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(71) Applicant *(for all designated States except US)*: **KORTEX 90, A.S.** [CZ/CZ]; Jilkova 203, 615 00 Brno (CZ).

(71) Applicant and
(72) Inventor: **HANULIAK, Alojz** [CZ/CZ]; Krenova 14, 602 00 Brno (CZ).

(74) Agent: **MUSIL, Dobroslav**; Patent Office, Cejl 38, 602 00 Brno (CZ).

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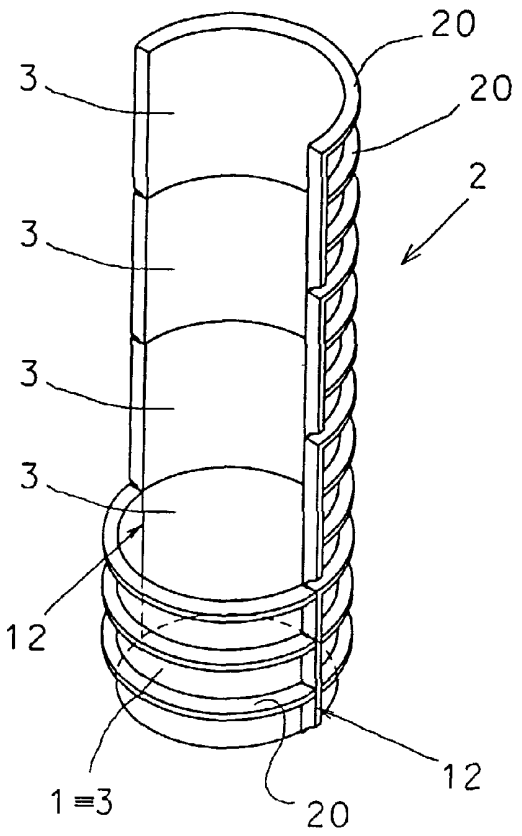

(57) Abstract: An element of a high pressure resisting barrier comprising a wall part, whereas the wall part (2) is in the lower part of its rear side fitted with a support section (1) and that the lower partof the element is adapted to be embedded into the ground.

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ELEMENTS OF A HIGH PRESSURE BARRIER AND THEIR APPLICATION

Technical field

The technical solution relates to an element of a high pressure resisting barrier comprising a wall part.

The technical solution also relates to a high pressure resisting barrier comprising elements.

Background art

There are known solutions aimed at the creation of a high pressure resisting barrier.

A drawback common to the known solutions consists in high financial and time consumption requirements placed on the embodiments of such solutions as well as in high requirements placed on the technological steps to be used in the realization of the known high pressure resisting barriers, and also in low mobility of the known solutions.

The technical solution aims to propose elements of a high pressure resisting barrier which place only limited requirements from the point of view of production and economy and permit to create a wide range of various high pressure resisting barrier types protecting against slides of various masses such as snow, earth, mud, stones, etc. as well as against water invasion.

Principle of the technical solution

The goal of the technical solution has been reached by an element of a high pressure resisting barrier whose principle consists in that the wall part is in the lower part of its rear side fitted with a support section and that the lower part of the element is adapted to be embedded into the ground.

Such element of a high pressure resisting barrier is easy to produce at favourable costs, and permits to create a wide range of various fully functional high pressure resisting barriers for holding back slide masses (snow, earth,mud, stones, etc.) and protecting against water invasion, as will be described further on.

From the point of view of the simplicity of use of the element of the high pressure resisting barrier it is advantageous if the support section of the element is made as an integral part of at least the lower part of the wall part of the element.

From the point of view of production and storage it is advantageous if the support section is detachable from the wall part of the element.

.According to one embodiment, it is advantageous if the wall part of the element consists of at least one flat plate.

In particular for applications with a higher load expected to act on the wall part of the element it is advantageous if the wall part of the element is made as at least one shaped element.

From the point of view of the production and utility it is advantageous if all shaped elements making up the wall part of the element are identical with the support section of the element because in this way the whole element of any desired height is made up of identical elements which permits, on the one hand, to reduce the cost of acquisition of production jigs, in particular of moulds required for the production of each element and, on the other hand, to achieve the required variability in height of the element.

From the point of view of exploiting the strength of the wall part of the element it is advantageous if the shaped elements and the support section of the element are made as one half of a cylinder surface divided in longitudinal direction.

To increase the load capacity and functional ability of the element of the high pressure resisting barrier it is advantageous if the wall part of the element and, as the case may be, also the support section of the element, is fitted on its outer side with means for strengthening and/or for noise suppression and/or for setting the direction of the fluid streaming along the wall part of the element.

To increase the load capacity of the element of the high pressure resisting barrier still more it is advantageous if the wall part of the element and, as the case may be, also the support section of the element are fitted with an inner reinforcement.

The goal consisting in the creation of a fully functional high pressure resisting barrier comprising elements according to the previous sections has been achieved by a high pressure resisting barrier whose principle consists in that it is made up of elements situated next to each other each of which is by its lower part embedded in the ground.

To increase the resistance of the high pressure resisting barrier against a sudden impact of dangerous masses, it is advantageous if the elements of the high pressure resisting barrier are fitted with a load in their lower part.

To still more increase the resistance of the high pressure resisting barrier against a sudden impact of dangerous masses, it is advantageous if the elements of the high pressure resisting barrier are fitted with at least one anchor in their lower part.

To still more increase the resistance of the high pressure resisting barrier, in particular the resistance of the wall parts of the elements of the high pressure resisting barrier against a sudden impact of dangerous masses, it is advantageous if the elements of the high pressure resisting barrier are fitted with at least one vertical strut leaning against the rear side of the wall part of each element of the high pressure resisting barrier.

To still more increase the resistance of the high pressure resisting barrier it is advantageous if the mutually neighbouring elements of the high pressure resisting barrier are mutually coupled with the adjoining edges of their wall parts, the elements of the high pressure resisting barrier being fitted with means for sealing the contact areas between the neighbouring elements of the high pressure resisting barrier.

In one preferred embodiment each two neighbouring edges of the wall parts of each two neighbouring elements of the high pressure resisting barrier are situated in a shaped profile element and each shaped profile element is coupled with a draw

pile situated in the direction of the expected impact of the dangerous mass in front of the high pressure resisting barrier.

Such high pressure resisting barrier has large capacity of holding back for instance mass slips in order to protect lives and health of persons, the nature, and material values.

From the point of view of the design simplicity while fully maintaining the functional ability it is advantageous if the shaped profile elements are fitted with flanges receiving one end of safety ropes whose the other ends are seated in the draw piles.

To improve the possibility of fully disassembling the high pressure resisting barrier it is advantageous if the safety ropes are coupled with the flanges by means of separable joints.

Description of the drawings

The technical solution is schematically shown in the drawings in which Fig. 1 is one example of embodiment of the element of the high pressure resisting barrier, Fig. 2 an embodiment of the element of the high pressure resisting barrier with a plane wall part of the element superior in width to the width of the support section, Fig. 3 an embodiment of the element of the high pressure resisting barrier with a plane wall part of the element equal in width to the width of the support section, Fig. 4 an example of embodiment of the high pressure resisting barrier in perspective front view, Fig. 5 an example of embodiment of the high pressure resisting barrier as flood combatting barrier in perspective rear view, and Fig. 6 a schematical side view of the arrangement of the flood combatting barrier of Fig. 5.

Examples of embodiment of the technical solution

The element of a high pressure resisting barrier comprises a wall part **2** having related thereto from its rear side on its lower end a support section **1** which can be made as a wall shaped as a part of a suitable geometrical body such as a cylinder or it can have another suitable plan view shape such as a part of an oval or

hexagon etc. Thus, the plan view of the support section can be shaped as a part of a circle, of an ellipse, of a parabola, of a triangle or of a polygon, etc. The support section 1 increases the plan view surface of the element of the high pressure resisting barrier thus increasing the surface of the base of the element and improving the stability of the element. To improve still more the stability of the element, the base of the element consisting of the lower end of the wall part of the element 2 and of the support section 1 can be filled with a suitable material such as soil or concrete and can receive plants 10 situated in a suitable receptacle 11 mounted in the base of the element, as is shown in Fig. 4.

The wall part 2 of the element of the high pressure resisting barrier can be made as a flat plate 4, see Figs. 2 and 3, whose width is superior or equal to the distance between two ends 12 of the support section 1. The wall part 2 of the element can also consist of at least one shaped element 3, see Figs. 1, 4, 5, and 6 whose plan view can be identical with the support section 1 of the element of the high pressure resisting barrier. The lower part of the wall part 2 of the element of the high pressure resisting barrier can be made as a common body with the support section 1 fitted with further shaped elements 3 constituting the wall part 2 of the element of the high pressure resisting barrier. In the shown examples of embodiment, the support section 1 is made as a plate bent to the shape of one half of a longitudinally separated cylinder surface. In the examples of embodiment shown in Figs. 1, 4, 5, and 6, the wall part 2 of the element of the high pressure resisting barrier consists of a number of shaped elements 3 identical with the support section 1 and put on each other in vertical direction which is advantageous in particular from the point of view of their manufacture since the whole element is made out of one embodiment of the shaped element 3. The wall part 2 of the element of the high pressure resisting barrier comprises as many shaped elements 3 as needed to reach the required height of the wall part 2. Consequently, the whole wall part 2 of the element is shaped as one half of a longitudinally separated cylinder surface. The individual shaped elements 3 constituting the element can be either interconnected in a suitable way or they are freely laid in a required configuration.

The whole element of the high pressure resisting barrier can be made of a single piece of material.

The element of the high pressure resisting barrier can be made of a plastic material, concrete, or another suitable material. The load limit of each of them can be increased by a suitable inner reinforcement so as to produce a laminate, reinforced concrete, etc.

The element of the high pressure resisting barrier can be on the outer side of the wall part **2** and, as the case may be, of the support section **1**, fitted with suitable means for reinforcing the wall part **2** and/or for noise suppression and/or for directing the streaming of fluids along the wall part **2**. Such means can consist for instance of shown horizontal ribs **20** or of not shown vertical ribs, or of suitably shaped projections, or of a layer of noise absorbing material etc., including the combination of some or all of such means. The horizontal and vertical ribs increase the load resistance of the wall part **2** by the effect of what is known as shape strength.

The high pressure resisting barrier comprising the individual elements consists of the elements situated next to each other each of which contains the wall part **2** which is in its lower part on the rear side fitted with a support section **1**. Each element of the high pressure resisting barrier is with its lower part embedded in the ground.

The application of the high pressure resisting barrier according to this technical solution permits easily and quickly to create bent and otherwise shaped high pressure resisting barriers.

An example of the (creation of) high pressure resisting barrier used for instance to hold backslides of earth, stones, or snow is shown in Fig. 4.

In this application, the lower ends of the elements of the high pressure resisting barrier, i.e., the space between the wall of the support section **1** and the lower end of the wall part **2** of each element of the high pressure resisting barrier can be filled with a load such as concrete and embedded in the ground. Neighbouring edges **21** of the wall parts **2** of each two neighbouring elements are situated inside a suitable shaped profile element **5**, for instance of a „U"-profile one,

which is on its front side fitted with a suitable flange **6** receiving fix or separably one end of a safety rope **7** whose the other end is seated in a draw pile **8** which is embedded in the ground in front of the high pressure resisting barrier in the direction **X** of the expected earth-, stone-, and snow-slides. This means that during the earth-, stone-, and snow-slides the safety ropes **7** and the flanges **6** are subject to the pull generated by the pressure load acting on the wall parts **2** of each element of the high pressure resisting barrier which can be strengthened for instance by the horizontal ribs **20** and possibly also by an inner reinforcement and by other suitable elements. It is self-evident that for the application in a high pressure resisting barrier the strength requirement is better met by a rounded shape of the wall part **2** of the elements, preferably a half-circular plan view shape of the wall part **2** as compared for instance with the flat-shaped wall part **2** shown in Figs. 2 and 3. The embodiment of the high pressure resisting barrier shown in Fig. 4 also can be used as a permanent barrier against water invasion, for instance against flood waves, tidal waves, etc.

The advantage of the shown embodiment of the separable high pressure resisting barrier in which the wall parts **2** of the elements of the high pressure resisting barrier consist of a number of separably connected shaped elements **3**, and the safety ropes **7** can be detached from the flanges **6** on the shaped profile elements **5** consists also in that in the period of zero risk of earth-, stone- and snow-slides as is the case in mountains in summer, or in places and times of zero flood risk previously covered by flood combatting barriers, the wall part of the element of each element can be dismantled leaving on the spot only lying safety ropes **7** and possibly the support sections **1** with the lower part of the wall parts **2** embedded in the ground and thus improving the appearance of the landscape. Said lower parts of the elements can receive receptacles **11** with plants **10**, etc. The whole high pressure resisting barrier can be very quickly and easily reinstalled. This is advantageous in the protection of, for instance, mountain huts and buildings, against seasonal factors such as snow-slides in winter and spring or against earth- and stone-slides in rain periods, etc.

The application of the high pressure resisting barrier for the creation of a flood combatting barrier in flood regions when water goes up and up is shown in Fig. 5. The elements of the high pressure resisting barrier, preferably consisting of semicircular barrier elements **3**, are situated next to each other, and their lower parts are filled with a suitable load such as concrete and are embedded into the ground as shown in Fig. 6. For increasing the stability of the flood combatting barrier, these lower parts of the elements are fitted with anchors **9** embedded in the ground. The contact areas of the neighbouring wall parts **2** of the elements of the high pressure resisting barrier are in a suitable way sealed against water invasion. In the lower part of the elements, for instance in the packing of the lower part of the elements of the high pressure resisting barrier, there is seated at least one vertical strut **90** leaning against the rear side of the wall part **2** of each element of the high pressure resisting barrier and thus reinforcing it. In the shown example of embodiment, each element of the high pressure resisting barrier is equipped with three vertical struts **90** consisting of thick-walled profile tubes. For increasing the strength of the high pressure resisting barrier intended to be used as a flood combatting barrier, the neighbouring wall parts **2** of the elements can be mutually coupled, for instance by situating said neighbouring edges **21** of the neighbouring wall parts **2** of the elements of the high pressure resisting barrier between arms of a suitable profile element such as a „U"-profile. The flood combatting barrier made of the element in this manner is sufficiently resistant against load by the hydrostatic pressure of the water held back. This resistance ability can be further increased by the application of the shape strength of the horizontal and/or vertical ribs **20** situated on the wall parts **2** of the elements of the high pressure resisting barrier and also by the application of the inner reinforcements in each shaped element **3**. After the flood has receded, the high pressure resisting barrier can remain where it is or it can be dismantled and stored on another place, or only a part of each element making up the wall part **2** of the element of the high pressure resisting barrier can be dismantled while the lower parts of the elements of the high pressure resisting barrier can remain where they are, etc. It is evident that the anchors **9** and/or the vertical struts **90** can be in case of need applied also to the elements of the high

pressure resisting barrier serving as high pressure resisting barriers shown in Fig. 4 whose strength and resistance are in this manner further increased.

It is evident that the high pressure resisting barrier according to the technical solution has a variety of scopes of application whose enumeration in this description is neither exhaustive nor limiting. Other regions and scopes of application of the technical solution are self-evident to those skilled in the art and thus require no further description.

Industrial applicability

The technical solution is widely applicable in many fields, in particular in the protection against devastating natural phenomena such as earth-, stone- and snow-slides, etc.

CLAIMS

1. An element of a high pressure resisting barrier comprising a wall part, characterized by that the wall part (2) is in the lower part of its rear side fitted with a support section (1) and that the lower part of the element is adapted to be embedded into the ground.

2. An element of a high pressure resisting barrier as claimed in Claim 1, characterized by that the support section (1) is made as an integral part of at least the lower part of the wall part (2) of the element.

3. An element of a high pressure resisting barrier as claimed in Claim 1, characterized by that the support section (3) is detachable from the wall part (2) of the element.

4. An element of a high pressure resisting barrier as claimed in any of Claims 2 and 3, characterized by that the wall part (2) of the element consists of at least one flat plate (4).

5. An element of a high pressure resisting barrier as claimed in any of Claims 2 and 3, characterized by that the wall part (2) of the element consists of at least one shaped element (3).

6. An element of a high pressure resisting barrier as claimed in Claim 5, characterized by that all shaped elements (3) making up the wall part (2) of the element are identical in shape with the support section (1) of the element.

7. An element of a high pressure resisting barrier as claimed in Claim 6, characterized by that the shaped elements (3) and the support section (1) are made (shaped) as one half of a cylinder surface.

8. An element of a high pressure resisting barrier as claimed in any of Claims 1 to 7, characterized by that the wall part (2) of the element and, as the case may be, also the support section (1), are fitted on their outer sides with means for strengthening and/or for noise suppression and/or for setting the direction of the fluid streaming along the wall part of the element (2).

9. An element of a high pressure resisting barrier as claimed in any of Claims 1 to 8, characterized by that the wall part (2) of the element and, as the case may be, also the support section (1) of the element are fitted with an inner reinforcement.

10. A high pressure resisting barrier comprising elements as claimed in any of Claims 1 to 9, characterized by that it is made up of elements situated next to each other each of which is by its lower part embedded in the ground.

11. A high pressure resisting barrier as claimed in Claim 10, characterized by that the elements of the high pressure resisting barrier are fitted with a load in their lower part.

12. A high pressure resisting barrier as claimed in any of Claims 10 to 11, characterized by that the elements of the high pressure resisting barrier are fitted with at least one anchor in their lower part.

13. A high pressure resisting barrier as claimed in any of Claims 10 to 12, characterized by that the elements of the high pressure resisting barrier are in their lower part fitted with at least one vertical strut (90) leaning against the rear side of the wall part (2) of each element of the high pressure resisting barrier.

14. A high pressure resisting barrier as claimed in any of Claims 10 to 13, characterized by that the mutually neighbouring elements of the high pressure resisting barrier are mutually coupled by the adjoining edges (21) of their wall parts (2), the elements of the high pressure resisting barrier being fitted with means for sealing the contact areas between the neighbouring elements of the high pressure resisting barrier.

15. A high pressure resisting barrier as claimed in Claim 14, characterized by that each two neighbouring edges (21) of the wall parts (2) of each two neighbouring elements of the high pressure resisting barrier are situated in a shaped profile element (5) and that each shaped profile element (5) is coupled with a draw pile (8) situated in the direction (X) of the expected impact of the dangerous mass in front of the high pressure resisting barrier.

16. A high pressure resisting barrier as claimed in Claim 15, characterized by that the shaped profile elements (5) are fitted with flanges (6) receiving one end of safety ropes (7) whose the other ends are seated in the draw piles (8).

17. A high pressure resisting barrier as claimed in Claim 16, characterized by that the safety ropes (7) are coupled with the flanges (6) by means of separable joints.

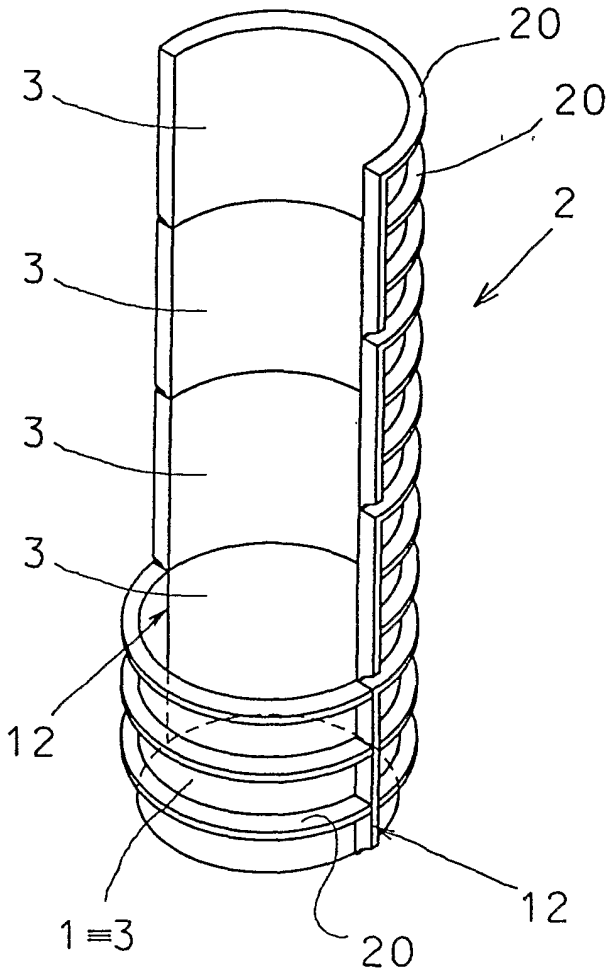

Fig. 1

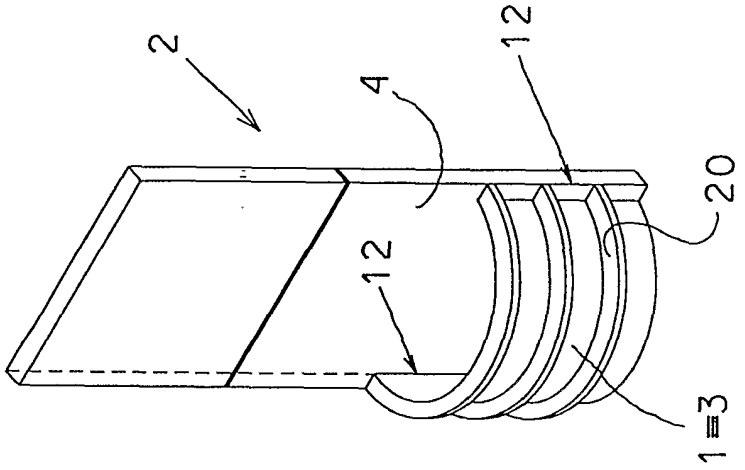

Fig. 3

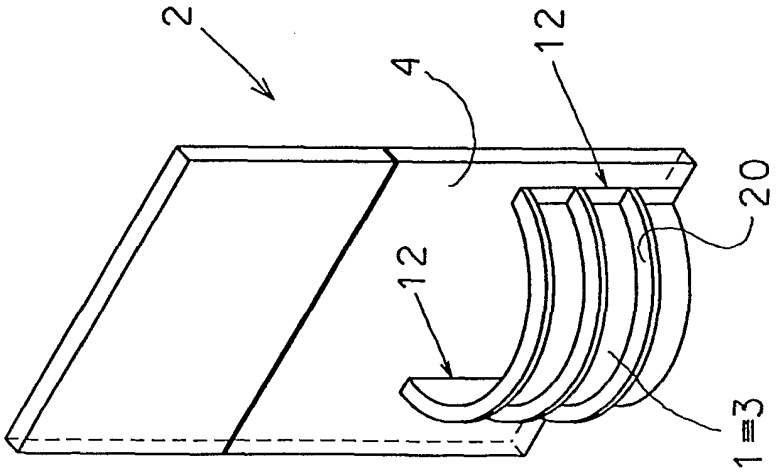

Fig. 2

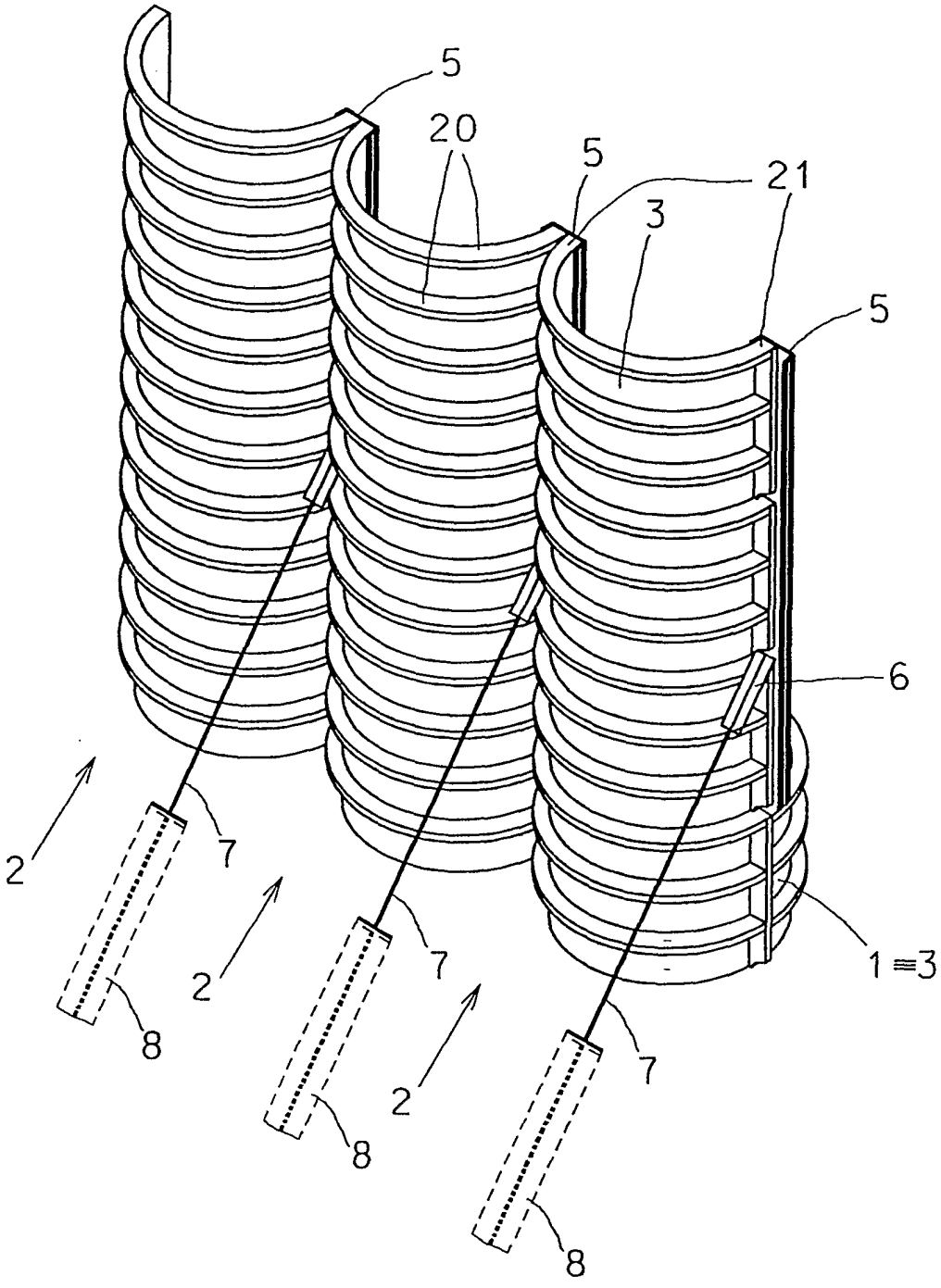

Fig. 4

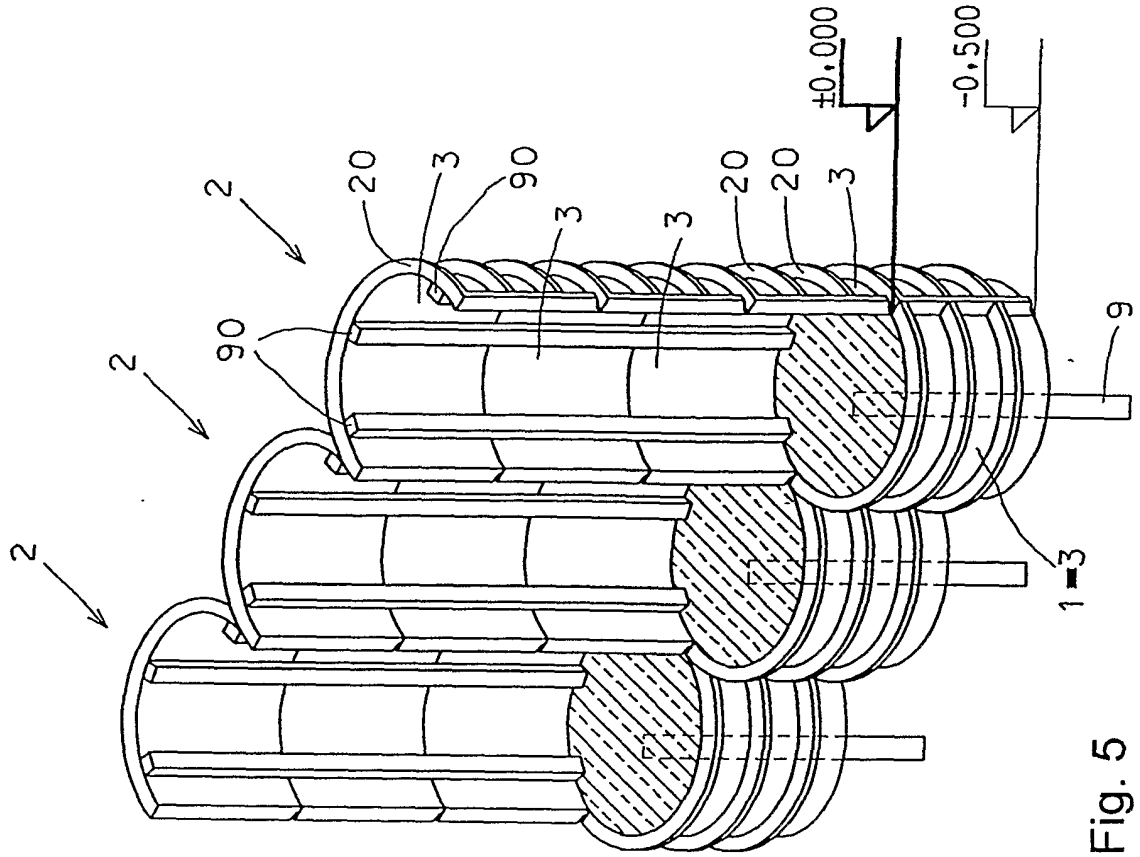

Fig. 5

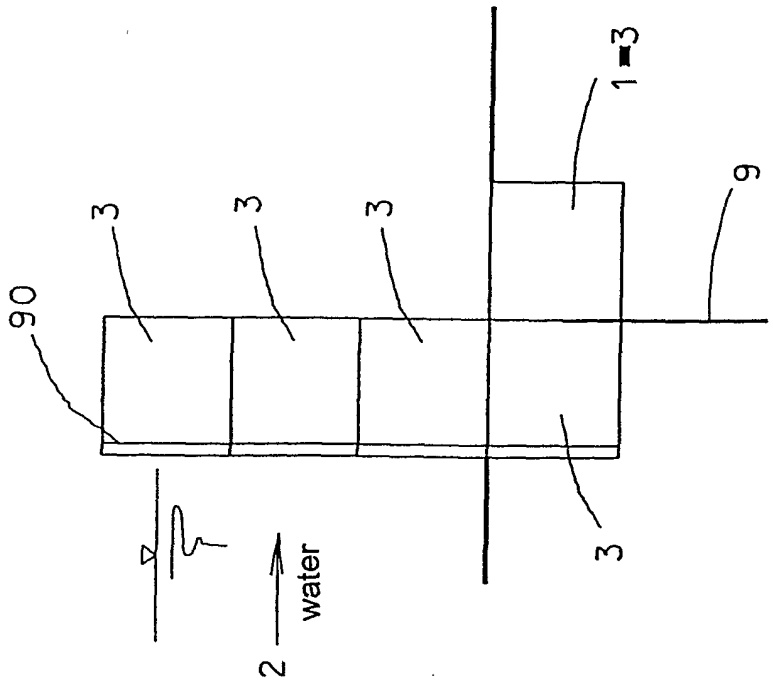

Fig. 6

INTERNATIONAL SEARCH REPORT

Internal application No
PCT/CZ 02/00015

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 E02D29/02 E01F7/04 E02B3/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 E02D E01F E02B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
1 July 2002	08/07/2002

Name and mailing address of the ISA	Authorized officer
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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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Form PCT/ISA/210 (continuation of second sheet) (July 1992)

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