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(54) Method and device for producing and packaging tooth brushes

(57) Method for producing and packaging tooth brushes (2) which at least consists in making several devices available, including at least one device (3) for supplying brush bodies (4) or parts thereof, at least one brush manufacturing device (5, 5A, 5B) and at least one packaging device (6) for packaging the produced tooth brushes (2), characterized in that use is made of a closed conveyance circuit (7) which can co-operate at least with the above-mentioned devices (3, 5-5A-5B, 6) to convey half-finished products, end products respectively, between the above-mentioned devices (3, 5-5A-5B, 6).

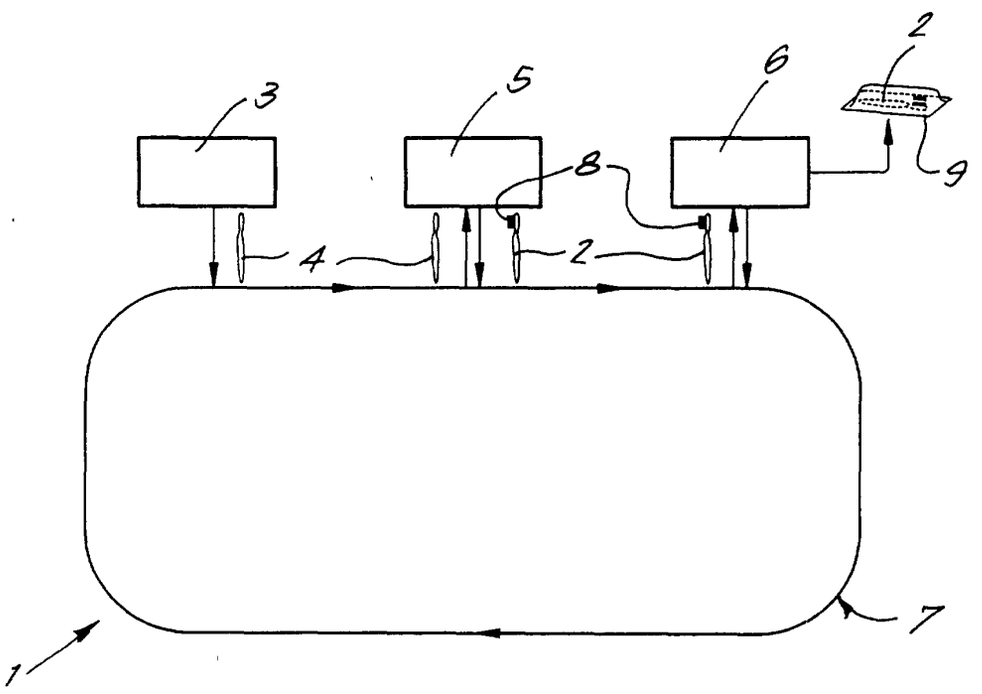

Fig. 1

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Description

[0001] The present invention concerns a method and a device for producing and packaging tooth brushes.

[0002] The invention aims a method and device which make it possible to produce tooth brushes in a smooth, universal manner.

[0003] To this aim, it concerns in the first place a method for producing and packaging tooth brushes which at least consists in making several devices available, including at least one device for supplying brush bodies or parts thereof, at least one brush manufacturing device and at least one packaging device for packaging the produced tooth brushes, characterized in that use is made of a closed conveyance circuit which can co-operate at least with the above-mentioned devices to convey half-finished products, by which are meant in the first place brush bodies, end products respectively, by which are meant the tooth brushes, between the above-mentioned devices.

[0004] As use is made of a closed conveyance circuit which cooperates with a device for supplying tooth brush bodies or parts thereof, as well as with a brush manufacturing device and a packaging device, a universally operating transmission system is obtained, whereby the disadvantages of individual transmission systems operating between two devices, such as the fact that these transmission systems are often difficult to adjust to one another, are excluded. Also, thanks to the use of a conveying device co-operating with the three above-mentioned devices, new possibilities are created to make the production process as smooth as possible under all circumstances, for example by providing for a buffer action in different places as explained hereafter, such that any short interruptions in one of the devices erected along the conveying device will have little or no influence on the average production speed.

[0005] Although, according to the invention, it is not excluded to produce the brush bodies, or possibly parts thereof, as separate beforehand, whereby the device for supplying the brush bodies or parts thereof consists of a supply station erected along the conveyance circuit where the brush bodies are brought in the conveyance circuit, use will preferably be made of an injection-moulding device for the supply of the brush bodies, in which the brush bodies or parts thereof are formed. Thus is created a comprehensive production circuit which offers the advantage that the half-finished products and the end products can be followed systematically from start to finish, which offers the advantage that also the orientation of the half-finished products and end products is always under control, such that the products are never presented to a device in an unexpected manner.

[0006] It should be noted that, apart from the above-mentioned device, also other devices can be used working in conjunction with the conveyance circuit and carrying out additional operations in between. Thus, for example, it is possible that, in the brush manufacturing device, just the brush fibers are inserted in the brush bodies, whereas the final processing, such as warping and rounding, is carried out in a separate device which is also erected along the conveyance circuit.

[0007] Further, it should be noted that, according to the invention, by a closed conveyance circuit is understood a circuit in which certain components are carried around according to a closed loop. This does not necessarily mean that the actual conveyance system should be closed. Thus, for example, as will be further explained in detail, use can be made of platform-shaped elements for the conveyance of the half-finished products and end products. According to the invention, such platform-shaped elements can then be systematically carried around in the conveyance circuit, whereby they are used to convey the brush bodies from the supply device to the brush manufacturing device and to convey the brushes from the brush manufacturing device to the packaging device. Although these platform-shaped elements are then carried around in a closed circuit, the means of transport used thereby does not necessarily need to describe a closed loop.

[0008] According to another preferred characteristic, the half-finished products, end products respectively, are moved in the conveyance circuit by means of removable holders. Such removable holders make it possible for the half-finished products and/or end products to be easily removed from the conveyance circuit at the place of the device where further treatment is required, and to be brought in the conveyance circuit again after said further treatment or processing.

[0009] The above-mentioned holders can be of different nature. Thus, for example, holders can be used which contain clamping devices to hold one or several half-finished products, end products respectively, in a clamped manner. These may be clamping devices which are self-gripping, or they may be controllable clamping devices.

[0010] Preferably, however, use is made of holders which mainly consist of platform-shaped elements, in particular what are called trays, upon which several half-finished products, end products respectively, can be provided, for example a series of 32 brush bodies, tooth brushes respectively. Such platform-shaped elements offer the advantage that they have a simple construction and can be universally used for the conveyance of the half-finished products, end products respectively, even when they have a different design, or when there is a production switch to tooth brushes having another design.

[0011] Use is preferably made of platform-shaped elements which are each provided with several seatings to put in the half-finished products, end products respectively. Such seatings make it possible for the half-finished products, end products respectively, to be simply laid down in the seatings. According to a preferred embodiment, the seatings are made such that the half-

products, end products respectively, provided in them remain in said seatings at least partially orientated, and preferably entirely orientated during the conveyance.

[0012] Also, the holders are preferably used universally with each of the above-mentioned devices, in other words preferably only one type of holder will be used for all the devices working in conjunction with the conveyance circuit.

[0013] Further, preferably platform-shaped elements are used which are made of plastic, for example by means of injection moulding. Such platform-shaped elements offer the advantage that they are cheap to produce, light to convey and easy to handle.

[0014] Further, the holders are preferably stackable, such that they can be stacked for example in buffers, whereby such buffers occupy little space.

[0015] According to a possibility of the invention, the above-mentioned holders are provided with identification means, so that they can be identified. Thus, it is impossible to mingle several half-finished products and/or end products during the conveyance thanks to the necessary detections.

[0016] According to a special embodiment, the holders are provided with identification means which can be adjusted, either or not automatically, as a function of the content which they convey or have to convey. Thus, for example, the above-mentioned platform-shaped elements are provided with a series of small sealable openings, such that, by sealing one or several openings, a code can be formed which can for example be detected by means of an optical eye. As a function of the formed code, such platform-shaped element can then either or not be subjected to a treatment on the device concerned.

[0017] According to the invention, use is preferably made in the conveyance circuit of conveying elements moving independently from one another, whereby these conveying elements may either consist of trolleys conveying the above-mentioned holders, or they may be shaped by means of the holders themselves. In the latter case, the holders can for example be moved over a roller track.

[0018] The use of conveying elements moving independently from one another offers the advantage that such conveying elements can be implemented with an optimal degree of capacity utilization. Indeed, every conveying element can carry along half-finished products or end products as of every device placed along the conveyance circuit to a following device placed along the conveyance circuit, so that the presence of empty conveying elements in the conveyance circuit can be reduced to a minimum.

[0019] According to the most preferred embodiment, use is made of holders for the conveyance in the conveyance circuit, as well as of buffers in which several of such holders can be temporarily put in a waiting position. Such buffers offer the advantage that the production cycles of the respective devices erected along the conveyance circuit do not have to be perfectly adjusted to one another. Any differences can then be absorbed by the buffers. Another major advantage of such buffers consists in that possible malfunctions in any of the devices do not necessarily result in the operation of the other devices being interrupted.

[0020] The used buffers can be of different nature, as will be further explained by means of a number of possibilities.

[0021] Thus, for example, use can be made of one or several buffers which function as a storage room to temporarily store the above-mentioned holders, whereby the latter can be empty holders and/or holders filled with half-finished products and/or end products. Such a buffer functioning as a storage room makes sure that there are always enough holders available in the conveyance circuit.

[0022] According to the most preferred embodiment, one or several of such buffers are provided at one or several devices working in conjunction with the conveyance circuit, such that a buffer action is created at least on the inlet of said devices. Thus can be guaranteed that every device is permanently supplied with incoming half-finished products or end products.

[0023] Naturally, it is also possible to erect several buffers at one or several devices.

[0024] It is also possible to provide for a buffer action both on the inlet and on the outlet of a device erected along the conveyance circuit. Thus, for example, it is possible to provide for a buffer action with half-finished products to be treated on the inlet, where several buffered holders are always present, whereas a buffer with one or several empty or partially empty holders is provided on the outlet, such that the half-finished products or end products leaving the device concerned can be put back in such a holder, after which this holder can then be further conveyed by means of the conveyance circuit.

[0025] Each device working in conjunction with the conveyance circuit preferably has a buffer.

[0026] According to a practical embodiment, use is made of buffers with a stacking system for the holders, such that said buffers occupy little space. The stacking method, as well as the stacking systems used thereby can be of various natures, and the practical realization of such a system lies within reach of any craftsman, and thus will not be further discussed here.

[0027] According to the invention, use can be made of buffers which are erected next to the conveying circuit, for example between a conveyor track forming the conveyance circuit and a device erected next to it, for example a brush manufacturing device, as well as of buffers which are part of the conveyance circuit. In the latter case, the conveyance circuit is for example designed such that the holders on every device concerned are stopped until the half-finished products and/or end products have been removed therefrom, provided therein respectively, whereby the waiting holders remain

present one after the other in the actual conveyance circuit. According to yet another possibility, use can be made of what is called a bypass, such that by sending the holders via the main circuit or the bypass, they can pass different devices, as desired, and a buffer action can then be provided for in the part concerned, either in the main circuit or in a bypass, while the other holders, which do not necessarily have to take part in the buffer action, can follow their path unhindered.

[0028] According to a variant, use is made of several devices having the same function, which are erected along the conveyance circuit, for example two or more devices for supplying brush bodies and/or two or more brush manufacturing devices and/or two or more packaging devices. In this way, the most optimal combinations can be realized for producing and packaging tooth brushes at a maximum speed.

[0029] As mentioned above, the half-finished products and/or end products are preferably moved by means of holders. Putting the half-finished products, end products respectively, in the holders and removing them takes place fully automatically according to a particularly practical embodiment, such at one or several and preferably at all the devices erected along the conveyance circuit.

[0030] As already mentioned, use can also be made of bypasses according to the invention which each work in conjunction with different devices, either or not of the same type. The use of such a bypass does not necessarily need to be combined with the use of buffers.

[0031] It is clear that different sorts of system controls can be applied. Preferably, however, a system control is provided which applies one or several of the following possibilities of control:

- a control whereby the half-finished products and/or end products are conveyed in a fixed order and with a fixed orientation, so that, by the sequence of the products, it is known what product is situated at what particular place in the device and at what time;
- a control whereby the half-finished products and/or end products are provided at random in the conveyance circuit, whereby the data concerned are stored at the time of the input, so that it is known where a certain half-finished product or end product has been provided in the conveyance circuit and where it is situated afterwards;
- a control whereby the half-finished products and/or end products are provided at random in the conveyance circuit, whereby use is made of holders to convey the half-finished products and/or end products which are provided with an identification mark as a function of the content of the holders;
- a control whereby the half-finished products and/or end products are provided at random in the conveyance circuit, whereby the control takes place by means of a detection as these half-finished products and/or end products are further processed, preferably carried out on the half-finished products and/or end products themselves;
- a control which is a combination of one or several of the above-mentioned possibilities.

[0032] In the second instance, the invention also concerns a device for producing and packaging tooth brushes, comprising at least one device for supplying brush bodies or parts thereof, as well as at least one brush manufacturing device and at least one packaging device for packaging the produced tooth brushes, characterized in that it also comprises a conveyance circuit which can co-operate at least with the above-mentioned devices, in other words, the device for supplying brush bodies or parts thereof, the brush manufacturing device and the packaging device, and which thus makes it possible to convey half-finished products, end products respectively, between these devices.

[0033] Other characteristics of the invention will become clear from the accompanying claims.

[0034] In order to better explain the characteristics of the invention, the following preferred embodiments of the invention are described as an example only without being limitative in any way, with reference to the accompanying drawings, in which:

figure 1 schematically represents a device according to the invention;
figures 2 to 4 schematically represent a number of variants;
figure 5 schematically represents an example of a holder which can be used in the device according to the invention;
figure 6 schematically represents another example of a device according to the invention.

[0035] As is represented in figure 1, the invention concerns a device 1 for producing and packaging tooth brushes 2. This device 1 contains at least one device 3 for supplying brush bodies 4 or parts thereof, as well as at least one brush manufacturing device 5 and at least one packaging device 6 for packaging the produced tooth brushes 2.

[0036] The invention is special in that the device 1 contains a conveyance circuit 7 which can co-operate at least with the above-mentioned devices, in other words, the device 3 for supplying brush bodies 4 or parts thereof, the brush manufacturing device 5 and the packaging device 6, and which thus makes it possible to convey the half-finished products, in particular the brush bodies 4, the end products respectively, in particular the tooth brushes 2, between these devices.

[0037] The conveyance circuit 7 as represented preferably consists of a closed circuit.

[0038] In a practical embodiment, the device 3 for supplying brush bodies 4 consists of an injection moulding device to form such brush bodies 4 or parts thereof.

[0039] The devices 3, 5 and 6 can work in conjunction

with the conveyance circuit 7 in any way whatsoever according to the invention. This co-operation can be either or not automatic. In fact, what it comes down to, is that the half-finished products and/or end products are moved by means of one single conveyance circuit 7 which either or not comprises several branches. The conveyance circuit 7 hereby preferably consists of one conveyor track, but it is not excluded to apply several, for example parallel conveyor tracks.

[0040] In the case of a fully automatic device 1, robots will for example be erected at the devices 3, 5 and 6, to convey the half-finished products, end products respectively, either or not directly between the conveyance circuit 7 and the devices 3, 5 and 6 concerned.

[0041] The working of the device from figure 1 then consists in that, in the case where the device 3 is made up of an injection-moulding device, brush bodies 4 are formed in this injection-moulding device, and after the injection mould has been opened, are removed from the injection-moulding device by means of a robot or such and are provided in the conveyance circuit 7 in an orderly manner.

[0042] On the site of the brush manufacturing device 5, the brush bodies 4 are taken out of the conveyance circuit 7 again, and provided with brush fibers 8 in the known manner, after which the formed tooth brushes 2 are put back in the conveyance circuit 7 so as to be supplied to the packaging device 6.

[0043] In the packaging device 6, the tooth brushes 2 are packed, either exclusively individually, for example in a blister pack 9, or in another manner, for example first individually and then again in larger packs.

[0044] Figure 2 represents a variant which shows that also several devices of the same type can be erected along the conveyance circuit 7, in this case two brush manufacturing devices, 5A and 5B respectively. This allows for. different production possibilities. When, for example, brush bodies 4 are being produced at high speed in the device 3, it may be necessary to use several brush manufacturing devices, in this case 5A and 5B, to produce tooth brushes 2 at the same speed. It is also possible to use two or more brush manufacturing devices to produce different tooth brushes on the basis of brush bodies 4 coming from the device 3 which are either or not different from one another.

[0045] According to yet another possibility, the brush bodies can be sequentially presented to the devices 5A and 5B, whereby every brush manufacturing device 5A, 5B respectively, carries out an operation on the brush bodies 4. Thus, for example, by means of the device 5A, a specific part of the holes of the brush bodies 4 can be filled with brush fibers 8, whereas the other second part of the holes on the second device 5B can be provided with either or not the same type of brush fibers 8. This may for example be important when tooth brushes 2 are produced whose brush body 4 has openings with different diameters to insert brush fibers 8 in, or when there is a varying (sectional) cut within the same brush. Also, the conveyance of device 5A to 5B preferably takes place by means of the conveyance circuit 7.

[0046] Naturally, it is also possible to carry out more than two operations on more than two brush manufacturing devices, whereby the operations and/or the materials used thereby, such as the brush fibers 8 and anchor plates, have different characteristics.

[0047] Figure 3 shows a variant in which is applied what is called a bypass 10, which offers the advantage that the tooth brushes 2 which have been produced in the brush manufacturing device 5A can be sent directly to the packaging device 6, without having to pass the brush manufacturing device 5B.

[0048] As represented in figure 4, such a bypass 10 can also be made such that a splitting up 11 of the brush bodies 4 to be treated is already carried out before the brush bodies 4 are carried to the brush manufacturing devices 5A and 5B. This offers the advantage that, at every brush manufacturing device 5A and 5B, only those half-finished products pass, in particular brush bodies 4, which have to be treated in the device 5A concerned, 5B respectively.

[0049] Of course, such bypasses 10 cannot only be applied in combination with several brush manufacturing devices 5A-5B, but also in combination with for example the use of two or more devices 3 and/or two or more packaging devices 6.

[0050] As mentioned in the introduction, the actual conveyance of the half-finished products and end products is preferably carried out by means of holders which can be removed from the actual conveyance circuit 7 and which can for example be temporarily stacked at every device 3 and/or 5 and/or 6. According to the most preferred embodiment, such a holder consists of a platform-shaped element in which several tooth brush bodies 4 and/or tooth brushes 2 can be provided.

[0051] An example of such a holder 12 is schematically represented in figure 5. The holder 12 is hereby carried out as a stackable platform-shaped element or what is called a tray, whereby this element is provided with a series of seatings 13 for the products concerned.

[0052] Finally, figure 6 represents another example of the device 1, for clarity's sake, which more specifically represents how use can be made of the above-mentioned holders 12.

[0053] The device 1 in this case contains a single device 3 for supplying brush bodies 4, consisting of an injection moulding device; a single brush manufacturing device 5; and a single packaging device 6. Further, between the conveyance circuit 7 and each of the devices 3, 5 and 6 are also provided buffers 14-15-16, for example in the shape of stacking devices.

[0054] The operation is then for example as follows. In the buffer 14, a number of empty holders 12 are permanently kept ready thanks to the regular supply of empty holders 12, as indicated by arrow 17. Each time a number of brush bodies 4 is formed, they are taken out of the mould of the injection moulding device and

placed in the seatings 13 of an empty holder 12. The holder 12 provided with brush bodies 4 is then put back in the conveyance circuit 7, as indicated by the arrow 18.

[0055] Then, said brush bodies 4 are conveyed in the holders 12 concerned to the brush manufacturing device 5, where they are placed in a buffer 15 in the holders 12 concerned. The brush bodies 4 are removed from there, provided with brush fibers 8 and placed back in a holder 12, either or not the same one as the one from where the brush bodies 4 concerned were taken, as a tooth brush 2.

[0056] Next, the same takes place at the packaging device 6, where the formed tooth brushes 2 are provided in a buffer 16 in the holders 12, and where these tooth brushes 2 are subsequently packaged and carried off in a suitable manner as indicated by arrow 19. The empty holders 12 are brought in the conveyance circuit 7 again, after which they are again made available to the above-mentioned device 3.

[0057] Naturally, it is also possible to provide buffers which are not specifically coupled to certain devices, such as for example a buffer 20 functioning as a storage room for empty holders 12, and a buffer 21 in the shape of an intermediate storage room for holders 12 which are filled with brush bodies 4.

[0058] Naturally, the invention also concerns a conveyance circuit 7 itself, which consists of a closed conveyance system and of holders 12 co-operating with this conveyance system for conveying the above-mentioned half-finished products and/or end products along the devices 3, 5 and 6.

[0059] It is clear that also other devices can be provided in, along the conveyance circuit 7 respectively. If for example the warping and rounding of the brush fibers 8 does not take place on the brush manufacturing device 5 itself, nor in a device directly coupled to it, and thus has to be carried out separately, an additional device for the warping and/or rounded can then for example be provided along the conveyance circuit 7 which, naturally, can also be equipped with a buffer for holders 12.

[0060] The invention is by no means limited to the above-described embodiments represented in the accompanying drawings; on the contrary, such a method and device for producing and packaging tooth brushes can be made in all sorts of variants while still remaining within the scope of the invention.

Claims

1. Method for producing and packaging tooth brushes (2) which at least consists in making several devices available, including at least one device (3) for supplying brush bodies (4) or parts thereof, at least one brush manufacturing device (5, 5A, 5B) and at least one packaging device (6) for packaging the produced tooth brushes (2), **characterized in that** use is made of a closed conveyance circuit (7) which can co-operate at least with the above-mentioned devices (3, 5-5A-5B, 6) to convey half-finished products, end products respectively, between the above-mentioned devices (3, 5-5A-5B, 6).

2. Method according to claim 1, **characterized in that** as a device (3) for supplying brush bodies (4) or parts thereof, use is made of an injection moulding device.

3. Method according to claim 2, **characterized in that** for producing and packaging the tooth brushes (2), use can exclusively be made of the devices placed along the closed conveyance circuit (7), whereby brush bodies (4) are thus formed in the injection moulding device, these are carried to a brush manufacturing device (5, 5A, 5B) by means of the above-mentioned conveyance circuit (7), the brushes are formed in the brush manufacturing device (5, 5A, 5B) by providing the above-mentioned brush bodies (4) with brush fibers (8), the formed tooth brushes (2) are conveyed to the packaging device (6) by means of the above-mentioned conveyance circuit (7), and the formed tooth brushes (2) are packed in the packaging device (6), whereby additional operations are either or not carried out in between.

4. Method according to any of the preceding claims, **characterized in that** the half-finished products, end products respectively, are moved in the conveyance circuit (7) by means of removable holders (12).

5. Method according to any of the preceding claims, **characterized in that**, in order to move the half-finished products, end products respectively, use is made of holders (12) which show one or several of the following characteristics:

   - that the holders (12) contain clamping devices to hold one or several half-finished products, end products respectively, in a clamped manner;
   - that the holders (12) mainly consist of platform-shaped elements, in particular what are called trays;
   - that the holders (12) mainly consist of platform-shaped elements which are each provided with several seatings (13) to put in the half-finished products, end products respectively;
   - that the holders (12) mainly consist of platform-shaped elements which are each provided with seatings (13) which make sure that the half-finished products, end products respectively provided in them remain in said seatings (13) at least partially orientated, and preferably entirely orientated during the conveyance;
   - that the holders (12) are universal, in other

words can be universally used with each of the above-mentioned devices (3, 5-5A-5B, 6);
- that only one type of holders (12) is used for all the devices (3, 5-5A-5B, 6) working in conjunction with the conveyance circuit (7);
- that for the holders (12), use is made of platform-shaped elements which are made of plastic;
- that the holders (12) are stackable, such that they can be stacked for example in buffers (14-15-16-20-21) ;
- that the holders (12) have been or will be provided with identification means, so that they can be identified;
- that the holders (12) are provided with identification means which can be adjusted, either or not automatically, as a function of the content which they convey or have to convey.

6. Method according to any of the preceding claims, **characterized in that**, in the conveyance circuit (7), use is made of conveyance elements moving independently from one another.

7. Method according to any of the preceding claims, **characterized in that**, for the conveyance in the conveyance circuit (7), use is made of holders (12) as well as of buffers (14-15-16-20-21) in which several of such holders (12) can be temporarily placed in a waiting position.

8. Method according to claim 7, **characterized in that** use is made of one or several buffers (14-15-16-20-21), whereby these buffers (14-15-16-20-21) have one or several of the following characteristics:

- that one or several buffers (20-21) are included which function as a storage room to temporarily store the above-mentioned holders (12), whereby the latter can be empty holders (12) and/or holders (12) filled with half-finished products and/or end products;
- that one or several buffers (14-15-16) are included which are erected at one or several devices (3, 5-5A-5B, 6) working in conjunction with the conveyance circuit (7), such that a buffer action is created at least on the inlet of said devices (3, 5-5A-5B, 6);
- that one or several buffers (14-15-16) are included which are erected at one or several devices (3, 5-5A-5B, 6) working in conjunction with the conveyance circuit (7), whereby a buffer action is created on the inlet of said devices, whereas empty or partially empty holders (12) are kept available on the outlet of the devices concerned, such that the half-finished products or end products leaving the devices concerned can be put back in such a holder (12);
- that several buffers (14-15-16) are included, such that every device (3, 5-5A-5B, 6) working in conjunction with the conveyance circuit (7) has a buffer at its disposition;
- that one or several buffers (14-15-16-20-21) are included which make use of a stacking system to buffer the holders (12);
- that one or several buffers (14-15-16-20-21) are included which are erected next to the conveyance circuit (7);
- that one or several buffers are included which are part of the conveyance circuit (7);
- that one or several buffers are included which are part of the conveyance circuit (7) and whereby they are designed as or provided in what is called a bypass (10).

9. Method according to any of the preceding claims, **characterized in that** use is made of several devices (5A-5B) having the same function, which are erected along the conveyance circuit (7).

10. Method according to claim 9, **characterized in that** at least a number of the tooth brushes (2) are produced by means of at least two operations which are each carried out on a separate brush manufacturing device (5A-5B).

11. Method according to claim 10, **characterized in that** on each of the brush manufacturing devices (5A-5B) is carried out an operation with other characteristics, such as for example the insertion of brush fibers (8) in openings with different diameters, the insertion of brush fibers (8) with a different (sectional) cut, etc.

12. Method according to any of the preceding claims, **characterized in that** the half-finished products and/or end products are moved in the conveyance circuit (7) by means of holders (12) which can be either or not placed in buffers (14-15-16-20-21) as well, and **in that** the half-finished products and/or end products at one or several, and preferably at all devices (3, 5-5A-5B, 6) working in conjunction with the conveyance circuit (7) can be automatically taken out of the holders (12) and placed in the devices (3, 5-5A-5B, 6), and, where necessary, are also automatically removed from the devices (3, 5-5A-5B, 6) and placed back in the holders (12).

13. Method according to any of the preceding claims, **characterized in that** use is made of bypasses (10) which each work in conjunction with different devices, either or not of the same type.

14. Method according to claim 13, **characterized in that** use is made of several brush manufacturing

devices (5A-5B), whereby they are provided as separate with half-finished products by means of one or several bypasses (10).

15. Method according to any of the preceding claims, **characterized in that** a system control is provided for which applies one or several of the following possibilities of control:

- a control whereby the half-finished products and/or end products are conveyed in a fixed order and with a fixed orientation, so that, by the sequence of the products, it is known what product is situated at what particular place in the device and at what time;
- a control whereby the half-finished products and/or end products are provided at random in the conveyance circuit (7), whereby the data concerned are stored at the time of the input, so that it is known where a certain half-finished product or end product has been provided in the conveyance circuit (7) and where it is situated afterwards;
- a control whereby the half-finished products and/or end products are provided at random in the conveyance circuit (7), whereby use is made of holders (12) to convey the half-finished products and/or end products which are provided with an identification mark as a function of the content of the holders (12);
- a control whereby the half-finished products and/or end products are provided at random in the conveyance circuit (7), whereby the control takes place by means of a detection as these half-finished products and/or end products are further processed, preferably carried out on the half-finished products and/or end products themselves;
- a control which is a combination of one or several of the above-mentioned possibilities.

16. Device for producing and packaging tooth brushes (2), comprising at least one device (3) for supplying brush bodies (4) or parts thereof, as well as at least one brush manufacturing device (5, 5A, 5B) and at least one packaging device (6) for packaging the produced tooth brushes (2), **characterized in that** it also comprises a conveyance circuit (7) which can co-operate at least with the above-mentioned devices, in other words, the device (3) for supplying brush bodies (4) or parts thereof, the brush manufacturing device (5, 5A, 5B) and the packaging device (6), and which thus makes it possible to convey half-finished products, end products respectively, between these devices.

17. Device according to claim 16, **characterized in that** the conveyance circuit (7) is a closed circuit.

18. Device according to claim 16 or 17, **characterized in that** the device (3) for supplying brush bodies (4) consists of an injection moulding device to form brush bodies (4) or parts thereof.

19. Device according to any of claims 16 to 18, **characterized in that** it contains means which make it possible to realize the method according to any of claims 5 to 15, whereby these means comprise holders (12) and/or buffers (14-15-16-20-21) and/or conveyance elements and/or devices erected along the conveyance circuit (7) and/or bypasses (10) and/or controls as defined in any of the preceding claims 5 to 13.

20. Conveyance circuit for realizing the method according to any of claims 1 to 15 or a device according to any of claims 16 to 19, **characterized in that** it consists of a closed conveyance system and of holders (12) working in conjunction with this conveyance system to convey the above-mentioned half-finished products and/or end products along the above-mentioned devices.

21. Conveyance circuit according to claim 20, **characterized in that** the holders (12) consist of platform-shaped elements in which are formed seatings to take up several of the above-mentioned half-finished products and/or end products, in other words brush bodies (4) of tooth brushes (2) and/or tooth brushes (2).

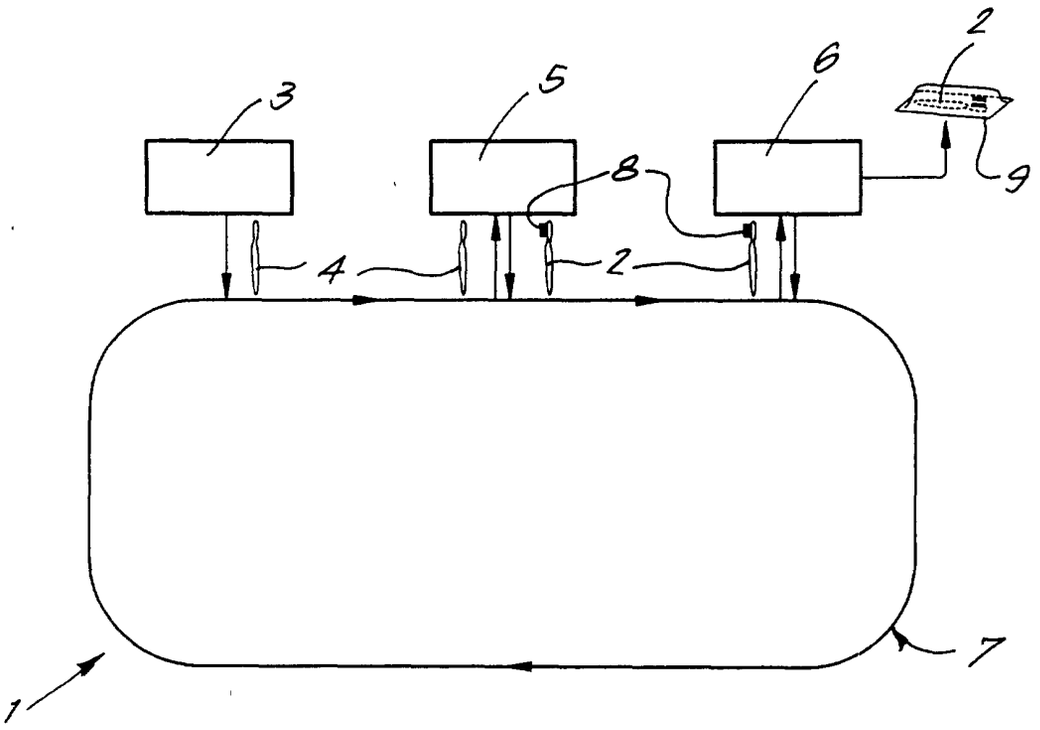

Fig. 1

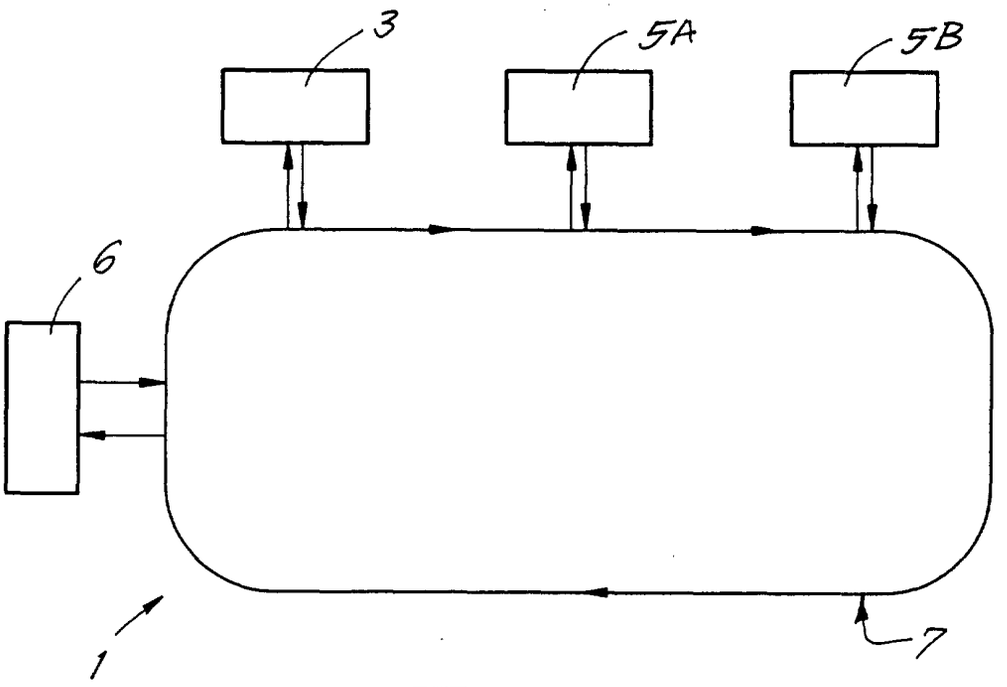

Fig. 2

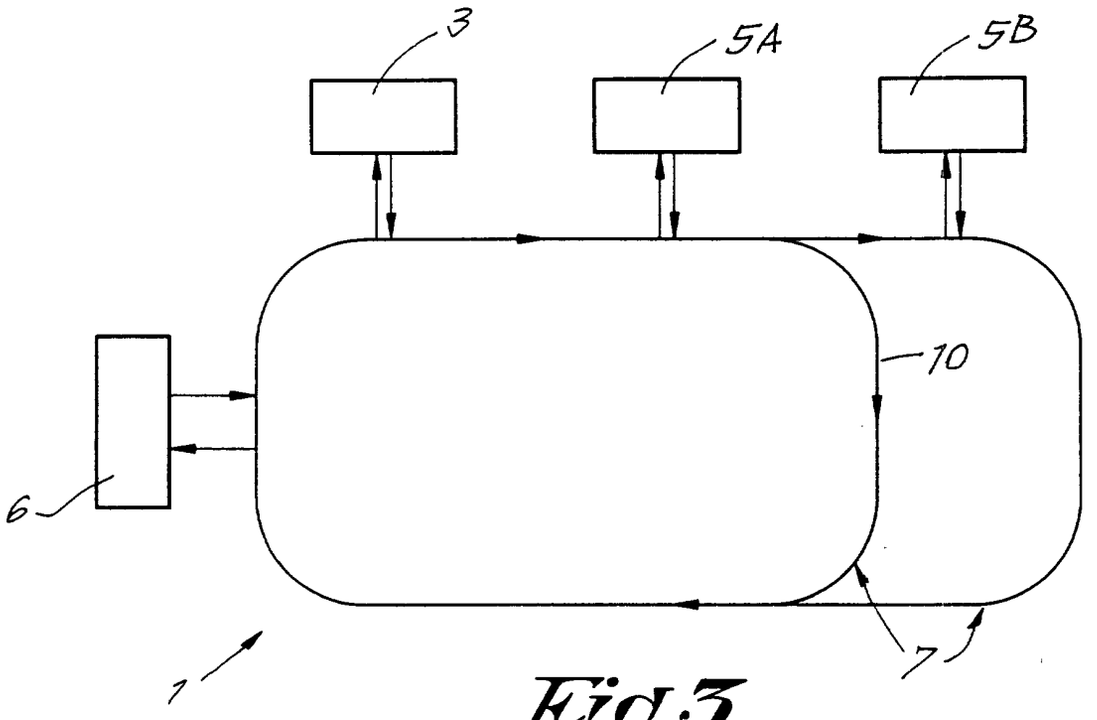

Fig.3

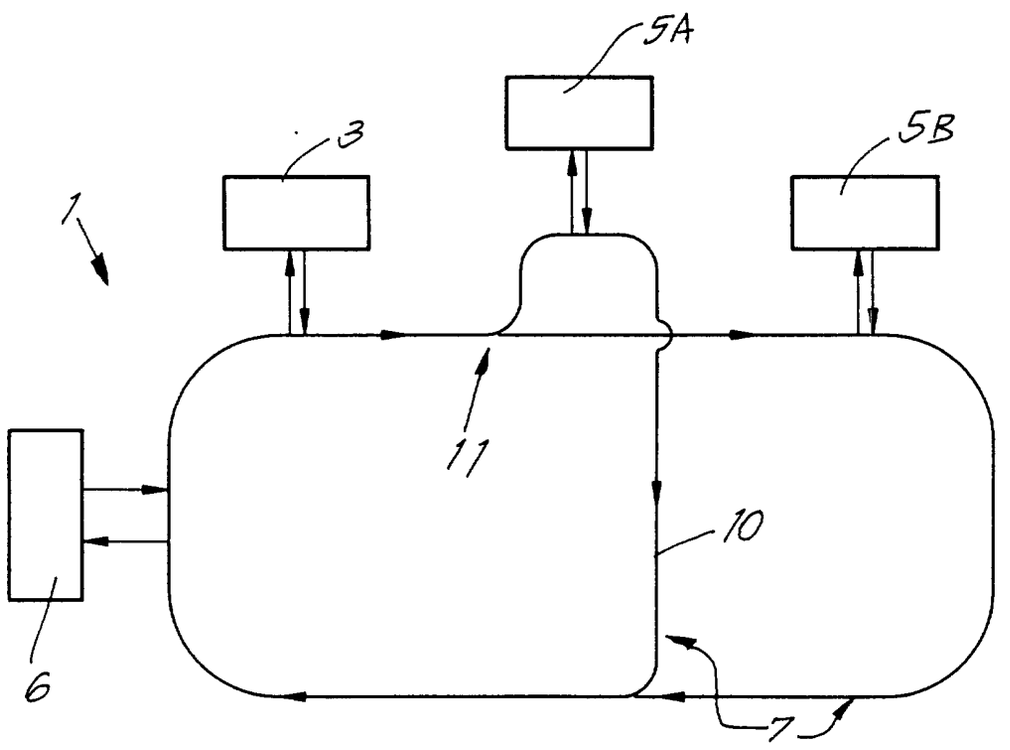

Fig.4

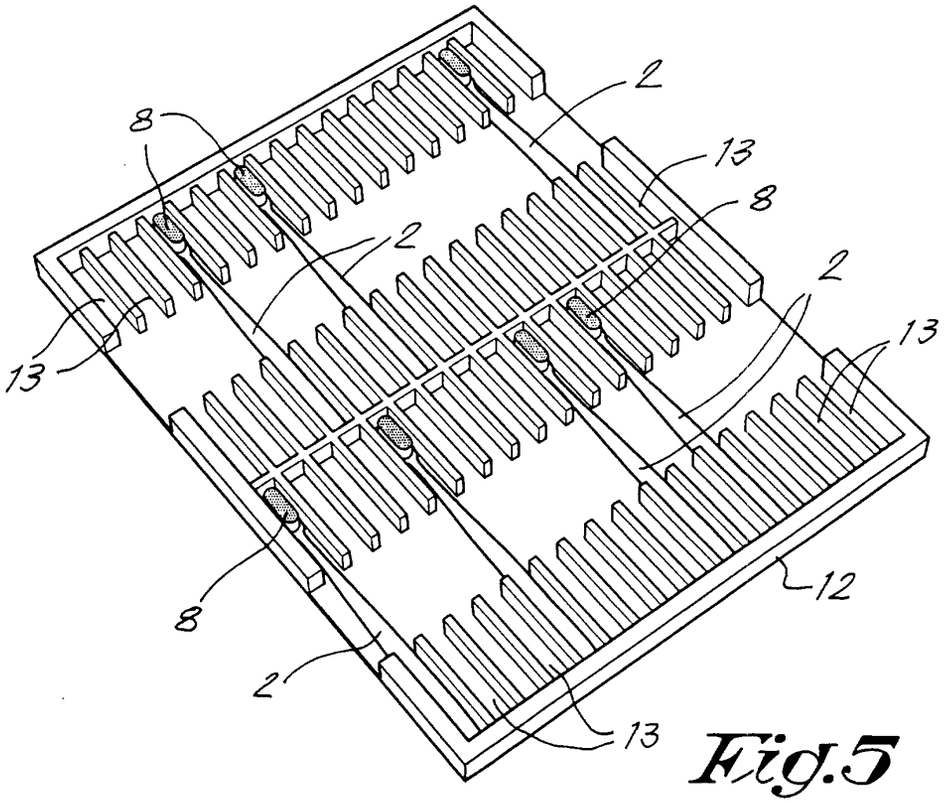
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Fig.5

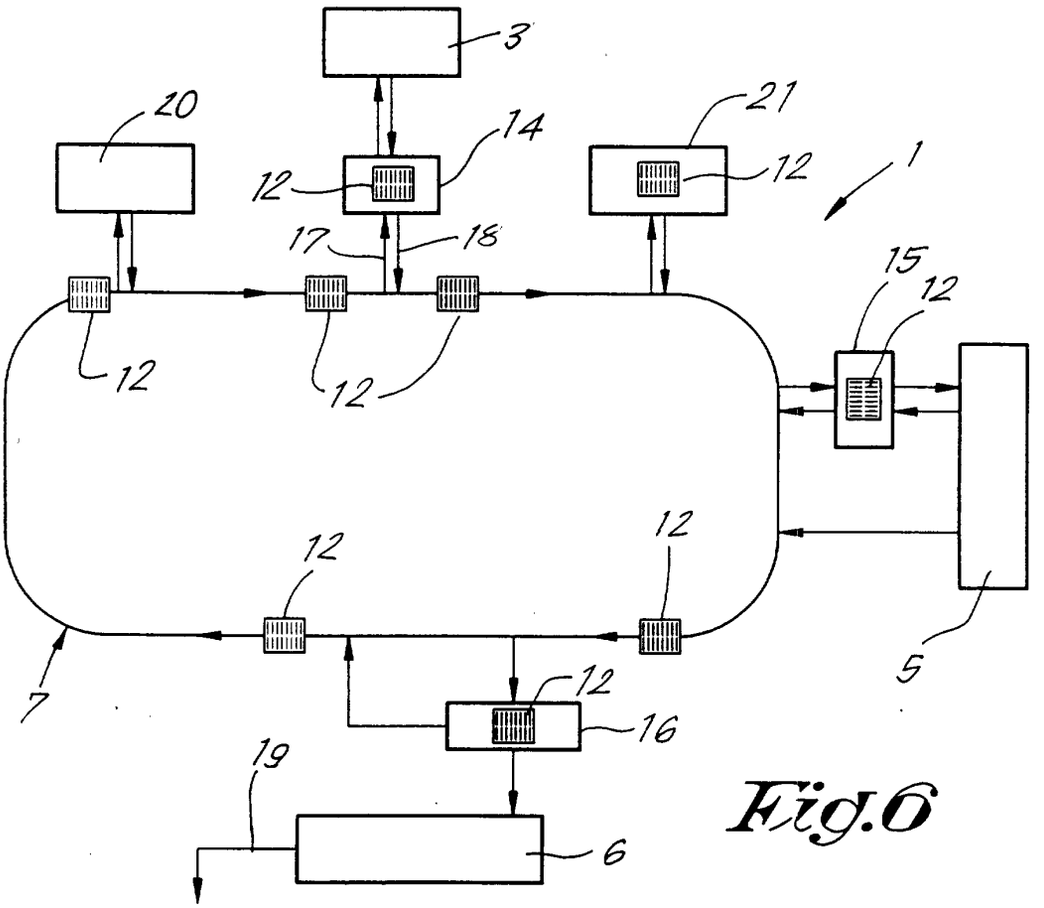
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Fig.6

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EUROPEAN SEARCH REPORT

Application Number
EP 01 20 3466

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	21 January 2002	van Bilderbeek, H.

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