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(54) **Tannery drum structure**

(57) A drum (10) for tanning process of skins (40) comprised of a closed cylindrical container (1) that defines a chamber of treatment (20) accessible through a loading/unloading opening (3) from which the skins (40) are loaded/unloaded from the drum. It comprises, furthermore, a plurality of mixing blades (21,22,23,24) arranged on an inner side surface (30) and located starting from a respective generatrix (21',22',23',24'). At least one blade is at an angle according to a determined angle (25), less than 75°, determined with respect to a tangential

plane (25') with respect to the inside side face (30) passing through the respective generatrix (21'). Furthermore, at least one of the other blades (22,23,24) is at an angle with respect to the above described blade for a differential angle (26'',27'',28''). This way, during the rotation of the drum following a rotation direction (60), the cicicality in mixing the skins (40) is discontinued, which are gathered from each blade (21,22,23,24), in an amount in turn different, assisting an easier and most effective absorption of the chemical bath with the tannery substances present in the drum.

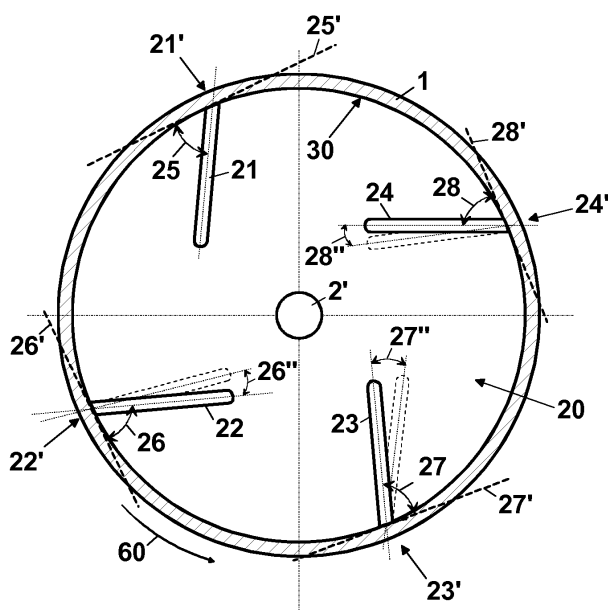


Fig. 2

Description

Field of the invention

[0001] The present invention relates to a tannery apparatus adapted to treat products such as, for example, skins or fabric, and, in particular, it relates to a drum structure suitable to carry out different steps of tannery processes.

Background of the invention

[0002] A drum is a rotating tanning machine adapted to carry out many processes on skins or fabric and, in particular, it is used for its capacity of assisting the penetration of chemical products in the structure of skins. In fact, the rotation moves the skins that are flattened, rubbed, folded, to assist a quicker absorption of the chemicals.

[0003] Structurally a typical drum for tannery is a cylindrical container with a horizontal axis and supported on both sides by a hollow support shafts that are mounted on bearings. The recess in each support shaft allows inflow of a bath with substances necessary to the many tannery processes in addition to allow an exit of gas formed during the processes.

[0004] The drum comprises, furthermore, an opening, with a liquid tight door for introducing the skins, and a motor associated with a suitable transmission mechanism.

[0005] In many types of drums the inner surface has protruding walls, which are often longitudinal blades extending for all the length of the drum, in order to enhance the movement of the skins and of the bath when the drum is operating. Some types of drums, as described in ES250665U, have radial blades that are arranged starting from the inner side surface, in order to divide the drum into a plurality of open compartments, where the skin and the bath are momentarily gathered, for then falling, cyclically, into another compartment. In other cases (as in GB2339796 or GB1760796) the drums have, instead, blades that are not radial but are arranged at an angle with respect to a tangential plane, according to the working speed of the drum. Also in this case, the blades at an angle act as spoons and carry, by the rotation, the skins towards the above and then leave them fall by gravity towards below. This movement generates a relative speed between the bath and the skins in order to increase the dynamism of the osmotic exchange, and to induce, as above said, a continuous action of folding repeatedly the skins in the bath and assisting by mechanical action (beating) the absorption of the chemical products of the bath.

[0006] It is desirable, furthermore, that the part of bath and of skins raised by the blades during the rotation of the drum is dragged as much as possible in order to maximize the height of fall towards below. In fact, the fall of the bath and of the skins causes an intense mechanical

effect that reduces the duration of a full working cycle of the drum, increasing the life of the drum and decreasing the electric energy costs.

[0007] Among other drawbacks in the structure of the blades, is that it is not possible to adjust their position, for example according to the load of the skins to treat; for this reason the beating mechanical action that has been studied and designed for an operation of the drum with full load of skins is not adapted in case of inferior loads.

Summary of the invention

[0008] It is a feature of the present invention to provide a drum structure that optimizes the tannery process of the skins by interrupting, in particular, the cyclicity of movement of the skins and of the bath within the drum.

[0009] It is also a feature of the present invention to provide a drum structure that is structurally modular, in a way according to the load of skins to treat.

[0010] It is another feature of the invention to provide a drum that is constructionally easy and cheap to make.

[0011] These and other objects are achieved by a drum structure for treatment of skins, comprising:

- a closed cylindrical container having an inner side surface that defines a chamber of treatment of said skins and a door for loading/unloading said skins,
- actuating means that transmit to said closed cylindrical container a rotational movement according to a determined rotation direction;
- a plurality of mixing blades that are arranged in said chamber of treatment, said blades extending from said inner side surface starting from a respective generatrix of said inner side surface, said blades increasing a mixing action on said skins that is caused by said rotational movement,

wherein said drum structure provides that least at a first blade of said plurality is arranged at an angle according to a first angle, wherein said first angle is measured in said rotation direction with respect to a plane tangential to said inner side surface passing through the respective generatrix, in particular said first angle being less than 75°,

and wherein at least one among the remaining blades of said plurality, with respect to a respective tangential plane, is at an angle that differs from said first angle of said first blade for at least 10°-13°, preferably 8°-10°, in particular 2°-5°.

[0012] Such an arrangement of blades interrupts the cyclicity of the amount of skins and bath that falls towards below at each fraction of turn, so that the tanning process increases the efficiency. In other words, the skins in the chamber of treatment are subject to a most effective mixing action that decreases the processing time and improves the quality of the final products.

[0013] Furthermore, such an arrangement of blades

allows an energy saving in the rotational movement since it reduces remarkably the number of turns per minute of the drum, reducing then therefore the energy consumption.

[0014] Advantageously, said blades are adjustable in height in order to optimize the mixing process responsive to the amount of skins to treat or to a specifically chosen tanning process.

[0015] This way, according to the load of the skins that has been loaded in the chamber of treatment it is possible to adjust the inclination of the blades in order to optimize the mixing process and then the tanning process.

[0016] Preferably, the height of said blades is set between 50 cm and 150 cm, preferably between 60 cm and 130 cm, in particular between 70 cm and 120 cm.

[0017] Advantageously, said height is identical for any of said blades or, alternatively, said height is different for any of said blades.

[0018] Advantageously, said blades are orientable in order to increase or to decrease the collecting capacity of each blade and then interrupting the cyclicity of the mixing process of the skins.

[0019] In particular, said blades are orientable by means of support guides that are pivotally mounted at opposite sides of said drum, at head and tail plates of said drum.

Brief Description of the drawings

[0020] Further characteristic and the advantages of the apparatus, according to the invention, will be made clearer with the following description of an exemplary embodiment thereof, exemplifying but not limitative, with reference to the attached drawings, in which like reference characters designate the same or similar parts, throughout the figures of which:

- figure 1 is an elevational front view of a drum for treatment of skins, according to the invention;
- figure 2 is a cross sectional view of the drum of Fig. 1 and shows a chamber of treatment with the blades adapted to mix the skins;
- figure 3 shows an exemplary embodiment of the mixing blades arranged with different heights;
- figures from 4 to 9 show a succession of steps where the skins follow a complete turn in the drum, according to the invention;
- figure 10 shows a perspective view of the drum, according to the invention, with a partial cross section, where support guides are shown that are adapted to adjust the inclination of the blades.

Detailed description of the invention

[0021] With reference to Fig. 1, a drum 10 is shown, for tannery processes of skins 40; the drum is comprised of, as well known, a closed cylindrical container 1 that rotates about an axis 2 and is pivotally supported by a

double shaft 2', 2" operated by a motor 6' and a transmission mechanism 6; the output shaft of the latter belongs to a gear 4' that meshes with a ring element 4 integral to a side wall of drum 10. In particular, the cylindrical container 1 defines a chamber of treatment 20 accessible through an loading/unloading 3 of from which the skins 40 (shown in Figs. from 4 to 9) are loaded/unloaded into/from the chamber of treatment 20. A mechanism 3' is provided for opening/closing the door 3" operated independently from an actuator 5.

[0022] As shown in the cross sectional view of drum 10 of Fig. 2, it comprises, furthermore, a plurality of mixing blades 21, 22, 23 and 24 that are arranged according in chamber of treatment 20, on an inner side surface 30 thereof, following a rotation direction 60. Each blade is positioned starting from a respective generatrix 21', 22', 23' and 24' equally from one another on the inner side surface 30.

[0023] According to the present invention, blades 21, 22, 23 and 24 are arranged, so that least at a first blade, for example blade 21, is arranged at an angle according to a determined angle 25 determined with respect to a plane 25' that is tangential to inside side face 30 passing through the respective generatrix 21'. In particular, angle 25 is an angle less than 75°.

[0024] Furthermore, at least one blade among the remaining blades 22, 23 and 24 is at an angle with respect to the respective tangential plane, indicated respectively with 22', 23' and 24', for an angle 26, 27, 28. In particular, each of these angles differ from the angle of inclination 25 of first blade 21 of a respective differential angle indicated as 26", 27" and 28". This way, during the rotation of the drum following rotation direction 60, the cyclicity is interrupted of the mixing process of the skins 40, which are gathered from each blade 21, 22, 23 and 24, in an amount that is in turn different, thus assisting an easier and most effective absorption of the chemical bath with the tannery substances that are present in the drum.

[0025] According to a preferred exemplary embodiment the difference angles 26", 27" and 28" vary responsive to the diameter of drum 10 and are at least 10°-13°, preferably 8°-10°, in particular 2°-5°.

[0026] As above said such an arrangement of blades 21, 22, 23 and 24 interrupts the cyclicity of the amount of skins and bath that falls towards below at each fraction of turn, so that the tanning process increases the efficiency. In other words, the skins in the chamber of treatment 20 are subject to a most effective mixing action that decreases the processing time and improves the quality of the final products. In fact, blades having all identical inclinations would cause a fall of the skins in a way repeatedly equal, with a cyclicity that do not enhance a remixing of the skins with one another.

[0027] As shown in Fig. 3, the blades are furthermore, different in height, in such a way that, also in this case, the mixing process is optimized responsive to the amount of skins to treat or to the specifically chosen tanning process. In fact, the collecting capacity of each blade 21, 22,

23 and 24 is given, not only by its own inclination, but also from its own extension in the chamber of treatment 20.

[0028] According to a preferred exemplary embodiment the height of the blades is set between 50 cm and 150 cm, preferably between 60 cm and 130 cm, in particular between 70 cm and 120 cm, and normally two main configurations are chosen where either blades 21, 22, 23 and 24 have a same height (Fig. 2), or alternatively, a height different to each other, indicated respectively with 29', 29'', 29''' and 29'''' in Fig. 3.

[0029] In particular, the range of values on the height of the blades as above described is function of the size of drum 10.

[0030] Figures from 4 to 9 show a succession of the positions of the skins 40 in drum 10. In particular, in Fig. 4 the skins 40 are arranged between blades 21 and 22 in the lowermost part of container 1. The rotational motion of drum 10, according to the direction 60, brings selectively the skins 40 to rest on blade 21 (Fig. 5 and 6).

[0031] Then, as shown in Fig. 7, the skins 40 arrive to a limit point on blade 21 until they fall towards below (Fig. 8) and must hit against blade 22 and 23 thus generating a moment towards the direction of rotation 60 of drum 10.

[0032] This way, the rotation of drum 10 is assisted by the movement of the skins 40 in the drum that allow to save energy in addition to cause a decrease of the time for treatment of skins 40 and of the relative production cost.

[0033] An advantageous feature of drum 10, according to the invention, concerns the adjustment of angles 25, 26, 27 and 28 of the blades responsive to the amount of skins 40 that has been loaded or responsive to the particular tanning process. This way an increase or a decrease of the collecting capacity of each blade can be achieved, thus optimizing the mixing process of skins 40.

[0034] In other words the adjustment of the angles i allows approaching or distancing each blade 21, 22, 23 and 24 to/from the inner side surface 30 thus changing the respective volume skins and bath that can be gathered by a blade.

[0035] This allows, firstly, reducing the number of turns/minute of drum 10, since the point where skins 40 fall has changed and has been optimised with respect to the actual position of each blade and, secondly, reducing the power of the motor 6' that operates drum 10.

[0036] As shown in Fig. 10, in a diagrammatical example of a possible exemplary embodiment, blades 21, 22, 23 and 24 are orientable by means of respective support guides 61, 62, 63 and 64, that are pivotally mounted at opposite sides to head surface 1' and tail surface 1'' of drum 10.

[0037] In particular, support guides 61, 62, 63 and 64 provide adjusting element, for example a lever (not shown), mounted on the surface of head 1' and adapted to actuate a corresponding head and tail guide that holds the blade. Alternatively, an actuator 50 can be provided that moves automatically such guide.

[0038] In addition, each support guide 61, 62, 63 and 64 moves within a slotted hole 51 for causing guides 61 and 61' to rotate, which is arranged on head surface 1' and tail surface 1'' of the drum. The guide is then blocked in a chosen position by means of dedicated lock means (not shown).

[0039] This way, it is possible to adjust each blade 21, 22, 23 and 24 by simply changing the inclination of the guide by actuator 50 or by the lever, in order to obtain a desired angle. Once completed the step of adjusting the blades the chosen configuration is fixed by lock means that support the load on the blades during the operation of the drum.

[0040] The foregoing description of a specific embodiment will so fully reveal the invention according to a conceptual point of view, so that others, by applying current knowledge, will be able to modify and/or adapt for various applications such an embodiment without further research and without parting from the invention, and it is therefore to be understood that such adaptations and modifications will have to be considered as equivalent to the specific embodiment. The means and the materials to realise the different functions described herein could have a different nature without, for this reason, departing from the field of the invention. It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

Claims

1. A drum structure for treatment of skins, comprising:

- a closed cylindrical container having an inner side surface that defines a chamber of treatment of said skins and a door for loading/unloading said skins,
- actuating means that transmit to said closed cylindrical container a rotational movement according to a determined rotation direction;
- a plurality of mixing blades arranged in said chamber of treatment, said blades extending from said inner side surface starting from a respective generatrix of said inner side surface, said blades increasing a mixing action on said skins that is caused by said rotational movement,

said drum structure being **characterised in that** at least a first blade of said plurality is arranged at an angle according to a first angle, wherein said first angle is measured in said rotation direction with respect to a plane tangential to said inner side surface passing through the respective generatrix, in particular said first angle being less than 75°, and wherein at least one among the remaining blades of said plurality, with respect to a respective tangential plane, is at an angle that differs from said

first angle of said first blade for at least 10°-13°, preferably 8°-10°, in particular 2°-5°.

2. A structure of drum, according to claim 1, wherein said blades are adjustable in height in order to optimize the mixing process responsive to the amount of skins to treat or to a specifically chosen tanning process. 5
3. A structure of drum, according to claim 2, wherein the height of said blades is set between 50 cm and 150 cm, preferably between 60 cm and 130 cm, in particular between 70 cm and 120 cm. 10
4. A structure of drum, according to claim 2, wherein said height is identical for any of said blades or, alternatively, said height is different for any of said blades. 15
5. A structure of drum, according to claim 1, wherein said blades are orientable in order to increase or to decrease the collecting capacity of each blade and then discontinue the cyclicity of the mixing process of the skins. 20
6. A structure of drum, according to claim 5, wherein said blades are orientable by means of support guides that are pivotally mounted at opposite sides of said drum, at head and tail plates of said drum. 25

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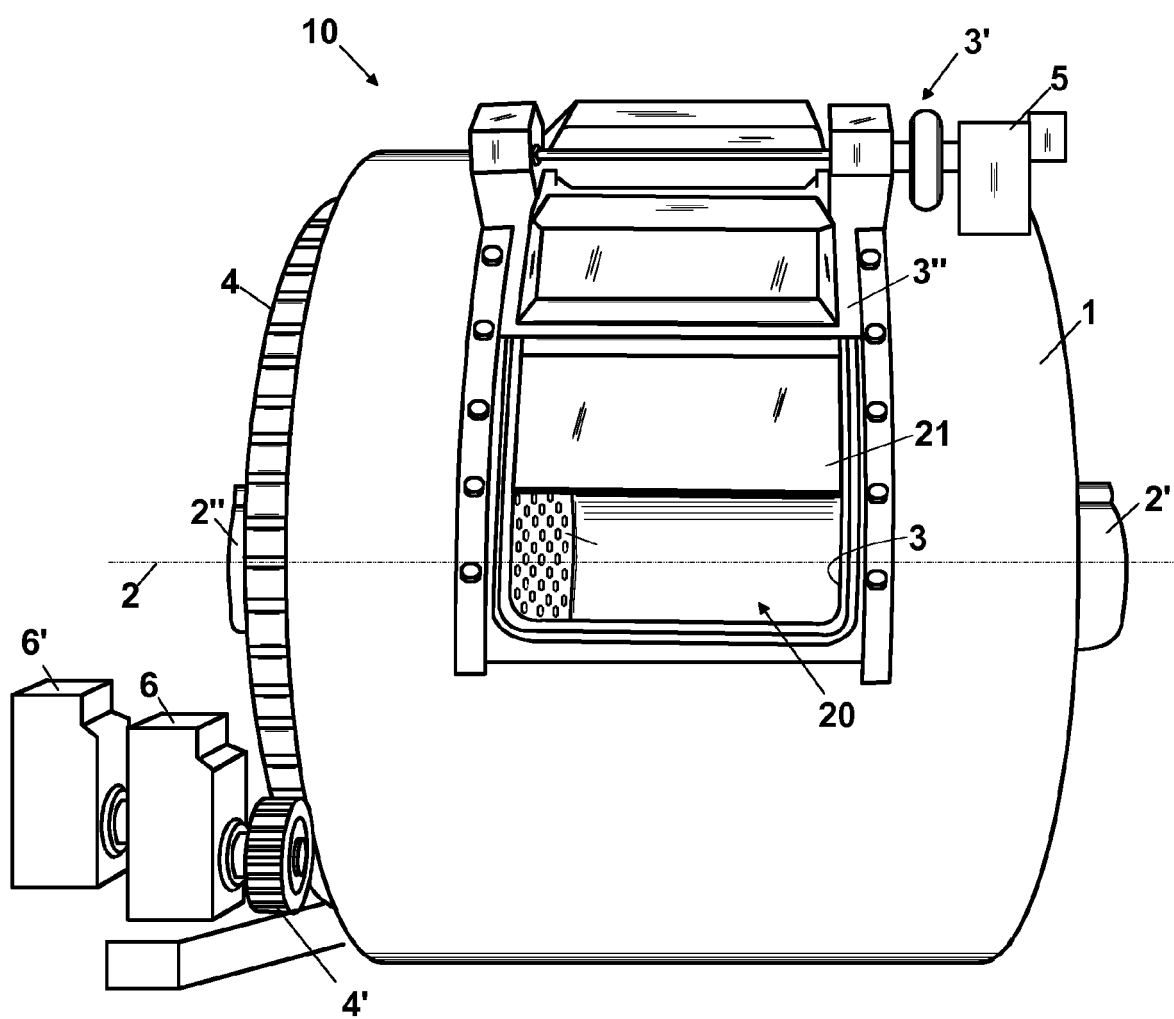
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Fig. 1



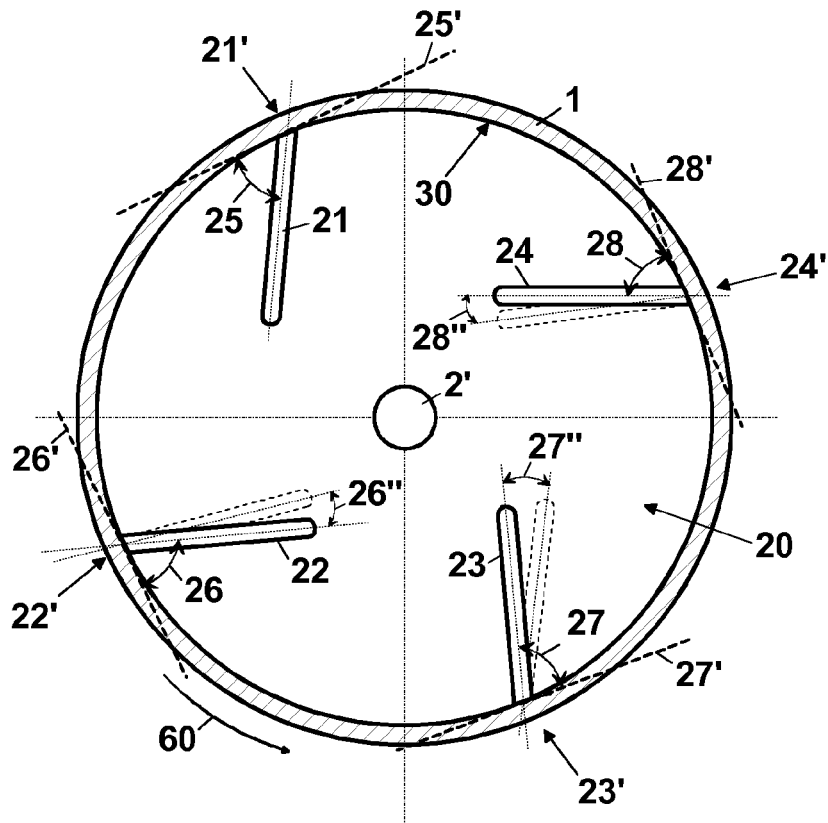


Fig. 2

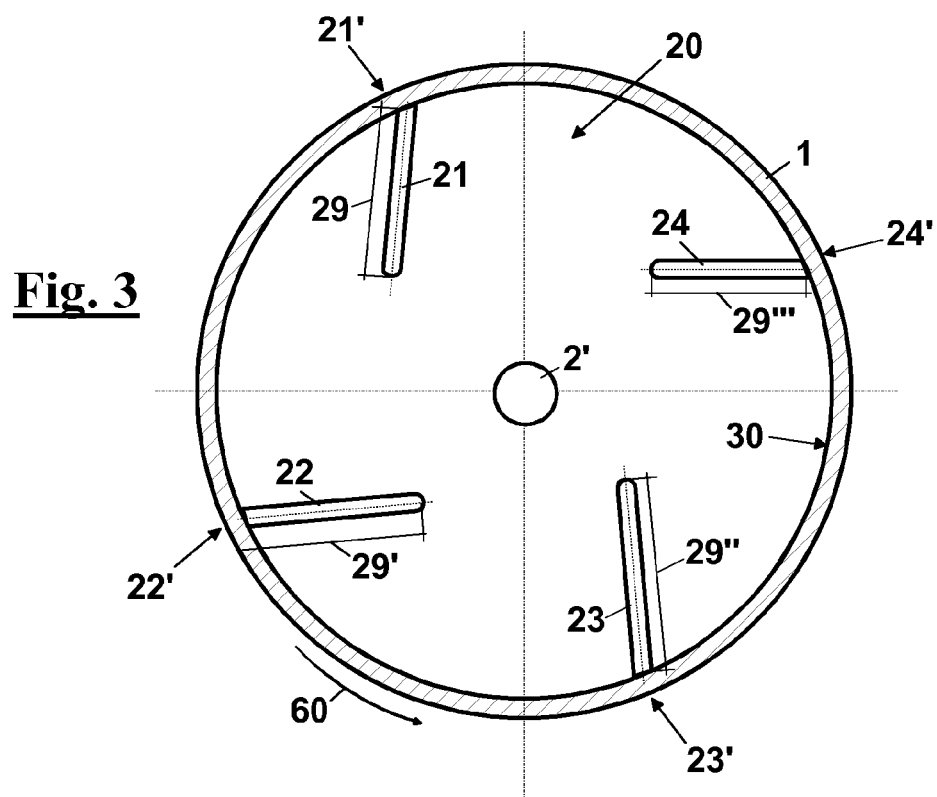


Fig. 3

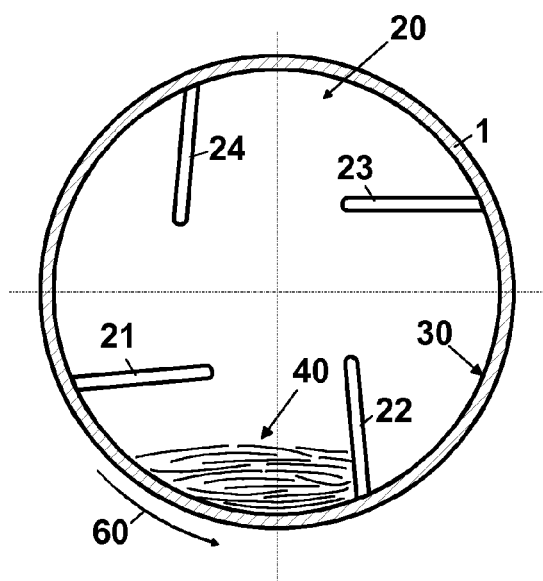


Fig. 4

Fig. 5

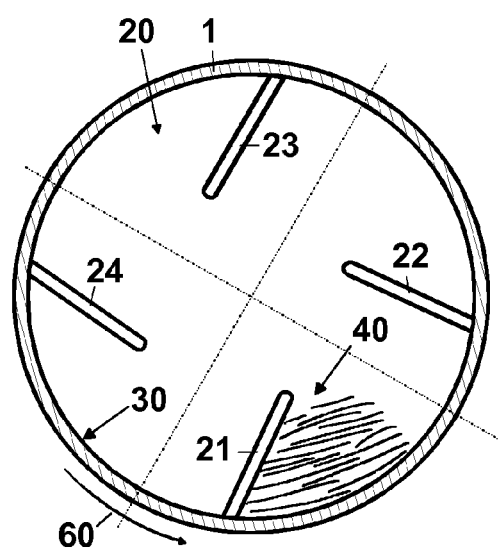
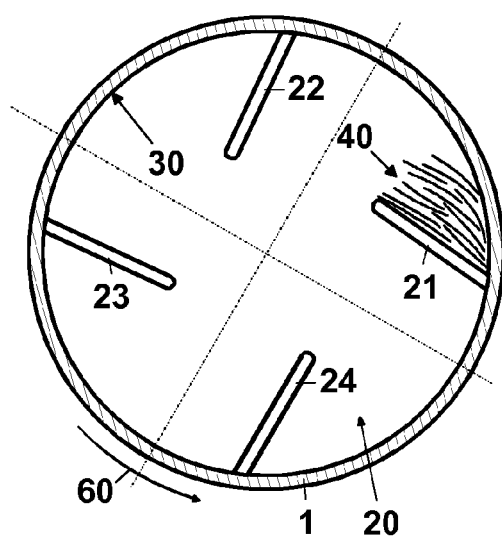


Fig. 6



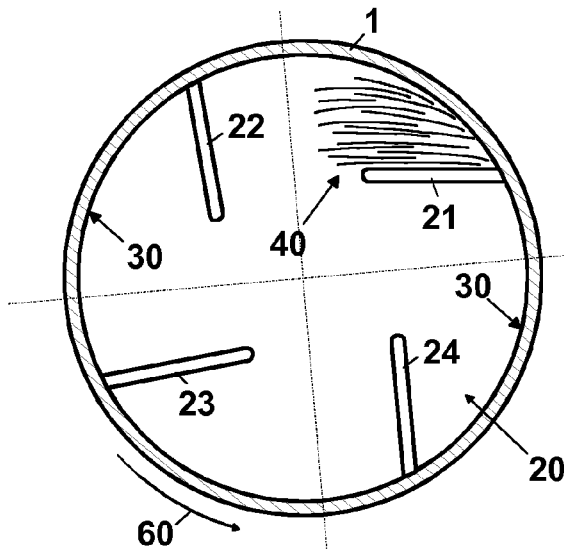


Fig. 7

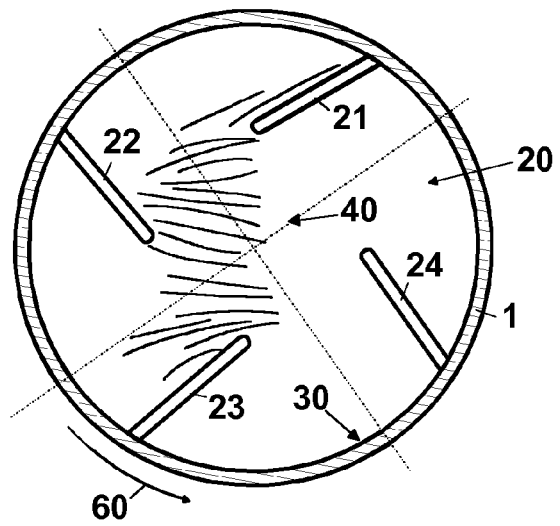


Fig. 8

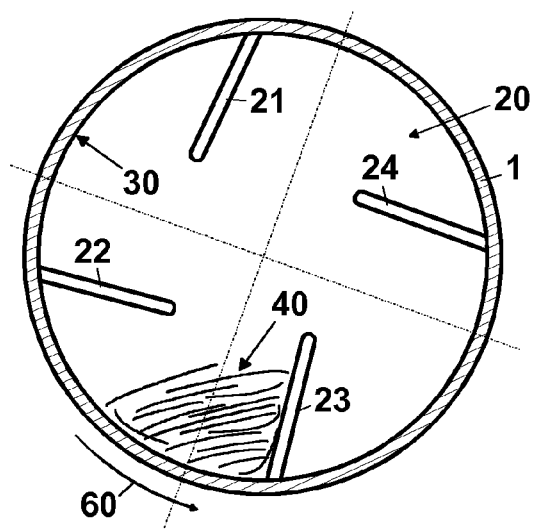
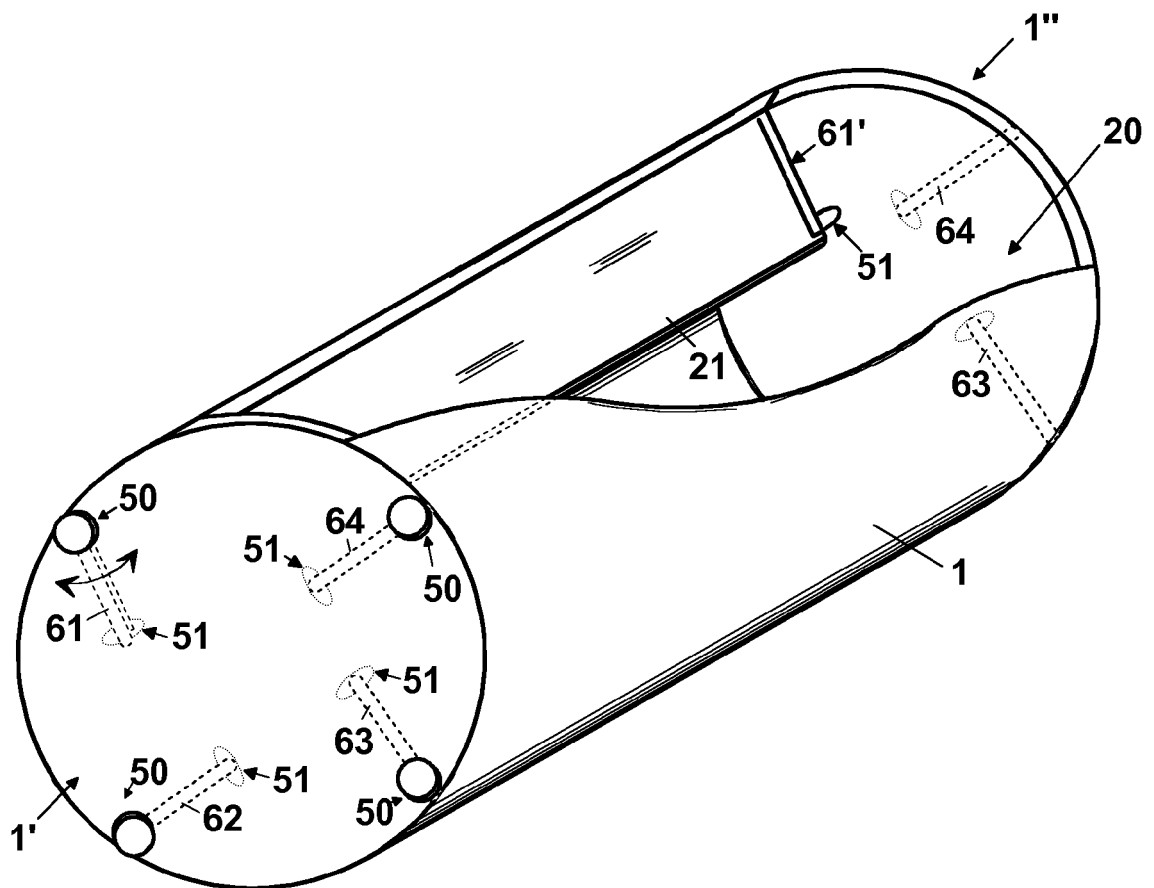


Fig. 9

Fig. 10





EUROPEAN SEARCH REPORT

Application Number
EP 08 16 6637

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Place of search Munich		Date of completion of the search 11 March 2009	Examiner Neugebauer, Ute
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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