Jan. 13, 1942.  J. P. BURKE 2,269,646

GROUND ANCHOR

Filed July 11, 1940

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This invention relates to a ground anchor or so-called "dead man" and has for its primary object to provide an improved means for anchoring stay cables such as are used in conjunction with telegraph, telephone and power poles, bridge cables, and for such other uses as require the anchoring of a cable or similar means to the ground.

Use of many types of conventional ground anchors, such as some of those having hinged wing-like portions, requires that a hole be dug in order to enable placement of the anchor beneath the surface of the ground, and this hole must be large enough to permit expanding of the wing-like portions after placement of the anchor. After the anchor is so placed it is necessary to replace the soil and tamp it firmly in place. This method of placing the anchor requires considerable labor and in addition it is found that results are not satisfactory because of the fact that the soil has been disturbed and an excessive pull on the anchor will cause loosening thereof. This invention has for its object to provide a ground anchor which avoids the objections above mentioned by avoiding the necessity of digging a hole and thereby eliminating any tendency for loosening of the anchor because of the presence of disturbed soil.

More specifically, the object is to provide an anchor which may be driven into the ground by means of a sledge hammer or the like, and means for expanding a portion of the anchor after it has been driven into the ground to prevent its removal therefrom. The means for expanding the anchor comprises a tubular body weakened in predetermined regions and means for firing an explosive charge in this region in such manner that a high internal pressure is developed and expansion of the weakened portion of the tube results.

Other objects and advantages will become more fully apparent as reference is made to the accompanying drawing wherein my invention is illustrated, and in which:

Fig. 1 is an elevation of the anchor, prior to expansion thereof,
Fig. 2 is a section of the anchor, with the driving member inserted therein,
Fig. 3 is a section illustrating the explosive charge supporting and exploding means,
Fig. 4 is an elevation of the anchor in an expanded condition, and
Fig. 5 is a section illustrating a modified means for supporting and exploding an explosive charge.

The anchor comprises an elongate metal tube 1 having a pointed metal nose 2 welded thereto. The tube is weakened adjacent the nose 2 by formation of a multiplicity of grooves 3 or sawcuts, extending in parallel relationship, and in the direction of the length of the tube. At its other end the tube has external threads 4.

The anchor is driven into the ground by inserting a metal rod 5 into the tube 1 and into contact with the flat end 6 of the nose member 2, and then striking the rod with a sledge hammer or the like. The anchor could, of course, be driven into the ground by striking the end of the tube, but this would very likely injure the screw threaded end of the tube.

After the anchor is inserted in the ground a cap 6 is screwed onto its upper end. The cap 6 has an elongate tubular extension 7 integral therewith. Welded in the lower end of the extension 7 is a body 8 having an axial bore 9 slidably receiving a firing pin 10. The firing pin extends upwardly through an axial bore 11 in the cap 6 and has a head 12 secured upon its upper extremity by a pin 13. A spring 14 is interposed between the cap 6 and the head 12 and urges movement of the firing pin upwardly and normally maintains a collar 15 on the firing pin in contact with the lower side of the cap 6.

The body 8 has a screw threaded portion 16 receiving and removably supporting a shell supporting member 17 having a bore 18 for receiving a metal portion 19 of a shell 20, and a shoulder 21 for engaging a flange 22 on the upper end of the shell. The shell 20 may be imagined as being similar to a conventional percussion type, paper shot gun shell, but without projectiles of course.

To expand the anchor the head 12 is struck by a hammer or the like, thereby causing the firing pin to strike the percussion cap 24 and the latter to explode the shell. The forces created by the explosion are entirely confined in the tube 1 which, therefore, expands in its weakest region. The tube in its expanded condition is illustrated in Fig. 4, wherein it is illustrated that the metal of the tube separates along the weakened lines 3. Greater or lesser separation can be obtained by varying the amount of explosive in the charge.

After the tube 1 has been expanded the cap 6 and complete firing mechanism is removed and a cap 25 is screwed onto the upper end of the tube. The cap 25 has an eye 26 or some other suitable means for attachment of a cable or the like thereto.
In Fig. 5 there is illustrated a tubular anchor 30 constructed identical to the anchor 1. In the lower end of the tube 30 is welded an internally threaded sleeve 31 into which the shell holder 32 is screwed. The shell holder 32 is screwed onto the lower end of an elongate firing pin support 33, and the metal flange portion 36 of a shell 35 is clamped between a shoulder 36 in the shell holder 32 and the lower end of the firing pin support 33. The shell holder 32 has a groove 37 therein and a finger 38 slidably mounted on the firing pin support engages in this groove to retain the shell holder against rotation. For replacement of a shell the finger 38 is moved out of engagement with the groove 37 so that the shell holder may be unscrewed from the firing pin support.

In the support 33 is a firing pin 39 having a head 40 on its upper end and a spring 41 interposed between the head 40 and the upper end of the firing pin support to normally hold the lower end of the firing pin spaced from the percussion cap of the shell 35. The shell 35 is exploded by striking the head 40 with a hammer, and its explosion causes expansion of the tube 30 in a manner identical to that described in connection with the tube 1.

In the first described form the entire tubular anchor is subjected to the pressure of the explosion, whereas in the second described form only the lower portion is subjected to the pressure. Therefore, in the second form it is not essential that the tube be weakened by grooves such as shown at 3. However, weakening of the tube is preferred because it results in more uniform expansion.

Although specific embodiments of the invention have been illustrated and described, it will be understood that various changes may be made within the scope of the appended claims without departing from the spirit of the invention, and such changes are contemplated.

What is claimed is:

1. An explosive holder for a ground anchor comprising an elongate tubular member having a cap on one end adapted to be secured to a ground anchor to seal the same, a removable shell holder on the other end of said tubular member adapted to receive an explosive shell of the percussion type, a firing pin slidably mounted in said tubular member with one end extending through said cap and its other end disposed adjacent a shell in said holder, and a spring yieldingly holding the firing pin out of contact with the shell in the holder.

2. An explosive holder for a ground anchor comprising a cap adapted to be secured on the upper end of a ground anchor, an elongate tubular extension on said cap adapted to be supported thereby within the ground anchor, a firing pin guide on the other end of said extension, a firing pin having one end slidably disposed in said guide and its other end extended through said cap, means for securing an explosive shell on the lower end of said guide for engagement by the adjacent end of said firing pin, and a spring yieldingly holding said firing pin retracted and spaced from an explosive shell held.

3. An explosive holder for a ground anchor comprising a cap adapted to be secured on the upper end of a ground anchor, an elongate tubular extension on said cap adapted to be supported thereby within the ground anchor, a firing pin guide on the other end of said extension, a firing pin having one end slidably disposed in said guide and its other end extended through said cap, a shell supporting member removably secured at the end of said extension for supporting an explosive shell adjacent the end of said firing pin, and a spring yieldingly holding said firing pin in a retracted position.

4. An explosive holder for a ground anchor comprising a cap adapted to be secured on the upper end of a ground anchor, said cap having a tubular extension extending axially thereof and adapted to be supported by said cap in a position extending into the ground anchor on which the cap is to be secured, a firing pin guide in the lower end of said extension, a firing pin received in said guide and extending upwardly through the extension and said cap, means on said firing pin for engaging said cap to restrict upward movement of the firing pin at a point where the lower end is in said guide, a spring yieldingly holding said firing pin in its upper position, and means for securing an explosive shell on said guide for engagement by the firing pin.

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