~~METHOD AND APPARATUS FOR DRIVING A PILE INTO A SUBSTRATE~~

DESCRIPTION

< Further, US 4102094A discloses a pile guide according to the preamble of claim 1.>

The present invention relates to a method and apparatus for driving a pile into a substrate, particularly but not exclusively an uneven or undulating underwater substrate with localised variations in level.

It is known to provide pile guides for underwater piling, see for example, Sea Steel Limited's range of pile guides as described in WO99/11872 (Fast Frame pile guide), WO01/92645 (Finned Frame/Follower pile guide), WO03/074795 (Orientation Control pile guide) and WO2009/024739 (Inclined Frame pile guide). <-> However, such pile guides are not ideally suited for driving a pile into an uneven or undulating underwater substrate with localised variations in level. This is because such an underwater substrate will have a tendency to support the pile guide at different

CLAIMS

1. A pile guide (10) for supporting a pile as it is driven into a substrate, comprising:

a base frame (12) having a planar substrate-engaging surface (14); and

a pile guide member (16) configured to guide a pile in a predetermined direction therethrough as it is driven into a substrate, the pile guide member (16) being mounted on the base frame (12) *via* a plurality of support members (20) extending therebetween, with at least one of the plurality of support members (20) having an adjustable length to enable the predetermined direction to be varied relative to the planar substrate-engaging surface (14) of the base frame (12), and with the or each adjustable-length support member(20) comprising a joint assembly (30) having a first part (32) coupled to the base frame (12) and a second part (34), rotatable relative to the first part (32), coupled to the pile guide member (16);

characterised in that ~~at least one of the plurality of support members has an adjustable length, with length adjustment of the or each support member enabling the predetermined direction to be varied relative to the planar substrate-engaging surface of the base frame~~ one part of the joint assembly (30) comprises an at least partially spherical member (50) with an elongate member (52) extending therefrom, and the other part of the joint

assembly comprises a housing (40) in which the at least partially spherical member (50) is rotatably mounted.

2. A pile guide (10) according to claim 1, in which the plurality of support members (20) comprise at least three support members.

3. A pile guide (10) according to claim 2, in which each support member (20) has an adjustable length.

4. A pile guide (10) according to claim 3, in which the at least three adjustable length support members (20) are spaced around the pile guide member (16) to enable components of the predetermined direction to be varied in two different planes each perpendicular to the planar substrate-engaging surface (14) of the base frame (12).

5. A pile guide (10) according to claim 4, in which the two different planes are mutually orthogonal.

~~6. A pile guide member according to any one of the preceding claims, in which the or each adjustable-length support member comprises a joint assembly having a first part coupled to the base frame and a second part, rotatable relative to the first part, coupled to the pile guide member.~~

~~7. A pile guide according to claim 6, in which one part comprises an at least partially spherical member with an elongate member extending therefrom, and the other part comprises a housing in which the at least partially spherical member is rotatably mounted.~~

~~8~~6. A pile guide (10) according to claim ~~7~~1, in which the at least partially spherical member (50) has a bore (54) extending therethrough for slidably receiving at least part of the elongate member (52).

~~9~~7. A pile guide ~~member~~ (10) according to claim ~~7~~1 or claim ~~8~~2, in which the pile guide member (16) comprises two portions (110, 112), each pivotally movable about a respective pivot axis between an operative position and an inoperative position, with the pivot axis of one portion being defined by the elongate member (52) extending from the at least partially spherical member (50).

~~10~~8. A method of driving a pile into a non-level substrate, comprising:

providing a pile guide (10) according to any one of claims 1 to ~~9~~7;

positioning the pile guide (10) with the planar substrate-engaging surface (14) of the base frame (12) resting on the non-level substrate; and

adjusting the or each support member (20) with an adjustable length to tilt the pile guide member (16) relative to the base frame (12) such that the predetermined direction is aligned substantially vertically when the planar substrate-engaging surface (14) of the base frame (12) rests on the non-level substrate.