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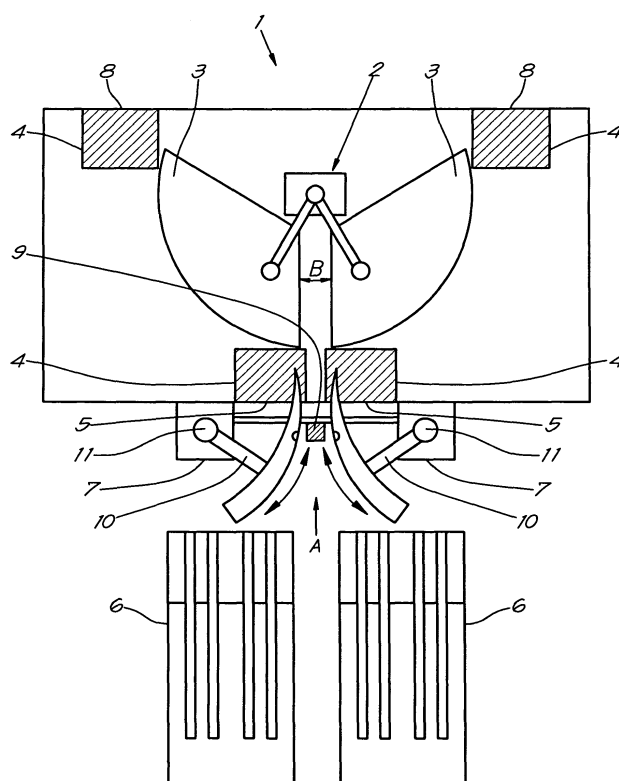
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(54) **Improved method for manufacturing brushes**

(57) Improved method for manufacturing brushes, whereby use is made of a device (1) whereby bundles of fibres are separated from an amount of loose fibres with at least one pair of filling tools (7) and are put in a

brush body or a holder (16), **characterised in that** at least one part of the filling tools (7) is made symmetrical.

Device to be used with the method according to the invention.



**Fig. 1**

## Description

**[0001]** The present invention concerns an improved method for manufacturing brushes and a device which can be used with the above-mentioned method.

**[0002]** Traditionally, brushes are made at high speed with sophisticated devices whereby the production process may be fully automatic.

**[0003]** A disadvantage of a method with such a device, however, is that the device is sizeable and occupies a lot of space.

**[0004]** An additional disadvantage is that, especially with an automated method, the space where the device is placed on must have an appropriate base as the device generates considerable vibrations.

**[0005]** The present invention aims to remedy these and any possible other disadvantages.

**[0006]** To this end, the present invention concerns an improved method for manufacturing brushes, whereby use is made of a device whereby bundles of fibres are separated from a number of loose fibres with at least one pair of filling tools and are placed in a brush body or a holder, characterised in that at least one part of the filling tools is made symmetrical.

**[0007]** In particular, the filling tools are made at least partly symmetrical in relation to the direction in which the above-mentioned bundles of fibres are supplied to the filling tool.

**[0008]** An advantage of the improved method according to the invention is that a method is obtained which generates less vibrations than when using a method whereby the filling tools are not symmetrically arranged.

**[0009]** In a preferred embodiment of a method according to the invention, the method is applied to one device instead of two known devices, whereby the new method with one device has a productive capacity that is just as large, but whereby the device is notably more compact in that it occupies less space.

**[0010]** An additional advantage is that this preferred method will also generate less vibrations during the production process.

**[0011]** The invention also concerns a device which can be used with a method according to the invention.

**[0012]** In order to better explain the characteristics of the invention, the following preferred embodiments are described by way of example only without being limitative in any way, with reference to the accompanying drawings, in which:

figure 1 schematically represents a method according to the invention;

figures 2 and 3 schematically represent a preferred method and an alternative according to the invention.

**[0013]** Figure 1 illustrates the method according to the invention by showing a device 1 from above which applies an improved method for manufacturing brushes according to the invention.

**[0014]** A device 1 for inserting the bundles of fibres in brush body parts or holders, which are not shown in figure 1, consists of a drive 2 and means 3 to make supports 4 switch places.

**[0015]** These supports 4 switch places between a filling station 5 where bundles of fibres are separated from one or several fibre cartridges 6 by means of at least one pair of filling tools 7 and are put in the openings of the supports 4 on the one hand, and an output station 8 where the bundles of fibres are removed from or with the support 4 concerned to a following step in the production process.

**[0016]** Essential to the invention is that at least one part of the filling tools 7 is made symmetrical, preferably in relation to the direction A according to which the holders 4 are carried to the filling station 5.

**[0017]** In figure 1, the filling stations 7 are made as two pick-up devices for the bundles of fibres 7 which are symmetrically arranged in relation to the drive 2 of the device 1. The pick-up devices for the bundles of fibres 7 separate bundles of fibres by means of rotating arms 10 which hinge around a point 11. These pick-up devices for the bundles of fibres 7 are known as such and are disclosed for example in EP 1, 803, 372.

**[0018]** However, it is clear that the filling tools 7 can also be made as slides which linearly supply the bundles of fibres, according to the direction A, to the device 1 or according to a turret principle, as is disclosed for example in EP 1, 561, 396.

**[0019]** The filling tools 7 can each be driven separately, but in figure 1 both filling tools 7 are driven by a common filling tool drive 11.

**[0020]** This offers the advantage that the filling tools 7 can operate entirely symmetrically and can pick up bundles of fibres from one or several fibre cartridges 6. In figure 1, two fibre cartridges 6 are arranged symmetrically as well, but a single common fibre cartridge 6 for both filling tools 7 may be conceivable as well.

**[0021]** The means 3 of the device 1 for making the supports 4 switch places are also represented as rotating arms in figure 1 which are arranged symmetrically in relation to a common drive 2, but just as with the filling tools 7, linearly operating means 3 or means 3 operating according to a turret principle as disclosed in EP 1,561,396 are conceivable as well. Figure 1 shows two means, but it is also possible for a single means 3 to simultaneously transfer all the supplied bundles of fibres by means of supports 4.

**[0022]** The method according to the invention as represented in figure 1 is simple and is in principle similar to the method as disclosed in EP 1,803,372, but with this characteristic difference that at least one part of the filling tools 7 is arranged symmetrically, such that the distance between two filling tools and consequently the shortest distance between two supplied bundles of fibres, represented in figure 1 by distance B, is minimised and is smaller than with two known filling tools 7 without any symmetrical parts that are arranged next to one another. As a result, the production process of brushes is made more

compact and the shop floor will be optimally used.

**[0023]** An additional advantage is that vibrations generated by the filling tools 7 and/or the means 3 are minimized if the filling tools 7 and/or the means 3 operate mirrorwise, symmetrically in relation to direction A.

**[0024]** A common drive 9 and/or 2 for the filling tools 7, means 3 respectively, offers the additional advantage that less drives 2 and/or 9 are required in the production process, as a result of which the investment and maintenance costs are reduced.

**[0025]** Figure 2 illustrates the method according to the invention by giving an overview of a production process seen from above and whereby an improved method for manufacturing brushes according to the invention is applied. The production process is hereby largely based on the method disclosed in EP 0,972,465, but it is clear that the method according to the invention can also be applied to alternative production processes for manufacturing brushes.

**[0026]** A device 12 hereby comprises two closed circuits 13 of clamping devices 14 provided on rotating tables 15. These clamping devices 14 are provided with clamps, not shown in the figure, to clamp in holders 16 for bundles of fibres.

**[0027]** The clamping devices 14 hereby pass for example four stations, namely a station 17 where the holders 16 are introduced, a station 8 where the holders 16 are filled with bundles of fibres, a station 18 where an additional part 19 of the brushes, either guards or a part of the brush sticks, is provided, and a station 20 respectively where the brush bodies 21 provided with bundles of fibres are carried off in a direction indicated by arrow A in figure 1 for a possible finishing process in a finishing device 22.

**[0028]** The station 17 for the introduction of the holders 16 may be conceived such that it is suitable for a manual introduction, an automatic introduction or both. In case of a manual introduction, the holders 16 are supplied from a storage cartridge 23 via an automatic supply device 24, such as a vibratory hopper. The same applies to the introduction of parts of the brush sticks or guards.

**[0029]** Such systems are sufficiently known as such and, consequently, they will not be discussed in any further detail below.

**[0030]** The device 1 for introducing the bundles of fibres in the holders 16 is preferably formed, as shown, of a machine part with several supports 4 that change places, in this case two supports 4A and 4B. As in EP 0,972,464, every support 4 may contain several groups of openings for the filling cartridges of the brushes.

**[0031]** As in figure 1, the supports 4 in figure 2 change places between a filling station 5 where the bundles of fibres are laterally separated from one or several fibre cartridges 6 by means of at least one pair of filling tools 7 and where they are put in the openings of the supports 4 on the one hand, and an output station 8 where the bundles of fibres are transferred from the support 4 concerned into the holders 16 situated underneath the latter

on the other hand.

**[0032]** Figure 2 shows an entirely symmetrical device 12, whereby two circuits 13 with two rotating tables 15, two filling stations 5, two finishing devices 24 and the like are symmetrically arranged in relation to a central axis XX' running parallel with the direction A in which the brush bodies 22 filled with bundles of fibres are carried off to the above-mentioned finishing devices 22.

**[0033]** However, it is clear that alternative configurations of the device 12 are possible while still remaining within the scope of the method according to the invention, whereby not necessarily all parts of the device 12 of the filling tools 7 are symmetrically arranged.

**[0034]** As in figure 1, the filling tools 7 may preferably operate mirrorwise in relation to the above-mentioned axis X-X'.

**[0035]** An advantage of this method is that an orderly method is being followed, whereby the vibrations are minimized.

**[0036]** According to an alternative method of figure 3, only one circuit 13 is integrated in the device 1, whereby the circuit 13 uses one oval rotating belt 15 instead of two rotating tables 15, as in figure 1.

**[0037]** The symmetrically arranged filling tools 7 can then both feed separated fibres to the stations 8, where the holders 16 are filled with bundles of fibres. Consequently, these stations 8 are symmetrical as well in relation to the above-mentioned axis 5 XX', which is then the axis of symmetry of the oval, rotating belt 15.

**[0038]** An advantage thereof is that the method can make use of a device 12 which occupies even less space than the device 12 in figure 2.

**[0039]** It should be noted that, as known in brush manufacturing, each clamping device 14 may preferably contain more than one holder 16 and that the fibres may be fixed to the holders 16 in several known manners.

**[0040]** It is clear that the method according to the present invention can also be realised according to the different combinations or with the different optional auxiliary tools which are described in the above-mentioned patent EP 0,972,465. Thus, auxiliary tools may be used for example to obtain a specific configuration of bundles of fibres.

**[0041]** Naturally, according to a variant method, also a manual or semi-automatic supply may be used for the complementary parts.

**[0042]** It is also clear that the filling tools 7 can be made in all sorts of shapes and dimensions, as mentioned above.

**[0043]** In case the fibres have been rounded beforehand, it is clear that they do not need to be rounded afterwards, but that the other finishing steps can still be applied.

**[0044]** The present invention is by no means restricted to the embodiments described by way of example and represented in the accompanying drawings; on the contrary, such an improved method for manufacturing brushes according to the invention can be carried out in all

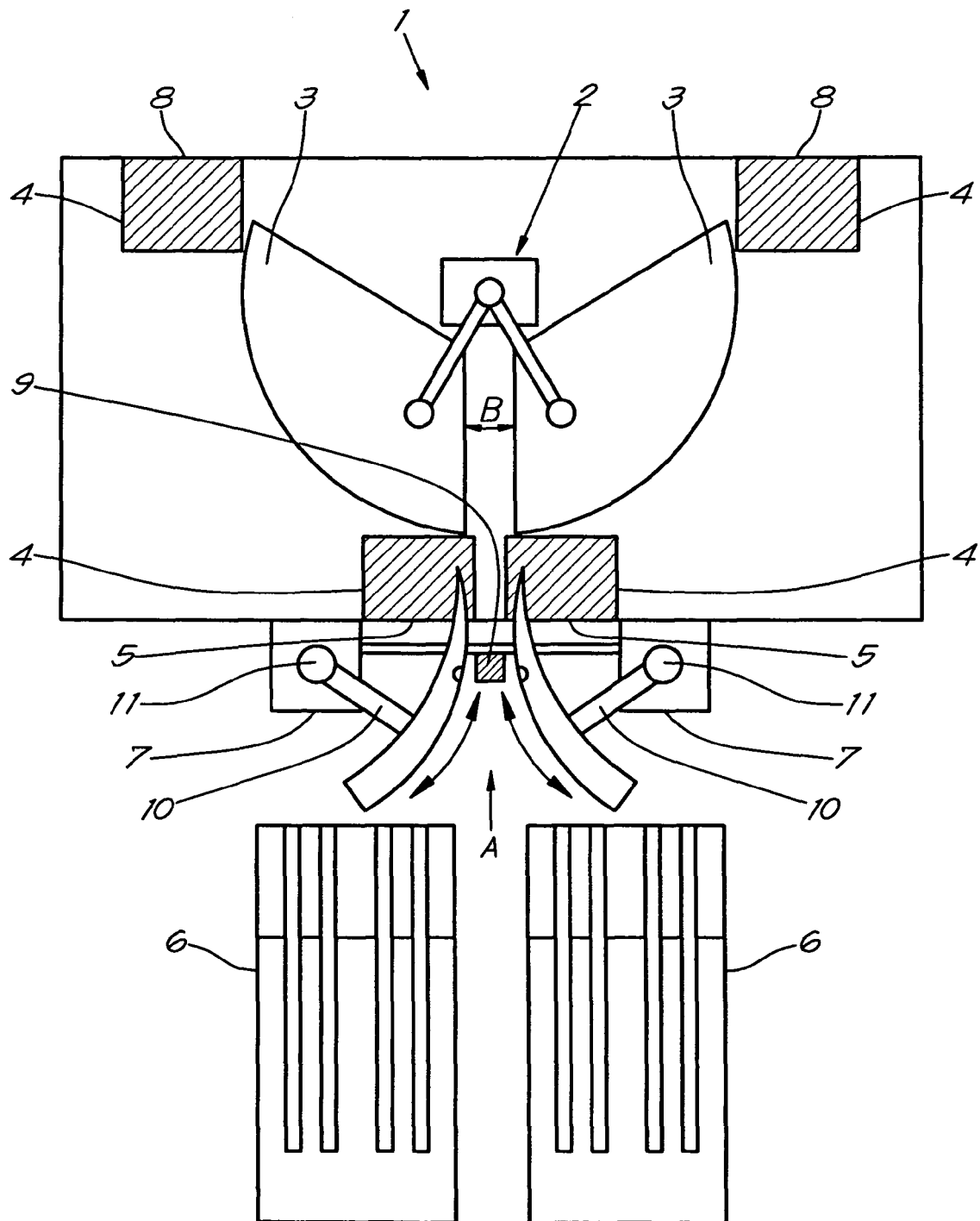
sorts of ways while still remaining within the scope of the invention.

#### Claims

1. Improved method for manufacturing brushes, whereby use is made of a device (1) whereby bundles of fibres are separated from an amount of loose fibres with at least one pair of filling tools (7) and are put in a brush body or a holder (16), **characterised in that** at least one part of the filling tools (7) is made symmetrical. 10
2. Improved method for manufacturing brushes according to claim 1, **characterised in that** the moving parts of the above-mentioned filling tools (7) operate mirrorwise. 15
3. Improved method for manufacturing brushes according to claim 2, **characterised in that** the moving parts of the above-mentioned filling tools (7) are pick-up devices for the bundles of fibres. 20
4. Improved method for manufacturing brushes according to claim 2, **characterised in that** the moving parts of the above-mentioned filling tools (7) are filling tool slides or equivalents thereof. 25
5. Improved method for manufacturing brushes according to any one of the preceding claims, **characterised in that** the above-mentioned filling tools (7) are made symmetrical according to the direction (A) in which the above-mentioned brush body (7) is carried off to a finishing device (22). 30 35
6. Improved method for manufacturing brushes according to any one of the preceding claims, **characterised in that** the drives (9) of the filling tools (7) are mechanically, electronically or otherwise coupled and/or are common. 40
7. Improved method for manufacturing brushes according to any one of the preceding claims, **characterised in that** the method makes use of a device (1) formed of at least two supports (15) with openings that are mutually arranged according to a specific pattern, whereby the bundles of fibres are provided in these supports (4) which are to be put in a brush body (21), and whereby the method further consists of the combination of at least four steps, i.e. laterally separating two bundles of fibres from at least two amounts of loose fibres by means of at least one pair of symmetrically arranged filling tools (7); mechanically providing the above-mentioned bundles of fibres stepwise in the above-mentioned supports (4); transferring the bundles of fibres to holders (16) by means of the supports (4) in which they are provided; 45 50 55

and fixing the bundles of fibres in the brush body (21) by means of said supports (4), or in at least a part of the brush body (21) respectively.

- 5 8. Improved method for manufacturing brushes according to any one of the preceding claims, **characterised in that** the above-mentioned supports (4) are placed stepwise in front of the filling tools (18) by means of a common device (1). 10
9. Device according to claim 5, **characterised in that** the device (1) also comprises at least two supports (4) with openings that are mutually arranged according to a specific pattern, whereby the bundles of fibres that are to be put in a brush body (21) can be provided in said supports (4). 15



*Fig. 1*

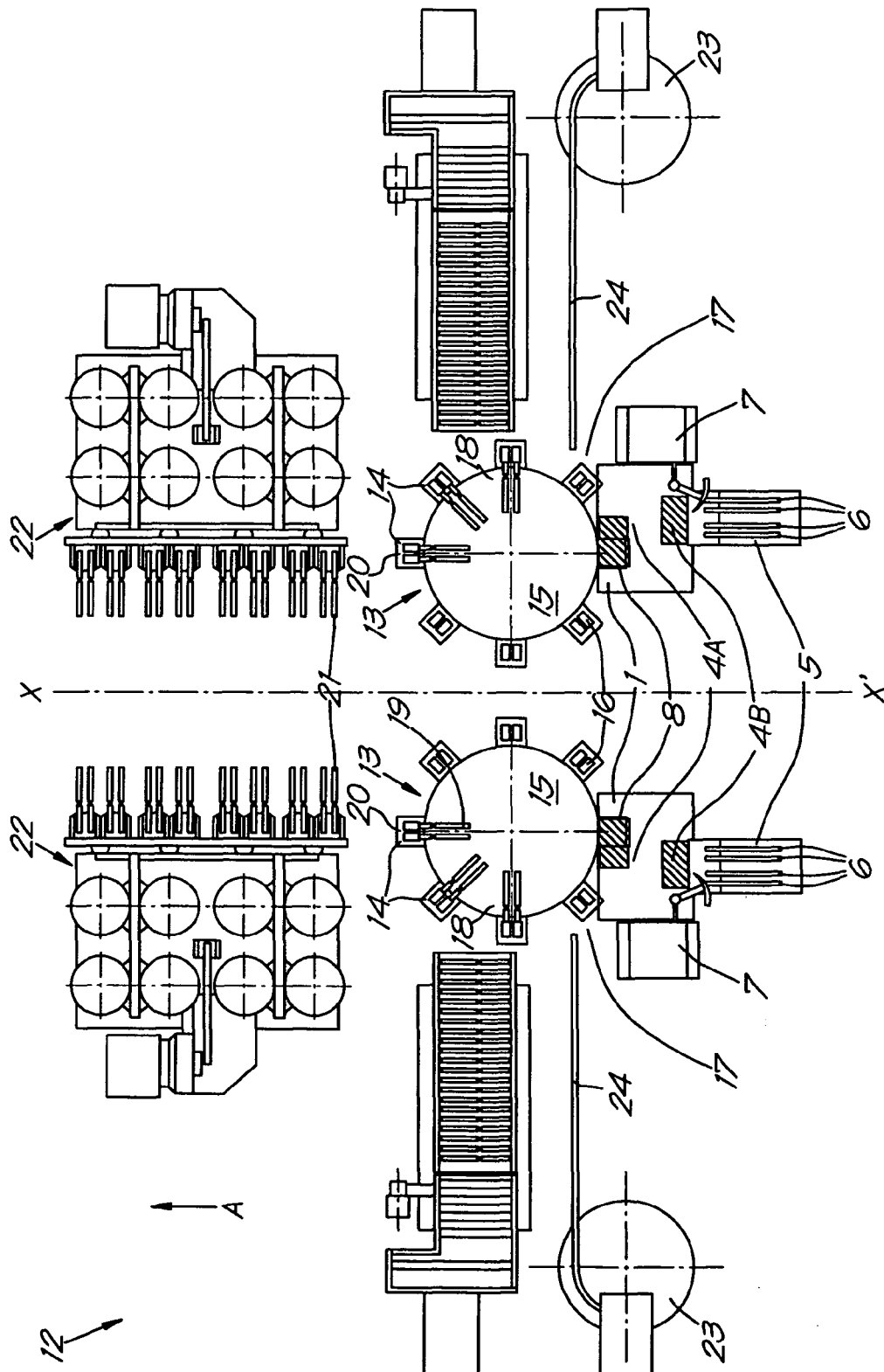


Fig. 2

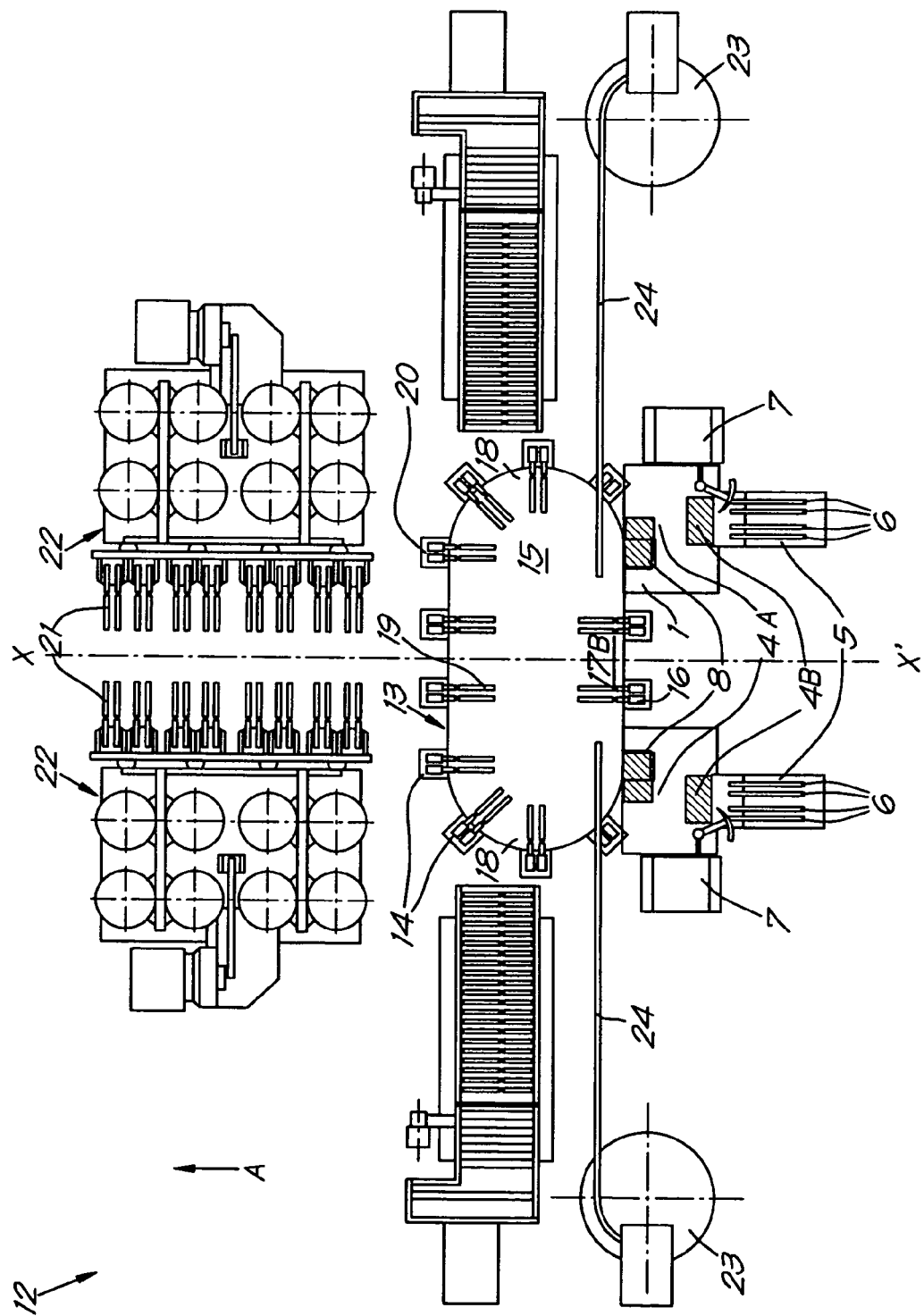


Fig. 3



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Application Number  
EP 09 00 0938

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                    |                                                                                                    |                                                                                                                                                                                                                                                                                       |                                         |
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| The present search report has been drawn up for all claims                                                                                                                                                                                             |                                                                                                    |                                                                                                                                                                                                                                                                                       |                                         |
| Place of search<br>The Hague                                                                                                                                                                                                                           |                                                                                                    | Date of completion of the search<br>9 July 2009                                                                                                                                                                                                                                       | Examiner<br>Nicolás, Carlos             |
| 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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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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