

(10) International Publication Number
WO 2013/043670 A1(43) International Publication Date
28 March 2013 (28.03.2013)

(51) International Patent Classification:

B65B 31/00 (2006.01) *B65B 51/14* (2006.01)
B65B 31/02 (2006.01) *B65B 63/02* (2006.01)
B65B 43/12 (2006.01) *B65B 63/00* (2006.01)

(21) International Application Number:

PCT/US2012/056026

(22) International Filing Date:

19 September 2012 (19.09.2012)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

61/536,263 19 September 2011 (19.09.2011) US

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(81) Designated States (unless otherwise indicated, for every
 kind of national protection available): AE, AG, AL, AM,
 AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,
 BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,
 DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
 HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP,
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 ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI,
 NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU,
 RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ,
 TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA,
 ZM, ZW.

(84) Designated States (unless otherwise indicated, for every
 kind of regional protection available): ARIPO (BW, GH,
 GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ,
 UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
 TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
 EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
 MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
 TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
 ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: FORM FILL COMPRESSION SEAL AND CUT-OFF PACKAGING SYSTEM FOR COMPRESSIBLE GOODS

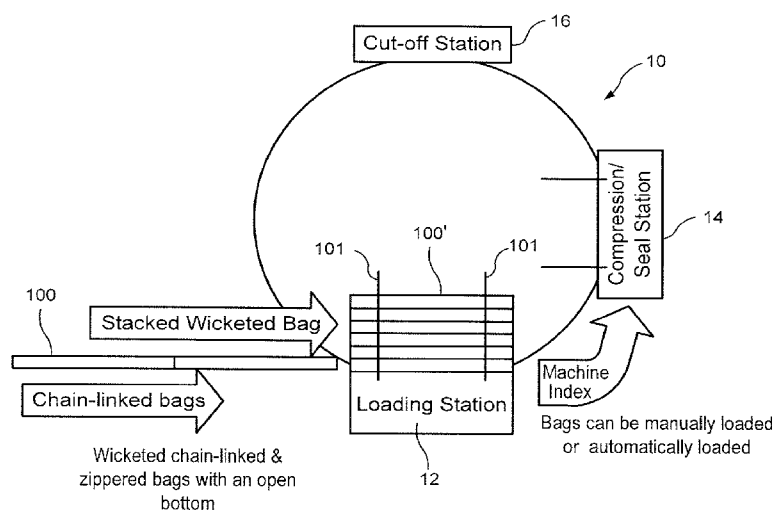


FIG. 2

(57) Abstract: The present disclosure relates to a packaging system for compressible goods utilizing pre-punched alignment apertures on wicketed and/or chain-linked open bottom bags. The disclosure relates to a bag transport and indexing system through the form fill compress and seal system. The disclosure further relates to the use of sprocket pins spaced accordingly on either a horizontal linear or rotary machine so that the sprockets correspond to the pre-punched apertures on the wicketed and/or chain-linked open bottom bags.



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**FORM FILL COMPRESSION SEAL AND CUT-OFF
PACKAGING SYSTEM FOR COMPRESSIBLE GOODS**

[0001] This application claims priority under 35 U.S.C. §119(e) of U.S. provisional patent application serial no. 61/536,263 filed on September 19, 2011, the contents of which is hereby incorporated by reference in their entirety.

BACKGROUND OF THE DISCLOSURE

Field of the Disclosure

[0002] The present disclosure relates to a packaging system for compressible goods utilizing pre-punched alignment apertures on wicketed and/or chain-linked open bottom bags. The disclosure relates to a bag transport and indexing system through the form fill compress and seal system.

Description of the Prior Art

[0003] In the prior art, the form fill compress and seal technology has been substantially developed. This technology forms a container, typically from polymeric material, fills the container with a compressible good, typically a large compressible good such as, but not limited to, a blanket or similar item, compresses the compressible good within the package and then seals the package shut.

[0004] Typical examples of this prior art have been developed by the assignee of the present application and include U.S. Published Patent Application 2011/0266188 entitled "Form Fill Seal Packaging Method and Apparatus for Compressible Goods" published on November 3, 2011; U.S. Published Patent Application 2011/0198260 entitled "Method and Apparatus for Compressing and Holding in Compression Woven Fabric Articles and Products Thereof" published on August 18, 2011; and U.S. Published Patent Application 2011/0197549 entitled "Method and Apparatus for Compressing and Holding in Compression Woven Fabric Articles" published on August 18, 2011, the contents of all of which are hereby incorporated by reference in their entirety.

[0005] In the prior art, the bags have typically required loops or thickened material on both film webs of the open bottom. These loops or thickened material are used to transport

the bags on guide rails or similar retaining means. This requires that the side of the bag with the loop or thickened material must be the control fixed or datum side, which may make the bags more difficult to control accurately. Moreover, the loops are formed on material which must be removed from the final product.

[0006] While these disclosures are well-developed and suited to their intended purposes, further improvements are sought which respect to accurate bag handling and increased manufacturing speed.

OBJECTS AND SUMMARY OF THE DISCLOSURE

[0007] It is therefore an object of the present disclosure to provide improvements in the form fill compress and seal technology, particularly with respect to accurate bag handling and increased manufacturing speed. These improvements are sought in both manual and automated production and in both horizontal and vertical fill application.

[0008] This and other objects are attained by providing either wicketed open-bottom vacuum bag or chain-linked open-bottom vacuum bags, which may possibly include zippered closures or one-way vacuum valves. Other embodiments may use open-bottom non-vacuum bags, such as one-time-use laminate film bags. These bags are typically made from two-layer laminate films, the outer layer being made from a gas barrier material such as nylon or polyester, the inner layer being made from a polyolefin type heat sealable material such as low density polyethylene. These bags have pre-punched apertures spaced across the open bottom, extending through one or both film webs. These bags are then loaded, either horizontally or vertically, with compressible goods. The goods are compressed and the open bottom is sealed shut. By use of drive machinery with sprocket pins which aligned with the pre-punched apertures, very accurate registration of the bags is achieved along with increased manufacturing speeds. Additionally, this configuration allows for fast and simple changeover from packing of one size of compressible goods to another size of compressible goods. Moreover, the bag making becomes more simplified because the control, fixed or datum side becomes the inverted closed top of the bags, which may include a zipper. The incoming film can be a continuous piece of material across its width, and there may be only one throw-away piece, rather than two pieces. Thus waste is reduced. The opening of the bag bottom through which the product is loaded may have either offset flanges of different lengths or flanges of equal lengths to assist with the bag opening and product loading processes. The apertures,

can be pre-punched during the bag making process or even punched in the packaging machinery.

[0009] Further possible advantages may include semi-automatic or manual loading of the compressible goods and ease of registration and feeding of the bags into and through the process. Furthermore, the process could run at a speed convenient to the operator, the machine could be easier to control and may even have a smaller footprint as compared to previous designs.

[0010] A further embodiment could employ chain-linked vacuum bags with a reclosable zipper through which the compressible products are loaded. The pre-punched apertures are formed in the film above the zipper.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] Further objects and advantages of the disclosure will become apparent from the following description and from the accompanying drawings, wherein:

[0012] Figure 1 is a side plan view of a concatenation of chain-linked bags of the present disclosure.

[0013] Figure 2 is an overhead plan view of a first embodiment of the present disclosure, a horizontal rotary carousel-type configuration.

[0014] Figure 3 is a second overhead plan view of the first embodiment of the present disclosure.

[0015] Figure 4 is an overhead view illustrating the use of acorn-shaped pins in an embodiment of the present disclosure.

[0016] Figure 5 is a perspective view of an embodiment of the apparatus of the present disclosure.

[0017] Figure 6 is a detailed view of the embodiment of the apparatus of the embodiment of Figure 5.

[0018] Figure 7 is a perspective view of a further embodiment of the apparatus of the present disclosure.

[00019] Figure 8 is a detailed view of a still further embodiment of the apparatus of the present disclosure.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[00020] Referring now to the drawings in detail wherein like numerals indicate like elements throughout the several views, one sees that Figure 1 is a side plan view of a concatenation of chain-linked bags 100 as used in embodiments of the present disclosure. The bags 100 are inverted so that open bottom 102 is presented as the uppermost part of the bag 100 in the orientation of Figure 1. The open bottom 102 is formed between offset flanges 104, 106 (see Figure 3) thereby presenting a path for filling or loading. Typically, one flange, illustrated here as flange 104 includes a series of spaced alignment apertures 108. The spacing of the apertures 108 corresponds to the spacing of the sprocket pin drive elements of the manufacturing apparatus (see subsequent figures). Front and rear polymeric walls 110, 112 extend from the flanges 104, 106 to form the bags 100, which a storage space formed therebetween. The top 114 of the bags 100, configured at the lowermost portion of the bags in the illustrated configuration, includes a closure 116 such as a zipper. Furthermore, the front polymeric wall 110 in Figure 1 includes an optional one-way vacuum valve 118 which may be used to evacuate further air during the compression process. Furthermore, side seals 120, 122 are formed between the front and rear polymeric walls 110, 112 thereby forming the side seals of the finished package. Typically, a slit 124 is formed between the side seals 120, 122 of adjacent bags 100. However, some embodiments may cut between the side seals 120, 122 of adjacent bags during the manufacturing process, particularly in the steps wherein the flanges 104, 106 are cut to form separate packages.

[00021] Figures 2 and 3 illustrate a horizontal rotary carousel embodiment of the present disclosure. This embodiment includes a horizontal rotary carousel apparatus 10 which receives the concatenation of chain-linked bags 100 at bag loading station 12. Alternately, the bag loading station 12 could receive a stack of wicketed bags 100' aligned with rods 101. In either case, the chain-linked bags 100 or wicketed bags 100' have an open bottom 102 (see Figure 1) and are inverted so that the open bottom 102 is facing upwardly. The bags 100 or 100' are opened by separating the flanges 104, 106 and the bags are loaded, either automatically or manually, with a compressible good or product, such as, but not limited to, blankets, bedding or other cloth materials, at bag loading stations. This loading is

typically done in a downward vertical direction, but it is envisioned that some embodiments could use horizontal loading. The concatenation of chain-linked bags 100 or 100' is then indexed around a portion of the circular carousel by sprocket pins engaging the spaced apertures 108 so that the filled bag is received by compression/sealing station 14 where the filled bag 100 or 100' is compressed so as to reduce its volume and the open bottom 102 is sealed shut in an air-resistant or airtight configuration so as to maintain the compressed configuration. The concatenation of filled bags 100 or 100' is then indexed again around a portion of the circular carousel by sprocket pins which drive the spaced apertures 108 to arrive at cut-off station 16 where the filled, compressed and sealed bag 100 or 100' is cut from the concatenation and the flanges 104, 106 are removed (i.e., the material above the bottom seal of the inverted bag 100 is removed) in order to form a separate package or bag. The various indexing steps are typically incorporated into a single indexing step wherein different steps (filling, compressing, sealing) may be simultaneously applied to different bags 100, 100' throughout the concatenation.

[00022] A further envisioned embodiment is the vertical rotary carousel wherein the path and movement is vertical, with vertical rotation and individual stations having sprocket pins spaced to accept the bags with the pre-punched apertures on one or both film webs on each of the wicketed and/or chain-linked open bottom bags. This is accomplished in that it still utilizes a rotary carousel style machine with multiple stations that can accept and use either wicketed bags or chain-linked bags that are open bottom and may include zippered closures and/or one way vacuum valves. Typically, a smaller footprint (i.e., less floor space required) is achieved by such a configuration.

[00023] Figure 4 illustrates the sprocket pins 30, which are preferably acorn shaped, which engage the spaced apertures 108. By use of a reduced diameter 31 on its inner neck on the proximal machine side, the concatenated bags 100 are held in place through the packaging system. Figure 4 further illustrates a typical configuration of the compressing/sealing station 14 wherein a plow 32 is provided to separate the flanges 104, 106 thereby providing an opening for the insertion of compressible material 200. Additionally, a reciprocating arm 34 is provided to compress the compressible material against stationary anvil element 36. A sealing element for sealing the previously open bottom would likewise be provided in this station.

[00024] Figure 5 illustrates a horizontal two-sided linear floating track embodiment of the form fill compress seal manufacturing apparatus 10 wherein a concatenation of chain-linked bags 100 is received. As previously described, the concatenation of inverted chain-linked bags 100 includes a series of spaced apertures 108 which is engaged by the sprocket pins 30 in order to drive the chain-linked bags from right to left in the orientation shown in Figure 5. Likewise, a series of goods of compressible material 200 (such as, but not limited to, blankets, bedding material or other cloth) is received on a conveyor belt 40. The goods of compressible material 200 are sequentially engaged by gripper 42, rotated ninety degrees so as to have a vertical orientation, and then vertically inserted into the inverted open bottom of sequential chain-linked bags 100 at loading station 12. The concatenation of chain-linked bags 100 is then indexed to the left (in the illustrated orientation) to the compression/sealing station 14 where the bag 100 and its contents are compressed and the previous open bottom is sealed thereby forming a bottom seal for the final product. The concatenation of chain-linked bags 100 is then indexed again to the left (in the illustrated orientation) to the cut-off station 16 where the material above (“above” in the inverted position, “below” with respect to the final product) the bottom seal is removed and any further cutting is done to separate the formed filled compressed and sealed bags into individual products.

[00025] Figures 6, 7 and 8 illustrate how the filling, compressing and sealing steps can be incorporated into a single station 48 and used in a horizontal two-sided linear floating track configuration of Figure 5. The sprocket pins 30 are configured on two opposing chain loops 50, 52, formed by pairs of guide wheels 51, 53 and 55, 57, to engage the pre-punched alignment apertures 108 and thereby serve as a driving mechanism for the concatenation of chain-linked bags 100. The flanges 104, 106 are separated by plow 32, and opened by floating tracks 150, 152 to receive the compressible goods, compression with the floating track now moving inwardly to compress and seal the two film webs. This demonstrates that the film web held by the fixed rail could move laterally (left to right in the illustrated embodiment), which could make up for the film webs having differential tension and slack from product loading. This assists in the film webs being flat and square for film-to-film heat sealing. Additionally, it should be noted that separate individual motion drives could be implemented whereby the chain-linked bag loading into the process could be at a different speed than compression, which could be at a different speed than bag sealing if this were done in a separate operation from the compression step.

[00026] Additionally, Figures 5-8 illustrate how loose film web may be addressed in carousel systems. With these systems, after the bags 100 are placed into the machine or apparatus 10, one side or film panel of the bag having the pre-punched apertures 108 is held in place and in register. The other opposite side or film panel of the bag 100 is not contained or held. Thereby, it is a loose film web which makes compression and heat sealing after compression difficult to control. Therefore, the embodiments of Figures 5-8 have pre-punched apertures 108 on both flanges 104, 106. Both flanges 104, 106 would be held by corresponding opposing chain loops 50, 52 of sprocket pins 30 on each side of the linear tracks 150, 152 thereby eliminating the loose film web. Moreover, at least one of the parallel tracks 150, 152 can float in that it can open up to a predetermined distance greater than that from the bags being loaded into the process, thereby opening up the open bottom of the bags for product loading. Both sides or film panels of the open bottom bag are held and under control. After the compression step, this aids in aligning the film webs into a flat and square configuration for the sealing step. This spreading or pulling the film webs flat can be done either before compression and continue as compression occurs, or after compression. In both cases, this would occur before heat sealing, and ensure that both film webs are flat and square for sealing.

[00027] It is further envisioned that some embodiments might load through an opened zipper of an upright bag (with a sealed bottom), compress the bag and contents and then close the zipper. This typically would eliminate film-to-film sealing after compression thereby reducing the need for alignment of the bag walls. Moreover, the zipper end stomps could be held and used to support the bag during zipper opening, product loading and zipper closing. The alignment apertures would be typically eliminated. Additionally, a peel seal may be provided above or below the zipper, with activation provided by a heat seal jaw after compression. This embodiment could further use the zipper itself for guiding, support and bag transport thereby eliminating the extra material needed for bag guidance in the previous embodiments.

[00028] Thus the several aforementioned objects and advantages are most effectively attained. Although preferred embodiments of the invention have been disclosed and described in detail herein, it should be understood that this invention is in no sense limited thereby and its scope is to be determined by that of the appended claims.

CLAIMS

What is Claimed is:

1. A method, comprising the steps of:

providing a concatenation of packages, wherein the packages include an upwardly facing opening and further include a series of spaced apertures proximate to the upwardly facing opening;

engaging the series of spaced apertures with a plurality of pins;

a first step of transporting the concatenation of packages by moving the plurality of pins, whereby the packages are successively placed in a filling station which inserts compressible goods into the upwardly facing opening;

compressing the filled package thereby reducing the volume of the filled package; and

closing the upwardly facing opening.

2. The method of Claim 1 wherein the step of closing is a sealing step.

3. The method of Claim 2 wherein the step of sealing includes thermal sealing.

4. The method of Claim 1 wherein the concatenation of packages is provided as a stack.

5. The method of Claim 4 wherein the stack is a wicketed stack of packages, wherein rods pass through spaced apertures of successive packages.

6. The method of Claim 1 wherein the packages of the concatenation are inverted whereby the upwardly facing opening is a bottom of the package and the top of the package is at a lower position.

7. The method of Claim 6 wherein the bottom of the package includes a reclosure.
8. The method of Claim 6 wherein the bottom of the package is closed.
9. The method of Claim 6 wherein the packages includes sidewalls.
10. The method of Claim 9 wherein at least one of the sidewalls includes a valve.
11. The method of Claim 9 wherein the sidewalls are polymeric.
12. The method of Claim 6 further including a second step of transporting the concatenation of packages by moving the plurality of pins, whereby the packages successively moved from the filling station to a compressing station for the step of compressing and the step of closing.
13. The method of Claim 12 further including a third step of transporting the concatenation of packages by moving the plurality of pins, whereby the packages successively moved from the compressing station to a cutting station for a step of cutting the packages from the concatenation of packages.
14. The method of Claim 13 wherein the first, second and third transporting steps are combined into a single indexing step wherein the first, second and third transporting steps apply to different packages within the concatenation.
15. The method of Claim 13 wherein the filling station, the compressing station and the cutting station are configured around a circular path.

16. The method of Claim 14 wherein the compressible goods are provided successively along a conveying device.

17. The method of Claim 16 wherein the filling station includes a gripper which sequentially engages the compressible goods and places the compressible goods into the packages.

18. The method of Claim 13 wherein the filling station and compressing station are combined into a single station.

19. The method of Claim 1 wherein the series of spaced apertures is placed on at least one flange extending from the open bottom of the package.

20. The method of Claim 1 wherein the filling station includes a plow for spreading apart the upwardly facing opening.

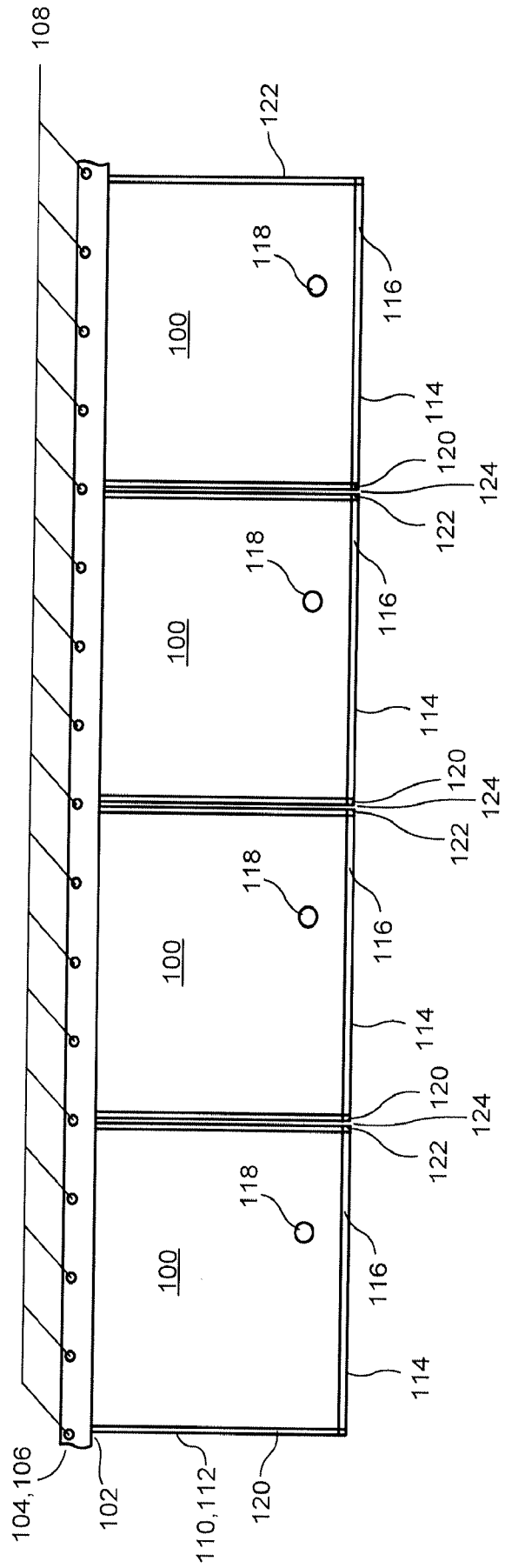


FIG. 1

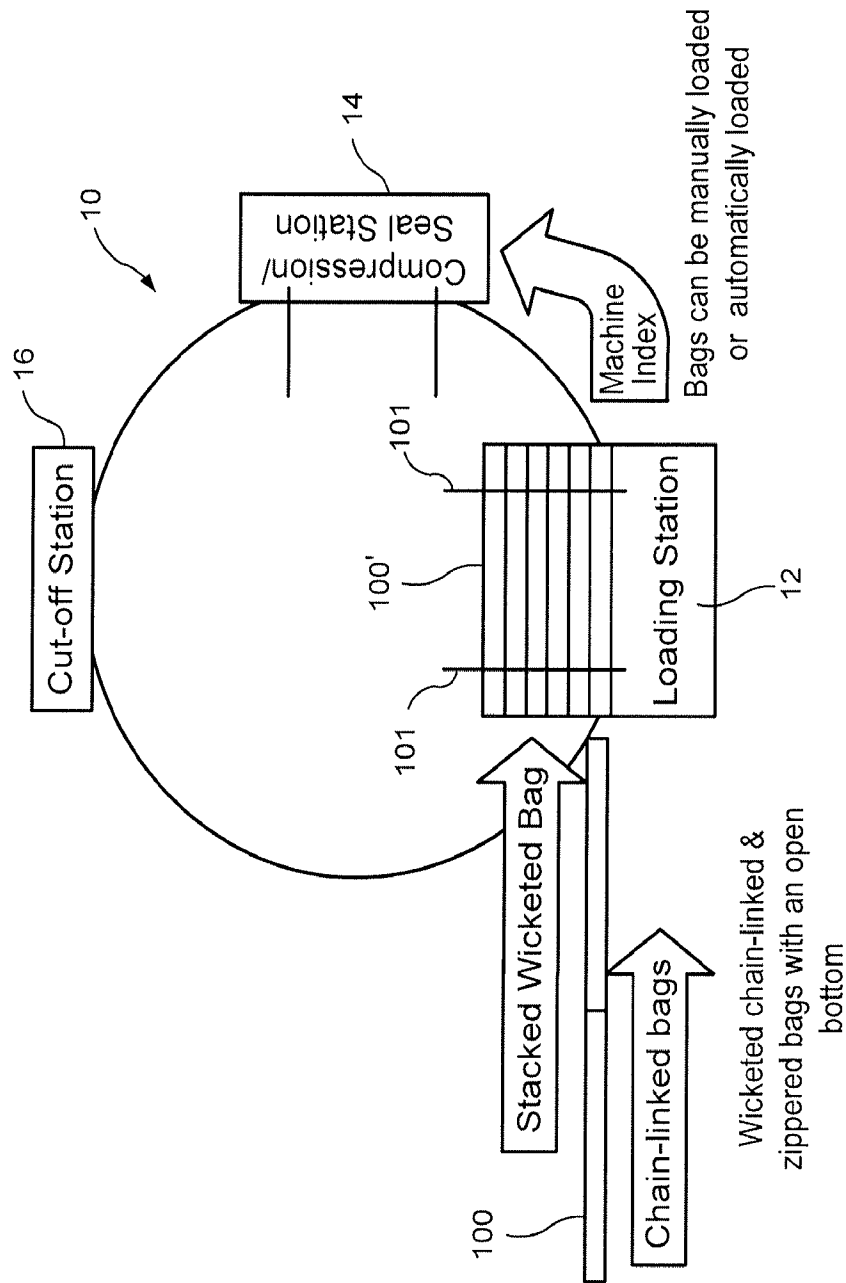


FIG. 2

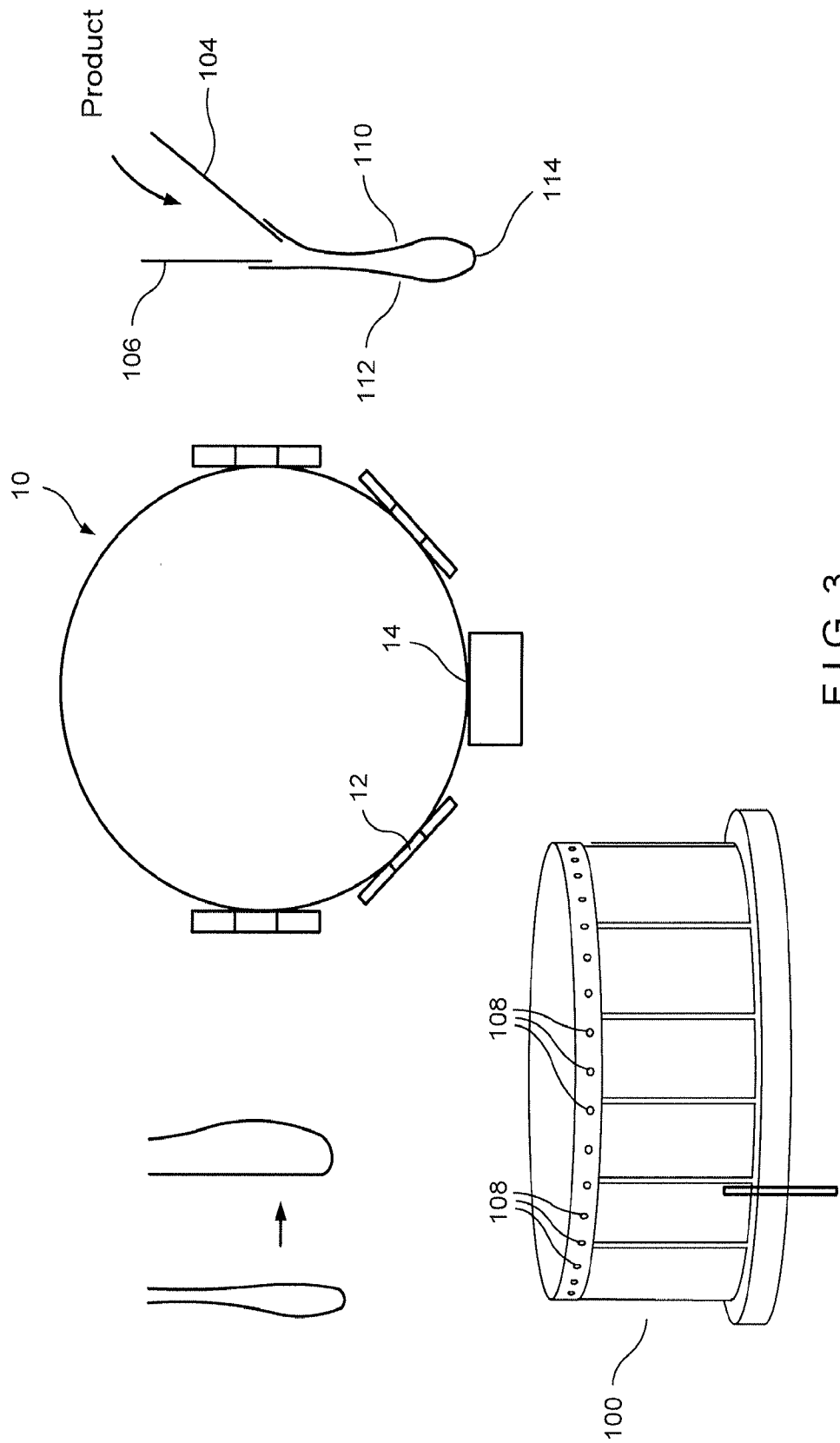
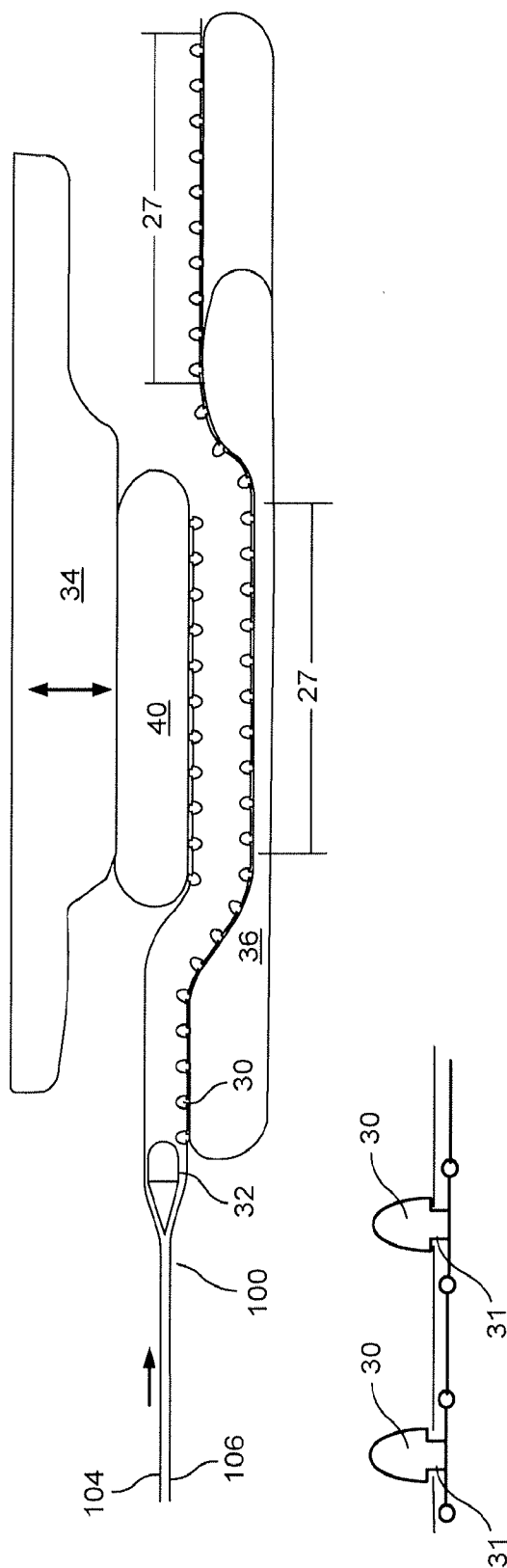
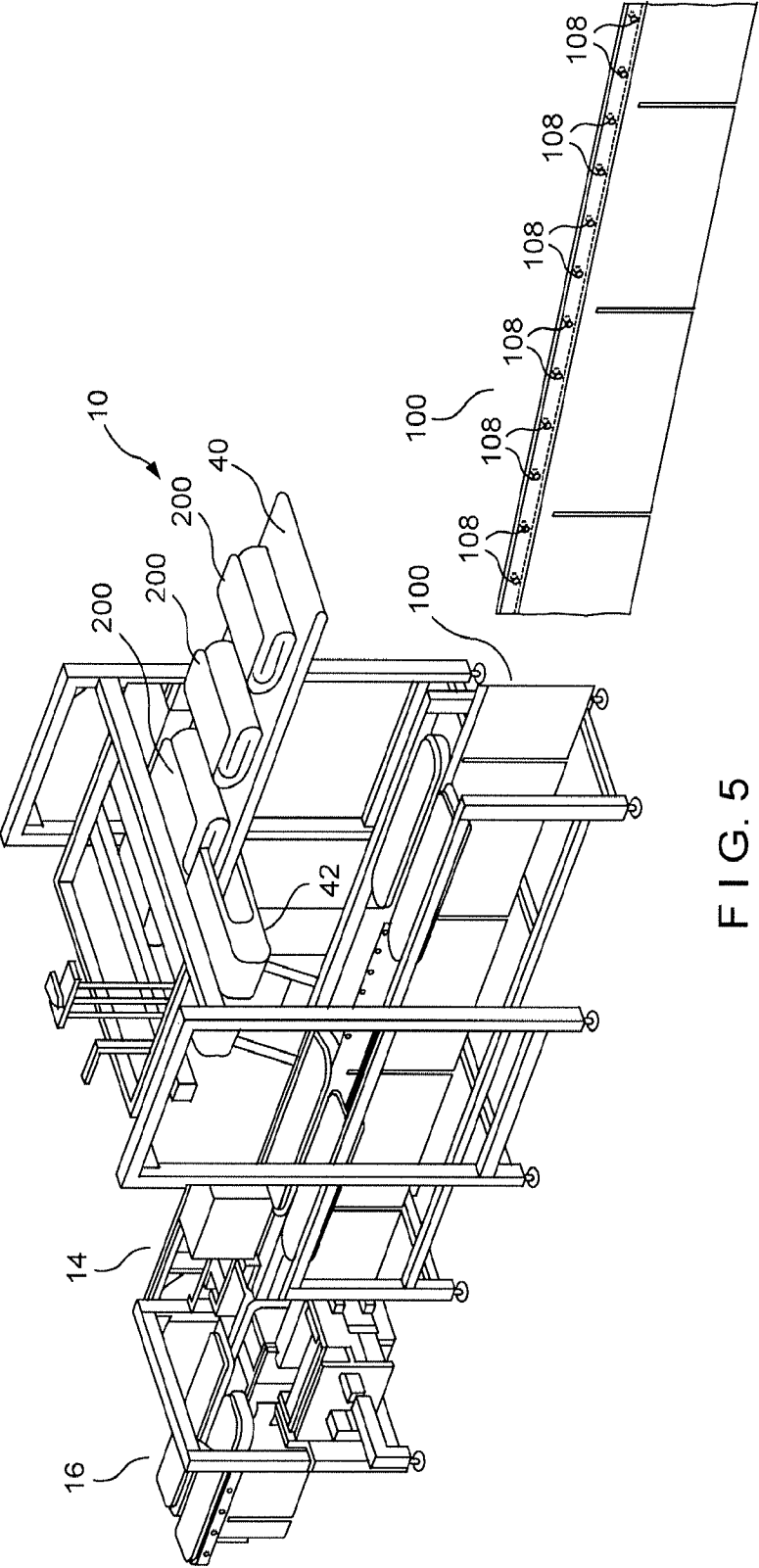


FIG. 3



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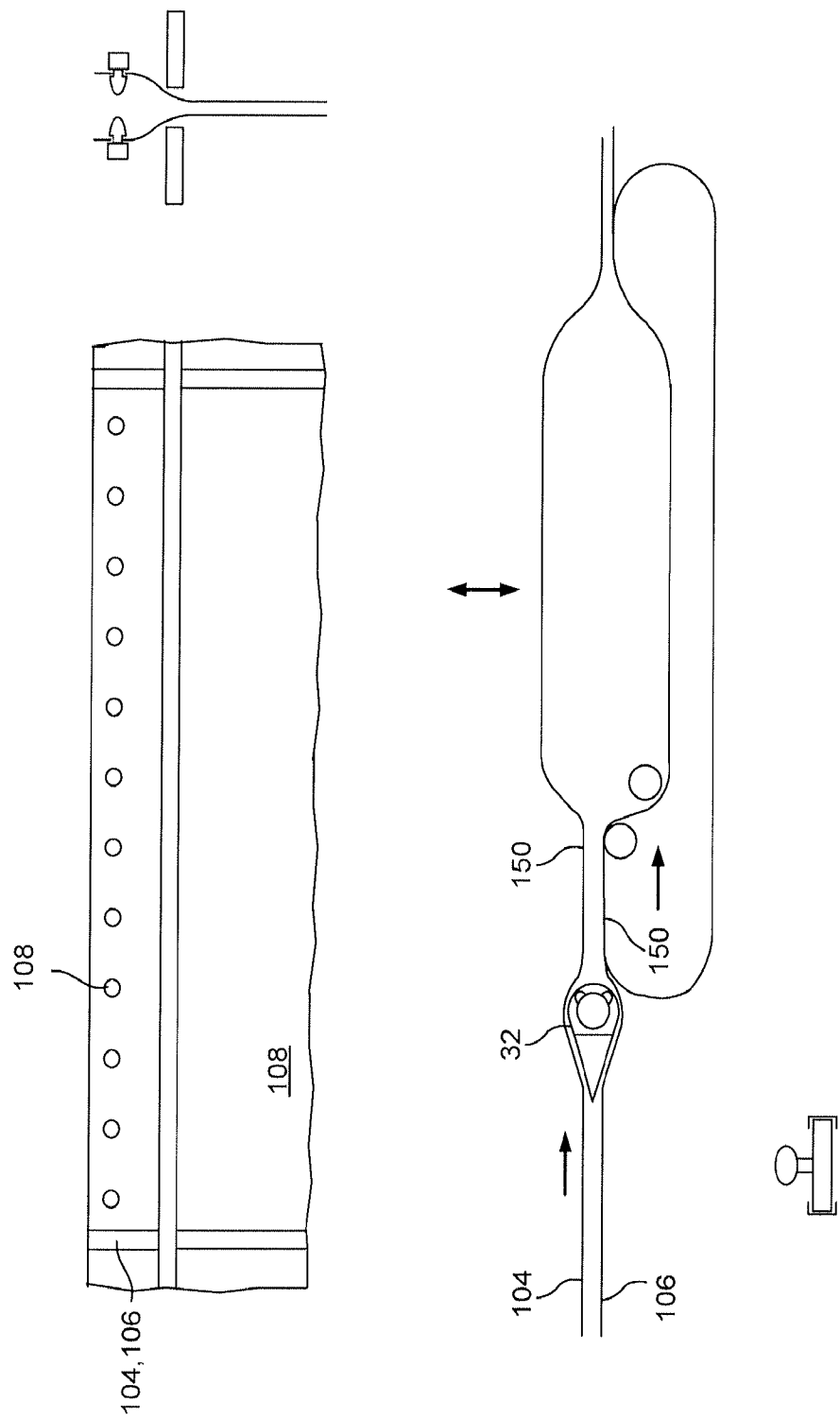
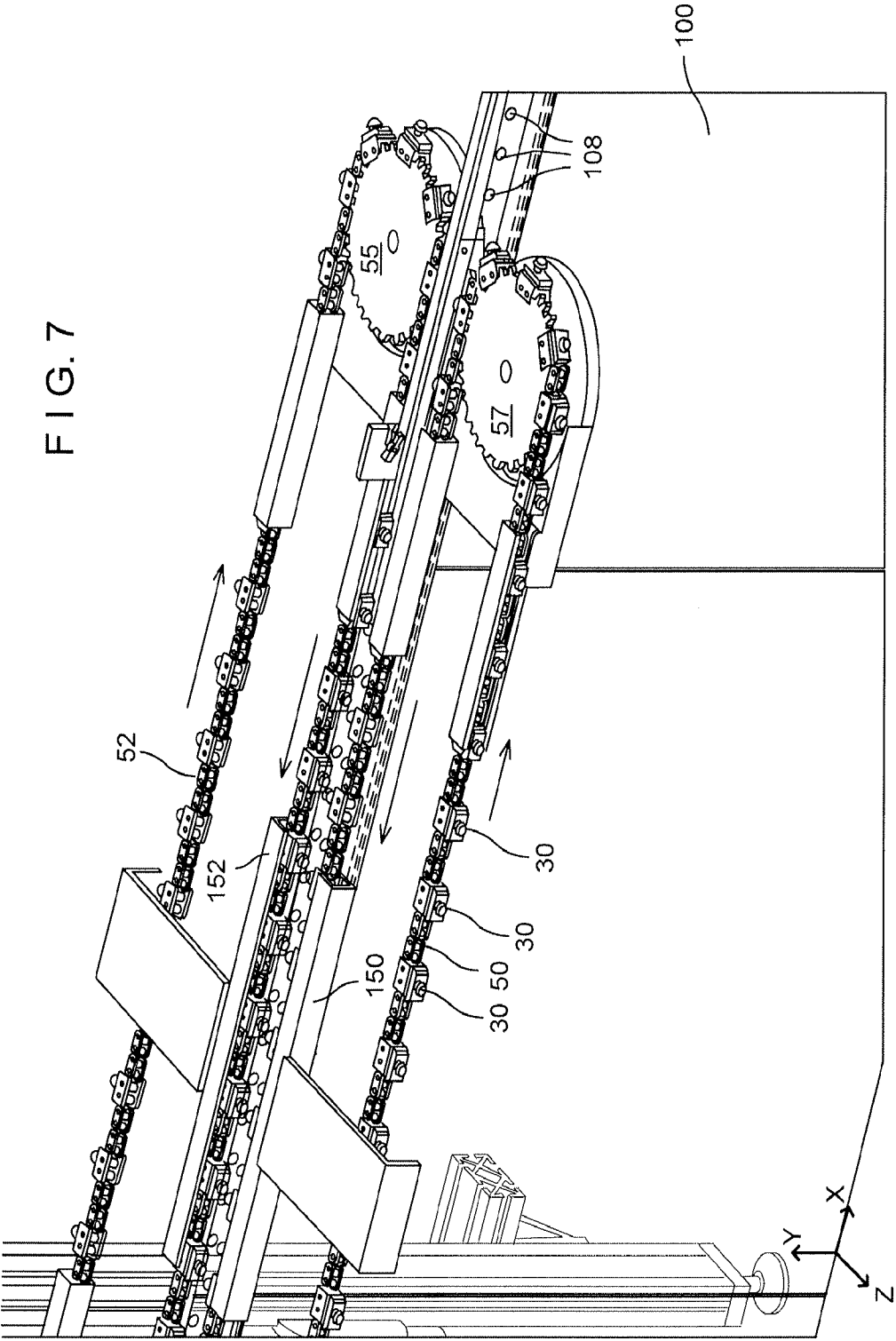
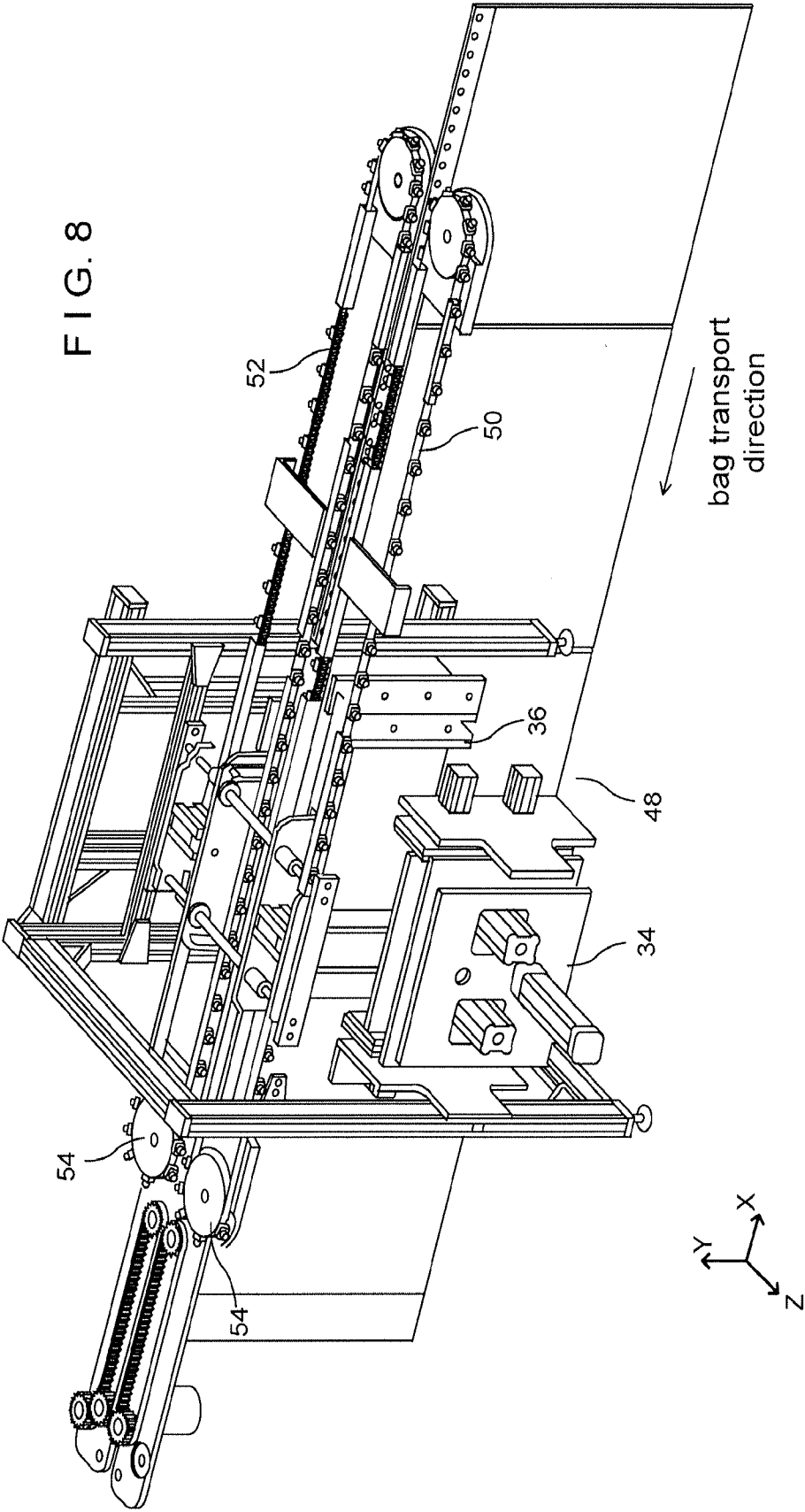


FIG. 7





INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/056026

A. CLASSIFICATION OF SUBJECT MATTER INV. B65B31/00 B65B31/02 B65B43/12 B65B51/14 B65B63/02 B65B63/00 ADD. According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) B65B Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
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☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
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Date of the actual completion of the international search 28 November 2012		Date of mailing of the international search report 05/12/2012
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer Yazici, Baris

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