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3,496,729

PROTECTIVE TUBE FOR CONCRETE PILE

Filed May 24, 1968

2 Sheets-Sheet 1

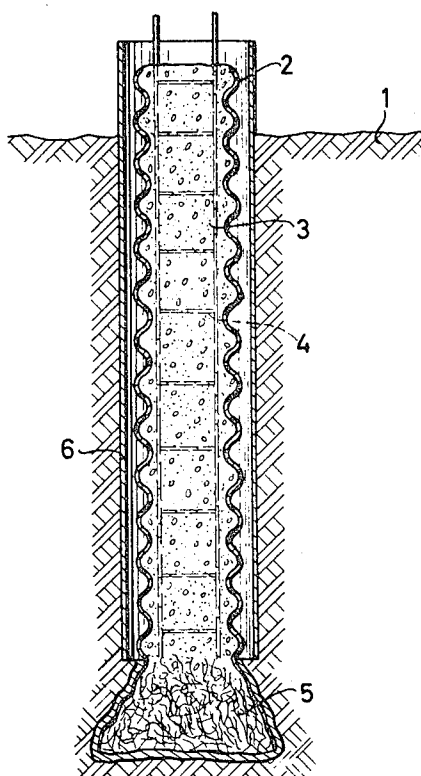


FIG. 1

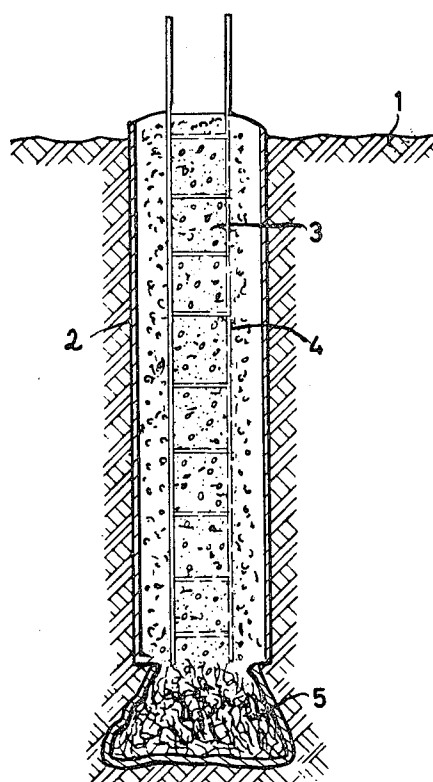


FIG. 2

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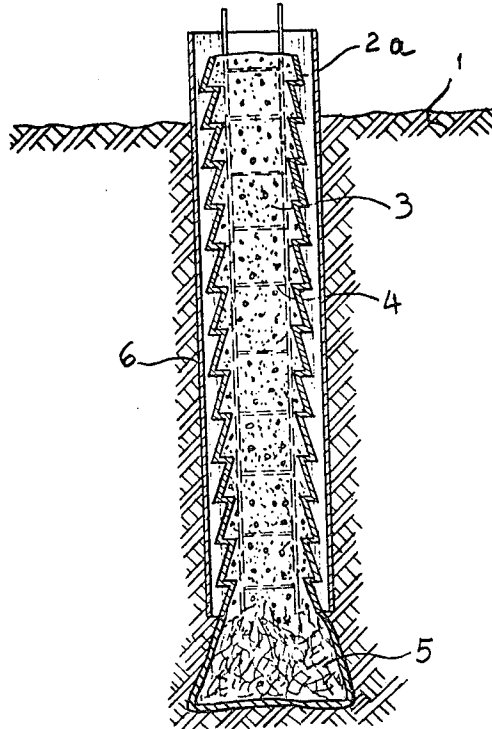


FIG. 3

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PROTECTIVE TUBE FOR CONCRETE PILE
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Continuation-in-part of application Ser. No. 553,909, May 31, 1966. This application May 24, 1968, Ser. No. 731,862

Int. Cl. E02d 5/44, 5/36

U.S. Cl. 61—53.6

4 Claims

ABSTRACT OF THE DISCLOSURE

A protective tube is located within a drilling pipe which extends into a foundation. Concrete mixture is introduced into the protective tube. Upon removal of the drilling pipe, the concrete mixture causes the protective tube to expand and to engage adjacent surfaces of the foundation. The lower portion of the protective tube is closed and has a greater expansion capacity so that a mushroom-shaped foot is formed by the concrete mixture.

The present application is a continuation-in-part of my co-pending patent application Ser. No. 553,909, filed May 31, 1966, now abandoned.

This invention relates to a protective tube which remains around a concrete pile after the concrete has set.

When making foundations and the like, it is often necessary to drill a long hole into the ground and then fill the hole with concrete which is allowed to set to form a concrete pile.

It was found that during the setting, concrete may be washed out, dissolved or otherwise damaged by certain types of ground water, particularly if it is sea water or if the water contains acids and the like.

Heretofore, attempts were made to protect the concrete pile by inserting a pipe into the hollow drill tube used for drilling the hole in the soil. When the hole is drilled, concrete is poured into this pipe, then the drill tube is removed and a casting mass is poured to fill the space between the pipe and the adjacent surfaces of the hole in the soil.

This arrangement has the drawback that the removal of the drilling pipe and the filling with the casting mass must take place simultaneously. The pipe remaining around the concrete pile has a comparatively low friction value with reference to the surrounding soil so that the carrying capacity of the concrete pile is substantially determined by the pressure of the lower end of the pile upon the soil.

An object of the present invention is to improve the prior art procedure by eliminating the necessity of using a casting mass, by providing a higher friction value between concrete and soil and in general by simplifying the method of producing a concrete pile.

Other objects will become apparent in the course of the following specification.

In the accomplishment of the objectives of the present invention it was found desirable to provide a protective tube consisting of a stretchable or expandible material, preferably a plastic material, including a plastic textile material. Furthermore, the outer surface of the tube is made of wavelike, rhomblike or similar curved configuration so that it can expand easily into a cylindrical tube of larger cross-sectional area. Tubes of plastic material are preferred since their edges can be easily welded together on location, so that the size and length of the tubes can be easily adapted to the size of the drill tubes and the depth of the hole. These tubes can be inserted into the drill tubes without any difficulty and the drill tubes can be easily removed after the pouring of concrete. There-

upon the soil settles against the enlarged surface of the protective tube so that a high friction value between the concrete pile and the enclosing soil is produced.

According to a further feature of the present invention the lower end of the protective tube has the shape of a bag with greater expanding capacity than the rest of the tube, being made, for example, of a plastic textile material. When it is filled with a liquid concrete mixture, the bag will expand and when concrete solidifies, the pressure of the pile will produce a mushroom-shaped pile foot which will greatly contribute to the stability of the pile.

The invention will appear more clearly from the following detailed description when taken in connection with the accompanying drawings, showing by way of example, preferred embodiments of the inventive idea.

In the drawings:

FIGURE 1 is a vertical section showing the filling of a protective tube with concrete prior to the removal of the drill tube.

FIGURE 2 is a section showing the same protective tube after the removal of the drill tube.

FIGURE 3 is a section similar to that of FIG. 1, but showing a protective tube of a somewhat different shape.

As shown in the drawings, initially a hollow drill tube 6 is drilled into the soil 1 to make a drill hole of the desired size and depth. Then an expandible tube 2 of plastic material is introduced into the interior of the drill tube 6.

In the example shown in FIG. 1 the tube 2 has outer wave-like surfaces. Initially the outer surface of the tube 2 are located at a distance from the inner surfaces of the drill 6.

In the example shown in FIG. 3 the tube 2a has outer surfaces shaped as saw teeth with horizontal lower flanges. In all other respects the arrangement of FIG. 3 is the same as that of FIG. 1.

It is apparent that the protective tube may have outer surfaces of various other shapes the purpose of which is to facilitate the expansion of the tube.

The lower end of each protective tube is closed by a bag 5 consisting preferably of a textile material with plastic threads which has a greater capacity to expand than the rest of the tube.

Then the usual reinforcement 4 and a concrete mixture 3 are inserted into the protective tube. FIGS. 1 and 3 show the process at the moment when the concrete is being poured in and before the protective tube has begun to expand, primarily to illustrate the initial shape of the tubes. Obviously, the tubes will begin to expand as soon as concrete has been poured in. However, the drill tube 6 can be quickly and easily removed before the pressure of the walls of the protective tube will become effective. It is also possible to pour an additional amount of concrete after the removal of the drill tube.

In the final condition shown in FIG. 2 the protective tube 2 presses with all its outer surfaces against the surrounding layers of soil 1. However, the initial curved shape of the outer surfaces of the tube may increase the friction value as far as the surrounding soil is concerned. The lower bag 5 will be enlarged to a greater extent under the weight of the concrete column, so that when concrete is solidified, a mushroom-like foot will be formed at the bottom of the concrete pile.

It is apparent that the protective tube remaining around the concrete pile will effectively protect the pile against detrimental effect of water, including salt water, acid-containing water and the like.

It is further apparent that the examples described above have been given merely by way of illustration and not by way of limitation and that they are capable of many variations and modifications within the scope of the present invention.

3

What is claimed is:

1. A protective tube for a concrete pile adapted to be inserted into a drill tube and thereafter to be filled with hardenable concrete, said protective tube comprising a body portion formed of expandible material so that the diameter of said protective tube is greater than that of said drill tube after removal of said drill tube, and a closed lower portion with greater expansion capacity than the remaining portion of the tube, whereby when filled with hardenable concrete under pressure, the lower portion becomes substantially wider than the remaining portion of the tube.

2. A protective tube as set forth in claim 1, wherein said tube is formed of material selected from the class consisting of plastic materials and textile materials.

3. A protective tube as set forth in claim 1, wherein the outer side of the tube is wave-shaped.

4

4. A protective tube as set forth in claim 1, the outer side of the tube wall being formed in saw tooth shape and having horizontal lower flanges.

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U.S. Cl. X.R.

61—53.62, 53.64