

"SCREW DRILL FOR THE MANUFACTURING OF CONCRETE
FOUNDATION PILES"

1 The invention relates to a screw drill for the
manufacturing of concrete foundation piles, comprising
a hollow core which is open at its top and bottom and
which is surrounded by a helical drilling blade which
5 extends radially outside the core and which at its
lower end extends towards the drill tip formed by the
core, and the drill having, at its upper end, means for
connecting the drill to a driving device.

A screw drill of this type is generally known. The
10 core of this known screw drill has the same inner and
outer diameter over its entire length and the outer
diameter of the helical blade is the same over the entire
length with the exception of its portion adjacent to
the drill tip. A hole is drilled into the soil with
15 the aid of such a screw drill which hole is filled with
concrete during the withdrawal of the drill by pouring
the concrete through the hollow core.

During the drilling operation a hole is formed whose
side walls of which have little or no strength and are
20 disturbed by the drilling operation. During drilling,
layers of insufficient supporting strength such as peat
moor, are drilled through and at those places subsidence
or deformation of the wall of the hole easily can take
place.

25 During the withdrawal of the drill one always has
to take care that the concrete pressure within the space
below the drill is larger than the pressure of the soil.
If this is not done the soil around the drilled hole
can be pressed inwardly by the pressure of the surroun-
30 ding soil and locally constrictions of the concrete

1 column can be formed.

However, outwardly bulging portions can be formed as well if the soil is soft to a degree such that it behaves like a viscous substance having a specific weight which is considerably smaller than the specific weight of the concrete.

The concrete column formed in the hole then cannot maintain its form; the concrete mass will move downwardly so that the concrete pile at the under end is much wider and is very small at the upper end.

The object of the invention is to provide a screw drill by means of which a hole and accordingly a concrete pile can be manufactured which avoids the abovementioned problem.

To this end, and from one aspect, the present invention consists in a screw drill for the manufacturing of concrete foundation piles, comprising a hollow core which is open at its top and bottom, and which is surrounded by a helical drilling blade which extends radially outside of the core and which at its lower end extends towards the drill tip formed by the core, and the drill having at its upper end means for connecting the drill to a driving device, characterized in that the outer surface of the core at a distance from the drill tip conically increases in diameter in the upward direction until a diameter is reached which is at least in the order of magnitude of the outer diameter of the drill blade, and in that the outer diameter of the drill blade with the exception of its lower end remains substantially the same throughout the axial length of the drill

1 blade.

By means of the conical increase in diameter of the outer surface of the core, the soil which is moved upwardly by the drill blade is pressed away laterally so that compression of the soil around the drilled hole is obtained having sufficient slide resistance to support the concrete column during the filling up until the concrete is sufficiently hardened. The condensed wall of the hole on one side is able to withstand the pressure of the soil and on the other side the pressure of the concrete.

Preferably, the conical portion of the core leads into an upper cylindrical portion, with the helical blade advantageously terminating upon the conical portion. This cylindrical portion maintains the already formed hole and this effect is increased further if the cylindrical portion has a diameter which is greater than the outer diameter of the drilling blade. The upper region of the conical portion and the cylindrical portion condense the hole wall due to the fact that the cylindrical portion makes a larger hole diameter than the drilling blade. The latter takes care for the supply of loosened soil which also in this case is pressed away laterally into the wall of the hole.

It is observed from the specification of published Dutch patent application No. 7408154 that it is known to solve the problem of the present invention by placing a flexible bag into the hole during the withdrawal of the drill so that the bag surrounds the poured in concrete. However with this different way of solving

1 this problem undesirable shapes of the pile cannot completely be avoided.

With the known screw drill it is common practice to drill until the supporting layer has been reached
5 and a sufficient core resistance is measured in the order of magnitude of 10 kg/cm^2 . Thereafter the drill is withdrawn whilst concrete is supplied with the abovementioned disadvantages.

With the drill constructed according to the invention another method is possible and desirable, in that
10 it is useful to drill down to depth where the drill has penetrated the supporting layer with its conical core portion before the drill is withdrawn. This means that the wall of the hole is condensed down to the supporting
15 layer. The drill itself penetrates in the supporting layer more than is usual but the above described problem with respect to the wall of the hole does not occur in the supporting layer.

Accordingly, from another aspect, the present
20 invention consists in a method of applying any of the screw drills defined above and having a conical core portion, for the manufacturing of concrete foundation piles by drilling with the drill into a supporting layer and subsequently supplying concrete through the
25 hollow core during the withdrawal of the drill, characterized in that the drill is moved with its conical core portion into the supporting layer before the withdrawal and the supply of concrete takes place.

In order that the invention may be more readily
30 understood reference will now be made to the

- 1 accompanying drawing which shows one embodiment
located in a hole formed by the drill in the soil.

The drill is formed by a hollow core 1 of tubular
form surrounded by a helical blade 2. In its upper
5 part the core 1 widens into a conical portion 3
followed by a smooth cylindrical portion 4. At its
upper end, the helical blade 2 terminates upon the
conical portion 3. The cylindrical portion 4 has a
diameter which is greater than that of the helical
10 blade 2.

The reference 5 denotes a known driving device
for the drill and the reference 6 a known filling hose
for concrete.

As the drill is driven downwards into the soil,
15 loosened soil is moved upwardly by the helical blade
2, with the conical portion 3 preventing the loosened
soil from moving above the soil surface 7. The
loosened soil is pressed away laterally and during
further downward movement of the drill the cylindrical
20 wall 4 smoothes the wall 8 of the hole formed by the
passage of the drill through the soil. The interr-
upted line 9 indicates the supporting layer and accord-
ing to the invention drilling can now be continued to
a depth at which the conical portion 3, preferably at
25 the location of the transition into the cylindrical
portion 4, has been moved down to the layer 9.



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CLAIMS

- 1 1. A screw drill for the manufacturing of concrete
foundation piles, comprising a hollow core which is
open at its top and bottom, and which is surrounded
by a helical drilling blade which extends radially
5 outside of the core and which at its lower end extends
towards the drill tip formed by the core, and the drill
having at its upper end means for connecting the drill
to a driving device, characterized in that the outer
surface of the core at a distance from the drill tip
10 conically increases in diameter in the upward direction
until a diameter is reached which is at least in the
order of magnitude of the outer diameter of the drill
blade, and in that the outer diameter of the drill
blade with the exception of its lower end remains
15 substantially the same throughout the axial length of
the drill blade.
2. A screw drill according to claim 1, characterized
in that the conical portion of the core leads into an
upper cylindrical portion having a smooth outer surface.
- 20 3. A screw drill according to claim 2, charact-
erized in that the cylindrical portion has a diameter
which is greater than the outer diameter of the drilling
blade.
4. A screw drill substantially as hereinbefore des-
25 cribed with reference to the accompanying drawing.
5. A method of applying the screw drill according to
any one of claims 1 to 4, for the manufacturing of
concrete foundation piles by drilling with the drill
into a supporting layer and subsequently supplying
30 concrete through the hollow core during the withdrawal



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1 of the drill, characterized in that the drill is moved with its conical core portion into the supporting layer before the withdrawal and the supply of concrete takes place.

5 6. A method of drilling substantially as hereinbefore described with reference to the accompanying drawing.

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