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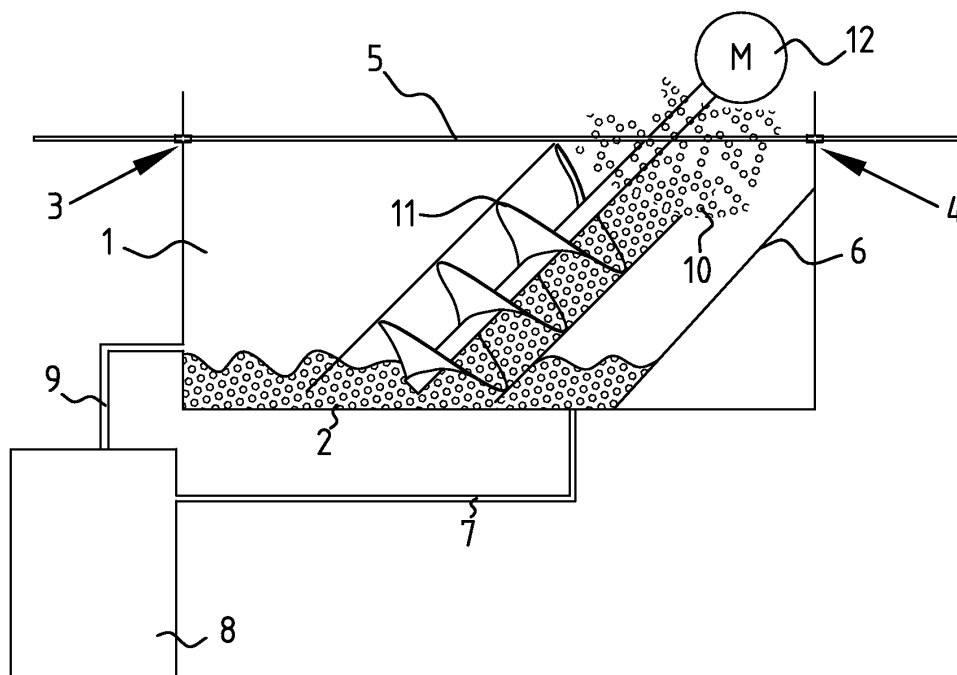
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(54) **Soap box and method for lubricating a metal wire**

(57) A method for lubricating a metal wire (5) in a soap box prior to drawing the wire through a wire drawing device for reducing the diameter of said wire, wherein said soap box comprises a container with a wire inlet (3) and a wire outlet (4) at two opposite ends of container, a wire feed device arranged to transport the wire through said container, said method comprising: supplying lubricant (2) into said container such that it partially fills said container;

simultaneously distributing said lubricant (2) in the container and transporting said wire (5) through said container; wherein said lubricant (2) is a lubricating liquid; said method further comprises providing a multitude of liquid carrying bodies (10) in said container; and simultaneously distributing said liquid carrying bodies (10) with said lubricating liquid (2) and transporting said wire (5) through said container.



**FIG. 1A**

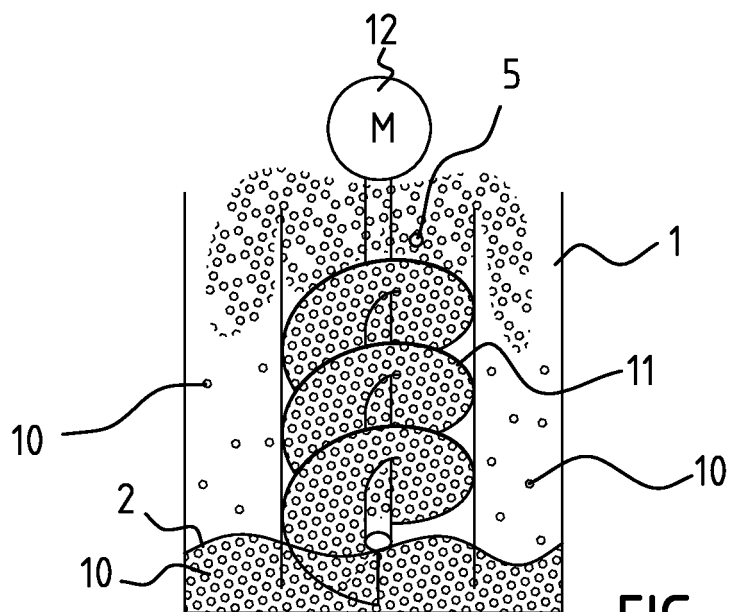


FIG. 1B

## Description

**[0001]** The invention relates to a method for lubricating a metal wire in a soap box prior to drawing the wire through a wire drawing device for reducing the diameter of said wire, wherein said soap box comprises a container with a wire inlet and a wire outlet at two opposite ends of container, a wire feed device arranged to transport the wire through said container, said method comprising supplying lubricant into said container such that it partially fills said container and simultaneously distributing said lubricant in the container and transporting said wire through said container.

**[0002]** Such a method is described in GB-A-795462. The wire typically is a steel wire used to produce a reinforcing bar for reinforced concrete, and needs to undergo a diameter reduction (for instance from 8½ mm to 8 mm) in order to get its strength. The wire to be drawn in the wire drawing device needs to be lubricated in order to facilitate the subsequent passage through the diameter reduction die. In the known method the wire is lubricated by putting dry soap powder in the soap box container and the container is then vibrated such that the soap powder is put in motion around the wire and thereby adheres to the wire.

**[0003]** The drawback of this known method is that the dry soap powder is difficult to contain in the soap box and will escape from the device, thereby polluting the environment of the device with fine soap dust. This is detrimental for the health of people and causes failure of the device itself or other devices around it.

**[0004]** The invention aims at a more efficient, effective, healthy and/or safe method for lubricating a metal wire.

**[0005]** To that end said lubricant is a lubricating liquid, and said method further comprises providing a multitude of liquid carrying bodies in said container and simultaneously distributing said liquid carrying bodies with said lubricating liquid and transporting said wire through said container.

**[0006]** By using a liquid lubricant, the problem of soap powder dust escaping from the device is solved in an efficient manner. By adding the lubricating bodies an efficient transfer of the soap to the wire is achieved.

**[0007]** Preferably said lubricating liquid is an aqueous solution of between 10% and 40%, preferably between 15% and 25% by weight soap, preferably a lime based soap.

**[0008]** Preferably said liquid carrying bodies are granules, grains or spheres, having a preferred average diameter between 3 and 12 mm, more preferably between 4 and 9 mm, and preferably made of a ceramic or plastic material.

**[0009]** The invention also relates to a soap box for lubricating a metal wire prior to drawing the wire through a wire drawing device for reducing the diameter of said wire, wherein said soap box comprises a container with a wire inlet and a wire outlet at two opposite ends of container, a wire feed device arranged to transport the

wire through said container, lubricant supply means arranged to supply lubricant into said container such that it partially fills said container, and lubricant distributing means arranged to distribute said lubricant in the container while said wire feed device transports said wire through said container. According to the invention said lubricant supply means are arranged to supply a lubricating liquid into said container, and said lubricant distributing means are arranged to distribute liquid carrying bodies with said lubricating liquid in said container. During use said container is partially filled with a multitude of said lubricating liquid and preferably said liquid carrying bodies.

**[0010]** Said lubricant supply means preferably comprise a lubricant vessel, a supply tube between said lubricant vessel and said container, and a pump arranged to pump said liquid lubricant into said container. Said lubricant supply means preferably further comprises a feed back tube between said container and said lubricant vessel and a filter arranged to clean said lubricant from impurities.

**[0011]** Said wire feed device is preferably arranged to transport said wire in a substantially horizontal or in a diagonal direction, and said lubricant distributing means are arranged to distribute said liquid carrying bodies substantially within a space formed by two narrowly spaced apart parallel vertical planes at both sides of said wire. In this manner the effectiveness of the process is improved.

**[0012]** In a first preferred embodiment said lubricant distributing means comprise an Archimedean screw arranged to lift said liquid carrying bodies and drop and/or push and/or throw them on said wire.

**[0013]** In a second preferred embodiment said lubricant distributing means comprise vibrating means arranged to vibrate said container, such that said liquid carrying bodies are put in motion around said wire inside said container. Said vibrating means preferably comprise a vibrating motor and springs attached to said container. The vibrating means are preferably arranged such that said container is vibrated in vertical direction and the bottom of said container is formed such that said liquid carrying bodies are thrown towards said wire thereby.

**[0014]** In a third preferred embodiment said lubricant distributing means comprise a rotatable bottom part having a conical shape and a vertical rotation axis and a motor arranged to rotate said conical shaped bottom part around said axis, such that the lubricant is forced upward against the conical wall into the container.

**[0015]** In a fourth preferred embodiment said container is a rotatable cylindrical drum having said wire inlet and said wire outlet at both central axial opposite ends, and said lubricant distributing means comprise a motor arranged to rotate said drum around said wire. Said drum is preferably provided with axial ribs on its inner cylindrical surface, said ribs being formed such that said liquid carrying bodies are dropped substantially within a space formed by two narrowly spaced apart parallel vertical

planes onto said wire while said drum is being rotated.

**[0016]** The invention will be explained in further detail with reference to the drawings, wherein similar functional elements are referenced by the same numerals, and wherein:

Figures 1A and 1B are a respective schematical front view and side view of a first embodiment of a soap box in accordance with the invention;

Figures 2A and 2B are a respective schematical front view and side view of a second embodiment of a soap box in accordance with the invention; and

Figures 3A and 3B are a respective schematical front view and top view of a third embodiment of a soap box in accordance with the invention.

**[0017]** According to figure 1A and 1B a soap box comprises a container 1 for holding a 20% aqueous lime based soap solution 2. The container comprises a wire inlet 3 on one side and a wire outlet 4 on the opposite side of the container 1, through which a steel wire 5 is fed by a wire feed device (not shown) towards a subsequent wire drawing device. Inside the container a sloping side wall 6 is mounted. The soap solution 2 is pumped out of the container 1 through a tube 7 into a vessel 8, where it is filtered, and then pumped through a tube 9 back into the container 1 again. The container 1 is partially filled with said soap solution 2 and thousands of spherical ceramic bodies 10 having a diameter of 6 mm. The soap box is further provided with an Archimedean screw 11, driven by a motor 12, for transporting the bodies 10 with the soap solution 2 from the bottom of the container 1 to a position above the wire 5, such that they are pushed against, and dropped on top of, said moving wire 5.

**[0018]** According to figure 2A and 2B the soap box comprises a container 1 having a generally U-shaped cross section, as seen in figure 2B, having sloping side walls near the lower side of said U-shape. The container 1 is mounted on a base 13 by means of springs 14, such that the container 1 can be moved in a circular motion by excentric motors 15 mounted under the container 1. By said movement and the shape of the bottom of the container, the bodies 10 with the soap solution 2 are thrown towards and on the moving wire 5.

**[0019]** According to figure 3A and 3B the soap box comprises a cylindrical container 1, mounted on a base 13 with the axis of the container 1 in vertical direction. The cylindrical container 1 has a conical bottom 16. On said bottom 16 a rotating element is mounted (not shown), which element also has a conical wall parallel to the bottom of the container 1 and radially extending upright vanes. A motor 17 rotates the conical rotating element. By the centrifugal force of the rotation of said vanes the bodies 10 with the soap solution 2 are thrown to the side and upwards in the container 1 towards and

on the moving wire 5.

**[0020]** According to figure 4A and 4B the container 1 is a rotatable cylindrical drum having a wire inlet 3 and a wire outlet 4 at both central axial opposite ends, and a motor is arranged to rotate the drum 1 around the wire 5. The drum 1 is provided with ribs 18 extending in axial direction on its inner cylindrical surface. The ribs 18 are formed such that the bodies 10 are dropped within a space formed by two narrowly spaced apart parallel vertical planes onto the wire 5 while the drum 1 is being rotated.

## Claims

1. A method for lubricating a metal wire in a soap box prior to drawing the wire through a wire drawing device for reducing the diameter of said wire, wherein said soap box comprises a container with a wire inlet and a wire outlet at two opposite ends of container, a wire feed device arranged to transport the wire through said container, said method comprising:

supplying lubricant into said container such that it partially fills said container; and simultaneously distributing said lubricant in the container and transporting said wire through said container;

### characterized in that

said lubricant is a lubricating liquid and said method further comprises providing a multitude of liquid carrying bodies in said container; and simultaneously distributing said liquid carrying bodies with said lubricating liquid and transporting said wire through said container.

2. The method according to claim 1, wherein said lubricating liquid is an aqueous solution of between 10% and 40%, preferably between 15% and 25% by weight soap.
3. The method according to claim 1 or 2, wherein said liquid carrying bodies are granules, grains or spheres.
4. The method according to claim 1, 2 or 3, wherein said liquid carrying bodies have an average diameter between 3 and 12 mm, preferably between 4 and 9 mm.
5. The method according to any of the previous claims 1 - 4, wherein said liquid carrying bodies are made of a ceramic or a plastic material.
6. A soap box for lubricating a metal wire prior to drawing the wire through a wire drawing device for reducing the diameter of said wire, wherein said soap box comprises a container with a wire inlet and a wire

outlet at two opposite ends of container, a wire feed device arranged to transport the wire through said container,

lubricant supply means arranged to supply lubricant into said container such that it partially fills said container; and 5

lubricant distributing means arranged to distribute said lubricant in the container while said wire feed device transports said wire through said container; **characterized in that** 10

said lubricant supply means are arranged to supply a lubricating liquid into said container; and said lubricant distributing means are arranged to distribute said lubricating liquid in said container together with liquid carrying bodies in said container. 15

7. The soap box according to claim 6, wherein said wire feed device is arranged to transport said wire in a substantially horizontal or in a diagonal direction, and said lubricant distributing means are arranged to distribute said liquid carrying bodies substantially within a space formed by two narrowly spaced apart parallel vertical planes at both sides of said wire. 20

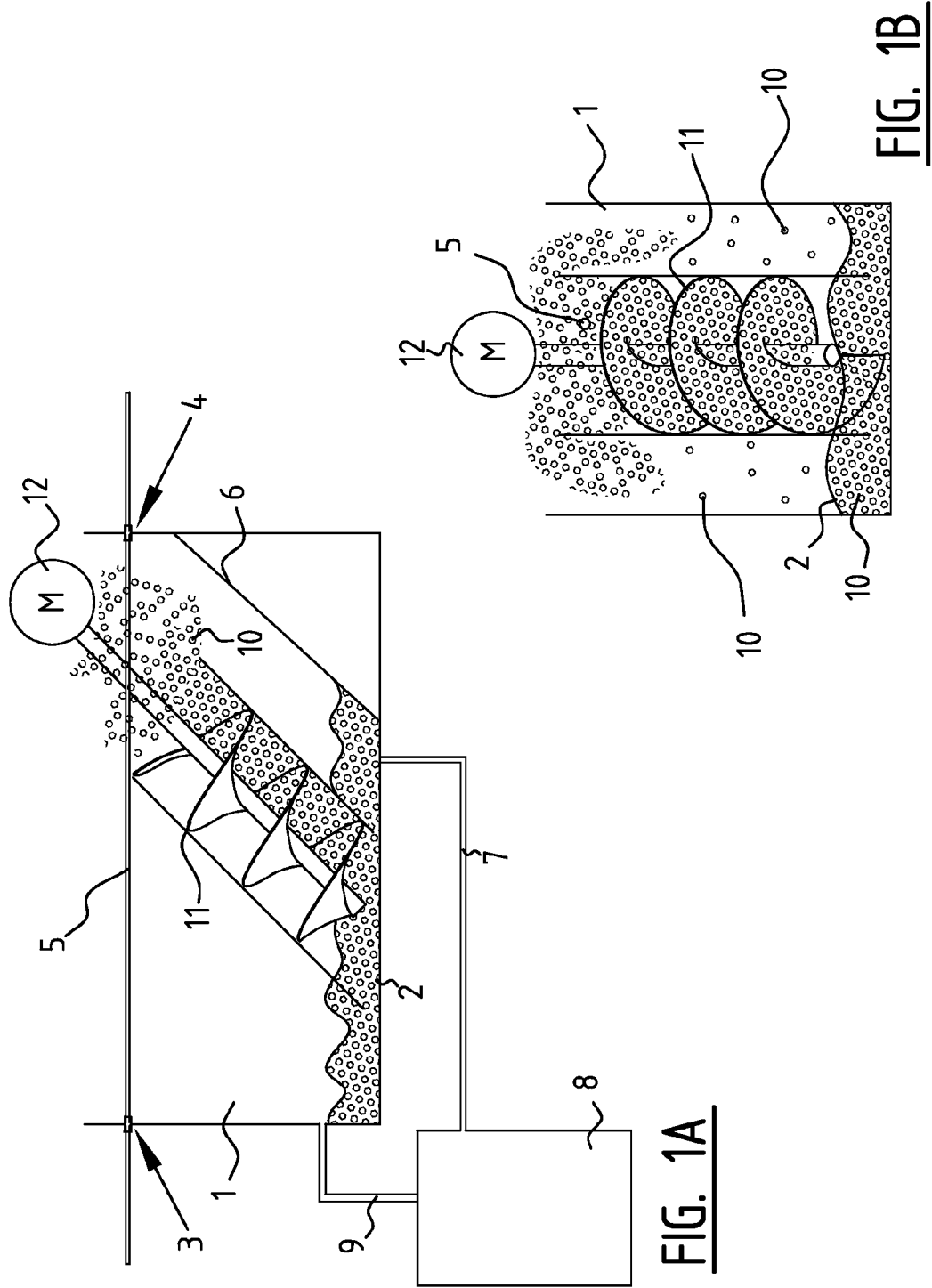
8. The soap box according to claim 6 or 7, wherein said lubricant distributing means comprise an Archimedean screw arranged to lift said liquid and/or said liquid carrying bodies and drop and/or push and/or throw them on said wire. 25

9. The soap box according to claim 6 or 7, wherein said lubricant distributing means comprise vibrating means arranged to vibrate said container, such that said liquid and/or said liquid carrying bodies are put in motion around said wire inside said container. 30 35

10. The soap box according to claim 9, wherein said vibrating means comprise a vibrating motor and springs attached to said container. 40

11. The soap box according to claim 9 or 10, wherein the vibrating means arranged such that said container is vibrated in vertical direction and the bottom of said container is formed such that said liquid and/or said liquid carrying bodies are thrown towards said wire thereby. 45

12. The soap box according to claim 6 or 7, wherein said lubricant distributing means comprise a rotatable bottom part having a conical shape and a vertical rotation axis and a motor arranged to rotate said conical shaped bottom part around said axis, such that the lubricant is forced upward against the conical wall into the container. 50 55



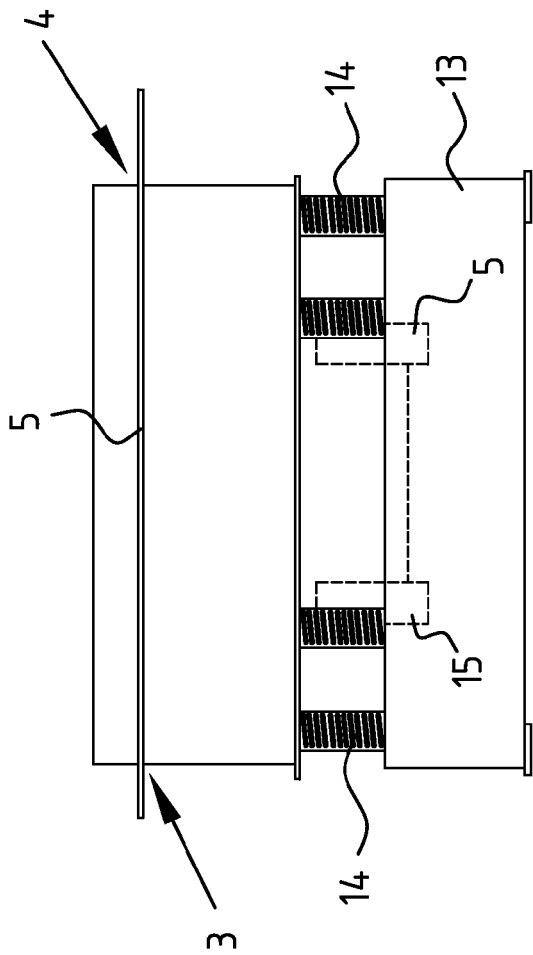


FIG. 2A

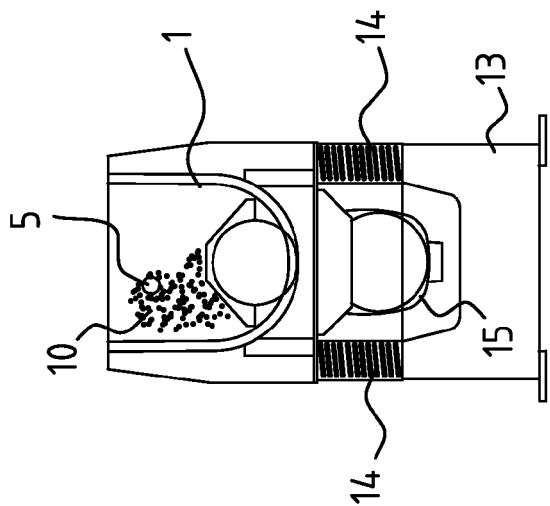


FIG. 2B

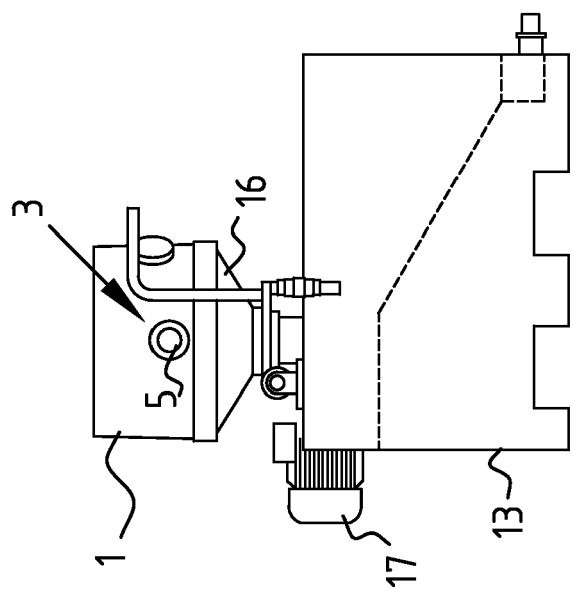


FIG. 3A

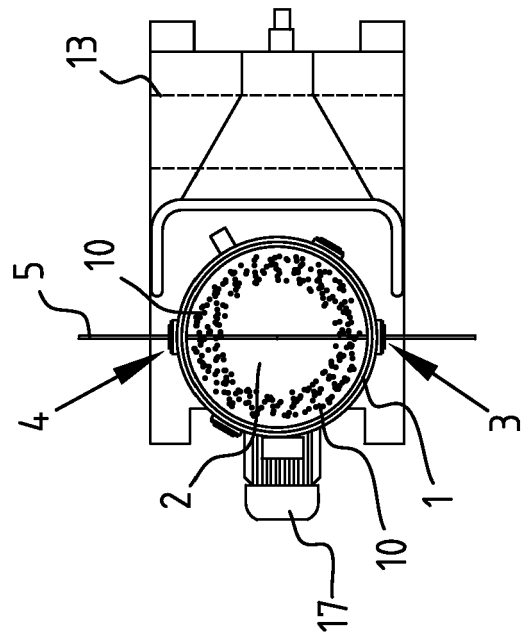


FIG. 3B



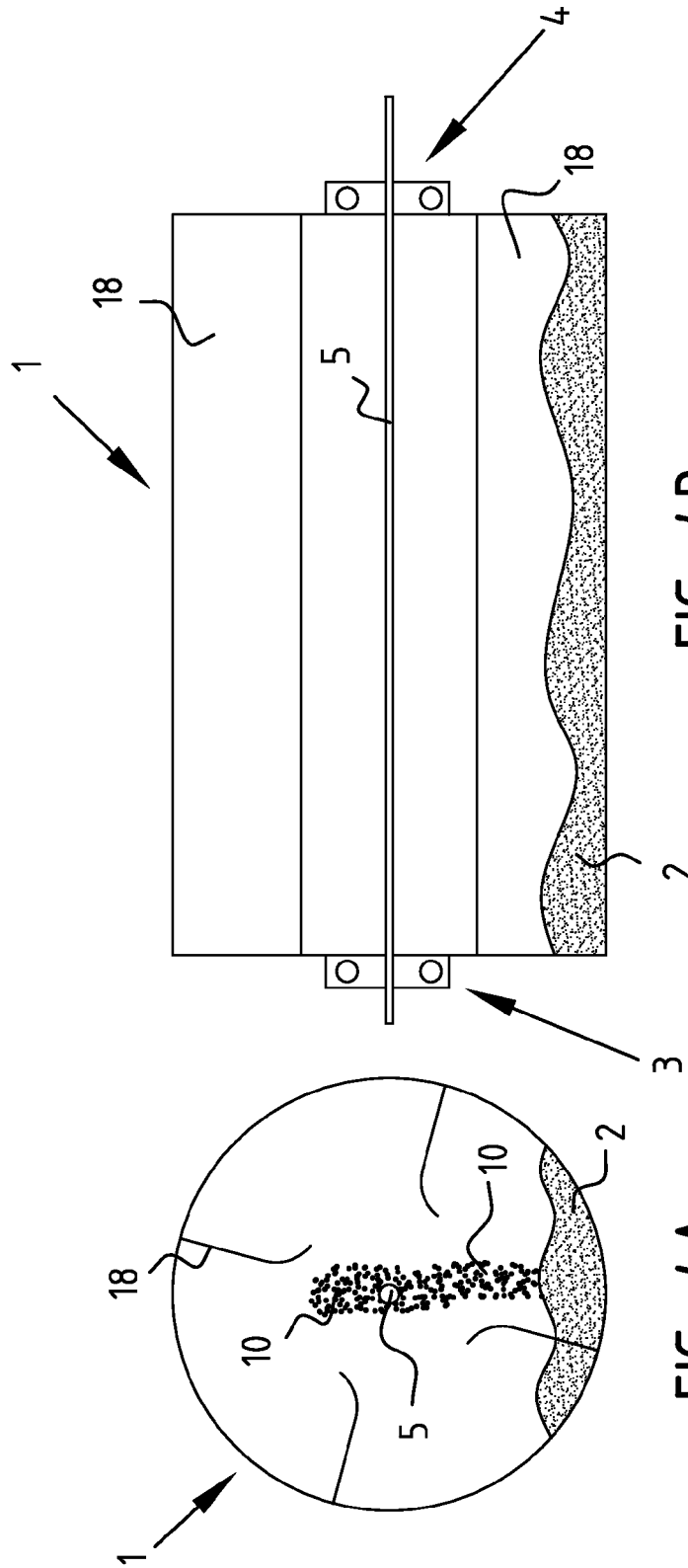


FIG. 4B

FIG. 4A



## EUROPEAN SEARCH REPORT

Application Number  
EP 09 15 6506

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                      |                                                         |                                                |
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| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                      |                                                         |                                                |
| Place of search<br><b>Munich</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                      | Date of completion of the search<br><b>23 July 2009</b> | Examiner<br><b>Ritter, Florian</b>             |
| 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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Application Number  
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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>23 July 2009                                                                                                                                                                                                                                      | Examiner<br>Ritter, Florian             |
| 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 |                                                                                                                                                                                     | T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>.....<br>& : member of the same patent family, corresponding document |                                         |

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 09 15 6506

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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