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### (54) Method and arrangement for separating a flow of material

(57) The invention relates to a water bath separator for separating material, like garbage, in a heavy fraction and a light fraction. For that purpose the material is dumped into a water filled bath consisting of a frame (1)

and a bottom (5) and transported through the bath with the aid of vibrators (2a,2b). Thereby, the light fraction lands on a screen (7) while the heavy fraction is transported via the bottom (5) of the bath.

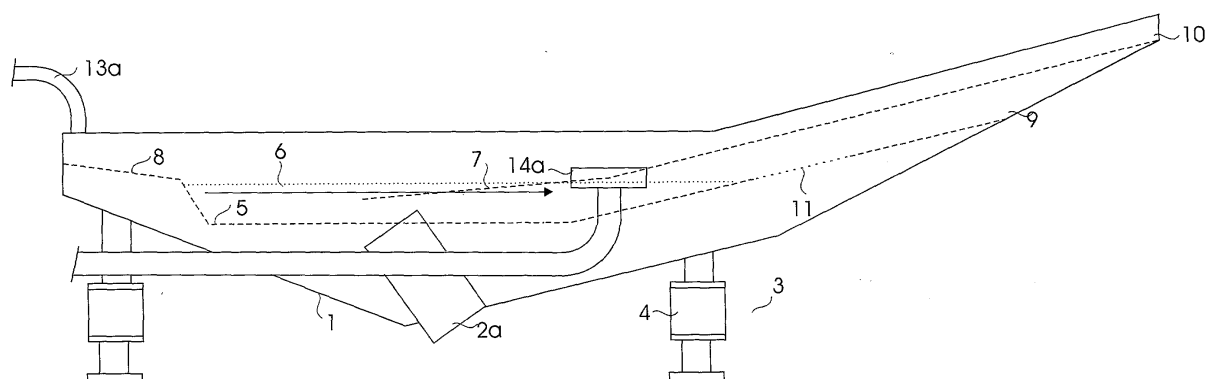


Fig. 3

## Description

**[0001]** The invention relates to a method for separating a flow of material, like garbage, in a first subflow of heavy material and a second subflow of light material, in the process of which the flow of material is guided into a water filled bath, whereby the first subflow is transported to a first discharge channel at least substantially alongside a bottom of the bath and the second subflow is transported to a second discharge channel at least substantially on a surface of the water. The method is frequently used, for example for separating shredded garbage, coming from a shredder, in a first subflow which must be separated further and a second subflow which may be dried and incinerated. Transportation of the first subflow towards the first discharge channel normally takes place via a conveyor belt, mounted on the bottom of the bath. The problem herewith is that part of the material ends up under the conveyor belt, as a result of which the conveyor belt rapidly becomes dirty and maintenance is frequently needed. The method according to the invention substantially obviates this disadvantage and is characterised in that the first subflow is transported to the first discharge channel with the aid of vibrations. This means that the bottom of the bath may have a smooth finishing and that vibration means, known as such, may be mounted to an outside of the bath, which means that maintenance is hardly needed any longer. An additional advantage is that the first subflow is transported very fast, which means that it will not take up much water. The light material remains at the surface and may be transported to the second discharge channel with the aid of a known method, for example by a screen.

**[0002]** A favourable realisation is according to a further aspect of the invention characterised in that the second subflow, intercepted by the screen, is transported to the second discharge with the aid of vibrations. For that purpose, the screen may be rigidly mounted to the bath, as a result of which the vibrations, generated by the vibration means mounted to the bath, will also provide for the transport of the light material, present on the screen.

**[0003]** A favourable realisation is according to another aspect of the invention characterised in that the second subflow is transported towards the screen with the aid of a flow, created in the water.

**[0004]** The invention also relates to a water bath separator, for separating a flow of material, like garbage, in a first subflow of heavy material and a second subflow of light material, comprising a bath filled, operationally filled with water up to a previously determined level, having an input side and a discharge side, and transport means coupled to the bath, for transporting the first subflow and the second subflow from the input side towards the discharge side. According to the state of the art, the transport of the first subflow towards the first discharge channel takes place with the aid of a conveyor belt,

mounted onto the bottom of the bath. The problem herewith is that the conveyor belt rapidly becomes dirty and maintenance is frequently needed. The inventive water bath separator substantially obviates this disadvantage and is characterised in that a bottom of the bath is provided with an ascending first discharge channel and that the transport means comprise vibration means, for transporting the first subflow towards and into the first discharge channel.

**[0005]** A favourable embodiment of the invention is characterised in that above the water level, the discharge channel is provided with sieve holes, via which small particles of heavy material, present in the first subflow, may leave the discharge channel, which means that the first subflow is immediately separated into a fine fraction and a coarse fraction.

**[0006]** A favourable embodiment is according to another aspect of the invention characterised in that the bath is provided with a screen rising up obliquely, of which a bottom side ends in the water, and with a second discharge channel, extending above the first discharge channel and connected to the screen, for removing the second subflow. In this case, the transport of the second subflow over the screen and along the second discharge channel is also provided for by the vibration means, which make the screen vibrate together with the bath.

**[0007]** A further favourable embodiment of the invention is characterised in that the transport means also comprise pump means, for supplying water to the input side, for transporting the second subflow floating on the water.

**[0008]** A further favourable embodiment of the invention is characterised in that the bath is provided with water outlet means, positioned underneath the screen. By positioning the water outlet means on this location, the lighter garbage lands very fast onto the screen and will consequently not absorb much water. This is important, as the lighter garbage usually has to be dried in the next process step.

**[0009]** A further favourable embodiment of the invention is characterised in that the water outlet means are connected to the pump means via filter means and/or a settling tank, which means that the water may be re-used.

**[0010]** The invention will now be further explained with a reference to the following figures, in which:

- Fig. 1 schematically represents a possible embodiment of a water bath separator according to the invention in side view;
- Fig. 2 schematically represents this embodiment in top view;
- Fig. 3 schematically represents an alternative embodiment of a water bath separator according to the invention in side view;
- Fig. 4 schematically represents this embodiment in top view;
- Fig. 5 represents in a block diagram a possible envi-

ronment of a water bath separator according to the invention.

**[0011]** Fig. 1 schematically represents a possible embodiment of a water bath separator according to the invention in side view, consisting of a frame 1 onto which two vibrators 2a,2b are mounted, as such well known in the art, of which in the figure only vibrator 2a is visible, which operationally make the entire frame vibrate in such a way that objects located on the frame will be transported from the left to the right in the figure. Frame 1 is placed on a solid underground with legs 3, each leg 3 being provided with a resilient member 4, usually a rubber bush filled with air, so that frame 1 may vibrate freely. In this embodiment, frame 1 is manufactured of steel and in frame 1 a bottom 5 is welded, shaped so that the assembly may be filled with water up to a previously determined level 6. Moreover a plate 7 is welded in frame 1, provided with perforations, to the extent that it constitutes a screen, of which a lower edge extends into the water. While in operation, material is dumped onto a platform 8, which material will land in the water under influence of vibrations in frame 1. Material which is heavier than water will sink to bottom 5 and will be transported in the figure to the right under influence of vibrations in frame 1, where it will be discharged via a first discharge opening 9. Material which is lighter than water will spread over the surface, land on plate 7 and will be transported in the figure to the right under the influence of vibrations in frame 1, where it will be discharged via a second discharge opening 10. Of importance is that heavy material will be in the water only for a very short time, so that not much water will be absorbed, while moreover a substantial part of water that clings to it will be shaken off on the rising part of bottom 5. If required, bottom 5 may be provided with perforations at a given distance above a water line 6, so that a fine fraction of the heavy material, like sand, will be discharged via a third discharge opening 11. In order to increase the transportation speed of light material towards plate 7, it is important to suppress or prevent the occurrence of waves on the water surface. For that purpose, the embodiment shown here is provided with a steel obstruction plate 12, which substantially coincides with the water surface and of which the length and width may be determined experimentally, so that an optimal suppression of waves is obtained. In that situation, a current is generated in the water under influence of the vibrations, schematically indicated by an arrow, thanks to which also the light material will be transported rapidly.

**[0012]** Fig. 2 schematically represents this embodiment in top view, with frame 1 to which the vibrators 2a, 2b are mounted, legs 3 and bottom 5. In frame 1 a plate 7 is welded, provided with perforations. While in operation, material is dumped onto platform 8. Material which is heavier than water will land on bottom 5 and will be discharged via first discharge opening 9. Material which is lighter than water will float on the surface in the figure

to the right and will be discharged via second discharge opening 10. If required, bottom 5 may be provided with perforations, so that a fine fraction of the heavy material will be discharged via a third discharge opening 11. Onto platform 8 a steel obstruction plate 12 is welded, which substantially coincides with the water surface and of which the length and the width can be experimentally determined so that an optimal suppression of waves is obtained.

**[0013]** Fig. 3 schematically represents an alternative embodiment of a water bath separator according to the invention in side view, with a frame 1 onto which two vibrators 2a,2b are mounted, as such well known in the art, which operationally make the entire frame vibrate in such a way that objects located on the frame will be transported from the left to the right in the figure. Frame 1 is placed on a solid underground with legs 3, each leg 3 being provided with a resilient member 4, usually a rubber bush filled with air, so that frame 1 may vibrate freely. In this embodiment, frame 1 is manufactured of steel and in frame 1 a bottom 5 has been welded, shaped so that the assembly may be filled with water up to a previously determined level 6. Moreover a plate 7 is welded in frame 1, provided with perforations, to the extent that it constitutes a screen, of which a lower edge extends into the water. In the embodiment shown here, two supply pipes 13a,13b are provided via which water is supplied and two water discharge tanks 14a,14b are mounted to both sides of frame 1, via which water supplied by supply pipes 13a,13b is drained away, as a result of which a current develops especially in the upper layer of the water. Water discharge tanks 14a,14b are preferably placed underneath plate 7, in such a way that a substantial part of the water current runs via the perforations of plate 7. While in operation, material is dumped onto a platform 8, which material will land in the water under influence of vibrations in frame 1. Material which is heavier than water will sink to bottom 5 and will be transported in the figure to the right under influence of vibrations in frame 1, where it will be discharged via a first discharge opening 9. Material which is lighter than water will float on the surface and will be carried along by a water current schematically indicated by an arrow, originating from supply pipes 13a,13b, towards plate 7 and will be transported under the influence of vibrations in frame 1, in the figure to the right, where it will be discharged via a second discharge opening 10. Important is that now also light material will be in the water only for a very short time, so that not much water will be absorbed, while moreover a substantial part of water that clings to it will be shaken off on the rising part of plate 7.

**[0014]** Fig. 4 schematically represents this embodiment in top view, with frame 1 to which the vibrators 2a, 2b are mounted which make the entire frame vibrate in such a way that objects located on the frame will be transported from the left to the right in the figure. In frame 1 a bottom 5 is welded and a plate 7, provided with perforations of which a lower edge extends into the

water. Moreover two supply pipes 13a, 13b are provided, via which water is supplied and two water discharge tanks 14a, 14b, positioned on both sides of frame 1, via which the water supplied by supply pipes 13a, 13b can be discharged.

**[0015]** Fig. 5 represents in a block diagram a possible environment of a water bath separator according to the invention, consisting of the water bath separator out of which water flows via water discharge tanks 14a, 14b, which may be polluted by finely dispersed light and heavy material. This water flows into a settling tank 15, where the heavy material may settle. With the aid of a pump 16, water is pumped from settling tank 15 and via supply pipes 13a, 13b towards the water bath separator. In the suction pipe of pump 16 a filter 17 is placed, as such well known, with which light material may be filtered out.

## Claims

1. Method for separating a flow of material, like garbage, in a first subflow of heavy material and a second subflow of light material, in the process of which the flow of material is guided into a water filled bath, whereby the first subflow is transported to a first discharge channel at least substantially alongside a bottom of the bath and the second subflow is transported to a second discharge channel at least substantially on a surface of the water, **characterised in that** the first subflow is transported to the first discharge channel with the aid of vibrations.
2. Method according to claim 1, **characterised in that** the second subflow is intercepted by a screen and transported to the second discharge channel.
3. Method according to claim 2, **characterised in that** the second subflow, intercepted by the screen, is transported to the second discharge with the aid of vibrations.
4. Method according to claim 3, **characterised in that** the second subflow is transported towards the screen with the aid of a flow, created in the water.
5. Water bath separator, for separating a flow of material, like garbage, in a first subflow of heavy material and a second subflow of light material, comprising a bath, operationally filled with water up to a previously determined level, having an input side and a discharge side, and transport means coupled to the bath, for transporting the first subflow and the second subflow from the input side towards the discharge side, **characterised in that** a bottom of the bath is provided with an ascending first discharge channel and that the transport means comprise vibration means, for transporting the first subflow towards and into the first discharge channel.
6. Water bath separator according to claim 5, **characterised in that** above the water level, the discharge channel is provided with sieve holes, via which small particles of heavy material, present in the first subflow, may leave the discharge channel.
7. Water bath separator according to claim 6, **characterised in that** the bath is provided with a screen rising up obliquely, of which a bottom side ends in the water, and with a second discharge channel, extending above the first discharge channel and connected to the screen, for removing the second subflow.
8. Water bath separator according to claim 7, **characterised in that** the transport means also comprise pump means, for supplying water to the input side, for transporting the second subflow floating on the water.
9. Water bath separator according to claim 8, **characterised in that** the bath is provided with water outlet means, positioned underneath the screen.
10. Water bath separator according to claim 9, **characterised in that** the water outlet means are connected to the pump means via filter means and/or a settling tank.

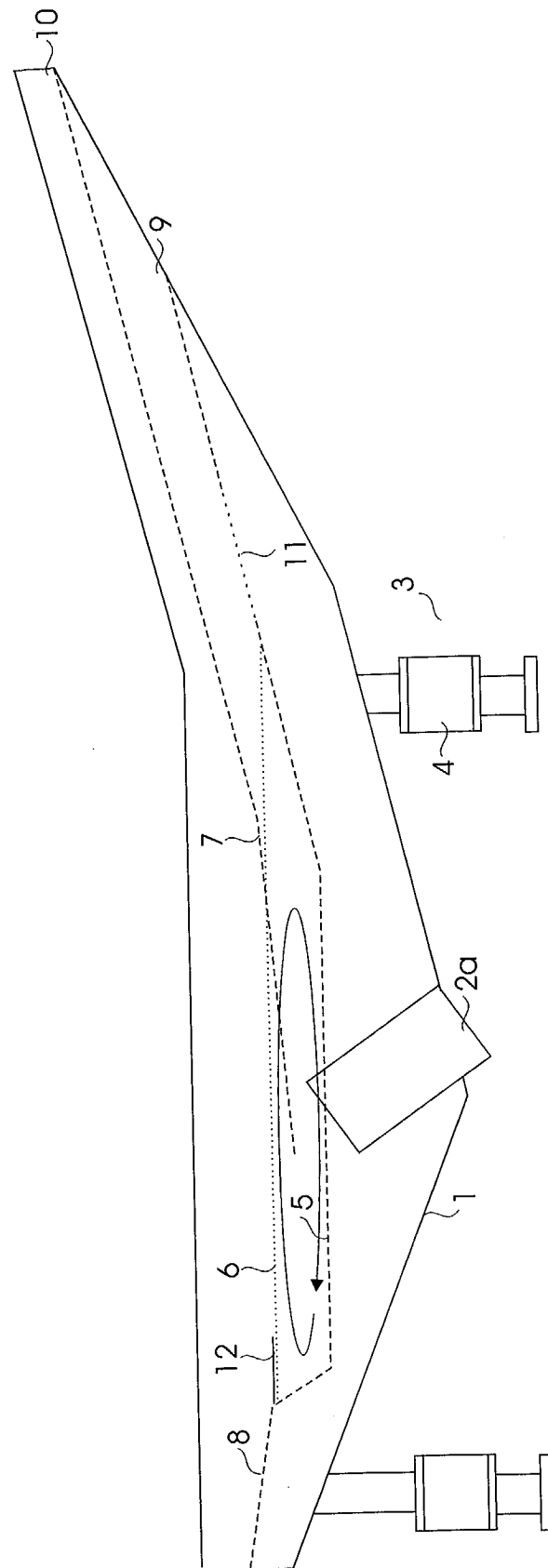


Fig. 1

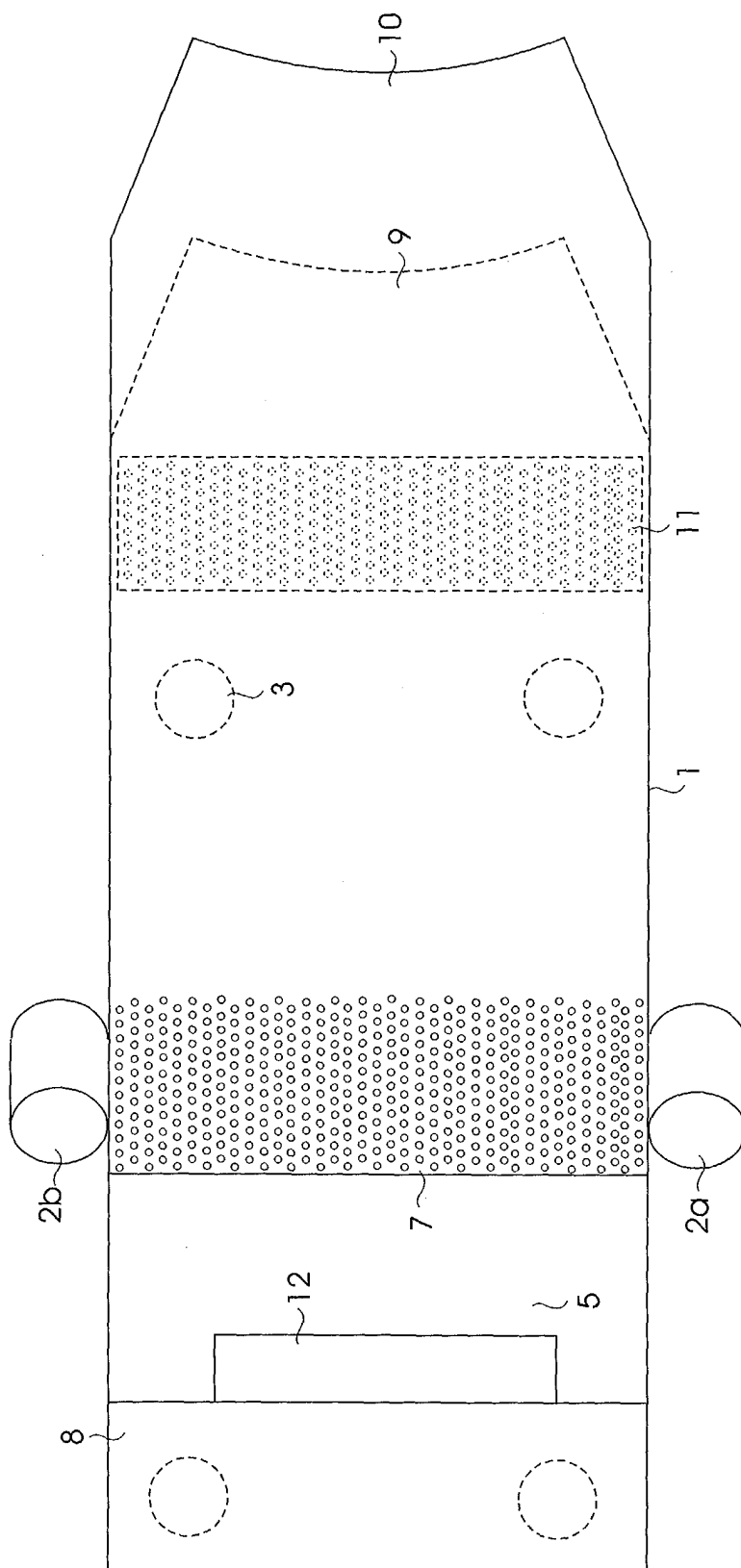


Fig. 2

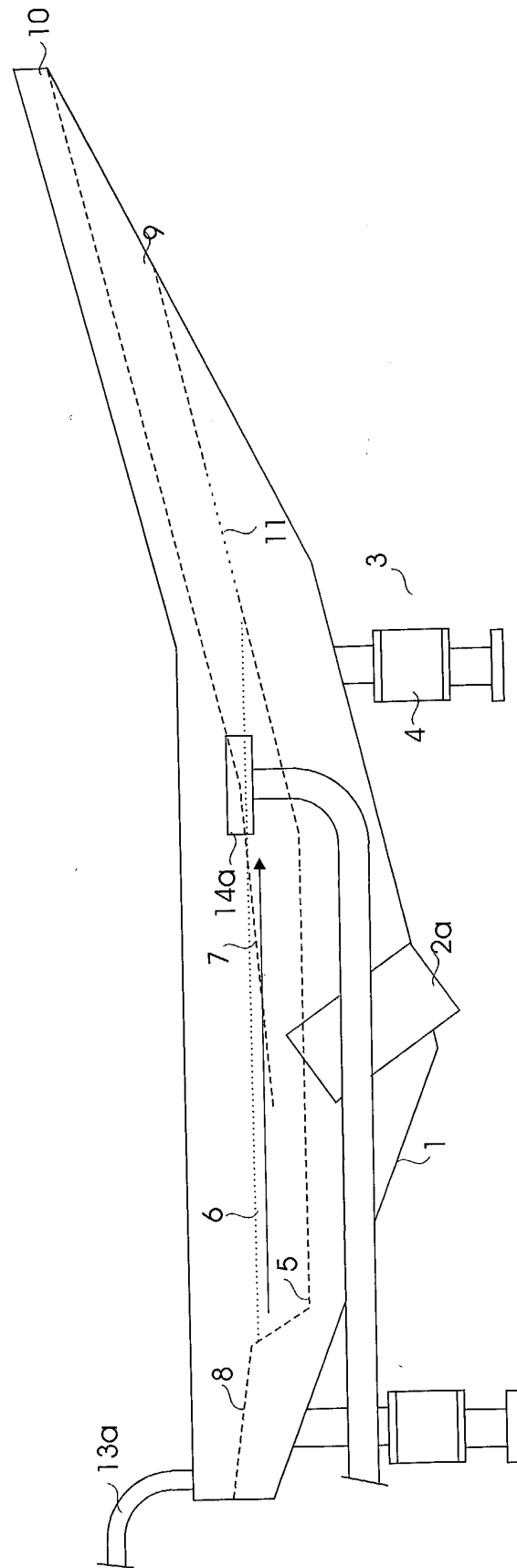


Fig. 3

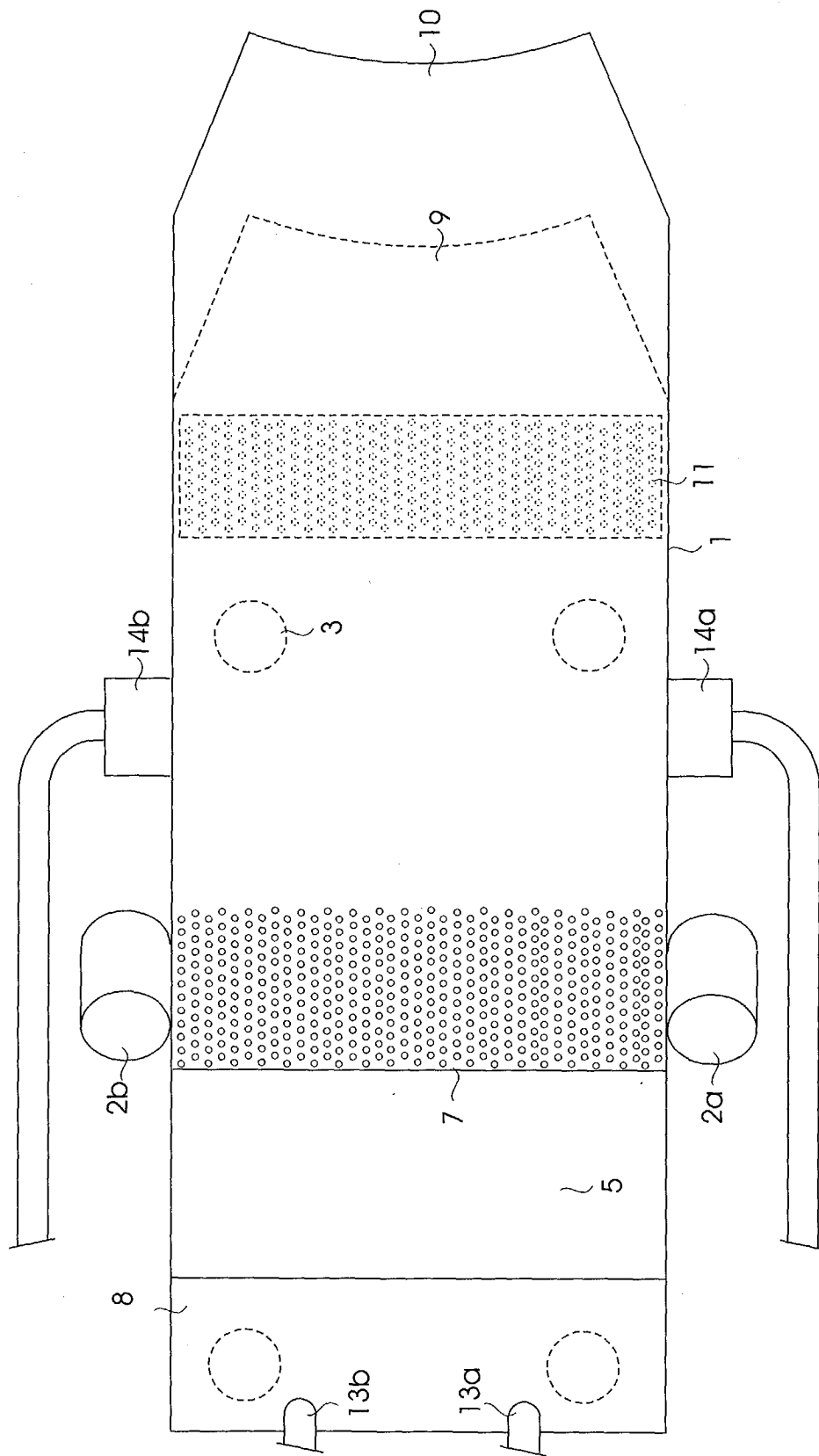


Fig. 4

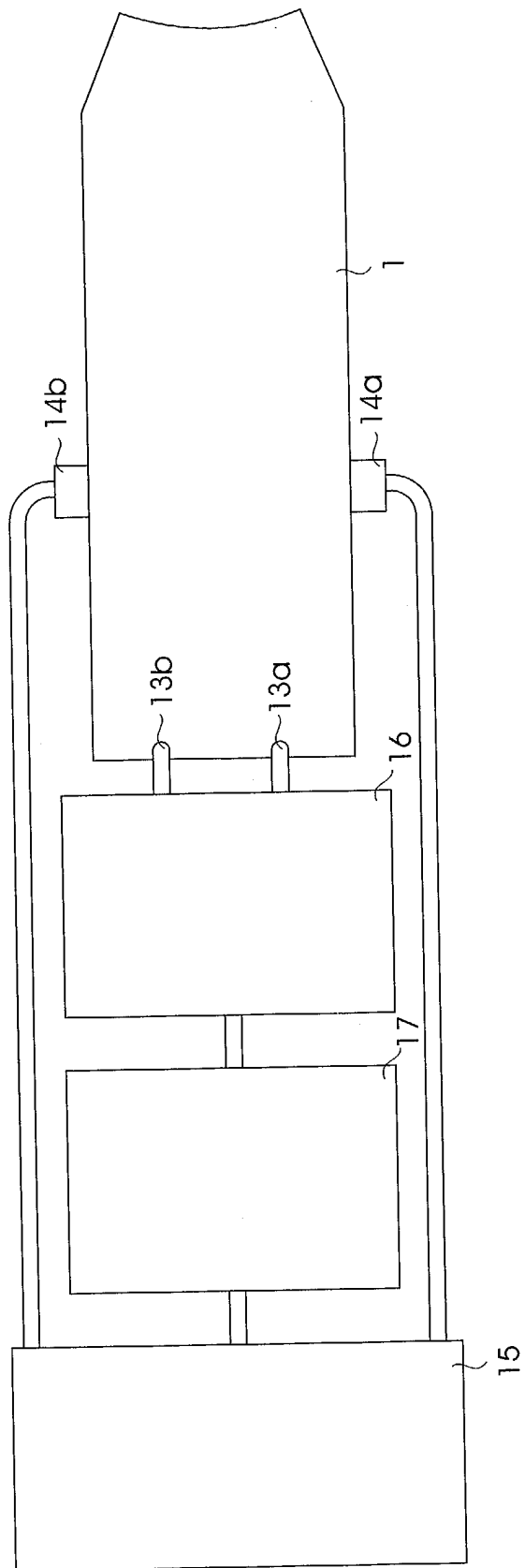


Fig. 5



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## EUROPEAN SEARCH REPORT

Application Number  
EP 04 07 7539

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                               |                                                     |                                                 |
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| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                               |                                                     |                                                 |
| Place of search<br>Munich                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                               | Date of completion of the search<br>9 December 2004 | Examiner<br>Leitner, J                          |
| CATEGORY OF CITED DOCUMENTS<br>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<br>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>& : member of the same patent family, corresponding document |                                                                                                                               |                                                     |                                                 |

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
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EP 04 07 7539

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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