



US 20120247072A1

(19) **United States**(12) **Patent Application Publication**
Romijn et al.(10) **Pub. No.: US 2012/0247072 A1**(43) **Pub. Date: Oct. 4, 2012**(54) **APPARATUS FOR, AND METHOD OF,
FORMING, FILLING AND CLOSING BAGS,
EACH WITH A POURING DEVICE**(30) **Foreign Application Priority Data**

Sep. 30, 2009 (DE) 10 2009 045 153.6

May 27, 2010 (DE) 10 2010 029 360.1

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Lambie**, St. Geertruid (NL)**Publication Classification**(51) **Int. Cl.**
B65B 1/02 (2006.01)(52) **U.S. Cl.** **53/558**(57) **ABSTRACT**

The invention relates to a device (10) for forming, filling and closing bags provided with respectively one pouring device, comprising a device (23) for forming a tube (25) from at least one material web (12), a filling device (28) for filling the tube (25) and/or the bags (5) and a cross-seam sealing and separating device (33) for separating respectively one bag (5) from the tube (5). According to the invention, said device (23) for forming the tube (25) comprises a forming device (24) which forms the tube (25) from one single material web (12) and the filling device (28) fills the tube (25) with the filling material over the entire cross-section of the tube (25) and one outer part (4) of the of the pouring device (1) is joined to the material web (12) after forming the tube (25).

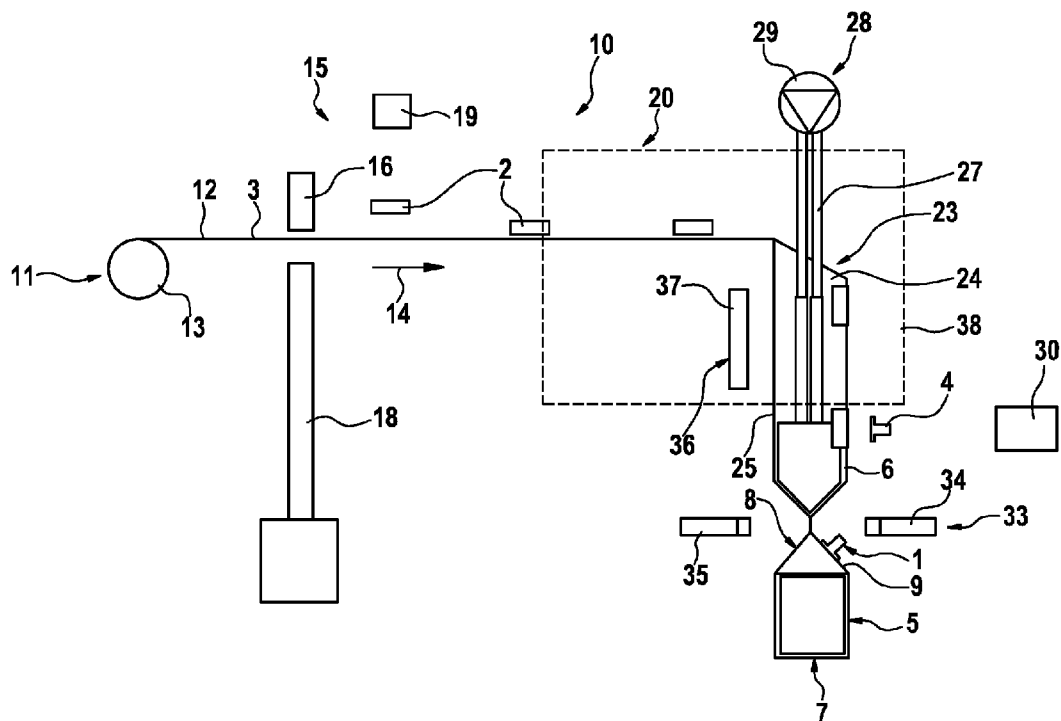
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Stuttgart (DE)(21) Appl. No.: **13/499,847**(22) PCT Filed: **Aug. 4, 2010**(86) PCT No.: **PCT/EP10/61330**§ 371 (c)(1),
(2), (4) Date: **Jun. 21, 2012**

Fig. 1

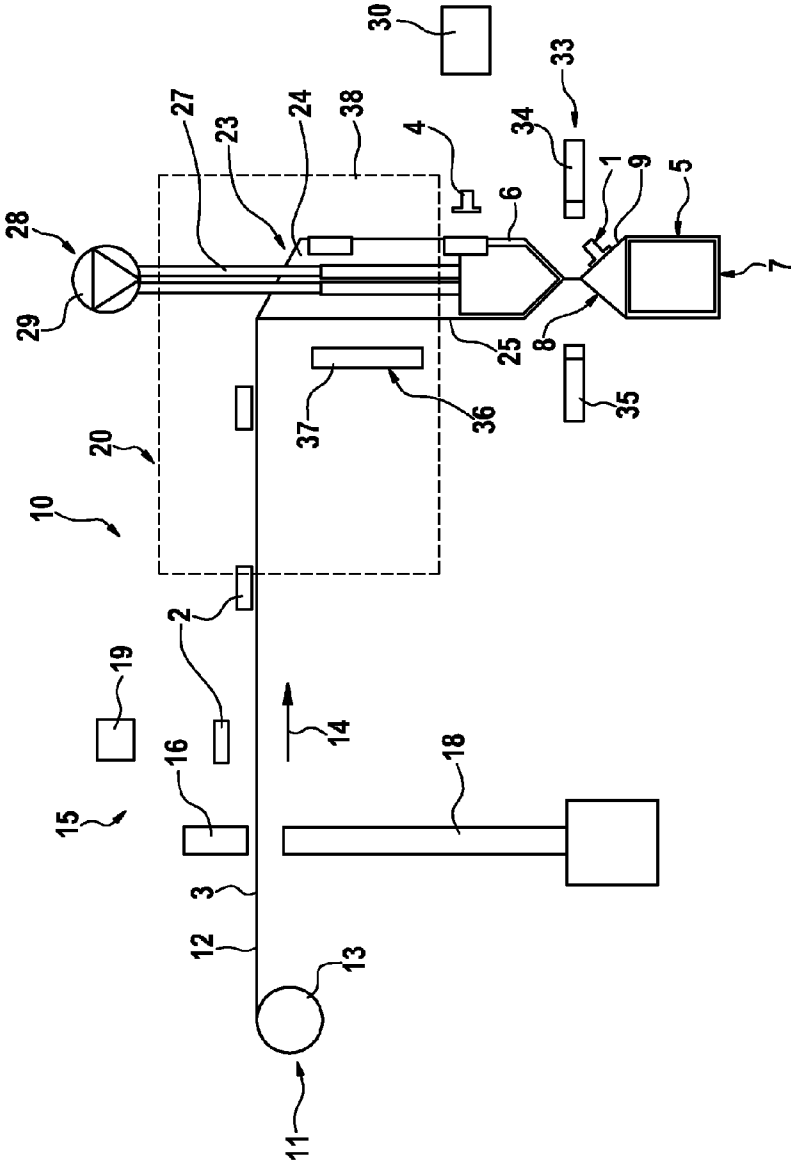


Fig. 2

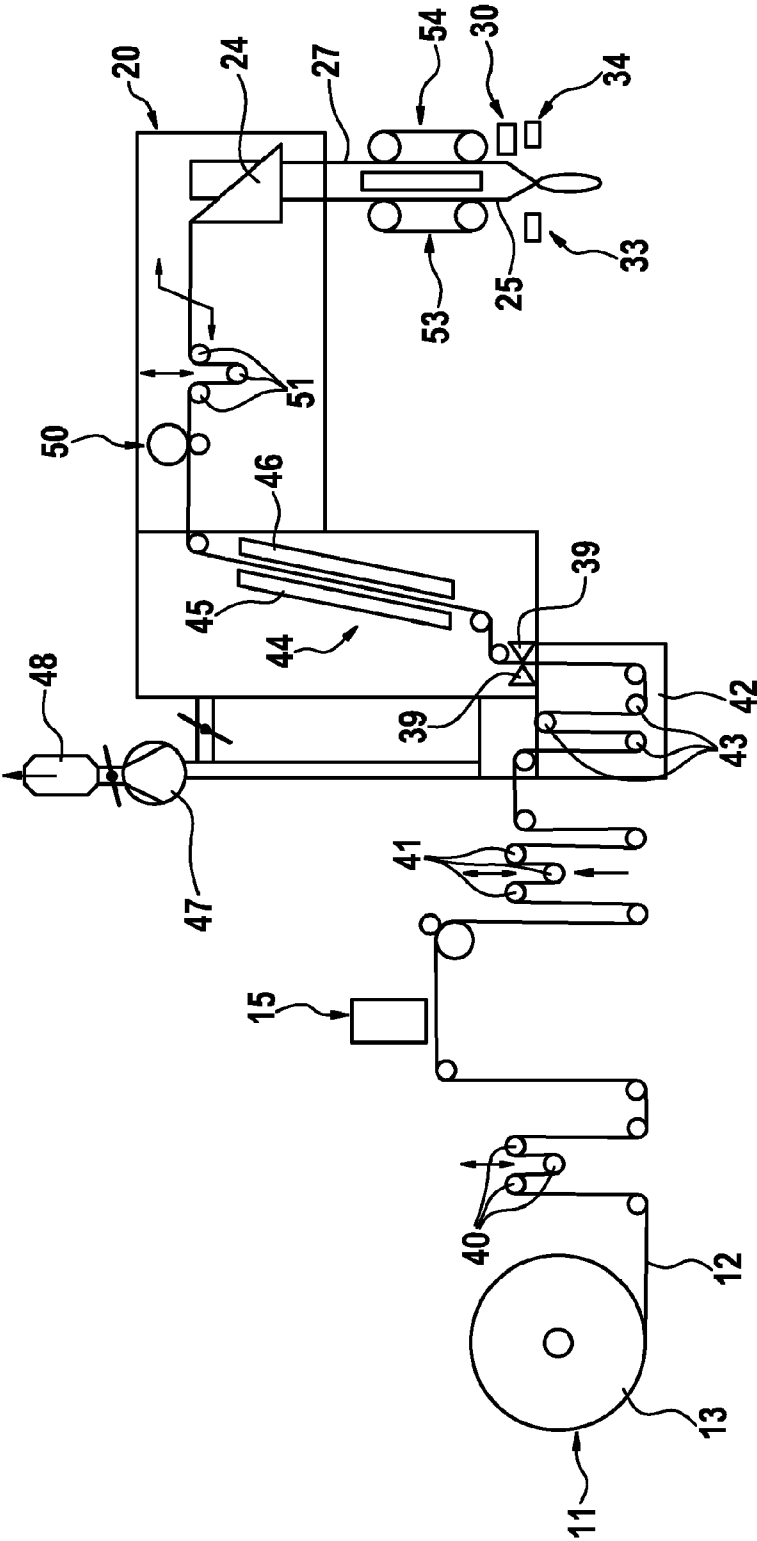


Fig. 3

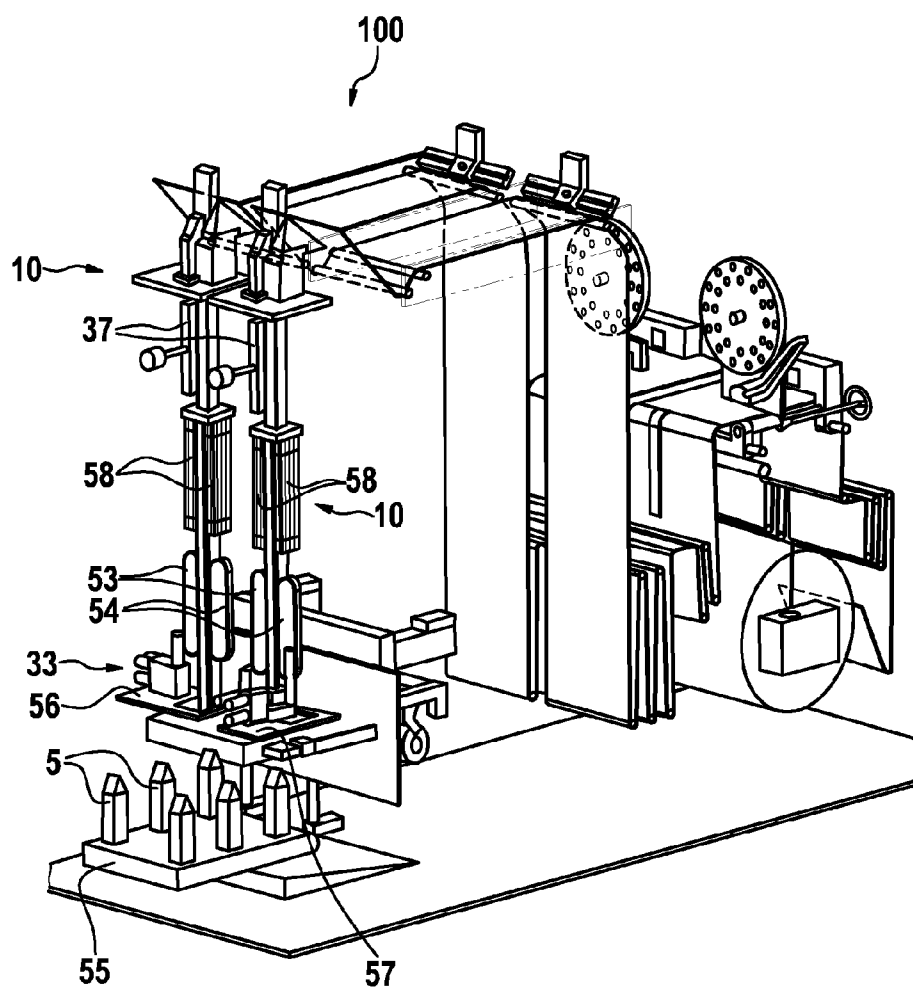


Fig. 4

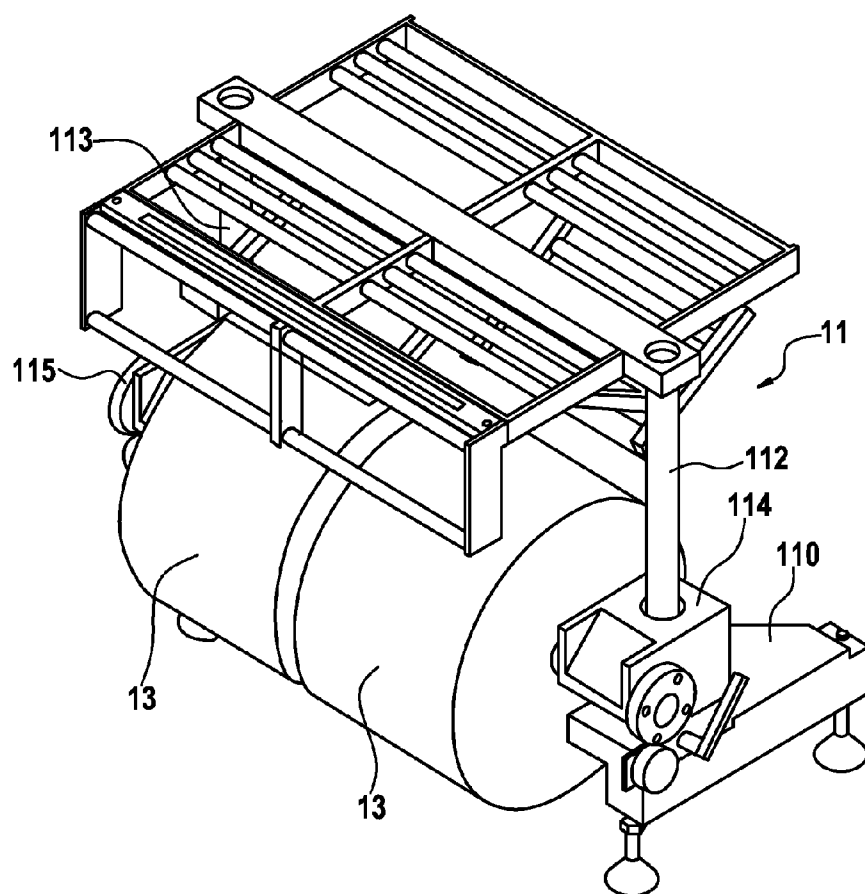


Fig. 5

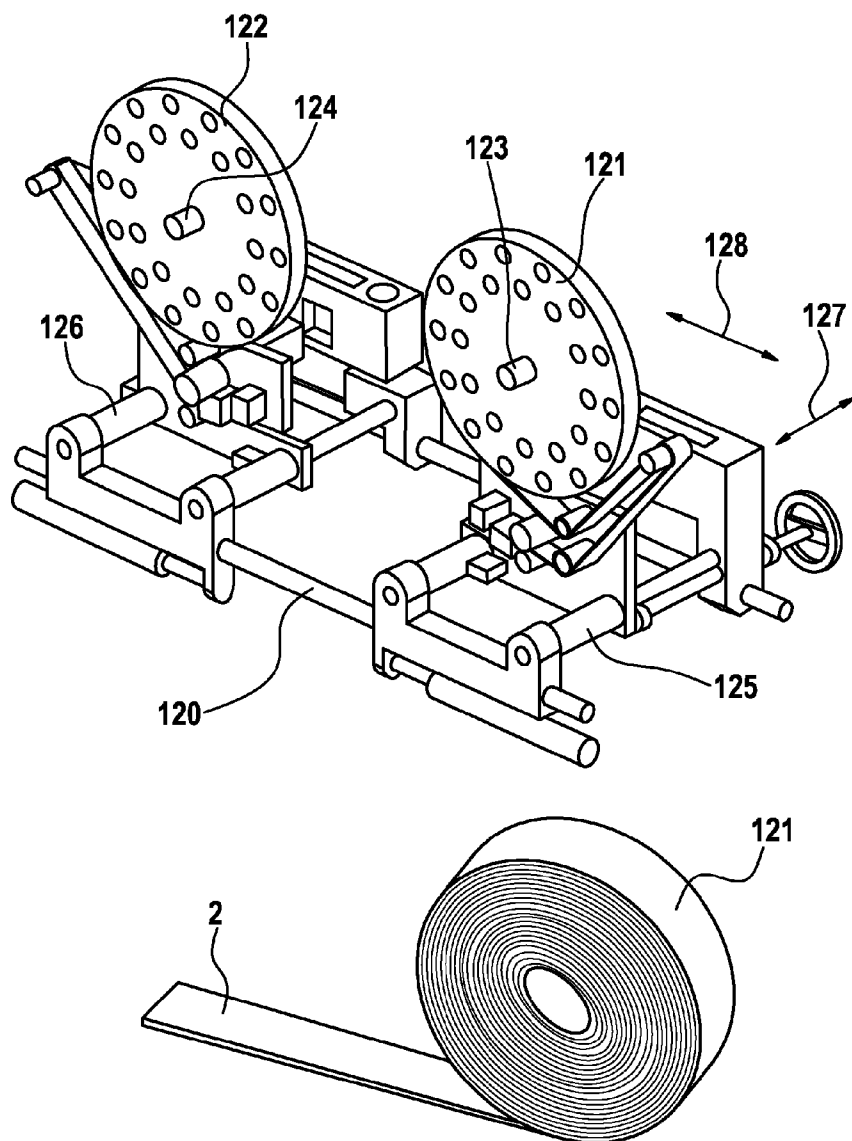


Fig. 6

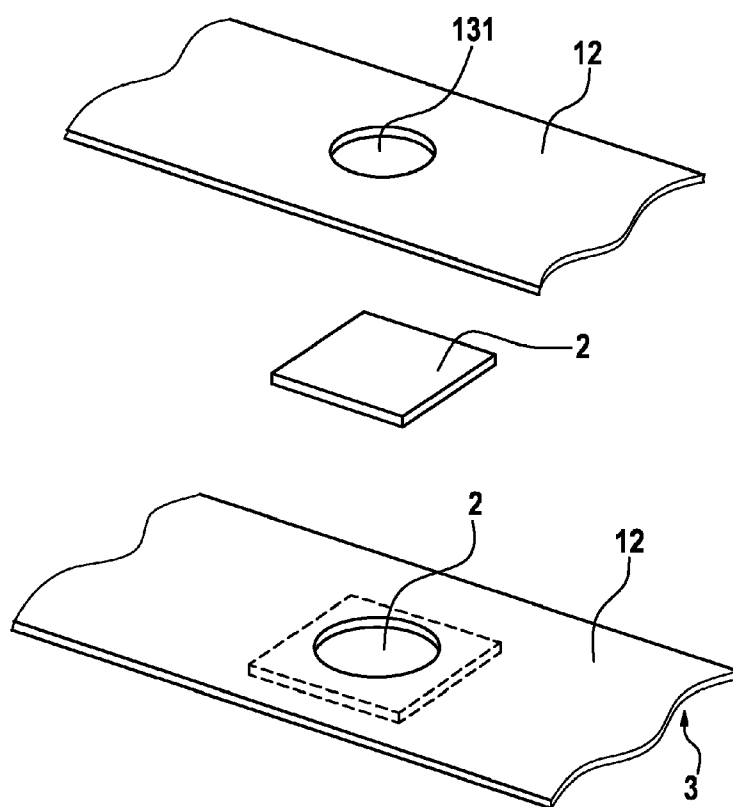


Fig. 7

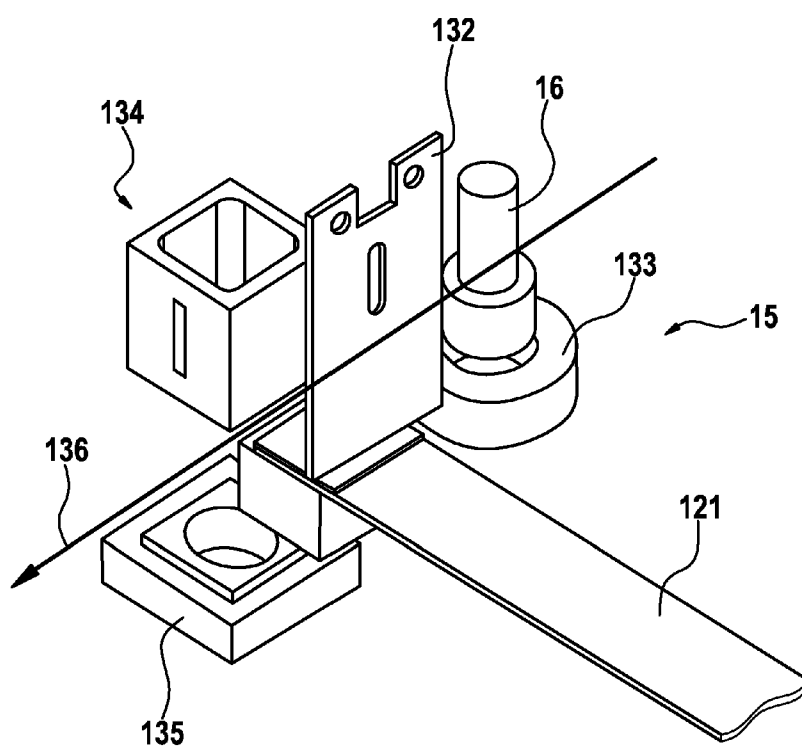
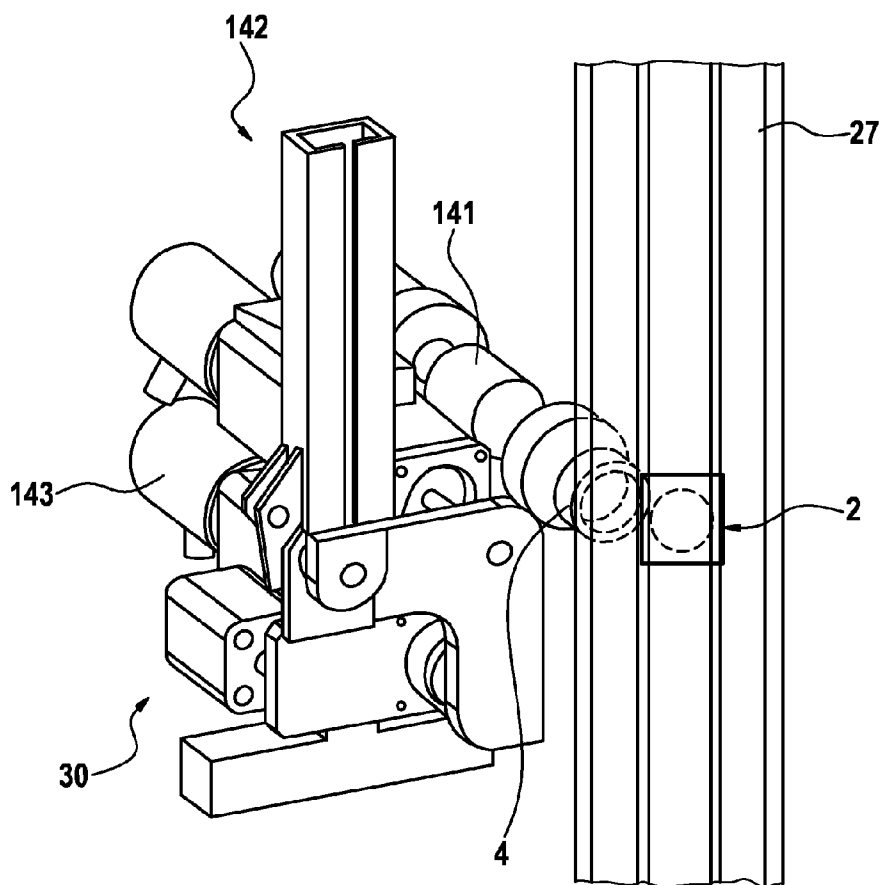


Fig. 8



**APPARATUS FOR, AND METHOD OF,
FORMING, FILLING AND CLOSING BAGS,
EACH WITH A POURING DEVICE**

BACKGROUND OF THE INVENTION

[0001] The invention relates to an apparatus for forming, filling and closing bags, each with a pouring device.

[0002] An apparatus is already known from U.S. Pat. No. 7,469,522 B2. In the case of the known apparatus, two flexible material webs are conveyed independently of one another and formed into bags using a flexible-tube-forming device. In this case, pouring devices are connected to one of the material webs beforehand using an applicator, wherein corresponding holes are formed prior to this in the material web. Once the bags have been fully formed, this also including closure of the bags in the head region thereof, the bags are then filled in a filling device, by the caps being unscrewed from the pouring devices and the bags being filled through the pouring devices.

[0003] The known apparatus, as a result of using two material webs which have to be welded by means of two longitudinal seams, involves the potential risk of the sealing in the region of the longitudinal seams not being tight. It should also be considered disadvantageous that the operation of filling the previously fully formed bags, provided with transverse seams, through the pouring devices means that this operation of filling the bags takes a relatively long period of time, since the filling cross section which is possible for the purpose of filling the bag is defined or limited by the size of the pouring device.

SUMMARY OF THE INVENTION

[0004] Proceeding from the prior art presented, it is an object of the invention to develop an apparatus for forming, filling and closing bags, each with a pouring device, such that the bags produced by means of the apparatus are sealed to particularly good effect and can be filled relatively quickly. This object is achieved in the case of a device for forming, filling and closing bags, each with a pouring device, characterized in that the material web is sterilized by means of a sterilizing device, and in that the sterilizing device encloses the region of the shaping device and terminates above the application device for the pouring devices having the features of claim 1. The invention is based on the idea of using a shaping device, which forms the flexible tube from a single material web, to reduce the number of longitudinal seams on the bags, which may potentially result in lack of sealing. Furthermore, filling over the entire opening cross section of the flexible tube makes a reduced filling period possible.

[0005] In a particularly advantageous development of the invention, it is provided that the shaping device is designed as a forming shoulder, and that a filling tube of the filling device is arranged in the forming shoulder, the flexible tube being filled through this filling tube prior to a head closure being formed on the bag. Such a design is already known in practice, and has proven successful, in the case of so-called tubular-bag machines.

[0006] Furthermore, it is provided that a second application device is provided for fastening an outer part of the pouring device, this second application device being arranged upstream of the transverse-seam-sealing and severing device, in the region of the filling tube, and connecting the second part of the pouring device to the first part of the pouring device from the outside of the flexible tube. This has the advantage

that the filling tube can be used as an abutment for the purpose of applying the second part of the pouring device, and therefore the second application device can be of relatively straightforward construction.

[0007] In order to allow straightforward transportation of the material web, in particular also over the forming shoulder, as soon as the first part of the pouring device has been connected to the material web, it is also particularly preferably provided that the inner part of the pouring device comprises a sheet-like element, which fully covers over the hole in the material web, and that the outer part comprises a mouthpiece with a cap element, which is connected to the first part, in particular by ultrasonic friction welding. The sheet-like element, which is relatively thin in the heightwise direction, renders it straightforwardly possible for the material web to be drawn over the forming shoulder, or the device for forming the bags, without there being any need for the latter to be of particularly complex design in order not to conflict with the first parts of the pouring device.

[0008] Arranging the pouring device in the head region of the bags has the advantage that the bags, when tilted, can easily be completely emptied.

[0009] In order to avoid the situation where germs form and/or multiply in certain foods, for example in milk, it is further provided, in a further design development of the invention, that the material web is sterilized by means of a sterilizing device, and that the sterilizing device encloses the region of the shaping device. This makes it possible, in particular, also for the inside of the material web to be protected, provided it has been arranged in a sterile atmosphere immediately prior to the flexible tubes being formed.

[0010] In order for the sterilizing device, nevertheless, to be kept as compact as possible, and also to avoid disruption to the sterilizing operation even when first parts of the pouring devices are being refilled into the first application device, it is, moreover, particularly preferably provided that the sterilizing device is arranged downstream of the first application device. In other words, this means that maintenance work or repair in the region of the first application device is possible at any time without intervention having to be made, for this purpose, in the region of the sterilizing device.

[0011] It is particularly preferred, in addition, to have production machines which comprise at least two apparatuses according to the invention, arranged parallel to one another, for forming, filling and closing bags, each with a pouring device. This allows the capacity of the installation to be increased relatively straightforwardly, and it is, if appropriate, also possible to use, for example, identical devices, e.g. identical conveying devices, in order to reduce the equipment-related outlay for a certain capacity.

[0012] It is particularly preferred here if the apparatuses have a common sterilizing device or a common control device.

[0013] The invention further comprises a method of forming, filling and closing bags, each with a pouring device, and to bags produced by this method.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] Further advantages and features of the invention can be gathered from the following description of preferred exemplary embodiments and with reference to the drawings, in which:

[0015] FIG. 1 shows a vastly simplified illustration of an apparatus according to the invention for forming, filling and

closing bags, each with a pouring device, for the purpose of explaining the basic construction and the basic functioning,

[0016] FIG. 2 shows an illustration of the apparatus according to FIG. 1 in a somewhat more detailed view,

[0017] FIG. 3 shows a perspective view of a production machine comprising two apparatuses according to the invention from FIGS. 1 and 2,

[0018] FIG. 4 shows a perspective view of a device for storing two material webs,

[0019] FIG. 5 shows a perspective view of a first application device, for applying sheet-like parts of the pouring device,

[0020] FIG. 6 shows a perspective view of the material web with the first part of the pouring device in the region of the application device according to FIG. 5,

[0021] FIG. 7 shows a perspective view of part of the application device according to FIG. 5 for the purpose of explaining the functioning, and

[0022] FIG. 8 shows a perspective view of a second application device, for the purpose of applying mouthpieces of the pouring device.

DETAILED DESCRIPTION

[0023] Identical parts or elements are designated by the same designations in the figures.

[0024] FIG. 1 illustrates an apparatus 10 for forming, filling and closing bags 5, each with a pouring device 1. The apparatus 10 comprises a storage device 11, in which a flexible material web 12, consisting of heat-sealable plastics material, is stored in the form of a roll 13. Possible materials for the material web here are those which are suitable in the prior art for producing so-called "tubular bags". As seen in the conveying direction of the material web 12, indicated by the arrow 14, the storage device 11 is followed by a first application device 15 for applying the pouring device 1. The first application device 15 here has, in particular, a punch 16, which punches a hole 131, illustrated in FIG. 6, into the material web 12, wherein the severed, in particular round punching waste is collected by means of a collecting container 18, which is located on that side of the material web 12 which is opposite to the punch 16.

[0025] The punch 16 is followed by an applicator 19 (not illustrated in detail) which applies first, inner parts 2 of the pouring devices 1 to the side 3 of the material web 12, this side forming the later inside of the bags 5, and connects them thereto. The first parts 2 here comprise a rectangular or square blank of a plastics sheet material, which reinstates the necessary sealing and the desired barrier properties in the region of the hole 131. For example ultrasonic friction welding or heat sealing is used as the method of connecting the first part 2 of the pouring device 1 and the material web 12.

[0026] The material web 12 provided with the uniformly spaced-apart first parts 2 of the pouring devices 1 then passes into the region of a sterilizing device 20. The sterilizing device 20 will be explained in more detail hereinbelow with reference to FIGS. 2 and 3. A forming device 23 is provided for forming the bags 5 from the material web 12, this forming device having a forming shoulder 24, over which the material web 12 is drawn, and formed, in a known manner in order to give a flexible tube 25. The forming shoulder 24 here, likewise in a known manner, has a filling tube 27 of a filling device 28 passing through it, it being possible for one or more, in particular liquid contents to be discharged through this filling tube into the flexible tube 25 over the entire opening cross section or the entire cross-sectional surface area of the

flexible tube 25. The filling device 28 here comprises a filling or metering means, which is designated by 29 in FIG. 1. A second application device 30, for applying a second, outer part 4 of the pouring device 1, is arranged beneath the forming shoulder 24, but still level with, or in the region of the filling tube 27. The second part 4 of the pouring device 1 here is designed as a mouthpiece, which is preferably provided with a screw-on cap, wherein the second part 4 is connected to the first part 2 of the pouring device 1 from the outside 6 of the flexible tube 25. The operation of connecting the two parts 2 and 4 of the pouring device 1 here preferably takes place by ultrasonic friction welding. The second part 2 contains cutting edges or the like (not illustrated) which, when the second part 4 is opened, slit or perforate the first part 2 in order to form a through-passage for the contents.

[0027] The second device 30 is followed underneath by a transverse-seam-sealing device 33, which has two transverse-seam-sealing jaws 34, 35 which can be moved in relation to one another and have in particular integral severing devices and folding devices in order, on the one hand, to form in each case the base regions 7 and/or the head regions 8 of the bag 5 and, on the other hand, to sever in each case one bag 5 from the flexible tube 25. As is further evident with reference to FIG. 1, the pouring devices 1 are arranged on the bags 5 in in each case a sloping head wall 9 of the bag 5. It is also possible to see a longitudinal-seam-sealing device 36 in the region of the filling tube 27, this device having at least one longitudinal-seam-sealing jaw 37 in order for the two peripheral regions of the material web 12 positioned one above the other to be welded to one another to give the flexible tube 25.

[0028] As is evident only with reference to FIG. 3, the longitudinal-seam-sealing jaw 37 is followed underneath by further longitudinal-seam-sealing jaws 58, in order for four longitudinal seams to be formed in the flexible tube 25, these longitudinal seams being arranged in the respective corner regions of the bag 5 in order for the latter to be rectangular or cuboidal overall in cross section. The longitudinal seams, which do not connect the two lateral end regions of the material web 12, are formed here as so-called "blind seams".

[0029] It is further evident with reference to FIG. 1 that the sterilizing device 20 follows the first application device 15 for the pouring devices 1 and has a housing 38 which encloses the region of the forming device 23, in particular of the forming shoulder 24, and terminates just above the second application device 30 for the pouring devices 1.

[0030] FIG. 2 illustrates parts of the apparatus 10 somewhat more specifically, and further details which are not evident with reference to FIG. 1 will now be described. It is thus possible to see between the storage device 11 and the first application device 15, on the one hand, and the first application device 15 and the sterilizing device 20, on the other hand, compensating rollers 40 and 41, respectively, which allow for compensation between the material web 12 conveyed continuously within the sterilizing device 20 and the material web 12 conveyed in stepwise fashion in the region of the first application device 15. The sterilizing device 20, which is necessary depending on the relevant application case, is also illustrated in more detail. This device contains a peroxide bath 42, through which the material web 12 is guided over a plurality of deflecting rollers 43 in order for the material web 12 to be sterilized on its two sides 3 and 6. The peroxide bath 42 is followed, within the housing 38, by a drying device 44, which removes the peroxide film from the material web 12 in a known manner, e.g. by means of blade nozzles 39 arranged

on the opposite sides 3 and 6 of the material web 12. The blade nozzles 39 are followed by heating or drying devices 45, 46, which are likewise located on both sides 3 and 6 of the material web 12, and dry the material web 12. The sterilizing device 20 further comprises, as is customary, ventilation devices 47 and catalytic converters 48.

[0031] The drying device 44 is followed by a transporting device 50, which convey the material web 12 continuously, by a friction fit, by means of rollers. The transporting device 50 is followed by further compensating rollers 51, for the interim storage of a portion of the material web 12. Also evident in FIG. 2 are two vacuum-assisted drawing-off belts 53, 54, which are arranged on opposite sides of the filling tube 27 in order to draw off the material web 12, or the formed flexible tube 25, cyclically over the forming shoulder 24.

[0032] FIG. 3 illustrates a production machine 100 which comprises two apparatuses 10 according to the invention arranged parallel to one another. This means that the production machine 100 contains a double set of essentially all those constituent parts of the apparatus 10 which have been explained in the context of the description above. For the sake of simplicity and of better clarity, however, FIG. 3 does not illustrate all the elements already described within the context of FIGS. 1 and 2. It is advantageously provided that the apparatuses 10 can also share certain devices. It is thus conceivable, in particular, for the apparatuses 10 to have a common sterilizing device 25 and, if appropriate, a common control device. This makes it possible to reduce the equipment-related outlay while having double the yield or capacity in comparison with a single apparatus 10. Also evident in FIG. 3 is a conveying device 55, on which the finished bags 5 are transported further, for example in order to be provided with further, external packaging. It is also possible to see that the transverse-seam-sealing device 33 has movable plate elements 56, 57, with the aid of which the base regions 7 and head regions 8 of the bags 5 are formed. Additional longitudinal-seam-sealing jaws 58 are also illustrated above the drawing-off belts 53, 54, these jaws forming the longitudinal seams arranged in the corner regions of the bags 5.

[0033] FIG. 4 illustrates the storage device 11 as used in the production machine 100, that is to say it serves for storing two rolls 13 arranged one beside the other. The storage device 11 has a framework 110 with two spaced-apart, vertically arranged carrying uprights 112, 113. Each carrying upright 112, 113 has fastened on it a pivoting mechanism 114, 115, which interacts with a roll 13, the roll 13 being mounted on a horizontal axial element, which in turn is connected to the pivoting mechanism 114, 115. This allows each of the rolls 13, for exchange purposes or for other reasons, to be pivoted separately, by means of its pivoting mechanism 114, 115, in the horizontal direction out of its operating position, which is illustrated in FIG. 4. The rolls 13 here are centered automatically by the storage device 111 during changeover and during operation.

[0034] Parts of the first application device 15 are illustrated in more detail in FIG. 5. This device has a framework 120 on which, for each material web 12, a storage roll 121, 122 with first parts 2 is mounted in a rotatable manner in axial elements 123, 124. The storage rolls 121, 122 here are arranged on separate carriages 125, 126, which can be moved horizontally in each case in accordance with the double arrows 127, 128. This makes it possible to gauge the position of the parts 2 on the material web 12. The first parts 2 are heated in order to be

applied to the material web 12, this allowing them to be connected to the material web 12 to good effect by heat sealing.

[0035] FIG. 6 illustrates a material web 12 in which a hole 131 has been formed by means of the punch 16, which is illustrated in FIG. 1. Also evident is a first part 2, which has been connected to the material web 12 from the inner side 3 of the material web 12 by means of the first application device 15.

[0036] FIG. 7 shows a severing device 132 as part of the first application device 15, this severing device severing a respective first part 2 from the storage roll 121. It is also possible to see the punch 16 with its abutment 133, further a heat-sealing jaw 134, for fastening the first part of the material web 12, and additionally a counterpart 135, for applying the necessary sealing pressure in conjunction with the heat-sealing jaw 134. The conveying direction of the material web 12 is indicated by the arrow 136 in FIG. 7, this conveying direction running at right angles to the conveying direction of the material web 12.

[0037] Parts of the second application device 30 are illustrated in more detail in FIG. 8. It is possible to see the filling tube 27, which serves simultaneously as forming tube, and a first part 2 fastened on the flexible tube 25. The second application device 30 has an ultrasonic sealing device 141, which connects a second part 4 to the first part 2 in each case. It is also possible to see a feed shaft 142, as part of a magazine for storing the second parts 4, and a conveying arm 143, which is arranged such that it can be pivoted between a receiving position, for receiving a second part 4, and a sealing position, for operative connection with the ultrasonic sealing device 141.

1-14. (canceled)

15. An apparatus (10) for forming, filling and closing bags (5), each with a pouring device (1), having a device (23) for forming a flexible tube (25) from at least one material web (12), having a filling device (28) for filling the flexible tube (25) or a bag (5), and having a transverse-seam-sealing and severing device (33) for severing in each case one bag (5) from the flexible tube (25), wherein the device (23) for forming the flexible tube (25) has a shaping device (24), which forms the flexible tube (25) from a single material web (12), wherein the filling device (28) fills the flexible tube (25) with contents over an entire cross section of the flexible tube (25), and wherein an application device (30) is provided, this connecting an outer part (4) of the pouring device (1) to the material web (12) once the flexible tube (25) has been formed, characterized in that the material web (12) is sterilized by means of a sterilizing device (20), and in that the sterilizing device (20) encloses the region of the shaping device (24) and terminates above the application device (30) for the pouring devices (1).

16. The apparatus as claimed in claim 15, characterized in that the shaping device is a forming shoulder (24), and in that a filling tube (27) of the filling device (28) is arranged in the forming shoulder (24), the flexible tube (25) being filled through this filling tube prior to a head closure (8) being formed on the bag (5).

17. The apparatus as claimed in claim 15, characterized in that the application device is arranged upstream of the transverse-seam-sealing and severing device (33), in the region of the filling tube (27).

18. The apparatus as claimed in claim 15, characterized in that the device (23) for forming the flexible tube (25) is

followed by at least one longitudinal-seam-sealing device (36) with longitudinal-seam-sealing jaws (37, 58) for forming longitudinal seams in corner regions of the flexible tube (25).

19. The apparatus as claimed in claim 15, characterized in that the sterilizing device (20) is arranged downstream of a first application device (15).

20. A production machine (100) comprising at least two apparatuses (10), arranged parallel to one another, as claimed in one claim 15.

21. The production machine as claimed in claim 20, characterized in that the apparatuses (10) have a common sterilizing device (20).

22. An apparatus as claimed in claim 15, characterized by the provision of a first application device (15), which has a punch (16), which punches a hole into the material web (12).

23. The apparatus as claimed in claim 15, characterized in that the sterilizing device (20) comprises a peroxide bath (42), through which the material web (12) is guided over a plurality of deflecting rollers (43) in order for the material web (12) to be sterilized on two sides (3, 6).

24. The apparatus as claimed in claim 23, characterized in that the peroxide bath (42) is followed, within a housing (38), by a drying device (44).

25. The apparatus as claimed in claim 15, characterized in that blade nozzles (39), which remove a peroxide film from the material web (12), are arranged on opposite sides (3, 6) of the material web (12).

26. The apparatus as claimed in claim 25, characterized in that the blade nozzles (39) are followed by heating or drying devices (45, 46), which are likewise located on both sides (3, 6) of the material web (12), and dry the material web (12).

27. The apparatus as claimed in claim 15, characterized in that the sterilizing device (20) comprises ventilation devices (47) and catalytic converters (48).

28. The apparatus as claimed in claim 15, characterized in that the application device (30) comprises an ultrasonic sealing device (141).

29. The apparatus as claimed in claim 15, characterized in that the application device (30) comprises a feed shaft (142) as part of a magazine for storing the outer parts (4).

30. The apparatus as claimed in claim 28, characterized in that the application device (30) comprises a conveying arm (143), which is arranged such that it can be pivoted between a receiving position, for receiving a second part, and a sealing position, for operative connection with the ultrasonic sealing device (141).

31. The production machine as claimed in claim 20, characterized in that the apparatuses (10) have a common control device.

32. The production machine as claimed in claim 20, characterized in that the apparatuses (10) have a common sterilizing device (20) and a common control device.

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