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(54) FILLING MACHINE FOR BAGS WITH OPENINGS

(57) Description of a filling machine (100) for bags (S) with an opening (B), comprising: a dispensing head (240) for a product to be packaged, and a handling mechanism (105) to feed the bags and stop them one at a time in a filling position (P5) with the opening (B) in line with the dispensing head (240);whereby this handling mechanism (105) comprises: a first and second flexible transmission part (110A, 110B), each of which runs inside a closed circuit along a route that comprises an operational section (120A, 120B) and a return section (125A, 125B), whereby the operational section (120A, 120B) for each of these first and second flexible transmission parts (110A, 110B) is substantially straight and parallel with the operational section (120A, 120B) of the other flexible transmission part, and two sets of grab plates (140) secured in sequence with the first (110A) and second flexible transmission part (110B) respectively, whereby the grab plates (140) are each fitted with a shaped side profile (150) and arranged such that, along the operational section (120A, 120B) of the flexible transmission parts (110A, 110B), the grab plates (140) secured to the first flexible transmission part (110A) are adjacent to the grab plates (140) secured to the second flexible transmission part (110B), and the shaped side profile (150) of each grab plate (140) secured to the first flexible transmission part (110A) defines, with the shaped side profile (150) of at least one grab plate (140) secured to the second flexible transmission part (110B), a holder (155) for the opening (B) on a bag (S).

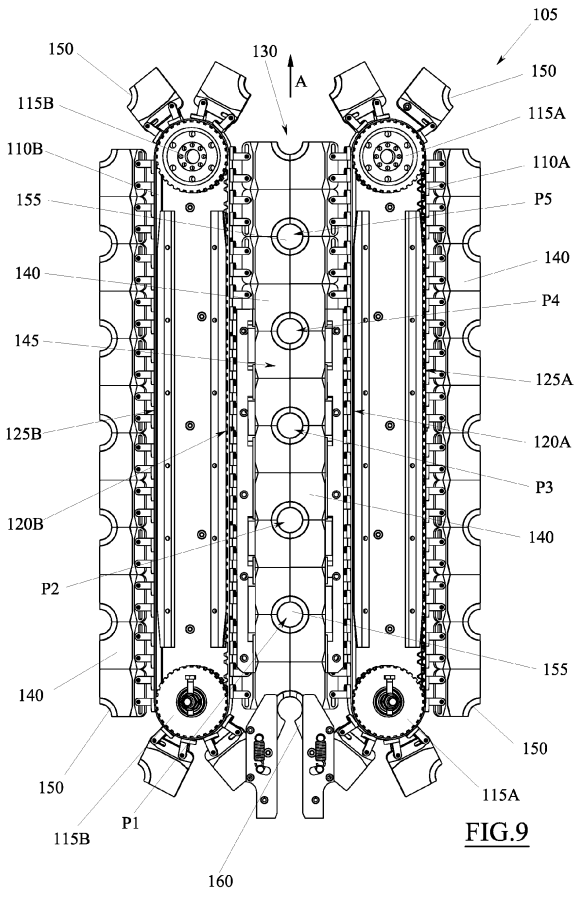

FIG.9

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Description

Technical field

[0001] This invention concerns a machine for filling bags with a product to be packaged, whereby the bags each have a rigid opening giving access to the volume inside, and the product to be packaged may be a foodstuff in liquid, semi-liquid, thick paste or mixed form (typically liquid containing solid parts), such as tomato purée, passata, fruit juices or similar.

Prior art

[0002] As is widely known, machines that fill bags as outlined above generally comprise a dispenser head for the product to be packaged and a handling mechanism, designed to feed flexible bags arranged in a row stopping them one at a time in a filling position with the opening in line with the dispenser head.

[0003] Currently there are various known construction solutions for the aforementioned handling mechanism, which are certainly effective but rather complicated and/or require complicated setups to ensure the filling process is sterile.

[0004] An aim of this invention therefore is to provide a filling machine with a relatively simple and reliable handling mechanism.

[0005] Another aim is to provide a filling machine with a bag handling mechanism that makes it possible to adopt simple and reliable solutions to ensure the filling process is sterile.

[0006] Lastly an additional aim of this invention is to achieve the above objectives while offering a practical solution at a relatively contained cost.

Summary of the invention

[0007] These and other aims are achieved owing to the characteristics of the invention outlined in independent claim 1. The dependent claims illustrate the preferred and/or particularly beneficial aspects of the invention.

[0008] In particular, one way of implementing this invention provides a filling machine for bags with an opening, which generally comprises a dispenser head for a product to be packaged, and a handling mechanism to feed the bags and stop them one at a time in a filling position where the opening is in line with the dispenser head, whereby the aforementioned handling mechanism comprises:

a first and second flexible transmission part, such as two belts or two chains, each of which runs inside a closed circuit along a route that comprises an operational section and a return section, whereby the operational section of each of these first and second flexible transmission parts is substantially straight and parallel with the operational section of the other flexible transmission part, and

two sets of grab plates secured in sequence with the first and second flexible transmission part respectively, whereby said grab plates are each fitted with a shaped side profile and arranged such that, along the operational section of the flexible transmission parts, the grab plates secured to the first flexible transmission part are adjacent to the grab plates secured to the second flexible transmission part, and the shaped side profile of each grab plate secured to the first flexible transmission part defines, with the shaped side profile of at least one grab plate secured to the second flexible transmission part, a holder for the opening on a bag.

[0009] Owing to this solution, the bag openings are attached to the grab plates and are simply and safely fed towards the dispenser head owing to the one-way movement of the flexible transmission parts.

[0010] According to one aspect of the invention, each holder can be defined by the shaped side profiles of four grab plates, with two consecutive grab plates secured to the first flexible transmission part and two consecutive grab plates secured to the second flexible transmission part.

[0011] In this way, the openings on the bags entering the filling machine can be grasped and released at the exit simply and safely.

[0012] According to another aspect of the invention, the holder for the opening can be substantially circular.

[0013] Consequently, the shape of the holder is compatible with the shape of the opening on the bags, thereby improving grab stability and enabling the grab plates to form a type of collar that separates the section of the opening capable of receiving the product in sterile conditions from the rest of the bag.

[0014] Another aspect of the invention provides the route of each flexible transmission part lying in a plane that is tilted with respect to the plane in which the grab plates lie along the operational section of this flexible transmission part.

[0015] Owing to this solution it is advantageously possible to reduce the lateral dimensions of the filling machine.

[0016] According to a different aspect of the invention, the dispenser head can be contained within a filling chamber, which is at least partially delimited by a set of grab plates situated along the operational sections of the first and second flexible transmission parts.

[0017] By doing so, the bag filling step is advantageously implemented in an isolated environment which may easily be kept sterile.

[0018] For this purpose it is provided that the filling machine may also comprise a device to inject a sterilising substance (e.g. an oxygenated water solution) into the filling chamber.

[0019] This injection of the sterilising substance can be implemented occasionally, to disinfect the filling

chamber before commencing a filling step for example.

[0020] According to another aspect of the invention, the filling machine can also comprise a device for injecting sterile air into the filling chamber.

[0021] Owing to this injection of sterile air, the filling chamber can be kept at a slightly higher pressure, effectively obstructing the entry of pollutants from the surrounding atmosphere.

[0022] According to an additional aspect of the invention, the filling machine can comprise a sanitisation chamber, which is at least partially delimited by a set of grab plates situated along the operational sections of the first and second flexible transmission parts upstream of the filling chamber with respect to the travel direction of the holders.

[0023] Owing to this solution it is advantageously possible for the bag openings to undergo sanitisation treatment before entering the filling chamber.

[0024] For this purpose it is provided that the filling machine can also comprise a device to inject a sterilising substance (e.g. an oxygenated water solution) into the sanitisation chamber.

[0025] According to an additional aspect of the invention the filling machine can also comprise a drying chamber which is at least partially delimited by a set of grab plates situated along the operational sections of the first and second flexible transmission parts upstream of the filling chamber and downstream of the sanitisation chamber with respect to the travel direction of the holders.

[0026] Owing to this solution, before the bag openings reach the filling chamber, the sterilising substance which was sprayed on them in the sanitisation chamber can be advantageously left to dry, such that it doesn't contaminate the product to be packaged during the filling step.

[0027] In this context, an aspect of the invention involves the filling machine comprising at least two openable barriers positioned to separate the sanitisation chamber from the drying chamber and the drying chamber from the filling chamber respectively.

[0028] By doing so these three compartments can be kept isolated from each other during the relevant steps of the process, only opening them to enable the progression of the bag openings from one step to the next.

[0029] According to an additional aspect of the invention the machine can also comprise an additional openable barrier positioned to separate the filling chamber from an exit zone, which is at least partially delimited by a set of grab plates situated along the operational sections of the first and second flexible transmission part, and is situated downstream of the chamber of this additional openable barrier with respect to the travel direction of the holders.

[0030] By doing so, the filling chamber can be kept closed when the product to be packaged is being dispensed, thus preventing the entry of contaminants, and can be opened only to enable the bag openings to progress after being filled.

[0031] Furthermore, in the aforementioned exit zone it is it advantageously possible to create a controlled environment that can act as a protective barrier against any contaminants which, coming from the external atmosphere, could enter the filling chamber when the barrier is open.

[0032] For this purpose, it is provided that the filling machine may comprise a device to inject sterile air into the exit zone for example, positioned immediately adjacent to the openable barrier.

[0033] This device can in fact create a type of stream of sterile air which, as a result of pneumatic or preventative action, stops the entry of contaminants in the filling chamber.

[0034] Additionally or as an alternative, the filling machine may also comprise a device to inject a sterilising substance (e.g. an oxygenated water solution) into the exit zone.

[0035] By doing so it is possible to eliminate any contaminants that could enter the filling chamber using chemical action.

[0036] In this case it is preferable for the sterilising substance to be injected into the exit zone only when the openable barrier is closed, to prevent the aforementioned sterilising substance from entering the filling chamber.

[0037] According to a different aspect of the invention, the filling machine can also comprise at least two protective guards positioned respectively to enclose the grab plates situated along the return section of the first flexible transmission part and the grab plates situated along the return section of the second flexible transmission part.

[0038] Owing to this solution, the grab plates that come into contact with the bag openings can be usefully kept separate from the surrounding environment even during the return step, thus reducing the possibility of them being fouled with contaminants.

[0039] According to one aspect of the invention, the filling machine can also comprise a device for injecting water into these protective guards.

[0040] Owing to this injection of water it is advantageously possible to wash the grab plates before they come into contact with the bag openings.

[0041] Another aspect of the invention provides the filling machine also having a device for injecting air into these protective guards.

[0042] Owing to this injection of air it is advantageously possible to dry the grab plates, after the aforementioned washing step with water for example.

[0043] Finally, another aspect of the invention provides the filling machine having a device to dispense a sterilising substance (e.g. an oxygenated water solution) into these protective guards.

[0044] By doing so the grab plates can be usefully sterilised, after the aforementioned washing and drying steps for example, before coming into contact with the bag opening.

Brief description of the drawings

[0045] Further characteristics and advantages of the invention will become more apparent from reading the description below, provided by way of non-limiting,example, with the aid of the figures illustrated in the attached tables.

Figure 1 is an axonometric view of a filling machine in accordance with one embodiment of this invention.
Figure 2 is a plan view of the machine in figure 1.
Figure 3 is section III-III of figure 2.
Figure 4 is section IV-IV of figure 2 enlarged.
Figure 5 is section V-V of figure 4 that only shows some details of the filling chamber.
Figures 6, 7 and 8 are sections VI-VI, VII-VII and VIII-VIII respectively of figure 2 enlarged.
Figure 9 is a plan view that only shows essential parts of the handling mechanism for the machine in figure 1.

Detailed description

[0046] The aforementioned figures show a filling machine 100 designed to fill flexible bags S with a product to be packaged.

[0047] The product to be packaged may be a foodstuff in liquid, semi-liquid, thick paste or mixed form (typically liquid containing solid parts) such as tomato purée, passata, fruit juices or similar.

[0048] In general, the product to be packaged may be a product that can be "pumped", i.e. a product that can be transported and channelled along pipes using pumps.

[0049] The flexible bags S can be made of a plastic material and be of different shapes, with a capacity between 5 and 25 litres for example, but not necessarily limited to this amount.

[0050] Each flexible bag S has a rigid and generally cylindrical opening B, designed to represent access to the internal volume.

[0051] During the manufacturing step, the internal volume of each flexible bag S is sterilised, after which the opening B is closed and sealed with a cap T.

[0052] The flexible bags S are provided by the manufacturer flat and joined together to form a continuous strip of flexible bags S in a row, with the corresponding openings B closed with appropriate caps T and separated by the same distance.

[0053] The filling machine 100 first and foremost comprises a handling mechanism generally indicated by 105, which is designed to feed the flexible bags S on a strip in an ordered fashion, and preferably in accordance with an arrangement with the flexible bags S folded in a "draping fashion".

[0054] As visible in figure 9, this handling mechanism 105 comprises a first flexible transmission part 110A and a second flexible transmission part 110B.

[0055] These two flexible transmission parts 110A and 110B may be for example two transmission belts, two transmission chains or similar parts.

[0056] Each flexible transmission part 110A and 110B is wrapped around a pair of idler wheels 115A and 115B respectively, designed to run in a closed circuit along a flat route that comprises an operational (or outward) section 120A and 120B respectively, and a return section 125A and 125B respectively.

[0057] Operational sections 120A and 120B are straight, mutually parallel and lie along the same plane for example the same horizontal plane.

[0058] Operational sections 120A and 120B are preferably the same length opposite and flanking each other, in order to outline a lane 130 on the common plane. Return sections 125A and 125B are positioned outside the lane 130 between operational sections 120A and 120B.

[0059] The return sections 125A and 125B can also be straight, mutually parallel and lie along the same plane, for example the same horizontal plane.

[0060] However it is preferable for the return sections 125A and 125B not to lie in the same plane as the operational sections 120A and 120B, but at a higher level for example.

[0061] As shown in figure 6, this effect can be obtained by simply turning the idler wheels 115A and 115B such that their axes of rotation are not orthogonal to the common lying plane of the operational sections 120A and 120B, with the result that each flexible transmission part 110A and 110B extends fully along a route that lies along a tilted plane with respect to the aforementioned lying plane.

[0062] Each flexible transmission part 110A and 110B is operated to run intermittently (in steps) along the aforementioned route by a dedicated motor 135A and 135B respectively, which can be designed to rotate one of the corresponding idler wheels either 115A or 115B (see figure 2).

[0063] In particular, these motors 135A and 135B can be configured and controlled such that the flexible transmission parts 110A and 110B run synchronised in the same travel direction A and at the same speed along the operational sections 120A and 120B.

[0064] The handling mechanism 105 also comprises two sets of grab plates 140, whereby the plates of one set are secured in sequence along the entire length of the first flexible transmission part 110A, whereas the plates in the other set are secured in sequence along the entire length of the second flexible transmission part 110B.

[0065] The grab plates 140 can be completely equal to each other and secured to the relevant flexible transmission part 110A or 110B using suitable connection brackets.

[0066] In particular, the grab plates 140 are sized and arranged such that at the operational sections 120A and 120B, the grab plates 140 secured to the first flexible transmission part 110A are adjacent to each other and are also secured to the second flexible transmission part

110B, by lying on the same plane for example in a common plane which may be horizontal.

[0067] In this respect it can be observed in figure 6 how the plane in which the grab plates 140 lie at the operational sections 120A and 120B is tilted with respect to the plane along which flexible transmission parts 110A and 110B run.

[0068] In this way, the grab plates 140 situated at the operational sections 120A and 120B generally define a type of sliding belt 145 that can be horizontal and is designed to run intermittently (in steps) in the travel direction A.

[0069] Obviously the speed of the sliding belt 145 coincides with the speed set for the flexible transmission parts 110A and 110B carrying the grab plates 140.

[0070] Preferably, all grab plates 140 situated at the operational sections 120A and 120B are in contact with each other such that the aforementioned sliding belt 145 basically forms a continuous wall.

[0071] Each grab plate 140 secured to the first and second flexible transmission part 110A and 110B is however provided with a shaped side profile 150, which can be configured as an indentation with an arc profile.

[0072] At the operational sections 120A and 120B, the shaped side profile 150 of each grab plate 140 secured to the first flexible transmission part 110A is designed to combine with the shaped site profile 150 of at least one of the grab plates 140 secured to the second flexible transmission part 110B, so as to define a holder 155 for the opening B on a flexible bag S.

[0073] Preferably each holder 155 is defined by the shaped side profiles 150 of four adjacent grab plates 140, with two consecutive grab plates 140 secured to the first flexible transmission part 110A and two consecutive grab plates 140 secured to the second flexible transmission part 110B.

[0074] In practice each holder 155 appears as a through hole made in the sliding belt 145 defined by the grab plates 140.

[0075] This through hole may be substantially circular in shape, complementary to the external side surface of at least one section of opening B, and has a diameter such as to prevent that the opening B may be axially removed as a result of interference or friction.

[0076] The sliding belt 145 defined by the grab plates 140 has an overall length that depends on the length of the operational sections 120A and 120B of the flexible transmission parts 110A and 110B.

[0077] This length is chosen such that the sliding belt 145 can contain a number of holders 155 which can be arranged in sequence along the travel direction A and can be separate from each other at a distance which is equal to the feed pitch of the sliding belt 145.

[0078] Owing to this architecture, at the idler wheels 115A and 115B positioned at the start of the operational sections 120A and 120B (with respect to the travel direction A), the grab plates 140 secured to the first and second flexible transmission part 110A and 110B are designed to gradually approach each other, thus forming the sliding belt 145 and simultaneously defining the holders 155.

[0079] In this position, the handling mechanism 105 comprises a clamp 160 designed to support the opening B on a flexible bag S, while waiting in a suitable position for this opening B to be clamped between a set of grab plates 140 and contained in a holder 155.

[0080] Following the intermittent movement of the sliding belt 145, each holder 155 then moves gradually along the travel direction A staying closed and being stopped at a number of consecutive positions.

[0081] In the non-limiting example illustrated herein,, the sliding belt 145 exhibits in particular a length such that five stopping positions are provided, shown in the order of P1, P2, P3, P4 and P5 in figure 9.

[0082] At the idler wheels 115A and 115B positioned at the start of the operational sections 120A and 120B (with respect to the travel direction A), the grab plates 140 secured to the first and second flexible transmission parts 110A and 110B are designed to move away from each other, opening the holders 155 before moving backwards along the respective return sections 125A and 125B.

[0083] As illustrated in figure 4, the filling machine 100 may comprise a sanitisation chamber 165, which is delimited within a casing 170 which overlaps and is closed inferiorly by a portion of the sliding belt 145, or a set of grab plates 140 situated along the operational sections 120A and 120B of the first and second flexible transmission parts 110A and 110B.

[0084] In particular, the casing 170 may be sized such that the sanitisation chamber 165 is inferiorly delimited by a portion of the sliding belt 145 which contains at least one holder 155, such as the holder in the first stopping position P1.

[0085] More preferably, the casing 170 exhibits an elongated shape on the sanitisation chamber 165 that covers, and is closed inferiorly by a portion of the sliding belt 145 which contains a plurality of consecutive holders 155 along the travel direction A, such as those in stopping positions P1, P2 and P3.

[0086] One or more injectors 175 may be associated with the casing 170 that are capable of injecting a sterilising substance inside the sanitisation chamber 165, such as a solution of oxygenated water which can be diluted or undiluted depending on the sanitisation requirements.

[0087] Preferably, these injectors 175 may be positioned at the start of the sanitisation chamber 165, for example such as to inject the sterilising substance at the first stopping position P1 of the holders 155.

[0088] To prevent the sterilising substance from being contaminated and/or overspilling, the casing 170 may be associated with an initial openable barrier 180, being positioned at the entrance to the sanitisation chamber 165 with respect to the travel direction A.

[0089] This openable barrier 180 can take the form of a shutter which is operated by an actuator 185 between

a raised position, with the shutter at a distance from the sliding belt 145 which leaves an open passage, and a lowered position, wherein the shutter rests against the sliding belt 145 thus closing the aforementioned passage.

[0090] Downstream of the sanitisation chamber 165 (with respect to the travel direction A), the filling machine 100 may further comprise a drying chamber 190 which is also delimited inside a casing 195 which overlaps and is closed inferiorly by a portion of the sliding belt 145.

[0091] In particular, the casing 195 may be sized such that the drying chamber 190 is delimited inferiorly by a portion of the sliding belt 145, which contains only one holder 155, such as the holder in the first stopping position P4.

[0092] In some embodiments, such as the one illustrated in the attached figures, the casing 195 on the drying chamber 190 may be integrally formed with the casing 170 on the sanitisation chamber 165.

[0093] An injector 197 can be associated with the casing 195 on the drying chamber 190 to inject sterile air inside.

[0094] The drying chamber 190 may be separated from the sanitisation chamber 165 with a second openable barrier 200, which can also take the form of a shutter which is operated by an actuator 205 between a raised position, wherein the shutter is at a distance from the sliding belt 145 leaving an open passage, and a lowered position, wherein the shutter rests against the sliding belt 145, thus closing the aforementioned passage.

[0095] Downstream of the drying chamber 190 (with respect to the travel direction A), the filling machine 100 may also comprise a filling chamber 210, which is also delimited inside a casing 215 that overlaps and is closed inferiorly by a portion of the sliding belt 145.

[0096] In particular, the casing 215 may be sized such that the filling chamber 210 is delimited inferiorly by a portion of the sliding belt 145, which contains just one holder 155, such as the holder in the first stopping position P5.

[0097] In the embodiment illustrated, for the purpose of not leaving spaces uncovered, the casing 215 on the filling chamber 210 is immediately adjacent to the casing 195 on the drying chamber 190, and has larger side dimensions than the latter.

[0098] The filling chamber 210 is separated from the drying chamber 190 by a third openable barrier 220 and has an exit that is closed by a fourth openable barrier 225.

[0099] Both the third and fourth openable barriers 220 and 225 may each take the form of an individual shutter which is operated by an actuator 230 and 235 respectively, between a raised position, wherein the shutter is at a distance from the sliding belt 145 which defines a passage, and a lowered position wherein the shutter rests against the sliding belt 145 and closes the aforementioned passage.

[0100] The filling chamber 210 contains a dispenser head 240 for the product to be packaged, which is generally shaped as a tube or sleeve and defines a passage through which the product to be packaged is dispensed downwards. This passage has a z-axis which is basically orthogonal to the sliding belt 145, in order to coincide with the axis of the holder 155 situated at stopping position P5.

[0101] The dispenser head 240 is part of a more complex dispensing unit indicated with 245, and is provided with devices to dispense measured quantities of the product to be packaged through the passage defined by the dispenser head 240.

[0102] In particular, the dispenser head 240 may be positioned at the bottom of the dispensing unit 245, which may stand upwards and protrude outside the filling chamber 210.

[0103] Lifting means (not shown in the drawings) may be associated to the dispensing unit 245 which is capable of moving the dispenser head 240 along its z-axis between a raised position, wherein the dispenser head 240 is at a distance from the sliding belt 145 and the opening B clamped in the holder 155, and a lowered position, wherein the dispenser head 240 is able to be coupled to said opening B.

[0104] As illustrated in figure 5, additional clamps 250 are also installed in the filling chamber 210, which are able to move and reposition the cap T on the opening B via suitable drive means 9 (not shown),.

[0105] The dispensing unit 245 and corresponding dispensing head 240 and clamps 250 are conventional parts per se and will therefore not be described in greater detail.

[0106] At least one injector 255 may also be associated with the casing 215 on the filling chamber 210, which is designed to inject sterile air into the filling chamber 210, and possibly at least one injector 260, which is designed to inject a sterilising substance inside the filling chamber 210 such as a solution of oxygenated water.

[0107] Downstream of the filling chamber 210 (with respect to the travel direction A), the filling machine 100 may comprise an exit zone 300, which is separated from the filling chamber 210 by a fourth openable barrier 225 and is delimited inside a casing 305 which overlaps and is partially closed inferiorly by a portion of the sliding belt 145.

[0108] In particular, the casing 305 may extend longitudinally, i.e. in the travel direction A, which is shorter than the casing that delimits the previous chambers, given that the exit zone 300 may simply be a transit area, i.e. an area each holder 155 passes through without stopping.

[0109] The casing 305 delimiting the exit zone 300 may also be higher than the sliding belt 145 and less wide than the casing that defines the previous chambers.

[0110] Unlike these chambers, the end of the exit zone 300 opposite the fourth openable barrier 225 (with respect to the travel direction A) may also be open constantly and have no barrier thus being constantly in contact with the external environment.

[0111] One or more injectors 315 (visible in figure 4)

may be associated with the casing 305 to inject sterile air into the exit zone 300, and may be arranged to create a stream of sterile air that reaches the fourth openable barrier 225, to prevent contaminants from entering the filling chamber 210 when the openable barrier 225 is open.

[0112] For example, two of the aforementioned injectors 315 may be associated with the casing 305, and shaped as vertical diffusers (small tubes) that are located on opposite sides of the fourth openable barrier 225 and so orientated as to generate jets of air at an inclination of approximately 45° in the travel direction of the sliding belt 145.

[0113] An injector 310 may also be associated with the casing 305 to inject a sterilising substance into the exit zone 300, such as a solution of oxygenated water whose chemical action is designed to eliminate any contaminants coming from the outside environment that could enter the filling chamber 210 when the fourth openable barrier 225 is open.

[0114] In order to prevent the sterilising substance from also spreading inside the filling chamber 210, it is provided that the injector 310 will operate intermittently, only with the openable barrier 225 being in the closed position thereof..

[0115] The filling machine 100 is finally complete with two protective guards globally referenced by 265A and 265B, which are positioned to cover the first and second flexible transmission parts 110A and 110B respectively and the corresponding grab plates 140.

[0116] In particular, the protective guards 265A and 265B are designed to cover return sections 125A and 125B of flexible transmission parts 110A and 110B, in addition to the grab plates 140 situated at these return sections 125A and 125B.

[0117] Preferably, the protective guards 265A and 265B may also cover the idler wheels 115A and 115B.

[0118] As illustrated in figure 6, each of the protective guards 265A and 265B may have a lower wall situated beneath the flexible transmission parts 110A and 110B, which is tilted with respect to the sliding belt 145 thereby creating the shape of an arc.

[0119] Both protective guards 265A and 265B may be associated with at least one initial injector 270A and 270B designed to inject water into the corresponding protective guard, in order to wash the grab plates 140 at the return sections 125A and 125B of the flexible transmission parts 110A and 110B (see figure 8).

[0120] Owing to the arc shape of the lower wall of the protective guards 265A and 265B, the injected water may flow downwards and collect along the lower edges of the protective guards where it may be removed via suitable outlets 275.

[0121] Each protective guard 265A and 265B may further be provided with at least one second injector 280A and 280B respectively downstream of the initial injectors 270A and 270B, with respect to the travel direction of return sections 125A and 125B, which is designed to inject air into the corresponding protective guard to dry the grab plates 140 after they have been washed (see figure 7).

[0122] Downstream of the second set of injectors 280A and 280B, again with respect to the travel direction of return sections 125A and 125B, each protective guard 265A and 265B may be provided with a third injector at least 285A and 285B respectively which is designed to inject a sterilising substance into the corresponding protective guard, so as to sterilise the grab plates 140 after they have been washed and dried and before the grab plates 140 form the sliding belt 145 (see figure 6).

[0123] It will be appreciated that, as shown in figure 3, in order to improve the washing, drying and sterilization steps, the inner volume of each protective guard 265A and 265B may be divided, by appropriate partitions 290, into at least three partially separate sections, which sections are adapted to be run successively by the grab plates 140 and to which the first injector 270A or 270B, the second injector 280A or 280B, and the third injector 285A or 285B respectively, are associated.

[0124] In light of the above, the operation of the filling machine may be summarised as follows.

[0125] A row of empty flexible bags S folded in a draping fashion is fed into the filling machine 100 with their openings B lined up and each individually closed with a cap T as shown in figure 3.

[0126] Each opening B on the row of flexible bags S is initially grasped and supported by a clamp 160.

[0127] After the flexible transmission parts 110A and 110B proceed a step, a set of grab plates 140 close around the opening B held by the clamp 160 and tighten it in a holder 155, while simultaneously moving away from the clamp 160 towards the first stopping position P1.

[0128] Note that the grab plates 140 close around an intermediate section of the opening B, such that its upper section with cap T protrude above the sliding belt 145 defined by the grab plates 140, whereas the corresponding flexible bag S hangs beneath the sliding belt 145.

[0129] Proceeding towards the first stopping position P1, the opening B enters the sanitisation chamber 165.

[0130] The first openable barrier 180 opens temporarily to enable entry into the sanitisation chamber 165 and closes immediately after the opening B has reached the first stopping position P1.

[0131] In the first stopping position P1, the outer surfaces of the upper part of the opening B and the corresponding cap T are sprinkled with the sterilising substance dispensed from the injector 175.

[0132] After the sliding belt 145 progresses another two steps, the opening B stops at positions P2 and P3.

[0133] The opening B undergoes no further treatment at stopping positions P2 and P3, but is simply given sufficient time for the sterilising substance to take effect.

[0134] With the next step taken by the sliding belt 145, the opening B moves towards stopping position P4, leaves the sanitisation chamber 165 and enters the drying chamber 190.

[0135] To enable this progression, the second openable barrier 200 opens temporarily and closes immediately after the opening B has reached stopping position P4.

[0136] The sterilising substance on the opening B and the cap T is dried in the drying chamber 190 to prevent it from coming into contact with the product to be packaged during the subsequent filling step.

[0137] This drying step may be assisted by the injector 197 injecting sterile air into the drying chamber 190, so it touches the opening B and the cap T for example.

[0138] Subsequently, the sliding belt 145 progresses to bring the opening B outside the drying chamber 190 and into the filling chamber 210, until stopping it at stopping position P5.

[0139] To enable this progression, the third openable barrier 220 opens temporarily and closes immediately after the opening B has reached stopping position P5.

[0140] In the filling chamber 210 the clamp 250 removes the cap T from the opening B, after which the dispensing head 240 is lowered and connects to the opening B to fill the flexible bag S with the product to be packaged.

[0141] The flexible bag S can be supported during filling operations on a support device 295 situated below the sliding belt 145, which could be tilted to form a chute and made in the form of a roller bed.

[0142] Once a flexible bag S has been filled, the dispensing head 240 is raised and detaches from the opening B, enabling the clamp 250 to reposition the cap T. The flexible bag S is also detached at position P5 from the remaining flexible bags (S) on the belt, using a suitable cutting device for example.

[0143] As the sliding belt continues to proceed 145, the opening B on the flexible bag S exits the filling chamber 210 and after proceeding through the exit zone 300 is released from the sliding belt 145 as the grab plates move away 140.

[0144] By doing so, the filled and capped flexible bag S is released onto the underlying support device 295 to be removed from the filling machine 100.

[0145] Simultaneously, the grab plates 140 rotate about the idler wheels 115A and 115B and, due to the continuous operation of the system, gradually proceed along the return sections 125A and 125B of the flexible transmission parts 110A and 110B.

[0146] The grab plates 140 are washed, dried and sterilised on the return journey before grasping the opening B on a new flexible bag S and repeating the process from the beginning.

[0147] Note that when the filling machine 100 is operating, injector 255 can be used to inject the sterilising substance inside the filling chamber 210 periodically.

[0148] This substance can be injected when filling operations are not taking place, to prevent contact with the product to be packaged. For example, the sterilising substance could be injected during a preliminary step when the filling machine 100 stops temporarily.

[0149] Injector 260 may however be used to inject sterile air into the filling chamber 210 even during filling operations, so it is kept at a slightly higher pressure to prevent contaminants entering from the external atmosphere.

[0150] Obviously the one skilled in the art could make numerous technical modifications to the filling machine 100 outlined above depending on the application, without departing from the scope of the invention as outlined in the claims below.

Claims

1. A filling machine (100) for bags (S) with an opening (B), comprising:

- a dispenser head (240) with a product to be packaged, and
- a handling mechanism (105) to feed the bags and stop them one at a time in a filling position (P5) wherein the opening (B) is lined up with the dispenser head (240),

characterised by the fact that said handling mechanism (105) comprises:

- a first and second flexible transmission part (110A, 110B), each of which runs inside a closed circuit along a route that comprises an operational section (120A, 120B) and a return section (125A, 125B), whereby the operational section (120A, 120B) of each of these first and second flexible transmission parts (110A, 110B) is straight and parallel with the operational section (120A, 120B) of the other flexible transmission part, and
- two sets of grab plates (140) secured in sequence with the first and second flexible transmission parts (110A and 110B respectively), whereby the grab plates (140) are each fitted with a shaped side profile (150) and arranged such that along the operational section (120A, 120B) of the flexible transmission parts (110A and 110B), the grab plates (140) secured to the first flexible transmission part (110A) are adjacent to the grab plates (140) secured to the second flexible transmission part (110B), and the shaped side profile (150) of each grab plate (140) secured to the first flexible transmission part (110A) defines, with the shaped side profile (150) of at least one grab plate (140) secured to the second flexible transmission part (110B), a holder (155) for the opening (B) on a bag (S), each holder (155) appearing as a through hole made in a sliding belt (145) defined by the grab plates (140) situated at the operational sections (120A, 120B) .

2. A filling machine (100) according to claim 1, **characterised by** the fact that the holder (155) is defined by the shaped side profiles (150) of four grab plates (140), with two consecutive grab plates (140) secured to the first flexible transmission part (110A) and two consecutive grab plates (140) secured to the second flexible transmission part (110B).

3. A filling machine (100) according to claim 1 or 2, **characterised by** the fact that this holder (155) is substantially circular.

4. A filling machine (100) according to any of the preceding claims, **characterised by** the fact that the route of each flexible transmission part (110A and 110B) lies in a plane that is tilted with respect to the plane in which the grab plates (140) lie along the operational section (120A, 120B) of this flexible transmission part (110A, 110B).

5. A filling machine (100) according to any of the preceding claims, whereby the dispenser head (240) is contained within a filling chamber (210), which is at least partially delimited by a set of grab plates (140) situated along the operational sections (120A, 120B) of the first and second flexible transmission parts (110A, 110B).

6. A filling machine (100) according to claim 5, comprising a device (260) for injecting sterile air into the filling chamber (210).

7. A filling machine (100) according to claim 5 or 6, comprising a device (255) for injecting a sterilising substance into the filling chamber (210).

8. A filling machine (100) according to any of claims 5-7, comprising a sanitisation chamber (165), which is at least partially delimited by a set of grab plates (140) situated along the operational sections (120A, 120B) of the first and second flexible transmission parts (110A, 110B) upstream of the filling chamber (210) with respect to the travel direction (A) of the holders (155).

9. A filling machine (100) according to claim 8, comprising a device (175) for injecting a sterilising substance into the sanitisation chamber (165).

10. A filling machine according to claim 8 or 9, comprising a drying chamber (190), which is at least partially delimited by a set of grab plates (140) situated along the operational sections (120A, 120B) of the first and second flexible transmission parts (110A, 110B) upstream of the filling chamber (210) and downstream of the sanitisation chamber (165) with respect to the travel direction (A) of the holders (155).

11. A filling machine (100) according to claim 10, comprising at least two openable barriers (200, 220) situated to separate the sanitisation chamber (165) from the drying chamber (190) and the drying chamber (190) from the filling chamber (210) respectively.

12. A filling machine (100) according to any of claims 5-11, comprising an openable barrier (225) situated to separate the filling chamber (210) from an exit zone, (300) which is at least partially delimited by a set of grab plates (140) situated along the operational sections (120A, 120B) of the first and second flexible transmission parts (110A, 110B), and downstream of the openable barrier (225) with respect to the travel direction (A) of the holders (155).

13. A filling machine (100) according to claim 12, comprising a device (315) to inject sterile air into the exit zone (300), in a position adjacent to the openable barrier (225).

14. A filling machine (100) according to claim 12 or 13, comprising a device (310) for injecting a sterilising substance into the exit zone (300).

15. A filling machine (100) according to any of the preceding claims, comprising at least two protective guards (265A, 265B) positioned respectively to enclose the grab plates (140) situated along the return section (125A) of the first flexible transmission part (110A) and the grab plates (140) situated along the return section (125B) of the second flexible transmission part (110B).

16. A filling machine (100) according to claim 15, comprising a device (270A, 270B) to inject water into these protective guards (265A, 265B).

17. A filling machine (100) according to claim 15 or 16, comprising a device (280A, 280B) to inject water into said protective guards (265A, 265B).

18. A filling machine (100) according to any of claims 15-17, comprising a device (285A, 285B) to inject a sterilising substance into said protective guards (265A, 265B).

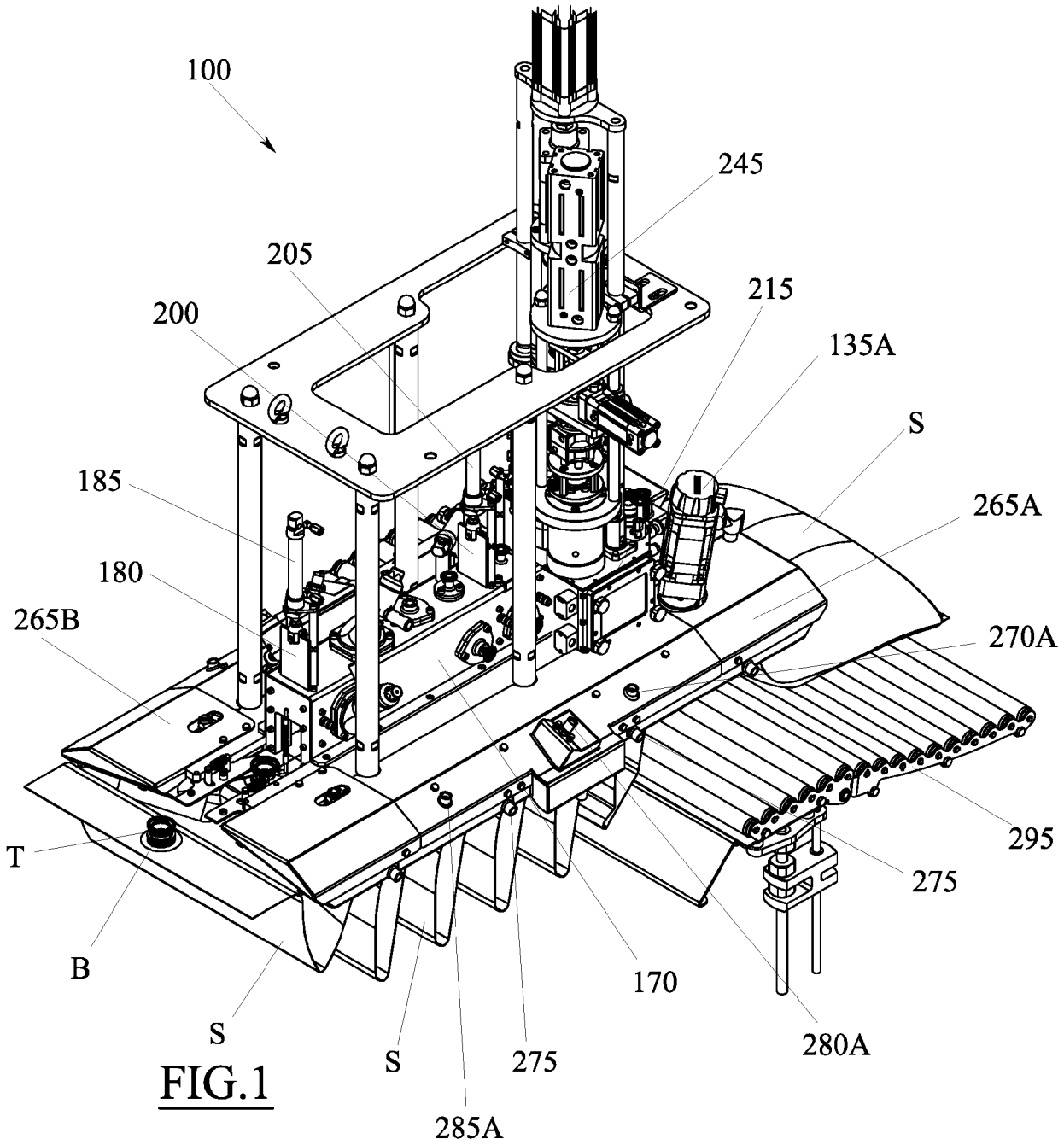
100
245
205
215
200
135A
S
185
265A
180
265B
270A
295
T
275
B
170
S
280A
S
275
285A

FIG.1

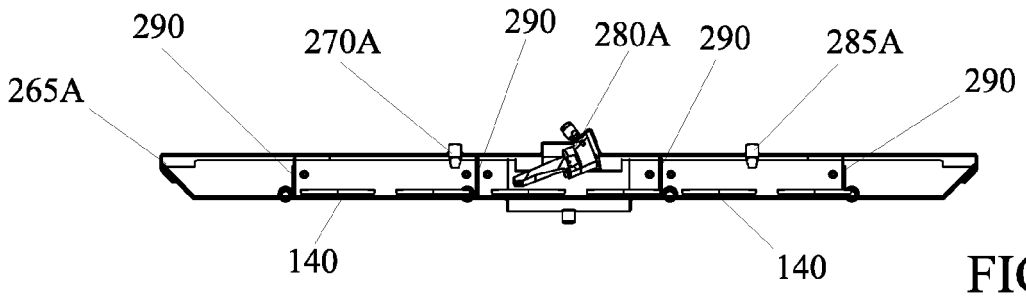

FIG.3

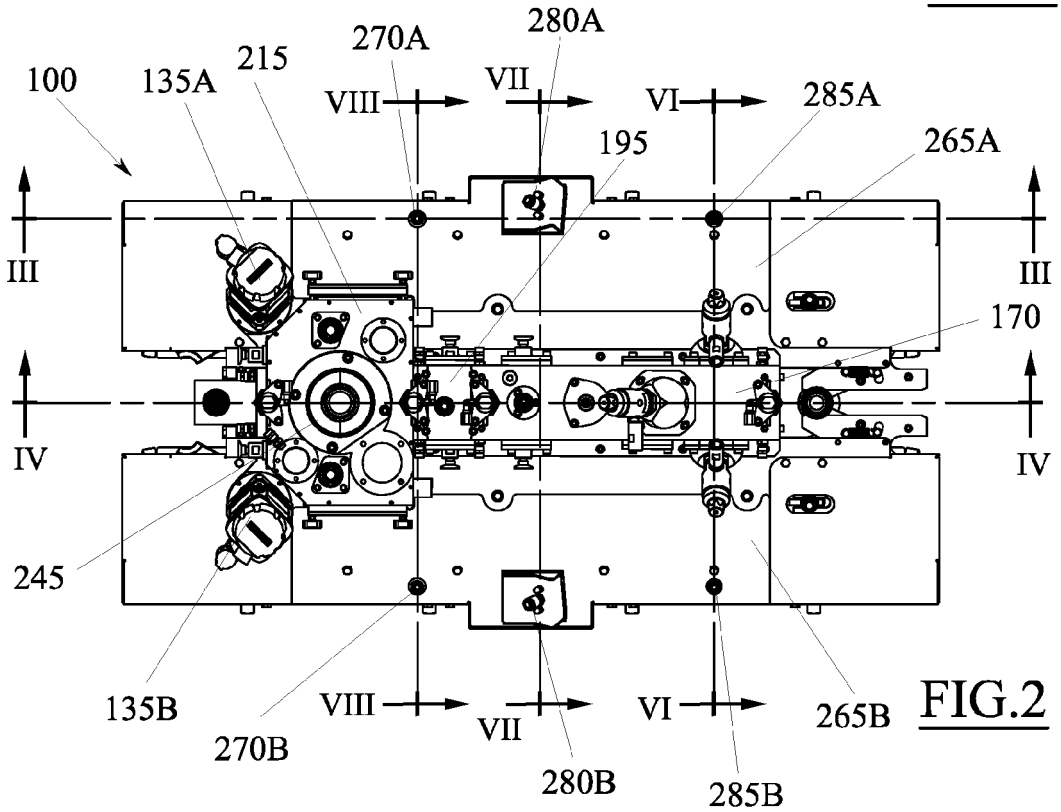

FIG.2

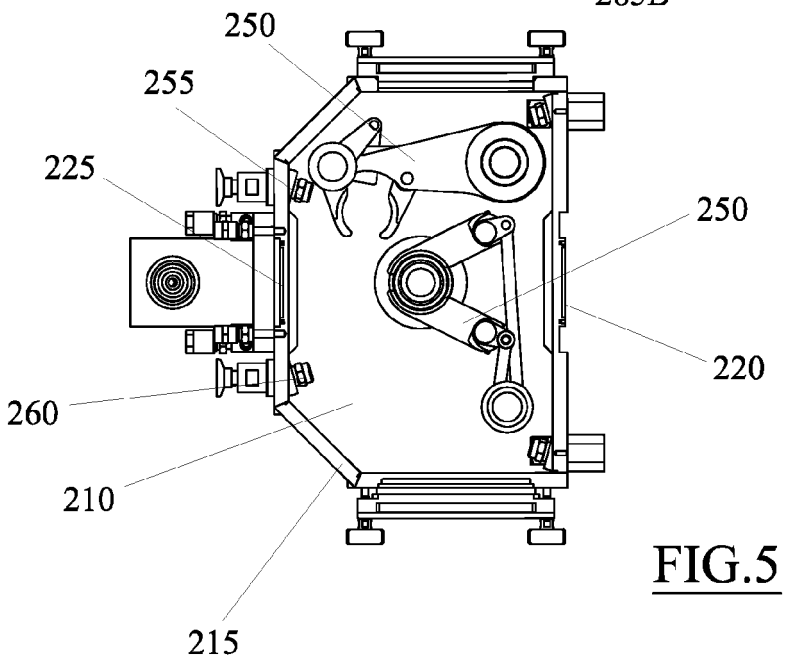

FIG.5

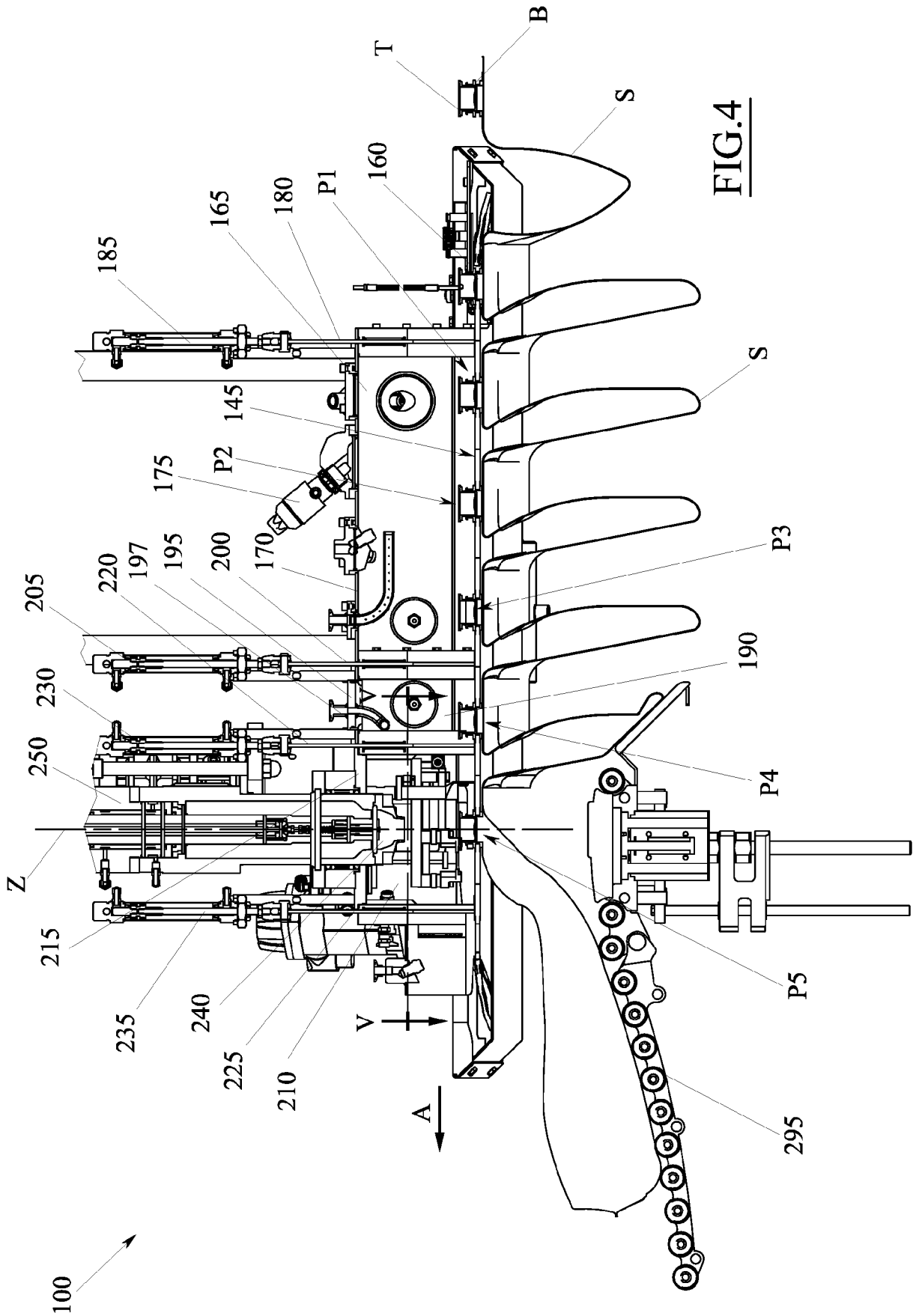
B
T
S
160
P1
180
165
185
S
145
P2
175
170
200
195
197
220
205
P3
190
230
250
P4
Z
215
P5
235
240
225
210
V
V
A
295
100

FIG.4

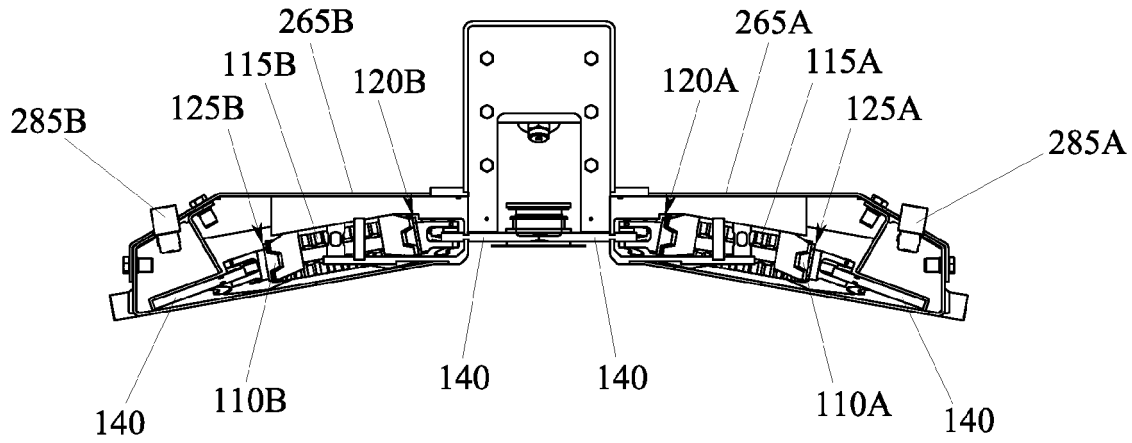

FIG.6

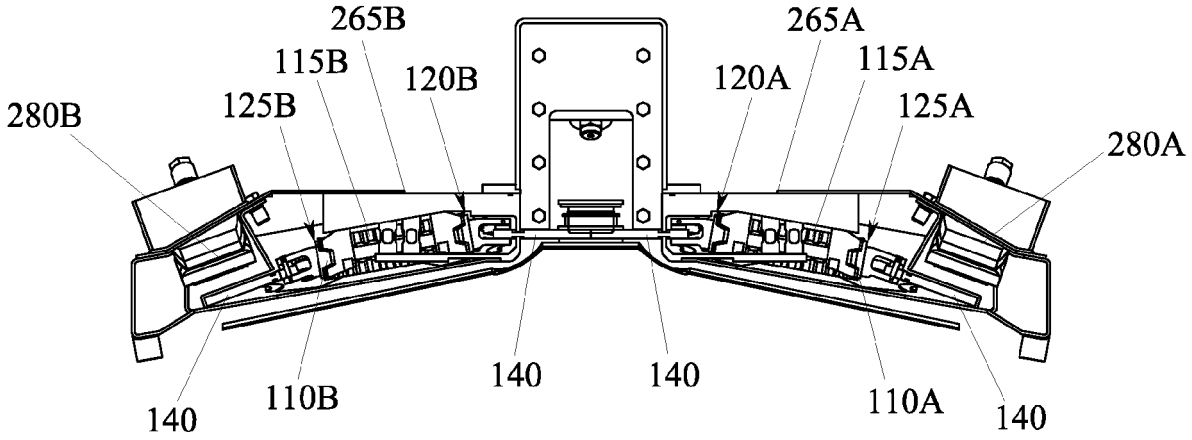

FIG.7

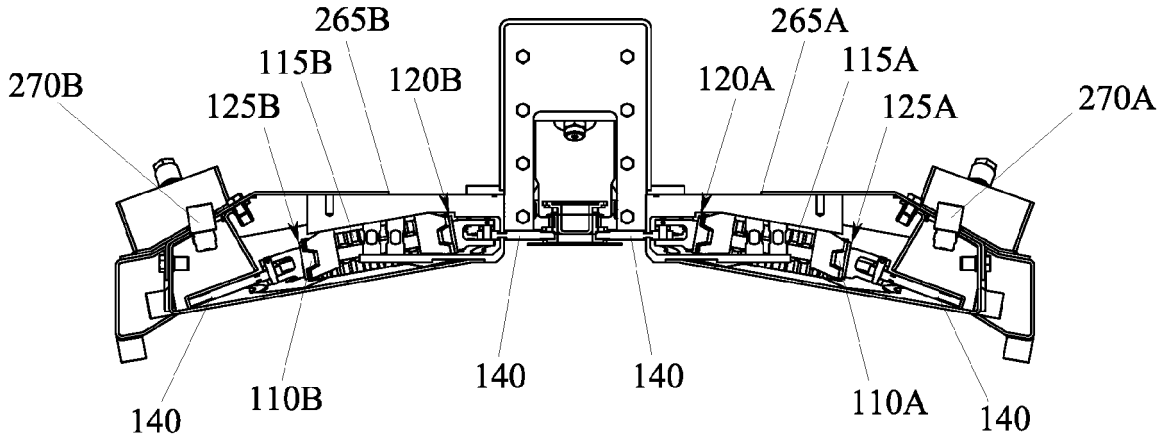

FIG.8

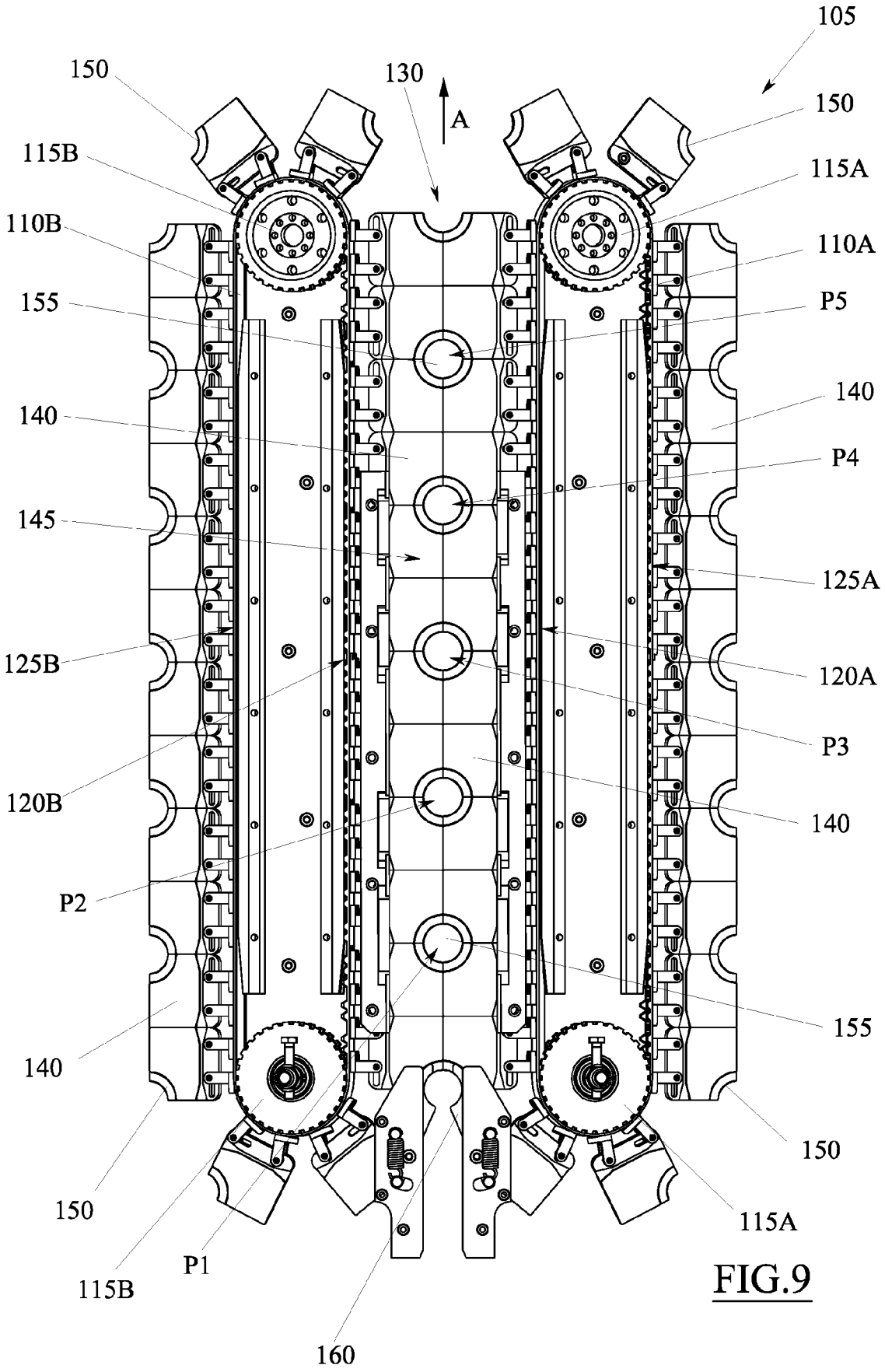
105
150
130
A
150
115B
115A
110B
110A
155
P5
140
140
P4
145
125A
125B
120A
P3
120B
140
P2
155
140
150
150
115A
115B
P1
160

FIG.9

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EUROPEAN SEARCH REPORT

Application Number
EP 18 18 5678

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B65B
B65G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
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