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(54) Packaging apparatus, particularly of the type of cartoning machines and the like

(57) A packaging apparatus (1), of the type of cartoning machines and the like, comprising a first supply line (2) for supply of products (A) to be packaged, preferably of the type of pouches, blister packs, bottles, vials and the like, and a second supply line (3) for supply of containers (B) shaped substantially like a parallelepiped. The first line (2) and the second line (3) are movable according to an intermittent rule of motion and lead to a loading area (4), which is affected by a main insertion assembly (5), designed for the transfer of each product (A) into a respective container (B), for its packaging. The main assembly (5) comprises a drive unit for at least one main rotating shaft (6), at least one pair of pushers (7) being functionally associated with the main shaft (6) and acting along respective predefined paths, which comprise a common active portion and a return portion, which is different from the active portion, to allow the return of each pusher (7) to the initial position of the active portion. The active portion, which is followed in different respective active steps during an idle step of each line (2, 3), intersects the first supply line (2) and leads to the second supply line (3), to ensure the movement of the products (A) and their insertion in the containers (B).

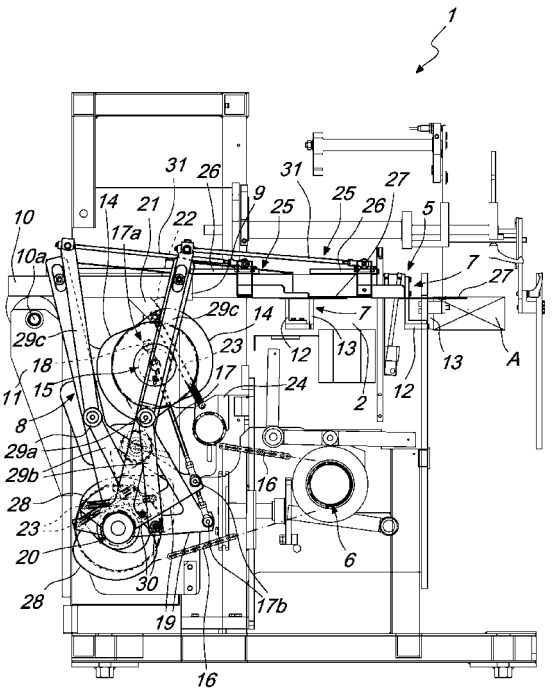

Fig. 2

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Description

[0001] The present invention relates to a packaging apparatus, particularly of the type of cartoning machines and the like.

[0002] Currently, automatic machines are widely used in numerous fields of industry and technology in order to allow high production volumes at modest costs (and/or by relieving operators of highly repetitive and sometimes dangerous activities).

[0003] For example, automatic machines are used often in the pharmaceutical, food and cosmetic fields and are designed for the preparation and packaging of products in various formats according to requirements.

[0004] In this field, automatic machines (known as cartoning machines), designed to insert primary containers, which contain the product intended for the consumer, such as pouches, blister packs, bottles, vials, et cetera, in the external packages (such as boxes or cases), have an assuredly important and delicate role.

[0005] Currently commercially available cartoning machines may be grouped substantially in two different macro-categories, depending on the operating logic according to which they work.

[0006] Machines which have intermittent motion mechanisms and machines in which the various components operate continuously are in fact known: the choice between the two different categories thus defined is usually made depending on the production rate (cycles per minute) at which one wishes to operate and on the dimensions of the products.

[0007] In fact, intermittent machines (or machines with consecutive stations) use a pusher provided with an alternating rectilinear motion, adapted to transfer the main containers by inserting them in the cases. Such machines, in order to contain the stresses on the mechanical components and, above all, on the product itself, are suitable for production rates up to approximately 120 cycles/minute, while with continuous machines it is possible to reach 500 cycles/minute (and sometimes even 700 cycles/minute), and the insertion of the primary containers into the secondary containers in such machines is made possible by pushers that "follow" the respective handling lines (continuously movable), by means of complex machine architectures.

[0008] Therefore, while continuous machines are a substantially forced choice when it is necessary to ensure high production volumes, intermittent machines are instead preferred in the field of low volumes, because with respect to continuous machines and for equal cycles per minute they have more modest space occupations and costs (and sometimes allow more complex packagings).

[0009] The situation outlined above, however, has some drawbacks.

[0010] The machines described above are scarcely effective when operation at production rates around 100-180 cycles/minute is required. As shown, these rates are in fact too high to allow the use of machines with intermittent operation but create a highly unsatisfactory utilization of continuous machines.

[0011] In order to ensure operation at such "intermediate" rates, manufacturers of the last type of machine (usually designed and sized to operate at far higher rates) in fact work on existing continuous cartoning machines simply by degrading them, i.e., eliminating some mechanisms with which they are provided and which are designed to ensure the highest rates (for example in the pushers, in the units for picking up and opening cases, et cetera).

[0012] It is evident that this solution does not make it possible to reduce overall dimensions and space occupations and therefore forces the buyer to adopt a machine that is as bulky and substantially complicated as the ones designed for production rates that are much higher than his requirements.

[0013] The aim of the present invention is to solve the above mentioned problems, by providing a packaging apparatus, particularly of the type of cartoning machines and the like, which operates according to intermittent operation logic criteria and is capable of ensuring high productivity.

[0014] Within the scope of this aim, an object of the invention is to provide a packaging apparatus which operates according to intermittent operation logic criteria and is capable of combining high performance and structural simplicity.

[0015] Another object of the invention is to provide a packaging apparatus provided with intermittently moving mechanisms which is capable of operating effectively at production rates of approximately 100-200 cycles/minute.

[0016] A further object of the invention is to provide a packaging apparatus having modest dimensions and space occupations.

[0017] Another object of the invention is to provide a packaging apparatus that ensures high operating reliability.

[0018] Another object of the invention is to provide a packaging apparatus that can be obtained easily starting from commonly commercially available elements and materials.

[0019] Yet another object of the invention is to provide a packaging apparatus that has modest costs and is safe in use.

[0020] This aim and these objects are achieved by a packaging apparatus, of the type of cartoning machines and the like, comprising a first supply line for supply of products to be packaged, preferably of the type of pouches, blister packs, bottles, vials and the like, and a second supply line for supply of containers shaped substantially like a parallelepiped, said first line and said second line being movable according to an intermittent rule of motion and leading to a loading area, which is affected by a main insertion assembly, designed for the transfer of each product into a respective container, for its packaging, **characterized in that** said main assembly comprises a

drive unit for at least one main rotating shaft, at least one pair of pushers being functionally associated with said main shaft and acting along respective predefined paths, which comprise a common active portion, covered in different respective active steps during an idle step of each one of said lines, and a return portion, which is different from said active portion, for the return of each one of said pushers to the initial position of said active portion, said active portion intersecting said first supply line and leading to said second supply line, for the movement of the products and their insertion in the containers.

[0021] Further characteristics and advantages of the invention will become better apparent from the description of a preferred but not exclusive embodiment of the packaging apparatus according to the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a schematic plan view of the packaging apparatus according to the invention;
Figure 2 is a schematic side elevation view of a first detail of the packaging apparatus according to the invention;
Figure 3 is a schematic front elevation view of a second detail of the packaging apparatus according to the invention.

[0022] With reference to the figures, the packaging apparatus according to the invention, generally designated by the reference numeral 1, is of the type of cartoning machines and the like and comprises a first supply line 2 for supply of products A to be packaged, preferably (but not exclusively) of the type of pouches, blister packs, bottles, vials and the like, and a second supply line 3 for supply of containers B shaped substantially like a parallelepiped, such as cases, boxes, made of polymeric material, paper, cardboard, et cetera.

[0023] According to a preferred application of the apparatus 1, to which reference shall be made constantly in the continuation of the present description, the apparatus 1 is designed therefore to be applied in the field of automatic machines designed to package products A in a case.

[0024] In even greater detail, the apparatus 1 is suitable for packaging products A constituted by primary containers (such as those listed above) of cosmetics, foods and/or drugs which in turn have to be inserted in secondary containers of the type of cases shaped substantially like a parallelepiped, in order to provide thus the final configuration in which consumers can subsequently find them on the market.

[0025] It should be noted that different applications of the apparatus 1 according to the invention (which are in any case within the protective scope claimed herein), for example in different industrial sectors or for handling and transferring different objects, if the specific application requirements make it possible and/or preferable, are not excluded.

[0026] Both the first line 2 and the second line 3 are movable according to an intermittent rule of motion and lead to a loading area 4, which is affected by a main insertion assembly 5, designed indeed for the insertion of the products A in the containers B.

[0027] The accompanying figures illustrate a constructive solution (which does not limit the application of the invention) which has a first supply line 2 and a second supply line 3 arranged mutually parallel. The products A and the containers B therefore advance side by side (according to an intermittent rule of motion), up to the loading area 4, at which, as will be shown hereinafter, the main assembly 5 transfers the products A inserting them in the containers B.

[0028] According to the invention, the main insertion assembly 5 comprises a drive unit (for example an electric motor) for at least one main rotating shaft 6. At least two pushers 7 are functionally associated with the main shaft 6 (used also for moving the supply lines 2, 3) and act according to respective predefined paths.

[0029] The predefined paths comprise a common active portion, which is covered in different respective active steps while the supply lines 2, 3 are in an idle step.

[0030] The active portion intersects the first supply line 2, in order to allow the movement of the products A, and leads to the second supply line 3, in order to ensure the insertion of the products A in the containers B.

[0031] According to the preferred solution, proposed in the accompanying figures by way of non-limiting example of the application of the invention, the active portion is substantially constituted by a rectilinear portion which is perpendicular to the advancement direction of the first supply line 2 and of the second supply line 3.

[0032] Each predefined path comprises moreover a return portion, which is different from the active portion, for the return of each pusher 7 to the initial position of the active portion, rearranging it therefore in the cycle start configuration.

[0033] It is therefore clear already that the possibility to move, by means of the same drive unit, a pair of pushers 7 that cover in different active steps the same active portion enables to obtain high productivities (as will be better described hereinafter) even in an apparatus 1 that operates according to intermittent logic criteria, thus achieving the intended aim.

[0034] With further reference to the preferred solution, which is not exclusive, the return portion (substantially identical for the two pushers in the preferred but not exclusive solution) is substantially constituted by a curvilinear portion along which each pusher 7 rises and returns toward the initial position of the active portion, allowing at the same time the other pusher 7 to cover in turn the active portion.

[0035] It should be noted, moreover, that the first supply line 2 and the second supply line 3 may be sufficiently spaced to allow the translation (parallel to the movement of the products A and the containers B) of a hopper C for guiding the products A into the containers B.

[0036] At the transit of the pushers 7 along the active portion (which comprises therefore also an intermediate space between the two lines 2, 3, designed to accommodate the hopper C), the guiding hopper C may conveniently arrange itself along the active portion, substantially facing the container B, in order to facilitate the insertion of the product A and prevent an unwanted subsequent exit thereof.

[0037] In greater detail, the hopper C can be constituted by one or more lateral panels which oscillate elastically and are kept substantially in a frustum-like idle configuration, to define a passage opening, directed toward the containers B, that is smaller than the transverse space occupation of the products A.

[0038] The products A, pushed by the pusher 7, can therefore cause the elastic rotation of the panels, which thus allow the passage of the products A for their insertion into the containers B (guiding in practice their motion).

[0039] After the passage, the elastic reaction determines the return of the panels to the idle configuration, in which, due to the reduced passage opening, they hinder and prevent an unwanted escape of the product A that has just been inserted in the container B (for example due to the bouncing of the product on the opposite wall of the container B).

[0040] Conveniently, the main shaft 6 is associated with an actuation assembly 8 for the pushers 7, capable of moving them in a guided manner, converting therefore the rotary motion of the main shaft 6 into the one already described of the pushers 7 along the predefined paths.

[0041] According to a constructive solution of considerable practical interest, mentioned by way of non-limiting example of the application of the invention, each pusher 7 comprises a slider 9, which can slide on a respective bar 10 that can oscillate about a fulcrum 10a associated with an end segment thereof, substantially pivoted to a component 11 of the frame of the packaging apparatus 1.

[0042] Each slider 9 is coupled to the actuation assembly 8 and supports, at the opposite end with respect to the above mentioned fulcrum 10a, a protrusion 12 provided with a plate 13, which can be moved substantially along the active portion.

[0043] When the plate 13 moves (substantially by translation) along the active portion, it is capable of affecting the first line 2, crossing the intermediate space in which the hopper C may be arranged, until it faces the second line 3 (and the lines 2, 3, indeed to allow the passage of the plate 13 and of the protrusion 12, are, as already noted, kept in the meantime in the idle condition), in order to push each product A up to its insertion in the respective container B.

[0044] In order to control and guide the motion of the pushers 7 (and particularly of the sliders 9) along the predefined paths, the actuation assembly 8 comprises a pair of first cams 14, which are keyed on a first auxiliary rotating shaft 15, which in turn is associated by way of transmission means with the main shaft 6. For example, and with reference to the solution shown in Figure 2, the transmission means can be constituted by at least one roller chain 16 wound around the main shaft 6 and at least the first auxiliary shaft 15.

[0045] Two tension members 17 are coupled, at a first end 17a which rotates jointly with the first auxiliary shaft 15, to the first auxiliary shaft 15 introduced above. For example, the first end 17a can be provided with a slot capable of accommodating a pivot 18 which is fixed to a face of the respective first cam 14.

[0046] The tension members 17 are pivoted, at their second end 17b, which is opposite the first one, to respective cranks 19, which rotate about a second auxiliary shaft 20 and are coupled, moreover, to a respective slider 9 of a corresponding pusher 7. In this manner, each crank 19 is capable of actuating the sliding of the respective slider 9 along a corresponding bar 10.

[0047] In greater detail, the cranks 19 may be constituted for example by three portions having a rectangular cross-section which are joined substantially in a triangular shape, as in the accompanying Figure 2, in which one of the three portions is extended until it surrounds the respective slider 9.

[0048] Moreover, the actuation assembly 8 comprises a pair of first arms 21, which are associated with respective first rollers 22 which can slide along the profile of a corresponding first cam 14 and are coupled at the opposite end to a corresponding bar 10. The first arms 21 can thus control the oscillation of the corresponding bar 10 about the fulcrum 10a.

[0049] Moreover, as can be seen from Figure 2, each first roller 22 is kept pushed elastically against the respective profile of a first cam 14. This configuration may be provided for example by using a pair of first traction springs 23, anchored respectively at one end to a fixed frame 24 and at the opposite end to the corresponding first roller 22.

[0050] In this manner, the rotation of the main shaft 6 determines the motion of the cranks 19 and of the first arms 21 (which also are part of the actuation assembly 8), which in turn control respectively the sliding of the slider 9 and the oscillation of the corresponding bar 10 and therefore, due to the combination of the two movements, define the rule of motion of the pushers 7 to which they are coupled, thus moving them along the respective predefined path.

[0051] Conveniently, the packaging apparatus 1 according to the invention comprises a secondary assembly 25 for inserting into the containers B instructions, information leaflets, illustrative sheets, objects having a substantially laminar shape in general (typically, but not exclusively, made of paper-like material), which is coupled to the actuation assembly 8, so as to allow its guided movement as a consequence of the rotation of the main shaft 6.

[0052] More particularly, in the constructive solution shown in the accompanying figures by way of non-limiting example of the application of the invention, the secondary

assembly 25 comprises a pair of sliding elements 26, each one of which can slide along a respective bar 10. The sliding elements 26 support a blade 27, which can move substantially along the active portion, substantially above the plates 13 and along a direction for affecting each instruction, information leaflet, illustrative sheet, laminar object in general, fed to the loading region 4 by a respective feeder.

[0053] In greater detail, the feeder supplies the objects cited above according to an orientation which is perpendicular to the orientation of the blade 27 and of its advancement direction, so that the latter, by moving substantially simultaneously with the pusher 7, can push and in the meantime fold the objects cited above until they are inserted in the respective container B. In the container B, the instructions or the other objects having a laminar shape are introduced substantially by interposition between the latter and the corresponding product A (in the configuration in which they are folded in a U-shape around the product A, in which the consumer typically finds them commercially).

[0054] In particular, with reference to the preferred constructive solution, in order to allow the desired movement of the sliding elements 26 and therefore of the blades 27, the second auxiliary shaft 20 also is associated by means of the already cited transmission means (and for example by means of the roller chain 16) with the main shaft 6, so as to give it the possibility of rotation about its own axis. Moreover, the actuation assembly 8 comprises a pair of second cams 28, which are keyed on the second auxiliary shaft 20, which rotates, and a pair of second arms 29, which are pivoted by means of a central segment 29a thereof to a respective crank 19. Each second arm 29, provided with a discontinuous profile, has, at a first end segment 29b, a respective second roller 30, which can slide along the profile of a corresponding second cam 28, and is pivoted, at the opposite end, to a respective rod 31, which is connected to a corresponding sliding element 26.

[0055] For example, Figure 2 proposes a constructive solution which entails the use of second arms 29 constituted by a first end segment 29b and a second end segment 29c (pivoted indeed to the rod 31), which are substantially rectilinear and connected in a V-like shape at the central segment 29a.

[0056] It should be noted, moreover, that each second roller 30 also is kept pressed elastically against the profile of the respective second cam 28, due to the action of a corresponding second traction spring 32.

[0057] Each second spring 32 is therefore anchored at one end to the fixed frame 24 and at the opposite end to the corresponding second roller 30.

[0058] Moreover, the possibility is not excluded of providing packaging apparatuses 1 according to the invention which are provided with a feeder, in which the insertion of the instructions in the containers B is entrusted to different types of device or, more simply, is obtained by making the products A themselves entrain the instructions during their translation toward the containers B.

[0059] Conveniently, according to the preferred (but not exclusive) constructive solution, the packaging apparatus 1 according to the invention comprises (as can be seen particularly in Figure 3) an assembly 33 for picking up and depositing the containers B from a magazine 34 to the second supply line 3.

[0060] In the magazine 34 the containers B are preferably but not exclusively arranged in a folded laminar configuration and are picked up in this configuration by the pick-up and deposition assembly 33 (according for example to the methods that will be described in the paragraphs that follow), to be then placed on the second supply line 3 in the final (box-like) configuration and opened laterally in order to receive at least the products A (and optionally the instructions or other similar objects, as shown in the previous paragraphs).

[0061] In particular, the pick-up and deposition assembly 33 comprises a disk 35, which faces and is proximate to the magazine 34 and to an initial portion of the second supply line 3. The disk 35 is associated with a supporting and guiding device 36 (which belongs to the pick-up and deposition assembly 33) for at least one pneumatic grip unit 37 (which comprises for example one or more suckers 37a), adapted to pick up and transfer a container B from the magazine 34 to the initial portion.

[0062] Moreover, along the path of the grip unit 37, between the magazine 34 and the initial portion, there is at least one unit for opening the containers B automatically, in order to ensure their automatic transition from the folded laminar configuration to the final configuration.

[0063] More precisely, the disk 35 has a plurality of slotted profiles (for example three, as in the accompanying figures), which are provided on at least one of its faces, and a respective third roller 38 can slide in a guided manner along each slotted profile.

[0064] The supporting and guiding device 36 comprises therefore a supporting plate 39 for the grip unit 37, which is articulated to the third rollers 38. The guided sliding of the third rollers 38 in the corresponding slotted profiles thus causes the movement of the grip unit 37, which therefore can move and modify its own orientation in order to arrange itself in the optimum configuration both for picking up the containers B from the magazine 34 and for depositing them, subsequently, on the initial portion of the second supply line 3.

[0065] Moreover, between pick-up and deposition the path of the grip unit 37 affects the opening element, which can be constituted for example by at least one suction bar 40 provided with a sucker unit. The arrangement of the suction bar 40 is such that the containers B, still in the laminar configuration, rest on the suction bar 40, and the grip of the sucker units is such as to open the containers B, bringing them to the final configuration in which they are deposited on the second supply line 3.

[0066] However, it is noted that the possibility to provide packaging apparatuses 1 in which the operations for depositing on the second supply line 3 the containers

B are entrusted to different types of device or are simply obtained by gravity is not excluded.

[0067] Operation of the packaging apparatus according to the invention is as follows.

[0068] As already described in the previous paragraphs, the pushers 7, which can move along the predefined paths, are capable of pushing (while they cover the common active portion of the predefined path) the products A into the containers B, thus providing the desired packaging. In the meantime, the blades 27 insert the instructions, information leaflets, or other similar objects into the containers B as well.

[0069] In greater detail, the rotation of the main shaft 6 determines, thanks to the presence of the roller chain 16, the rotation of the first auxiliary shaft 15 and of the second auxiliary shaft 20.

[0070] The first cams 14 thus move jointly with the first auxiliary shaft 15, and likewise the second cams 28 are turned jointly with the second auxiliary shaft 20. The profiles of the first cams 14 and of the second cams 28 (as well as the sizing of the various elements involved) are specifically studied in order to give the desired rule of motion to the pushers 7 (designed to insert the products A in the containers B) and to the sliding elements 26 (which support the blades 27 that introduce the instructions in the containers B). In particular, it is possible to size the elements listed above in order to give a rectilinear motion to the pushers 7 along the active portion, and a curvilinear motion during the return portion, separate from the previous one.

[0071] In even greater detail, as regards the guided motion of the pushers 7, the rotation of the first cams 14 causes the movement of the first rollers 22 that slide along their profile, and this makes it possible to move according to the desired rule of motion the first arms 21, which are associated with the bar 10 on which the slider 9 slides, the slider 9 in turn supporting the plate 13 that pushes the products A. The bar 10, and therefore the slider 9, can thus rise and descend upon the movement of the first rollers 22.

[0072] Moreover, the tension members 17 are associated with the first cams 14 according to the methods already described and determine the oscillation of the cranks 19 about the rotation axis defined by the second auxiliary shaft 20. The cranks 19 are connected in turn to the slider 9 and the combination of the movements of the cranks 19 and of the first arms 21 makes it possible to give the pushers 7 the desired predefined path, which is composed, as mentioned, of a rectilinear active portion and a curvilinear return portion, in which the pusher 7 rises and in practice clears space so that the other pusher 7 acts.

[0073] Instead, as regards the secondary assembly 25, and therefore the sliding elements 26 and the blades 27, as shown, the rods 31, connected to the sliding elements 26, are coupled to second arms 29, the movement of which is defined by second rollers 30 which can slide on the profile of the second cams 28.

[0074] Therefore, the rods 31 and the sliding of the sliding elements 26 substantially on the bars 10 determine the rule of motion of the blades 27.

[0075] From what has been described in the previous pages it can be seen, therefore, that each full rotation of the main shaft 6 determines, besides the advancement by one spacing of the supply lines 2, 3, also the movement of the first auxiliary shaft 15 and of the second auxiliary shaft 20.

[0076] In greater detail, by means of a suitable sizing, it is possible to obtain a transmission ratio such that for every two rotations of the main shaft 6 there is one rotation performed for each auxiliary shaft 15, 20 (which therefore move more slowly together with all the elements connected to them). Since each auxiliary shaft 15, 20 is capable of actuating the motion of two pushers 7 and of two blades 27 which move substantially in phase opposition, upon each rotation of the main shaft 6 alternately one of the two pushers 7 performs an insertion cycle and one of the two blades 27 introduces an instruction sheet (or the like) into the container B.

[0077] It is therefore possible to ensure high productivity (by imposing high rotation rates only to the main shaft 6, which determines the pace with which the supply lines 2, 3 advance) while keeping low the rates of the elements of the actuation assembly 8 (which are moved by the auxiliary shafts 15, 20, which move, for example, at half the rate of the main shaft 6).

[0078] In practice, each pusher 7 covers the active portion while the auxiliary shafts 15, 20 rotate through approximately 180°, and therefore the packaging of two products A is obtained by means of a total rotation through 360°.

[0079] Thus, the packaging apparatus 1, which operates as shown according to intermittent operating logic criteria, allows the packaging of a large number of products A (for example, up to 200-300 cycles/minute, without thereby stressing excessively neither the moving parts nor the products A) and ensures therefore high productivities, absolutely higher than those normally obtainable with intermittent automatic machines of the known type.

[0080] It is in fact useful to note that this result is absolutely an improvement with respect to apparatuses of the known type (the volumes and dimensions of which, however, can be maintained easily), where an increase in performance would require an increase in the operating speeds and stresses of all the involved elements, and usually a pusher which moves with an alternating rectilinear motion along the active portion, forcing therefore the supply line to maintain itself motionless both during the forward stroke and during the return stroke, then forcing the latter to perform a very quick forward movement in the remaining part of the cycle, without achieving high productivities.

[0081] As already noted, the presence of the assembly 33 for picking up and deposing the containers B enables to move the containers in an effective manner, providing at the same time their transition from the folded laminar

configuration to the final configuration.

[0082] In greater detail, the motion of the plate 39 that supports the grip unit 37 (for example that comprises suckers 37a) is achieved by means of the sliding in respective slotted profiles of third rollers 38, associated indeed (by means of respective third arms 41, for example) with the plate 39.

[0083] The packaging apparatus 1 therefore combines intermittent operation logic criteria (considering for example the supply lines 2, 3) with productivities that can be achieved typically by continuous machines. For example, as shown, the packaging apparatus 1 is capable of reaching up to 200-300 cycles/minute, and in the performance segment comprised between 100 cycles/minute and 200 cycles/minute, in which it is not excessively stressed, it ensures an optimum operation.

[0084] In addition, indeed because of the use of intermittent logic criteria that manage most of the mechanisms, the volumes and the structural complexity remain absolutely modest, in alignment with intermittent machines of the known type (which have, however, very modest performance).

[0085] In practice it has been found that the packaging apparatus according to the invention fully achieves the intended aim, since the use of a pair of pushers that act according to respective predefined paths, which comprise a common active portion that is covered in different respective active steps and intersects the supply lines of the products and of the containers that move by intermittent motion, and a return portion, different from the active portion, allows the movement of the products and their insertion into the containers, ensuring at the same time high productivity.

[0086] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims. All the details may further be replaced with other technically equivalent elements.

[0087] In the exemplary embodiment shown, individual characteristics, given in relation to specific examples, may actually be interchanged with other different characteristics that exist in other exemplary embodiments.

[0088] Moreover, it should be noted that anything found to be already known during the patenting process is understood not to be claimed and to be the subject of a disclaimer.

[0089] In practice, the materials used, as well as the dimensions, may be any according to requirements and to the state of the art.

[0090] The disclosures in Italian Patent Application No. BO2011A00026 from which this application claims priority are incorporated herein by reference.

[0091] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A packaging apparatus (1), of the type of cartoning machines and the like, comprising a first supply line (2) for supply of products (A) to be packaged, preferably of the type of pouches, blister packs, bottles, vials and the like, and a second supply line (3) for supply of containers (B) shaped substantially like a parallelepiped, said first line (2) and said second line (3) being movable according to an intermittent rule of motion and leading to a loading area (4), which is affected by a main insertion assembly (5), designed for the transfer of each product (A) into a respective container (B), for its packaging, **characterized in that** said main assembly (5) comprises a drive unit for at least one main rotating shaft (6), at least one pair of pushers (7) being functionally associated with said main shaft (6) and acting along respective predefined paths, which comprise a common active portion, covered in different respective active steps during an idle step of each one of said lines (2, 3), and a return portion, which is different from said active portion, for the return of each one of said pushers (7) to the initial position of said active portion, said active portion intersecting said first supply line (2) and leading to said second supply line (3), for the movement of the products (A) and their insertion in the containers (B).

2. The packaging apparatus according to claim 1, **characterized in that** said main shaft (6) is associated with an actuation assembly (8) for said pushers (7), for their guided movement, following the rotation of said main shaft (6), along said predefined paths.

3. The packaging apparatus according to claims 1 and 2, **characterized in that** each one of said pushers (7) comprises a slider (9), which is slidable on a respective bar (10) able to oscillate about a fulcrum (10a) associated with an end segment thereof, each one of said sliders (9) being coupled to said actuation assembly (8) and supporting, at the opposite end with respect to said fulcrum (10a), a protrusion (12) provided with a plate (13) movable substantially along said active portion, in order to push each product (A) until it is inserted in the respective container (B).

4. The packaging apparatus according to one or more of the preceding claims, **characterized in that** said actuation assembly (8) comprises a pair of first cams (14), which are keyed on a first auxiliary rotating shaft (15) associated by transmission means with said main shaft (6), two tension members (17) being coupled to said first auxiliary shaft (15) at a first end (17a)

of said members (17) which rotates jointly with said first auxiliary shaft (15), said tension members (17) being pivoted, at the second end (17b), opposite the first one, to respective cranks (19), which rotate about a second auxiliary shaft (20) and are coupled to a respective slider (9) of a corresponding pusher (7), for the actuation of the sliding of said slider (9) along a corresponding bar (10), said actuation assembly (8) comprising a pair of first arms (21), which are associated with respective first rollers (22) which can slide along the profile of a corresponding said first cam (14) and are coupled at the opposite end to a corresponding bar (10), for the actuation of its oscillation about said fulcrum (10a).

5. The packaging apparatus according to one or more of the preceding claims, **characterized in that** it comprises a secondary assembly (25) for inserting in the containers (B) instructions, information leaflets, illustrative sheets, objects having a substantially laminar shape in general, which is coupled to said actuation assembly (8), said secondary insertion assembly (25) being coupled to said actuation assembly (8), for its guided movement as a consequence of the rotation of said main shaft (6).

6. The packaging apparatus according to claim 5, **characterized in that** said secondary assembly (25) comprises a pair of sliding elements (26) slidable along respective said bars (10), said sliding elements (26) supporting a blade (27) movable substantially along said active portion, substantially above said plates (13) and along a direction for affecting each instruction, information leaflet, illustrative sheet, laminar object in general, fed to said loading region (4) by a respective feeder, in order to push each one of them until they are inserted in the respective container (B), substantially in interposition between the latter and the corresponding product (A).

7. The packaging apparatus according to one or more of the preceding claims, **characterized in that** said second auxiliary shaft (20) is associated, through said transmission means, with said main shaft (6) for its possibility to rotate about its own axis, said actuation assembly (8) comprises a pair of second cams (28), which are keyed on said second auxiliary rotating shaft (20), and a pair of second arms (29), which are pivoted with a central segment (29a) thereof to respective said cranks (19), each one of said second arms (29), provided with a discontinuous profile, having, at a first end segment (29b), a respective second roller (30), slidable along the profile of a corresponding said second cam (28), and being pivoted, on the opposite side, to respective rods (31), which are connected to said sliding elements (26).

8. The packaging apparatus according to one or more of the preceding claims, **characterized in that** it comprises an assembly (33) for picking up and depositing the containers (B) from a magazine (34), in which the containers (B) are accommodated in a folded laminar configuration, to said second feeding line (3), in which the containers (B) are conveyed in the final configuration and are open laterally in order to receive at least the products (A).

9. The packaging apparatus according to claim 8, **characterized in that** said pick-up and deposition assembly (33) comprises a disk (35), which faces and is proximate to said magazine (34) and to an initial portion of said second feeding line (3), said disk (35) being associated with a supporting and guiding device (36) for at least one pneumatic grip unit (37), adapted to pick up and transfer a container (B) from said magazine (34) to said initial portion, along the path of said grip unit (37), between said magazine (34) and said initial portion there being at least one unit for opening the containers (B) automatically, for their automatic passage from the folded laminar configuration to the final configuration.

10. The packaging apparatus according to one or more of the preceding claims, **characterized in that** said disk (35) has a plurality of slotted profiles, provided along at least one of its faces, a respective third roller (38) being able to slide in a guided manner along each slotted profile, said supporting and guiding device (36) comprising a supporting plate (39) for said at least one grip unit (37), which is articulated to said third rollers (38), the guided sliding of said third rollers (38) in the corresponding said slotted profiles causing the movement of said at least one grip unit (37) to pick up the containers (B) from said magazine (34) and deposit them on said initial portion of said second feeding line (3).

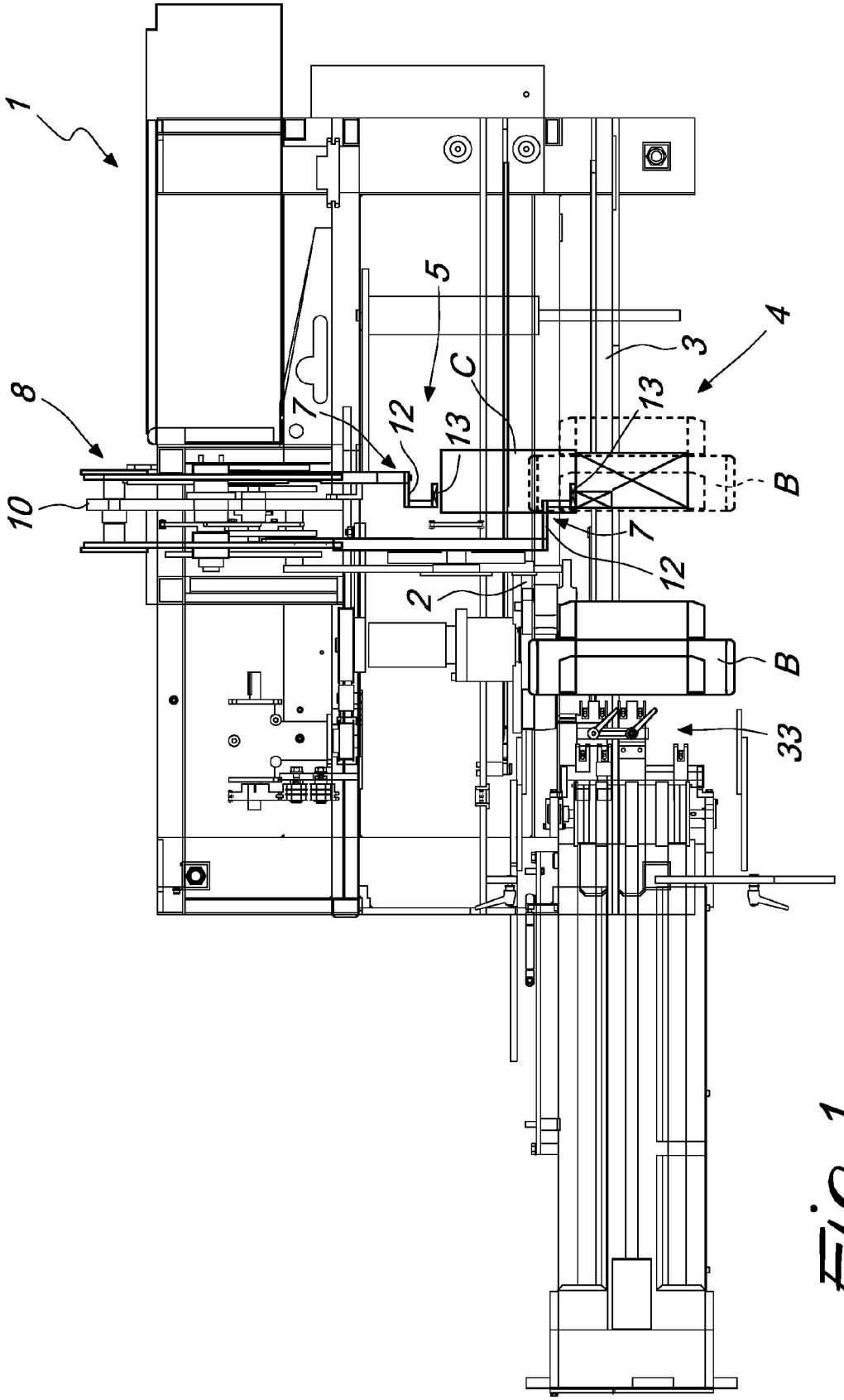
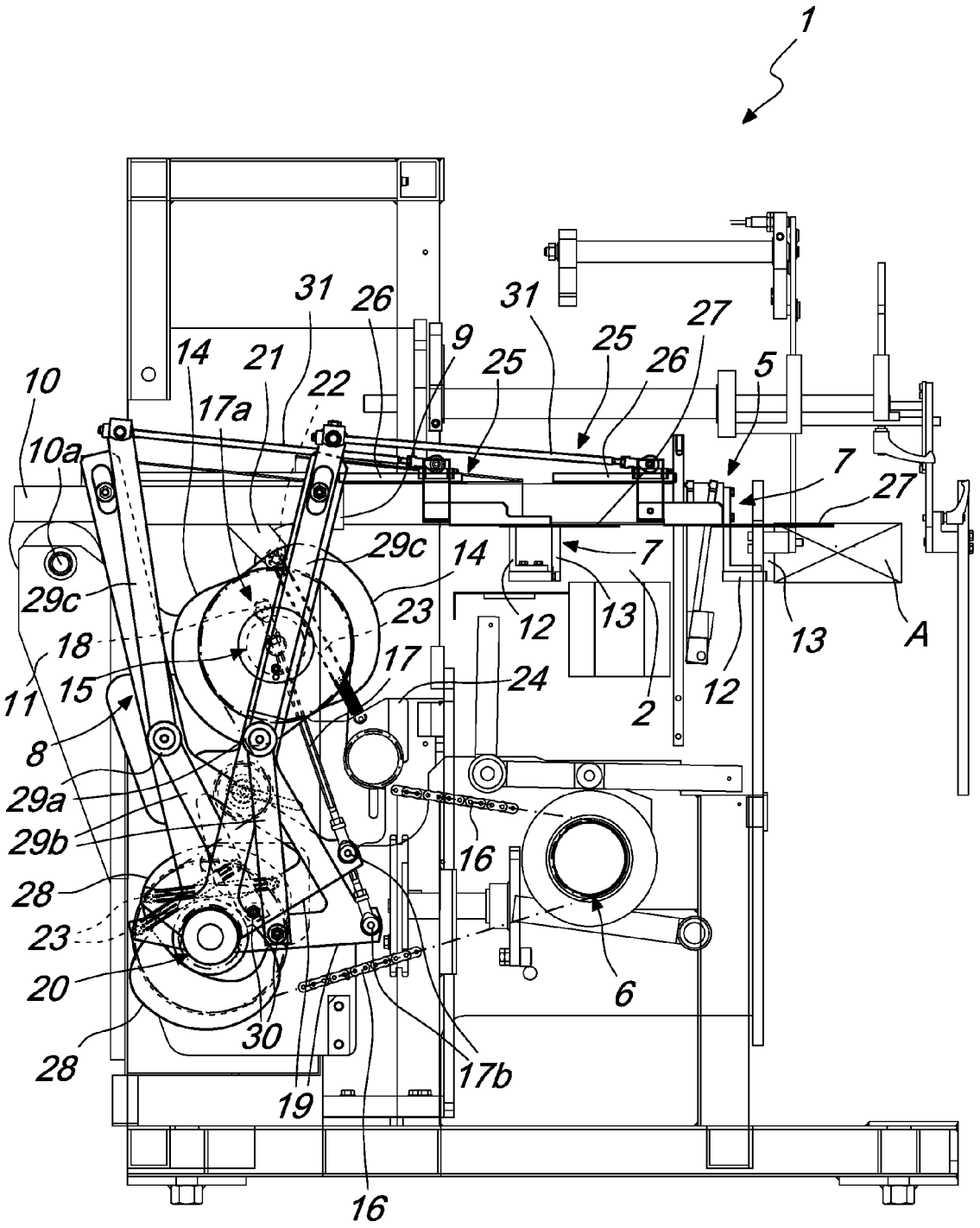


Fig. 1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14
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29c
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29a
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17b
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Fig. 2

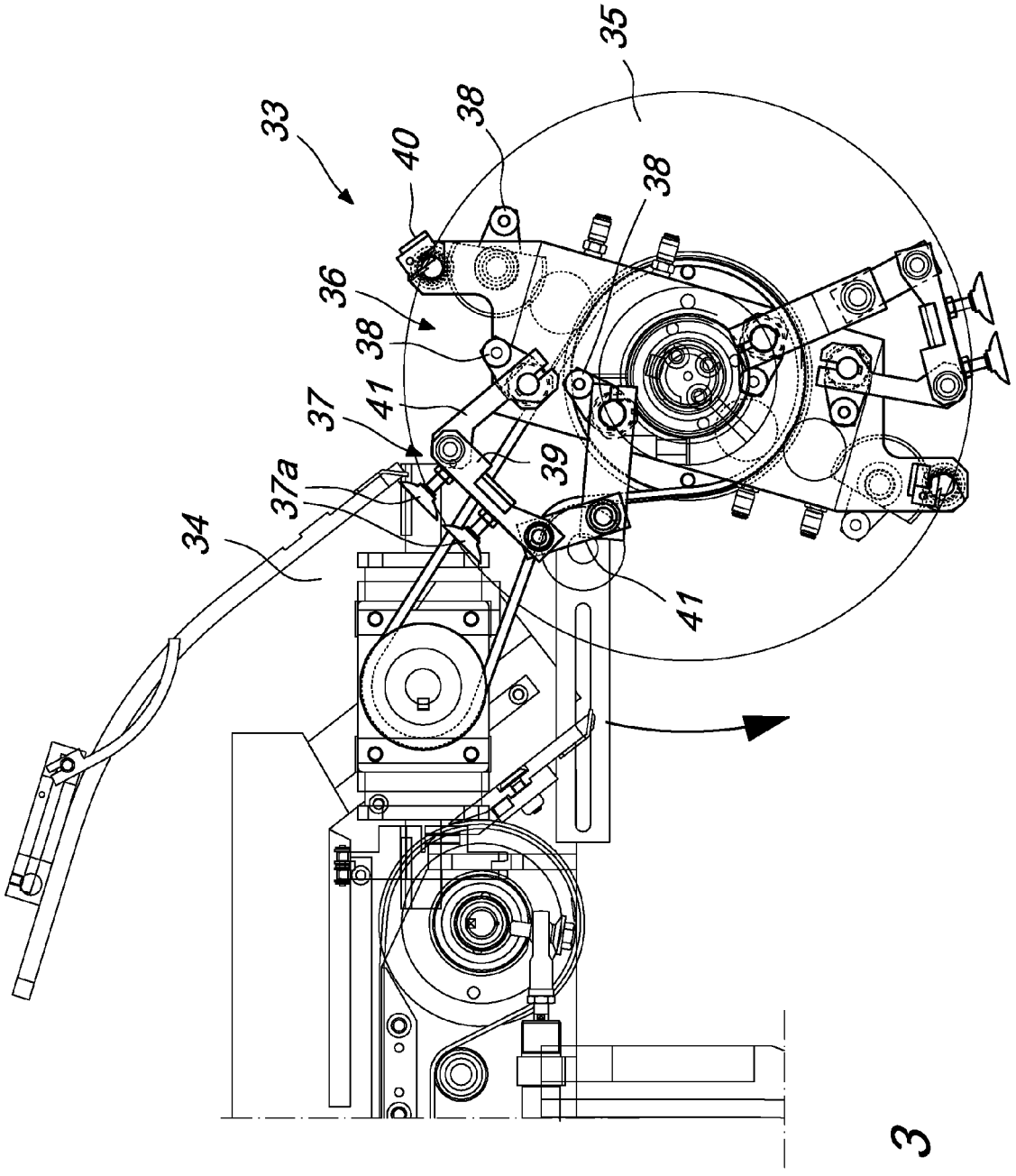

Fig. 3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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