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(54) Device and method for feeding containers

(57) A device for feeding containers (101) slidably supported by rods (103) of magazines (100) includes two parallel bars (401), downwards inclined and always supported at least by a first gripping mean (402) or by a second gripping mean (403).

The bars (401) are removably associated to the rods (103) of at least a magazine (100) in such a way that, in a first discharging condition (G), the first gripping mean (402) releases the bars (401) and a predefined amount of containers (101), which slide toward the second gripping mean (403) supporting the bars (401) and in such a way that, in a second discharging condition (H), the first gripping mean (402) support the bars (401) and the second gripping mean (403) releases these latter and a predefined amount of containers (101).

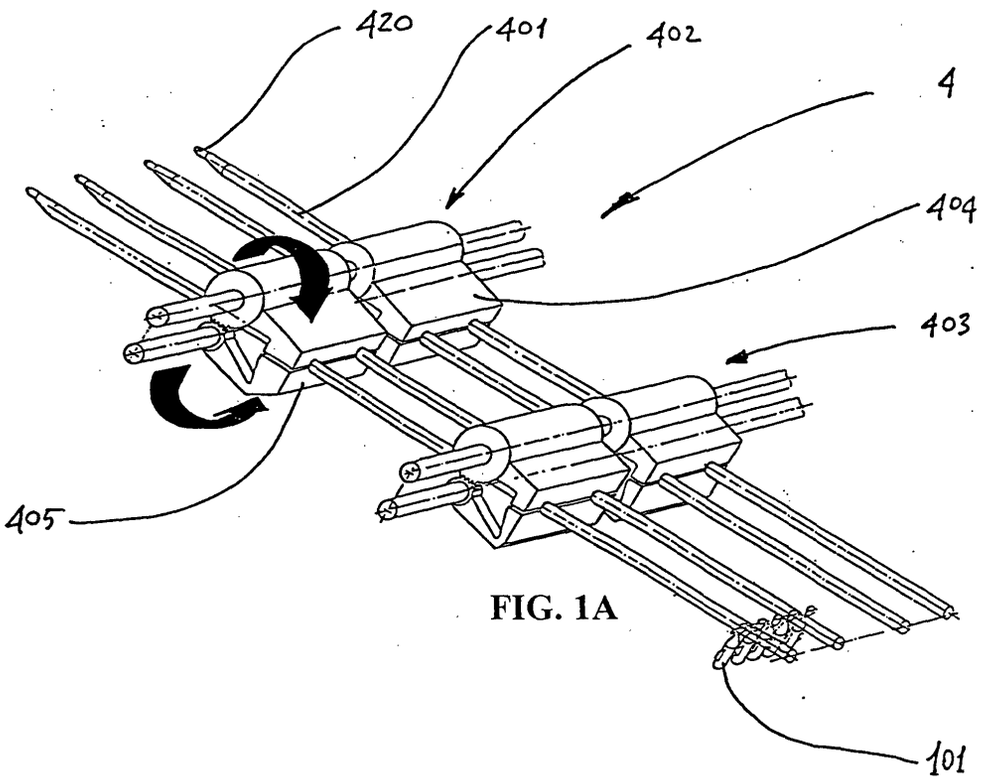

FIG. 1A

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Description

[0001] The present invention relates to packaging machines, particularly the invention refers to a device and a method for feeding containers, for instance flexible pharmaceutical containers.

[0002] In the known packaging machines, the feeding devices usually consist of a horizontal or inclined support on which the containers to be manufactured are positioned.

[0003] The flexible containers are usually inserted on suitable supports, constituted by at least two parallel rods interconnected at the ends by a fixed handle and removable handle. The assembly rods-containers constitutes a so-called magazine.

[0004] An operator manually transfers the containers from the magazine rods to the standards of the slanting support of the feeding device and by gravity they slide toward the picking point. The standard of the slanting support is fixed to the machine and therefore is not replaceable by the magazine of the containers, which must be manually transferred. The magazine rods support the container strips in correspondence of gaps between these latter and therefore said rods cannot be connected to an external support, which would preclude the containers removal from said rods.

[0005] After having transferred the containers in the feeding device, the operator checks the correct containers distribution and usually inserts a gravity pusher which presses the containers forcing them to regularly slide toward the picking area. The pusher, which is usually constituted by a weight sliding on the feeding device supports, must be manually inserted and disconnected by the operator at each loading sequence in order to avoid possible containers jamming or blocking, which may happen because of the sliding frictions between the containers and the side and external lower guides of the feeding device.

[0006] The main drawback of the known feeding devices consists in the manual transfer of the containers, which is difficult and delicate to be performed and requiring one or more skilled operators for transferring with great attention the content to the feeding device of the packaging machine.

[0007] Other drawback consists in the slowness of the feeding procedure, which limits the machine productivity at no more than twenty-thirty products per minute for packaging line of a single machine.

[0008] Further drawback of the known feeding devices consists in that the containers are excessively manipulated by the operator, which is obliged to touch said containers in order to insert correctly these latter in said devices. The manipulation is, in fact, very critical in case of processes with pharmaceutical products in aseptic or sterile atmosphere, which require sterile containers and therefore no contacts between operator and containers.

[0009] Another drawback of the known feeding devices consists in the possibility that the containers, sliding along the slanted guides of the feeding device, can jam or even obliquely stop with respect to the sliding direction.

[0010] The main object of the present invention is to propose a device and a method for feeding containers in which the manual loading operation is reduced and simplified, without requiring the use of skilled operators, and such to avoid the contact of the containers by the operator, so preserving the integrity and the sterility of said containers.

[0011] Other object is to propose a device and a method, which allow moving fifty-sixty containers per minute, for each packaging line. Further object is to propose a feeding device having a safe and continuous operation, without containers jamming or blocking.

[0012] The above-mentioned objects are achieved according to the content of the claims.

[0013] The characteristics of the present invention are underlined in the following with particular reference to the attached drawings, in which:

- figures 1A and 1B show schematic axonometric views of the device for feeding containers object of the present invention;
- figures 2A, 2B and 2C show schematic front views of figure 1 device respectively in a first discharging condition, in a second discharging condition and in a blocking condition of the containers;
- figure 3 shows a partial front view of the figure 1 device with a container magazine inserted by a loading station;
- figures 4A and 4B show partial enlarged front views of the figure 3 device respectively in an alignment and insertion condition.

[0014] With reference to figures 1A and 1B, numeral 4 indicates a feeding device for flexible containers 101 including at least two bars 401, usually four, parallel and slanted downwards, preferably of around 30° with respect to a horizontal plan.

[0015] For instance, the device 4 is fit in a packaging machine of flexible containers for sanitary and/or pharmaceutical products between a store and a conveyor of the same machine.

[0016] As shown in figures 2A - 2C, the bars 401 are supported by gripping means, first 402 and second 403, of the device 4 and each one having a two couples of mobile opposed jaws, upper 404 and lower 405.

[0017] The jaws, upper 404 and lower 405, are reciprocally connected in such a way to synchronically rotate with opposed direction and so that the lower jaw 405 rotates more than the upper jaw 404 to allow the free slide of the containers 101 along the bars 401 when the jam is not gripping the bars.

[0018] The lower mobile jaw 405 further has a tooth 411 fit to engage a seat 410 of each corresponding bar 401 for keeping the axial position of this latter. The shape and the dimension of the mobile jaws, upper 404

and lower 405, are such to guarantee the exact support and axial reference of the bars 401 even in case these latter are alternatively supported by only one of the two gripping means, first 402 and second 403.

[0019] The bars 401 usually have circular or elliptical section and each one has in correspondence of an upper end an insertion pivot 420, eccentric with respect to the axis of the related bar, for the removably connection with a magazine 100.

[0020] The magazine 100 are constituted, for instance, by two rods 103, each having a first end rigidly connected to a fixed handle 104 and the second end removably connected to a detachable handle 102 provided with fixing pivots 106 which are inserted to the ends of the two rods 103, in correspondence of respective seats 105.

[0021] The cross section dimensions of the bars 401 are grater than the dimensions of the rods 103 and entirely filling the spaces or the openings of the containers 101, for instance monodose container strips, allow these latter to freely slide by gravity along the bars 401 without blocking or jamming.

[0022] The feeding device 4 has couples of presence sensors first upper 416 and first lower 406, second upper 417 and second lower 407, third upper 408 and third lower 418 and a minimum load sensor 409. Said optical or inductive or capacitive sensors provide a signal, usually digital, associated to the presence or absence of the containers 101 in the feeding device, and active the different operational phases for the feeding sequence of the containers 101.

[0023] The operation of the device provides an operator manually insert a predefined number of magazines 100, from one to three in parallel and usually two, into the feeding device 4. The insertion is carried out by inserting the insertion pivots 420, at the upper ends of the rods 401, inside the corresponding tubular housings 105, at the free ends of the rods 103, in an insertion condition E.

[0024] It is provided that a suitable loading device 3 can also automatically execute this manual operation. At this point the magazines 100 are integral with feeding device 4, since are rigidly connected to this latter.

[0025] It must be underlined that the assembly magazines/ support bars 401 is rigidly supported by the gripping means, first 402 and second 403. The alternate and not contemporary opening of the opposed jaws 404 and 405 of one of the gripping means, first 402 or second 403, does not cause instability to the assembly magazines/ support bars which, in fact, remains always tightly and statically coupled by means of the remaining support.

[0026] When the insertion operation of a group of magazines 100 in the respective rods 401 is made, a first container subgroup of the containers 101 group is stopped by the operator or by the loading station 3 and a second container group slide along the rods 103 and the bars 401 up to stop in correspondence of the first gripping mean 402.

[0027] The condition of container absence, sensed by the first upper sensor 416, and by the couples of sensors second 417, 407 and third 418, 408 and the condition of container presence, sensed by the first lower sensor 406, enable the opening of the first gripping mean 402, as shown in figure 2A, corresponding to a first discharging condition G, to allow the second container subgroup sliding and moving in correspondence of the second gripping means 403.

[0028] The condition of container absence, sensed by the first couple of sensors 416, 406, by the second upper sensor 417 and by the third couple of sensors 418, 408, and the condition of containers presence, sensed by the second lower sensor 407, enable the discharge of the second container subgroup by the operator or by the loading station 3. The containers slide up to stop in correspondence of the first gripping mean 402, which in the meantime is closed again.

[0029] The condition of container absence, sensed by the sensors first upper 416, second upper 417, third upper 418, third lower 408 and by the minimum load sensor 409, and the condition of container presence sensed by the sensors first lower 406 and second lower 407, enable the opening of the second gripping mean 403, as shown in figure 2B, which allows the second container subgroup to slide toward a picking area 5. The second gripping mean 403 is maintained in open position until the third couple of sensors 418 and 408, respectively sensing the absence and the presence of containers 101, enable its closure.

[0030] The minimum load sensor 409 senses the presence of minimum number of containers to be transferred to a conveyor downstream the feeding device 4.

[0031] Once closed the second gripping mean 403, in a condition of container presence of the sensors, first lower 406 and third lower 408, and in a condition of container absence of the sensors, first upper 416, second upper 417, second lower 407 and third upper 418, the first gripping mean 402 is opened to allow the first container subgroup sliding toward the second gripping mean 403.

[0032] The condition of container absence of the sensors first upper 416, first lower 406, second upper 417, and the condition of container presence of second lower sensor 407, enable the closing of the first gripping mean 402.

[0033] The condition of container absence of the second upper sensor 417, of the third couple of sensors 418, 408 and of the minimum load sensor 409 and the condition of container presence of the second lower sensor 407 enable the opening of the second gripping mean 403, to allow the first container subgroup sliding toward the picking area 5.

[0034] The condition of container absence, sensed by the second couple of sensors 417, 407 and by the third upper sensor 418, and the condition of container presence, sensed by the sensors third lower 408 and of min-

imum load 409, enable the closing of the second gripping mean 403 and the assent for the extraction of the empty magazines from the rods 401, by the operator or the loading device 3.

[0035] The device is fit to move at least fifty/sixty containers for packaging line and however is related to the operational cycles of the packaging machine in which said device is fit.

[0036] The feeding device 4 is completely controlled by electronic calculation and control means, not shown, fit to control the phase coincidence between at least the gripping means, first 402 and second 403, according to the signals received from the presence sensors first upper 416 and first lower 406, second upper 417 and second lower 407, third upper 408 and third lower 418 and of minimum load 409.

[0037] The main advantage of the present invention is that to provide a device for feeding flexible containers in which the manual loading operation is reduced and simplified, not requiring the use of skilled operators.

[0038] Other advantage is to provide a device, which allows minimising the manipulation and the contact of the containers by the operator, in order to preserve the integrity and the integrity and the sterility of said containers.

[0039] Further advantage is to furnish a device that allows moving at least fifty/sixty container per minute, for each packaging line.

[0040] Other advantage is also to provide a feeding device having a safe and continuous operation, without container jamming or blocking.

Claims

1. Device for feeding containers (101) slidably supported by rods (103) of magazines (100) **characterized in that** includes at least two parallel bars (401), downwards inclined and always supported at least by a first gripping mean (402) or by a second gripping mean (403), said bars (401) being removably associated to the rods (103) of at least a magazine (100) in such a way that, in a first discharging condition (G), the first gripping mean (402) releases the bars (401) and a predefined amount of containers (101) which slide toward the second gripping mean (403) supporting the bars (401) and in such a way that, in a second discharging condition (H), the first gripping mean (402) support the bars (401) and the second gripping mean (403) releases these latter and a predefined amount of containers (101).

2. Device according to claim 1 **characterized in that** each bar (401) has circular or elliptical section and has in correspondence of an upper end an insertion pivot (420), eccentric with respect to the axis of the related bar (401), for removable joining with the end of the corresponding rod (103) of the magazine (100).

3. Device according to claim 1 **characterized in that** each gripping mean, first (402) and second (403), includes at least two mobile jaws, upper (404) and lower (405).

4. Device according to claim 3 **characterized in that** the jaws, upper (404) and lower (405), are reciprocally connected in such a way to synchronically rotate with opposite direction and in such a way that the lower jaw (405) rotates more than the upper jaw (404) for allowing the free sliding of the containers (101) along the bars (401).

5. Device according to claim 3 **characterized in that** each lower jaw (405) has a tooth (411) fit to engage a seat (410) of each corresponding bar (401) in a support condition in which at least a gripping mean, first (402) and second (403), blocks and supports the related bar (401).

6. Device according to claim 1 **characterized in that** includes presence sensors (406, 416, 407, 417, 408, 418, 409) of optic or inductive or capacitive type, fit to sense the presence of the containers (101) on the bars (401).

7. Device according to claim 6 **characterized in that** the presence sensors (406, 416, 407, 417, 408, 418, 409) include:

   - at least a first couple of sensors (406, 416) positioned upstream the first gripping mean (402);
   - at least a second couple of sensors (407, 417) positioned between the gripping means first (402) and second (403);
   - at least a third couple of sensors (408, 418) positioned downstream the second gripping mean (403);

   each of said couples of sensors, first (406, 416), second (407, 417) and third (408, 418), constituted respectively by an upstream sensor and a downstream sensor and fit to sense the presence of the containers (101) in such a way to enable the opening of the gripping means, first (402) and second (403), in correspondence of the containers (101) presence sensed by the downstream sensor and the contemporary containers (101) absence sensed by the corresponding upstream sensor.

8. Device according to claim 6 **characterized in that** further includes at least a minimum load sensor (409) positioned downstream the third couple of sensors (408, 418), and fit to sense a predefined minimum number of containers (101) and, in correspondence of such minimum number, to send an

enabling signal for opening the second gripping mean (403).

9. Device according to any of the claims from 6 to 8 **characterized in that** is completely controlled by electronic calculation and control means fit to control the phase coincidence between at least the gripping means, first (402) and second (403), according to the signals received by the presence sensors (406, 416, 407, 417, 408, 418, 409).

10. Method for feeding containers (101) grouped in magazines (100) **characterized in that** provides:

- to connect rods (103) of at least a magazine (100) to bars (401) of the feeding device;
- to block a first subgroup of containers (101) of the group of containers (101) in each magazine (100);
- to slide a second subgroup of containers (101) along the rods (103) and the bars (401) up to match a first gripping mean (402);
- to open the first gripping mean (402) for sliding the subgroup of containers (101) up to match a second gripping mean (403);
- to close the first gripping mean (402);
- to discharge the first subgroup of containers (101);
- to open the second gripping mean (403) for sliding the second subgroup of containers (101);
- to close the second gripping mean (403).

11. Method according to claim 10 **characterized in that** provides to sense the presence or the absence of the containers (101) on the bars (401) and to open the first gripping mean (402) in a condition of container presence sensed by a first lower sensor (406) and in a condition of container absence sensed by sensors first upper (416), second upper (417) and second lower (407).

12. Method according to claim 10 **characterized in that** provides to sense the presence or the absence of the containers (101) on the bars (401) and to close the first gripping mean (402) in a condition of container presence sensed by a second lower sensor (407) and in a condition of container absence sensed by sensors first upper (416), first lower (406) and second upper (417).

13. Method according to claim 10 **characterized in that** provides to sense the presence or the absence of the containers (101) on the bars (401) and to open the second gripping mean (403) in a condition of container presence sensed by a second lower sensor (407) and in a condition of container absence sensed by sensors second upper (417), third upper (408), third lower (418) and of minimum load (409).

14. Method according to claim 10 **characterized in that** provides to sense the presence or the absence of the containers (101) on the bars (401) and to close the second gripping means (403) in a condition of container presence sensed by sensors third lower (408) and of minimum load (409) and in a condition of container absence sensed by sensors second upper (417), second lower (407) and third lower (418).

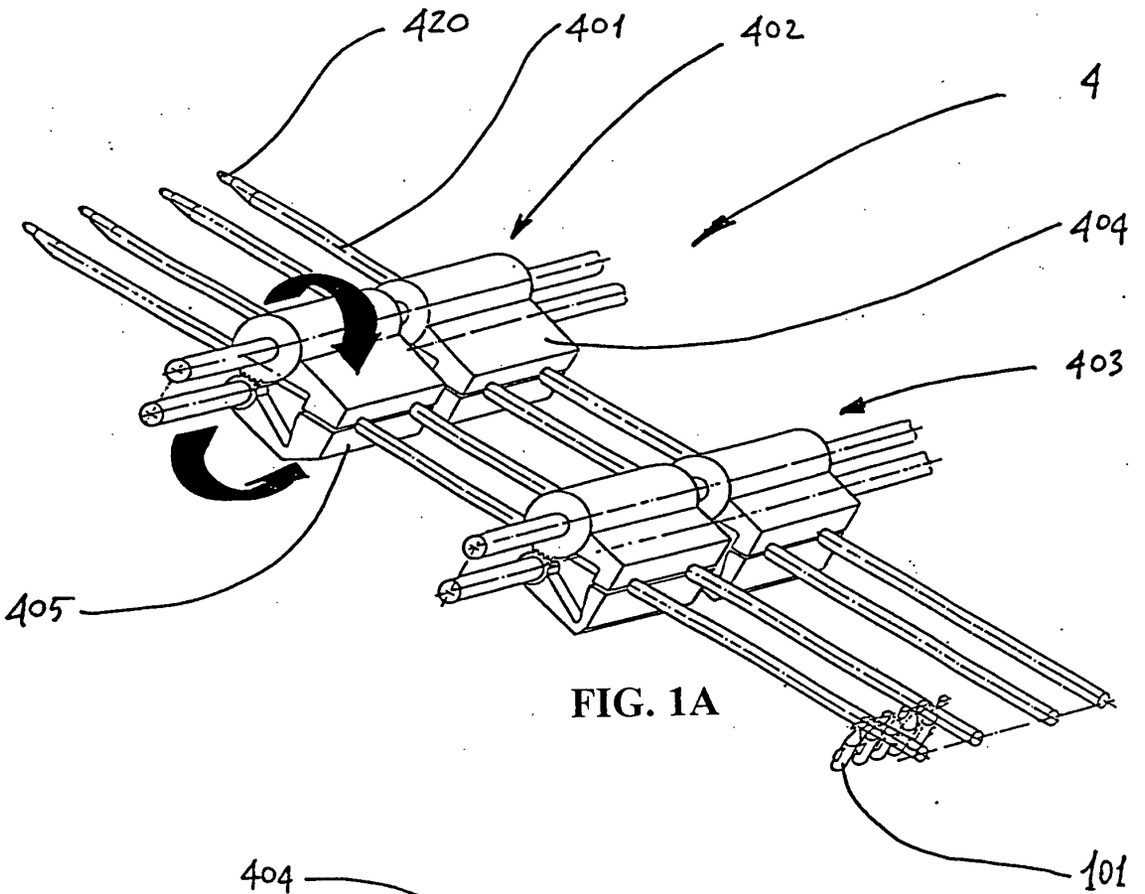

FIG. 1A

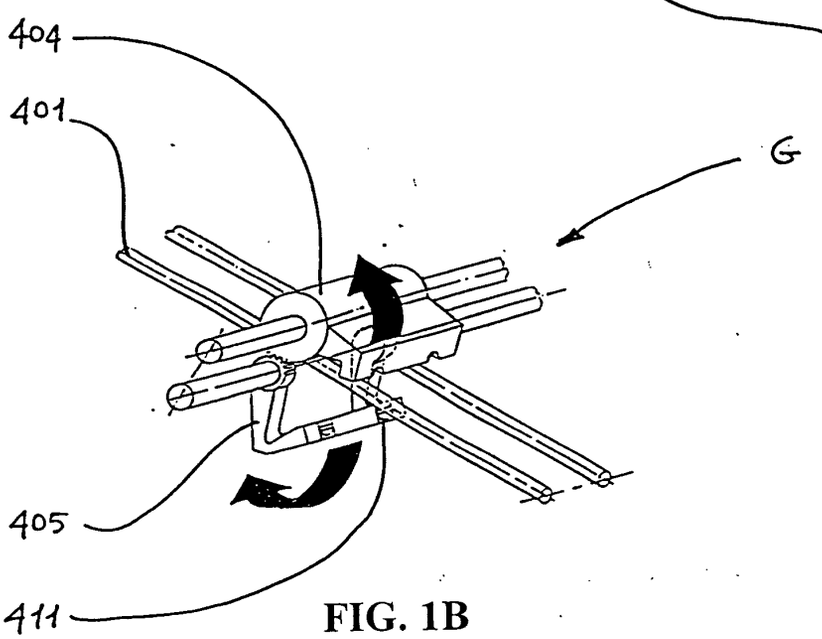

FIG. 1B

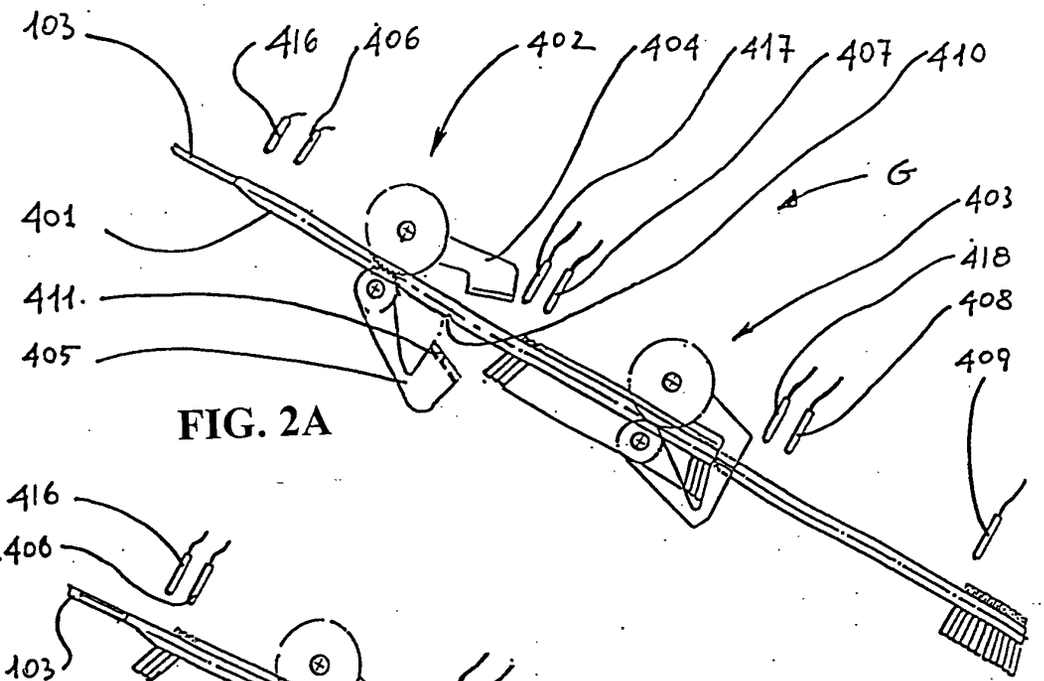

FIG. 2A

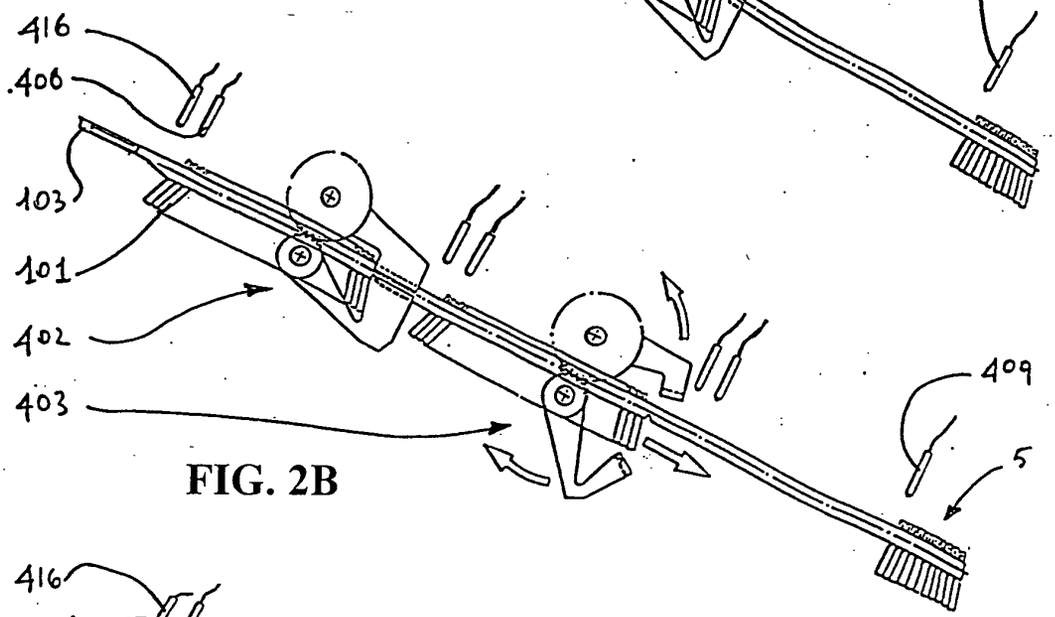

FIG. 2B

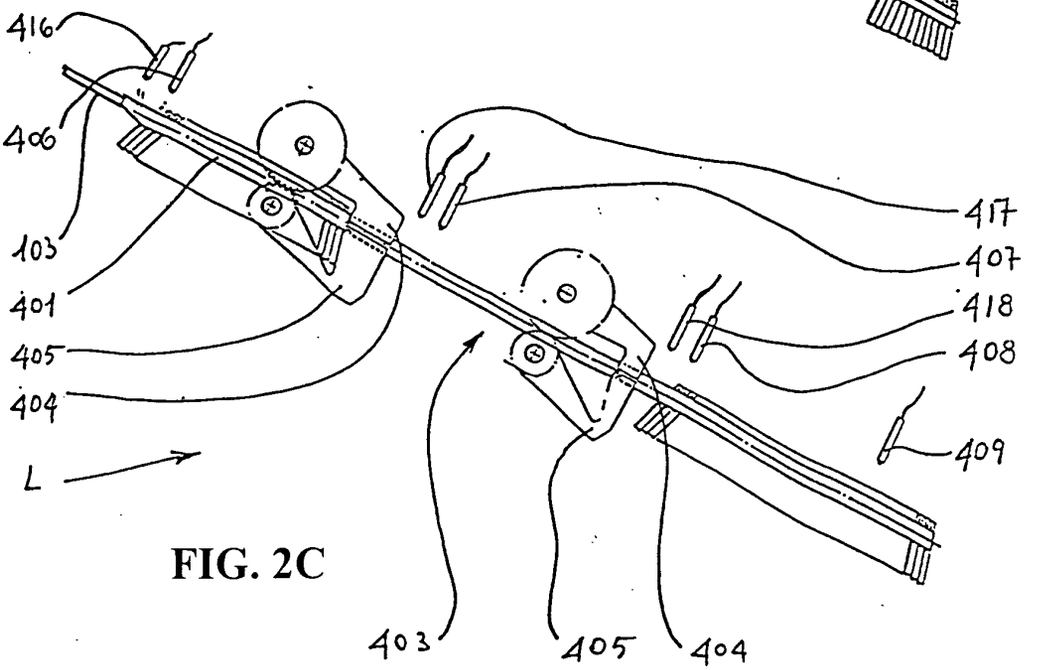

FIG. 2C

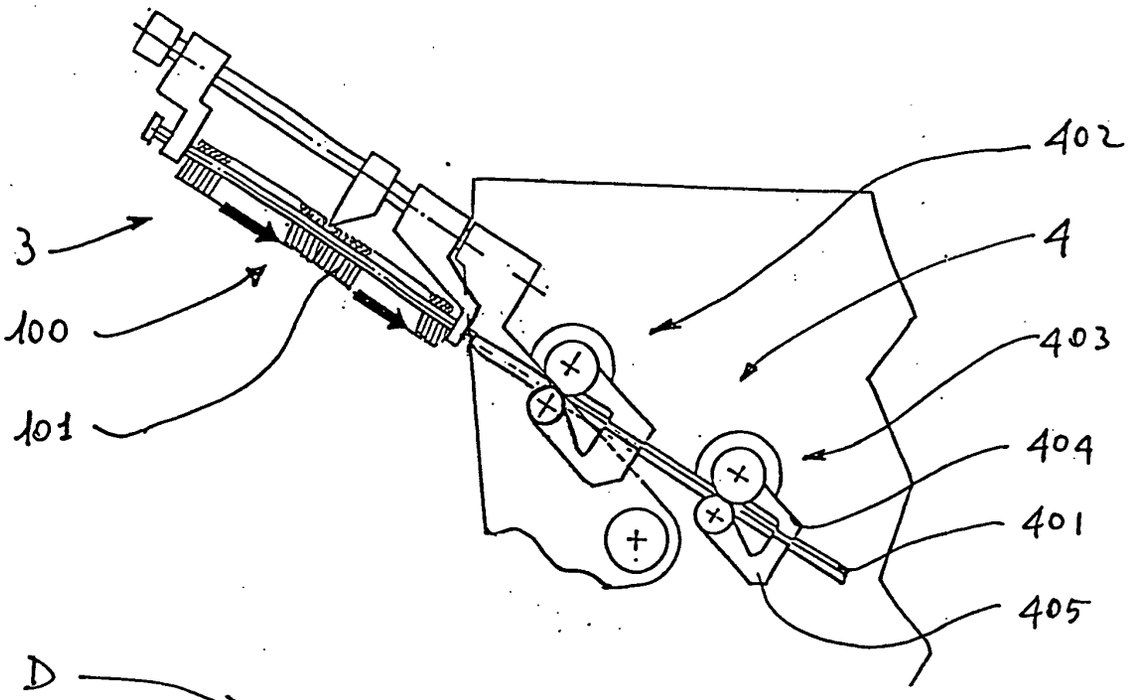

FIG. 3

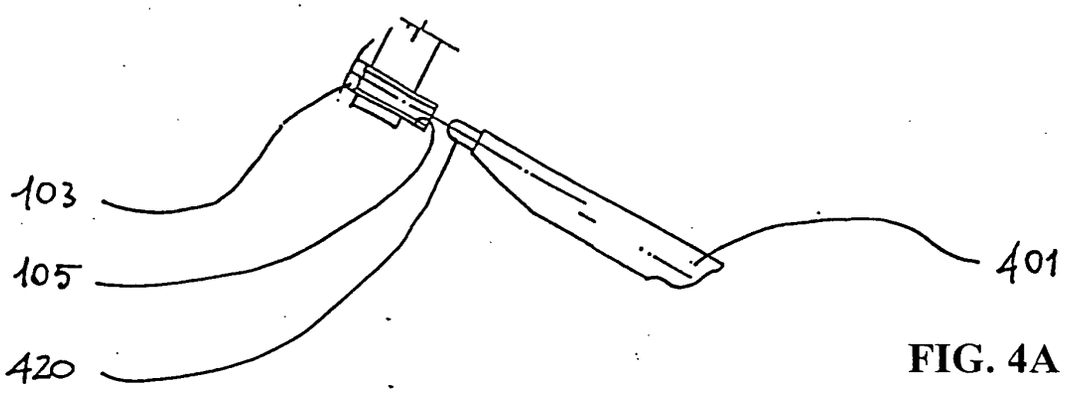

FIG. 4A

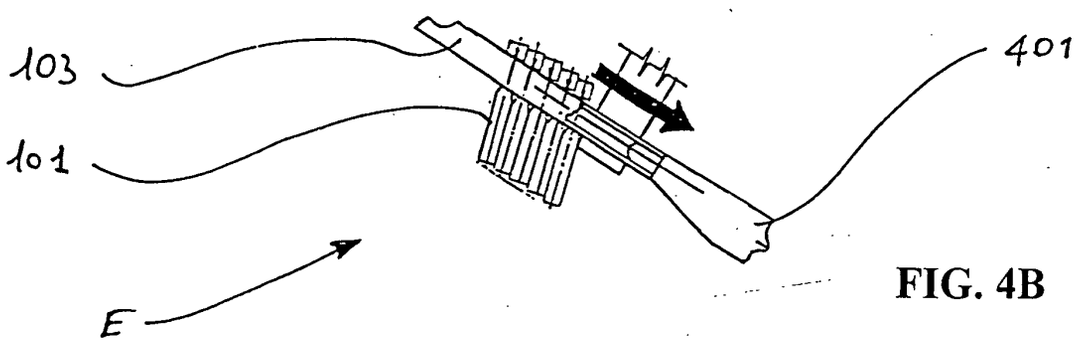

FIG. 4B

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 00 6457

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	US 3 028 029 A (MORSE) 3 April 1962 (1962-04-03) * the whole document *	1,10	B65B43/42
A	US 2 693 957 A (WELSH) 9 November 1954 (1954-11-09) * column 1, line 78 - column 2, line 45; figures 1-5 *	1,10	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B65B
B31B
B65H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	19 June 2002	Claeys, H

CATEGORY OF CITED DOCUMENTS

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19-06-2002

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3028029 A	03-04-1962	NONE	
US 2693957 A	09-11-1954	NONE	

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