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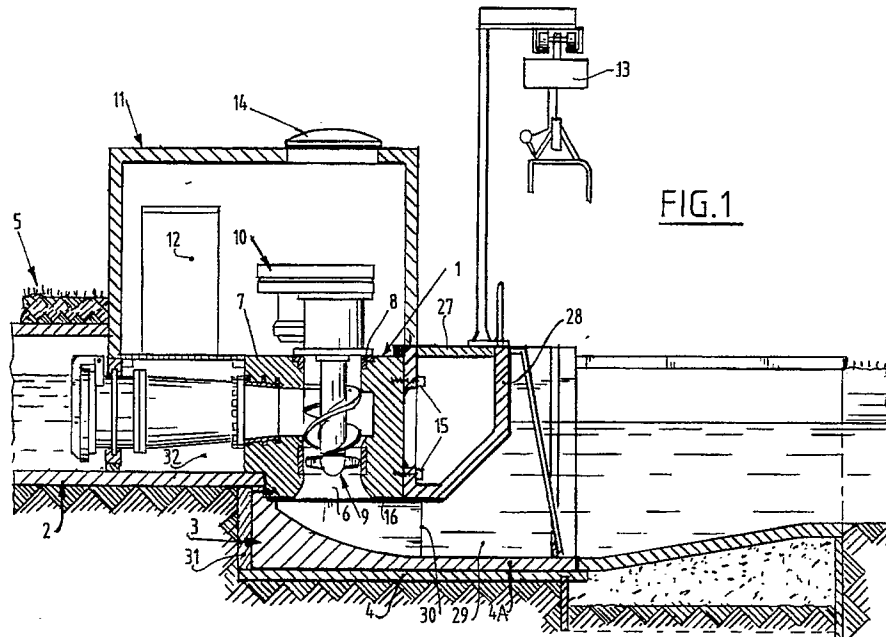
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54 **Method for constructing a pumping installation and pumping installation manufactured according to the method.**

57 The disclosure discloses a method for constructing a pumping installation which includes a prefabricated concrete pump house (7) and a prefabricated concrete suction box (3). The pump house (7) and

suction box (3) are then placed on and coupled to a workfloor (4) manufactured at the building site. A pump is then installed in the pump house (7).



**FIG.1**

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Pumping installations, particularly as used in pumping stations in open country, should require the least possible degree of maintenance. Furthermore, it is important that as little installation work as possible need be carried out at the place of use. To this end it has already been proposed that pumps, or at least the pump house and the adjoining parts, be manufactured from concrete. This is preferably carried out in a prefab construction method wherein the pump house amongst other things is manufactured in concrete portions which are attached to each other at the place of use. Although this is a considerable improvement compared to the classical method, that is, the complete manufacture at the place of use of the housing of both the pump and the remaining parts of the installation, the number of operations to be performed at the place of use was still undesirably large. Another drawback is that the flexibility of design is not optimal. The aim is to provide a pumping installation which can be modularly constructed, which ensures a great degree of flexibility and requires a minimum number of operations at the building site itself.

According to the invention this is achieved with a method for constructing a pumping installation by manufacturing from concrete in a prefabricated manner and with chosen dimensions a pump block comprising at least one pump house and a suction box, manufacturing a workfloor at the building site and by then placing and coupling on the workfloor the suction box and the pump house and subsequently installing the pump.

On the building site it will suffice according to the invention to carry out the ground work, to manufacture a workfloor from concrete or other foundation material such as slag material, gravel and the like and thereafter to place as desired the prefabricated modules, for example with a hoisting device, and finally to install the pump itself, that is, the drive mechanism and the impeller part. With a pump block according to the invention a very high degree of protection against corrosion is achieved which can in addition be easily integrated into the whole pumping or draining installation and imposes no restrictions on the architect designing an optional superstructure. Because the installation is modularly constructed, different dimensions can be chosen for each of the modules, namely the pump house and the suction box, subject to the requirements at the place of use.

A pump house provided with a volute can be manufactured by fitting a casing consisting of separate portions, casting the concrete and removing portions of the casing, for example those of the volute, while the other portions remain behind as permanent casing. The casing portions are of metal.

In order to be able to remove the casing portions from the finished pump block the casing wall of the pump house is constructed in a vertical direction from at least three portions. After the casting and setting of the concrete these portions are detached and removed successively in vertical direction. The casing wall of the volute can be assembled from at least three portions. After casting and setting of the concrete these portions are detached from the remaining casing and removed to the inside, that is, towards the pump area.

For pouring the concrete of the pump house the bottom side is closed off with a casing wall. After removal of the casing the distance corresponding with the thickness of the bottom wall of the casing has to be bridged in order to be able to centre the pump block on the remaining portions. In practice this can be done with plastic plates the thickness of the casing wall.

The invention will be further elucidated with reference to the drawings.

Fig. 1 shows a cross sectional view through a pumping installation according to the invention, fig. 2 shows the modules of the installation according to fig. 1 in dismantled state,

fig. 3 shows a perspective view of the pump block,

fig. 4 shows the different casing portions in dismantled state,

fig. 5 shows the pumping installation in assembled state, and

fig. 6, 7 and 8 show different possible combinations of the modules of the pumping installation.

The pumping installation is built up of the pump block 1, the culvert body 2, the accessories area 3 and the suction box 3. The different modules are disposed on a workfloor 4 which is manufactured in the work. The whole is built into for example the body of a dike 5.

The pump block contains the pump area 6 which is bounded by the pump house 7. The actual pump, that is, the impeller body 9 and the associated drive motor 10, are mounted on a foundation ring 8 which is cast into the concrete of the housing 7. In the surrounding housing 11 can be arranged a control box 12 with signalling units, control units and power supply. Next to the housing can be disposed a duckweed grating cleaning installation 13.

The figures 6, 7 and 8 show different possible combinations of the installation formed from modules.

The different modules are anchored to each other using bolts and cast-in screwed sleeves (see for instance fig. 3) 15. For the desired height adjustment plastic plates 16 can be used which are placed under the pump block in order to enable centering on the suction box.

For manufacturing the pump house use is made of a casing consisting of portions. The casing for the cylindrical pump area consists of four portions 17, 17A, 18, 18A which are mutually connected in lengthwise direction. Arranged around this casing 17, 17A, 18, 18A are three casing portions for the volute 19, 20 and 21. Also arranged are the casing 22 A to D and 23 for the discharge as well as an annular portion 24 serving as foundation ring. This foundation ring can be cast directly into the pump house or arranged later in the finished pump house and cast into a recess. The underside of the pump block is bounded by the portions 25 and 26 which can be coupled by the elements 27. Of the drawn portions, the portions 23, 24 and 25 are portions which are to be regarded as permanent casing. These remain behind cast in the concrete. On the other hand, the portions 17, 17A, 18, 18A, 19, 20, 21, 22 A to D and 26 are removed after the setting of the concrete. To this end the portions 17A and 18A are first detached and successively removed in vertical direction. After detaching of the portions 19, 20 and 21 these are removed one by one inward to the pump area and subsequently in vertical direction. The portion 22 then follows which is taken out via the pump area and subsequently in vertical direction. Finally, the portion 26 is removed in downward direction. After manufacture of the separate modules these can be carried using normal transportation, for example a truck, trailer or the like, to the place of use and there arranged on the intended location with simple hoisting devices.

It is noted that the suction box 3 (fig. 1) can be modularly constructed. A cover plate 27, a guiding plate 28, both side plates, whereof one 29 is visible, an anti-rotation partition 30, the end plate 31 and bottom plate 4A are then prefabricated. These portions are then assembled on the building site.

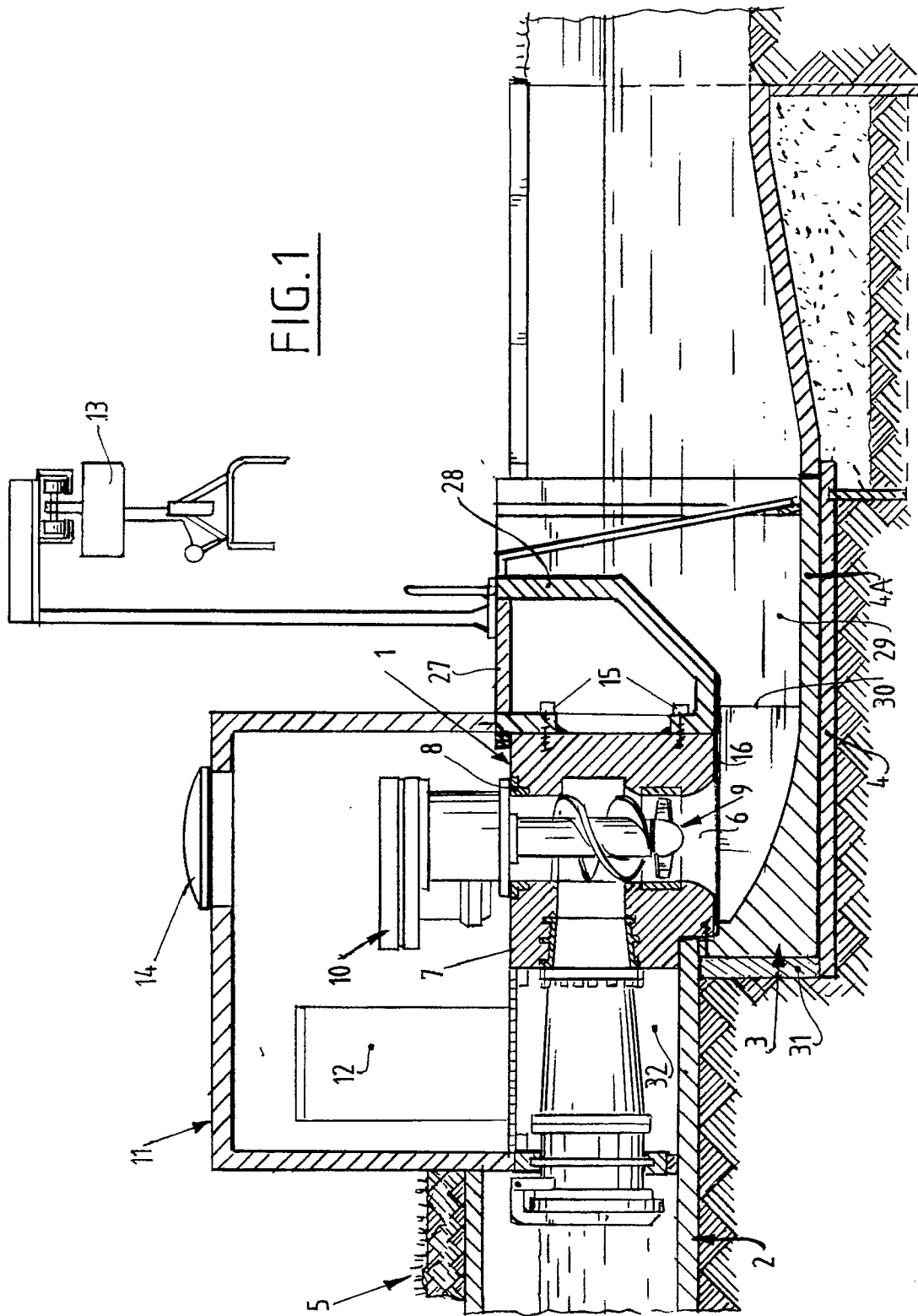
It is also possible to construct other added elements modularly. This applies for example to the accessories area 32.

**Claims**

1. Method for constructing a pumping installation by manufacturing from concrete in a prefabricated manner and with chosen dimensions a pump block comprising at least one pump house (7), and a suction box (3), manufacturing a workfloor on the building site, subsequent placing and coupling on said workfloor of said suction box (3) and said pump house (7) and thereafter installing the pump in said pump house (7).
2. Method as claimed in claim 1, **characterized in that** the suction box is modularly construct-

ed (fig. 1).

3. Method as claimed in claim 2, **characterized in that** the suction box (3) is built up from a guiding plate (28), two side plates (29), a cover plate (27), an anti-rotation partition (30), a bottom plate (4A) and an end plate (31).
4. Method as claimed in claims 1-3, **characterized in that** an accessory area (32) is added to the pumping installation in a modular manner.
5. Method as claimed in claims 1-4, **characterized in that** a modularly constructed culvert is added to the pumping installation.
6. Method for manufacturing a pumping house provided with a volute by fitting a casing consisting of portions, the casting of concrete and removing of portions of said casing, for example those of said volute, while the other portions remain behind as permanent casing.
7. Method as claimed in claim 6, **characterized in that** the casing wall of the pump house is constructed in vertical direction from at least three portions (fig. 4).
8. Method as claimed in claims 6-7, **characterized in that** the casing wall of the volute is assembled from at least three portions.
9. Pumping installation constructed according to the method as claimed in one or more of the claims 1-8.



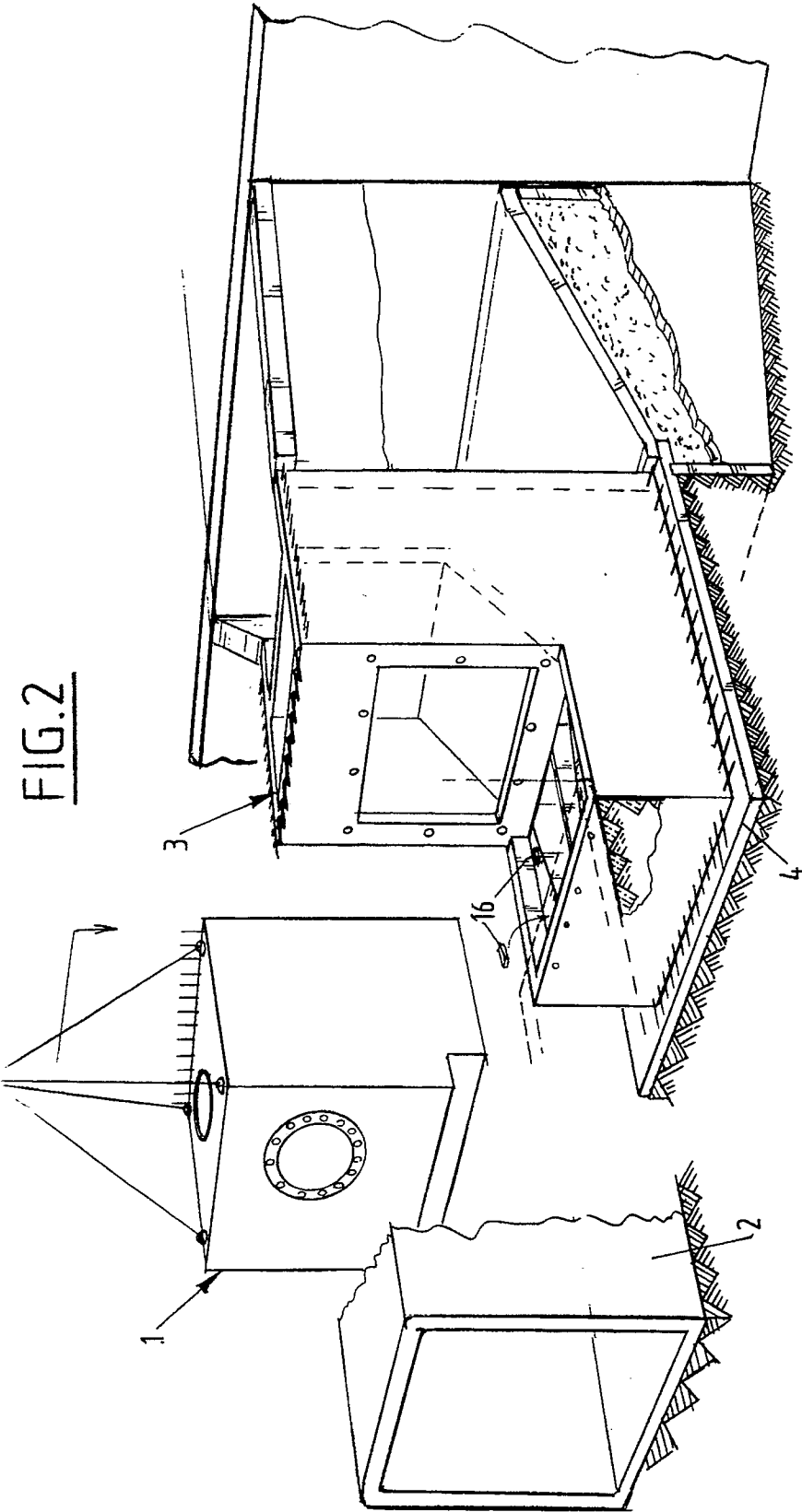
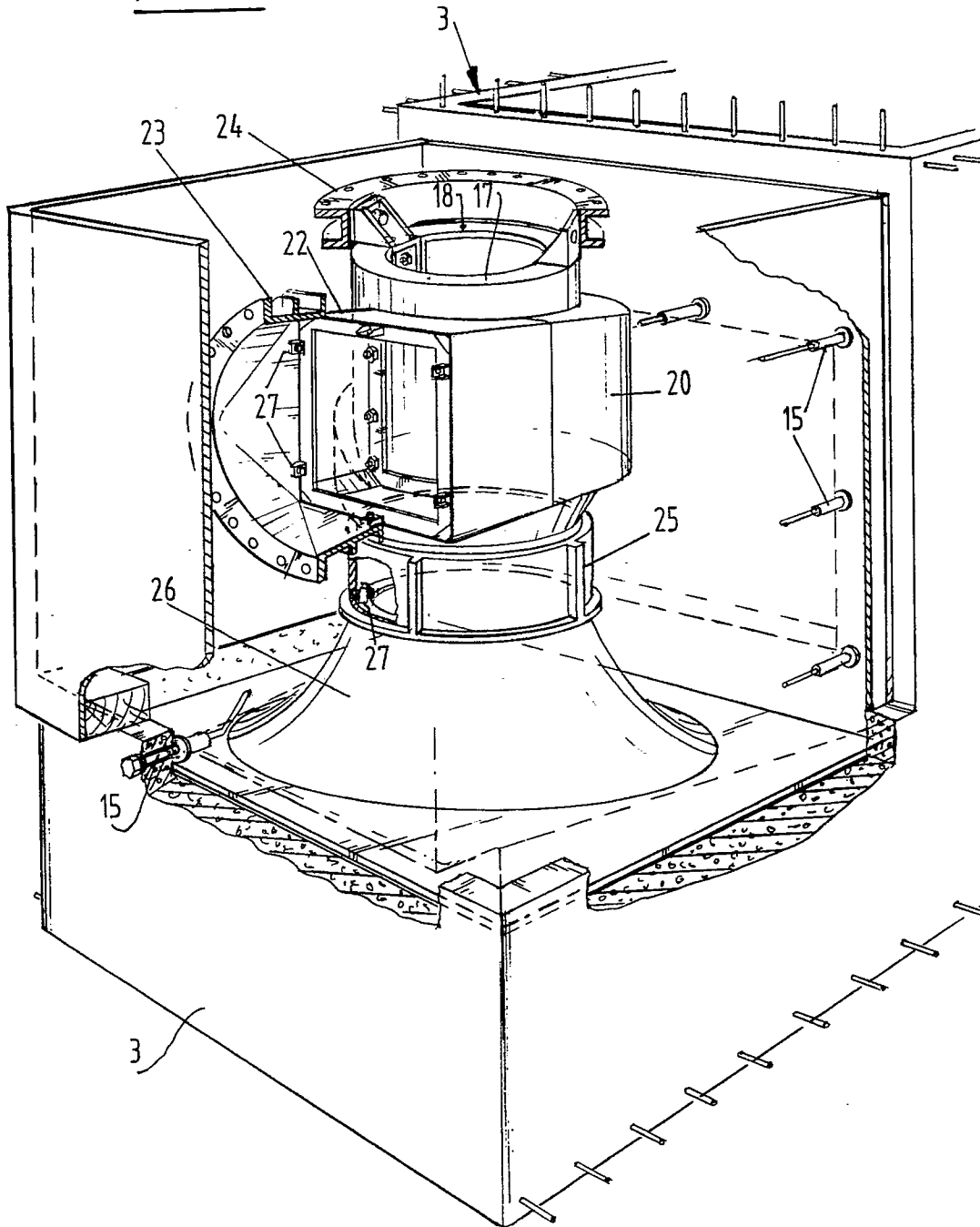


FIG.3



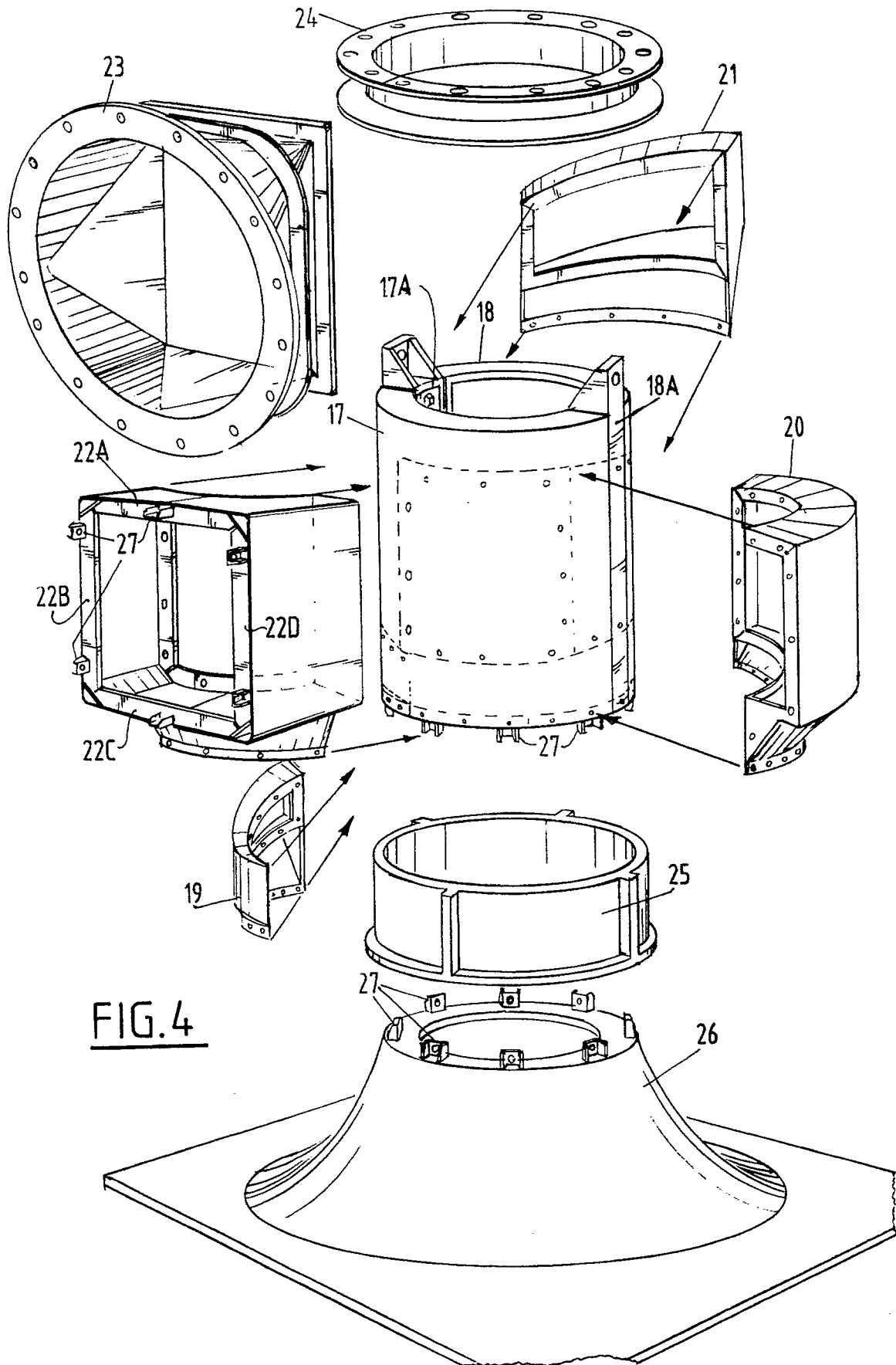
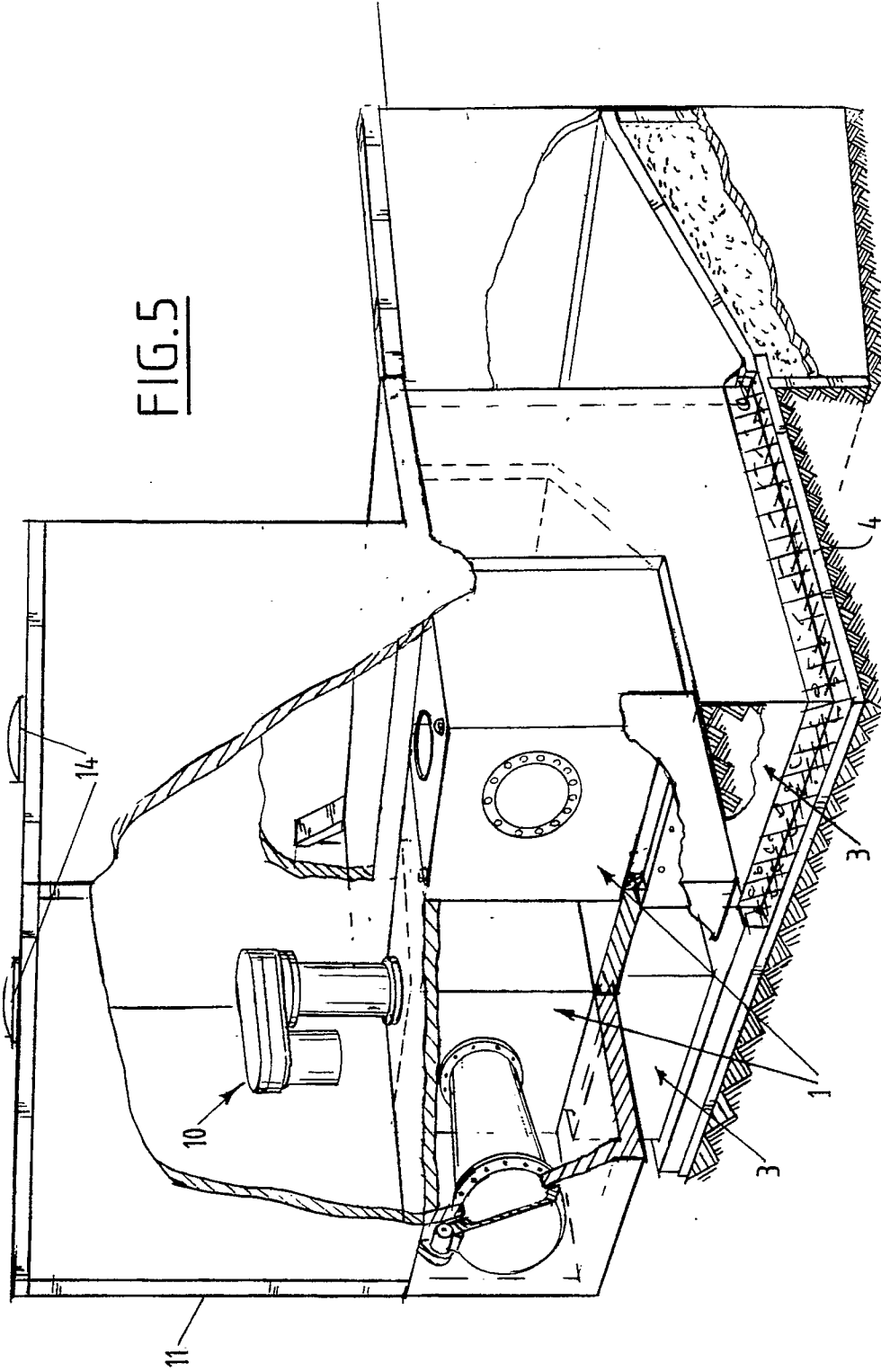
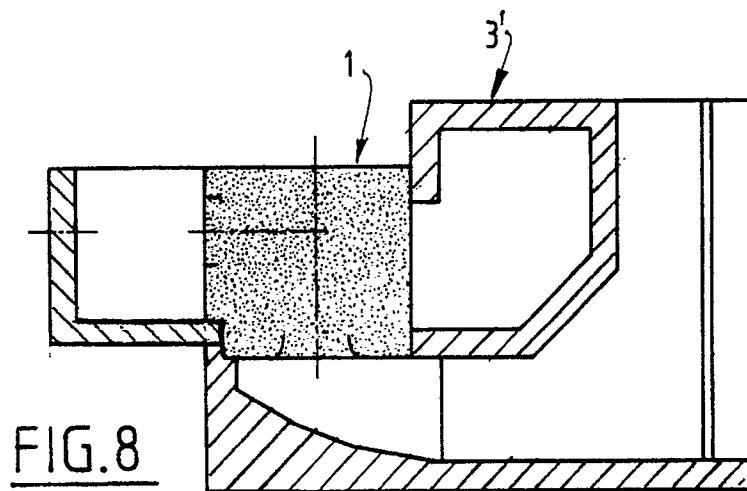
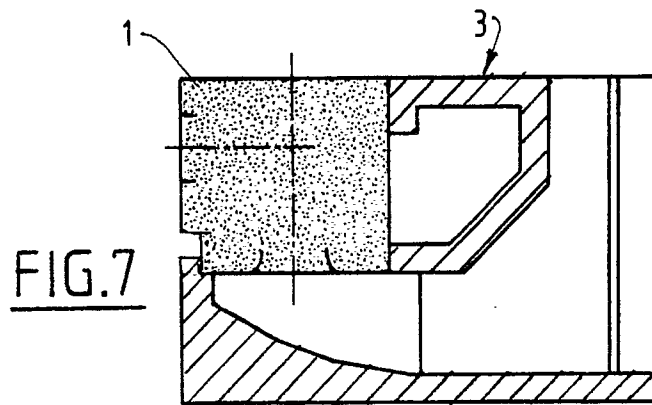
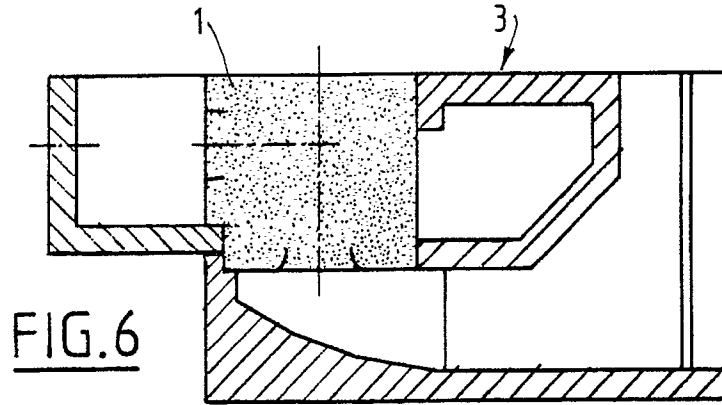


FIG. 4







| 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.5)                |
| X   | DE-A-2 555 253 (BALCKE-DÜRR)<br>* Page 1, lines 1-7; page 4, lines 12-15; page 5, lines 20-22; figures 1-3<br>*<br>---   | 1,2,9  | F 04 D 29/64<br>F 04 D 29/42<br>F 04 D 29/54<br>F 04 D 13/02 |
| X   | WORLD PUMPS, no. 1, January 1990, pages 10-13, Oxford, GB; J.H. BUNJES: "Pumps with concrete housings"<br>* Page 12, right-hand column, lines 1-9; figures *<br>---  | 1,2,9  |  |
| A   | KSB TECHNISCHE BERICHTE, no. 17, 1977, pages 28-36; M. SIEKMANN: "Einfluss von Bauwerk und Zulaufbedingungen auf die Kühlwasserpumpen und die verschiedenen Kühlwasserpumpenbauarten für Kühltürme"<br>* Paragraphs 4.1,4.2,4.3 *<br>--- | 1-3,9  |  |
| X   | KSB TECHNISCHE BERICHTE, no. 17, 1977, pages 36-41; M. SIEKMANN: "Einfluss von Bauwerk und Zulaufbedingungen auf die Kühlwasserpumpen"<br>* Pages 39,40, paragraph 6.3 *<br>---  | 6,9  | TECHNICAL FIELDS SEARCHED (Int. Cl.5)                        |
| A   | IDEM<br>---  | 7,8  | F 04 D   |
| A   | EP-A-0 101 628 (STORK POMPEN)<br>-----   |  |  |
| The present search report has been drawn up for all claims  |  |  |  |
| Place of search<br>THE HAGUE  |  | Date of completion of the search<br>28-03-1991 | Examiner<br>WALVOORT B.W.                                    |
| <p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone<br/> Y : particularly relevant if combined with another document of the same category<br/> A : technological background<br/> O : non-written disclosure<br/> P : intermediate document</p> <p>T : theory or principle underlying the invention<br/> E : earlier patent document, but published on, or after the filing date<br/> D : document cited in the application<br/> L : document cited for other reasons<br/> -----<br/> &amp; : member of the same patent family, corresponding document</p> |  |  |  |



**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing more than ten claims.

- All claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for all claims.
- Only part of the claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid,  
namely claims:
- No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

**x LACK OF UNITY OF INVENTION**

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions,  
namely:

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- All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid,  
namely claims:
- None of the further search fees has been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims.  
namely claims:



**LACK OF UNITY OF INVENTION**

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims 1-5,9: Method for constructing a pumping installation.
2. Claims 6-9: Method for manufacturing a pump housing.