base flange of the rail while other spikes have their heads bearing against the tie plates or rubber rail seats. In recent years, base structures other than wooden ties have come into use. More recently, precast concrete ties have been used in place of wooden ties and, in some instances, concrete beds have been laid for supporting the rails. Heretofore, the use of concrete, either in the tie form or bed form, nut and bolt fastening means have been used, the bolts being either imbedded in the concrete at the time of casting or suitable holes are provided through the concrete structure so that the bolts may be inserted therein.

One of the major railroad expenses today is the maintenance expense for replacement of spike killed wooden ties. The exposure of a wooden tie to weather and the effects of oil and corrosive brine which drips from the railroad cars attacks the area of the wooden tie adjacent the spike holes. The constant jarring and vibration of rolling stock on the track tends to loosen the spikes and permit the water, oil, brine or the like to enter the spike holes resulting in the rotting and decaying of the wood in this area. Such rotting and decaying of the wood in the area around the spike decreases the holding power and, consequently, the tie must be replaced although the only deterioration is in the area of the spike holes.

Heretofore, efforts have been made to reuse the spike holes in a wooden tie after they have been worn. Oversized spikes have been used but the length of their holding power is reduced because the decayed area in which they are driven rapidly spreads once it is started. New tie plates have been installed with holes positioned differently so that the spikes are received in solid timber but such efforts were not entirely satisfactory as the area in which they are driven is close to the area of the previously used spike holes and, consequently, there is a tendency for the wood ties to split. Efforts have even been made to use a wooden filler peg in a spike hole, the spike then being driven into the peg with the peg splitting and wedging against the decayed area of the previously used spike hole. The use of such wooden pegs is unsatisfactory in that the holding power is not as great as driving a spike in the solid wood and oftentimes the splitting of the wooden peg caused the spike to be driven out of alignment with its required position, resulting in a portion of the spike bearing against the decayed portion of the hole. When such condition occurs, there is an uneven holding power on the spike.

More recently, efforts have been made to reuse spike holes by insertion of a thermosetting and thermoplastic glue in capsule form into the hole and then rupturing the capsule by the spike to cause the glue or preservative to be pressurized and impregnate the portions of the wood surrounding the hole. Such a fastening required time for the glue or preservative material to set and is unsatisfactory for general use in that it is common procedure to reset rails from time to time due to creep and the like

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and, consequently, the spikes must be capable of being withdrawn without damage to the wood around the spike hole. The thermosetting resins which impregnate into the wood and which hold the spike cause considerable difficulty in removing the spike as well as causing damage to the tie in the area of the hole. Modifications of the use of thermoplastic and cold setting resins were tried wherein wood pegs having suitable grooves therein were inserted into the spike hole and subsequently a wood hardening glue in fluid form was provided in the groove so that the driving of the spike into the hole pressurized the glue into the peg and into portions of the immediately adjacent hole. Here, again, there were installation difficulties encountered and also the disadvantage of damaging the timber surrounding the hole as in instances where the spike had to be removed so the track could be reset.

In regard to the use of concrete ties and concrete beds as the supporting base structure for the rails, the fastening of the rails thereto by bolts has been a costly expenditure and a time-consuming operation. In instances where the vibrations have worked an imbedded bolt loose in the concrete base structure, the repair of such structure involved considerable labor and expense. In cases where the bolt extended through holes provided in the concrete structure, the forces caused by the rolling stock passing over the rails were exerted primarily against the bottom of the concrete by the bolt head and such vibrations in a concentrated area eventually caused loosening and cracking of the concrete which necessitated constant tightening of the nuts.

An object of the present invention is to provide an improved method of making and an improved rail fastening wherein metal spikes, either the conventional cut spikes or screw spikes, may be used with either wood ties, concrete ties or concrete bed structures.

Another object of the present invention is to provide an improved method of and rail fastening for previously used spike holes in wooden ties.

Still another object of the present invention is to provide a rail fastening in which a spike may be held in a railway track supporting structure with at least the same holding power as generally required by the insertion of a spike into a solid wood tie, the spike being capable of being removed without damage to the railway track supporting structure.

Another object of the present invention is to provide a method of and rail fastening for wooden and concrete ties and concrete bed structures wherein the holding power is uniformly distributed onto the spike from all sides.

A further object of the present invention is to provide a method of and rail fastening for attaching rails to a base supporting structure which may be accomplished in a minimum of time. By use of the present invention, it has been found that a spike killed wooden tie can be reconditioned and placed in use in approximately 4½ minutes, the reconditioned wooden tie having substantially the same life as a new wooden tie with spikes driven into creosote treated solid wood.

Ancillary to the preceding object, it is a further object of the present invention to materially reduce the cost of maintenance of railway track structures.

A further object of the present invention is to provide a tubular insert plug made of a resilient plastic material which is unaffected by weather, water, oil, brine and the like and which when used in a spike hole has sufficient elastic memory to provide a uniform holding power on a spike driven into the same.

These and other objects and advantages of the present invention will appear more fully in the following specification, claims and drawings in which:

FIGURE 1 is a perspective view of the tubular insert plug of the present invention;

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FIGURE 2 is a top plan view of the insert plug of FIGURE 1 installed into a reconditioned hole in a wooden tie;

FIGURE 3 is an exploded perspective view illustrating the method of reconditioning a previously used spike hole, inserting the insert plug into the spike hole and inserting the spike into the insert plug;

FIGURE 4 is a sectional view through a typical installation of the present invention with a wooden tie;

FIGURE 5 is a sectional view similar to FIGURE 1 but illustrating a typical installation of the rail fastening of the present invention in a concrete tie or concrete bed.

Referring now to the drawings wherein like or similar characters represent like or similar parts and, in particular, the exploded fragmentary perspective view of FIGURE 3, a conventional wooden railroad tie 10 is illustrated with the conventional tie plate or rubber rail seat removed. The wooden tie 10 is shown with a used spike hole 12 having a wall portion which has been deteriorated by decay or rot. It will be understood that such a wooden tie 10 is what has been heretofore known as "a spike killed tie" in that the spike holes 12 have deteriorated to a point that it has no further holding power to retain either the conventional cut spike 14 or a lag screw type of spike (not shown). Such deterioration of spike holes in a wooden tie normally occurs in six to ten years but may occur earlier if the spikes have to be removed for resetting or replacing of rails. The wood of the tie 10 is normally solid except in the immediate area of the used spike holes 12 and, as has been heretofore the practice, such ties were generally discarded and replaced with new wooden ties.

The present invention contemplates reconditioning such "spike killed ties" while still in place in the roadbed so that their service life can be at least doubled. To accomplish the present invention, the used spike hole 12 is reamed out by use of a conventional long shank wood bit (not shown). All of the decayed wood is reamed from the spike hole 12 so that the hole will be surrounded by good solid wood, as shown at 12' in FIGURE 3. The reamed out hole 12' is necessarily larger than the original hole 12 and extends into the wooden tie to a depth of approximately 4 inches. If desired, it may then be treated by spraying creosote into the same so as to assist in rendering the reamed out solid walls of the new hole 12' resistant to decay.

After reaming out the previously used spike hole 12 to form a new closed bottom hole 12', a resilient plastic tubular insert plug 20 having substantially the same external dimensions as the hole 12' is introduced into the hole 12' by pushing the same in or lightly tapping it with a hammer. The tubular insert plug 20 is provided with an undersized spike hole 22 therethrough having substantially the same cross-sectional configuration as the cross-sectional configuration of the spike 14. As shown in the drawing, the conventional spike is quadrangular or square and, consequently, the hole 22 is quadrangular or square but is of slightly less cross-sectional dimensions than the cross-sectional dimensions of the spike 14.

Once the resilient plastic tubular plug 20 has been inserted into the hole 12' with its spike hole 22 having one wall 24, FIGURE 2, aligned parallel with the edge of the base flange 26 of the rail 28, as indicated by the broken line 30 in FIGURE 2, the tie plate or rail seat, as the case may be, is inserted between the base flange 26 and the top surface of the tie 10 with its hole aligned with the spike hole 22. As illustrated in FIGURE 4, a rubber rail seat 32 is shown between the tie 10 and the base flange 26 of rail 28 but, of course, it will be understood that the conventional steel tie plate may be used.

With the rail seat 32 in position, the rail fastening is then completed by driving the spike 14 into the spike hole 22 of the tubular insert plug 20, as shown in FIGURE 4. The spike 14 causes the tubular plug 20 to uniformly expand transversely into tight sealing engagement with

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the solid wall of the hole 12', thus assuring a pressure seal of the wall of the hole 12'. Since the spike hole 22 in the insert plug 20 is smaller in cross-section than the cross section of the pipe and, further, since the insert plug 20 has an elastic memory, the plug 20, coupled with the walls of the hole 12', exerts a uniform holding power on the spike which is at least equal to the original spike holding power of a wood tie when the spike is directly driven into the wooden tie.

While the method of the present invention has been described in association with the reconditioning of a "spike killed tie," it is, of course, within the scope and spirit of the invention to fasten rails to new wooden ties by drilling suitable dimension insert plug holes in the wooden ties and then subsequently following the steps of the above-described method.

The insert plug 20 illustrated in FIGURE 1 is inexpensively made by extruding a resilient plastic material having an elastic memory into long lengths of tubing, the extruded lengths of tubing having an outside diameter substantially equal to the reamed out holes and having a bore therethrough of proper cross-sectional dimensions. After the extrusion process, the long length of tubing is then cut into insert plug lengths of approximately four inches so that the resulting tubular insert plug is cylindrically shaped. A typical dimensioned plug for general use in conventional track structures has a length of approximately four inches, an outside diameter of approximately $1\frac{1}{8}$ inches and a square hole therethrough about $\frac{1}{2}$ of an inch less than a $\frac{5}{8}$ inch square spike.

The insert plug 20, as mentioned above, must be made of a material having at least some elastic memory and the additional characteristics of toughness and imperviousness to weather, water, oil, brine or the like. A preferable material for use in making the insert plug 20 is a plasticized polyvinyl chloride resin which is inexpensive and easily extruded but still has the necessary characteristics of toughness and imperviousness to weather, water, brine or the like. Plasticized polyvinyl chloride resin inserts plugs are also capable of withstanding the heat and cold encountered by track structures without losing any of its properties.

While plasticized polyvinyl chloride resins are the preferable material for use in extruding the insert plugs 20, it has also been found that such plugs may be made from a high density linear polyethylene or from polyoxymethylene.

Referring now to FIGURE 5, a modified form of rail fastening is disclosed. In this form of the invention, a concrete bed or concrete tie 40 is provided with a closed bottom hole 42 having a diameter substantially equal to the diameter of the plug 20. The plug 20 is inserted into the hole 42 and, since its diameter is substantially equal to the diameter of the hole 42, it may be pushed in or tapped in by use of a hammer or the like. When the plug 20 is inserted into the preformed hole 42, the rail seat 32 and the rail 28 positioned thereon can be fastened to the concrete bed or tie 40 by use of the conventional spike 14. The spike 14 when driven into the hole 22 of the plug 20, expands the plug uniformly into tight engagement with the concrete wall of the preformed hole 42, the elastic memory of the plug being such that the wall of its spike hole 22 tightly grips the spike and maintains a sufficient uniform holding power on the spikes to anchor the rails on the ties.

The use of the resilient plastic insert plug 20 in the rail fastening for either wood ties, concrete ties or concrete bed structures has a further unexpected result in that the spikes 14 may be removed by suitable pulling tools when it is desired or necessary to reset or replace the rails. In the case of the wood ties, removal of the spike 14 in no way damages the reamed out hole 12' and, in the case of the concrete supporting structures, the removal of the spike can be accomplished quickly and efficiently. While the insert plugs 20 may be reused because of their elastic

memory, they can be easily replaced with new plugs because of the relative inexpensiveness of the same. Further, since the insert plugs are made of a resilient material and when expanded in either the hole 12' of a wood tie or the hole 42 of a concrete tie 40, they conform to the surface of the hole to protect the wall of the hole as well as conform to the surface of the spike so as to protect the same. It will be understood that the spikes do not have machined surfaces and, since the plug insert is resilient, the wall of the spike hole 22 in the plug 20 very closely conforms to the roughened surface of the spike and thus prevents water or brine from corroding and rusting the spike. Only the head of the spike is exposed to corrosive elements and thus the length of use of the spike is increased.

As will now be apparent, the present invention provides a simple, economical and efficient method for providing rail fastenings for track structures. The specific insert plug described hereinbefore fully accomplishes the objects and advantages of the present invention, but it will now be apparent that some modifications and changes may be made to the plug, rail fastening, and method without departing from the spirit and principles of the invention involved.

The terminology used in this specification is for the purpose of description and not limitation, the scope of the invention being defined in the claims.

What is claimed is:

1. In a fastening for a rail: a rail a base structure for supporting the rail, said base structure having at least one closed bottom hole extending downwardly from its rail supporting surface, a spike, an elongated cylindrical insert plug made of a resilient plastic material having an elastic memory, said insert plug being substantially impervious to the deteriorating effects of weather, water, oil and brine and said insert plug having outside dimensions substantially equal to the dimensions of said closed bottom hole and further having an undersized spike hole extending therethrough, said insert plug having a thread free, rib free and substantially smooth exterior surface, said spike hole having a longitudinal axis coincident with the longitudinal axis of said plug and having a cross-sectional configuration substantially the same as but smaller in size than the cross-sectional configuration of said spike, said insert plug being located within the closed bottom hole in said base structure so that its exterior surface is contiguous with the wall of said closed bottom hole, said spike being located within the spike receiving hole of said insert plug to thereby uniformly expand the plug laterally into tight pressure sealing engagement with the wall of the closed bottom hole in said base structure while the elastic memory of said insert plug exerts a uniform holding power on said spike to thereby anchor the rail to said base structure, a tapered bottom portion of said spike extending past said insert plug spike hole into said base structure therebelow, said insert plug substantially conforming to the wall of said closed bottom hole to protect the surface thereof from the deteriorating effects of weather, water, oil and brine, and the spike hole of said insert plug very closely conforming to the exterior surface of said spike to prevent water and brine from corroding and rusting the spike, and thereby preventing water and brine from entering said closed bottom hole.

2. The rail fastening of claim 1 wherein said base structure for supporting the rails is a wood tie and wherein said closed bottom hole is a rebored previously used spike hole.

3. The rail fastening of claim 1 wherein said insert plug is made of a plasticized polyvinyl chloride resin.

4. The rail fastening of claim 1 wherein said insert plug is made of a high density linear polyethylene.

5. A rail fastening of claim 1 wherein said insert plug is made of polyoxymethylene.

6. The method of reconditioning a previously used spike hole and reusing a wood railway tie for supporting

a rail by utilizing a resilient plastic plug having an elastic memory, a thread free, rib free and substantially smooth exterior surface and an undersized spike receiving hole extending therethrough with substantially the same cross-

sectional configuration as but being smaller in size than the cross-sectional configuration of a railway spike comprising the steps of: removing a railway spike from the previously used spike hole, removing the rail and conventional rail seat means from the previously used spike hole, reaming out the previously used spike hole in the tie until all decayed wood around the spike hole has been removed and the cross-sectional dimensions of the reamed out hole are substantially equal to the cross-sectional dimensions of the plastic plug, introducing the plastic plug into the reamed out hole in the tie and aligning one wall of said spike receiving hole substantially parallel to said rail, replacing the rail seat means and the rail, and then driving the railway spike into the undersized spike receiving hole in the plug and uniformly expanding the plug laterally into tight engagement with the wall of the reamed out hole in the tie, whereby the spike is retained in the tie with a uniform holding power applied by the plug, said holding power being at least substantially the same as the original holding power of the tie to thereby anchor the rail to the tie, the spike being driven into the spike receiving hole so that a tapered bottom portion of the spike extends past the spike receiving hole and into the tie therebelow, the plastic plug substantially conforming to the wall of said reamed out hole to protect the surfaces thereof from the deteriorating effects of weather, water, oil and brine and the spike receiving hole of the plastic plug very closely conforming to the exterior surface of the spike to prevent water and brine from corroding and rusting the spike, and thereby preventing water and brine from entering said reamed out hole.

7. The method of reconditioning a previously used spike hole and reusing a wood railway tie for supporting a rail by utilizing a resilient plastic plug made of a plasticized polyvinyl chloride resin having an elastic memory, and a thread free, rib free and substantially smooth exterior surface, said plug having an undersized spike receiving hole extending therethrough with substantially the same non-circular cross-sectional configuration as but being smaller in size than the cross-sectional configuration of a railway spike comprising the steps of: removing a railway spike from the previously used spike hole, removing the rail and tie plate from the previously used spike hole, reaming out the previously used spike hole in the tie until all decayed wood around the spike hole has been removed and the cross-sectional dimensions of the reamed out hole are substantially equal to the cross-sectional dimensions of the plastic plug, aligning the non-circular hole in the plastic plug in a spike receiving position relative to the tie plate and the base of the rail, then inserting the plug into the reamed out hole while maintaining alignment of its spike receiving hole, and then replacing the tie plate and the rail, and then driving a spike into the undersized spike receiving hole in the plug and uniformly expanding the plug laterally into tight engagement with the wall of the reamed out hole in the tie, whereby the spike is retained in the tie with a uniform holding power applied by the plug, said holding power being at least substantially the same as the original holding power of the tie to thereby anchor the rail to the tie, the spike being driven into the spike receiving hole so that a tapered bottom portion of the spike extends past the spike receiving hole and into the tie therebelow, the plastic plug substantially conforming to the wall of said reamed out hole to protect the surfaces thereof from the deteriorating effects of weather, water, oil and brine and the spike receiving hole of the plastic plug very closely conforming to the exterior surface of the spike to prevent water and brine from corroding and rusting the spike, and thereby preventing water and brine from entering said reamed out hole.

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8. The method of fastening a rail to a rail base structure by utilizing a spike and a resilient plastic plug having an elastic memory, a thread free, rib free and substantially smooth exterior surface and an undersized spike receiving hole extending therethrough with substantially the same cross-sectional configuration as but being smaller in size than the cross-sectional configuration of the spike comprising the steps of: forming a bottom closed hole in the rail base structure having a cross-sectional area substantially equal to the cross-sectional area of the resilient plastic plug and a depth approximately equal to the length of the resilient plastic plug, introducing the resilient plastic plug into the formed hole and aligning one wall of said spike receiving hole substantially parallel to the base flange of the rail, placing a rail seat means and the rail in a spike receiving position, and then driving the spike into the undersized spike receiving hole in the resilient plastic plug and uniformly expanding the plug laterally into tight engagement with the wall of the formed hole in the base structure, whereby the spike is retained with a uniform holding power applied by the plug, said holding power being sufficient to anchor the rail to the rail base structure, the spike being driven into the spike receiving hole so that a tapered bottom portion of the spike extends past the spike receiving hole and through the bottom of the closed bottom hole into said base structure below said closed bottom hole, the plastic plug substantially conforming to the wall of said closed bottom hole to protect the surfaces thereof from the deteriorating effects of weather, water, oil and brine and the spike receiving hole of the plastic plug very closely conforming to the exterior surface of the spike to prevent water and brine from corroding and rusting the spike, and thereby preventing water and brine from entering said closed bottom hole.

9. The rail fastening device of claim 1 wherein said base structure is concrete and wherein said closed bottom hole is preformed in said base structure.

10. An article of manufacture for use in fastening a spike in a closed bottom hole provided in a railway track base structure for supporting a rail comprising: an extruded elongated cylindrical insert plug made from a plasticized polyvinyl chloride resin and having an elastic memory, said insert plug having a thread free, rib free and substantially smooth exterior surface and said plug

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having a longitudinally extending spike receiving hole therethrough which is substantially square in cross-section but having dimensions about $\frac{1}{32}$ inch less than the $\frac{5}{8}$ inch square dimensions of a railway spike having a longitudinal axis coincident with the longitudinal axis of said plug, said plug having an external diameter substantially equal to the diameter of the closed bottom hole in which it is insertable so that its exterior surface will be contiguous with the wall of the closed bottom hole, said spike receiving hole dimensions being such that a railway spike is drivable into the spike receiving hole of said plug to uniformly expand the plug laterally into tight pressure sealing engagement with the wall of the closed bottom hole in said base structure while the elastic memory of said plug exerts a uniform holding power on said spike to thereby anchor the rail to said base structure, a tapered bottom portion of said spike being extendable past said plug spike receiving hole into said base structure therebelow, said plug substantially conforming to the wall of said bottom hole to protect the surfaces thereof from the deteriorating effects of weather, water, oil and brine and the spike receiving hole of said plug very closely conforming to the exterior surface of said spike to prevent water and brine from corroding and rusting the spike, and thereby preventing water and brine from entering the closed bottom hole.

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