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(54) **VERTICAL FORM FILL SEAL MACHINE WITH AN EXTENSION UNIT TO PRODUCE PACKAGES WITH A ZIPPER**

(57) The present invention relates to a vertical form fill seal machine with a film reel (2) from which a film is transported to a forming shoulder (5) and formed around a fill-tube into a film-tube, wherein the longitudinal ends of the film are connected by longitudinal sealing means and which comprises cross sealing-/cutting-means (6) to close a filled package and to separate the package from the film. The present invention further relates to a method to modify a vertical form fill seal machine into a packaging machine that produces packages with a zipper.

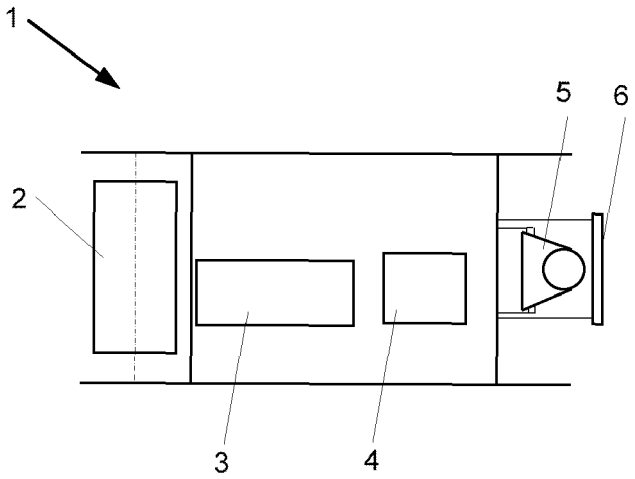

Fig. 1

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Description

[0001] The present invention relates to a vertical form fill seal machine with a film reel from which a film is transported to a forming shoulder and formed around a fill-tube into a film-tube, wherein the longitudinal ends of the film are connected by longitudinal sealing means and which comprises cross sealing-/cutting-means to close a filled package and to separate the package from the film. The present invention further relates to a method to modify a vertical form fill seal machine into a packaging machine that produces packages with a zipper.

[0002] Packaging machines must be nowadays more and more flexible in order to produce a large variety of different bags.

[0003] There is therefore a constant need to increase the flexibility of vertical form fill seal machines.

[0004] The problem I solved with a vertical form fill seal machine with a film reel from which a film is transported to a forming shoulder and formed around a fill-tube into a film-tube, wherein the longitudinal ends of the film are connected by longitudinal sealing means and which comprises cross sealing-/cutting-means to close a filled package and to separate the package from the film, wherein it comprises an extension unit to produce packages with a zipper.

[0005] The disclosure made regarding this subject matter also applies to the inventive method and vice versa. Subject matters disclosed in connection with this embodiment of the present inventio, can also be combined with other subject matters and vice versa.

[0006] The present invention relates to a vertical form fill seal machine, a so called vertical flow-wrapper, with a film reel on which a plane packaging film, for example a plastic film is provided. The packaging machine is, for example utilized to produce bags, e.g. Pouches, Quattro-seal-bags or Doy-style bags without a zipper as a reclosing means. During the production of the bags, the film is unwound continuously or intermittently from the reel and is transported to a forming shoulder and formed around a fill-tube into a film-tube. After forming, the longitudinal ends of the film are connected, e.g. sealed by longitudinal sealing means, preferably under the influence of heat and/or pressure, so that a film-tube is provided. The product to be package is filled into the film-tube via the fill-tube. After completion of the filling, the film-tube is closed by a cross-seal, which is provided, preferably transverse to the transportation direction of the film-tube. This is executed by cross sealing-/cutting-means which are provided downstream from the lower end of the fill-tube. Shortly after and/or while the cross seal is provided, the completed package is separated from the film-tube by the cutting means. The packaging machine may comprise means to form a gusset into the bottom and/or the top of each bag produced.

[0007] Between the reel of the film and the forming shoulder preferably a dancer and/or means to guide the film towards the forming shoulder are provided. Such means to guide are for example rolls or the like.

[0008] According to the present invention, the vertical form fill seal machine now comprises an extension unit to produce packages with a zipper. This extension unit is preferably a standalone unit with a frame that can be connected to and removed from a particular vertical form fill seal machine, preferably its frame as needed, when bags with a zipper shall be produced. One extension can be utilized for several vertical flow wrappers, not in parallel, but one after the other, in case bags with a zipper shall be produced on different machines. Preferably, the extension unit uses the unwinding system of the vertical flow wrapper.

[0009] At any rate, the extension unit comprises means to seal the zipper to the film material. Furthermore, according to preferred embodiment of the present invention, the extension unit comprises means to prepare the zipper for its connection to the film material. Such preparation actions may be cutting, punching, connection improvement, e.g. keying or the like. Additionally, according to a preferred embodiment, the extension unit comprises means to remove the zipper from a storage, for example to roll the zipper off a reel.

[0010] The zipper is preferably provided as a continuous string, which is cut to length as needed for the particular package.

[0011] Preferably, the extension unit comprises a forming shoulder, a fill tube, cross sealing-/cutting-means and longitudinal-/zipper-seal-means. The forming shoulder can be different from the forming shoulder of the vertical form fill seal machine or can be the same. Preferably, the forming shoulder the extension unit is asymmetrical. The fill tube may have the same cross-section and/or length as the fill tube of the form fill seal machine. However, preferably, particularly the cross-section of the extension unit is different from the cross section of the fill tube of the vertical form fill seal machine. The cutting means at the extension unit is, according to a preferred embodiment of the present invention, adapted to cut through at least parts of the zipper during the separation of the finalized bag from the film-tube. Furthermore, the extension unit comprises means to move the film-tube vertically downwards.

[0012] According to a preferred embodiment, the vertical form fill seal machine comprises a mechanical interface between the vertical form fill seal machine and the extension unit. This mechanical interface secures the extension unit in a clearly defined position relative to the vertical form fill seal machine, preferably to its frame. Preferably, the position is defined at least in two directions, which are perpendicular to each other and which define a plane, preferably a horizontal plane. More preferably, the position is defined in three directions, which are perpendicular to each other, respectively. The means can be static- and/or motor means, which secure the extension unit in the desired position relative to the form fill seal machine.

[0013] Preferably, the vertical form fill seal machine

comprises an electrical- and/or control-interface between the vertical form fill seal machine and the extension unit. According to this preferred embodiment, the extension unit does not comprise an individual electrical supply but is connected to the electrical supply of the form fill seal machine. The same is true for the control system. Preferably, the extension unit does not have an individual control system, but the drives and/or sensors are connected to the control system of the vertical form fill seal machine and the drives of the extension unit are controlled by this control system. The control system is preferably a computer, which more preferably controls the drives of the form fill seal machine and/or the extension unit by a feed-back control system. According to a preferred embodiment, the control system recognizes whether the extension unit is connected to the form fill seal machine or not. In case such a connection is recognized, the control system controls the drives of longitudinal sealing means, the drives to transport and/or process the zipper and/or the cross sealing means of the extension unit.

[0014] The vertical form fill seal machine and/or the extension unit can operate intermittently or continuously. However, preferably, it operates continuously, i.e. the film moves at a constant speed.

[0015] Another subject matter of the present invention is a method to modify a vertical form fill seal machine as described above into a packaging machine that produces packages with a zipper, wherein an extension unit is connected to the vertical form fill seal machine and wherein the film is directed to a form shoulder of the extension unit.

[0016] The disclosure made regarding this subject matter also applies to the inventive machine and vice versa. Subject matters disclosed in connection with this embodiment of the present inventio, can also be combined with other subject matters and vice versa.

[0017] According to this embodiment of the present invention, the extension unit is, preferably mechanically and/or electrically connected to the form fill seal machine. Furthermore, at least some of the drives and/or sensors of the extension unit are preferably connected to the control system of the form fill seal machine and the film, from which the packages are produced and whose reel-support is part of the form fill seal machine, is directed towards the extension unit so that packages with a zipper can be produced. In case bags without zipper shall be produced, the extension unit is removed and the film is guided to the forming shoulder of the form fill seal machine.

[0018] The inventions ae now explained according to the Figures. These explanations are only exemplary and do not limit the scope of protection. The explanations apply to the inventive machine and the inventive method likewise.

Figure 1 shows the form fill seal machine.

Figure 2 shows the extension unit.

Figure 3 shows the extension unit attached to the form fill seal machine.

[0019] In **Figure 1**, the vertical form fill seal machine (VFFS) 1 according is schematically shown. A VFFS is a packaging machine, which comprises a support for a film reel 2 on which the film reel is rotatably supported. The plane film is unwound and transported, preferably via a dancer and some guiding means, like rolls to a forming shoulder 5 which forms the film into a foil tube, which is transported along a fill tube by transportation means. Two ends of this foil tube are sealed together by a longitudinal sealing means. Subsequently, the packaging item is filled into the foil tube via the fill tube and a cross-seal is applied by cross sealing means 6 to the foil tube to close the package. Simultaneously or after applying the cross-seal, the finalized packages are cut off the foil tube bx cutting means 6. The VFFS 1 comprises a frame/housing, at which a form shoulder 5, a fill tube, longitudinal sealing means and cross-sealing means 6 are provided. The VFFS may comprise gusset- forming means to form the bottom and/or the top of each bag. The VFFS may be operated continuously or intermittently, but a continuous operation is preferred. The VFFS comprises a control system which controls at least some of the drives of the VFFS and which may be connected to sensors. Typical drives which may be controlled are the drive(s) for the cross sealing-/cutting means or the drive that moves the film tube along the fill tube. The inventive VFFS may comprise a printer 4 and/or a labeler 3, which are preferably provided upstream from the forming shoulder.

[0020] A plane film, especially a weldable plastic film, is supplied from the reel 2, which supplies the plane film continuously or intermittently to the forming shoulder 3, which shapes the foil web into a rather tubular form around the fill tube. In the context of the present invention, a "tubular form" of the bags or of the film means any cross-sectional form including a circular form or another form, and especially a rectangular or generally a polygonal form. Longitudinal sealing means, which are provided downstream from the form shoulder 5, seal the edges to the foil tube together. After sealing, the bottom of the bag can be formed by a special bottom forming means, for example gusset-forming means. Finally, cross seals, extending preferably perpendicularly to the direction of flow of the film, are applied, especially by means of cross-sealing means 6. These cross sealing means 6 apply to the bag not only a cross-seal closing the top of the bag 2, but these cross-sealing means 6 advantageously also provide, preferably simultaneously a cross-seal defining the bottom of the subsequent, upstream bag. The bags produced are separated from one another by a cutting means, which are preferably incorporated into the cross-sealing means 6. Between the application of the bottom- and top-cross-seal of each bag, the bag is filled with the product, preferably an edible product.

[0021] **Figure 2** shows the extension unit 10, which

comprises a frame. Connected to the frame is a forming shoulder 11, which may be identical or different from the forming shoulder of the VFFS, but which is preferably different. Preferably, the forming shoulder 11 of the extension unit 10 is asymmetrical relative to a plane provided in the center of the subsequent fill tube. As already mentioned, downstream from the forming shoulder, the extension unit comprises a fill tube around which the film tube is formed and transported. Furthermore, the extension unit comprises cross sealing means 12, which may specifically adapted to provide a cross seal to a bag with a zipper and cutting means 12 which may specifically adapted to cut a completed bag from the film tube, which may comprise a zipper. The extension unit may additionally comprise means to support and unwind a reel on which a zipper-strand is provided. Additionally, the extension unit may comprise a dancer and means to prepare the zipper strand to the sealing to film material. Such means can be cutting means, punching means, heating means and/or attachment enhancing means, which change for example the attachment surface of the zipper. The zipper is attached, preferably sealed to the film, preferably parallel to the longitudinal seal of the bags. Therefore, the extension unit also comprises zipper-seal-means 13, preferably longitudinal zipper-seal-means 13. The zipper is preferably attached to the film as a continuous strand. In case pretreatment of the zipper strand takes place, the can be executed while the zipper strand is moving or while it stands still. In case of an intermittent transportation of the zipper strand but a continuous motion of the film, a dancer must be provided around which the zipper strand moves.

[0022] **Figure 3** shows combination of the VFFS 1 and the extension unit 10. In case bags with a zipper shall be produced, the extension unit is transported towards the VFFS and preferably in front of the fill tube, and preferably aligned such, that the center of the fill tube of the VFFS and the center of the fill tube of the extension unit are in the same vertical plane. Preferably, the VFFS and the extension unit comprise mechanical means which connect them in the desired alignment. Preferably, the VFFS and the extension unit are then electrically and/or electronically connected together. Additionally, according to a preferred embodiment of the present invention, the extension unit is connected to the control system of the VFFS. The support for the film reel and preferably the guiding means of the VFFS are used even if the extension unit is connected to the VFFS. The same applies to a printer and/or labeler which may be part of the VFFS. Before production, the film is guided towards the form shoulder of the extension unit and is then transported along the fill tube of the extension unit by transportation means of the extension unit. In case the support of the reel is motorized and/or a dancer provided in the path of the film is motorized, their motors and the motor of the transportation means of the extension unit are synchronized. With the extension unit a conventional VFFS can easily be refurnished to produce bags with a zipper and converted back in case conventional bags without zipper shall be produced.

List of reference signs:

[0023]

1	Vertical form fill seal machine, VFFS
2	Film reel
3	Labeler
4	Printer
5	Forming shoulder
6	Cross sealing-/cutting-mean
10	Extension unit
11	Forming shoulder
12	Cross sealing-/cutting-means
13	Longitudinal-/zipper-seal-means.

Claims

1. Vertical form fill seal machine (1) with a film reel (2) from which a film is transported to a forming shoulder and formed around a fill-tube into a film-tube, wherein the longitudinal ends of the film are connected by longitudinal sealing means and which comprises cross sealing-/cutting-means to close a filled package and to separate the package from the film, **characterized in, that** it comprises an extension unit (10) to produce packages with a zipper.

2. Vertical form fill seal machine (1) according to claim 1, **characterized in, that** the extension unit (10) comprises a forming shoulder (11), a fill tube, cross sealing-/cutting-means (12) and longitudinal-/zipper-seal-means (13).

3. Vertical form fill seal machine (1) according to claims 1 or 2, **characterized in, that** it comprises a mechanical interface between the vertical form fill seal machine (1) and the extension unit (10).

4. Vertical form fill seal machine (1) according to one of the preceding claims, **characterized in, that** it comprises an electrical- and/or control-interface between the vertical form fill seal machine (1) and the extension unit (10).

5. Vertical form fill seal machine (1) according to one of the preceding claims, **characterized in, that** it operates continuously.

6. Method to modify a vertical form fill seal according to the preamble of claim 1 into a packaging machine that produces packages with a zipper, **characterized in, that** an extension unit (10) is connected to the vertical form fill seal machine (1) and that the film is directed to a form shoulder of the extension unit

(10).

7. Method according to claim 6, **characterized in, that** the extension unit (10) is connected mechanically to the vertical form fill seal machine (1).

8. Method according to claims 6 or 7, **characterized in, that** the extension unit (10) is connected to the control system of the vertical form fill seal machine (1).

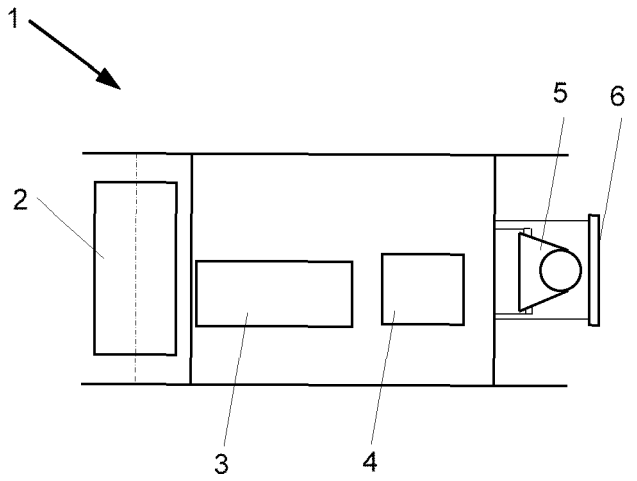

Fig. 1

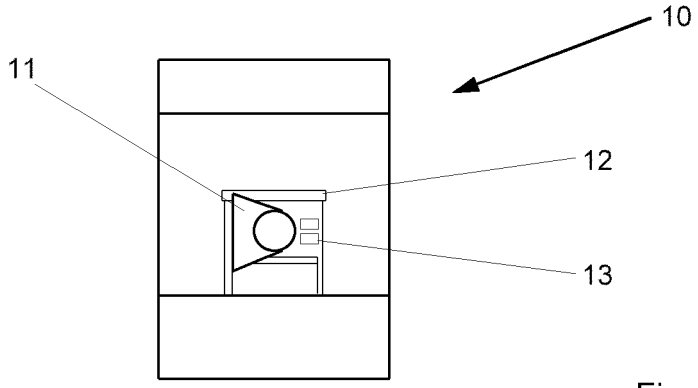

Fig. 2

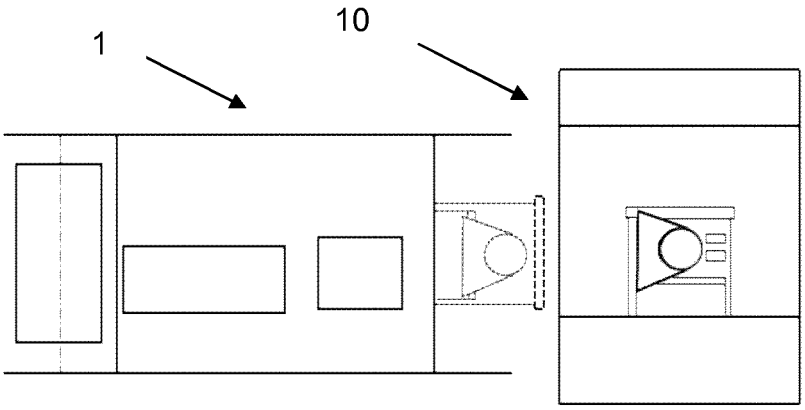

Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 19 18 6730

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2006/196151 A1 (KNOERZER ANTHONY R [US] ET AL) 7 September 2006 (2006-09-07) * Figures; 0115, 0120- 0123 and their description * -----	1-8	INV. B65B9/20 B65B61/18
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TECHNICAL FIELDS SEARCHED (IPC)

B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	15 November 2019	Ngo Si Xuyen, G

CATEGORY OF CITED DOCUMENTS

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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