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(54) Corking machine

(57) A corking machine comprising a column (11) tied to a fixed support (13) and destined to hold corks (15) falling down vertically one after the other originating from an external feeder, and an apparatus (26) for distributing and inserting the corks (15) in bottles (18), composed of a rotating platform (20) supporting a series of levers (24) and brackets (17) capable of picking up in flight and transporting the cork (15) to a block (29) for compressing the same, prior to inserting it into the neck (35) of the bottle (18), with the aid of a punch (21) sliding in a cylinder (23).

The rotating platform (20) provides a number of levers (24) and brackets (17) for picking up, firmly holding and transporting the cork (15), matching the number of the machine's corking heads; moreover, there are appropriately shaped cam systems (28, 30, 31) and mechanical synchronizing devices which allow closing and opening the brackets (17) at the appropriate instants.

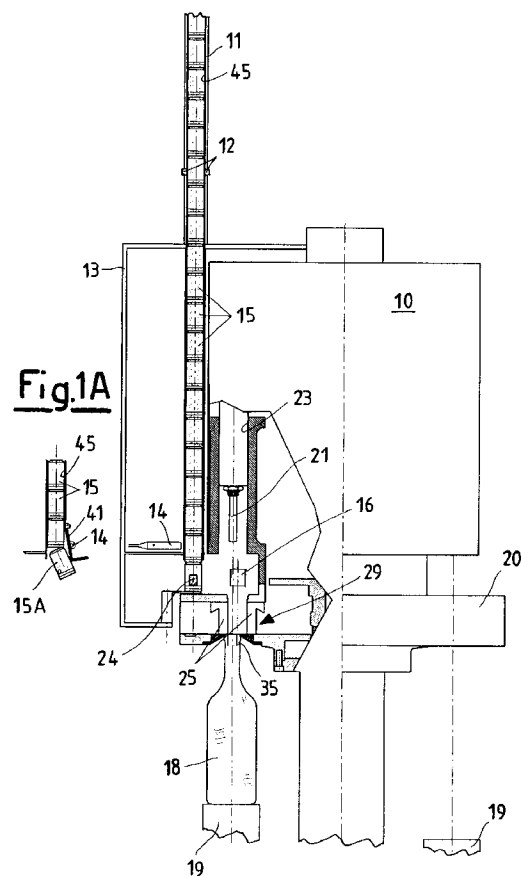


Fig.1A

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Description

[0001] This invention refers to a corking machine, in particular to a machine capable of introducing flush or mushroom-type corks into bottles.

[0002] For the purpose of corking bottles, some rotating corking machines are used at this time which are equipped with a multiple number of corking heads and comprise a cork feeding device. The latter rotates along with the body of the machine and takes care of feeding the corks to a number of distribution columns of a diameter fitting the circular size of the corks; the number of the distribution columns equals that of the corking heads.

[0003] Moreover, corking machines for flush corks generally use one feeding device for each individual head, which consequently makes it necessary, even in this case, to provide as many distribution columns as there are corking heads.

[0004] In this connection is worth recalling that the traditional corking machines provide for a number of corking heads generally ranging from 4 to 24 and that it is therefore necessary to build an equal number of distribution columns with the resulting high production, operating and maintenance costs of the machine, which should ideally be reduced.

[0005] Moreover, the feeding device containing all the corks to be distributed assumes, being firmly attached to the structure of the corking machine, a rotating motion such as to move all corks and thus allow their falling down on each column in a row, one after another.

[0006] This inevitably causes the corks to impact and rub off on each other, thus releasing some cork dust that settles on the corking machine and the surroundings in large amounts, with the resulting risk of causing serious contamination or alterations of the liquid to be bottled.

[0007] In a similar manner, where mushroom-type corks of a bubbly-wine-type are employed, owing to the fact that corking machines similar to those for flush-type corks are currently used for this purpose, the same drawbacks as above are encountered. A single feeding apparatus is usually provided, which supplies the various distribution columns with corks while using a single tube. Moreover, these machines must be equipped with a particular cork-orienting device, so as to enable their descent into the bottles' necks in a certain direction. Its is therefore obvious that these arrangements suffer from numerous serious drawbacks.

[0008] The scope of this invention is therefor to offer a corking machine capable of eliminating the mentioned drawbacks, or to produce a corking machine capable of allowing the distribution of a series of corks to the necks of bottles, so as to operate under the best working conditions, without generating dust and thus without risking a contamination of the bottled fluid, while at the same time also minimizing the generation of dusts inside the machine itself, and generally on the working location.

[0009] Another purpose of this invention is to indicate

a corking machine of extremely reliability over its average lifetime, even after highly extended and continuous operating periods, based on the fact that it comprises a smaller number of parts with respect to the known art, and therefore a lesser likelihood of their failure.

[0010] Not the last purpose of this invention is to indicate a machine easily and economically produced with respect to the known art, and capable of a high performance in terms of corks applied per unit time.

[0011] Based on this invention, these purposes are achieved by a corking machine built in accordance to claim 1, being referred to for brevity.

[0012] The invention advantageously uses a single cork feeding device built into the same corking machine, capable, in a single operation, of in-flight distributing all the corks on all the heads and of arranging them between the clamps of a compressing block, in a motion perfectly synchronized with the vertical descent of a punch designed to insert the corks into a bottle.

[0013] This makes it possible to employ only a single cork distributing column, which may eventually be connected to a picking-up containers outside the machine.

[0014] This production also allows achieving a substantially clean condition of the corks and totally eliminating the risk of eventually contaminating the liquid in the bottles by any cork dust which may form while shifting the corks during the corking phase.

[0015] According to this invention, the corking machine allows an in-flight distribution of flush or mushroom-type corks on the bottles. In this case, the external feeding also takes care of orienting the corks, so as to ensure their descent into the bottle in a proper direction.

[0016] According to the invention, the operation of the machine is also purely mechanical, which allows attaining a good structural reliability, as a result of both the extreme simplicity of its realization and above all of the small number of components utilized.

[0017] Finally, the output of the machine in terms of bottles corked per unit time is greatly increased over that of the known art.

[0018] Additional characteristics and advantages of a corking machine according to this invention will become more clearly evident from the following description, relating to a simplified and non-limiting embodiment and referring to the attached drawings, in which:

- Figure 1 is a lateral elevation view, partially sectioned, of a corking machine according to this invention, in an blocked position due to failures or malfunctions;
- Figure 1A is a front view of a detail of Figure 1;
- Figure 2 is a lateral elevation view, partially sectioned, of a corking machine, according to this invention, in a resting position;
- Figure 3 is a lateral elevation view, partially sectioned, of a corking machine, according to this invention, in a first operating position;
- Figure 3A is a plan view, partially sectioned, of the

corking machine, according to this invention, shown in Figure 3;

- Figure 4 is a lateral elevation view, partially sectioned, of a corking machine, according to this invention, in a second operating position;
- Figure 4A is a plan view, partially sectioned, of the corking machine, according to this invention, shown in Figure 4;
- Figure 5 is a lateral elevation view, partially sectioned, of a corking machine, according to this invention, in a third operating position;
- Figure 5A is a plan view, partially sectioned, of the corking machine, according to this invention, shown in Figure 5;
- Figure 6 is a lateral elevation view, partially sectioned, of a corking machine, according to this invention, in a fourth operating position;
- Figure 6A is a plan view, partially sectioned, of the corking machine, according to this invention, shown in Figure 6;
- Figure 7 is a lateral elevation view, partially sectioned, of a corking machine, according to this invention, in a fifth operating position;
- Figure 7A is a plan view, partially sectioned, of the corking machine, according to this invention, shown in Figure 7.

[0019] With reference to the mentioned figures, 10 generally indicates the rotating body of a corking machine according to the present invention, 13 indicates a fixed supporting structure of the body 10, 11 indicates a feeding column for corks 15, arranged one after another, 12 a device for sensing the presence of the corks 15, in particular a photocell, 14 a device for sensing the presence of foreign bodies or defective corks 16 in the corking machine or of corks improperly positioned inside the column 11, 21 a punch sliding inside a cylinder 23 capable of inserting the cork 15 inside the neck 35 of a bottle 18 positioned on a support 19, 29 indicates a compressing block for the cork 15 constituted by two clamps 25, and 22 indicates a pneumatic cylinder to arrest the corks 15 falling down from the column 11, which is actuated in case the bottle 18 is missing on its support 19.

[0020] 26 generally indicates a collecting and transporting mechanism of a cork 15, beginning from an area corresponding to the lower opening 40 of the column 11, from where the corks 15 exit, up to a cavity 36 of the block 29 where the cork 15 is subjected to a compression of the walls induced by the clamps 25 and a pushing action in a vertical direction exerted by the punch 21 while being introduced inside the neck 35 of the bottle 18.

[0021] The mechanisms 26 are present in a number equaling that of the corking heads used in the corking machine, and are anchored to a circular platform 20, rotating and rigidly connected to the body 10 of the machine, opposite a multiple number of peripheral positions provided along the perimeter of the platform 20, at

fixed and pre-determined intervals.

[0022] These comprise a lever 24, a bracket 17 mounted on a torsion spring not shown here and anchored to the lever 24, a locking pin 27 of the bracket 17 and a locking pin 32 of the lever 24.

[0023] The direction of torsion of the spring rigidly connected to the bracket 17 is shown by the arrow F, while the direction of rotation of the platform 20 and the body 10 is shown by the arrow marked F1.

[0024] Finally, the numbers 28, 30 and 31 schematically indicate certain general cam-type moving systems, whose profile is appropriately shaped so as to force all the components of mechanism 26 to perform certain predetermined motions corresponding to operations and functions pre-arranged by the corking machine object of this invention.

[0025] The operation of the corking machine according to this invention is essentially as follows.

[0026] The corks 15, of a flush or mushroom-type, are introduced inside the feeding column 11, which is shaped so as to contain them in a row, one after the other; if the corks 15 are of a mushroom type, an orienting device provided upstream of the feeding column 11 takes care of orienting them in the proper direction.

[0027] A photocell 12 is fastened to the column 11 at a certain height, so as to detect the presence of the corks 15 inside the same.

[0028] Should the photocell 12 not detect the presence of corks 15 inside the column 11, a snag occur during the descent of the corks 15 inside the column 11 or a foreign body 16 be present opposite the lower opening 40 of the column 11 or in the area facing the compressing block 29 so as to affect the normal operation of the corking machine, the sensing device 14 detects it, while a pneumatic cylinder 22 sends out a signal to stop the descent of the corks 15 in the column 11.

[0029] If a snag occurs during the descent of the corks 15 in the column 11, the sensor 14 also commands the opening of a portion 41 of the wall 45 of the column 11 itself, so as to expel the cork 15A responsible for the snagging.

[0030] On the other hand, if a foreign body 16 is present under the punch 21, the sensing device 14 detects its presence and commands a shut-down of the machine, by the action of the pneumatic cylinder 22, so that the user may take some prompt manual action to remove it. The pneumatic cylinder 22 blocks the descent of the corks 15 in the column 11 even if the container or bottle 18 to be corked is, for any reason, missing on at least one of its supports 19.

[0031] After removing any of the anomalies mentioned above, the sensor 14 takes no action, while the pneumatic cylinder 22 unblocks the descent of the corks 15 which may fall out of the lower opening 40.

[0032] The corks 15 are thus dropped, one after another, to rest on a lever 24 of the picking-up and transporting mechanism 26. The latter is rigidly connected, by a locking pin 32, to a swiveling platform 20 which ro-

tates in the direction of the arrow F1, which is rigidly connected to the rotating body 10 of the corking machine.

[0033] After sliding for a certain length on the lever 24 thanks to the latter's rotating motion, the cork 15 is blocked between one end of the lever 24 and the bracket 17, which happens to be tied to the lever 24 and have a hook-type appendix 50.

[0034] The appendix 50 is forced to move in accordance with a predetermined trajectory actuated by a cam system 28 tied to a fixed support.

[0035] When the cork 15 slides on the lever 24, the appendix 50 opens, whereas when the cork 15 approaches the extremity of the lever 24, the cam 28 forces the appendix 50 of the bracket 17 to rotate, thus blocking the cork 15 between the walls of the appendix 50 and the lever 24, also thanks to the action of a torsion spring, not shown in the figures, which is rigidly connected to the bracket 17 and kept loaded in the direction of the arrow F and of the locking pin 27.

[0036] At this point, the cork 15 is dragged by the bracket 17 along a circular trajectory, in accordance with the sense of rotation of the swiveling platform 20, until reaching a position essentially opposite the cavity 36 of the compressing block 29.

[0037] A second cam system 31 guides the lever 24 and the bracket 17 until it reaches the exact point of the cavity 36 set opposite the compressing clamps 25, while a third cam-type moving system 30 forces the bracket 17 to shift in a sense contrary to the rotating direction assumed during the blocking phase of the cork 15, thus freeing the cork 15 and allowing it to fall inside the cavity 36.

[0038] At the end of this operation, the lever 24 and the bracket 17 are again released to accept a new cork 15 showing up opposite the opening 40 and to start a new cycle of picking up, transporting and depositing in the cavity 36.

[0039] At the instant in which the cork 15 is inside the compressing block 29, the clamps 25 simultaneously compress the walls, so that the descent of the punch 21 provokes the introduction of the cork 15 inside the neck 35 of the bottle 18. In the immediately following instant, the clamps 25 re-open to accept another cork 15 in the cavity 36.

[0040] Because the number of the picking-up and transporting mechanisms 26 of the cork 15 matches the number of the corking heads present on the machine and the peripheral velocity of the platform 20 attains values of 20-24 rpm on a diameter of about one meter, it can easily be seen that the operations needed to complete an operating cycle of the machine must be carried out within a very short time.

[0041] For this purpose it is therefore necessary to provide for a perfect synchronization between the commands of descending the cork 15 from the column 11 and passing it over the lever 24 and the motion of the platform 20 and the devices acting to move the punch 21 and to open and close the clamps 25.

[0042] The above description clearly outlines the characteristics of the corking machine, object of this invention, as well as its advantages.

[0043] In particular, they refer to the following aspects:

- the possibility of achieving a substantial cleanliness of the corks and a reduction of the volume of dust generated in the environment due to their motion;
- a rapid distribution of the corks, originating from a single feeding support, to the various corking heads, by using a single rotating body and a series of purely mechanical motions;
- a greater reliability of the machine, in terms of its operation, average lifetime, and outages for its settings and maintenance, with respect to conventional and electronically controlled corking machines;
- lower production and operating costs, with respect to the known technologies;
- lower risks of environmental and food contamination, with respect to the known art.

[0044] Finally, it is possible to introduce some variants to the embodiments of the invention described here, without abandoning the principles underlying the inventive concept, just as it is possible, in the practical execution of the invention, to select the materials and measurements depending on the existing technical requirements.

Claims

1. Corking machine comprising some distributing devices (11) of corks (15) picked up from a common feeder and deposited opposite a multiple number of corking heads, a rotating body (10) tied to a fixed support (13) of a swiveling element (20) and to a multiple number of supports (19) of corresponding containers, in particular of bottles (18) to be corked, by compressing the walls of said corks (15) with the aid of clamps (25) of at least one compressing module (29) and by the subsequent insertion of said corks (15) inside the neck (35) of said bottles (18) by the pushing action of at least one punch (21) sliding inside a guiding element (23), characterized in that said distributing devices (11) of the corks (15) are constituted by a single hollow column, kept rigidly connected to said fixed support (13) inside which said corks (15) are inserted one after another, after being picked up from said common feeder.
2. Corking machine according to claim 1, characterized in that said swiveling element (20) is associated with a multiple number of devices (26) capable of blocking and transporting said corks (15), arranged in fixed and predetermined positions.

3. Corking machine according to claim 2, characterized in that said blocking and transporting devices (26) of said corks (15) matches the number of said corking heads of said corking machine.
4. Corking machine according to claim 2, characterized in that said means 26 of blocking and transporting said corks (15) comprise at least one lever-type element (24) on which said corks (15) are made to rest after their exit from said opening (40) of said hollow column and at least one bracket-type element (17) attached to said lever-type element (24), capable of blocking, transporting and releasing said corks (15) after their passage over said lever-type element (24).
5. Corking machine according to claim 4, characterized in that said bracket-type element (17) provides at least one hook-type profiled appendix (50), which can be moved by a curved trajectory, where said trajectory is determined by at least one cam-type system (28, 30, 31) having an appropriately contoured profile, so as to enable it to grasp and transport or to release said corks (15) opposite at least one cavity (36) of said compression module (29) set between said clamps (25).
6. Corking machine according to claim 4, characterized in that said bracket-type element (17) is mounted on top of at least one elastic element, loaded in a predetermined direction (F).
7. Corking machine according to claim 4, characterized in that said lever-type element (24) is fitted with at least one elastic element, loaded in a predetermined direction (F).
8. Corking machine according to claim 1, characterized in that said hollow column is equipped with at least one photocell (12) suitable for detecting the presence or absence of corks (15) in the interior.
9. Corking machine according to claim 1, characterized in that said hollow column is equipped with at least one sensor (14) to detect an eventual snag during the descent of said corks (15) inside said column and/or to detect the presence of foreign bodies (16) inside said compressing module (29).
10. Corking machine according to claim 9, characterized in that at least one portion (41) of one of the walls of said column is movable for the expulsion of at least one of said corks (15) or any other element responsible for said snagging.
11. Corking machine according to claim 1, characterized in that said hollow column is equipped with at least one pneumatic cylinder (22) for arresting the descent of said corks (15) inside said column.
12. Corking machine according to claim 1 or 2, characterized in that said hollow column presents at least one opening (40) for the exiting of said corks (15), set opposite an area of said swiveling element (20), where said swiveling element (20) is constituted by a platform rotating in a predetermined direction (F).
13. Corking machine according to claim 1, characterized in that it provides some mechanical devices for synchronizing the motions of said punch (21), of said clamps (25) and of said swiveling element (20).

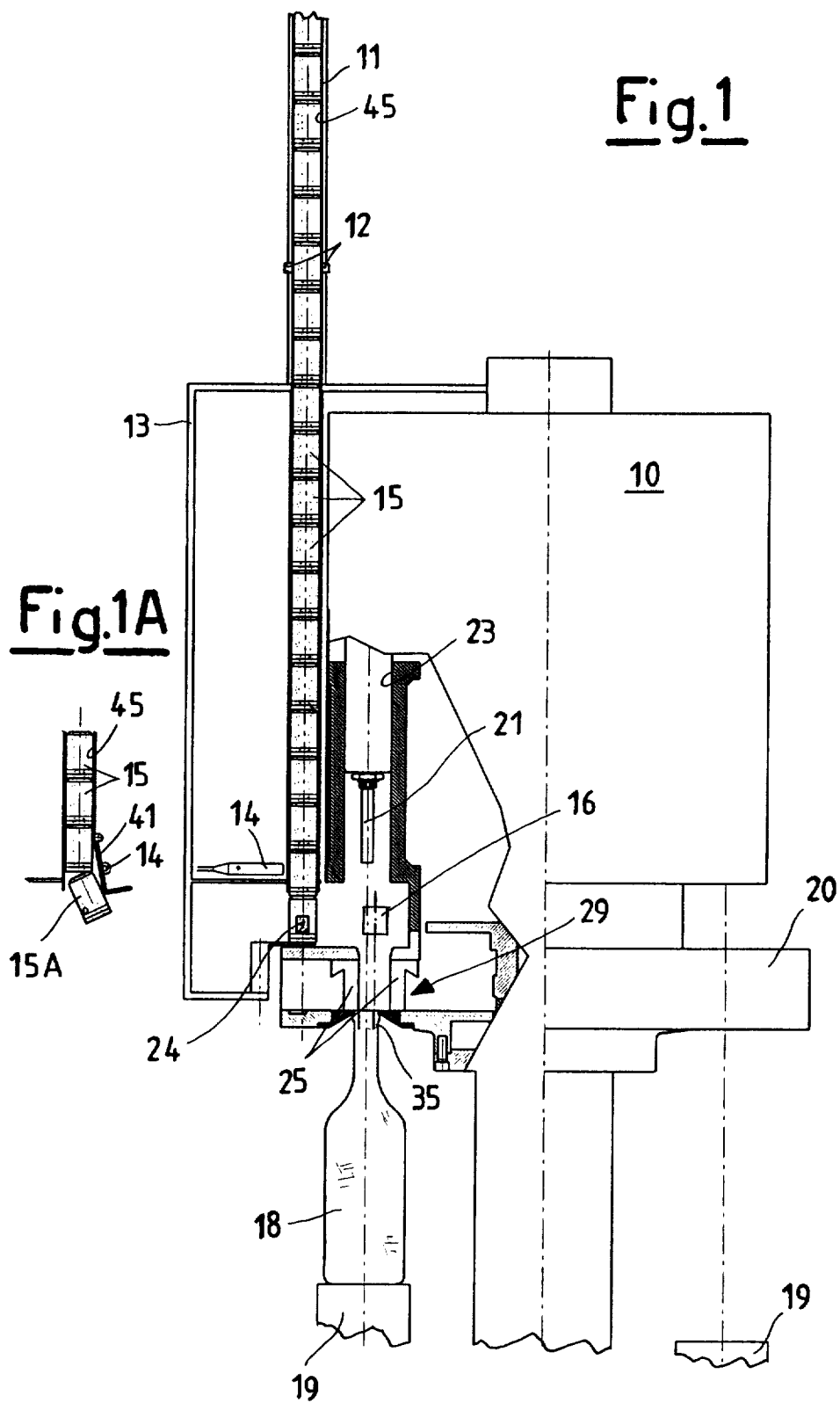
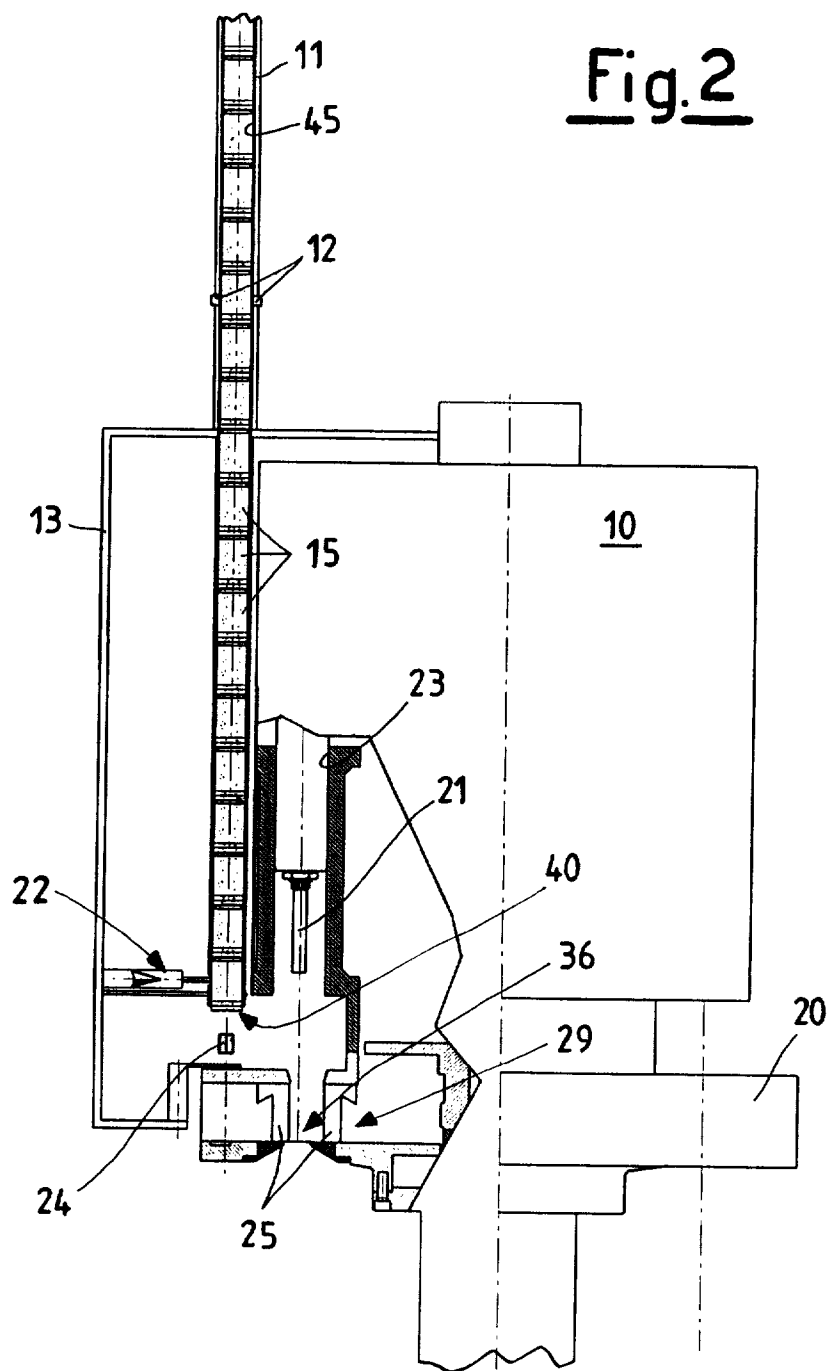


Fig.2



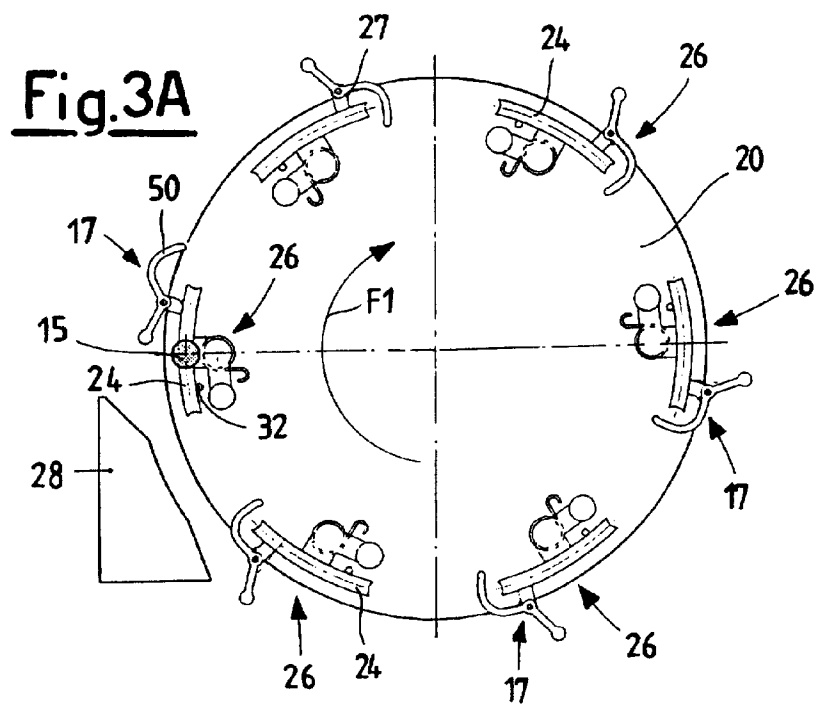
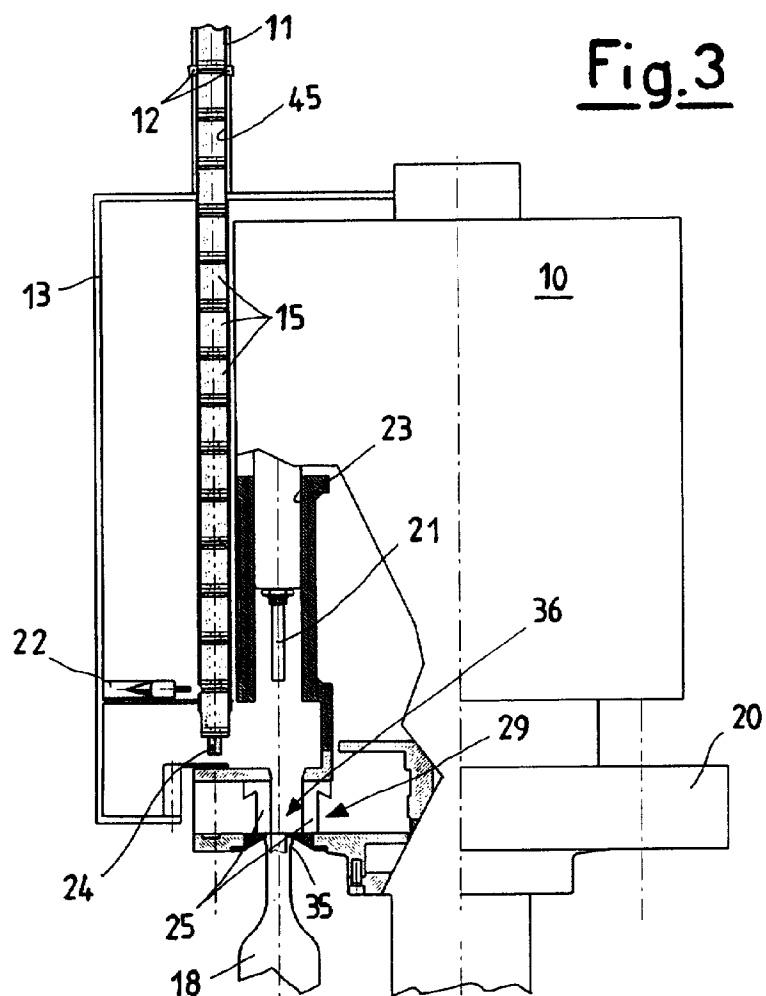


Fig.4

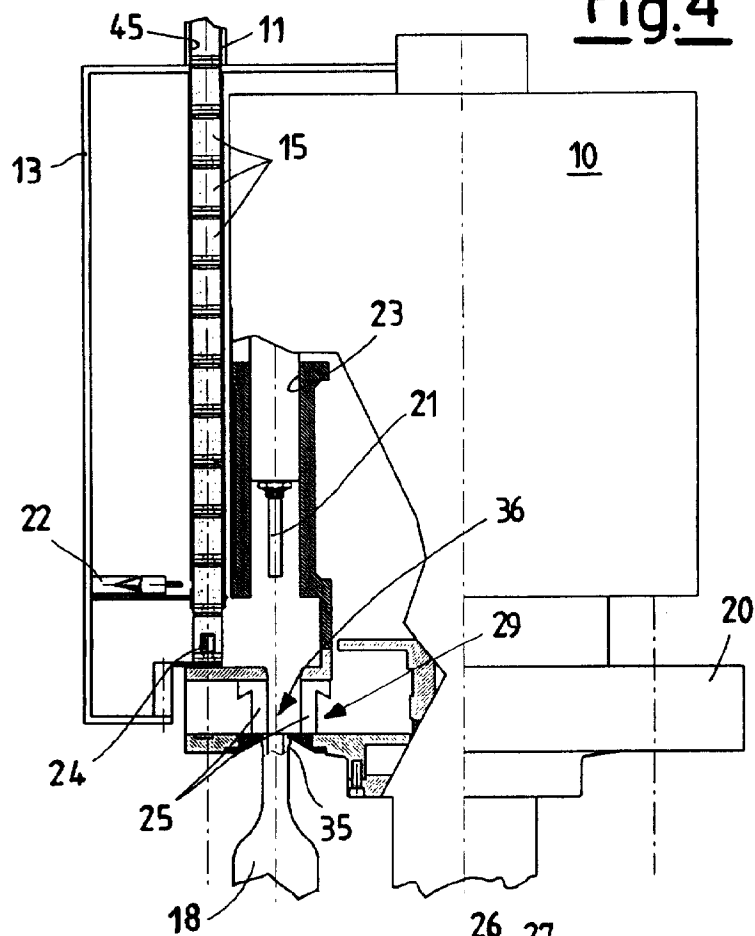


Fig.4A

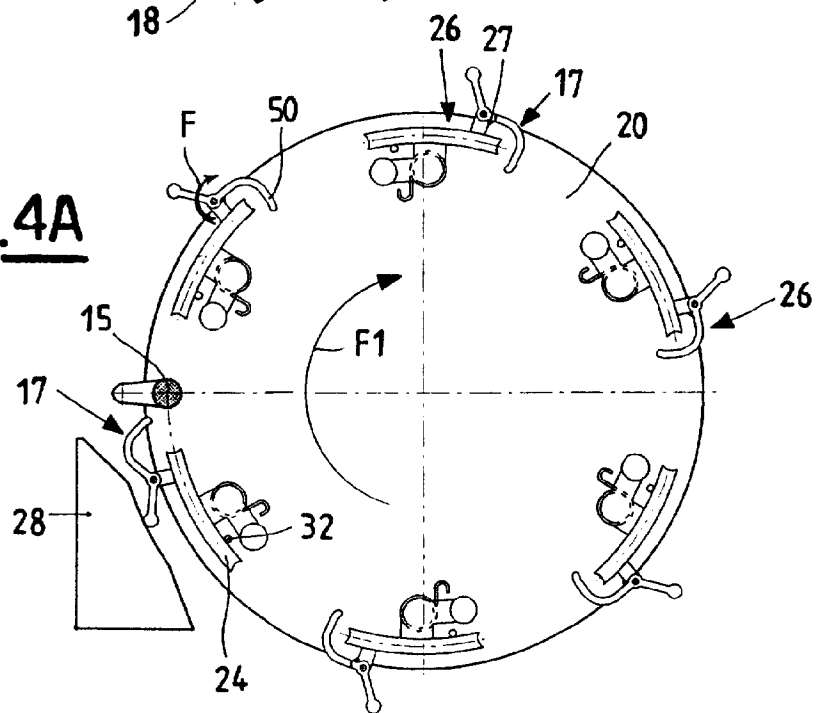


Fig.5

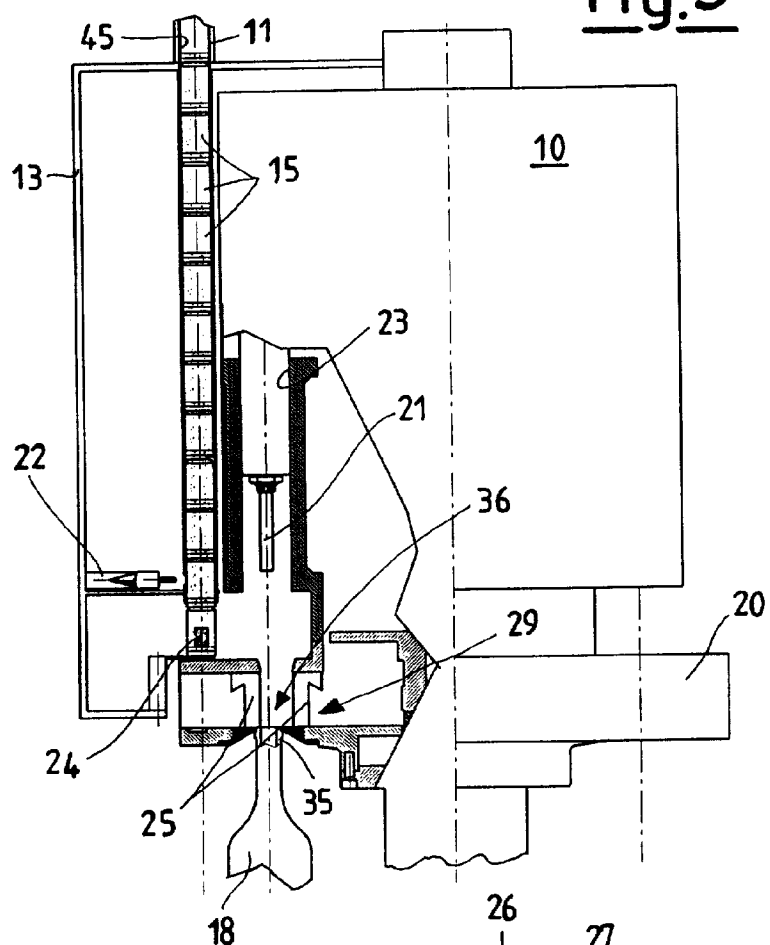


Fig. 5A

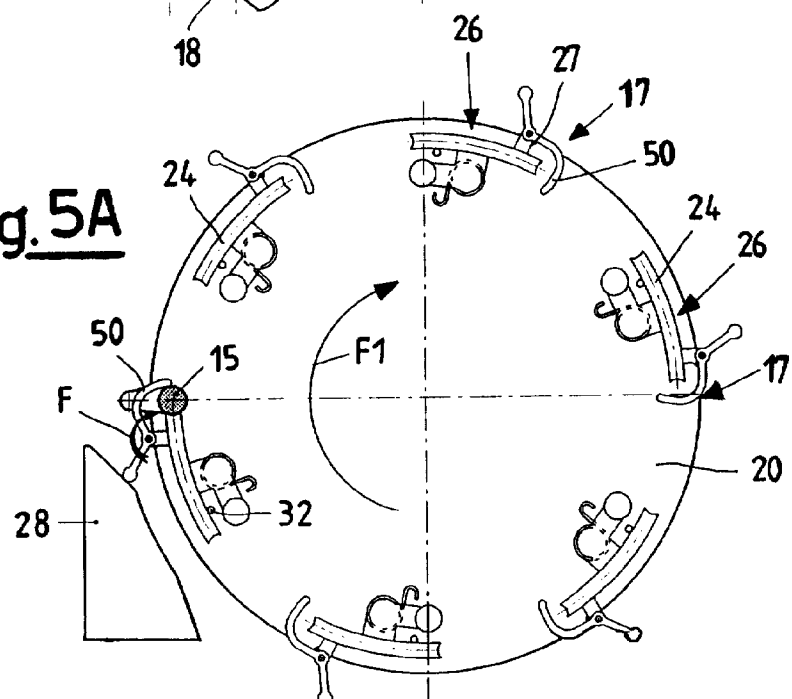


Fig.6

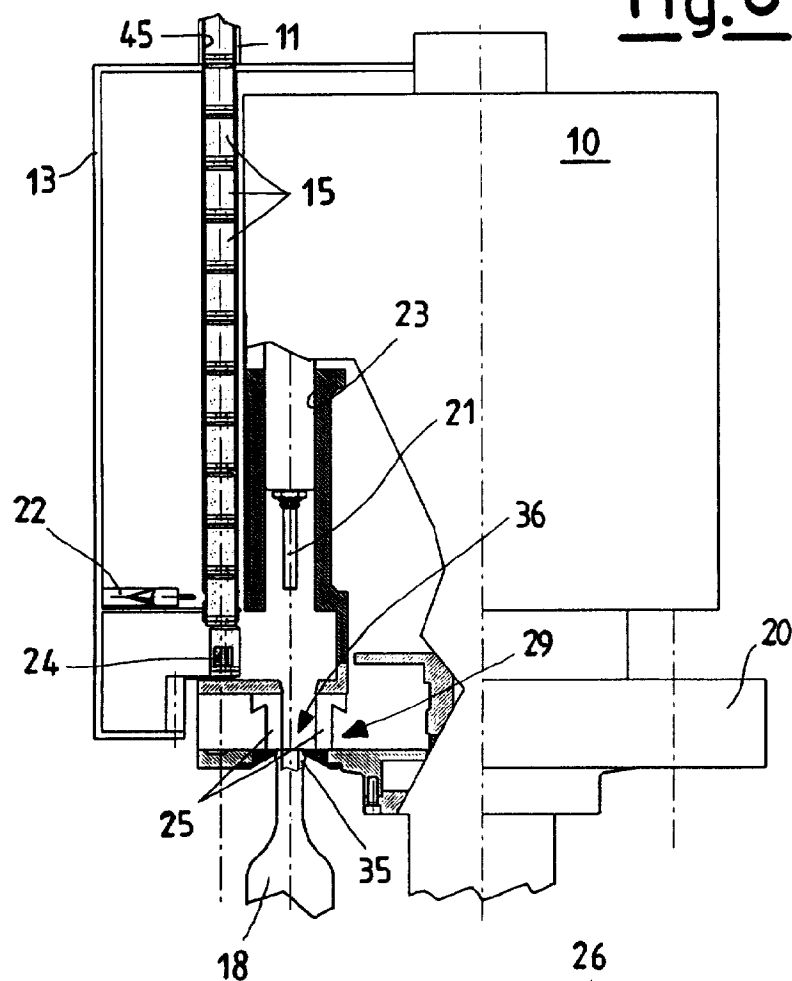


Fig.6A

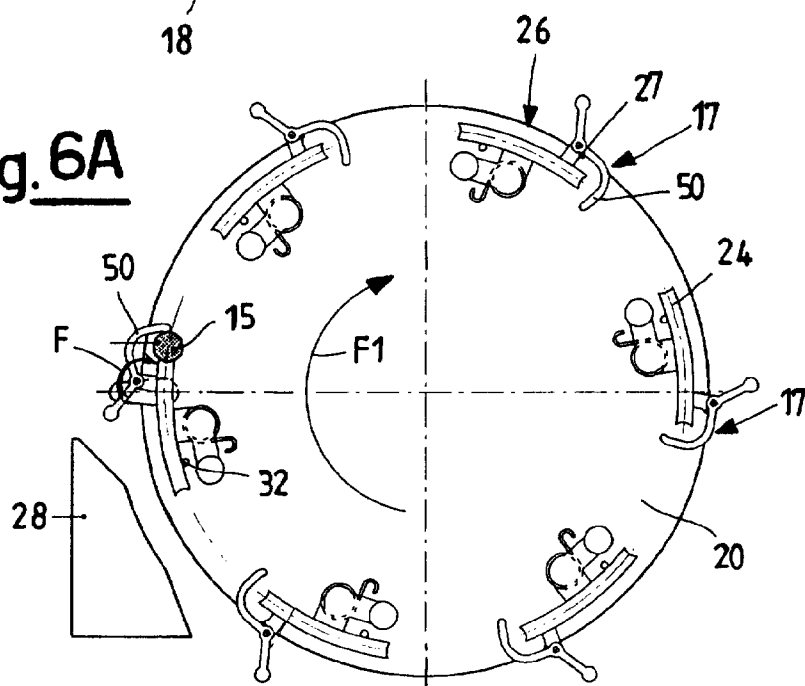


Fig.7

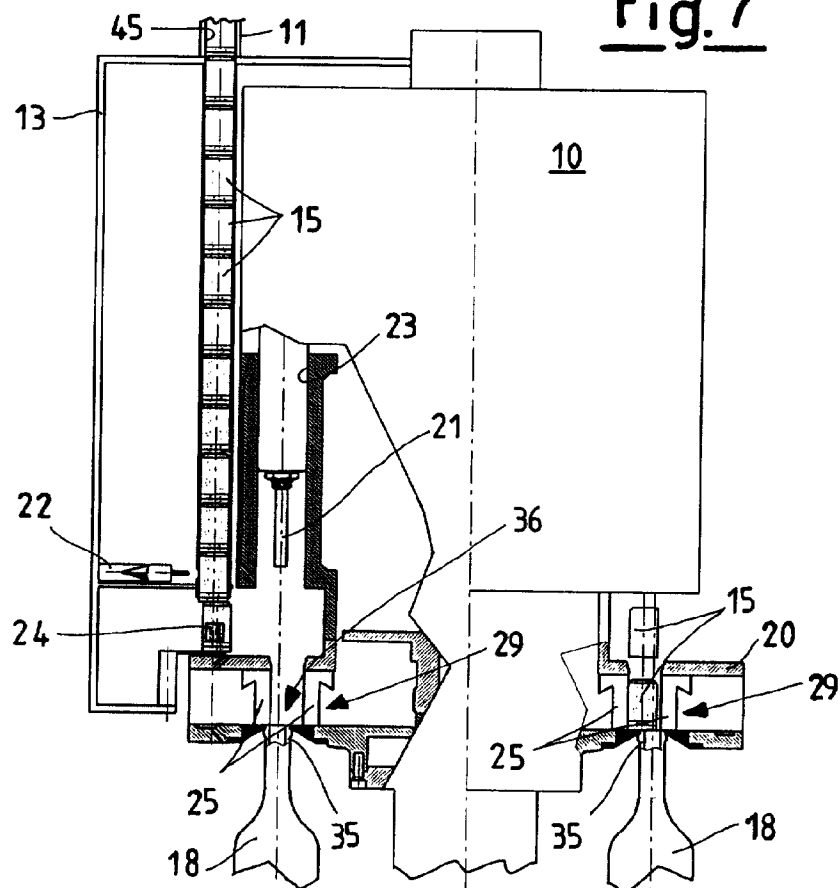
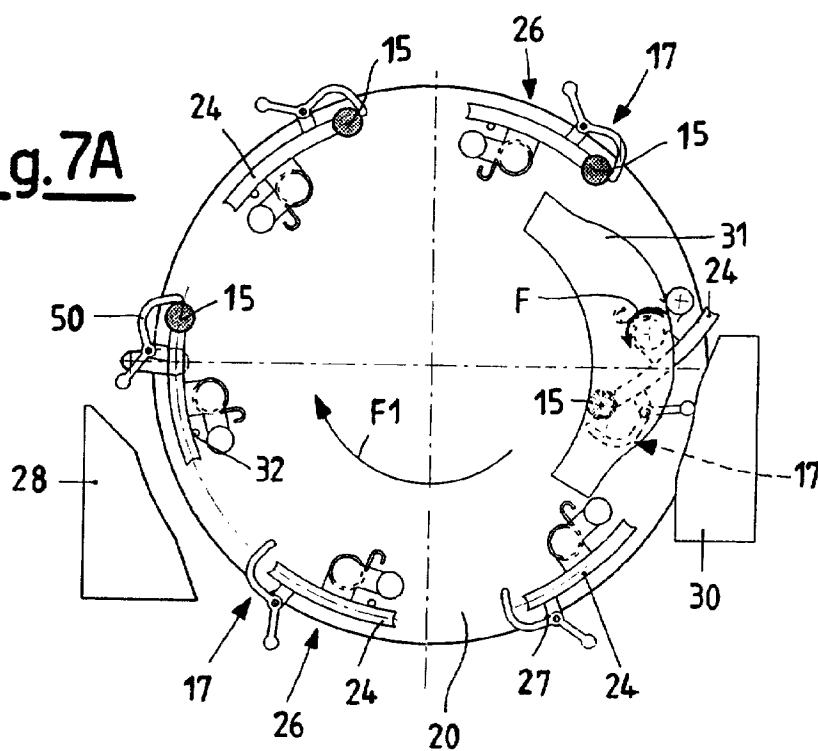


Fig.7A





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EUROPEAN SEARCH REPORT

Application Number
EP 99 20 0656

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.6)
X	FR 510 174 A (BÉDON, CHARLES) 29 November 1920 * page 2, line 33 - line 43 * * page 2, line 79 - line 85; figures 1-4 *	1-7, 12, 13	B67B1/04
A	DE 558 923 C (GEBRÜDER SCHEFFLER)		
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			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B67B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 11 June 1999	Examiner Müller, C
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