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(54) Free-standing acoustic screening system

(57) The invention relates to a free-standing acoustic screening system comprising
a container box (1);
an acoustic screen (2) vertically extendable from a lower position in which it is housed in the container box (1) to an upper position;
two vertical side guides (3) anchored to respective side parts of the container box (1) in which the acoustic screen (2) is guided in its movement between said lower position and said upper position.

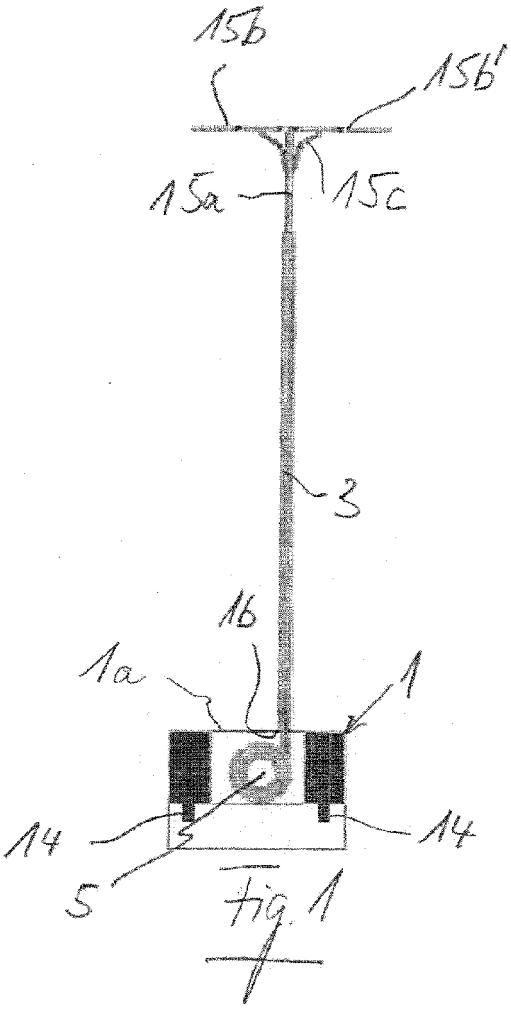

Fig. 1

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Description

Technical Field of the Invention

[0001] The present invention is comprised in the technical field of transportable and reusable acoustic screens.

Background of the Invention

[0002] The acoustic impact caused in urban settings by certain temporary sources of noise, such as construction and demolition works, popular events (parties, concerts, public acts,...), etc., is a constant in today's society which, while increasingly more people reject it, has traditionally presented a difficult solution that has in turn involved a lack of action taken by those in charge to resolve the problem.

[0003] The rather few efforts aimed at resolving the situation have focused on trying to control the emission at the source of the problem. This approach is valid and correct from the acoustic point of view, but reality has proven that the results were not as good as expected. Thus, for example, although there are specific regulations which limit the noise emission of certain machines to be used outdoors, the operating activity of the works proves that even though the equipment complies with the regulation at the source, they exceed the regulatory levels due to factors such as misuse, lack of maintenance or the operating conditions different from those used in the cataloguing test. The main corrective measure (at least the most widespread) applicable in the noise propagation path corresponds with the use of acoustic screens. In recent decades, thousands of kilometers of acoustic screens have been installed in the vicinity of sources of noise that could be referred to as "fixed", mainly associated with transport infrastructures and large industrial facilities. This type of screen has been built for the purpose of lasting over time and the know-how is not applicable for temporary situations requiring screening systems that can be quickly assembled and disassembled and are reusable in different settings.

[0004] Transportable and reusable acoustic attenuation systems are known. Japanese patent application JP-2006342592-A describes a system made in the form of a framing that can be assembled and disassembled, comprising vertical posts joined together by stringers and cross members between which acoustic screening panels are arranged. The assembly and disassembly of this system, which is not height-adjustable, is relatively complex and requires considerable time.

[0005] German patent application DE-19652871-A describes an acoustic screen applicable to noisy machinery, streets and railroad tracks. It consists of inflatable elements that can be inflated with a gas or filled with a liquid to form an acoustic barrier. The inflatable elements can be assembled with one another to give the assembly the desired shape to insulate the room or the source of noise. Beside the fact that this system is not height-adjustable, folding the hydraulic elements after being deflated is laborious. Furthermore, when inflating, these elements may be rendered useless if they experience mechanical damages that result in air or liquid leaks.

[0006] Japanese patent application JP-2000248655-A describes an insulating wall system applicable to the inside of buildings under construction. It is also inflatable and adjustable by expansion and contraction of the elements forming it. The insulating wall also incorporates an also inflatable roof and is adjusted to the inside of the building under construction. It is also modular and can be combined with insulating walls. Since it is adjusted to the walls and to the ceiling of the building under construction, not only does it acoustically insulate but it also prevents the transmission of the noise inside the building. The easy assembly and disassembly is also advantageous. This system, which is exclusively intended for indoor acoustic insulation suffers from the same drawbacks as German patent application DE-19652871-A.

[0007] German patent application DE-2948248-A describes an acoustic screen consisting of a folding base which serves as support for a frame and which in turn secures the acoustic insulation unit formed by cassette elements. The screen of the invention is modular and can be combined by means of flexible attachments with other units to cover the desired area under construction or in residential areas. Although the assembly and transport are simplified since said base is folding, the frame and therefore the acoustic insulation unit is neither height-adjustable nor folding, so it is a drawback in terms of height and the space required for its storage and transport.

[0008] German utility model DE-29711222-U describes an indoor screen or door which, although it serves as acoustic insulation, also acts as an access door for a room. It can move horizontally and can be wound at one of the sides. The windable door is formed by slats which are unwound, guided by horizontal rails to the end of the profile formed by the frame, where the end of the windable door is hooked. Although it has some similarity with the invention, it is neither transportable, nor folding, nor height-adjustable.

Description of the Invention

[0009] The object of the present invention is to overcome the drawbacks of the state of the art described above by means of a free-standing acoustic screening system comprising a base, an acoustic screen and side profiles for the acoustic screen, which is characterized in that the base is a container box, the acoustic screen is vertically extendable from a lower position in which it is housed in the container box to an upper position, and the side profiles are two vertical side guides anchored to respective side parts of the container box in which the acoustic screen is guided in its movements between said lower position and said upper position.

[0010] The acoustic screen can be made of a material with acoustic insulation capacity that can integrate a transparent or translucent material to allow light in and/or to prevent the effects of a boxed-in feeling for people and/or to allow the screened acoustic source to remain visible.

[0011] In a first embodiment of the invention, the acoustic screen is windable about a winding shaft. According to this first embodiment, the acoustic screen can be formed by horizontal rows of windable slats and joined together like a blind extending between said side guides, by a flexible material windable around a winding shaft, or by rows of strips in a staggered arrangement joined together by means of horizontal shafts, at least one of said horizontal shafts being able to be guided in said side guides in the latter case.

[0012] According to this first embodiment of the invention, the container box can be provided with an upper cover with a groove extending between said side guides and sized to allow the passage of the acoustic screen. Furthermore, the winding shaft can suitably be connected to a winding mechanism for winding the acoustic screen when the latter drops from its upper position to its lower position. Likewise, in this first embodiment of the invention, the side guides can comprise respective C-shaped curved upper sections performing the function of an acoustic ridge board.

[0013] In a second embodiment of the invention, the acoustic screen is formed by horizontal rows of folding slats articulated to one another by means of horizontal shafts guided in said side guides and by means of respective second horizontal shafts shorter than the first horizontal shafts and which are not guided in the side guides, such that two folding slats articulated to one another by means of one of the second horizontal shafts are arranged between every two of the first horizontal shafts.

[0014] According to a third embodiment of the invention, the acoustic screen is formed by horizontal rows of folding slats articulated to one another like a bellows by means of horizontal shafts guided in said side guides and by means of respective second horizontal shafts shorter than the first horizontal shafts and which are not guided in the side guides. Each first horizontal shaft is coupled to a first side slat and to a second side slat, whereas two first folding side slats and two second folding side slats articulated to one another respectively by means of one of the second horizontal shafts are arranged between every two of the first horizontal shafts.

[0015] In the second and third embodiments of the invention, the container box can comprise an upper cover with a passage opening extending between said side guides and sized to allow the passage of the acoustic screen. In this case, the container box can furthermore be provided with at least one hatch cover blocking the passage opening and is articulated to said upper cover such that it is pushed upwards by each folding slat, which moves towards said upper position of the acoustic screen.

[0016] According to the invention, the acoustic screen can be coupled to an upper horizontal securing bar that can be immobilized at least at one height and preferably at different heights in said side guides by means of an anchoring system. This anchoring system can be comprised by bolts traversing respective holes in the side guides and entering respective cavities in the ends of the securing bar.

[0017] In a fourth embodiment of the invention, the system comprises an additional acoustic screen with some or all of the features of one of the embodiments of the invention defined above in this specification.

[0018] The system according to the invention can furthermore comprise a ridge board comprising a vertical plate coupled at the top portion to said side guides and in which at least one side wing that can be unfolded towards a horizontal plane is articulated. The ridge board can therefore comprise at least one side wing that can be unfolded towards one side of the vertical plate and at least one side wing that can be unfolded towards the other side of the vertical plate. The ridge board contributes to the acoustic screening and preferably at least one of its wings is coupled to the vertical plate by means of supporting elements which allows regulating the degree of inclination of the wing with respect to the vertical plate. Likewise, at least one of the side wings can comprise an articulation such that they can be regulated.

[0019] In order to assure the positioning of the system in the ground and thus prevent swaying or overturning when the acoustic screen is in said upper position, the container box can be coupled to side or axial counterweights and/or comprise respective side compartments to house a counterweight material and/or respective axial compartments for housing such counterweight material. The counterweight material can be sand, water, construction material, gravel, etc. In the event of loading with construction material, the container can have an upper hatch system for filling the compartments and a lower or side hatch system facilitating their subsequent unloading.

[0020] In a fifth embodiment of the invention, the container box comprises coupling means for coupling it with at least another container of an acoustic screening system with the features indicated above in this specification.

[0021] According to the foregoing, the screening system can be easily transported, assembled and disassembled while at the same time it is effective for mitigating the noise from construction work, public entertainment events, etc.

[0022] Due to its free-standing capacity (not requiring foundation), the system is ideal for urban settings, and the possibility of modifying its height allows assuring its efficacy without requiring excessive approximation to the source of noise which may interfere in the operation thereof, and in the case of construction areas, have an effect on safety aspects. Its fast assembly and disassembly allow it to be adapted to the movements of sources

of noise with a short duration.

[0023] On the other hand, due to its easy transport and assembly, the system is especially effective in a construction area, festivals etc.

Brief Description of the Drawings

[0024] Aspects and embodiments of the invention are described below based on a set of drawings in which

Figure 1 is a partially sectioned schematic elevation side view which generally shows relevant elements according to an embodiment of the invention;
Figure 2 is a schematic side view of the ridge board shown in Figure 1;
Figure 3 is a front-side schematic perspective view of the embodiment of the invention shown in Figures 1 and 2;
Figure 4 is a partially sectioned schematic front view of a first practical embodiment of the acoustic screening system according to the present invention in which the acoustic screen is wound in its lower position;
Figure 5 is a schematic side section view of the embodiment shown in Figure 4;
Figure 6 is a partially sectioned schematic upper plan view of the embodiment shown in Figure 4;
Figure 7 is a partially sectioned schematic front view corresponding to the first practical embodiment illustrated in Figure 4, in which the acoustic screen has been unwound and arranged in its upper position;
Figure 8 is a schematic side section view of the embodiment shown in Figure 7;
Figure 9 is a partially sectioned schematic upper plan view of the embodiment shown in Figure 7;
Figure 10 is a partially sectioned schematic front view of a second practical embodiment of the acoustic screening system according to the present invention in which the acoustic screen is wound in its lower position;
Figure 11 is a schematic side section view of the embodiment shown in Figure 10;
Figure 12 is a partially sectioned schematic upper plan view of the embodiment shown in Figure 10;
Figure 13 is a front-side schematic perspective view corresponding to the second practical embodiment illustrated in Figure 10, in which the acoustic screen has been unwound and arranged in its upper position;
Figure 14 is a schematic side section view of the embodiment shown in Figure 13;
Figure 15 is a partially sectioned schematic upper plan view of the embodiment shown in Figure 13;
Figure 16 is a partially sectioned schematic front view of a third practical embodiment of the acoustic screening system according to the present invention in which the acoustic screen is folded in its lower position;
Figure 17 is a partially sectioned schematic side view of the third practical embodiment illustrated in Figure 16;
Figure 18 is a schematic upper plan view of the embodiment shown in Figure 16 in which the acoustic screen is unfolded to its upper position;
Figure 19 is a schematic side section view corresponding to Figure 18;
Figure 20 is a schematic view of a fourth embodiment of the acoustic screening system according to the present invention, formed by a plurality of modules corresponding to those illustrated in Figures 16-18;
Figure 21 is a schematic upper plan view of the screening system shown in Figure 20;
Figure 22 is a front-side schematic perspective view of the screening system shown in Figure 20;
Figure 23 is a schematic view of a fifth embodiment of the acoustic screening system according to the present invention, comprising two windable acoustic screens;
Figure 24 is a schematic side elevational view of an alternative embodiment of the ridge board;
Figure 25 is a schematic side elevational view of another alternative embodiment of the ridge board.

[0025] The reference numbers in these drawings identify the following elements:

1, 1'	container box
1a	upper cover
1b	groove
1 c	passage opening
1d	axial compartments
3	vertical side guides
3'	double profile
3a	C-shaped curved upper sections
2, 2'	acoustic screen
4	windable slats
5	winding shaft
6	strips
7, 7'	horizontal shafts
8, 8'	folding slats
9	first horizontal shafts

10 second horizontal shafts

11 bolts

12 hatch cover

13 securing bar

14 retractable wheels

15 ridge board
15a vertical plate
15b, 15b' side wing
15c supporting elements
16 vertical sheets
17 side counterweights
18 transport flanges

Embodiments of the Invention

[0026] Figure 1 shows a general embodiment of the free-standing acoustic screening system in which the latter comprises a container box -1-, an acoustic screen -2- vertically extendable from a lower position in which it is housed in the container box -1- to an upper position (shown in Figures 1-3) and two vertical side guides -3- anchored to respective side parts of the container box -1- in which the acoustic screen -2- is guided in its movement from the lower position to the upper position. The box performs the function of transport module.

[0027] A ridge board -15- is arranged in the upper part of the screen, said ridge board comprising a vertical plate -15a- coupled at the top portion to said side guides -3- and in which a first side wing -15b- and a second side wing -15b'- that can be unfolded towards the other side of the vertical plate are articulated. These wings -15-, -15b- can be unfolded towards a horizontal plane such that the ridge board -15- has a T-shaped vertical section. The wings -15-, -15a- can be kept in their unfolded state by means of clamps and/or supporting elements -15c- such as support arms.

[0028] The container box -1- comprises an upper cover -1a- with a groove -1b-extending between said side guides -3- and sized to allow the passage of the acoustic screen -2-. Likewise, the container box -1- is provided with retractable wheels -14- which allow moving it to the desired locations. The container box can also be provided with a support height regulating system (such as for example a conventional system based on an endless belt) for leveling out the container box and thus allowing the adaptation of the screening system to the irregularities of the terrain.

[0029] The sides of the container box -1- are coupled to respective counterweights -17. The container box also is provided with coupling flanges -18-, such as for example those of the type shown in Figures 18 to 20, to enable movement of the system by means of a crane.

[0030] In the first practical embodiment shown in Figures 4 to 9, the acoustic screen -2- is formed by horizontal rows of windable slats -4- on a winding shaft -5- extending between said side guides -3- and joined together like a blind. The acoustic screen -2- is coupled to an upper horizontal securing bar -13- that can be immobilized at least at one height in the side guides -3- by means of an anchoring system.

[0031] In the second practical embodiment shown in Figures 10 to 15, the acoustic screen -2- is also formed by horizontal rows of windable slats -4- on a winding shaft -5- and is formed by rows of strips -6- in a staggered arrangement joined together by means of horizontal shafts -7-. At least one -7'- of said horizontal shafts -7- can be guided in the side guides -3-. The vertical guides -3- comprise respective C-shaped curved upper sections -3a- such that the part of the acoustic screen -2- that is guided in these sections -3a- acts as the ridge board.

[0032] In the embodiments described above, the winding shaft -5- can be connected to a winding mechanism, such as a crank mechanism or an electric motor (not shown in the drawings) for winding the acoustic screen -2- when the latter drops from its upper position to its lower position. Likewise, in these embodiments the container box -1- comprises respective axial compartments -1d- for housing a counterweight material, such as for example sand, water, construction material and the like, in order to assure the positioning of the system in the ground when the acoustic screen -2- is in said upper position.

[0033] In the third practical embodiment shown in Figures 16 to 19, the acoustic screen -2- is formed by horizontal rows of folding slats -8, 8'- articulated to one another like a bellows by means of horizontal shafts -9- guided in said side guides -3- and by means of respective second horizontal shafts -10- shorter than the first horizontal shafts and which are not guided in the side guides -3-. Each of the first horizontal shafts -9- is coupled to a first side slat -8- and to a second side slat -8'-. In turn, two first folding side slats -8- and two second folding side slats -8'- articulated to one another respectively by means of one of the second horizontal shafts -10- are arranged between every two of the first horizontal shafts -9-. The container box -1- comprises an upper cover -1 a- with a passage opening -1 c- extending between the side guides -3- and sized to allow the passage of the acoustic screen -2-. The passage opening -1c- can be blocked by two hatch covers -12- articulated to the upper cover -1a- such that it is pushed upwards by each folding slat -7, 7'- which moves towards said upper position of the acoustic screen -2-. As can be seen in Figure 19, the anchoring system mentioned above comprises bolts -11- traversing respective holes in the side guides -3- and entering respective cavities in the ends of the securing bar -13-. In this embodiment the folding of the acoustic screen -2- occurs due to gravity.

[0034] In the fourth practical embodiment shown in Figures 20 to 22, the screening system comprises a plurality of coupling systems such as those describe above with

respect to Figures 16 to 19. To that end, the container boxes -1-, -1'- are provided with conventional coupling means (not shown in the drawings) for being coupled to one another. The side guides -3- between contiguous screening systems can be integrated in H-shaped double profiles -3'-. Alternatively, side guides of the type of the described above can be used. With respect to the gaps between the respective side guides -3- guiding the respective acoustic screens -2-, -2'-, they are covered by vertical sheets to prevent acoustic leaks.

[0035] In the fifth practical embodiment shown in Figure 23, the system comprises two acoustic screens -2-, -2'- parallel to one another and windable about respective winding shafts -5- arranged in the container box -1-. This embodiment, in which the acoustic screens -2-, -2'- can be like the windable screens described above in this specification in reference to Figures 1-15, provides selective acoustic screening because depending on the level of noise that must be screened, only one or both acoustic screens -2- can be used.

[0036] Figure 24 illustrates another embodiment of the folding ridge board -15- with two side wings -15b- the upper one of which is unfolded upwards about 90° and the lower one of which comprises an intermediate articulation and is unfolded downwards about 45° from the vertical plate -15a- of the ridge board -15- and retained in that position by two supporting chains -15c-.

[0037] Figure 25 illustrates a final embodiment of the ridge board -15- comprising a plurality of first side wings -15b- that can be unfolded downwards to about 45° on one side of the vertical plate -15a- and a plurality of second side wings -15b'- that can be unfolded downwards to about 45° on the other side of the vertical plate -15a-. The side wings -15b, -15b'- are supported by respective supporting chains -15c-.

Claims

1. Free-standing acoustic screening system comprising a base, an acoustic screen and side profiles for the acoustic screen, **characterized in that**
   the base (1) is a container box (1);
   the acoustic screen (2) is vertically extendable from a lower position in which it is housed in the container box to an upper position;
   the side profiles are two vertical side guides (3) anchored to respective side parts of the container box (1) in which the acoustic screen (2) is guided in its movements between said lower position and said upper position.

2. Acoustic screening system according to claim 1, **characterized in that** the acoustic screen (2) is formed by horizontal rows of windable slats (4) on a winding shaft (5) extending between said side guides (3) and joined together like a blind.

3. Acoustic screening system according to claim 1, **characterized in that** the acoustic screen (2) is formed by a flexible material which can be wound about a winding shaft (5).

4. Acoustic screening system according to claim 1, **characterized in that** the acoustic screen (2) can be wound about a winding shaft (5) and is formed by rows of strips (6) in a staggered arrangement joined together by means of horizontal shafts (7).

5. Acoustic screening system according to claim 4, **characterized in that** at least one of said horizontal shafts (7) is guided in said side guides (3).

6. Acoustic screening system according to one of claims 2 to 5, **characterized in that** the container box (1) comprises an upper cover (1a) with a groove (1b) extending between said side guides (3) and sized to allow the passage of the acoustic screen (2).

7. Acoustic screening system according to one of claims 2 to 6, **characterized in that** the winding shaft (5) is connected to a winding mechanism for winding the acoustic screen (2) when the latter drops from its upper position to its lower position.

8. System according to one of claims 2 to 7, **characterized in that** the side guides (3) comprise respective C-shaped curved upper sections (3a).

9. Acoustic screening system according to claim 1, **characterized in that** the acoustic screen (2) is formed by horizontal rows of folding slats (8) articulated to one another by means of horizontal shafts (9) guided in said side guides (3) and by means of respective second horizontal shafts (10) shorter than the first horizontal shafts and which are not guided in the side guides (3), such that two folding slats (8) articulated to one another by means of one of the second horizontal shafts (10) are arranged between every two of the first horizontal shafts (9).

10. Acoustic screening system according to claim 1, **characterized in that** the acoustic screen (2) is formed by horizontal rows of folding slats (8, 8') articulated to one another like a bellows by means of horizontal shafts (9) guided in said side guides (3) and by means of respective second horizontal shafts (10) shorter than the first horizontal shafts and which are not guided in the side guides (3), each first horizontal shaft (9) being coupled to a first side slat (8) and to a second side slat (8') and two first folding side slats (8) and two second folding side slats (8') articulated to one another respectively by means of one of the second horizontal shafts (10) being arranged between every two of the first horizontal shafts (9).

11. Acoustic screening system according to one of the previous claims, **characterized in that** the acoustic screen (2) is coupled to an upper horizontal securing bar (13) that can be immobilized at least at one height in said side guides (3) by means of an anchoring system.

12. Acoustic screening system according to one of the previous claims, **characterized in that** it comprises a ridge board (15) comprising a vertical plate (15a) coupled at the top portion to said side guides (3) and in which it is articulated to at least one side wing (15b) that can be unfolded towards a horizontal plane.

13. Acoustic screening system according to claim 15, **characterized in that** the ridge board (15) comprises at least one side wing (15b) that can be unfolded towards one side of vertical plate (15a) and at least one side wing (15b') that can be unfolded towards the other side of the vertical plate.

14. Acoustic screening system according to one of the previous claims, **characterized in that** it comprises an additional acoustic screen (2') parallel to the acoustic screen (2).

15. Acoustic screening system according to one of the previous claims, **characterized in that** the container box (1) comprises coupling means for coupling it to at least another container box (1') of an acoustic screening system.

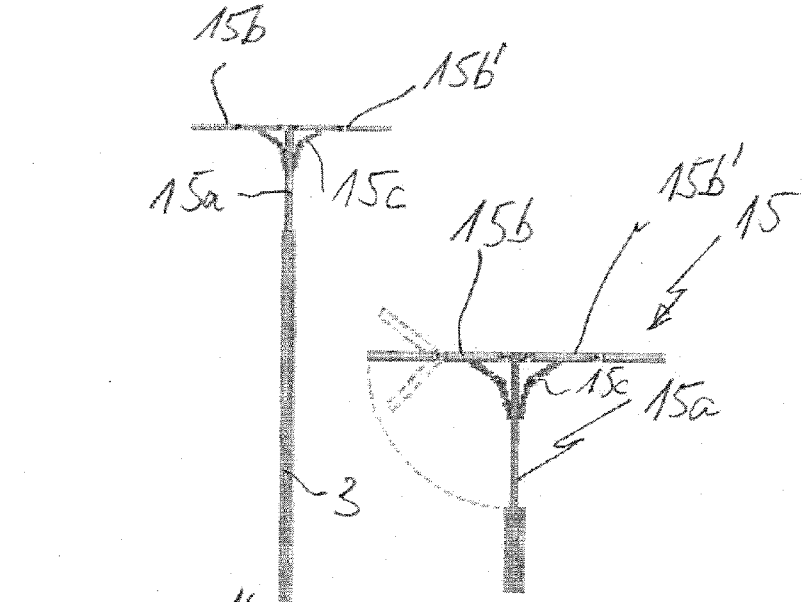

Fig. 2

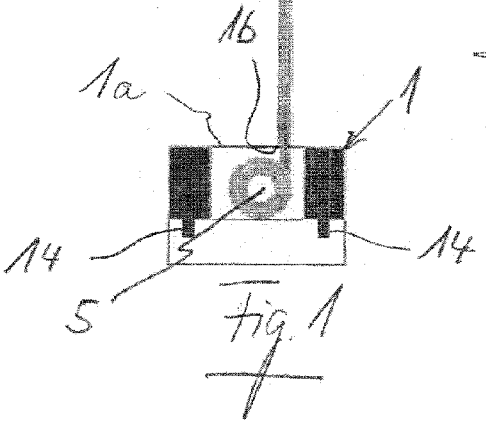

Fig. 1

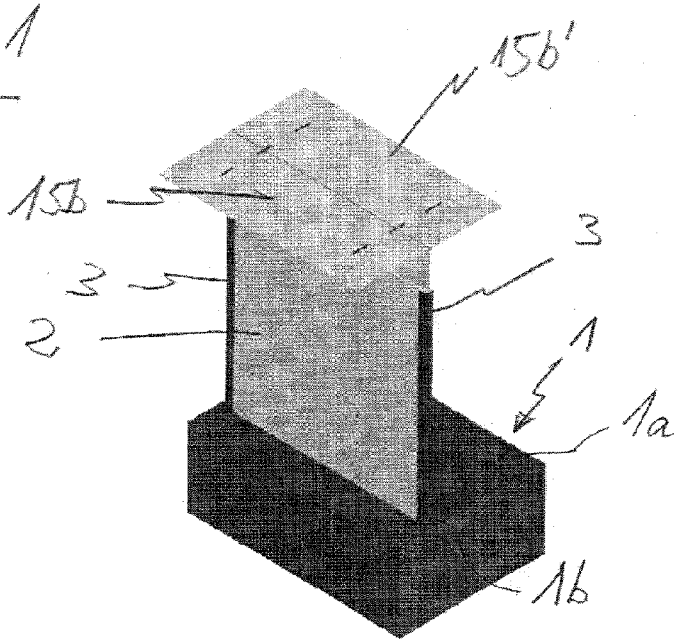

Fig. 3

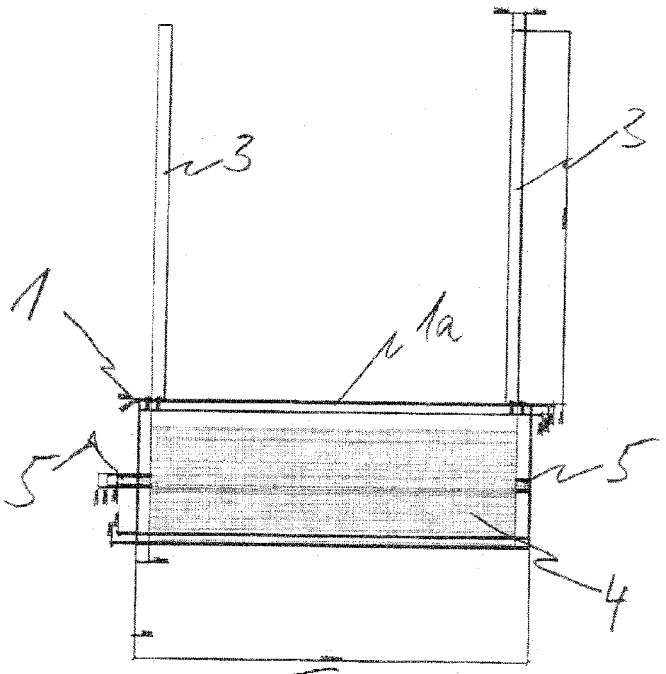

Fig. 4

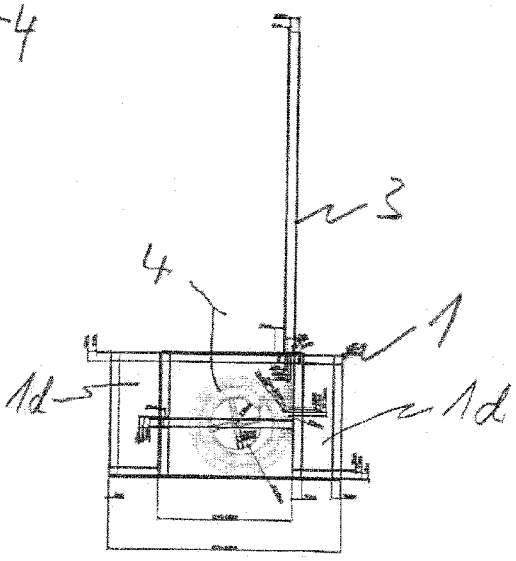

Fig. 5

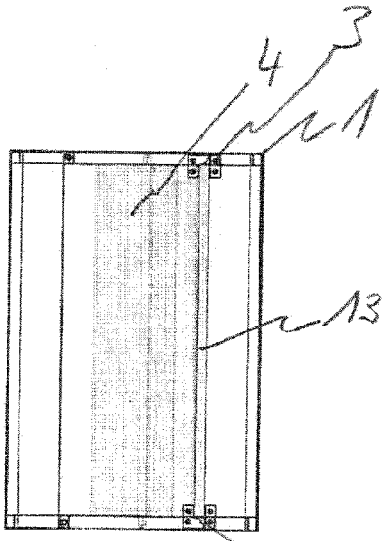

Fig. 6

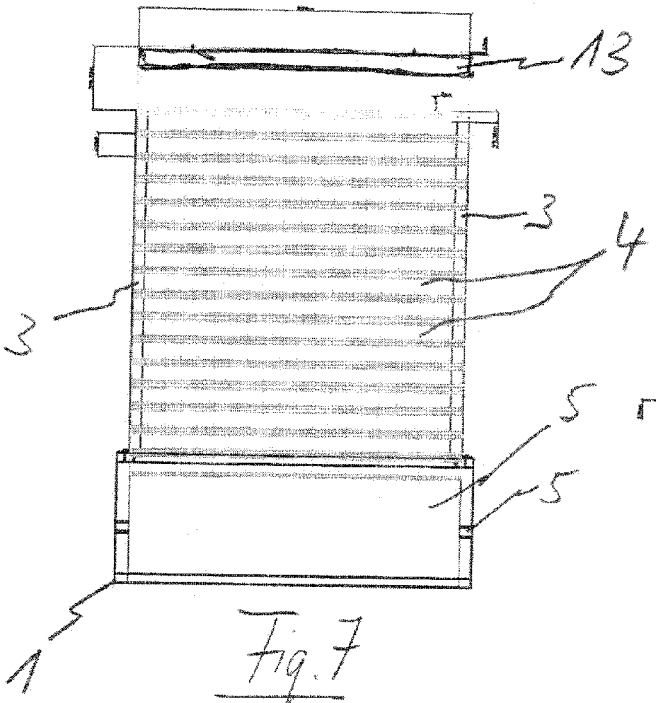

Fig. 7

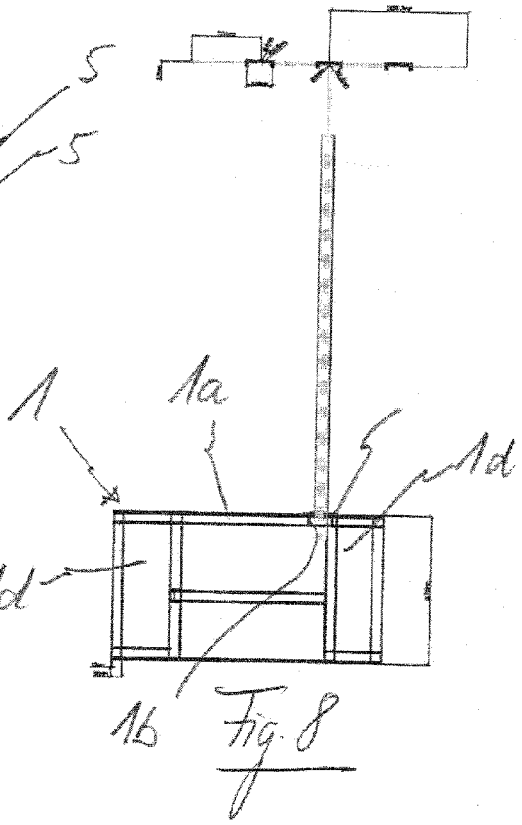

Fig. 8

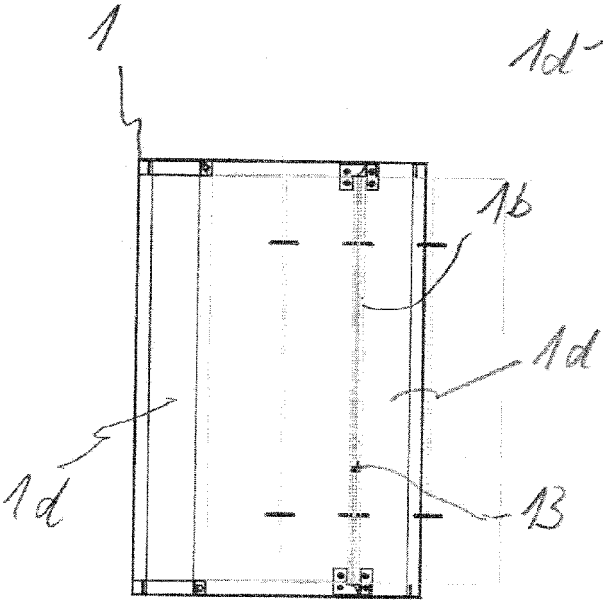

Fig. 9

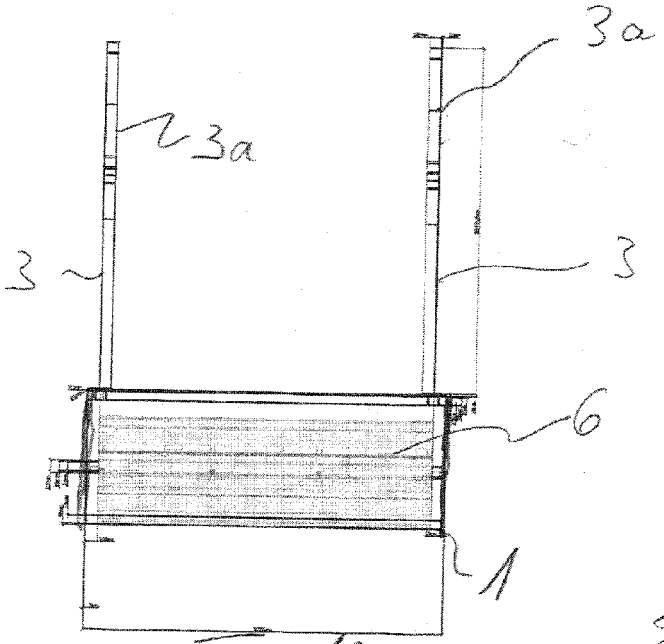

Fig. 10

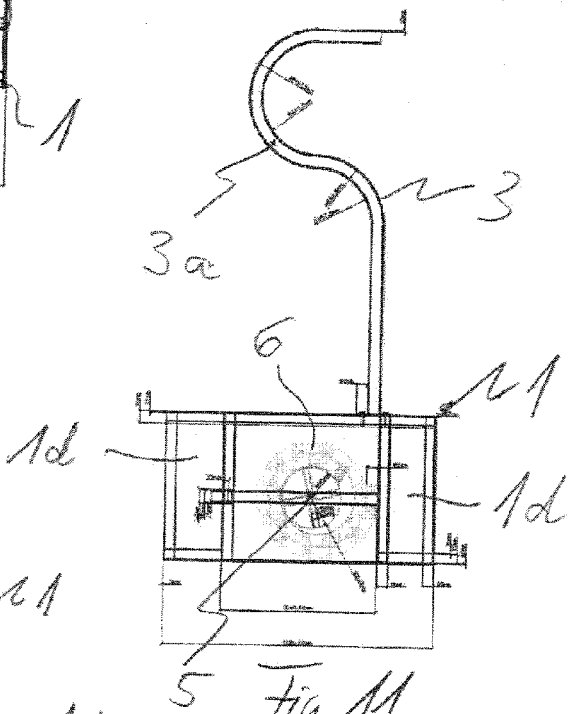

Fig. 11

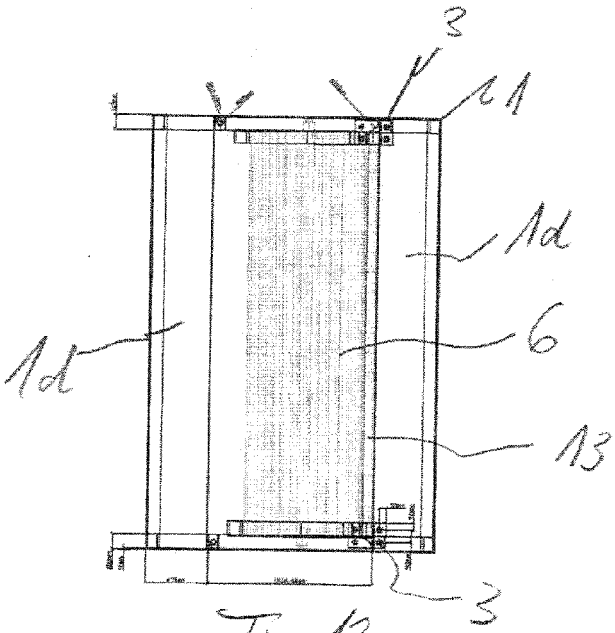

Fig. 12

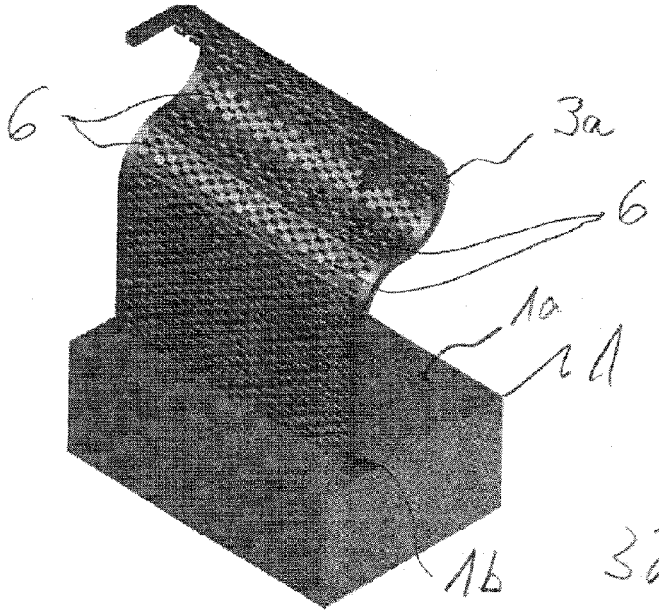

Fig. 13

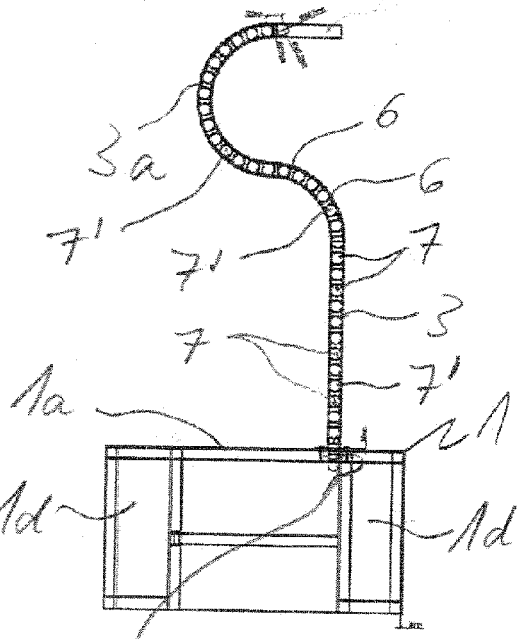

Fig. 14

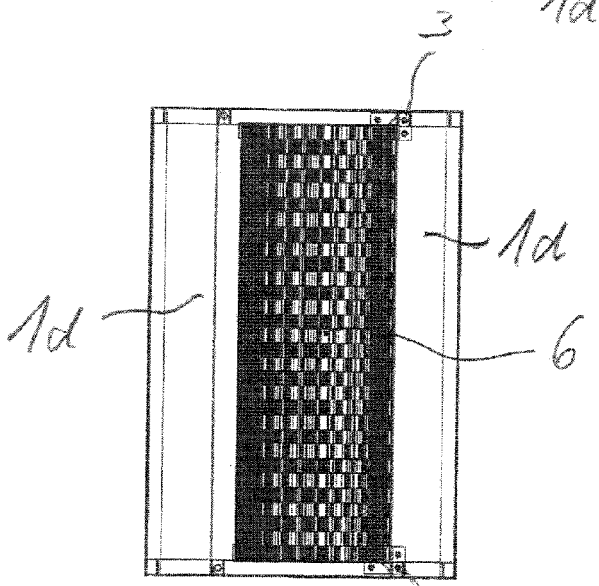

Fig. 15

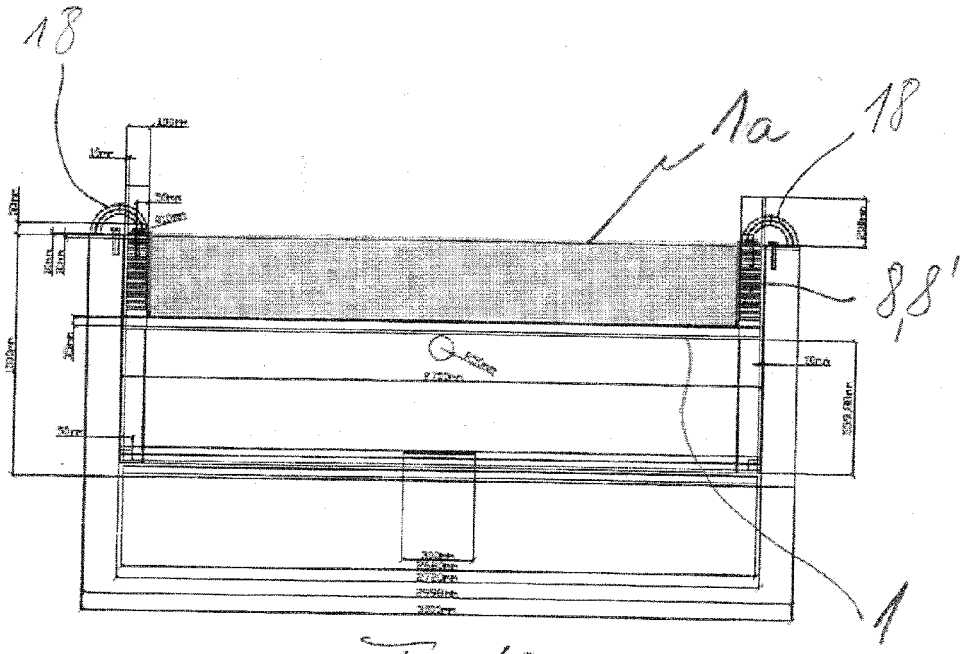

Fig. 16

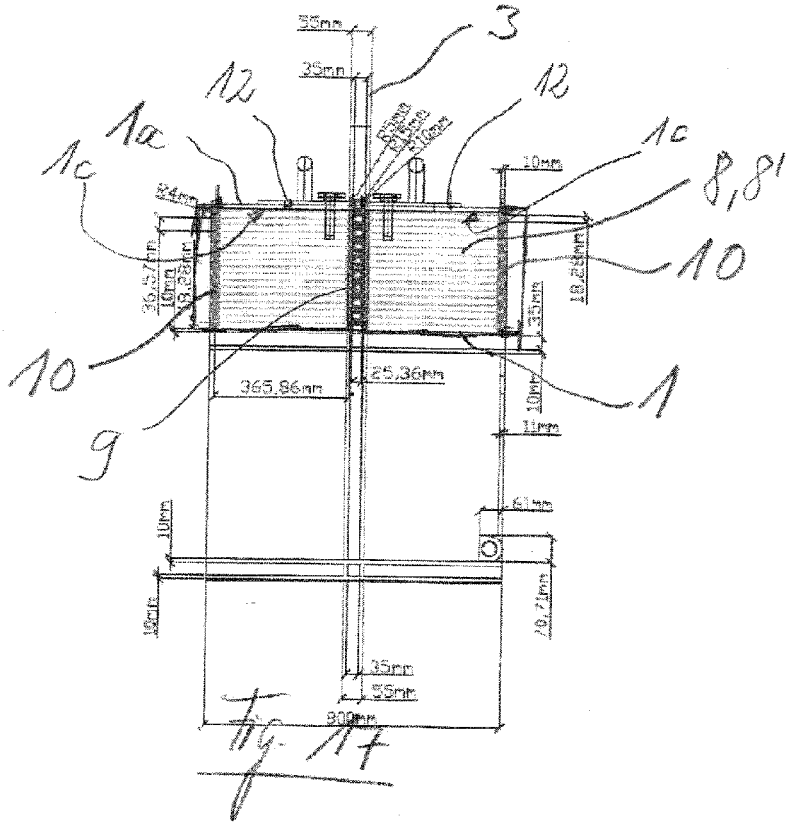

Fig. 17

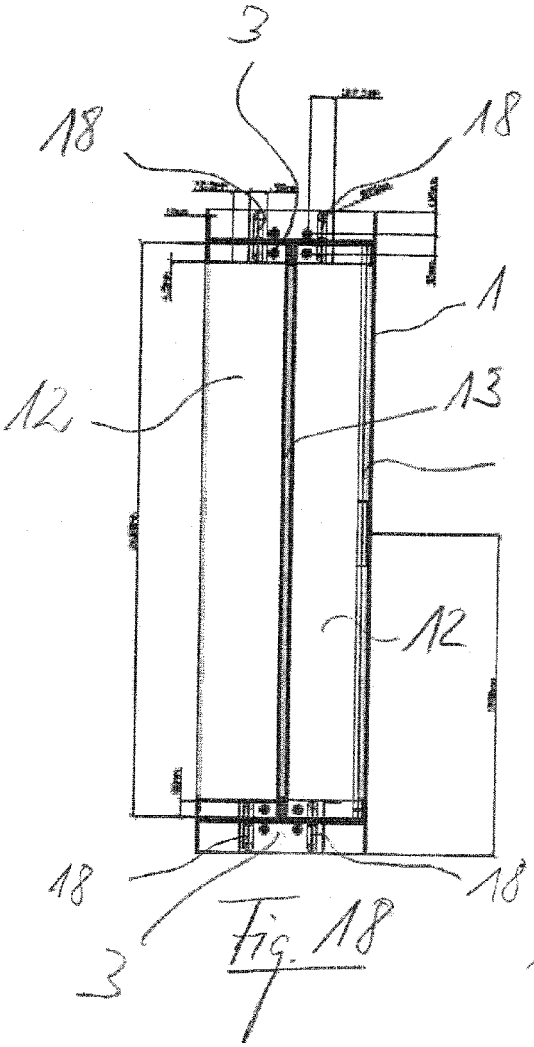
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Fig. 18

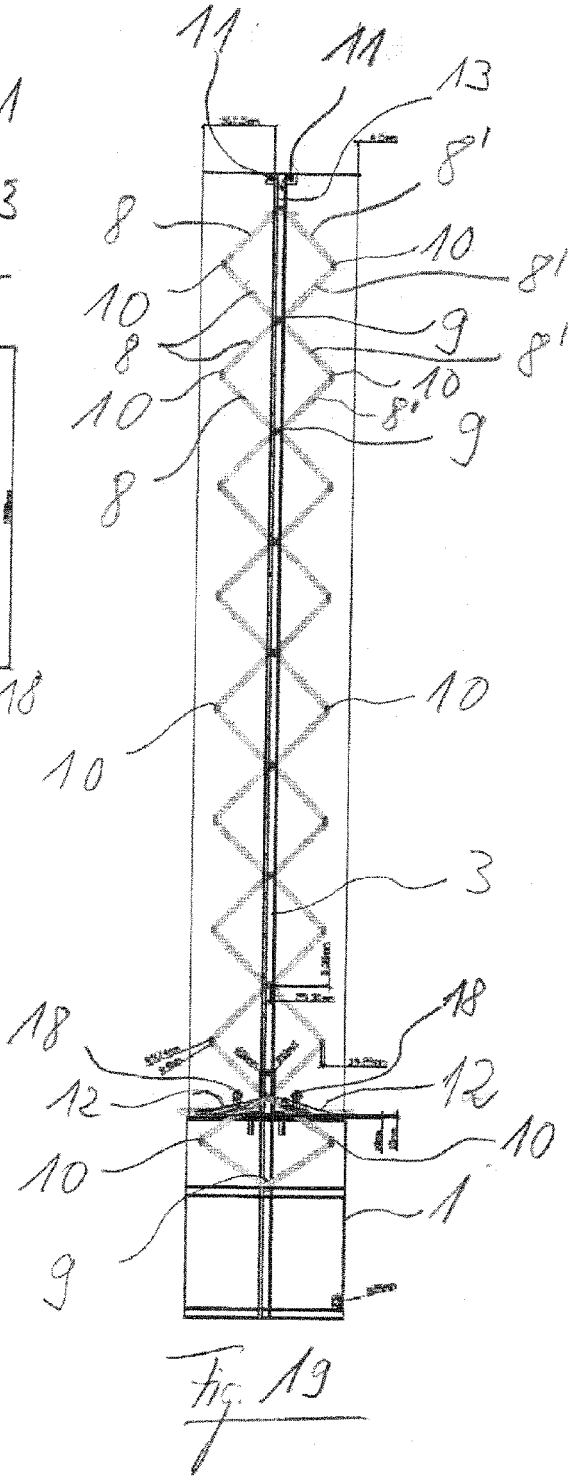
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Fig. 19

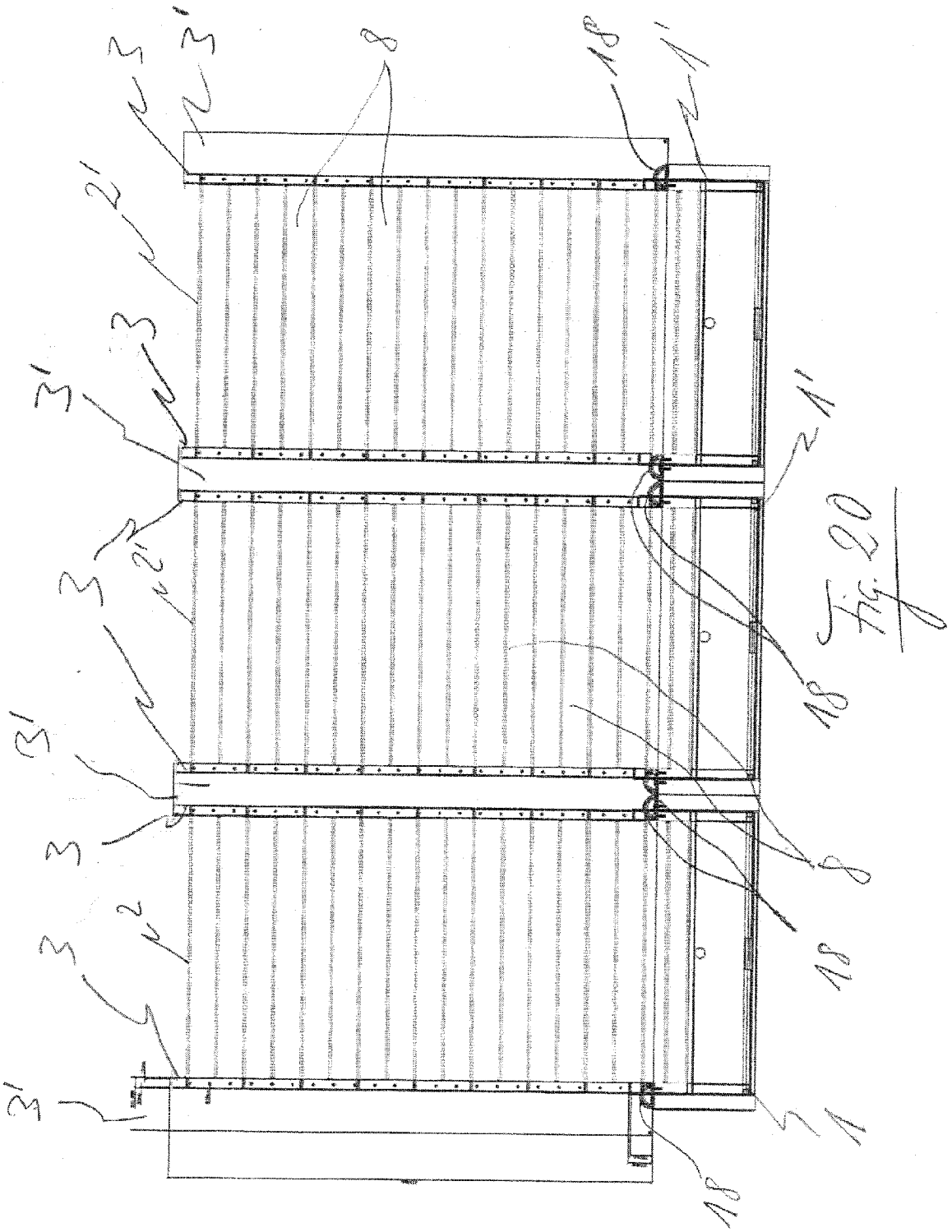

Fig. 20

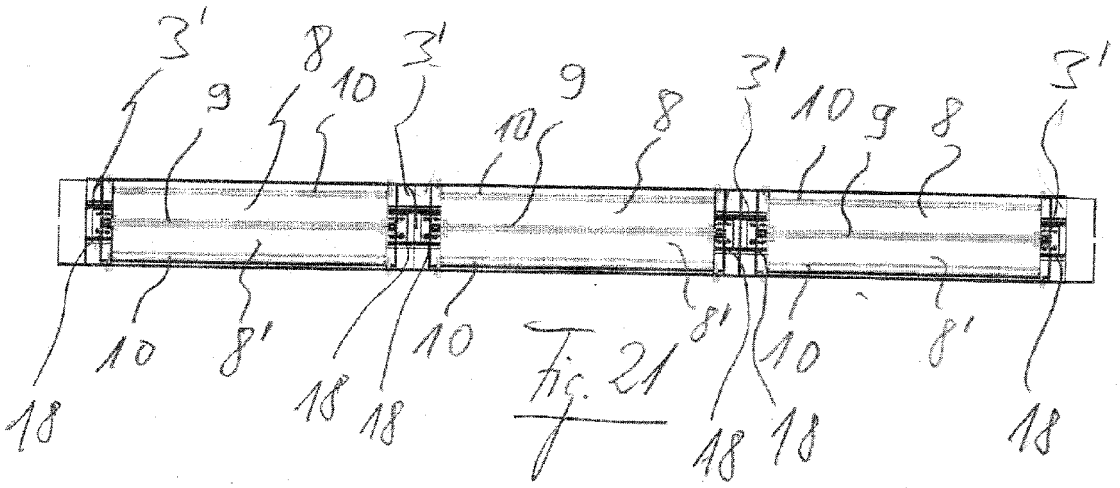
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Fig. 21

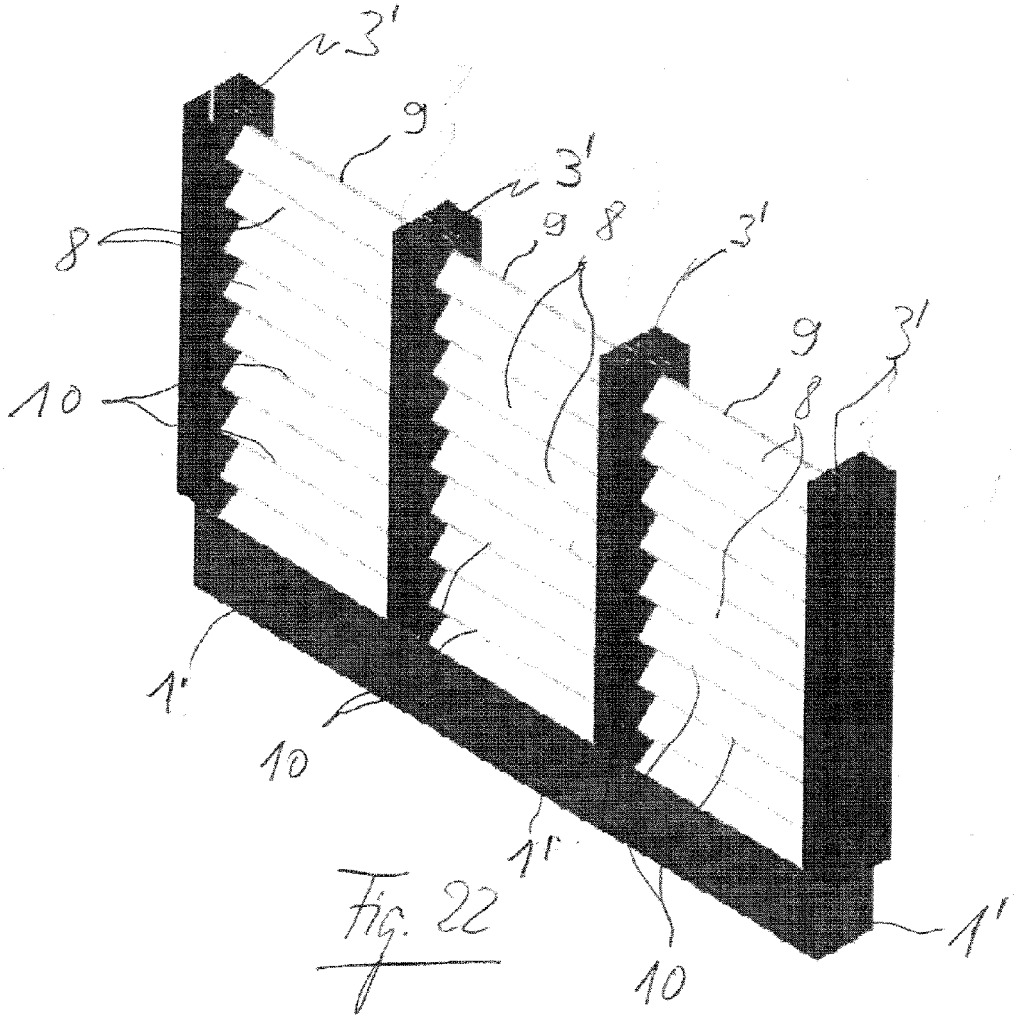
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Fig. 22

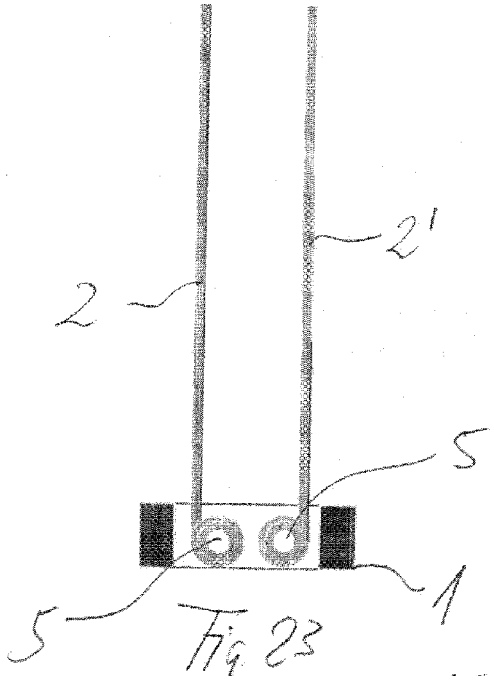

Fig 23

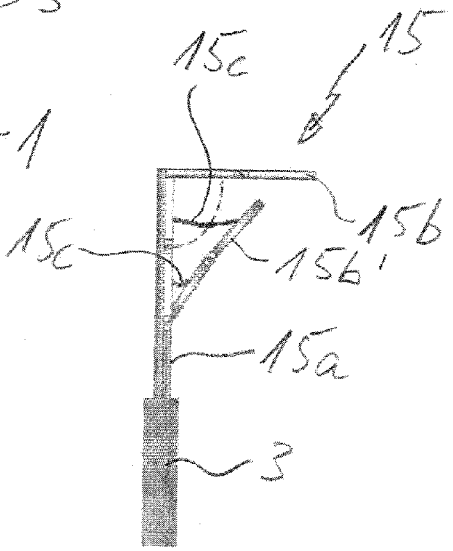

Fig. 24

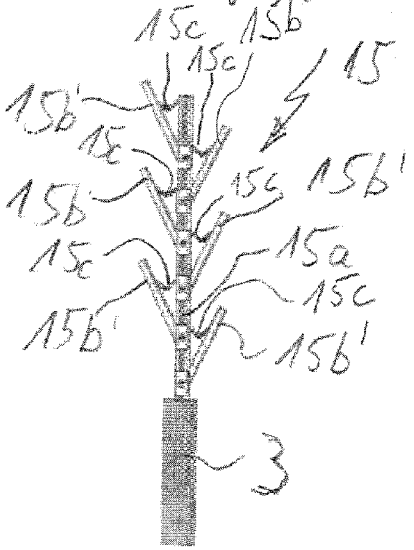

fig. 25

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EUROPEAN SEARCH REPORT

Application Number
EP 09 38 2314

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 39 10 998 A1 (SCHANZ HANS [DE]) 25 October 1990 (1990-10-25) * figures 1-3 *	1-11,14, 15	INV. E01F8/00
X	GB 2 380 218 A (GARVEY NIGEL [GB]) 2 April 2003 (2003-04-02) * figures 1,4 *	1-11,14, 15	
X	US 5 460 462 A (REGAN PATRICK [US]) 24 October 1995 (1995-10-24) * figures 1,2 *	1,7,15	
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X	US 2001/006591 A1 (NOMURA YASUHIRO [JP] ET AL) 5 July 2001 (2001-07-05) * figure 1 *	1,7,8, 14,15	

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E01F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	7 June 2010	Tran, Kim-Lien

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