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NL-2587 BN 's-Gravenhage (NL)**(54) **Pile coupling for prefabricated pile elements made of concrete.**

(57) A pile coupling for prefabricated pile elements (1, 1') made of concrete, each comprising, at the end to be coupled, a cast-in metal sleeve (2, 2'), each sleeve (2, 2') being of a wavy design and having a length of at least one complete wave period (a). The wave form (3) at the location of the wave crest on the end face (4, 4') of the pile element (1, 1') is extended over a certain distance (x), such that when the end faces (4, 4') butt on each other, the

distance between the wave troughs (14, 14') located on both sides of the joint face is greater than the wave period (a). Two half clamping rings (6), provided with a corresponding, regular wave profile (3) and having a length of at least two wave periods (a), are clamped around the metal sleeves (2, 2'), the arrangement being such that the end faces (4, 4') of the pile elements (1, 1') are pressed against each other with pretension.

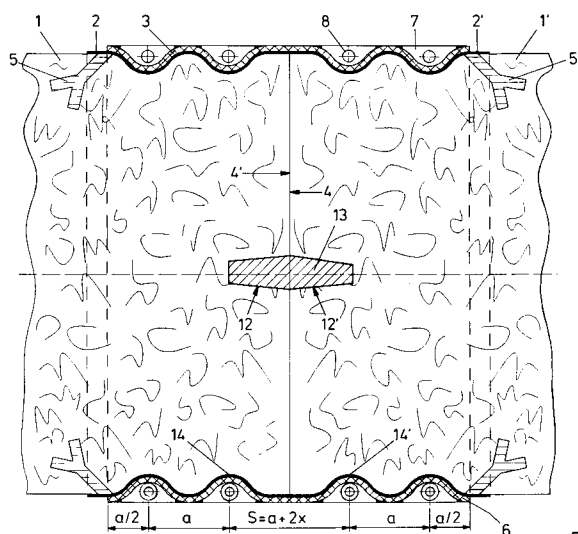


FIG.1

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The invention relates to a pile coupling for prefabricated pile elements made of concrete, each comprising, at the end to be coupled, a cast-in metal sleeve, which metal sleeves are interconnectable.

For providing foundation piles in the ground, prefabricated pile elements of high-grade concrete can be used, such as for instance disclosed in DE-OS 21.20.691. For reasons of manufacture and transport, the length of these prefabricated pile elements is limited to approximately 20-25 m. If the bearing ground layers are located at a greater depth below the ground level than the length of these conventional, prefabricated pile elements, these pile elements must be coupled in any way so as to form a pile element of a sufficient length.

A pile coupling of the above-described type is known from practice. When a first prefabricated pile element has been driven into the ground for the larger part, a second pile element is coupled thereto by welding together the metal sleeves which are cast in at the ends of the pile elements to be coupled. In itself, such a pile coupling is relatively cheap; however, welding together the cast-in metal sleeves requires quite some time and, moreover, should be carried out while the pile-driving rig is stationary, which is undesired because it is expensive. Moreover, the thus obtained pile coupling has poor resistance to tensile stresses acting on the weld, which may give rise to cracks so that the prefabricated pile elements become loose from each other, which has a very adverse impact on the bearing capacity and the reliability of the thus formed foundation pile.

The object of the invention is to provide a pile coupling of the above-described type, wherein these drawbacks have been overcome. According to the invention, this object is realized by providing a pile coupling in which each sleeve is of a wavy design and has a length of at least one complete wave period, the wave form at the location of the wave crest on the end face of the pile element being extended over a certain distance, such that when the end faces butt on each other, the distance between the wave troughs located on both sides of the joint face is greater than the wave period, and two half clamping rings, provided with a corresponding, regular wave profile and having a length of at least two wave periods, are clamped around the metal sleeves, the arrangement being such that the end faces of the pile elements are pressed against each other with pretension.

In this manner, a pile coupling is obtained which is extremely reliable and which, moreover, can be provided very quickly, so that the pile-driving rig will be stationary only for a short period. According to the invention, the prefabricated pile elements to be coupled are pressed against each

other with pretension.

One embodiment of the pile coupling according to the invention will be further explained with reference to the accompanying drawings. In these drawings:

Fig. 1 shows two end faces, abutting against each other, of prefabricated pile elements made of concrete, provided with the pile coupling according to the invention;

Fig. 2 shows a detail, in section, of the pile coupling according to Fig. 1; and

Fig. 3 is a side elevation of the pile coupling according to Fig. 1.

Fig. 1 shows the ends of two prefabricated pile elements 1, 1', whose end faces 4, 4' abut against each other. Provided in the two end faces 4, 4' are recesses 12, 12' for accommodating therein a guide dowel 13. Each pile end comprises a cast-in metal sleeve 2, 2', both sleeves having a wavy profile. The wave form 3 is chosen such that it can readily be provided, through a rolling operation, in the sleeves 2, 2'. The wave form 3 is for instance sinusoidal or trapezoidal. The length of each sleeve 2, 2' is at least one complete wave period a , however preferably at least two complete wave periods. By means of anchors 5, 5', the sleeves 2, 2' are anchored in the prefabricated pile elements 1, 1'.

At the location of the joint face 4, 4' of the two pile elements 1, 1', the wave form 3 slightly deviates from the regular wave form. At the wave crest, located in the joint face 4, 4', the wave form is extended over a distance x . This means that the wave troughs 14, 14', located on both sides of the joint face 4, 4', are spaced apart at a distance greater than one complete wave period a and is for instance $S = a + 2x$, the distance x preferably being approximately 0.5-1 mm.

The coupling further comprises two half clamping rings 6, provided with a wave profile 3 corresponding to the wave profile provided in the sleeves 2, 2'. The length of the two half rings approximately corresponds to twice the length of a metal sleeve 2, 2'. At the location of the joint face 4, 4', the wave form of the half clamping rings 6 deviates from the wave form 3 of the sleeves 2, 2' in the sense that the distance between the wave troughs on both sides of the joint face 4, 4' is equal to one wave period a of the wave profile 3 of the sleeves 2, 2' or even somewhat smaller. At the ends, viewed in circumferential direction, each half clamping ring 6 is provided with clamping blocks 7, secured in the wave troughs by welding and provided with drilled holes 8. For clamping the two ring halves 6 around the sleeves 2, 2', bolts 9 are passed through the drilled holes 8 of the clamping blocks 7 and tightened by means of nuts 10.

As explained hereinabove, the distance between the wave troughs 14, 14' on both sides of the joint face 4, 4' of the two sleeves 2, 2' equals $S = a + 2x$, while the spacing between the corresponding wave troughs in the half clamping rings 6 is smaller than this distance S. When the two ring halves 6 are placed on the sleeves 2, 2' and, subsequently, the nuts 10 are tightened, the wave troughs 14, 14' of the sleeves 2, 2' are pressed toward each other and the end faces 4, 4' are pressed together forcefully, so that the ends of the prefabricated pile elements will abut against each other with pretension. In this manner, the ends of the pile elements 1, 1' are coupled to each other in a highly reliable manner, so that the coupled pile elements indeed behave like a single, extended pile. The coupling can be arranged considerably more quickly than the time required for welding together the edges of the two metal sleeves 2, 2', so that the pile-driving rig used for making foundation piles is out of operation for a considerably shorter period.

Claims

1. A pile coupling for prefabricated pile elements made of concrete, each comprising, at the end to be coupled, a cast-in metal sleeve, said metal sleeves being interconnectable, characterized in that each sleeve (2) is of a wavy design and has a length of at least one complete wave period (a), the wave form (3) at the location of the wave crest on the end face (4, 4') of the pile element being extended over a certain distance (x), such that when the end faces (4, 4') butt on each other, the distance between the wave troughs located on both sides of the joint face is greater than the wave period (a), and two half clamping rings (6), provided with a corresponding, regular wave profile (3) and having a length of at least two wave periods (a), are clamped around the metal sleeves (2), the arrangement being such that the end faces (4, 4') of the pile elements (1, 1') are pressed against each other with pretension.
2. A pile coupling according to claim 1, characterized in that the metal sleeve (2) is provided with a sinusoidal wave profile having a length of at least two complete wave periods (a).
3. A pile coupling according to claims 1-2, characterized in that at the location of the ends, viewed in circumferential direction, the half clamping rings (6) are provided with clamping blocks (7), secured in the wave troughs by welding and provided with a drilled hole (8).

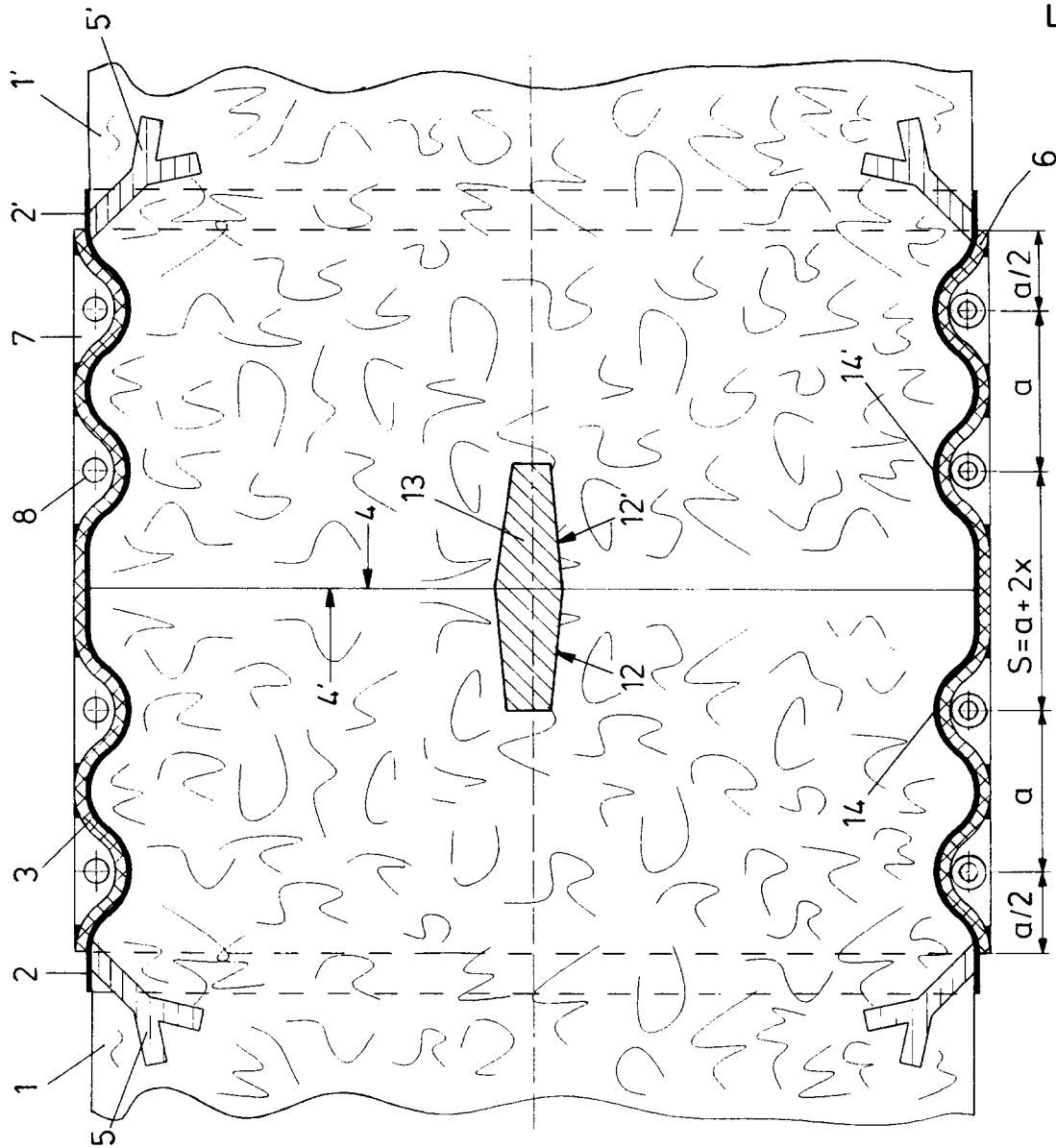


FIG.1

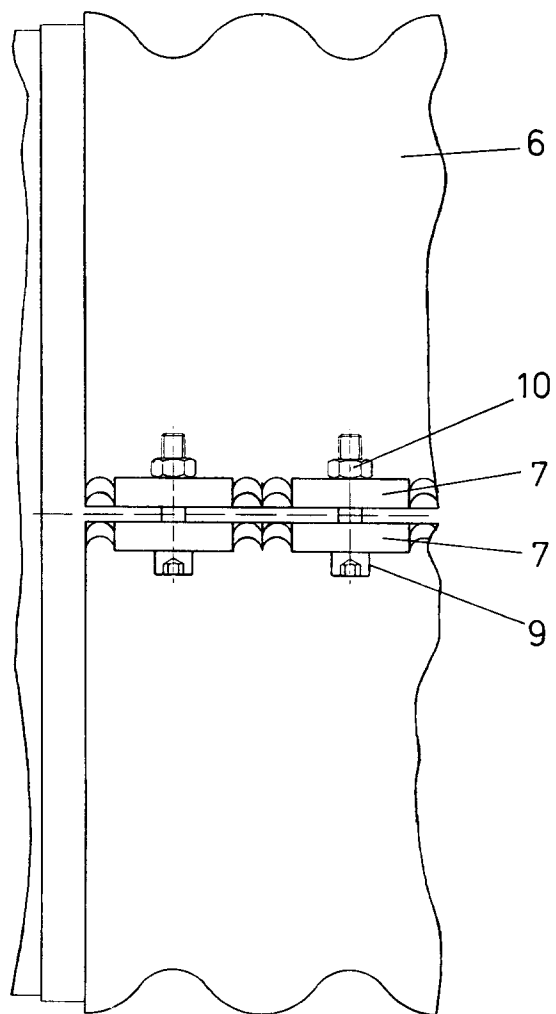


FIG. 3

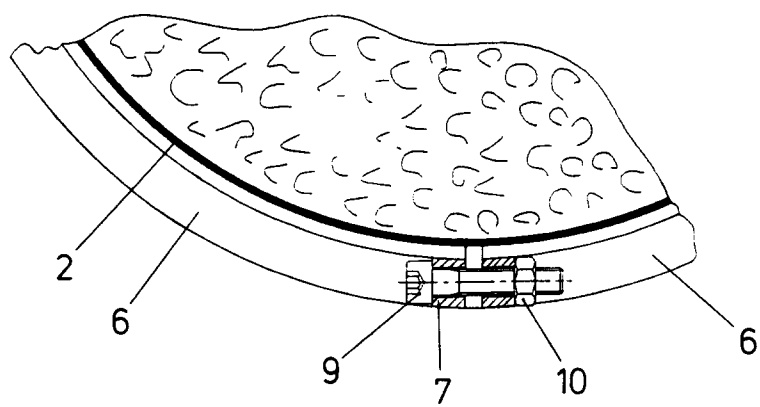


FIG. 2



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EUROPEAN SEARCH REPORT

Application Number
EP 94 20 1936

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	GB-A-985 130 (BAITTINGER) * page 1, left column, line 10 - page 2, left column, line 2 * * page 2, left column, line 54 - page 3, left column, line 36; figures 1-7 * ---	1	E02D5/52 E04H12/12
A	AT-A-350 980 (AKTIENGESELLSCHAFT FÜR BAUWESEN) * page 2, line 39 - page 3, line 26; figures * ---	1	
A	NL-A-7 600 684 (FOUNDACON B.V.) -----		
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E02D E04H E04C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 6 October 1994	Examiner Blommaert, S
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