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(54) **PACKAGING MACHINE CONFIGURED TO PRODUCE SEALED PACKAGES CONTAINING A POURABLE PRODUCT, REMOVABLE PRINTING KIT FOR SUCH PACKAGING MACHINE AND METHOD FOR PRODUCING PACKAGES CONTAINING A POURABLE PRODUCT**

(57) There is described a packaging machine (1) configured for producing sealed packages (2) and comprising: conveying means configured to advance a web (4) of packaging material along an advancement path (P); a tube forming unit (5, 40) configured to fold the web (4) into a tube (3) and to longitudinally seal the tube (3); a forming and sealing unit (6) configured to form the tube (3) and seal the tube (3) along successive transversal cross-sections thereof in order to obtain a sequence of packs (2a); a folding device configured to sequentially fold the packs (2a) in order to obtain a plurality of sealed packages (2); and a printing system (11) comprising a printer device (12) configured to sequentially print codes (13) on the packaging material; the printer device (12) is arranged along the advancement path (P) in a position operatively upstream of the forming and sealing unit (6), and is configured to print said codes (13) directly on the web (4).

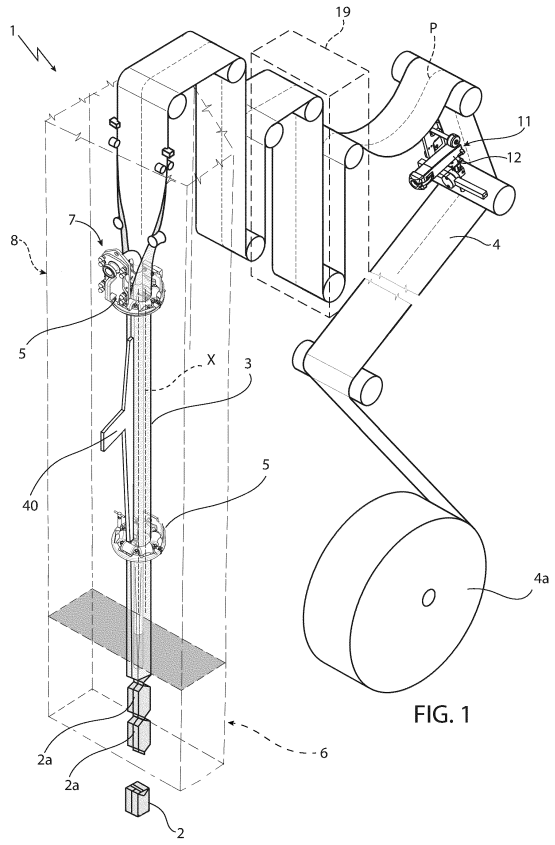

FIG. 1

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Description

TECHNICAL FIELD

[0001] The present invention relates to a packaging machine configured to produce sealed packages containing a pourable product, preferably a pourable food product.

[0002] The present invention also relates to a removable printing kit for such a packaging machine, and in particular implementable in such a packaging machine in a removable manner.

[0003] The present invention further relates to a method for producing packages containing a pourable product, preferably a pourable food product.

BACKGROUND ART

[0004] As it is generally known, many pourable food products, such as fruit juice, UHT (ultra-high temperature-treated) milk, wine, tomato sauce, etc., are sold in packages made of sterilized packaging material.

[0005] A typical example is the parallelepiped-shaped package for pourable food products known as Tetra Brik Aseptic (registered trademark), which is made by folding and sealing a laminated web of packaging material.

[0006] The packaging material has a multilayer structure comprising a base layer, e.g. made of paper, covered on both sides with layers of heat-seal plastic material, e.g. polyethylene.

[0007] In the case of aseptic packages for long-storage products, such as UHT milk, the packaging material also comprises a layer of oxygen-barrier material, e.g. an aluminum foil, which is superimposed on a layer of heat-seal plastic material, and is in turn covered with another layer of heat-seal plastic material forming the inner face of the package eventually contacting the food product.

[0008] Packages of this sort are normally produced on fully automatic packaging lines, which comprise packaging machines configured to form and fill the packages starting from a multilayer packaging material.

[0009] In particular, according to a non-limiting example of a packaging machine, a continuous tube is formed starting from a web of packaging material initially wound in a reel and fed through a plurality of unwinding rollers. The web of packaging material is sterilized by a sterilization unit, e.g. by applying a chemical sterilizing agent, such as hydrogen peroxide solution, which, once sterilization is completed, is removed from the surfaces of the packaging material, e.g. evaporated by heating. The web so sterilized is then maintained in a closed, sterile environment, and, advanced by the aforementioned unwinding rollers, is folded and sealed longitudinally to form the tube by means of a known web folding unit.

[0010] The tube is fed continuously along a first direction, normally a straight vertical direction, is filled with the sterilized food product from above and is formed, sealed and subsequently cut along equally spaced transversal cross-sections extending along a second direction, normally a direction orthogonal to the first direction.

[0011] In order to perform the forming and sealing operations, the known packaging machines comprise a forming and sealing unit configured to form the tube, so as to imprint an external shape to it corresponding to the desired shape of the package, and to seal the tube at equally spaced cross-sections orthogonal to the tube advancement direction.

[0012] Generally, a packaging machine of the above type comprises a pair of alternately movable forming and sealing jaws which are controllable with a reciprocating movement in the first direction and in a third direction orthogonal to the first direction and second direction to interact with the tube at successive portions thereof.

[0013] So-called pillow packs are obtained thereby, which have a longitudinal sealing band, a top transversal sealing band and a bottom transversal sealing band. The pillow packs are then cut at the cross-sections to be separated from one another and directed to a folding unit of the packaging machine for the final folding thereof.

[0014] The finished packages are thereby obtained.

[0015] It is known in the field the occurrence of faulty (non-nominal) packs produced by the forming and sealing unit, such as packs having a shape, weight, or sealing deviating from the desired ones.

[0016] To this end, the known packaging machines comprise a discard device operatively arranged between the forming and sealing unit and the folding unit and configured to discard the faulty packs.

[0017] It is also known in the field the need for printing information and/or data on the packages, such as production lot number, expiration date, or the like.

[0018] To this end, the packaging machines of the aforementioned type further comprise a printing unit for printing such information on the finished packages.

[0019] More in particular, a typical packaging machine comprises at least one printing unit arranged in a position operatively downstream of the folding unit and configured to print the data (usually in the form of an alphanumeric code or bar code) on the filled, formed, sealed and folded packages, thereby defining a printing process.

[0020] Although being structurally and functionally valid, the Applicant has observed that the packaging machines of the above type are still open for further improvements.

[0021] In particular, the need is felt for improving the synchronization between the packaging material and the printing unit during the aforementioned printing process.

[0022] Moreover, the need is felt for improving the detection and tracking of pillow packs and packages when the packaging machine undergoes non-nominal, production process related events, and more specifically for improving the detection and tracking of faulty packs.

DISCLOSURE OF INVENTION

[0023] It is therefore an object of the present invention to provide a packaging machine, a removable printing kit and a method for production of packages which are designed to meet at least one of the above-mentioned needs in a straightforward and low-cost manner.

[0024] This object is achieved by a packaging machine, a removable printing kit and a method for production of packages as claimed in the respective appended independent claims. Preferred embodiments of the present invention are laid down in the dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a schematic perspective view, with parts removed for clarity, of a packaging machine according to the present invention;

Figures 2 and 3 are perspective views, with parts removed for clarity, of a printing system of the packaging machine of Figure 1; and

Figure 4 is a top view, with parts removed for clarity, of a pillow pack produced with the packaging machine of Figure 1.

BEST MODE FOR CARRYING OUT THE INVENTION

[0026] With reference to Figure 1, number 1 indicates as a whole a non-limiting example of a packaging machine configured to produce sealed packages 2 containing a pourable product, preferably a pourable food product such as pasteurized or UHT milk, water, fruit juice, wine, peas, beans, etc.

[0027] In detail, packaging machine 1 is configured to form, seal and fold packages 2 starting from a web 4 of packaging material, which is initially wound in a reel 4a, and then folded into a tube 3 of packaging material, as explained below.

[0028] Preferably, packaging machine 1 is part of a packaging line (known per se and not shown) configured for producing, grouping and boxing a plurality of packages in a known manner.

[0029] As schematized in Figure 1, packaging machine 1 comprises:

- conveying means configured to advance web 4 along an advancement path P;
- a tube folding device 5 configured to progressively fold web 4 into a tube 3;
- a sealing element 40 for longitudinally seal tube 3, in a manner known and not described in detail;
- a filling device 7 for filling tube 3 (from above) with the pourable product;
- a forming and sealing unit 6 configured to form tube 3 and seal tube 3 along successive transversal cross-sections thereof in order to obtain a sequence of pillow packs 2a, in a manner known and not described in detail;
- an isolation chamber 8 internally defining an environment containing a controlled atmosphere, in particular sterile and/or aseptic gas, preferably sterile and/or aseptic air, and housing the forming and sealing unit 6, the tube folding device 5, the sealing element 40 and the filling device 7;
- a folding device (not shown) configured to sequentially fold packs 2a in order to obtain a plurality of sealed packages 2.

[0030] Tube folding device 5 and sealing element 40 define together a tube forming unit.

[0031] Preferably, forming and sealing unit 6 has an axis X along which tube 3 is fed, in use.

[0032] Axis X is parallel to a straight direction, which preferably is a straight vertical direction.

[0033] Hence, in use, tube 3 is fed along axis X, downwards, and while being filled from above is formed and sealed by forming and sealing unit 6.

[0034] More specifically, tube 3 is drawn (downwards) along axis X by forming and sealing unit 6 in a known manner.

[0035] In this way, a plurality of pillow packs 2a are obtained.

[0036] In light of the above, packaging machine 1 is configured to form and seal a plurality of pillow packs 2a containing the pourable product starting from web 4 and tube 3 and then to fold the pillow packs 2a for obtaining the aforementioned formed, sealed and folded packages 2 containing the pourable product.

[0037] As visible in Figure 4, pillow packs 2a have a main body 41, with a longitudinal sealing band 42 longitudinally extending along main body 41 and two opposite transversal sealing bands 43, one at each longitudinal end portion of the pack 2a.

[0038] Preferably, packaging machine 1 also comprises a discarding or sorting device (of the type known and not shown) configured to discard or sort the packs, e.g. by sampling the produced packs. The discarding or sorting device may be positioned downstream of the forming and sealing unit 6.

[0039] The discarding device is configured to discard packs 2a, such as packs 2a having a shape, weight, or sealing deviating from the desired ones or packs that are sampled for testing purposes.

[0040] Packaging machine 1 further comprises a printing system 11 comprising a printer device 12 configured to sequentially print codes 13 (Figures 2 and 4) on the packaging material.

[0041] According to a preferred embodiment, printer device 12 is configured to print codes 13 containing information/data correlated with production events or with the production process.

[0042] For example, each code 13 may contain infor-

mation and/or data such as a specific (sequential) production lot number or an expiration date.

[0043] For example, each code 13 may contain information and/or data indicative of the settings and/or parameters of the components of the packaging machine 1 interacting with the web 4, such as the folding and sealing unit 6.

[0044] According to one aspect of the present invention, printer device 12 is arranged along advancement path P in a position operatively upstream of forming and sealing unit 6, and is configured to print codes 13 directly on web 4.

[0045] More in particular, as visible in Figure 1, printer device 12 is arranged in a position operatively upstream of tube forming unit (and in detail upstream of tube folding device 5) with respect to advancement path P, for printing codes 13 directly on web 4 prior to the folding of web 4 into tube 3.

[0046] In other words, printer device 12 is configured to sequentially print codes 13 on the unfolded web 4, i.e. directly on web 4 before web 4 is folded into tube 3.

[0047] Thanks to this configuration, every pack 2a will have a code 13 printed thereon, since codes 13 are provided on the packaging material still in form of web, and therefore before web 4 is transformed into a plurality of packs 2a.

[0048] In this way, a number of packs 2a discarded by the discarding device may be successfully identified.

[0049] This is particularly advantageous during tests, during which the packs 2a (sometimes faulty) may be sampled and tested, the packs providing useful information and data about the test itself.

[0050] Advantageously, thanks to the instant printer device 12, all packs can be identified correctly. That is, due to the printing being performed on the web 4, it is possible to control accurately the printing process. Conveniently, packaging machine 1 comprises a control unit 14 configured to control the operation of the conveying means, of tube forming unit, of forming and sealing unit 6 and of the folding device.

[0051] Advantageously, control unit 14 is further configured to control the operation of printing system 11, i.e. of printer device 12.

[0052] Expediently, control unit 14 is further configured to directly send to printer device 12 signals/data correlated with codes 13 to be printed.

[0053] Advantageously, the control of the printing system can be performed directly by the packaging machine, e.g. adapting dynamically to transients and events.

[0054] According to a further aspect of the present invention, printing system 11 further comprises a sensor device 15 configured to detect a speed (and in particular an advancing speed) of web 4 along advancement path P. Accordingly, control unit 14 is configured to receive from sensor device 15 a speed signal indicative of the detected speed and to control the operation of printer device 12 as a function of such speed signal.

[0055] In one embodiment, control unit 14 is configured to adjust a printing cadence of printer device 12 as a function of the speed signal.

[0056] In one embodiment, control unit 14 is configured to control a movement of printer device 12 towards and away from web 4 (i.e. from advancement path P) as a function of the speed signal for adjusting a distance of printer device 12 from web 4 (i.e. from advancement path P).

[0057] According to the preferred and non-limiting embodiment shown, sensor device 15 includes (Figures 2 and 3) :

- a roller 16 configured to rotatably abut against web 4 and to cooperate in contact with web 4 so as to convey the web 4, e.g. the roller 16 can be actuated in rotation by the advancement of web 4; and
- an encoder 17 coupled with roller 16 and configured to detect a speed of web 4 by means of the rotation of roller 16 (which, as said, is caused by the advancement of web 4).

[0058] Thanks to the presence of sensor device 15, a direct synchronization of printer device 12 with web 4 is provided, which is easier to manage, more reliable and less prone to errors than a synchronization made between a printing unit and the finished packages 2, as it is the case in the prior art configurations.

[0059] In fact, sensor device 15 provides a better and direct synchronization of printer device 12 with web 4, as the chain of errors and tolerances is shorter than the one between finished packages 2 and a printing unit arranged downstream of the folding device, as it is the case in the prior art configurations.

[0060] Preferably, sensor device 15 further comprises a counter-roller 18 configured to abut against roller 16, with the interposition on web 4.

[0061] In this way, the detection performed by encoder 17 can better adapt to possible fluctuations in the packaging material thickness or speed, thereby further improving the synchronization between web 4 and printer device 12.

[0062] Advantageously, roller 16 (and therefore also counter-roller 18) is arranged in a position adjacent to printer device 12, so as to define a detection area on the advancing web 4 that is located adjacent to printer device 12.

[0063] The Applicant has observed that such positioning of roller 16 provides the most accurate speed detection, at an area close to where the printing is carried out, thereby minimizing the effect of possible events, undertensioning and/or overtensioning of web 4 on the speed detection, and shortening the chain of error.

[0064] As schematized in Figure 2, web 4 consists of web portions 4b.

[0065] Hence, the conveying means are configured to advance a sequence of web portions 4b defining the web 4, each web portion 4b being apt to define a respective package 2 after the forming, sealing and folding thereof.

[0066] Conveniently, control unit 14 is further configured to carry out a tracking of each web portion 4b, and then of each pillow pack 2a and package 2, along the packaging machine 1.

[0067] More specifically, control unit 14 is configured to carry out a method for tracking each web portion 4b, pack 2a, or package 2 as described in the Italian Patent Application No. 102023000007410, in the name of the same Applicant.

[0068] According to an alternative embodiment not shown, sensor device 15 may comprise a detector (not shown) configured to sequentially detect data carriers on web 4, each data carrier being indicative of the position and/or speed of a respective web portion 4b, the detector being configured to send to control unit 14 signals correlated with each detection.

[0069] For example, the data carriers may be defined by markers such as optical marks or magnetic marks.

[0070] Accordingly, the detector includes an optical detector for optically detecting the data carriers, or a magnetic detector for magnetically detecting the data carriers, depending on the nature of the data carriers.

[0071] Expediently, the detector is arranged along the advancement path P in a position operatively upstream of printer device 12.

[0072] The above configuration allows for reducing wear on the packaging material, compared to the sensor device 15 with encoder 17 and roller 16, albeit being less accurate than the roller-encoder system described above.

[0073] As schematized in Figure 1, packaging machine 1 further comprises a sterilization unit 19 arranged along advancement path P in a position upstream of tube folding device 5 and configured to perform a sterilizing treatment on web 4.

[0074] Advantageously, printer device 12 is arranged in a position upstream of sterilization unit 19, with respect to advancement path P, for printing codes 13 directly on web 4 prior to its sterilization.

[0075] In this way, even the printed code 13, which may consist of ink, is sterilized together with the packaging material.

[0076] In one embodiment, sterilization unit 19 includes an electron-beam sterilizer of the type known, configured to irradiate web 4 with a beam of electrons.

[0077] By arranging printer device 12 upstream of such sterilizer, it is ensured that codes 13 are cured by the electron beam, i.e. codes 13 are well-dried on the packaging material, other than being sterilized.

[0078] In one embodiment, printer device 12 is an inkjet printer.

[0079] In one embodiment, printer device 12 is a laser printer. In such a case, there is no need for any ink to dry.

[0080] As said, each pack 2a has a main body 41, with a longitudinal sealing band 42 longitudinally extending along main body 41 and two opposite transversal sealing bands 43, one at each longitudinal end portion of the pack 2a, as shown in Figure 4.

[0081] Advantageously, printer device 12 is configured to print a pair of codes 13 on each web portion 4b, so that a first code 13a is located at a part of the web portion 4b corresponding to a first end 41a of the respective pack 2a or package 2 proximal to a first sealing band 43 thereof, and a second code 13b is located at another part of the web portion 4b corresponding to a second end 41b of the respective pack 2a or package 2 proximal to a second sealing band 43 thereof.

[0082] This condition is shown in Figure 4.

[0083] Thanks to this feature, tracking and identification of packs 2a and packages 2, especially during tests, is largely improved. In fact, in some cases packs 2a or packages 2 are cut in half during tests. Having a unique code 13 in each respective half allows for better detecting to which pack 2a or package 2 the cut half belongs.

[0084] The control unit may be configured to receive an event signal indicative of an event occurring in the packaging machine. For example, such event comprises a splice, i.e. a joining of the web of packaging material with a new web belonging to a new reel.

[0085] The control unit may be configured to adjust a control of the printer device 12 as a function of the event signal, preferably varying the printing cadence and/or printing codes 13 indicative of said event. For example, the codes 13 may comprise information on the event.

[0086] In case of a splice, the code 13 printed on the packages may comprise such splice, in order to identify the web portions 4b in proximity thereof, e.g. the web portion affected by the splice and the neighboring ones.

[0087] According to a further aspect of the present invention, printer device 12 and sensor device 15, i.e. printing system 11, are configured to be implemented in packaging machine 1 in a removable manner, so as to define a removable printing kit for packaging machine 1.

[0088] In other words, printing system 11 according to the present invention advantageously defines a removable printing kit adapted to be implemented in packaging machine 1, the removable printing kit comprising:

- a printer device 12, configured to be removably arranged along advancement path P in a position operatively upstream of forming and sealing unit 6, preferably upstream of the tube forming unit, even more preferably upstream of sterilization unit 19, for printing codes 13 directly on web 4; and
- a sensor device 15 coupled to printer device 12, configured to be removably arranged along advancement path P and configured to interact with the advancing web 4 for detecting a speed of web 4 along advancement path P and to control printer device 12 based on said detection.

[0089] Furthermore, printing system 11 according to the present invention allows to implement a method for the production of packages 2 containing a pourable product starting from a web 4 of packaging material, the method comprising the steps of:

- advancing the web 4 along an advancement path P;
- folding the web 4 into a tube 3;
- longitudinally sealing the tube 3;
- filling the tube 3 with the pourable product;
- forming and transversally sealing the tube 3 so as to obtain a plurality of packs 2a;
- folding the packs 2a to obtain a plurality of packages 2;
- sequentially printing codes 13 on the packaging material;

wherein the step of printing comprises directly printing the codes 13 on the web 4, prior to the step of folding the web 4.

[0090] Conveniently, the method comprises the steps of:

- detecting a speed of the web along the advancement path;
- controlling the step of sequentially printing codes 13 as a function of the speed detected during the step of detecting.

[0091] The advantages of packaging machine 1, the removable printing kit and the method according to the present invention will be clear from the foregoing description.

[0092] In particular, as codes 13 are printed on the packaging material in form of web 4, and therefore before web 4 is turned into a plurality of packs 2a, every pack 2a and package 2 will have one or more codes 13 printed thereon.

[0093] In this way, even if packs 2a are discarded by the discarding or sorting device, it is possible to successfully identify them. This is particularly advantageous during tests, during which the packs 2a (sometimes faulty) may provide useful information and data about the test itself.

[0094] Advantageously, thanks to the printing system 11 a correct identification of the packages is possible also in case of events, transients or variations in the tensioning of the web.

[0095] Furthermore, thanks to the presence of sensor device 15 as described above, a direct synchronization of printer device 12 with web 4 is provided, which is easier to manage, more reliable and less prone to errors than a synchronization made between a printing unit and the finished packages 2, as it is the case in the prior art configurations. In fact, sensor device 15 provides a better and direct synchronization of printer device 12 with web 4, as the chain of errors and tolerances is shorter than the one between finished packages 2 and a printing unit arranged downstream the folding device, as it is the case in the prior art configurations.

[0096] Clearly, changes may be made to packaging machine 1, the removable printing kit and the related method as described herein without, however, departing from the scope of protection as defined in the accompanying claims.

Claims

1. Packaging machine (1) configured for producing sealed packages (2) containing a pourable product starting from a web (4) of packaging material, the packaging machine (1) comprising:

- conveying means configured to advance the web (4) along an advancement path (P);
- a tube forming unit (5, 40) configured to fold the web (4) into a tube (3) and to longitudinally seal the tube (3);
- a forming and sealing unit (6) configured to form the tube (3) and seal the tube (3) along successive transversal cross-sections thereof in order to obtain a sequence of packs (2a);
- a folding device configured to sequentially fold the packs (2a) in order to obtain a plurality of sealed packages (2); and
- a printing system (11) comprising a printer device (12) configured to sequentially print codes (13) on the packaging material;

wherein the printer device (12) is arranged along the advancement path (P) in a position operatively upstream of the forming and sealing unit (6), and is configured to print said codes (13) directly on the web (4) .

2. Packaging machine as claimed in claim 1, wherein the printer device (12) is arranged in a position operatively upstream of the tube forming unit (5, 40), with respect to the advancement path (P), for printing said codes (13) directly on the web (4) prior to the folding of the web (4) into said tube (3).

3. Packaging machine as claimed in claim 1 or 2, wherein the printing system (11) further comprises a sensor device (15) configured to detect a speed of the web (4) along the advancement path (P);
and wherein the packaging machine (1) further comprises a control unit (14) configured to receive from the sensor device (15) a speed signal indicative of the detected speed, and to control the operation of the printer device (12) as a function of the speed signal.

4. Packaging machine as claimed in claim 3, wherein the control unit (14) is configured to adjust a printing cadence of the printer device (12) as a function of the speed signal.

5. Packaging machine as claimed in claim 3 or 4, wherein the control unit (14) is configured to control a movement of the printer device (12) towards and away from the web (4) as a function of the speed signal for adjusting a distance of the printer device (12) from the web (4).

6. Packaging machine as claimed in any one of the claims 3 to 5, wherein the sensor device (15) includes:

- a roller (16) configured to rotatably abut against the web (4) and to cooperate in contact with the web (4) so as to be actuated in rotation by the advancement of the web (4); and
- an encoder (17) coupled with the roller (16) and configured to detect a speed of the web (4) by means of the rotation of the roller (16).

7. Packaging machine as claimed in claim 6, wherein the roller (16) is arranged in a position adjacent to the printer device (12), so as to define a detection area on the advancing web (4) that is located adjacent to the printer device (12).

8. Packaging machine as claimed in any of claims 3 to 7, wherein the sensor device (15) comprises a detector configured to sequentially detect data carriers on the web (4), each data carrier being indicative of the position and/or speed of a respective web portion (4b) which is apt to define a respective pack (2a), the detector being configured to send to the control unit (14) signals correlated with each detection;
and wherein the detector is arranged along the advancement path (P) in a position operatively upstream of the printer device (12).

9. Packaging machine as claimed in any of the foregoing claims and comprising a control unit (14) configured to control the operation of the conveying means, of the tube forming unit (5, 40), of the forming and sealing unit (6) and of the folding device;
and wherein the control unit (14) is further configured to control the operation of the printing system (11) .

10. Packaging machine as claimed in claim 9, wherein the control unit (14) is further configured to:

- receive data indicative of operation of the conveying means, of the tube forming unit (5, 40), of the forming and sealing unit (6) and/or of the folding device, and
- printing said codes (13) as a function of said data.

11. Packaging machine as claimed in any of the foregoing claims, and comprising a sterilization unit (19) arranged along the advancement path (P) in a position upstream of the tube forming device (5, 40) and configured to perform a sterilizing treatment on the web (4);
wherein the printer device (12) is arranged in a position upstream of the sterilization unit (19), with respect to the advancement path (P), for printing said codes (13) directly on the web (4) prior to its sterilization.

12. Packaging machine as claimed in any one of the foregoing claims, wherein the conveying means are configured to advance a sequence of web portions (4b) defining said web (4), each web portion (4b) being apt to define a respective package (2) after the forming, sealing and folding thereof, each package (2) having a main body (41) longitudinally delimited by two opposite sealing bands (43);
wherein the printer device (12) is configured to print a plurality of said codes (13) on each web portion (4b), preferably so that a first code (13a) is located at a part of the web portion (4b) corresponding to a first end (41a) of the respective package (2) proximal to a first sealing band (43) thereof, and a second code (13b) is located at another part of the web portion (4b) corresponding to a second end (41b) of the respective package (2) proximal to a second sealing band (43) thereof.

13. Packaging machine as claimed in claim 3 or 8, wherein the printer device (12) and the sensor device (15) are configured to be implemented in the packaging machine (1) in a removable manner, so as to define a removable printing kit for the packaging machine (1).

14. Removable printing kit adapted to be implemented in a packaging machine (1) configured for producing sealed packages (2) containing a pourable product starting from a web (4) of packaging material, the packaging machine (1) comprising a conveying device configured to advance the web (4) along an advancement path (P), a tube forming device (5, 40) configured to fold the web (4) into a tube (3) and to longitudinally seal the tube (3), a forming and sealing unit (6) configured to form the tube (3) and seal the tube (3) along successive transversal cross-sections thereof in order to obtain a sequence of packs (2a), and a folding device configured to sequentially fold the packs (2a) in order to obtain sealed packages (2), the printing kit being removably couplable to the packaging machine (1) and comprising:

- a printer device (12) configured to sequentially print codes (13) on the packaging material and to be removably arranged along the advancement path (P) in a position operatively upstream of the forming and sealing unit (6) for printing said codes (13) directly on the web (4); and
- a sensor device (15) coupled to the printer device (12), configured to be removably arranged along the advancement path (P) and configured for detecting a speed of the web (4) along the advancement path (P) and to control the printer device (12) based on said detection.

15. Method for the production of packages (2) containing a pourable product starting from a web (4) of packaging material, the method comprising the steps of:

- advancing the web (4) along an advancement path (P) ;
- folding the web (4) into a tube (3);
- longitudinally sealing the tube (3);
- filling the tube (3) with the pourable product;
- forming and transversally sealing the tube (3) so as to obtain a plurality of packs (2a);
- folding the packs (2a) to obtain a plurality of packages (2);
- sequentially printing codes (13) on the packaging material;

wherein the step of printing comprises printing the codes (13) directly on the web (4), prior to the step of folding the web (4).

16. Method as claimed in claim 15, and comprising the steps of:

- detecting a speed of the web (4) along the advancement path (P);
- controlling the step of sequentially printing codes (13) as a function of the speed detected during the step of detecting.

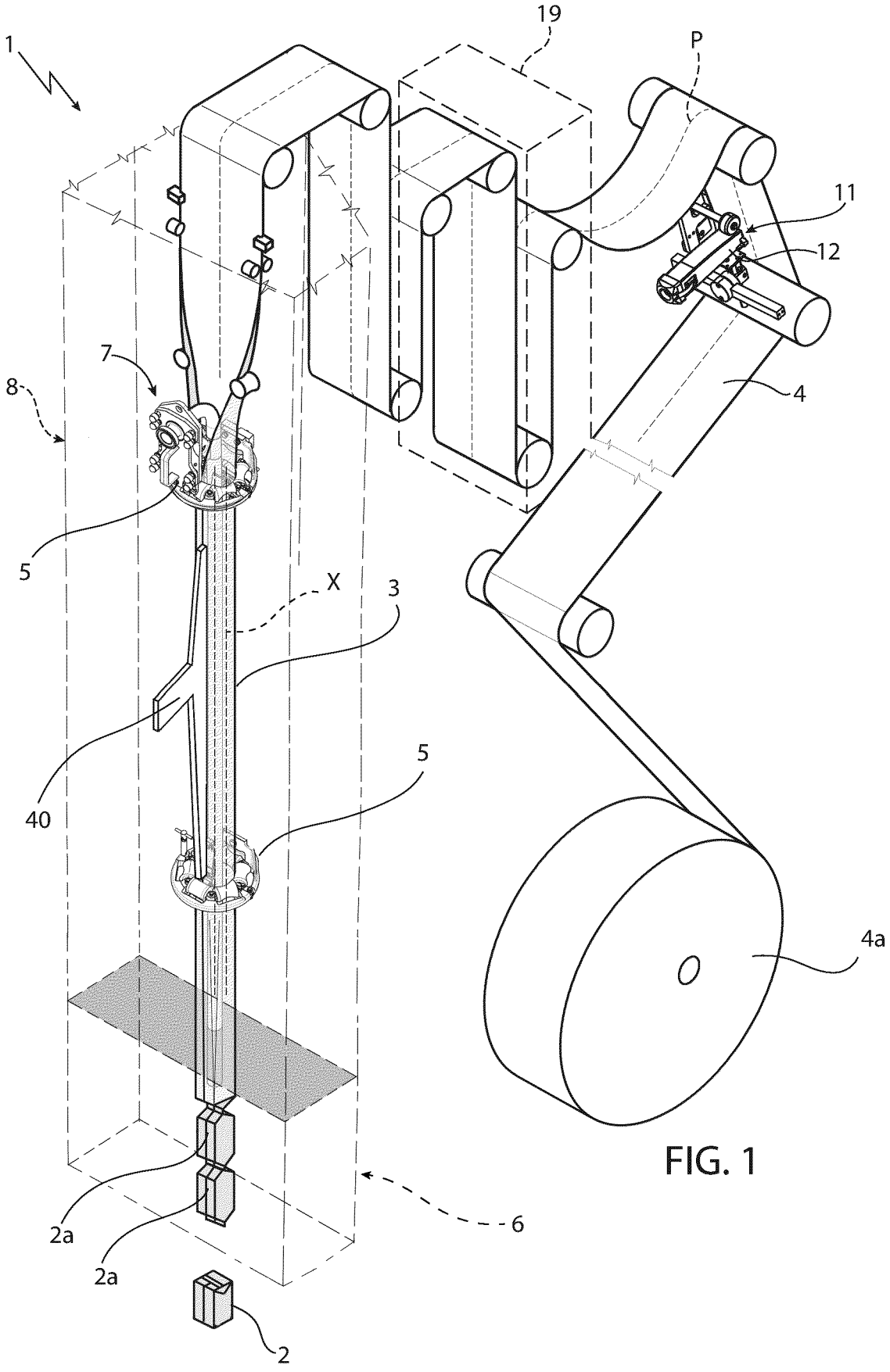


FIG. 1

FIG. 2

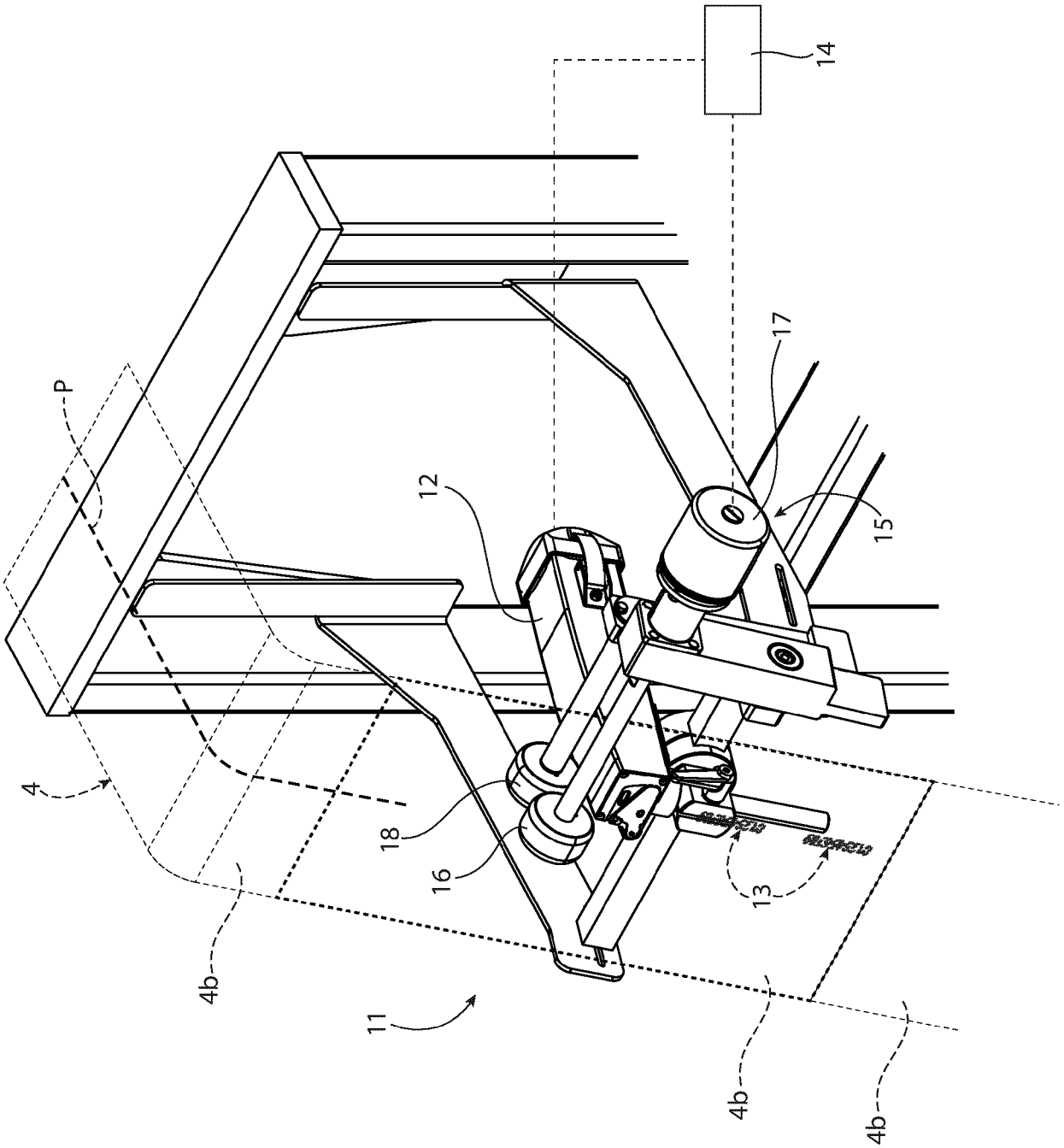


FIG. 3

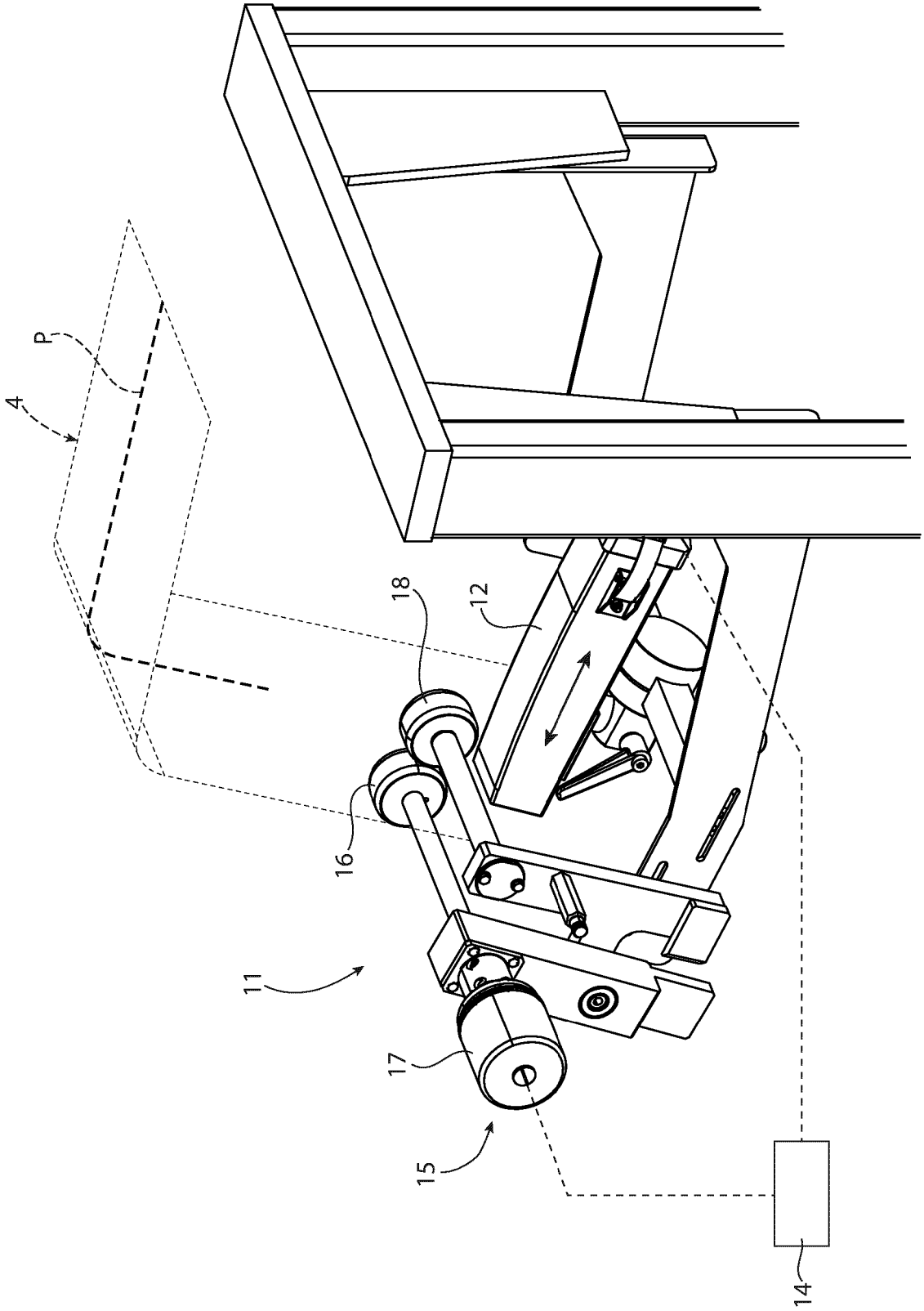
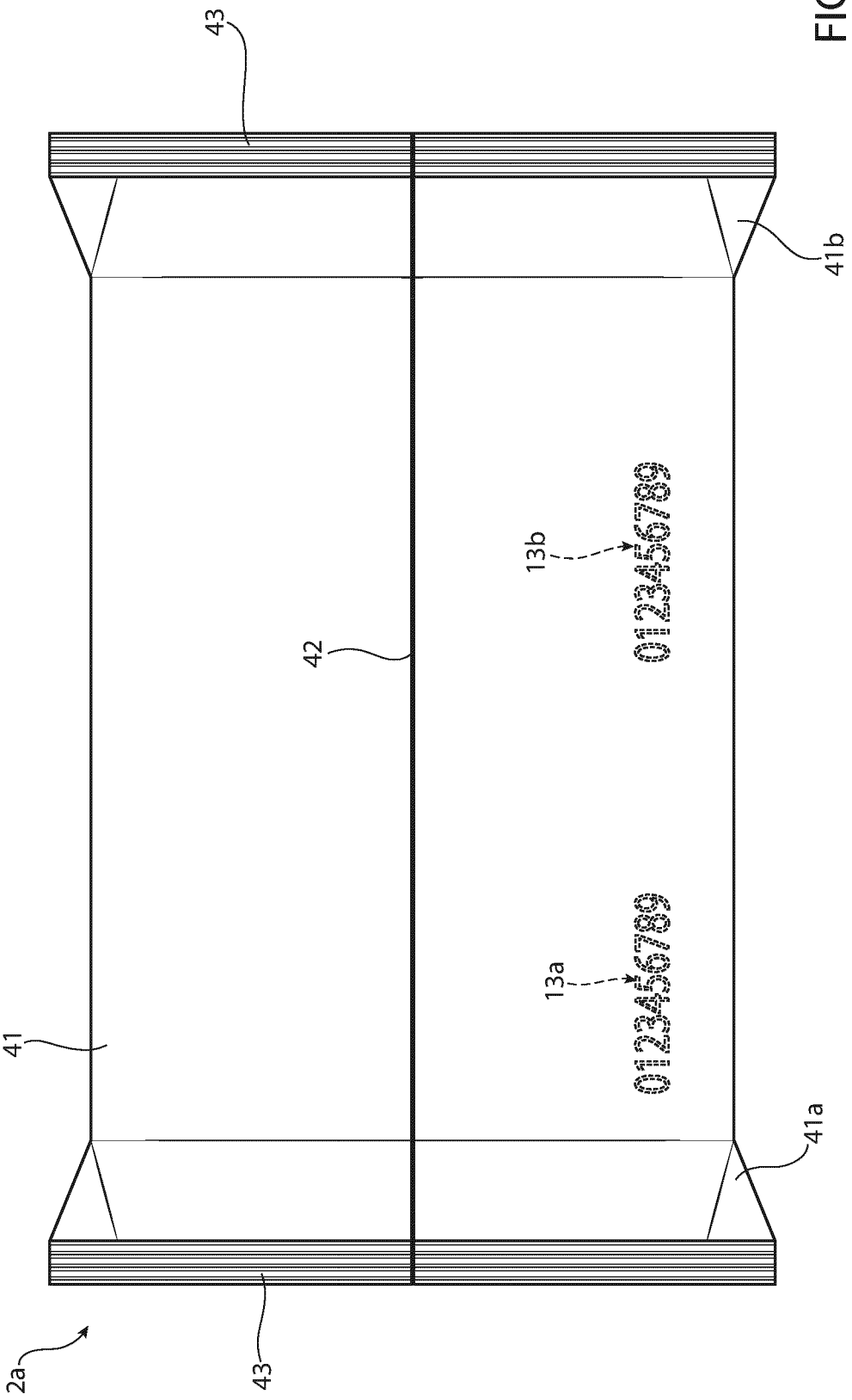


FIG. 4



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Application Number
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	31 March 2025	Dick, Birgit

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