METHOD AND APPARATUS FOR THE OPENING AND FILLING OF FLEXIBLY SIDED CONTAINERS SUCH AS BAGS HAVING AT LEAST ONE OPENING THEREIN

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ABSTRACT
A method and apparatus for the opening and filling of flexibly sided containers such as bags having at least one opening therein. The abstract of the disclosure is submitted herewith as required by 37 C.F.R. §1.72(b). As stated in 37 C.F.R. §1.72(b): A brief abstract of the technical disclosure in the specification must commence on a separate sheet, preferably following the claims, under the heading “Abstract of the Disclosure.” The purpose of the abstract is to enable the Patent and Trademark Office and the public generally to determine quickly from a cursory inspection the nature and gist of the technical disclosure. The abstract shall not be used for interpreting the scope of the claims. Therefore, any statements made relating to the abstract are not intended to limit the claims in any manner and should not be interpreted as limiting the claims in any manner.
METHOD AND APPARATUS FOR THE OPENING AND FILLING OF FLEXIBLY SIDED CONTAINERS SUCH AS BAGS HAVING AT LEAST ONE OPENING THEREIN

CONTINUING APPLICATION DATA


BACKGROUND

[0002] 1. Technical Field

[0003] The present application relates to a method and apparatus for the opening and filling of flexibly sided containers such as bags having at least one opening therein.

[0004] 2. Background Information

[0005] Background information is for informational purposes only and does not necessarily admit that subsequently mentioned information and publications are prior art.

[0006] The present application relates to a device for the treatment of flexible, tubular structures, for example bags, with at least one gripper pair holding the structure and having at least one leading gripper and one trailing gripper, whereby the leading gripper and the trailing gripper are mounted on separate guide trains that can be moved relative to one another, and further whereby the two guide trains are each motor driven independently of one another, and whereby the guide trains are configured so as to be motor-displaceable relative to one another so as to vary a distance between the grippers and/or a distance between the gripper pairs. It is to be understood that the separate guide trains may be independently moved with one or at least one motor arrangement. A motor arrangement may comprise a motor and one or more clutch arrangements, rods, cams, or other devices to effectuate independent movement of the separate guide trains and be within the scope of the present application.

[0007] Some devices, to accept different bags of varying bag widths, the distance between the leading gripper and the trailing gripper is modified. This is done by means of a phase adjustment of the associated motors.

[0008] Furthermore, some devices for the treatment of flexible, tubular structures take a similar approach. Such machines are used to transfer bags to a processing station, for example, where these bags are filled in most cases with liquid or dry products.

[0009] To this end, the bags can be produced from flat sheets of wrapping material that is pulled off the roll and cut to form the individual bags. The individual bags are sealed at the end opposite the opening by e.g. thermal sealing, ultrasound or bonding or similar processes.

[0010] The device in question can, of course, also be used for the treatment of premade bags or similar flexible, tubular structures. The key point is that the structures or bags are forwarded for subsequent processing. This not only includes filling as described above, but also such things as the attachment of spouts, adapters and valves. The bags can also be contoured or labels, tags, tabs, etc., can be applied to the bags, finally, subsequent processing steps or treatment of the bags can include processes such as flushing with inert gas, sterilization or dust extraction.

[0011] Some horizontal, flat bag machines or bag sealing machines work with an internal double-rod gripper system, which holds the bag in position for processing while itself remaining stationary. In addition to this internal double-rod gripper system, there is also an external double-rod gripper system, which is powered and moves forward and back to grasp the respective bag. The bag is then transported and released, whereby the interaction between the two double-rod gripper systems moves the respective bag forward.

[0012] Some devices therefore turn to a complex solution that requires or desires a plurality of components. Furthermore, replacement of the grippers to retool the device for bags with a different exterior contour and/or different exterior dimensions is difficult and requires or desires time-consuming installation.

[0013] Added to this is that with the double-rod gripper systems described above, the individual bags must or should be repeatedly released and regrasped. When processing liquid products and the filled bags, this can result in the filled product spilling outward. A potential consequence of this is that the gripper no longer holds the bag securely and the bag drops off under its own weight.

[0014] But problems with the filling of such bags are not limited to liquid products, they also occur with dry products such as powders. This is generally due to the flexibility of the tubular bag and/or wrapping material, which results in imprecisions during grasping and the falling off of the bag.

[0015] With small bags with tight tolerances or larger bags with small fill openings, the mode of operation described above with the two double-rod gripper systems can even result in the bags no longer being properly centered relative to the respective filling nozzles. This results in metering errors because the filling nozzles miss the middle of the bag and meter product beside the respective bag.

[0016] Some devices for the treatment of flexible, tubular structures with at least one opening use a carousel equipped with grippers. A plurality of gripper pairs are provided over a relatively small diameter, which grippers hold and handle the bags at the two outer, vertical ends. As the radius of such machines increases, so does the speed of rotation, which results in very high centrifugal forces; these machines are thus limited with respect to transport speed. In addition, the generally small diameter of each carousel permits metering with at most two different metering devices or filling nozzles.

[0017] In practice, however, there is an increasing demand for more than two feeds, and thus a plurality of metering devices or filling nozzles is desired. Instant soups in bags, for example, desire at least three, if not even four or more, metering devices that fill noodles, dried vegetables, croutons and the actual soup powder into each bag to make an instant soup. Consistent or optimum quality with the desired proportions of the respective components can be essentially ensured or promoted by means of the individual feeds described above. In this example, this presumes at least four metering devices are provided at or above the device in question for the treatment of flexible, tubular structures with at least one opening, which is not possible with these devices with a gripper-equipped carousel. The present application seeks to alleviate these issues.
more, replacement of the grippers to retool the device for different bags is difficult and requires or desires time-con-
suming installation.

**OBJECT OR OBJECTS**

[0019] An object of the present application is to refine such a device for the treatment of flexible, tubular structures with at least one opening, for example bags, so as to enable simple and fast replacement of the gripper pairs and to provide sufficient space for the attachment of associated metering devices.

**SUMMARY**

[0020] To achieve this technical objective, the present application teaches a generic device wherein the leading gripper and the trailing gripper are mounted on separate guide trains that can be moved relative to one another.

[0021] In addition and in accordance with at least one possible embodiment according to the present application, to achieve this technical objective, a generic device within the scope of the present application is wherein there is a controller provided that shifts the respective leading gripper by a certain amount in the direction of transport and the respective trailing gripper by the same amount opposite the direction of transport so that the bag middle retains its position even in the event of a bag change. In at least one embodiment, the grippers may be moved in relation to one another while both are moving in a direction of transport.

[0022] According to the present application, the leading gripper is the gripper of a gripper pair that leads the gripper pair during the transport of a structure, whereas the trailing gripper follows the leading gripper and thus is the last gripper of the gripper pair relative to the direction of transport or the direction of travel of the grippers. The grippers can hold the respective structure or bag in any possible manner; for example, the grippers can be inserted into the opening, spreading the openings per frictional connection until the grippers rest against the walls of the bag. Of course, it is likewise within the scope of the present application if the grippers grab the respective bag or structure with clips, by suction, etc., typically with the leading gripper grabbing the front vertical end of the bag relative to the direction of transport or motion and the trailing gripper grabbing the corresponding rear vertical end.

[0023] Also covered by the present application is the case in which the bags are gripped by their side edges rather than at the opening as shown in this possible embodiment.

[0024] In detail, the two guide trains, which are moved relative to one another, are powered by a motor and independently of one another, whereby a separate drive for each guide train is in one possible embodiment to essentially ensure or promote the motion of the guide trains relative to one another described above.

[0025] In addition, in detail, the two guide trains, which are stationary relative to one another, are powered by a motor and independently of one another, whereby a separate drive for each guide train is in one possible embodiment to essentially ensure or promote the motion of the guide trains relative to one another described above. By means of this motion relative to one another, the present application essentially ensures or promotes that bags of very different sizes and correspondingly variable openings and/or fill openings and contours can be processed. According to the present application, what is required or desired when changing from one type of bag to another is to engage the motors of the guide trains such that the leading gripper and the trailing gripper are moved the same distances, with the leading gripper moving in the direction of transport and the trailing gripper moving opposite the direction of transport. However, it is to be understood that both the leading and trailing grippers may be moving in a direction of transport at different speeds and be moved with respect to one another. Presuming that the bags are mirror-symmetric relative to a plane passing through the middle of the bag, this procedure essentially ensures or promotes that the middle of the bag and thus the plane of symmetry in question remain unchanged during this procedure. The present application thus essentially ensures or promotes in this manner that metering devices located relative to the middle of the respective bag continue to meter product into the middle of the bag, including with bags of different dimensions.

[0026] The two guide trains are generally in the form of an endless loop and are also operated as such. Essentially, of course, two independently-driven endless loops are realized, because the two guide trains are laid out separately from one another. The guide trains themselves can have one or more conveying devices, such as belts, chains, etc., to which the leading grippers or trailing grippers are mounted separately and independently. In other words, the leading grippers are mounted on one guide train, the leading gripper train. The trailing grippers are likewise mounted on a single guide train, the trailing gripper train. As previously elucidated, both the leading gripper train and the trailing gripper train have their own motor drive and their own conveying devices.

[0027] Both guide trains or gripper trains and their motors are connected to a common controller that is responsible for the motion of the gripper relative to one another. A path of motion defined by the two guide trains or gripper trains is linear over at least one segment of defined length. This segment of defined length accounts for the requirements arising from the desire or need to meter different products or components into the structure of the bag. The length of the linear segment is defined as a function of the number of metering units, which are generally arranged linearly and in series.

[0028] Overall, the path of motion described by the two guide trains or gripper trains is an elongated circle. The two grippers are normally on the same side—the processing side—relative to the path of motion described by the guide trains. A front and a rear deflector for the grippers or the individual gripper pairs essentially ensure or promote that these continue to circulate around the elongated circular path.

[0029] As previously elucidated, the distance between the two grippers relative to one another generally corresponds to the width of the bag to be processed or the width of its opening or fill opening. Once a gripper pair has secured the bag to be processed, the bag is not released until it has been completely processed, e.g., filled to the required or desired level, has a label applied to it and possibly subjected to a dust extraction process. It is understood that the distance in question is stored in the aforementioned controller and can be called up when processing the bag in question. Other processing distances for the respective grippers are also stored in the controller.

[0030] As soon as a bag change is performed, for example, this corresponds to a different processing distance between the grippers or between two gripper pairs, which is queried in the controller. The controller also essentially ensures or promotes that the two grippers of each gripper pair are moved
apart in a reproducible manner, whereby it is also essentially ensured are promoted that a bag change does not result in a change in the respective bag middles. This essentially ensures or promotes that the bags are reproducibly centered under the corresponding metering unit with the middle of the bag in a fixed position. This enables the device to be retooled more or less by the push of a button in the event of a bag change, in that the processing distances corresponding to the new bags are queried in the controller and the controller also initiates the required or desired relative movement of the grippers of each gripper pair.

[0031] In at least one possible embodiment according to the present application, the two guide trains/gripper trains are arranged above one another when viewed from the side. This allows the mounting of the two grippers on mounting plates, from which they extend. The mounting plates themselves are mounted on the guide trains or gripper trains arranged one above the other when viewed from the side.

[0032] As described previously, the guide trains or gripper trains, and with them the leading gripper and the trailing gripper of each gripper pair, can be displaced relative to one another, in one possible embodiment by means of a motor, in that the motor of the leading gripper train and that of the trailing gripper train are actuated as specified by the controller for the respective bag. Of course, it is also possible and within the scope of the present application to manually adjust the guide trains or the gripper trains to adjust for a bag change. Both the manual and the motorized displacement of the gripper or guide trains relative to one another does more than make it possible to vary the distance between the grippers. The distance between the gripper pairs can also be selectively modified. This distance between the gripper pairs is also called the gripper pair gauge. Motorized and manual displacement can also be combined.

[0033] With the ability to adjust the gripper pair gauge, the present application takes into account requirements saying that a larger bag can and must or should be filled with two instead of four metering devices as was the case previously, for example. In such a case, a larger gripper pair gauge than before is usually used and possibly the speed of the guide trains or gripper trains increased. Naturally, the opposite approach is also plausible.

[0034] Because the grippers are in one possible embodiment non-permanently mounted on the guide trains or non-permanently mounted on their corresponding mounting plates, the device according to the present application can be easily retooled with other grippers. This further increases the flexibility and enables the device described to be used for almost any application. Another option is to divide the leading gripper train, the trailing gripper train or both into segments, which can be assembled into modules. This requires or desires transition stations, e.g., from one leading gripper train to the next leading gripper train, and also synchronization of the motion. That can be accomplished by the common controller.

[0035] The result is the provision of a device for the treatment of flexible, tubular structures with at least one opening, in one possible embodiment bags, with heretofore unknown flexibility. Indeed, very different bags or structures with varying openings or fill openings can be processed without the need or desire for any mechanical manipulation. Instead, the device is retooled essentially automatically in the event of a bag change by calling up the corresponding processing program in the controller. Finally, the grippers are simple to replace, thus easily facilitating various gripping applications.

[0036] The above-discussed embodiments of the present invention will be described further herein below. When the word “invention” or “embodiment of the invention” is used in this specification, the word “invention” or “embodiment of the invention” includes “inventions” or “embodiments of the invention”, that is the plural of “invention” or “embodiment of the invention”. By stating “invention” or “embodiment of the invention”, the Applicant does not in any way admit that the present application does not include more than one patentably and non-obviously distinct invention, and maintains that this application may include more than one patentably and non-obviously distinct invention. The Applicant hereby asserts that the disclosure of this application may include more than one invention, and, in the event that there is more than one invention, that these inventions may be patentable and non-obvious one with respect to the other.

BRIEF DESCRIPTION OF THE DRAWINGS

[0037] One possible embodiment of the present application is described in greater detail below illustrated with the accompanying drawings, in which:

[0038] FIG. 1 shows as perspective view of one section of the device according to the present application;

[0039] FIG. 1A shows detail references of the perspective view of the section of the device shown in FIG. 1;

[0040] FIG. 2 shows a side view of the device, partly in detail;

[0041] FIG. 3 shows a side view during a bag change; and

[0042] FIG. 4 is a block diagram showing a device according to the present application.

DESCRIPTION OF EMBODIMENT OR EMBODIMENTS

[0043] The figures show a device for the treatment of flexible, tubular structures with at least one opening that in this embodiment is suitable for the treatment of bags 1, but is not restricted thereto. Processing of the bags 1 means, for example, filling them by means of a metering device 2. Alternatively or in addition, this could also mean the application of labels, an overprint, contours, the application or attachment of spouts, adapters, valves, etc.

[0044] The basic configuration of the device comprises at least one gripper pair 3, 4, having a leading gripper 3 and a trailing gripper 4. One sees that the possible embodiment includes a plurality of leading grippers 3 and trailing grippers 4. Each bag 1 is secured and transported with the help of the associated gripper pair 3, 4. The gripper pair 3, 4 holds the bag 1 in question at its opening or fill opening.

[0045] In one possible embodiment according to the present application, the leading gripper or grippers 3 and the trailing gripper or grippers 4 are mounted on different guide trains or gripper trains 5, 6, which can be moved relative to one another. In fact, all are most of the leading grippers 3 are mounted on a leading gripper train 5, whereas, by way of exception, the trailing grippers 4 are mounted on a trailing gripper train 6 for the two guide trains or gripper trains 5, 6.

[0046] One sees that the leading grippers 3 in the direction of transport or direction of motion R of each gripper pair 3, 4 assumes a leading position, whereas the trailing grippers 4—as the name suggests—trail. So that the two guide trains 5, 6 can be moved or displaced relative to one another, the guide
trains 5, 6 are equipped with separate motorized drives 7, 8, which can be impinged independently of one another and are suggested in the figures. Of course, it is also within the scope of the present application to also work with one drive as long as this permits the independent impingement of the leading gripper train 5 on the one hand and the trailing gripper train 6 on the other.

[0047] The motorized drive 7 is a leading gripper train drive 7, which acts on the leading gripper train 5, whereas motorized drive 8 is configured as a trailing gripper train drive 8 and impinges the trailing gripper train 6. Both the leading gripper train drive 7 and the trailing gripper train drive 8 are realized in the embodiment as, but are not restricted to, electronic servomotors and are connected to a common controller 9.

[0048] Both guide trains 5, 6, are in the form of an endless loop, which in the possible embodiment has the form of an elongated circle. The path of motion in direction R defined in this manner by the two guide trains or gripper trains 5, 6 is linear over at least one segment T of defined length L. Indeed, this segment T of the defined length L allows for the number of metering devices 2 in this example, each of which is arranged in a fixed location.

[0049] So that the metering devices 2 and the associated processing points can fill the bags 1 without problems, it must or should be essentially ensured or promoted that the middle M of each bag or the center plane of the bag is positioned exactly or virtually exactly or generally below or above the metering devices 2 arranged along the path of motion as the bags circulate. By doing so, the bag 1 in this example can be processed or filled without problems even if bags 1 of different sizes, variable shapes or which otherwise differ from one another are to be treated.

[0050] As shown in FIG. 1A, metering device 2 comprises an upper material holding portion 35, having a funnel configuration in the embodiment shown, and a lower exiting portion 28 depending downward from material holding portion 35. Bags 1 are disposed with grippers 3 and 4 with the middle M of the opening in bag 1 substantially below exiting portion 28. The materials being metered into bag 1 may flow through exit portion 29 by gravity into middle M of bag 1 as shown by material flow 29.

[0051] One sees that the two guide trains or gripper trains 5, 6 are arranged or run one above the other when viewed from the side and define the path of motion in question. The two guide trains 5, 6 can include one or more conveying devices such as belts, chains, etc., which are not expressly shown and can also be used in combination. The leading grippers 3 and the trailing grippers 4 are mounted separately and independently on the said conveying devices; in one possible embodiment, the leading grippers 3 on the conveying device of the leading gripper train 5 and the trailing grippers 4 on the respective conveying device of the trailing gripper train 6.

[0052] With the help of the controller 9, the distance A between the two grippers 3, 4 can be varied, e.g. in that the leading gripper train drive 7 impinges the leading gripper train 5 while the trailing gripper train 6 remains stationary. It is also possible to vary a distance B between the gripper pairs 3, 4. This distance B between the gripper pairs 3, 4 is also called the gripper pair gauge. By impinging the leading gripper train drive 7 on the one hand and the trailing gripper train drive 8 on the other, the controller can vary both the distance A between the grippers 3, 4 and the distance B between the gripper pairs 3, 4, or the gripper gauge, as a function of the size of the bag 1 to be processed in the example and the number of components desired, and thus the number of metering devices 2 for filling the bag 1.

[0053] In the event of a bag change, as long as the bags 1 are mirror-symmetric relative to a plane of symmetry running through the middle M of the bag (which is often the case), the controller 9 essentially ensures or promotes that the respective leading gripper 3 is shifted by a defined amount C in the direction of transport R, for example, and the corresponding trailing grippers 4 are moved by the same amount C in the direction opposite the direction of transport R. By means of this quasi symmetrical shift by the same amount C, the middle M of the bag retains its same position even in the event of a bag change, as is clearly illustrated in FIG. 3 for different bags 1 or for the case of a bag change.

[0054] Thus a bag change is performed more or less at the push of a button, in that the corresponding processing distances A and/or B for the respective bag 1 are queried in the controller and result in a corresponding actuation of the motors or drives 7, 8. In an embodiment, distances A and/or B may be changed with one or at least one motor arrangement. A motor arrangement may comprise a motor and one or more clutch arrangements, rods, cams, or other devices to change distances A and/or B. As is suggested in FIG. 2, the gripper pair gauge can also be modified by the insertion of corresponding spacers. This means that the distances A and/or B can be adjusted both by motor and manually. This accounts for bags 1 of different shapes in the event of a bag change, and also essentially ensures or promotes that the position of the middle M of the bags relative to the guide trains 5, 6 and thus to the metering devices 2 remains unchanged.

[0055] The grippers 3, 4 are mounted on mounting plates 11, 12, which are best seen in FIG. 1. The leading mounting plates 11 holding the leading grippers 2 are mounted on the leading gripper train 5. On the other hand, the trailing mounting plates 12 are mounted on the trailing gripper train 6. This can be done by bolting, riveting, etc. The grippers 3, 4 themselves are non-permanently attached to, and in this example suspended from, the respective guide trains or gripper trains 5, 6 or their associated mounting plates 11, 12.

[0056] The leading grippers 3 are mounted on conveying device 5 and the trailing grippers 4 are mounted separately and independently on conveying device 6 as shown in FIG. 1A. Specifically, grippers 3 are comprised of a leading jaw 24 and a trailing jaw 23 depending from a base 25. Grippers 4 are comprised of a leading jaw 44 and a trailing jaw 43 depending from a base 45. Base 25 is connected to gripping train 6 with mounting plate 12. Base 45 is connected to gripping train 5 such that bases 25 and 45 are positioned at a similar vertical height. Mounting plate 11 is connected to gripping train 5 and extends horizontally therefrom. Downwardly extending arm 46 connects horizontally extending arm 47 to mounting plate 11. Base 45 extends from extending arm 47 toward base 25.

[0057] Leading jaw 24 and/or trailing jaw 23 may be movable with respect to one another such that gripper 4 operates to grip bag 1 proximate trailing upper edge 32. The jaw(s) 23 and/or 24 may be moved with an electro mechanical motor or electronic servomotor and may be controlled with controller 9. Grippers 3 and 4 may be electromagnetic and/or may have one or more cams to effectuate gripping. Leading jaw 44 and/or trailing jaw 43 may be movable with respect to one another such that gripper 3 operates to grip bag 1 proximate leading upper edge 31. The jaw(s) 43 and/or 44 may be moved with an electro mechanical motor and may be controlled with controller 9. However, leading jaw 24 and trailing jaw 23 may
be biased toward one another wherein trailing side wall 34 of bag 1 may have upper edge 32 inserted therebetween. In a like manner, leading jaw 44 and trailing jaw 43 may be biased toward one another wherein leading side wall 33 of bag 1 may have upper edge 31 inserted therebetween. Such biasing may eliminate a need for a motor to grip bags 1. Jaws 23 and 24 of gripper 4 may have a throw or distance therebetween when separated to receive a portion of bag 1 to incorporate a tolerance in the position of edge 32 and jaws 43 and 44 of gripper 3 may have a throw or distance therebetween when separated to receive a portion of bag 1 to incorporate a tolerance in the position of edge 31. It is to be understood that grippers 3 and 4 may be configured to grip edges 31 and 32, respectively as shown in FIG. 1A, and may also be configured to grip bag 1 proximate seams 29 and 30. Alternatively, bag 1 may not have seams 29 or 30. Other and different grippers, as are known in the art, may be incorporated in embodiments of the present application.

[0058] For example, in an embodiment, grippers 3 and 4 such as those disclosed FIG. 6 of U.S. Pat. No. 4,108,300, incorporated herein by reference in its entirety, may be incorporated into embodiments of the present application. As shown in FIG. 6 therein, “the bag gripping claws 11 are composed of parts 11a to 11g. A movable claw 11a moves about a pin 11d against a resilient force of a compression spring 11c, and a fixed claw 11b is fixedly mounted on a slide block 11f together with a roller 11g by means of a bolt 11e. The slide block 11f is slidably supported on a rod-shaped attachment 13 of the chain conveyor 12. The empty bag 1 is gripped between the movable claw 11a and the fixed claw 11b by the resilient force of the compression spring 11c. Reference numerals 14 and 15 designate rails for guiding the chain conveyors 12, and numerals 16 and 17 designate guide rails for guiding the roller 11g. A pusher device 18 moves the gripping claws 11 in accordance with the geometrical decrease of the size W of the bag in FIG. 2 which occurs when the top mouth of the empty bag 1 is opened. The pusher device 18 moves the gripping claws 11 by moving the roller 11g and is integrally formed with a regulating table 19 which is integral with the rail 15. The piston rod of the pusher device 18 is adapted to be guided by the rail 15.” U.S. Pat. No. 4,108,300, column 2, lines 35 through 54.

[0059] Gripper 3 may be mounted to a base 25 and may comprise a leading jaw 23 and a trailing jaw 24. Gripper 4 may be mounted to a base 45 and may comprise a leading jaw 44 and a trailing jaw 43. One or both of the leading and trailing jaws may be biased toward each other.

[0060] In a possible embodiment, grippers 3 and 4 may have a configuration as disclosed U.S. Pat. No. 6,276,117, incorporated herein in its entirety. “Referring in greater detail to the clamps 60, 62 of the preferred embodiment with reference to FIGS. 13 through 15 illustrating an exemplary trailing clamp, it is seen that the trailing clamp includes a base 100 that mounts to the posts 94. The base 100 carries a pair of jaws 102, 104 which are pivotable relative to the base 100, via an arm 106. The jaws 102, 104 are pivotable relative to each other and biased towards each other by a spring clip 108 surrounding the jaws 102, 104. The movement of the jaw 102, 104 is controlled by two followers 110, 112 which are adapted to engage surfaces for actuating and controlling the position of the jaws 102, 104. A coil spring 114 biases the arm 106 towards a rest position. The inside jaw 102 is fixed to the arm 106 while the outside jaw 104 is movable with respect thereto. Upon proper actuation of the first follower 110, the outside jaw 104 is urged away from the inside jaw 102 against the action of the spring clip 108 such that the jaws 102, 104 are opened to a pick position as shown in FIG. 16 to receive an edge of a pouch therein. The pick position is utilized at the pick station 34 (FIGS. 5 through 9) to pick new unfilled pouches from a pouch supply. Once the edge of the pouch is between the opened jaws 102, 104, the first follower 110 is released to allow the spring clip 108 to close the jaws 102, 104 and pinch the pouch edge therebetween. At this point the pouch is closed. To assist in opening the pouch by providing slack in the pouch, the second follower 112 is actuated against the action of the coil spring 114 which pushes the arm 106 and the pair of jaws 102, 104 forward toward the leading clamp 60 as shown in FIG. 17. This shortens the distance between leading and trailing clamps 60, 62 and provides sufficient slack in the pouch such that the pouch remains open for filling operations (see reference number 36 in FIG. 5). Turning to further details of the leading clamp 60, it includes a base member 120 mounted to the mounting posts 94. The base member 120 projects beyond the periphery of the chain guides 76, 78 to support an upright arm 122 which projects vertically to the elevation at which the jaws 102, 104 of the trailing clamp 62 are located. Near the top end of the arm 122 at a similar elevation as the jaws 102, 104, resilient clips 124 are provided which are adapted to be opened to receive an edge of a pouch and closed to pinch the pouch in order to hold the edge of the pouch. The leading clamp 60 works cooperatively with the trailing clamp 62 to support a pouch.” U.S. Pat. No. 6,276,117, column 7, lines 6 through 49.

[0061] Comparing FIG. 1 and FIG. 3, one recognizes that the two grippers 3, 4 are on the same side, the processing side 13, relative to the path of motion defined by the guide trains or gripper trains 5, 6. In this way the metering devices 2 can be arranged linearly and in series one behind the other above the path of motion on this processing side 13, and the guide trains 5, 6 are largely protected against any fouling during metering. The linear course of the path of motion in the affected segment T also facilitates this arrangement. In fact, the metering devices 2 and the guide trains 5, 6 are aligned and in parallel or are aligned virtually parallel to one another, at least in this segment T.

[0062] Finally, FIG. 2 suggests that the two guide trains or gripper trains 5, 6 with the associated frame can be assembled modularly and consequently can be made up of various modules. This makes it possible to adapt the length and configuration of the device described to vastly different requirements. This includes the option of providing another, third train not shown here either above or below the two guide trains or gripper trains 5, 6. This third guide train or gripper train can be equipped with multiple pairs of dual grippers, so that two bags 1 can be processed simultaneously or substantially simultaneously. Of course, it also lies within the scope of the present application to place additional guide trains with corresponding grippers 3, 4 either above or below the two guide trains 5, 6, either as alternatives or as supplements.

[0063] Bag 1 may have seams 29 and 30 between panels 33 and 34 and may have a seam at the bottom between panels 33 and 34. Bag 1 may be tubular and may be without seams. Bag 1 may have only one seam or may have any plurality of seams. Bag 1 has an open top and at least substantially closed sides and bottom. Bag 1 may be comprised of a clear, see through, or opaque plastic material, a metallized material, or other materials as are known in the art for containing fill materials such as bulk goods.
Prior to bag 1 being gripped with grippers 3 and 4, whether being gripped proximate seams 29 and 30, between seams 29 and 30, or at other portions of bag 1, bag 1 needs to be opened. Bag 1 is opened with an apparatus configured to open bags as is known by one of ordinary skill in the art. For example, in one embodiment, bags 1 may be opened with an apparatus similar to that disclosed in FIG. 4 of U.S. Pat. No. 4,108,300. “Reference numerals 20, 20 designate vacuum suction cups for opening the top of the bag 1 for purpose of charging the bag 1 with the contents. The vacuum suction cups are mounted on levers 21, 21, which are in turn rockable about a fulcrum on a support shaft 22 in accordance with the opening state of the bag 1. The support shaft 22 is supported from the main body 8 in a vertically slidable manner, and the vacuum suction cups 20 are so composed that the vertical movement and the bag opening operation may be effected thereby. The gripping claws 11 are mounted on the rod-shaped attachment 13 of the chain conveyor 12 at a fixed pitch, and the chain conveyor 12 is conveyed by a drive sprocket 23 in the direction of advance as indicated by an arrow in FIG. 3, the conveying distance (one pitch being equal to P (FIG. 3)). The movement of the chain conveyors 12 is intermittent, and in the illustrated positions they are stopped. The drive sprocket 23 is rotated through a shaft 25 by an indexing device 24, while the input shaft of the indexing device 24 is connected via coupling means 27 to a power source such as a motor 26 or the like supported from the main body frame. U.S. Pat. No. 4,108,300, column 2, line 55 through column 3, line 8.

In an embodiment, the opening of bag 1 may be processed with a device similar to that disclosed in U.S. Pat. No. 6,276,117. “FIGS. 5 through 6 schematically illustrating the preferred embodiment, the endless carrier 28 generally picks up newly formed or otherwise supplied pouches at a pick station 34, opens the pouches at an opening station 35 (which includes a clamp distance shortening station 36 and a wedge forming station 37), fills the pouches with the desired material at a fill station 38, seals or otherwise closes the pouches at a closing station 39, seals the pouches at a seal station 40 and drops off the sealed and filled pouches at a drop station 42.” U.S. Pat. No. 6,276,117, column 4, lines 33 through 42. “To also maintain high rates of production, the sequence or configuration of the stations may also be changed. For example, vacuum machinery which pulls the sides of the pouches at the filling station 38 may be removed and replaced with a wedge opening station 37 located upstream of the filling station. A partly schematic illustration of the machinery used at the wedge opening station 37 is shown in FIG. 20. The machinery includes a bracket 156 which mounts on the support frame 26 that carries a wedge carriage 158 which includes a wedge 160 for forming a pocket in the pouch 22 prior to filling as schematically indicated by reference numeral 37 in FIG. 5. The carriage 158 is slidable and linearly translatable on guide rods 162 to move into and out of pouches. The carriage 158 is driven by the cycle shaft 33 in a conventional cycle such that the wedge 160 is driven into the pouch during the dwell time to form an opening or pocket therein. By eliminating the vacuuming step at the fill station 38, the minimum required dwell time is reduced thereby allowing for an increase in packaging production.” U.S. Pat. No. 6,276,117, column 9, lines 3 through 21.

An embodiment of an apparatus for filling bags as disclosed herein may comprise a first guide train 5 and a second guide train 6, each having a portion movable in a substantially parallel orientation. A first gripper 3 is disposed with the first guide train 5 and a second gripper 4 is disposed with the second guide train 6. Prior to bags 1 being gripped with grippers 3 and 4, they are opened and disposed for gripping. For example, a continuous roll of bags 1 may be unrolled, cut to separate into individual bags 1, opened, and placed with a portion between each pair of jaws of grippers 3 and 4. The bags may be opened by any means as is known in the art. For example, in an embodiment wherein bags 1 have seams 29 and 30, bags 1 may be gripped proximate seams 29 and 30 and moved together. The opening may be enhanced by blowing air into the opening of bag 1, using vacuum grippers on the sides of bag 1, or by inserting a wedge into bag 1. In an embodiment wherein bags 1 do not have seams, opening may be effected with vacuum, for example. The open bags 1 may then be positioned within grippers 3 and 4 for gripping with an arrangement configured to position bags 1 for gripping with grippers 3 and 4.

In an embodiment, jaws 23 and 24 of gripper 4 and jaws 43 and 44 of gripper 5 are separated by a sufficient throw or distance to incorporate tolerances in the positions of portions of bags 1 to be gripped. For example, jaw 23 of gripper 4 and jaw 43 of gripper 5 may both be extended by an amount such jaws 23 and 43 are proximate with the middle of the opening of bag 1. At the same time, jaw 24 of gripper 4 and jaw 44 of gripper 5 are moved in a direction away from the middle of the opening of bag 1.

An embodiment having an arrangement configured to position bags 1 may be incorporated with guide trains 5 and 6 or may be a separate arrangement. For example, the apparatus shown in FIG. 3 of U.S. Pat. No. 6,276,117 ("117") may open bags 1 and position a portion between jaws 23 and 24 and another portion between jaws 43 and 44. Each gripper 60 and 62 shown in FIG. 4 of "117 may be disposed with an extending arm 122. The extension of arms 122 may position a portion of bags 1 between jaws 23 and 24 and another portion between jaws 43 and 44. Bags 1 may be positioned within grippers 3 and 4 having an opening orthogonal, parallel, or oblique with the direction R of guide trains 5 and 6.

The positioning of the portions of bag 1 to be gripped with grippers 3 and 4, whether the portions be seams 29 and 30, upper edges 31 and 32, or portions of panels 33 and 34, may be detected with sensors, such as optical sensors. In at least one embodiment, optical sensors may detect the opening of bags 1, the positioning of portions of bag 1, the gripping of bags 1, and/or positioning of the middle M with respect to metering device 2 of bags 1. The data gathered by the optical sensors may be relayed to controller 9. Controller 9 may then relay commands to change positioning of bag 1, discard bag 1, suspend metering and/or change other or different processing parameters.

FIG. 4 shows a block diagram of at least one embodiment of the present application. Flexibly sided containers are fed at 50 to an arrangement 51 configured to open and dispose flexibly sided containers. Arrangement 51 may have grippers or may have vacuum or suction apparatuses, or may use other means as are known in the art to open and dispose flexibly sided containers for gripping. Arrangement 51 may be a part of filling apparatus 53 or may be a separate apparatus. Flexibly sided containers are fed at 52 to a filling station 53. Filling station 53 is configured to fill flexibly sided containers by first gripping and then disposing the flexibly sided containers under a filling apparatus. Gripping arrange-
ments 54 are opened and closed to grip portions of flexibly sided containers with an activating device 55 configured to open and close the gripping arrangements 54. Activating device 55 may comprise one or more electromagnetic motors, cams, rods, or other devices as are known in the art to move the jaws of the grippers of gripping arrangements 54 together for gripping and apart for releasing portions of flexibly sided containers. For example, each jaw of a gripper, each gripper, each pair of grippers, or a plurality of pairs of grippers may have an electromagnetic motor in communication therewith to effectuate gripping and releasing of flexibly sided bags with gripping arrangements 54. The flexibly sided containers are gripped and opened with gripping arrangements 54 and moved under a filling apparatus where they are filled with filling materials. The filling materials may include food items such as candies, for example gummi bears or jelly beans, snack items, for example pretzels or potato chips, or other food items. However, the flexibly sided containers may be filled with any liquid or solid materials such as bulk goods. The flexibly sided containers may be moved with one or more conveying arrangements. The conveying arrangements may be linear or in a loop configuration. The conveying arrangements may be moved with one or more motor arrangements 59. After filling, the flexibly sided containers are moved from filling station 53 at 56 where they may be further processed, for example closed, labeled, etc., at processing station 57. For example, the flexibly sided containers may be re closable bags that are closed with the application of pressure to each side of the closing structure at processing station 57. In an embodiment, the flexibly sided bags may be welded shut with the application of heat or otherwise thermally sealed, ultrasonically bonded, or otherwise closed by other means as is known in the art. For example, flexibly sided containers may be closed with an apparatus such as the device disclosed in United States Patent Application No. 2007/0101684, incorporated herein by reference in its entirety. Filled flexible containers exit the arrangement at 58.

[0071] An object of the present application is a device for the treatment of flexible, tubular structures with at least one opening, for example bags 1. This device is equipped with at least one gripper 3, 4 that holds the structure at its opening and that has at least one leading gripper 3 and one trailing gripper 4. According to the present application, the leading gripper 3 and the trailing gripper 4 are mounted on separate guide trains 5, 6 that can be moved relative to one another.

[0072] One feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in a device for the treatment of flexible, tubular structures, in one possible embodiment bags 1, with at least one gripper pair 3, 4 that holds the structure and comprising at least one leading gripper 3 and one trailing gripper 4, wherein the leading gripper 3 and the trailing gripper 4 are mounted on different guide trains 5, 6 that can be moved relative to one another.

[0073] Another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the device, wherein the two guide trains 5, 6 are each motor driven independently of the other.

[0074] Yet another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the device, wherein the two guide trains 5, 6 are each in the form of an endless loop.

[0075] Still another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the device, wherein the two guide trains 5, 6 are arranged at least in part one above the other when viewed from the side.

[0076] A further feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the device, wherein the two guide trains 5, 6 each have one or more conveying devices, such as belts, chains, etc., to which the leading grippers 3 or trailing grippers 4 are mounted separately and independently.

[0077] Another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the device, wherein a path of motion defined by the two guide trains 5, 6 is linear at least over a segment T of defined length L.

[0078] Yet another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the device, wherein the guide trains 5, 6 can be displaced manually or by motor to vary a distance A between the grippers 3, 4 and/or a distance B between the gripper pairs 3, 4.

[0079] Still another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the device, wherein the grippers 3, 4 are non-permanently mounted on the guide trains 5, 6.

[0080] A further feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the device, wherein the two grippers 3, 4 each extend from mounting plates 11, 12, which themselves are mounted on the guide trains 5, 6.

[0081] Another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the device, wherein the two grippers 3, 4 are arranged on a common processing side 13 relative to the path of motion defined by the guide trains 5, 6.

[0082] One feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in a device for the treatment of flexible, tubular structures, in one possible embodiment bags 1, with at least one gripper pair 3, 4 that holds the structure and that has at least one leading gripper 3 and one trailing gripper 4, whereby:

[0083] the leading gripper 3 and the trailing gripper 4 are mounted on separate guide trains 5, 6 that can be moved relative to one another, further whereby

[0084] the two guide trains 5, 6 are each motor-driven independently of one another, and whereby

[0085] the guide trains 5, 6 can be displaced relative to one another by a motor to vary a distance A between the grippers 3, 4 and/or a distance B between the gripper pairs 3, 4, wherein

[0086] with the help of a controller 9, the respective leading gripper 3 is shifted by a certain amount C in the direction of transport R and the respective trailing gripper 4 is shifted by the same amount C opposite the direction of transport R, so that

[0087] the middle M of the bag remains in the same position even in the event of a bag change.

[0088] Another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the device, wherein the two guide trains 5, 6 are each in the form of an endless loop.

[0089] Yet another feature or aspect of an embodiment is believed at the time of the filing of this patent application to
possibly reside broadly in the device, wherein the two guide trains 5, 6 are arranged in part one above the other when viewed from the side.

[0090] Still another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the device, wherein the two guide trains 5, 6 each have one or more conveying devices, such as belts, chains, etc., to which the leading grippers 3 or trailing grippers 4 are mounted separately and independently.

[0091] A further feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the device, wherein a path of motion defined by the two guide trains 5, 6 is linear at least over a segment T of defined length L.

[0092] Another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the device, wherein the grippers 3, 4 are non-permanently mounted on the guide trains 5, 6.

[0093] Yet another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the device, wherein the two grippers 3, 4 each extend from mounting plates 11, 12, which themselves are mounted on the guide trains 5, 6.

[0094] Still another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in the device, wherein the two grippers 3, 4 are arranged on a common processing side 13 relative to the path of motion defined by the guide trains 5, 6.

[0095] One feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in an apparatus for filling flexibly sided containers having open tops and at least substantially closed sides and closed bottoms, the apparatus comprising: an arrangement configured to open and dispose flexibly sided bags for gripping; a first gripping arrangement configured to grip a first top edge portion of flexibly sided bags disposed by the arrangement configured to open and dispose flexibly sided bags; a second gripping arrangement configured to grip a second top edge portion substantially opposite a first top edge portion of flexibly sided bags disposed by the arrangement configured to open and dispose flexibly sided bags; at least one motor arrangement configured to move the first and the second gripping arrangements; a filling apparatus configured to fill flexibly sided bags with filling materials; the first and the second gripping arrangements being configured to dispose flexibly sided bags of different sizes and having different amounts of materials being filled into an open flexibly sided container; and a controller configured to operatively move the first and the second gripping arrangements with the at least one motor arrangement.

[0096] Another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in an apparatus for filling flexibly sided bags wherein the first gripping arrangement comprises a first gripping arrangement comprising a first gripper removably mounted on a first conveying device with a mounting plate extending toward an operating side of the first conveying device; the second gripping arrangement comprises a second gripper removably mounted on a second conveying device with a mounting plate extending toward the operating side of the second conveying device; the filling apparatus being on the operating side of the first and the second conveying devices; the first and the second conveying devices are each independently motor driven and are independently movable relative to one another; the first and the second conveying devices each form an endless loop; the first and the second conveying devices are arranged with one above the other; and the first and the second conveying devices each comprise a linear path segment under the filling apparatus.

[0097] Yet another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in an apparatus for filling flexibly sided containers having open tops and at least substantially closed sides and closed bottoms, the apparatus comprising: an arrangement configured to open and dispose flexibly sided containers for gripping; a first gripping arrangement configured to grip a first top edge portion of flexibly sided containers disposed by the arrangement configured to open and dispose flexibly sided containers; a second gripping arrangement configured to grip a second top edge portion opposite a first top edge portion of flexibly sided containers disposed by the arrangement configured to open and dispose flexibly sided containers; at least one motor arrangement configured to move the first and the second gripping arrangements; the first and the second gripping arrangements being configured to open flexibly sided containers a sufficient amount to minimize spillage of materials being filled into an open flexibly sided container; the first and the second gripping arrangements being configured to dispose flexibly sided containers under a filling apparatus; the first and the second gripping arrangements being configured to move filled flexibly sided containers away from a filling apparatus; and a controller configured to operatively move the first and the second gripping arrangements with the at least one motor arrangement.

[0098] Still another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in an apparatus for filling flexibly sided containers wherein: the first and the second gripping arrangements are configured to open and position centers of openings of flexibly sided containers of different sizes substantially under a filling apparatus; and the controller being configured to open a filling device and the second gripping arrangements with respect to one another to position centers of openings of flexibly sided containers of different sizes substantially under a filling apparatus to minimize spillage of materials being filled into an open flexibly sided container.

[0099] A further feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in an apparatus for filling flexibly sided containers wherein: the first gripping arrangement comprises a first gripper mounted on a first conveying device and extending toward an operating side of the first conveying device; and the second gripping arrangement comprises a second gripper mounted on a second conveying device and extending toward the operating side of the second conveying device.

[0100] Another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in an apparatus for filling flexibly sided containers wherein: the first gripping arrangement is
removably mounted on the first conveying device; and the second gripping arrangement is removably mounted on the second conveying device.

[0101] Yet another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in an apparatus for filling flexibly sided containers wherein the at least one motor arrangement configured to move the first and the second gripping arrangements comprises a first and a second motor arrangement, the first motor arrangement being configured to independently move the first conveying device, and the second motor arrangement being configured to independently move the second conveying device.

[0102] Still another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in an apparatus for filling flexibly sided containers wherein the first and the second conveying devices each form an endless loop and the apparatus comprises at least one device configured to open and close the first and the second gripping arrangements.

[0103] A further feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in an apparatus for filling flexibly sided containers wherein the first and the second conveying devices are arranged with one above the other.

[0104] Another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in an apparatus for filling flexibly sided containers wherein the first and the second conveying devices each comprise a linear path segment in at least the position where flexibly sided containers are filled.

[0105] Yet another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in an apparatus for filling flexibly sided containers having open tops and at least substantially closed sides and closed bottoms, the apparatus comprising: an arrangement configured to open and dispose flexibly sided containers for gripping; a first gripping arrangement configured to grip a first portion of flexibly sided containers disposed by the arrangement configured to open and dispose flexibly sided containers; a second gripping arrangement configured to grip a second portion opposite a first portion of flexibly sided containers disposed by the arrangement configured to open and dispose flexibly sided containers; at least one motor arrangement configured to move the first and the second gripping arrangements; the first and the second gripping arrangements being configured to open flexibly sided containers of different sizes a sufficient amount to minimize spillage of materials being filled into an open flexibly sided container; the first and the second gripping arrangements being configured to dispose of a center of an opening of flexibly sided containers of different sizes substantially under a filling apparatus; the first and the second gripping arrangements being configured to move filled flexibly sided containers away from a filling apparatus; a controller configured to operably move the first and the second gripping arrangements with at least one motor arrangement with respect to one another to dispose of a center of an opening of flexibly sided containers of different sizes substantially under a filling apparatus to minimize spillage of materials being filled into an open flexibly sided container.

[0106] One feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in an apparatus for filling flexibly sided containers wherein: the first gripping arrangement being disposable and configured to grip a first top edge portion of flexibly sided containers disposed by the arrangement configured to open and dispose flexibly sided containers; and the second gripping arrangement being disposable and configured to grip a second top edge portion opposite a first top edge portion of flexibly sided containers disposed by the arrangement configured to open and dispose flexibly sided containers.

[0107] Another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in an apparatus for filling flexibly sided containers wherein: the first gripping arrangement comprises a first gripper mounted on a first conveying device and extending toward an operating side of the first conveying device; and the second gripping arrangement comprises a second gripper mounted on a second conveying device and extending toward the operating side of the second conveying device.

[0108] Yet another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in an apparatus for filling flexibly sided containers wherein: the first gripping arrangement is removably mounted on the first conveying device; and the second gripping arrangement is removably mounted on the second conveying device.

[0109] Still another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in an apparatus for filling flexibly sided containers wherein the at least one motor arrangement configured to move the first and the second gripping arrangements comprises a first and a second motor arrangement, the first motor arrangement being configured to independently move the first conveying device and the second motor arrangement being configured to independently move the second conveying device and move the first and the second gripping arrangements a substantially equal amount to or from one another to thus position a center of an open container under a filling apparatus.

[0110] A further feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in an apparatus for filling flexibly sided containers wherein the first and the second conveying devices each form an endless loop and the apparatus comprises at least one device configured to open and close the first and the second gripping arrangements.

[0111] Another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in an apparatus for filling flexibly sided containers wherein the first and the second conveying devices are arranged with one above the other.

[0112] Yet another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in a device for the treatment of flexibly, tubular structures, in particular bags 1, with at least one gripper pair 3, 4 that holds the structure and that has at least one leading gripper 3 and one trailing gripper 4, whereby the leading gripper 3 and the trailing gripper 4 are mounted on separate guide trains 5, 6 that can be moved relative to one
another, further whereby the two guide trains 5, 6 are each motor-driven independently of one another, and whereby the guide trains 5, 6 can be displaced relative to one another by a motor to vary a distance A between the grippers 3, 4 and/or a distance B between the gripper pairs 3, 4 characterized in that with the help of a controller 9, the respective leading gripper 3 is shifted by a certain amount C in the direction of transport R and the respective trailing gripper 4 is shifted by the same amount C opposite the direction of transport R, so that the middle M of the bag remains in the same position even in the event of a bag change.

[0114] Still another feature or aspect of an embodiment is believed to be at the time of the filing of this patent application to possibly reside broadly in a method for filling flexibly sided containers of different sizes comprising: opening and disposing a flexibly sided container of a first size having an open top and at least substantially closed sides and bottom for gripping with an arrangement configured to open and dispose flexibly sided containers for gripping; gripping a first portion of a flexibly sided container of a first size with a first gripping arrangement configured to grip flexibly sided containers disposed by the arrangement configured to open and dispose flexibly sided containers; gripping a second portion of a flexibly sided container of a first size substantially opposite a first portion with a second gripping arrangement configured to grip flexibly sided containers disposed by the arrangement configured to open and dispose flexibly sided containers; opening a flexibly sided container of a first size with the first and the second gripping arrangements by an amount sufficient to minimize spillage of materials being filled into an open flexibly sided container; moving a flexibly sided container of a first size under a filling apparatus with a center of its opening substantially below a filling apparatus to minimize spillage of materials being filled into an open flexibly sided container; filling a flexibly sided container of a first size with filling materials; moving a filled flexibly sided container of a first size away from a filling apparatus; moving the first and second gripping arrangements with respect to one another to dispose a center of an opening of flexibly sided container of a second size substantially under a filling apparatus to minimize spillage of materials being filled into an open flexibly sided container; opening and disposing a flexibly sided container of a second size having an open top and at least substantially closed sides and bottom for gripping with an arrangement configured to open and dispose flexibly sided containers for gripping; gripping a first portion of a flexibly sided container of a second size with a first gripping arrangement configured to grip flexibly sided containers disposed by the arrangement configured to open and dispose flexibly sided containers; gripping a second portion of a flexibly sided container of a second size substantially opposite a first portion with a second gripping arrangement configured to grip flexibly sided containers disposed by the arrangement configured to open and dispose flexibly sided containers; opening a flexibly sided container of a second size with the first and the second gripping arrangements by an amount sufficient to minimize spillage of materials being filled into an open flexibly sided container; moving a flexibly sided container of a second size under a filling apparatus with a center of its opening substantially below a filling apparatus to minimize spillage of materials being filled into an open flexibly sided container; filling a flexibly sided container of a second size with filling materials; and moving a filled flexibly sided container of a second size away from a filling apparatus.

[0115] The components disclosed in the various publications, disclosed or incorporated by reference herein, may possibly be used in possible embodiments of the present invention, as well as equivalents thereof.

[0116] The purpose of the statements about the technical field is generally to enable the Patent and Trademark Office and the public to determine quickly, from a cursory inspection, the nature of this patent application. The description of the technical field is believed, at the time of the filing of this patent application, to adequately describe the technical field of this patent application. However, the description of the technical field may not be completely applicable to the claims as originally filed in this patent application, as amended during prosecution of this patent application, and as ultimately allowed in any patent issuing from this patent application.

[0117] Therefore, any statements made relating to the technical field are not intended to limit the claims in any manner and should not be interpreted as limiting the claims in any manner.

[0118] The appended drawings in their entirety, including all dimensions, proportions and/or shapes in at least one embodiment of the invention, are accurate and are hereby included by reference into this specification.

[0119] All, or substantially all, of the components and methods of the various embodiments may be used with at least one embodiment or all of the embodiments, if more than one embodiment is described herein.

[0120] The purpose of the statements about the object or objects is generally to enable the Patent and Trademark Office and the public to determine quickly, from a cursory inspection, the nature of this patent application. The description of the object or objects is believed, at the time of the filing of this patent application, to adequately describe the object or objects of this patent application. However, the description of the object or objects may not be completely applicable to the claims as originally filed in this patent application, as amended during prosecution of this patent application, and as ultimately allowed in any patent issuing from this patent application.

[0121] Therefore, any statements made relating to the object or objects are not intended to limit the claims in any manner and should not be interpreted as limiting the claims in any manner.

[0122] All of the patents, patent applications and publications recited herein, and in the Declaration attached hereto, are hereby incorporated by reference as if set forth in their entirety herein.

[0123] The summary is believed, at the time of the filing of this patent application, to adequately summarize this patent application. However, portions or all of the information contained in the summary may not be completely applicable to the claims as originally filed in this patent application, as amended during prosecution of this patent application, and as ultimately allowed in any patent issuing from this patent application.

Therefore, any statements made relating to the
summary are not intended to limit the claims in any manner and should not be interpreted as limiting the claims in any manner.

[0123] It will be understood that the examples of patents, published patent applications, and other documents which are included in this application and which are referred to in paragraphs which state “Some examples of . . . which may possibly be used in at least one possible embodiment of the present application . . .” may possibly not be used or useable in any one or more embodiments of the application.

[0124] The sentence immediately above relates to patents published patent applications and other documents either incorporated by reference or not incorporated by reference.


[0126] Some examples of apparatuses for opening and disposing bags and of gripping arrangements that may possibly be utilized or adapted for use in at least one possible embodiment may possibly be found in the following U.S. patents: U.S. Pat. No. 4,108,300, having the title “BAG PACKING APPARATUS,” issued on Aug. 22, 1978; and U.S. Pat. No. 6,276,117, having the title “ADJUSTABLE POUCH CARRIER FOR DIFFERENT SIZE POUCHES AND PACKAGING MACHINE HAVING AN ADJUSTABLE POUCH CARRIER,” issued on Aug. 21, 2001.

[0127] Some examples of apparatuses for closing arrangements that may possibly be utilized or adapted for use in at least one possible embodiment may possibly be found in United States Patent Application 2007/0101684, having the title “Device For The Production Of Tubular Bags”, published on May 10, 2007.

[0128] All of the patents, patent applications or patent publications, which were cited in the International Search Report dated Sep. 19, 2007, and/or cited elsewhere are hereby incorporated by reference as if set forth in their entirety herein as follows: EP 0999137, having the title “POUCH CARRYING APPARATUS,” published on May 10, 2000; and U.S. Pat. No. 6,276,117, having the title “ADJUSTABLE POUCH CARRIER FOR DIFFERENT SIZE POUCHES IN A PACKAGING MACHINE HAVING AN ADJUSTABLE POUCH CARRIER,” published on Aug. 21, 2001.


[0130] The patents, patent applications, and patent publications listed above, beginning on line 1174 on page 57 in the paragraph with the statement: “The following patents, patent applications or patent publications, are hereby incorporated by reference as if set forth in their entirety herein: . . .” and ending on line 1219 on page 59 in the paragraph with the phrase: “. . . published on Apr. 15, 1999,” are herein incorporated by reference as if set forth in their entirety. The purpose of incorporating U.S. patents, Foreign patents, publications, etc. is solely to provide additional information relating to technical features of one or more embodiments, which information may not be completely disclosed in the wording in the pages of this application. Words relating to the opinions and judgments of the author and not directly relating to the technical details of the description of the embodiments therein are not incorporated by reference. The words all, always, absolutely, consistently, preferably, guarantee, particularly, constantly, ensure, necessarily, immediately, end- lessly, avoid, exactly, continually, expediently, need, must, only, perpetual, precise, perfect, require, requisite, simultaneous, total, unavoidable, and unnecessary, or words substantially equivalent to the above-mentioned words in this sentence, when not used to describe technical features of one or more embodiments, are not considered to be incorporated by reference herein.

[0131] The corresponding foreign and international patent publication applications, namely, Federal Republic of Germany Patent Application No. 10 2006 028 796.7, filed on Jun. 23, 2006, having inventor Thomas MATHEYKA, and DE-OS 10 2006 028 796.7 and DE-PS 10 2006 028 796.7, and International Application No. PCT/EP2007/005390, filed on Jun. 20, 2007, having WIPO Publication No. WO2007/147566 and inventor Thomas MATHEYKA, are hereby incorporated by reference as if set forth in their entirety herein for the purpose of correcting and explaining any possible misinterpretations of the English translation thereof. In addition, the published equivalents of the above corresponding foreign and international patent publication applications, and other equivalents or corresponding applications, if any, in corresponding cases in the Federal Republic of Germany and elsewhere, and the references and documents cited in any of the documents cited herein, such as the patents, patent applications and publications, are hereby incorporated by reference as if set forth in their entirety herein.

[0132] The purpose of incorporating the Foreign equivalent patent application PCT/EP2007/005390 and German Patent Application 10 2006 028 796.7 is solely for the purpose of providing a basis of correction of any wording in the pages of the present application, which may have been mistranslated or misinterpreted by the translator. Words relating to opinions and judgments of the author and not directly relating to the technical details of the description of the embodiments therein are not to be incorporated by reference. The words all, always, absolutely, consistently, preferably, guarantee, particularly, constantly, ensure, necessarily, immediately, end- lessly, avoid, exactly, continually, expediently, need, must, only, perpetual, precise, perfect, require, requisite, simultaneous, total, unavoidable, and unnecessary, or words substantially equivalent to the above-mentioned words in this sentence, when not used to describe technical features of one or more embodiments, are not generally considered to be incorporated by reference herein.
Statements made in the original foreign patent applications PCT/EP2007/005399 and DE 10 2006 028 796.7 from which this patent application claims priority which do not have to do with the correction of the translation in this patent application are not to be included in this patent application in the incorporation by reference.

All of the references and documents, cited in any of the documents cited herein, are hereby incorporated by reference as if set forth in their entirety herein. All of the documents cited herein, referred to in the immediately preceding sentence, include all of the patents, patent applications and publications cited anywhere in the present application.

The description of the embodiment or embodiments is believed, at the time of the filing of this patent application, to adequately describe the embodiment or embodiments of this patent application. However, portions of the description of the embodiment or embodiments may not be completely applicable to the claims as originally filed in this patent application, as amended during prosecution of this patent application, and as ultimately allowed in any patent issuing from this patent application. Therefore, any statements made relating to the embodiment or embodiments are not intended to limit the claims in any manner and should not be interpreted as limiting the claims in any manner.

The details in the patents, patent applications and publications may be considered to be incorporable, at applicant's option, into the claims during prosecution as further limitations in the claims to patentably distinguish any amended claims from any applied prior art.

The purpose of the title of this patent application is generally to enable the Patent and Trademark Office and the public to determine quickly, from a cursory inspection, the nature of this patent application. The title is believed, at the time of the filing of this patent application, to adequately reflect the general nature of this patent application. However, the title may not be completely applicable to the technical field, the object or objects, the summary, the description of the embodiment or embodiments, and the claims as originally filed in this patent application, as amended during prosecution of this patent application, and as ultimately allowed in any patent issuing from this patent application. Therefore, the title is not intended to limit the claims in any manner and should not be interpreted as limiting the claims in any manner.

The abstract of the disclosure is submitted herewith as required by 37 C.F.R. §1.72(b). As stated in 37 C.F.R. §1.72(b):

A brief abstract of the technical disclosure in the specification must commence on a separate sheet, preferably following the claims, under the heading “Abstract of the Disclosure.” The purpose of the abstract is to enable the Patent and Trademark Office and the public generally to determine quickly from a cursory inspection the nature and gist of the technical disclosure. The abstract shall not be used for interpreting the scope of the claims.

Therefore, any statements made relating to the abstract are not intended to limit the claims in any manner and should not be interpreted as limiting the claims in any manner.

The embodiments of the invention described herein above in the context of the preferred embodiments are not to be taken as limiting the embodiments of the invention to all of the provided details thereof, since modifications and variations thereof may be made without departing from the spirit and scope of the embodiments of the invention.

1. An apparatus for filling flexibly sided bags comprising:
   - an arrangement configured to open and dispose flexibly sided bags for gripping;
   - a first gripping arrangement configured to grip a first top edge portion of flexibly sided bags disposed by said arrangement configured to open and dispose flexibly sided bags;
   - a second gripping arrangement configured to grip a second top edge portion substantially opposite a first top edge portion of flexibly sided bags disposed by said arrangement configured to open and dispose flexibly sided bags;
   - at least one motor arrangement configured to move said first and said second gripping arrangements;
   - a filling apparatus configured to fill flexibly sided bags with filling materials;
   - said first and said second gripping arrangements being configured to open flexibly sided bags of different sizes a sufficient amount to minimize spillage of materials being filled into an open flexibly sided container;
   - said first and said second gripping arrangements being configured to dispose flexibly sided bags of different sizes with centers of openings positioned substantially under said filling apparatus;
   - said first and said second gripping arrangements being configured to move filled flexibly sided bags away from said filling apparatus; and
   - a controller configured to operably move said first and said second gripping arrangements such that said first and said second gripping arrangements move independently from or to one another a substantially equal distance such that the middle of bag openings of different size bags remain in substantially the same position under said filling apparatus upon a change of bag size.

2. The apparatus for filling flexibly sided bags according to claim 1 wherein:
   - said first gripping arrangement comprises a first gripper removably mounted on a first conveying device with a mounting plate extending toward an operating side of said first conveying device;
   - said second gripping arrangement comprises a second gripper removably mounted on a second conveying device with a mounting plate extending toward said operating side of said second conveying device;
   - said filling apparatus being on said operating side of said first and said second conveying devices;
   - said first and said second conveying devices are each independently motor driven and are independently movable relative to one another;
   - said first and said second conveying devices each form an endless loop;
   - said first and said second conveying devices are arranged with one above the other; and
   - said first and said second conveying devices each comprise a linear path segment under said filling apparatus.

3. An apparatus for filling flexibly sided containers having open tops and at least substantially closed sides and closed bottoms, said apparatus comprising:
   - an arrangement configured to open and dispose flexibly sided containers for gripping;
   - a first gripping arrangement configured to grip a first top edge portion of flexibly sided containers disposed by said arrangement configured to open and dispose flexibly sided containers;
a second gripping arrangement configured to grip a second top edge portion opposite a first top edge portion of flexibly sided containers disposed by said arrangement configured to open and dispose flexibly sided containers;

at least one motor arrangement configured to move said first and said second gripping arrangements;

said first and said second gripping arrangements being configured to open flexibly sided containers a sufficient amount to minimize spillage of materials being filled into an open flexibly sided container;

said first and said second gripping arrangements being configured to dispose flexibly sided containers under a filling apparatus;

said first and said second gripping arrangements being configured to move filled flexibly sided containers away from a filling apparatus; and

a controller configured to operatively move said first and said second gripping arrangements with said at least one motor arrangement.

4. The apparatus for filling flexibly sided containers of claim 3, wherein:

said first and said second gripping arrangements are configured to open and position centers of openings of flexibly sided containers of different sizes substantially under a filling apparatus; and

said controller being configured to operably move said first and said second gripping arrangements with respect to one another to position centers of openings of flexibly sided containers of different sizes substantially under a filling apparatus to minimize spillage of materials being filled into an open flexibly sided container.

5. The apparatus for filling flexibly sided containers of claim 3, wherein:

said first gripping arrangement comprises a first gripper mounted on a first conveying device and extending toward an operating side of said first conveying device; and

said second gripping arrangement comprises a second gripper mounted on a second conveying device and extending toward said operating side of said second conveying device.

6. The apparatus for filling flexibly sided containers of claim 5, wherein:

said first gripping arrangement is removably mounted on said first conveying device; and

said second gripping arrangement is removably mounted on said second conveying device.

7. The apparatus for filling flexibly sided containers of claim 6, wherein said at least one motor arrangement configured to move said first and said second gripping arrangements comprises a first and a second motor arrangement, said first motor arrangement being configured to independently move said first conveying device, and said second motor arrangement being configured to independently move said second conveying device.

8. The apparatus for filling flexibly sided containers of claim 7, wherein said first and said second conveying devices each form an endless loop and said apparatus comprises at least one device configured to open and close said first and said second gripping arrangements.

9. The apparatus for filling flexibly sided containers of claim 8, wherein said first and said second conveying devices are arranged with one above the other.

10. The apparatus for filling flexibly sided containers of claim 9, wherein said first and said second conveying devices each comprise a linear path segment in at least the position where flexibly sided containers are filled.

11. An apparatus for filling flexibly sided containers having open tops and at least substantially closed sides and closed bottoms, said apparatus comprising:

an arrangement configured to open and dispose flexibly sided containers for gripping;

a first gripping arrangement configured to grip a first portion of flexibly sided containers disposed by said arrangement configured to open and dispose flexibly sided containers;

a second gripping arrangement configured to grip a second portion opposite a first portion of flexibly sided containers disposed by said arrangement configured to open and dispose flexibly sided containers;

said first and said second gripping arrangements being configured to a center of an opening of flexibly sided containers of different sizes substantially under a filling apparatus;

said first and said second gripping arrangements being configured to move filled flexibly sided containers away from a filling apparatus; and

a controller configured to operably move said first and said second gripping arrangements with said at least one motor arrangement configured to move said first and said second gripping arrangements;

said first and said second gripping arrangements being configured to open flexibly sided containers of different sizes a sufficient amount to minimize spillage of materials being filled into an open flexibly sided container;

said first and said second gripping arrangements being configured to dispose a center of an opening of flexibly sided containers of different sizes substantially under a filling apparatus;

said first and said second gripping arrangements being configured to move filled flexibly sided containers away from a filling apparatus; and

a controller configured to operably move said first and said second gripping arrangements with said at least one motor arrangement with respect to one another to dispose a center of an opening of flexibly sided containers of different sizes substantially under a filling apparatus to minimize spillage of materials being filled into an open flexibly sided container.

12. The apparatus for filling flexibly sided containers of claim 11, wherein:

said first gripping arrangement being disposable and configured to grip a first top edge portion of flexibly sided containers disposed by said arrangement configured to open and dispose flexibly sided containers; and

said second gripping arrangement being disposable and configured to grip a second top edge portion opposite a first top edge portion of flexibly sided containers disposed by said arrangement configured to open and dispose flexibly sided containers.

13. The apparatus for filling flexibly sided containers of claim 12, wherein:

said first gripping arrangement comprises a first gripper mounted on a first conveying device and extending toward an operating side of said first conveying device; and

said second gripping arrangement comprises a second gripper mounted on a second conveying device and extending toward said operating side of said second conveying device.

14. The apparatus for filling flexibly sided containers of claim 13, wherein:

said first gripping arrangement is removably mounted on said first conveying device; and

said second gripping arrangement is removably mounted on said second conveying device.
15. The apparatus for filling flexibly sided containers of claim 14, wherein said at least one motor arrangement configured to move said first and said second gripping arrangements comprises a first and a second motor arrangement, said first motor arrangement being configured to independently move said first conveying device, and said second motor arrangement being configured to independently move said second conveying device and move said first and said second gripping arrangements a substantially equal amount to or from one another to thus position a center of an open container under a filling apparatus.

16. The apparatus for filling flexibly sided containers of claim 15, wherein said first and said second conveying devices each form an endless loop and said apparatus comprises at least one device configured to open and close said first and said second gripping arrangements.

17. The apparatus for filling flexibly sided containers of claim 16, wherein said first and said second conveying devices are arranged with one above the other.

18. The apparatus for filling flexibly sided containers of claim 17, wherein said first and said second conveying devices each comprise a linear path segment in at least the position where flexibly sided containers are filled.

19. The apparatus according to claim 11 for the treatment of flexibly, tubular structures, in particular bags (1), with at least one gripper pair (3, 4) that holds the structure and that has at least one leading gripper (3) and one trailing gripper (4), whereby

the leading gripper (3) and the trailing gripper (4) are mounted on separate guide trains (5, 6) that can be moved relative to one another, further whereby

the two guide trains (5, 6) are each motor-driven independently of one another, and whereby

the guide trains (5, 6) can be displaced relative to one another by a motor to vary a distance (A) between the grippers (3, 4) and/or a distance (B) between the gripper pairs (3, 4).

caracterized in that

with the help of a controller (9), the respective leading gripper (3) is shifted by a certain amount (C) in the direction of transport (R) and the respective trailing gripper (4) is shifted by the same amount (C) opposite the direction of transport (R), so that the middle (M) of the bag remains in the same position even in the event of a bag change.

20. The apparatus according to claim 19, wherein:

the two guide trains are each in the form of an endless loop;
the two guide trains are arranged in part one above the other when viewed from the side;

the two guide trains each have one or more conveying devices, such as belts, chains, etc., to which the leading grippers or trailing grippers are mounted separately and independently;

a path of motion defined by the two guide trains is linear at least over a segment τ of defined length L;

the grippers are non-permanently mounted on the guide trains;

the two grippers each extend from mounting plates which themselves are mounted on the guide trains; and

the two grippers are arranged on a common processing side relative to the path of motion defined by the guide trains.

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