

(19)



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(11)

EP 0 826 836 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
04.03.1998 Bulletin 1998/10

(51) Int. Cl.⁶: **E02F 5/28, E02F 3/90**

(21) Application number: **96202447.7**

(22) Date of filing: **03.09.1996**

(84) Designated Contracting States:
**AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC
NL PT SE**

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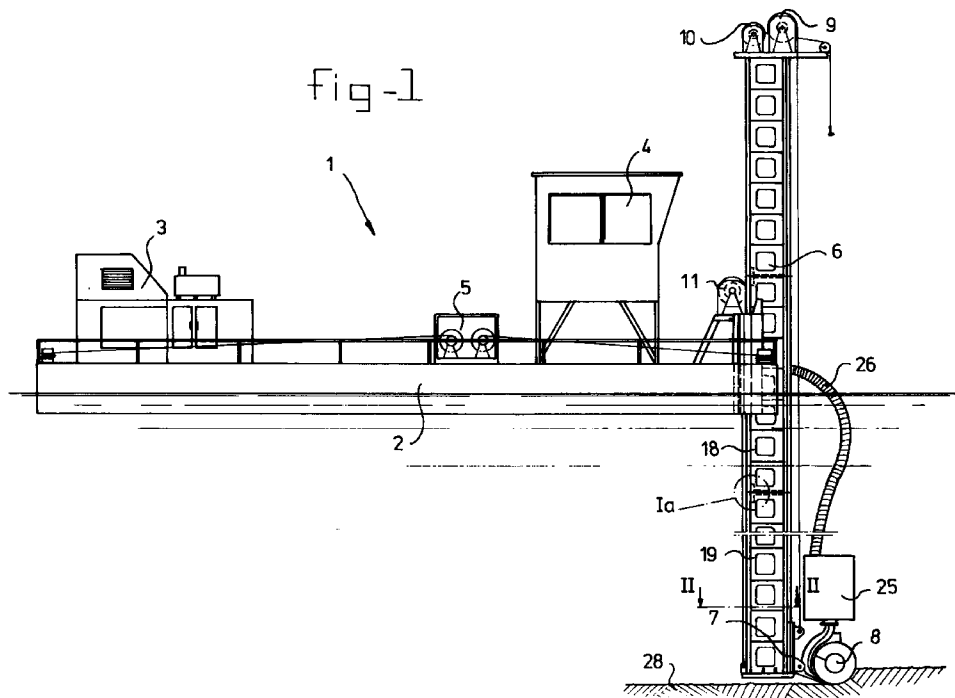
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(54) Vessel provided with a vertical ladder with tools for working underwater

(57) Vessel (1) provided with a profile section (6) which is arranged so as to be displaceable in the vertical direction. By means of a carriage (7) which is to be attached to the profile section (6), tools (8) mounted on the carriage can be taken underwater and can carry out

operations there. Operations of this kind are dredging the bottom (28) beneath the vessel, and treating walls or the bank in front of or next to the vessel.



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Description

The present invention relates to a vessel provided with a frame which is to be placed in a water wherein tools acting on the bottom under or the wall/bank of the water near the vessel can be arranged on the underside of the said frame. A vessel of this kind is generally known from the prior art and comprises a floating body composed of one or more pontoons, on which a heavy crane with a piling frame is mounted. This can be used to place piles into the bottom at relatively great depth. A vessel of this kind is used in excavation pits, in which case, after prior driving and/or sinking of pile planking sections, the bottom and the walls of the excavation pits are finished by pouring in underwater concrete, whereupon the excavation pit is pumped out and the appropriate engineering structure, such as a railway or road, is arranged therein.

After inserting the pile planking, and before or after driving the piles, many other operations are also required. Thus it is often necessary to dredge further material from the bottom or it is necessary to clean the walls.

Many of these operations are carried out with the aid of apparatus operated by divers. Owing to the specialist training of divers and legal regulations which restrict the time for which they can remain underwater, the use of divers is expensive and forms a significant part of the costs of producing an underwater structure. In excavation pits of this kind, it is generally not possible to use conventional dredging implements, because a first requirement is that the various components of a vessel of this kind must be able to be transported to the excavation pit by road, and secondly the dimensions of the excavation pit are so small (a few tens by hundreds of metres) that it is not feasible to use a conventional dredging vessel.

The object of the present invention is to provide a vessel which can be used to carry out all sorts of operations and to which tools can be coupled in a stable manner in order to carry out operations of this kind.

This object is achieved in a vessel as described above in that said frame comprises a single straight profile section and in that said vessel is provided near an extremity with a guide for receiving said profile section as well as with winch means mounted on said vessel, the cable of which winch means is connected to the profile section. The invention is based on the insight that it is now possible to attach the profile section or pillar to the vessel relatively firmly by means of a guide. This means that there is no longer the unstable situation of a pile-driving crane moving over a number of pontoons. Moreover, it is possible to attach structures other than the piling frame described above to a vertical profile section of this kind. Thus, it is possible to attach a dredging device near the end of the profile section. The dredging depth can be set during the adjustment of the height of the profile section with respect to the vessel.

If the profile section is in addition provided with a carriage which can move along it, tools of this kind can easily be moved up and down without the profile section, i.e. the pillar, having to be moved up and down with respect to the vessel. In this manner, it is possible for example to attach brushing or high-pressure spraying means to the carriage, in order to brush or spray a pile planking.

Using the device described above, it is also possible to lay a mat on the bottom of a pit by attaching a reel to the carriage with mat material.

Since, at least at great depths of the pillar (for example approximately 30 metres), considerable forces are exerted on the attachment between pillar and vessel, it is necessary to provide a sturdy guide. A guide of this kind can be achieved by providing a recess in the vessel for receiving the profile section or pillar therein. The profile section is, moreover, preferably provided with projections which are situated within this recess, and guide members are likewise mounted on the vessel within this recess, in order to engage on these projections.

For the purpose of simple assembly and easy adaptation to differing operating conditions, the profile section preferably comprises a number of part profile sections which are connected in the longitudinal direction. In contrast to piling frames, the profile section or pillar is preferably of rectangular design. This is due to the fact that in piling frames the forces essentially act in one direction, while the profile section according to the present invention is subjected to forces on all sides.

For certain applications, it is important that the carriage be fixed in a certain position with respect to the pillar. This is in particular the case if forces acting in the vertical direction are acting thereon. This may be important if, for example, dredging operations are being carried out. Operations such as dredging are possible in a particularly simple manner by manoeuvring the pontoon into the correct position by means of winches and thus moving dredging implements of this kind along the bottom. Dredging implements of this kind preferably comprise a reclamation dredging head, a cutter, a worm wheel and the like, which can be connected to a suction device comprising a submerged pump-type structure.

The invention will be illustrated in more detail below with reference to an exemplary embodiment depicted in the drawing, in which:

Fig. 1 shows a diagrammatic side view of the vessel provided with a pillar according to the invention;
Fig. 2 shows a cross-section on the line II-II in Fig. 1;
Fig. 3 shows a front view of the tool attached to the profile section; and
Fig. 4 shows a side view of a detail of the lower part of the profile section according to the invention.

In Fig. 1, the vessel according to the invention is

generally referred to by 1. It comprises a number of floating bodies 2 which are connected to one another and are not shown in more detail. Each of the floating bodies 2 is dimensioned such that they can easily be transported by road or rail to the excavation pit in question. The energy supply, denoted by 3, for the various winches and tools which are yet to be described and are attached to the vessel is situated on one side of the vessel. The operating bridge is denoted by 4, while the manoeuvring winches are denoted by 5. The ends of the cables connected thereto are attached at various points on land, so that the position of the vessel 1 in the excavation pit (not shown in more detail) can be defined accurately by winches.

The profile section or pillar according to the invention is denoted by 6. It extends down to the bottom 28 and is adjustable in the vertical direction by means of a winch 11, the cable of which is connected at the end of profile section 6. A carriage 7 is arranged on pillar 6, to which carriage a tool can be fastened. An example of a tool of this kind is a dredging device 8. The position of the carriage with respect to the pillar can be controlled by means of a winch 9. This is attached to the top of the pillar, so that movement of the pillar with respect to the vessel has no effect on the position of the carriage with respect to the pillar. Moreover, an auxiliary winch 10 is provided for the purpose of hoisting up, for example, tools from the carriage.

As can be seen from Figs. 1 and 1a, the pillar comprises a number of elements 18 and 19 which are connected by means of a fastening 20. The forces are transmitted exclusively via this fastening 20, comprising two sleeve parts pressing on one another and a bolt arranged therein.

The pillar or the profile section 6 is depicted in detail in Fig. 2. It can be seen from this figure that it is essentially rectangular.

Box profiles 12 are arranged at the corners of the pillars 6. It can be seen from fig. 2 that two of these box profiles 12 are enclosed by a guide 15 of the carriage 7. The other two box profiles 12 are enclosed by a guide 13 arranged in the vessel. This guide 13 is situated in a recess 27 in the floating body 2.

Both guides 13 and 15 are provided with plastic coatings, 14 and 16 respectively, in order to limit wear. The guide between the pillar and the vessel in particular has to meet high standards.

Fig. 4 shows a side view of the bottom part of the pillar. It can be seen from this figure that the bottom of the pillar is provided with a baseplate 21, which also serves as a stop for the carriage 7, that is to say the carriage cannot run off the bottom of the pillar. Moreover, a locking pin 22 is present, arranged in the pillar, which pin can move into an opening made in the carriage in the lowest position thereof. Operation is carried out by means of a cable 24, which is shown. By this means, the position of the carriage with respect to the pillar can be fixed. It should be understood that various locking

devices of this kind can be arranged at other positions.

In the design shown in this example, a dredging implement 8 is arranged on carriage 7 (see also Fig. 3). This comprises two worm parts 29 on a shaft with a discharge between them, into which discharge the inlet 30 of a centrifugal underwater pump (not shown in more detail), and more particularly a submerged pump, opens out. This submerged pump is arranged in casing 25, which also contains the driving motor for the submerged pump. Lines run from power supply 3 to the driving motor in casing 25 and to the driving motor(s) of the worm parts 29 and winches. A line 26, through which the dredge spoil is removed, extends from casing 25 to the water surface.

The above-described device makes it possible to carry out a very large number of operations underwater by selecting the appropriate tool. Examples which may be mentioned here are the removal of dredged material, levelling water bottoms, cleaning walls, carrying out hoisting, pile driving and transporting activities, laying mats and casting underwater concrete.

It should be understood that the dredger pump depicted here is only an example. It can be of a different design known from the prior art. It should be understood that the length of the pillar depends on the task and is dimensioned accordingly. It is possible to go down to great depths using the structure shown here. If the stability of the vessel is insufficient, it is possible to increase this stability in a simple manner by attaching more pontoons.

These and further modifications are obvious to those skilled in the art on reading the above description.

Claims

1. Vessel (1) provided with a frame which is to be placed in a water wherein for tools acting on the bottom under or the wall/bank of said waterway near the said vessel can be arranged on the underside of said frame, characterized in that the said frame comprises a single straight profile section (6) and in that the said vessel is provided near an extremity with a guide (13) for receiving said profile section as well as with winch means (11) mounted on the said vessel, the cable of which winch means is connected to the profile section.
2. Vessel according to Claim 1 wherein said profile section being provided with a carriage (7) which can move along this profile section and on which carriage the attachment means for the said tool are arranged.
3. Vessel according to one of the preceding claims, wherein guide in the vessel comprising a recess (27) for substantially receiving the said profile section therein, said profile section being provided with projections and guide members engaging on these

projections being arranged within the recess.

4. Vessel according to one of the preceding claims,
wherein said profile section being composed of part
profile sections (18, 19) which are connected in lon- 5
gitudinal direction.
5. Vessel according to one of the preceding claims,
the said profile section being essentially rectangu- 10
lar.
6. Vessel according to Claim 1 in combination with
Claim 2, wherein said profile section being provided
with locking means interacting with the carriage. 15

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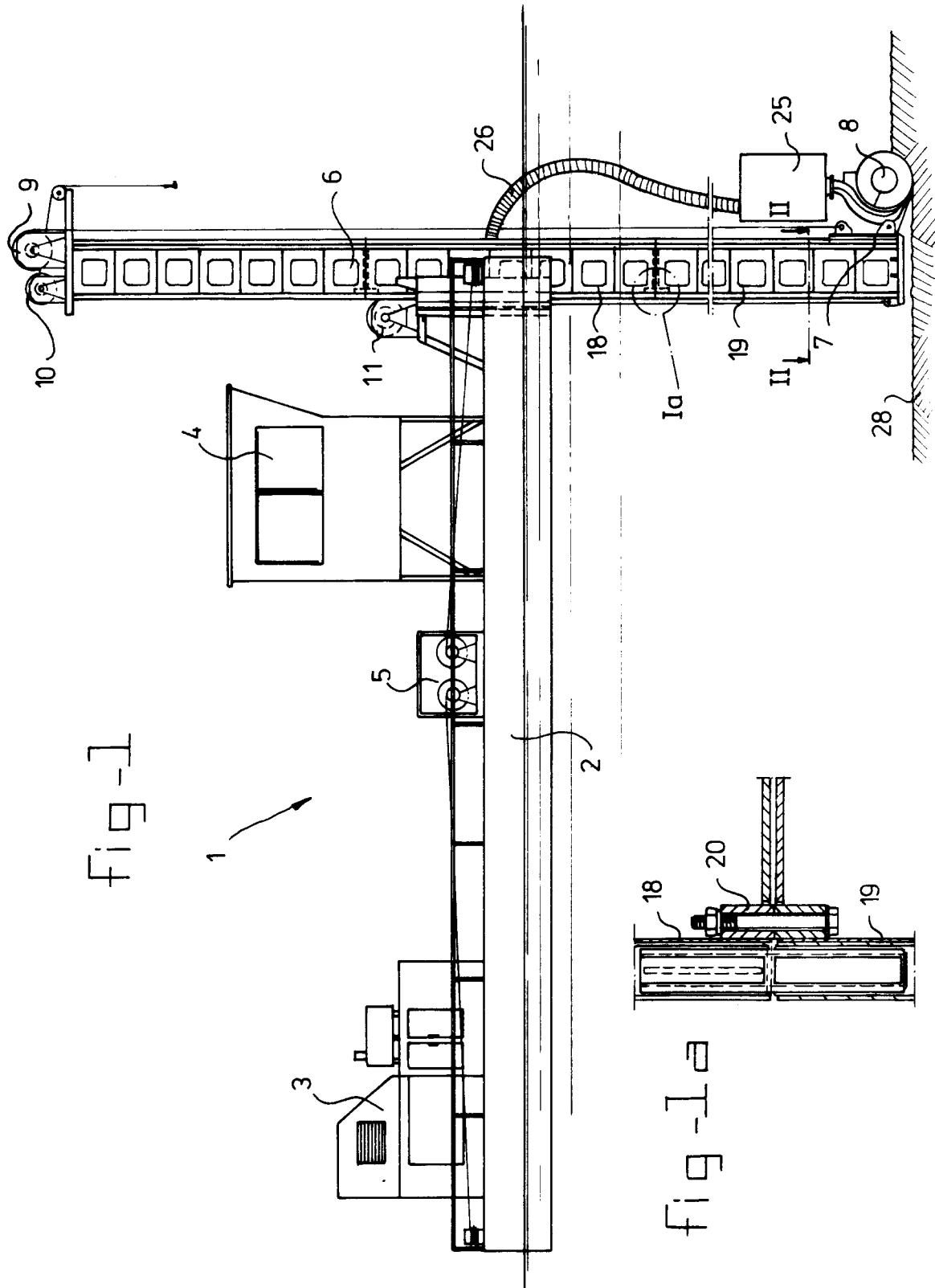


fig-3

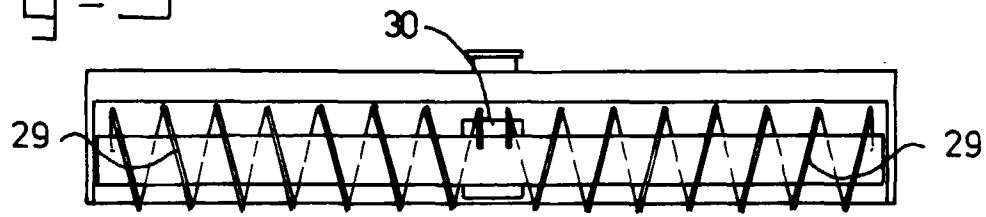


fig-2

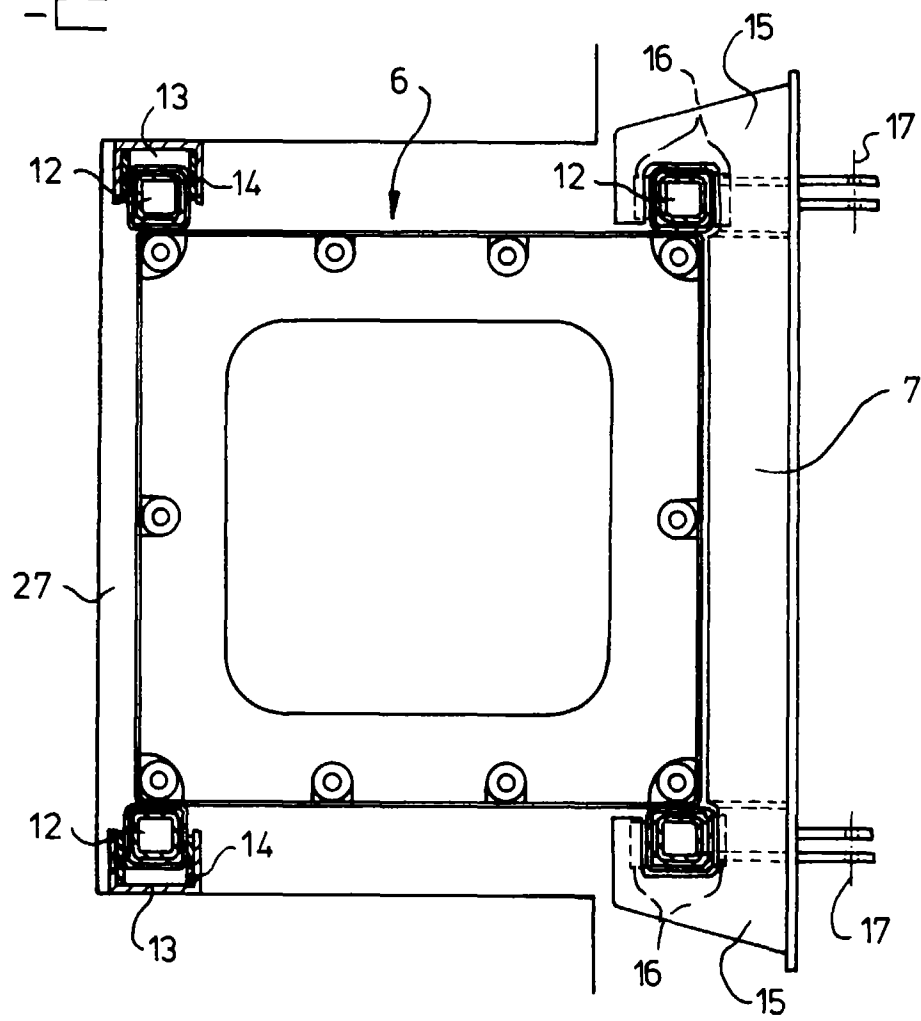
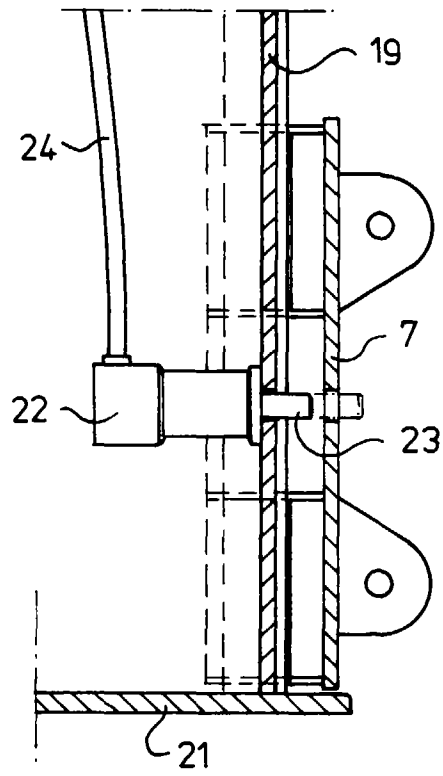


fig - 4





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EUROPEAN SEARCH REPORT

Application Number
EP 96 20 2447

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)
X	FR 2 383 273 A (BALLAST NEDAM GROEP) * page 3, line 2 - page 9, line 10; figures * ---	1-3,5,6	E02F5/28 E02F3/90
X	US 3 187 447 A (W.HOLLYOAK) * column 1, line 52 - column 2, line 22; figures * ---	1	
X	US 4 073 078 A (J.LEITZ) * column 4, line 9 - line 56; figures * ---	1	
A	DE 14 84 523 A (NV WERF GUSTO) * page 7 - page 9; figures * ---	1-3	
A	EP 0 054 498 A (HYDROCONSULT SA) * abstract; figures * ---	1-3,5	
A	EP 0 205 341 A (MIYANAGI) * abstract; figures * -----	1-3,5	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E02F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 30 January 1997	Examiner Stierman, E
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