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(54) **Mobile pumping unit**

(57) A pumping unit (1) for use as a draining machine, comprising a housing (5) with a space for installing one or more pumps (6) therein and a suction space (7) communicating with the space for the pumps, which suction space (7) is at least partly bounded by walls or wall parts with openings therein, which may or may not give direct access to the surroundings of the

housing, which housing further comprises means for coupling one or more discharge pipes (11) with the pump space and/or the pump or pumps (6) to be installed therein, while the pumping unit is further of mobile construction.

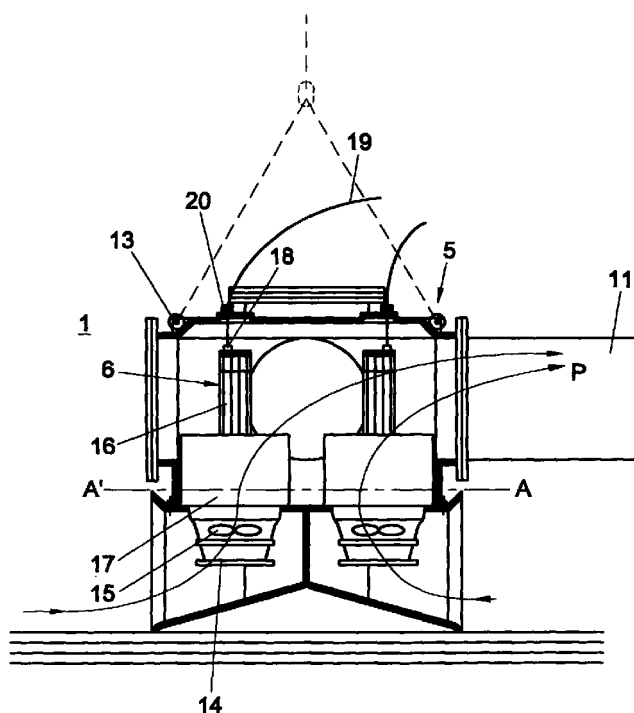


Fig. 2

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Description

[0001] The invention relates to a pumping unit for use as a draining machine.

[0002] The procedure conventional in water management is to pump by means of stationary draining machines. These draining machines are arranged to enable drainage of water according to need with a broad margin for adequate drainage in extreme situations.

[0003] It is known that situations may occur in which the capacity of a draining machine falls short as compared with the real need. Situations may then occur in which great damage may be caused and the safety of human and animal is jeopardized. The capacity of a draining machine can fall short through a breakdown of pumps to which adequate reactions are not possible in time. Sometimes, for instance in the case of floods or extreme rainfall, so much water must be drained that the capacity is simply too low to get rid of the water in time, even when a capacity with a broad margin is provided. Sometimes, too, a draining machine has an undercapacity, but adaptation or reconstruction is not forthcoming. In the intermediate period a solution must be offered. Also, the calculated capacity of a draining machine is sometimes sufficient, but the water cannot be discharged via the normal channels because the water level is too high for the employed draining method. Furthermore, the possibility may arise that in special situations the stationary draining machines are not capable of draining off the water, for instance in an area inundated as buffer for preventing floods somewhere else where a draining machine is not provided.

[0004] It is an object of the invention to remove these and other drawbacks and to meet a need for a flexibly employable draining machine. This object is achieved with a pumping unit according to the opening paragraph, comprising a housing with a space for installing one or more pumps therein and a suction space communicating with the space for the pumps, which suction space is at least partly bounded by walls or wall parts with openings therein, which may or may not give direct access to the surroundings of the housing, which housing further comprises means for coupling one or more discharge pipes with the pump space and/or the pump or pumps to be installed therein, while the pumping unit is further of mobile construction. When the discharge pipes are not directly connected to the pump, the pump space is used as pressure box, with connections for coupling discharge pipes. Furthermore, because of the fact that the pumping unit is mobile, it can be flexibly brought into action in places where it is needed, for instance in case of calamities. The dimensions of the unit are preferably such that transport on public roads is possible, and the pumping unit has a high pumping capacity which is particularly suitable for pumping large amounts of polder water. Furthermore, the unit is very reliable and may be provided, if desired,

with special pumps for use when draining polluted liquids, such as polder water containing, inter alia, water plants and mud.

[0005] In a preferred embodiment, the pumping unit is further characterized according to the invention in that the pump space and the suction space are superimposed adjacent to each other in the housing and are separated by a wall portion in which as many openings are provided as pumps can be installed in the pump space, to or in each of which openings one of the pumps to be installed in the pump space can be connected. The whole is of such construction that all the arrangements for pumping the water can be arranged, transported and locally brought into action as one compact unit.

[0006] In a further preferred embodiment, the housing of the pumping unit according to the invention is arranged to removably install two or more pumps therein, preferably to removably install four pumps therein. Advantageously, the openings between the pump space and the suction space are further each individually sealable. The number of pumps can be varied according to need, from a minimum of one to the number of pumps that can be maximally installed, depending on the required capacity. Pumps not used can be brought into action at other locations, so that an optimum use of means is possible. Moreover, when the arrangement allows it, the type of pump may be varied. This has the advantage that pumps can be used which are equipped for pumping under special conditions, for instance extremely polluted water etc., or which have a higher capacity. The openings not used in which or on which the pumps can be installed must further be sealed for a proper pumping operation, at least when the pump space is used as pressure box.

[0007] Advantageously, the means for coupling the discharge pipes may be each individually sealable. Depending on the possibilities and the need, discharge pipes may then be connected to different points on the pump space/pressure box. When the situation occurs that the discharge pipes cannot be coupled to some means, this is no problem, and the unit remains usable.

[0008] It is further advantageous that the suction space and/or pump space can be removably connected together, so that the pumps are easily accessible and can be placed/replaced, and the unit can be repaired/put in readiness. A further advantage is obtained in the case that the suction space and/or pump space are of modular construction. This construction offers advantages, because, by means of different components of possibly different types, various pumping units can be put in readiness, which are each arranged according to need, for instance with an enlarged suction box in case extreme amounts of dirt are expected.

[0009] In the pumping unit according to the invention, the suction space and/or pump space are preferably made of preserved steel, in particular of a rustproof and very durable construction, because of the type of

use for which the unit is intended, especially also in view of longer times of non-use, during which the unit must remain in optimum condition.

[0010] The pumping unit according to the invention is further preferably arranged to install pumps of the sinking pump type. These pumps are "free from clog-
5 ging" and very reliable, in general electrically driven. They can be easily installed and are available in different capacities and operative powers. A characteristic capacity is of the order of 10 to 200 m³/min. Further-
10 more, with standard pumps a lifting height of 10 m can be obtained.

[0011] In order that the unit can be easily placed on location, it is provided with means by which it can be hoisted or lifted by a crane or the like. These means
15 comprise, for instance, a crane hook.

[0012] It is further preferred that in the pumping unit according to the invention the suction space is provided on the inlet side with a filtering device which is tiltably
20 arranged on the upper side of the suction space. This filtering device is important when pumping water containing duckweed or branches and the like, because this can prevent the pumping unit from clogging up. The pumping unit can be cleaned, while in operation, by causing the pumps to pump in the reverse direction,
25 which results in the filtering device tilting and the dirt being removed from the suction space and from the filtering device.

[0013] The invention further relates to a method for draining a polder or flooded area or canal or storage
30 basin or the like with a pumping unit according to the invention, by installing in the pumping unit as many pumps as is necessary or desirable and transporting the pumping unit with a transport unit, for instance consisting in a trailer with a flatbed and a crane or the like,
35 to a suitable location, placing it in the water on the bottom so that the suction space is substantially submerged, connecting the pumping unit with water transport discharge pipes with which the superfluous water can be pumped away to another place as well as
40 with a control and switch box for operating the pumping unit and, if desired, an (emergency) power unit for supplying power. A pumping unit according to the invention is eminently suitable for bringing into action in case of calamities or as an emergency arrangement, although
45 the unit may also be used as a semi-permanent solution. It is further not necessary to make special local arrangements, such as constructing a supporting floor or other arrangements, for placing or connecting the unit. Because of its construction, the unit can be placed
50 directly in the water on the bottom, and a slight subsidence or skewness is no problem. Furthermore, the pumping unit could also be used as a conventional pumping unit, for instance for draining building pits etc.

[0014] Further advantages and uses will be explained with reference to the drawings, in which

Fig. 1 is a side view of a practical example of a

mobile pumping unit according to the invention;

Fig. 2 schematically shows the internal parts of the mobile pumping unit of Fig. 1;

Fig. 3 is a top view of the mobile pumping unit of Fig. 1;

Fig. 4 is a cross-section taken on the line A-A in Fig. 1;

Fig. 5 shows another practical example of another mobile pumping unit according to the invention, a so-called monopump;

Fig. 6 shows a detail of a pumping unit according to the invention, with an enlarged suction box; and

Fig. 7 shows the operation of the filtering device in a mobile pumping unit according to the invention.

[0015] In the figures similar parts are indicated by the same reference numerals.

[0016] Fig. 1 shows a mobile pumping unit 1 according to the invention in operation. The mobile pumping unit 1 is installed on the bottom 2, below the water surface 3. The mobile pumping unit 1 pumps the water over a dike 4. The mobile pumping unit 1 has on the upper side a pressure box 5 in which four submersible pumps 6 are installed, of which two are visible in
20 Fig. 2 on the side. The pressure box 5 communicates with the suction box 7, which is further provided with a dirt grating or duckweed grille 8. The pressure box 5 is further provided with pressure pipe connections 9, 10 for coupling pressure pipes capable of discharging the water. In Fig. 1 only the upper pressure pipe connection
25 10 is connected to a pressure pipe 11, and the other pressure pipe connections 9 are sealed by sealing flanges 12. In Fig. 2 the pressure pipe connection 10 is connected to one of the pressure pipe connections 9. The mobile pumping unit 1 is further provided with eyes
30 13 for hoisting the mobile pumping unit 1 so that it can be placed and removed again. The pump 6 is a submersible pump (sinking pump), which pumps up the water via the suction pipe 14 and pumps it out into the pressure box 5. In Figs. 1 and 2, the direction of flow of the water is indicated by arrows P. The pumps 6 have a rotor 15 and an electrically driven underwater motor 16 installed in the shaft 17. The pumps 3 further have
35 power connecting points 18, from which power lines 19 are passed via a guard and a motor bushing 20 along the pressure pipe 11 to a level switch 21. The motor bushing 20 is pressure-resistant so as to be resistant to the pressure from the pumps on the pressure box 5. The guard stalls in case of excess pressure. The power
40 lines 19 are further passed to a switch box, not shown, for starting and stopping the unit and an electric generator. The level switch 21 switches off the power if a specific minimum height of the water surface 3 is reached.

[0017] Fig. 5 shows a practical example of a so-called monopump unit 22 according to the invention, which is installed on the bottom 23 below the water surface 24. Fig. 5 further shows a dike 25 over which the water is pumped away. This device is characterized by a

single, optionally stationary pump 26. To be distinguished in Fig. 5 is the suction box 27 with a dirt grating 28. The pump 26 is installed on a pump foundation plate 29 at which a suction mouth 30 is formed. The suction box 27 is further provided with supporting beams 31 for increasing the firmness and with a bottom plate 32. The pump 26 is installed in the pressure box 33. The pressure box 33 has pressure pipe connections 34, 35, of which the connection 34 is connected with a pressure pipe 36 and the connection 35 is sealed by screwing with a sealing flange 37. The pressure box 33 further has a pressure-resistant bushing and guard 38, through which the power cable 39 is passed to the pump 26.

[0018] Furthermore, Fig. 6 shows another detail of a pumping unit according to the invention, with an enlarged suction box 40 and a dirt grating 41. This suction box 40 may project above the water level and is intended in case extreme amounts of dirt are expected. In that case the inlet openings must be as large as possible to keep the local flow rates as low as possible so as to reduce the risk of clogging.

[0019] Fig. 7 shows in detail how, in case a pumping unit is clogged notwithstanding, the pumping unit and the dirt grating 42 can be cleaned, while in operation, by causing the pumps to pump in the reverse direction, which direction is indicated by the arrow Q, which results in the dirt grating 42 tilting about a pivot 43 and the dirt being removed from the suction space and from the dirt grating 42.

Claims

1. A pumping unit for use as a draining machine, comprising a housing with a space for installing one or more pumps therein and a suction space communicating with the space for the pumps, which suction space is at least partly bounded by walls or wall parts with openings therein, which may or may not give direct access to the surroundings of the housing, which housing further comprises means for coupling one or more discharge pipes with the pump space and/or the pump or pumps to be installed therein, while the pumping unit is further of mobile construction.
2. A pumping unit according to claim 1, characterized in that the pump space and the suction space are superimposed adjacent to each other in the housing and are separated by a wall portion in which as many openings are provided as pumps can be installed in the pump space, to or in each of which openings one of the pumps to be installed in the pump space can be connected.
3. A pumping unit according to claims 1-2, characterized in that the housing is arranged to removably install two or more pumps therein.
4. A pumping unit according to claim 3, characterized in that the housing is arranged to removably install four pumps therein.
5. A pumping unit according to claim 2, characterized in that the openings between the pump space and the suction space are each individually sealable.
6. A pumping unit according to claims 1-5, characterized in that the means for coupling the discharge pipes are each individually sealable.
7. A pumping unit according to any of the preceding claims, characterized in that the suction space and/or pump space are removably connected together.
8. A pumping unit according to any of the preceding claims, characterized in that the suction space and/or pump space are of modular construction.
9. A pumping unit according to any of the preceding claims, characterized in that the suction space and/or pump space are made of preserved steel.
10. A pumping unit according to any of the preceding claims, characterized in that it is arranged to install pumps of the sinking pump type.
11. A pumping unit according to any of the preceding claims, characterized in that it is provided with means by which it can be hoisted or lifted by a crane or the like.
12. A pumping unit according to any of the preceding claims, characterized in that the suction space is provided on the inlet side with a filtering device which is tiltably arranged on the upper side of the suction space.
13. A method for draining a polder or flooded area or canal or storage basin or the like with a pumping unit according to any of the preceding claims, by installing in the pumping unit as many pumps as is necessary or desirable and transporting the pumping unit with a transport unit, for instance consisting in a trailer with a flatbed and a crane or the like, to a suitable location, placing it in the water on the bottom so that the suction space is substantially submerged, connecting the pumping unit with water transport discharge pipes with which the superfluous water can be pumped away to another place as well as with a control and switch box for operating the pumping unit and, if desired, an (emergency) power unit for supplying power.

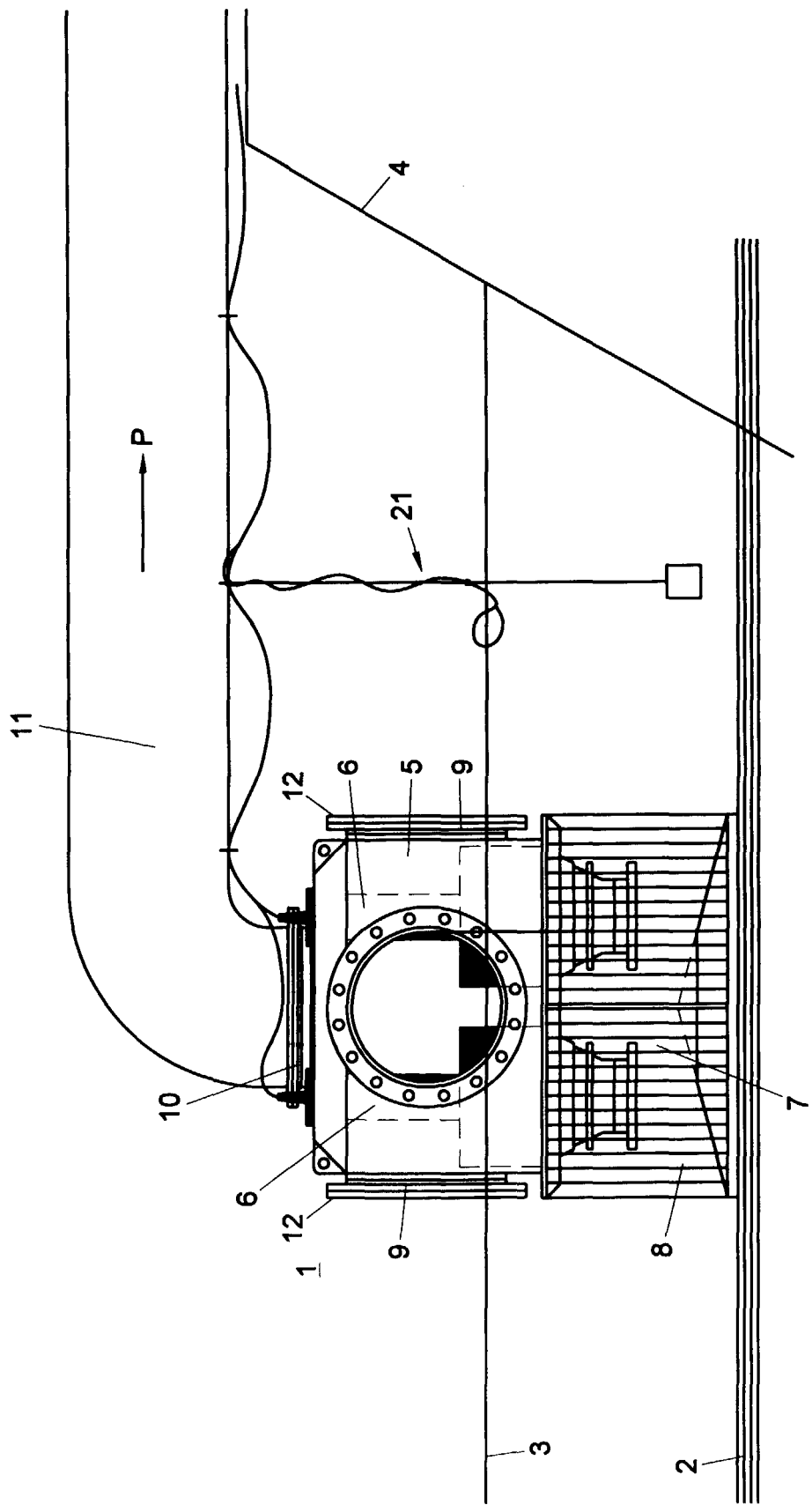


Fig. 1

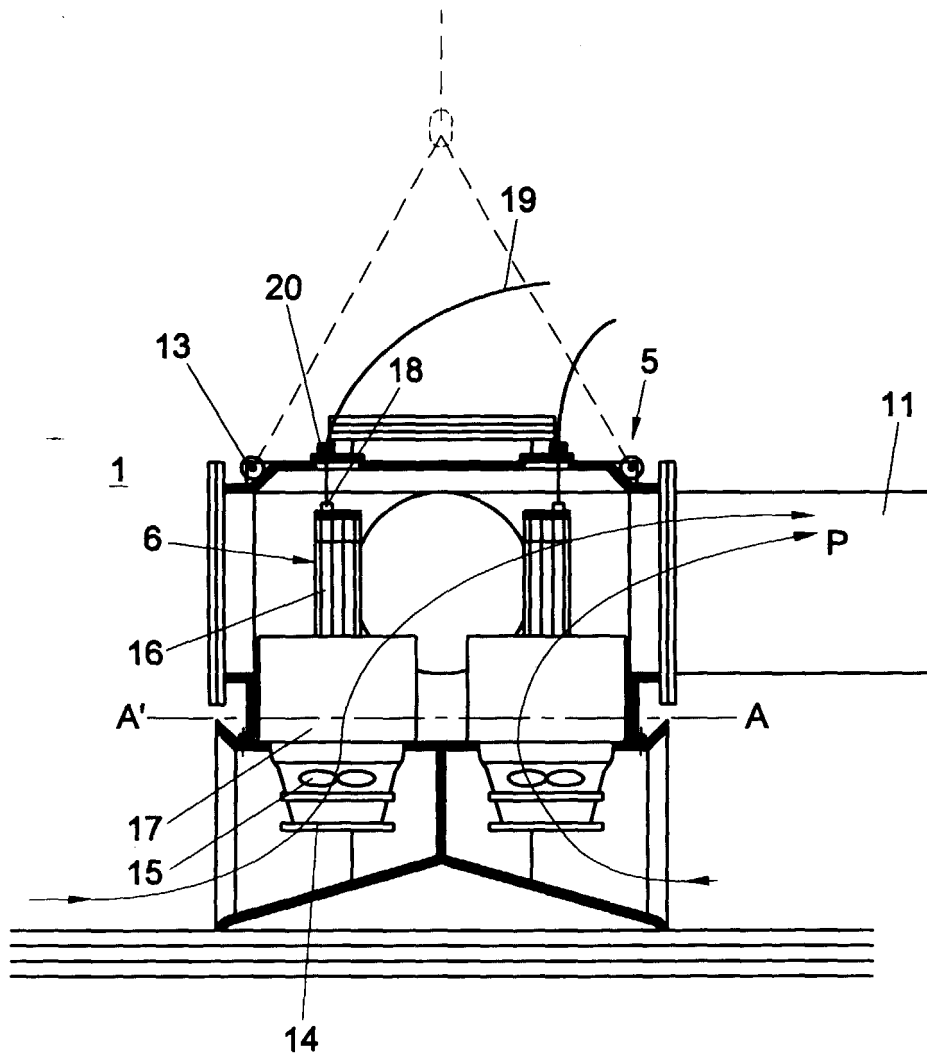


Fig. 2

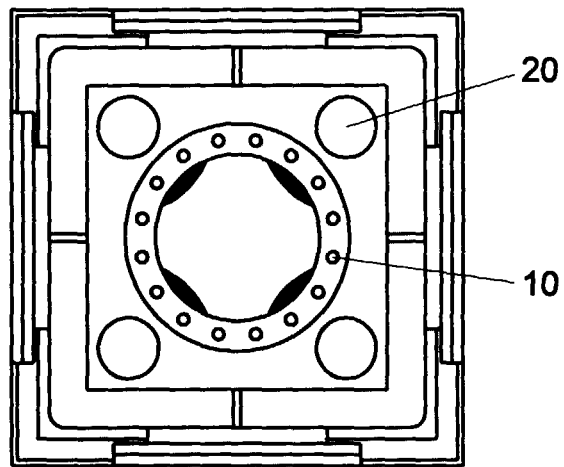


Fig. 3

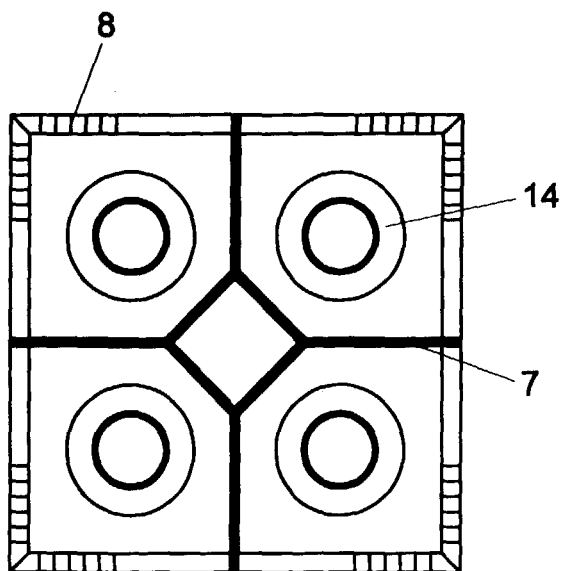


Fig. 4

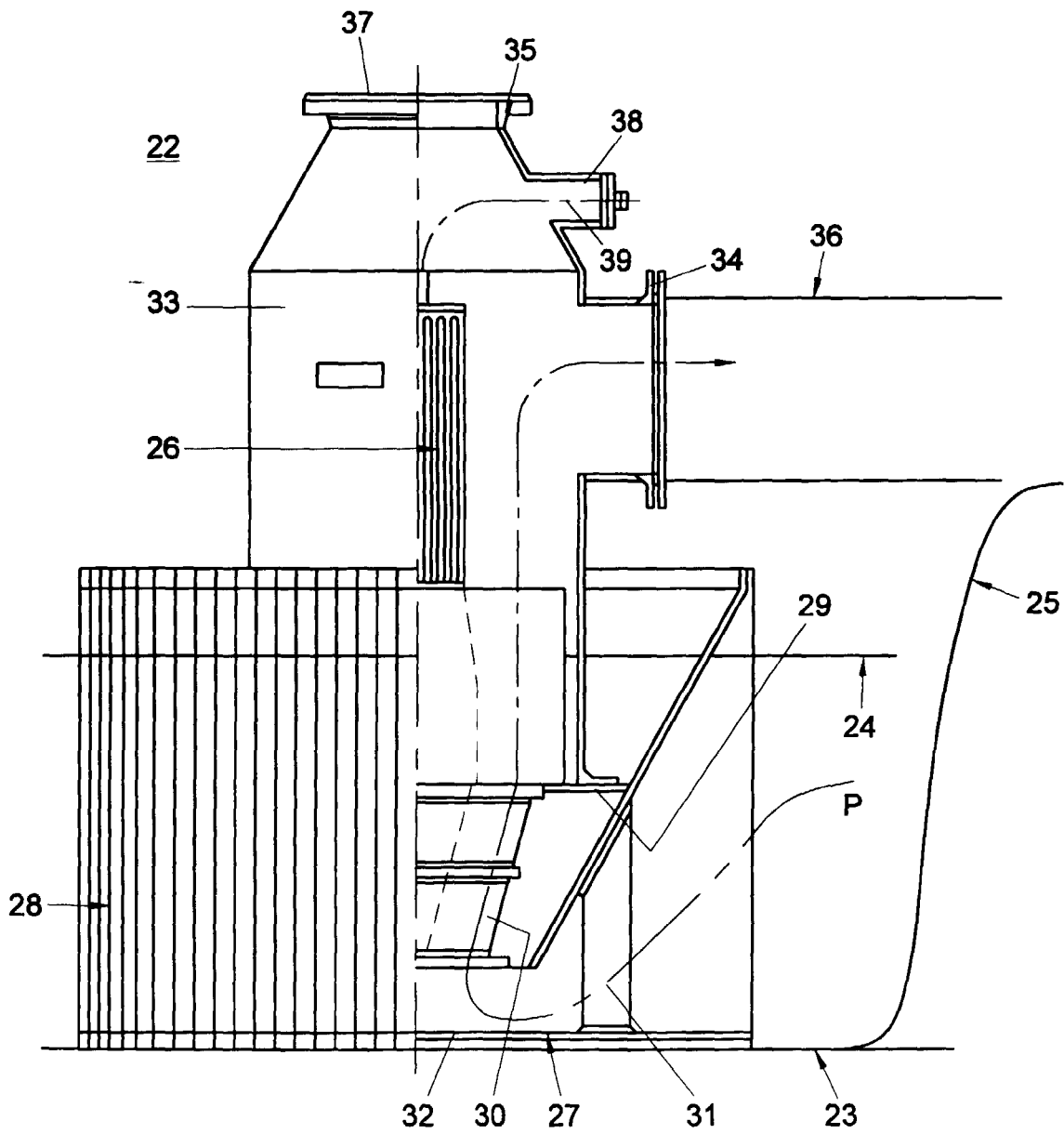


Fig. 5

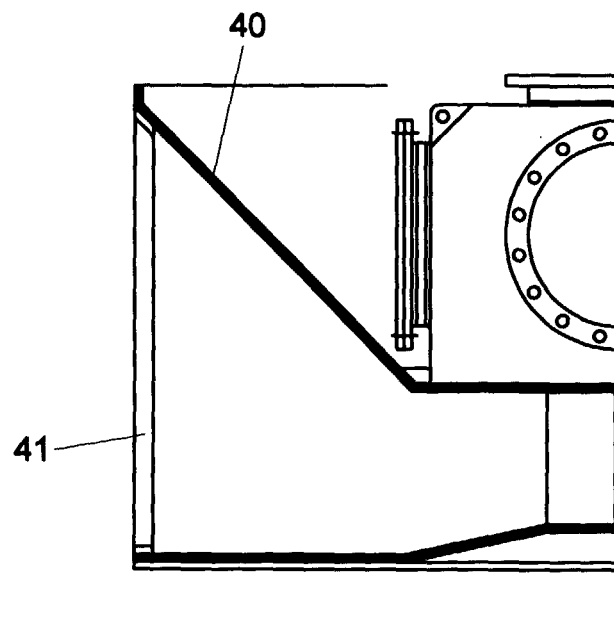


Fig. 6

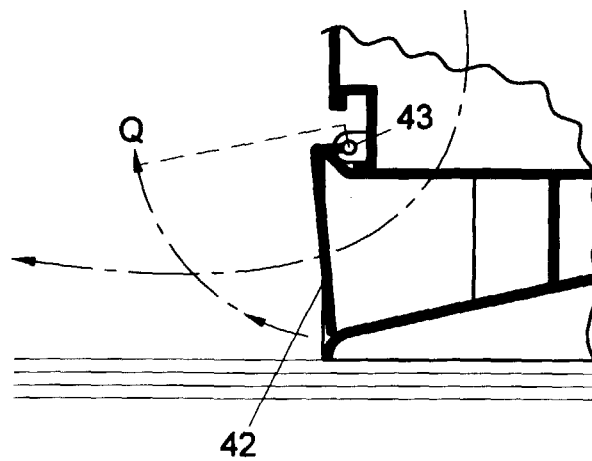


Fig. 7



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EUROPEAN SEARCH REPORT

Application Number
EP 00 20 1565

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			F04D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 7 July 2000	Examiner Teerling, J
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 20 1565

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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