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(72) Inventors:
• **Zabolonkov, Rauf**
Sankt-Peterburg (RU)
• **Dobrotin, Sergej**
Sankt Peterburg (RU)

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(74) Representative:
Patentanwälte
Zellentin & Partner
Zweibrückenstrasse 15
80331 München (DE)

(71) Applicant:
S. Zolotilovo statybiniu darbu imonė "Lokys"
5800 Klaipėda (LT)

(54) Method and equipment for embankment reconstruction

(57) The present invention relates to hydrotechnical construction and can be used for embankment reconstruction in order to deepen the bottom of the defined water area securing the same embankment cordon line.

The basis of the old embankment wall (1) is reinforced by erecting additional support (3) prior to deepening the bottom of the defined water area. the support (3) consists of plurality of elements (5), piled to a designed bottom depth. Each element (5) consists of sheet pile and metal connecting profile, attached to the upper part of lateral surface of the sheet pile (7) at an angle α , equal to 90-135°.

Metal profile of the piled to the bottom soil element (5) is connecting the old embankment wall (1) and new equipment (3). Loads affecting the thus reconstructed embankment are transferred from the old wall (1) via connecting metal profiles to new equipment (3). In this way, the whole complex - old wall (1) and new equipment (3) - acts as one element.

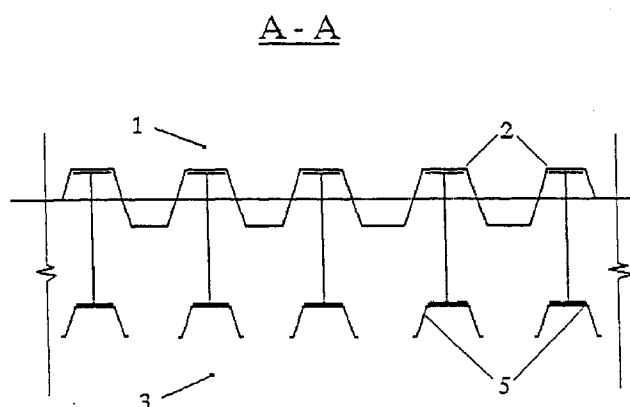


Fig.2

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Description

The present invention relates to hydrotechnical construction and can be used for embankment reconstruction in order to deepen the bottom of defined water area securing the same embankment cordon line.

Sea and river embankment basis should be enforced before deepening port bottom. Different methods of doing so are known. E.g. Patent SU 1613522 presents equipment for reconstruction of embankment. This equipment is mounted on platform, movable on an embankment in longitudinal direction and consists of lowered borer, hollow bar with working element, piston with pressing and lifting mechanism, systems to prepare reinforcing concrete and apply it to soil. The bottom near embankment under reconstruction basis is bored in many places and ducts made in this way are filled with reinforcing concrete.

Extensive equipment and complicated technology is necessary to reconstruct embankments in this way.

This invention presents method and equipment that allows to reconstruct the existing embankment construction with minimum technical and labor efforts, i.e. to reinforce its basis without changing the cordon line and at the same time without changing location of all elements necessary for normal port activities, with the aim to deepen the bottom of defined water area.

A support, consisting of separate elements, lowered to bottom soil to designed bottom depth is offered to reconstruct the old embankment. Every element consists of sheet pile and metal connecting profile. Loads from the old wall are transferred via this connecting profile to additional elements inserted into the bottom. The whole unit - the old wall and new equipment - acts as unitary element.

Further the invention is explained with reference to attached drawings, where:

Fig.1 - lateral view with the old embankment wall;
Fig.2 - cross sectional view per line A-A.

Fig.1 and 2 are schematic views of embankment, consisting of old wall 1, made of welded together sheet piles 2, and new additional support element 3, consisting of separate elements 5, lowered to the bottom soil till designed level 4. 6 is the initial bottom depth.

Elements 5, consisting of sheet piles 7 of a defined length and I-shaped metal profiles 8, are stand-manufactured. One end of the metal I-shaped profile is by any suitable way, e.g. by welding, screwing etc., attached to the upper part of the lateral surface of sheet pile 7. Using specialized detachable element 9 and piling machine 10, elements 5 from the old embankment are piled into the bottom till designed bottom depth 4 at a certain distance from the old wall 1, coinciding with the length of connecting I-shaped profile 8, at a defined step (2 at one sheet pile). To make it easier for element 5 to glide the surface of sheet pile 2 of the old wall 1, I-

shaped profile 8 is attached to the lateral surface of sheet pile 7 at the angle α , equal to 90-135°. At the same time the old wall 1 is acting as the guide for gliding of I-shaped profile 8 of being piled element 5. After insertion of one element 5, latch 11 is unlocked, element 9 detached and used to pile the second element 5. Deepening of the bottom can be done only having reinforced the embankment like this.

Metal I-shaped profile 8 of the piled element 5 connects the old embankment wall 1 and new array 3. Loads, affecting the so reconstructed embankment, are transferred from the old wall 1 via connecting I-shaped metal profiles 8 to new array 3, constituting of piled elements 5. Thus, the whole complex - old wall 1 and new supporting array 3 - is acting as one element.

Another advantage of this reconstruction method is in possibility to secure the unchanged embankment cordon line 12 after reconstruction of the old embankment wall 1, i.e. no changes, relating to functionality of embankment equipment and communications, are necessary.

This invention is describing a particular metal I-shaped connecting profile 8, the end configuration of support with wall 1 of which is in conformity with the cross section of the support surface of the rhombi-shaped sheer pile 2. Nevertheless, specialists are aware, that in case of the old wall 1 consisting of sheet piles 2 having supporting surfaces of half-ring or other cross sections, connecting profiles 8 of corresponding support end shapes can be used.

Claims

1. Method of embankment reconstruction, including additional reinforcement of the embankment basis, **characterised** in that plurality of elements (5), consisting of sheet pile (7) and connecting profile (8) are inserted along the old connecting wall (1) sheet piles (2), that act as guides, into the bottom near the basis of the embankment under reconstruction and are piled to designed bottom depth (4) at the distance from the old wall (1), corresponding to connecting metal profile (8) length of element (5).
2. Equipment for embankment reconstruction, consisting of wall, made of plurality of piled sheet piles and embankment basis reinforcement equipment, **characterised** in that embankment reinforcement equipment (3) is constituted of plurality of elements (5), piled near the basis of embankment under reconstruction, every element (5) consisting of sheet pile (7) and connecting profile (8), attached to lateral surface of the upper part thereof at the angle α , equal to 90-135°, via which, loads, affecting the old wall (1) are transferred to new support equipment (3), the end configuration of support with wall (1) of metal connecting profile (8) corresponds to the cross section shape of support surface of sheet

pile (2).

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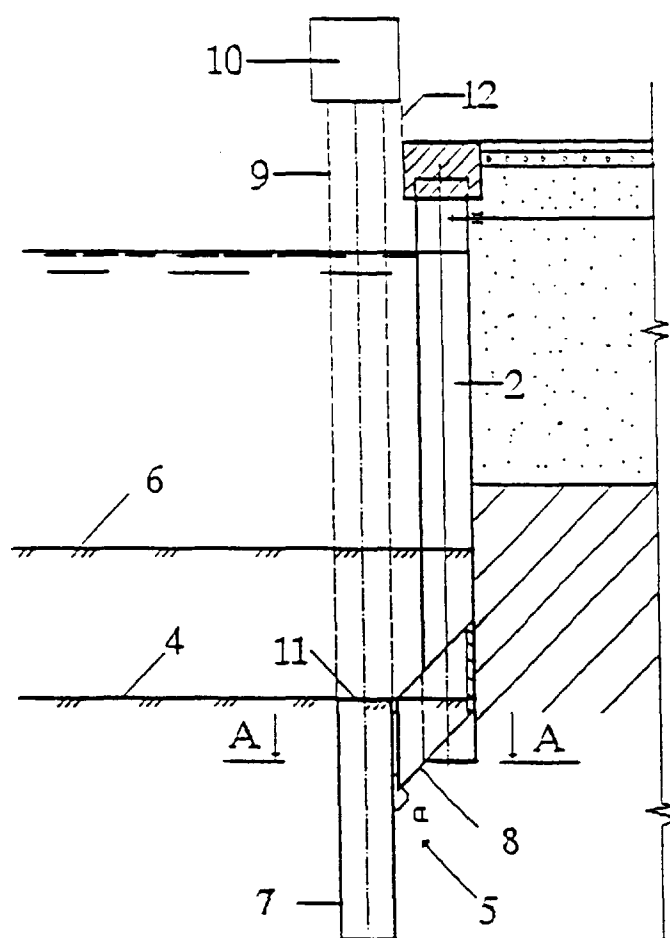


Fig.1

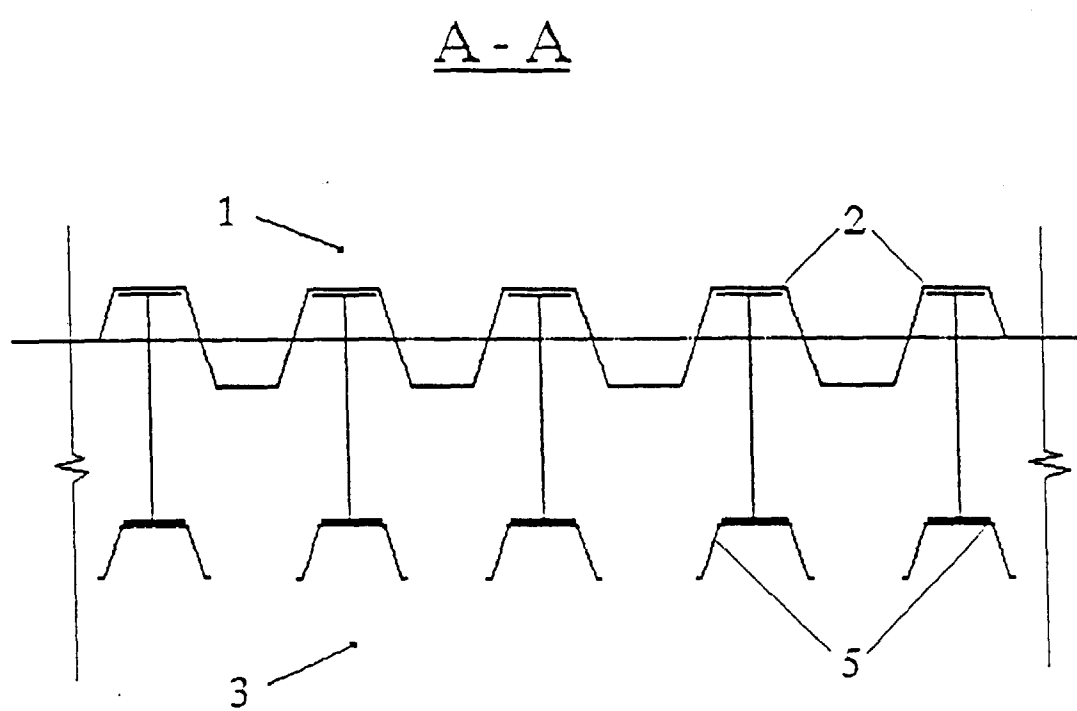


Fig.2



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EUROPEAN SEARCH REPORT

Application Number
EP 97 12 0741

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	US 4 728 225 A (BRANDL) 1 March 1988 * column 5, line 6-28; figure 4 * ---	1,2	E02B3/06 E02D5/04 E02D13/04
A	US 4 172 681 A (HACHE) 30 October 1979 * column 2, line 22-52; figures 1,2 * ---	1	
A	GB 347 556 A (PRIELIPP) -----		
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E02B E02D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 23 June 1998	Examiner Kergueno, J
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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