Claims

1. A tool for forming an underground cast-in-situ pile having an enlarged base, the tool comprising:

a first pile-forming member having a first base-forming member at a lower end thereof;

a second pile-forming member having a second base-forming member at a lower end thereof, the pile-forming members extending collinearly and being movable in a longitudinal direction relative to one another between:

a digging state wherein the base-forming members are proximate to one another so that together, they define a leading helix of the tool such that the pile-forming members can be driven underground to form an elongate hole underground having a first diameter; and

a base-forming state wherein the base-forming members are spaced from one another in the longitudinal direction so as to form an underground void between the first and second base-forming members at a depth of the elongate hole, the void having a second diameter that is greater than the first diameter and being fillable with a flowable fill to form the enlarged base of the underground cast-in-situ pile; and

a jack screw means, wherein rotation of which causes relative longitudinal movement between the pile-forming members.

2. The tool of claim 1, wherein the jack screw means is threadingly engaged with the first pile-forming member such that rotation of the jack screw means in one direction moves the pile-forming members into the digging state, and rotation of the jack screw means in the opposite direction moves the pile-forming members into the base-forming state.

3. The tool of claim 2, wherein the jack screw means and the second pile-forming member are rotatable, but not longitudinally movable, relative to one another.

4. The tool of claim 3, wherein the second pile-forming member comprises a collar via which the jack screw means is secured to restrict relative longitudinal movement therebetween, and wherein a thrust bearing is disposed between the jack screw and the second pile-forming member to enable relative rotation therebetween.

5. The tool of claim 1, further comprising limiting means for limiting the extent to which the base-forming members can be spaced from one another.

6. The tool of claim 5, wherein the limiting means comprises a collar extending from the jack screw means, and wherein when the pile-forming members are moved into the base-forming state, the first pile-forming member engages the collar, thereby limiting longitudinal movement between the pile-forming members which would further increase the space between the base-forming members.

7. The tool of claim 1, wherein the pile-forming members are telescopically arranged and configured such that one pile-forming member cannot be rotated independently of the other pile-forming member.

8. The tool of claim 1, wherein:
the first pile-forming member is a first screw pile;
the second pile-forming member is a second screw pile;
the first base-forming member is a first helix; and
the second base-forming member is a second helix.

9. The tool of claim 8, wherein in the digging state, the first and second helices are engaged with one another to define the leading helix of the tool.

10. The tool of claim 1, wherein:
the first pile-forming member is a first blade pile;
the second pile-forming member is a second blade pile;
the first base-forming member is a first blade; and

the second base-forming member is a second blade.

11. The tool of claim 1, wherein:

the first diameter is approximately equal to a diameter of the first pile-forming member and/or a diameter of the second pile-forming member; and

the second diameter is approximately equal to a diameter of the first base-forming member and/or a diameter of the second base-forming member.

12. A method of forming an underground cast-in-situ pile having a shaft and an enlarged base, the method using a tool comprising:

a first pile-forming member having a first base-forming member at a lower end thereof;

a second pile-forming member having a second base-forming member at a lower end thereof, the pile-forming members extending collinearly and being movable in a longitudinal direction relative to one another between:

a digging state wherein the base-forming members are proximate to one another so that together, they define a leading helix of the tool such that the pile-forming members can be driven underground to form an elongate hole having a first diameter; and

a base-forming state wherein the base-forming members are spaced from one another in the longitudinal direction so as to form an underground void between the first and second base-forming members at a depth of the elongate hole, the void having a second diameter that is greater than the first diameter and being fillable with a flowable fill to form the enlarged base of the underground cast-in-situ pile,

the method comprising:

(a) when the pile-forming members are in the digging state, driving the pile-forming members underground to a predetermined depth to form the elongate hole;

(b) moving the pile-forming members towards the base-forming state to form the underground void at the depth of the elongate hole;

(c) while moving the pile-forming members towards the base-forming state, supplying the flowable fill to the void so as to form the enlarged base of the underground cast-in-situ pile; and

(d) driving the pile-forming members out of the ground while supplying the flowable fill underground to form the shaft of the cast-in-situ pile.

13. The method of claim 12, wherein step (b) further comprises:

(i) while moving the pile-forming members towards the base-forming state, determining the magnitude of a force required to move the pile-forming members towards the base-forming state;

(ii) if the magnitude of the determined force is below a threshold amount, repeating steps (a) and (b) at a deeper depth underground until the magnitude of the determined force is equal to or greater than the threshold amount; and

(iii) when the magnitude of the determined force is equal to or greater than the threshold amount, continuing to move the pile-forming members towards the base-forming state while supplying the flowable fill to the void to form the enlarged base.

14. The method of claim 13, wherein the force relates to a torque force applied to a jack screw means of the tool configured to move the pile-forming members towards the base-forming state.

15. The method of claim 14, wherein the force relates to an axial force carried by one or both pile-forming members.