

Method and apparatus for forming a reinforced concrete pile in an earth situs.

The invention relates to a method for forming a reinforced concrete pile in an earth situs, in which a hollow-shafted auger provided with a helical blade is screwed into the earth situs and in which reinforcing rods are introduced into the hole by means of said auger, whilst concrete is fed into the hole through the hollow-shaft of the auger as the auger is withdrawn from the hole during which withdrawal the reinforcing rods are caused to remain in the concrete in the hole.

Such a method is known from U.S. specification 3.464.216. According to said known method at the end of the drilling operation reinforcing rods are inserted through the interior of the hollow shaft of the auger and in doing this are used to disconnect the driving bit from the auger when the latter is withdrawn. The disadvantage of said known method accordingly is that the reinforcing rods are concentrated too far from the outer side of the pile which means too far from the region where they are needed to take up stress during bending of the pile whilst furthermore with the construction of each pile the drill bit is lost and a new one has to be used.

Purpose of the invention is to provide a method by means of which said disadvantages are avoided.

According to the invention this purpose is achieved in that the helical blade of the auger is provided with series of aligned openings or indents through which during the drilling operation bars or pipes extend, that prior to the withdrawal of the auger and the introduction of the concrete the reinforcing rods are placed so as to extend through the series of aligned openings or indents or through the pipes and that during the introduction of the concrete the auger is non-rotatably withdrawn whilst the reinforcing rods are caused to remain in the hole.

This means that during the drilling operation an auger is used, the turns of the blade of which are coupled to each other in the longitudinal direction of the auger by bars or pipes which have to cooperate with the rotating auger and which therefore, have to move with respect to the earth present between the turns of the helical auger blade. Surprisingly it was found that this did not lead to problems and that the auger is properly filled with earth with only the earth which is substantially outside the rods or pipes but within the circumference of the auger being slightly stirred.

When the auger in this way has been properly installed at its required depth the bars could be replaced by the reinforcing rods which are necessary for the concrete pile. This replacement of the bars by the reinforcing rods can be taken into consideration when there is a risk that during the drilling operation a comparative thin reinforcing rod might bend. To avoid this during drilling thick bars can be used

which are withdrawn when the drilling has been completed and which are then replaced by the reinforcing rods.

Naturally the bars are preferably the reinforcing rods which remain in the hole when the auger is being withdrawn. When pipes are used the reinforcing rods are passed there-through before the auger is withdrawn. Said pipes can contain the reinforcing rods already during the drilling operation but said rods can also be inserted at the end of the drilling operation.

The withdrawing takes place without rotation so that the rods for reinforcing the concrete of the pile remain in their proper position.

It is thus achieved that the concrete supplied through the hollow core of the auger surrounds the reinforcing rods when they are already positioned in the hole.

Due to the fact that the reinforcing rods with the method of the invention are placed outside the hollow shaft of the auger they can be located at the proper place with respect to the outer wall of the concrete pile and it is not necessary to provide the auger with a removable drill bit which remains in the hole. If a drill bit is used it can be used again and again because it forms an integral part of the auger.

It is observed that from U.S. specification 4.022.286 an auger is known having a hollow shaft and a helical blade which helical blade at its outer edge has been provided with a plurality of indents which in a direction parallel to the axis of the hollow shaft are in line. Said recesses are at the location of spray means having their outlet opening at their inner edge of the indent.

The invention will now be elucidated more in detail with reference to the accompanying drawings, where:

Fig. 1 illustrates one embodiment of the method with an apparatus in accordance with the invention; and

Fig. 2 illustrates a variant.

In Fig. 1, a diagrammatic representation of part of a framework is indicated by reference numeral 1 and the gear case 2 of the auger is movable in vertical direction along said framework. The auger 3 comprises a hollow core or shaft 4 and communicates with a hose 5 through casing 2; concrete is fed through said hose. The hollow core is surrounded by a helical blade 6 which, preferably, constitutes a continuous helical line. Pipes 7 and 8 pass through a series of openings running parallel to the centre line of the auger and a reinforcing rod 9 may be inserted into said pipes.

When the borehole has its requisite depth, as shown in Fig. 1, rods 9 are positioned within pipes 7 and 8 and in other pipes, if required, whereupon the auger is non-rotatably withdrawn while leaving the rods behind in the hole; simultaneously, said hole is filled by feeding

concrete into the bottom of the hole through hose 5 and hollow core 4.

Instead of pipes, it is also possible to provide the helical blade with indents 10 or openings 11 (Fig. 2). During the drilling operation there are bars in said openings or indents and, preferably, they are reinforcing rods which remain behind in the hole when the auger is withdrawn.

At their lower ends, the pipes may be closed, e.g. by a plug, said plug being removed by the rods. It is now possible to install clean rods, i.e. which are not fouled by earth, and thus the adhesion between rods and concrete will be improved.

It is also possible to carry out sounding tests through the pipes in order to check the assumed bearing capacity of the floor of the borehole.

Claims

1. A method for forming a reinforced concrete pile in an earth situs, in which a hollow-shafted auger (3) provided with a helical blade (6) is screwed into the earth situs and in which reinforcing rods (9) are introduced into the hole by means of said auger, whilst concrete is fed into the hole through the hollow-shaft (4) of the auger as the auger is withdrawn from the hole, during which withdrawal the reinforcing rods are caused to remain in the concrete in the hole, characterized in that the helical blade (6) of the auger (3) is provided with series of aligned openings (11) or indents (10) through which during the drilling operation bars or pipes (7) extend, that prior to the withdrawal of the auger and the introduction of the concrete the reinforcing rods (9) are placed so as to extend through the series of aligned openings (11) or indents (10) or through the pipes (7) and that during the introduction of the concrete the auger is non-rotatably withdrawn whilst the reinforcing rods (9) are caused to remain in the hole.

2. Method according to claim 1, characterized in that the bars present in the openings (11) or indents (10) during the drilling operation are the reinforcing rods (9) which remain in the hole.

3. Auger for applying the method according to claim 1 comprising a hollow shaft (4) and a helical blade (6), characterized in that pipes (7) are secured in series of aligned openings (11) or indents (10) provided in the helical blade (6), said pipes running parallel to the center line of the auger and having a length which is substantially the same as the length of the auger, each pipe having a bore adapted to receive a reinforcing rod (9).

Revendications

1. Un procédé pour réaliser un pieu en béton armé dans un emplacement terrestre, dans lequel une tarière à arbre creux (3) pourvue d'une lame hélicoïdale (6) est vissée dans l'em-

placement terrestre et dans lequel des tiges d'armature (9) sont introduites dans la cavité au moyen de ladite tarière, tandis que du béton est introduit dans la cavité par l'arbre creux (4) de la tarière lorsque la tarière est retirée de la cavité, retrait pendant lequel les tiges d'armature sont amenées à rester dans le béton de la cavité, caractérisé en ce que la lame hélicoïdale (6) de la tarière (3) est pourvue de séries d'ouvertures (11) ou d'échancrures (10) alignées à travers lesquelles, pendant l'opération de forage, des barres ou des tuyaux (7) s'étendent, qu'avant le retrait de la tarière et l'introduction du béton, les tiges d'armature (9) sont disposées de façon à s'étendre à travers les séries d'ouvertures (11) ou d'échancrures (10) alignées ou à travers les tuyaux (7) et que pendant l'introduction du béton, la tarière est retirée de façon non-rotative tandis que les tiges d'armature (9) sont amenées à rester dans la cavité.

2. Procédé selon la revendication 1, caractérisé par le fait que les barres présentes dans les ouvertures (11) ou les échancrures (10) pendant l'opération de forage sont les barres d'armature (9) qui restent dans la cavité.

3. Tarière pour l'application du procédé selon la revendication 1, comportant un arbre creux (4) et une lame hélicoïdale (6), caractérisée en ce que des tuyaux (7) sont fixés dans des séries d'ouvertures (11) ou d'échancrures (10) alignées prévues dans la lame hélicoïdale (6), ces tuyaux étant disposés parallèlement à la ligne centrale de la tarière et présentant une longueur qui est pratiquement la même que la longueur de la tarière, chaque tuyau ayant un trou adapté pour recevoir une tige d'armature (9).

Patentansprüche

1. Verfahren zur Herstellung eines Stahlbetonortspfähles, in dem ein mit einer Hohlwelle versehener Bohrer, der mit einer schraubenförmigen Klinge (6) versehen ist, in die Erde geschraubt wird, und in dem ein verstärkender Stangenzug (9) in das Loch eingeführt wird mit Hilfe des besagten Bohrers, während der Beton in das Loch eingefüllt wird durch den Hohlkern (4) des Bohrers, wenn der Bohrer zurückgezogen wird aus dem Loch, wobei während des Herausziehens der verstärkende Stangenzug in dem Beton in dem Loch zurückgelassen wird, dadurch gekennzeichnet, daß die schraubenförmige Klinge (6) des Bohrers (3) versehen ist mit einer Reihe von in einer Linie liegenden Öffnungen (11) oder Einkerbungen (10), durch die während des Bohrverfahrens Stangen oder Röhren (7) eingeführt werden, daß vor dem Herausziehen des Bohrers und der Einfüllung des Betons der verstärkende Stangenzug (9) so plaziert wird, daß er durch die Reihen der in einer Linie liegenden Öffnungen (11) oder Einkerbungen (10) führt oder durch die Röhren (7) und daß während der Einfüllung des Betons der Bohrer, ohne sich zu drehen, herausgezogen



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concrete into the bottom of the hole through hose 5 and hollow core 4.

Instead of pipes, it is also possible to provide the helical blade with indents 10 or openings 11 (Fig. 2). During the drilling operation there are bars in said openings or indents and, preferably, they are reinforcing rods which remain behind in the hole when the auger is withdrawn.

At their lower ends, the pipes may be closed, e.g. by a plug, said plug being removed by the rods. It is now possible to install clean rods, i.e. which are not fouled by earth, and thus the adhesion between rods and concrete will be improved.

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3. Auger for applying the method according to claim 1 comprising a hollow shaft (4) and a helical blade (6), characterized in that pipes (7) are secured in series of aligned openings (11) or indents (10) provided in the helical blade (6), said pipes running parallel to the center line of the auger and having a length which is substantially the same as the length of the auger, each pipe having a bore adapted to receive a reinforcing rod (9).

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wird, während der verstärkende Stangenzug (9) in dem Loch zurückgelassen wird.

2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß die Stangen, die während des Bohrverfahrens in den Öffnungen (11) oder Einkerbungen (10) sind, den verstärkenden Stangenzug (9) bilden, der in dem Loch zurückbleibt.

3. Bohrer zur Durchführung des Verfahrens nach Anspruch 1, der einen Hohlkern (4) und eine schraubenförmige Klinge (6) enthält, da-

durch gekennzeichnet, daß Röhren (7) in Reihen von in einer Linie angebrachten Öffnungen (11) oder Einkerbungen (10), die in der schraubenförmigen Klinge (6) sind, befestigt sind, wobei die besagten Röhren parallel zu der Mittellinie des Bohrers verlaufen und eine Länge haben, die weitgehend die selbe ist wie die Länge des Bohrers, wobei jede Röhre einen Durchmesser hat, der passend ist, um einen verstärkenden Stangenzug (9) aufzunehmen.

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