DEVICE FOR PRODUCING SHOCK-ABSORBING INFLATABLE PACKAGE AND METHOD FOR FILLING IT

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ABSTRACT

Bag blank (13) comprising an inflatable package blank (11) on a running web, which package blank (11) comprises a semi-finished product consisting of a first plane plastic sheeting (21) and a second plane plastic sheeting (22), which plastic sheetings abut with their plane surfaces against each other and are interconnected by welds (18) so that a series of delimited transverse chambers (16) is formed between the two plastic sheetings (21, 22) across the surface of the entire package blank (11), this semi-finished product being folded or welded together along a longitudinal centre line (14) so that its two long sides are parallel and face in the same direction, and that a first longitudinal suspension arrangement (15, 23a, 43a) is connected to the edge along the first long side of the package blank (11) or the bag blank (13), and that a second longitudinal suspension arrangement (23b, 43b) is applied at the edge along the second long side of the package blank (11) or the bag blank (13), as well that the bag blank (13) is provided with transverse full-penetration weldings (18) having a length that has been terminated a distance from the longitudinal suspension arrangements.
Fig 3
DEVICE FOR PRODUCING SHOCK-ABSORBING INFLATABLE PACKAGE AND METHOD FOR FILLING IT

TECHNICAL FIELD

[0001] The present invention relates to a bag blank, which is formed of an inflatable package blank and a method and a device to pack products using such a bag blank. These package blanks are formed with a plurality of channels, which can be gas-filled and closed to obtain a shock-absorbing gas cushion, preferably air cushion, around the packed product or products.

BACKGROUND OF THE INVENTION

[0002] The background of the invention is seen in the published patent application US 201010251665, which shows a machine for the inflation and sealing of an inflatable structure. Said structure is provided with double layers of a plastic film, which layers are welded in such a way that the structure forms transverse bubble-like channels, which can be gas-filled and welded together longitudinally to obtain a shock-absorbing gas-filled package structure consisting of a plurality of gas occlusions oriented in the cross-direction of the structure. The mentioned patent application shows, however, primarily a machine for the gas-filling of the structure from the long side thereof via filling nozzles as well that the structure, after gas-filling, is welded together by a sealing device. This gas-filled package structure may then be used to wrap different types of products that need to be protected extra carefully from impacts in transportation.

[0003] Such a wrapping of products with a gas-filled package structure is a manual and time-consuming operation, which therefore also becomes costly. In addition, this type of package structure requires large transport vehicles by the fact that the structure is gas-filled.

[0004] The background of the general packing technique is for instance seen in the American patent specification U.S. Pat. No. 6,349,523, which shows a method and a device to form and fill packages formed of package blanks manufactured by folding a flexible strip of plastic material into the package blank that consists of bag-like parts joined together one after the other. Said parts are furthermore arranged to be supported and transported along a web by support arms provided with channels or supporting tubes in or on which the package blank slides. The bag-like parts slide along the support arms for opening, filling, sealing and separation into individual packages filled with contents. In the publication, it is seen that the package blank is formed with upper edge parts provided with thickenings, which are intended to slide in each one of the channels in the support arms, which are situated parallel in relation to each other. At a filling area, the support arms curve off from each other and form a greater spacing between themselves, the joined together bag-like parts being opened and filling can take place. After the bag-like parts have passed said filling area, the distance between the support arms decreases again, an after-treatment in the form of sealing, separation, and detachment from the support arms commencing.

[0005] Furthermore, the patent specification SE 525 741 (WO 2005/023693) discloses a method and a device for producing a continuous edge thickening along the running direction of a stretched and tensioned web of a positively and continuously transported thermoplastic film. The thickening according to this patent specification is provided by edge parts of the plastic film being folded and welded into a final state for the use of the plastic film as packages, e.g., in a packing machine according to prior art, e.g. WO 02/083506. [0006] These disclosed methods and devices for providing a package do not afford a package having impact-protecting effect for goods packed in such a way.

THE OBJECT OF THE INVENTION

[0007] The object of the invention is to simplify handling and packing of products that require an impact-protecting package.

[0008] The object of the present invention is to provide a bag blank in the form of inflatable bag-like packages as well as a device and a method that use such bag blanks in the packing of products.

[0009] The object of the bag blank is furthermore to afford a simplified handling in packages that can afford products a package protection by means of gas-filled cushions.

[0010] The object of the device is further to obtain an automatic packing method wherein the package is provided with a number of shock-absorbing gas-fillings.

SUMMARY OF THE INVENTION

[0011] By the present invention, as the same appears in the independent claims, the above-mentioned objects are met, said disadvantages having been eliminated. Suitable embodiments of the invention are defined in the dependent claims.

[0012] The invention comprises bag blanks that are formed of package blanks to become continuous bags. The walls of each bag have two sheeting layers that are welded together in such a way that there is formed a number of pockets between the bottom of the bag and edge welds. These pockets are then filled with gas/air, after the bag has been filled with the respective article. Either the package blank or the bag blank is supplemented with a suspension arrangement, for instance a so-called bag stripe having thickenings. The material of the suspension arrangement/package blank may consist of different plastics and different layers of film. Antistatic film is an example.

[0013] The possibility of delivering bag blanks without gas occlusions to a potential customer implies large delivery advantages of the bag blank. More inexpensive transports, less storage space and in addition the possibility of simply and smoothly packing products that require impact protection in existing packing machines of standard type.

[0014] The suspension arrangement, for instance the thickenings of the bag stripe, is introduced into a pair of support and opening arms, in a way that is previously known. The arms open up a row of bags for filling. The filled bags move further along the arms to an auxiliary equipment that has the purpose of blowing air into the pockets that are welded between the material of the bag walls. Sealing of the bag and the air pockets takes place by means of a welding device positioned in the packing machine.

[0015] The invention is arranged to handle all types of "bubble bags", which are connected in long strips and then also bags that are directed by chains having holes and spikes or that are kept in place by friction.

[0016] The equipment for inflating "the bubbles" consists of a separate compressor or in that the equipment can be coupled to an existing compressed air net. The equipment is
Further, the invention comprises a gas divider, in another embodiment of the invention, which has the purpose of controlling the inner film edges in a way that seals against the air current. This control is formed to minimize the air that is given off in the short ends of the bag. When the air is pressed into the bubbles/chambers, it is important that the chambers are closed, so that no air leaks out in the way into the friction strips.

The invention concerns a bag blank comprising an inflatable package blank on a running web wherein the package blank comprises a first plane plastic sheeting and a second plane plastic sheeting, which plastic sheetings abut with their plane surfaces against each other and are interconnected by welds in such a way that a series of delimited transverse chambers are formed between the two plastic sheetings over the entire surface thereof. This semi-finished product is folded or welded together or welded together and folded along a longitudinal centre line, which defines either the top of the bag blank or the bottom of the bag blank. The two long sides of the bag blank are parallel and face in the same direction, a first longitudinal suspension arrangement being applied at the edge along the first long side of the semi-finished product and a second longitudinal suspension arrangement being applied at the edge along the second long side of the semi-finished product. These suspension arrangements may be applied to the semi-finished product before folding/welding or after folding/welding. The suspension arrangements may be formed as material strings having a thickness of 2 mm at a preferred sheeting thickness in an interval of 25-250 um. The semi-finished product is in addition provided with transverse full-penetration weldings having a length that has been terminated a distance from the longitudinal suspension arrangements when the semi-finished product is folded/welded. Said inflatable package blank is extraordinarily suitable for using as bag blanks in packing machines that pack goods in bags on a running packing web. It is also possible to supplement existing packing machines to be able to handle also these inflatable bag blanks on a running web so as to obtain an automated packaging having gas-filled wrappings around sensitive goods.

In one embodiment of a bag blank according to the invention, each suspension arrangement consists of a thickening that is connected to one outermost, plastic sheeting at the respective long side.

In one embodiment of a bag blank according to the invention, each suspension arrangement consists of a thickening that is connected to the two plastic sheetings at the respective long side.

In one embodiment of a bag blank according to the invention, the bag blank is provided with gas filling channels.

In one embodiment of a bag blank according to the invention, the transverse full-penetration welding is terminated beside the suspension arrangements having either a hole punching or a short longitudinal full-penetration welding.

The invention also concerns a device in packing, which device comprises two control arms provided with holder means. The holder means are formed either as channels in which a bag blank can slide or as tubular support rails on which a bag blank can slide depending on if the bag blank is provided with thickenings or channels. Thus, the holder means are arranged to hold up a continuous bag blank. Accordingly, the control arms are formed with slide tracks or runners for the bag blank to slide on or in. The control arms run parallel near each other and are in addition arranged to be distanced from each other for the bag blank to open and be possible to be filled at a filling area, and which control arms after that again run parallel near each other to allow the bag blank to be sealed at a sealing area. Specifically, the device is provided with at least one gas-filling nozzle formed with discharge holes directed toward the bag blank. The gas-filling nozzle is mounted and integrated in the device so that the gas-filling takes place continuously when a bag blank adapted for gas-filling passes the gas-filling nozzle. This gas-filling nozzle is suitably adapted to the type of bag blank that is to be filled.

In one embodiment of a device according to the invention, the gas-filling nozzle is formed as a cylindrical pin oriented parallel to the holder means. The discharge holes of the gas-filling nozzle are placed on the periphery of the cylindrical pin for a discharge direction perpendicular to the direction of the cylindrical pin. Such a formed gas-filling nozzle is suitable in the use of bag blanks provided with gas filling channels, which slide over the gas-filling nozzle and can gas fill chambers in the side part of the bag blank. Suitable embodiments are also to arrange double gas-filling nozzles placed in parallel, which together fill the chambers of both sides in the bag blank. This type of gas-filling nozzle is suitable for bag blanks having thickenings as well as for bag blanks having channels as suspension members but where said suspension members join the two plastic sheetings at the respective side.

In one embodiment of a device according to the invention, the gas-filling nozzle is provided with an externally placed seal intended to seal between the gas-filling nozzle and a gas filling channel arranged in the bag blank. This seal decreases the gas consumption since gas does not ooze out from the gas filling channel while this slides forward over the gas-filling nozzle.

In one embodiment of a device according to the invention, a knife blade is mounted at the gas-filling nozzle in order to cut up the gas filling channel when the bag blank passes. The knife blade is preferably directed perpendicular to the direction of the gas-filling nozzle. This placement of the knife blade is both simple and cost-effective even if it would be feasible to place the knife blade in other ways.

In one embodiment of a device according to the invention, the gas-filling nozzle is formed with a gas divider, which is arranged to distribute filling gas to openings in chambers formed in the bag blank. Said gas-filling nozzle is formed to jointly and simultaneously fill the gas filling channels arranged in the bag blank when the bag blank is formed with suspension members that are connected only to the outermost sheeting of the bag blank. In doing so, the gas divider makes it possible to fill in gas between the outermost sheeting and the free edge of the adjacent sheeting in order to simultaneously fill the chambers of both sides in the bag blank from one and the same gas source. This embodiment is shown in more detail in FIGS. 3 and 6 and FIGS. 10a-c and 11a-c.

In one embodiment of a device according to the invention, nip rolls are arranged adjacent to the gas-filling nozzle to block the openings into the chambers of the bag blank in order to prevent premature gas-filling of the same.
The advantage of these nip rolls is to only allow filling of the chambers when they reach up to the gas-filling nozzle so that an uncontrolled early filling should not take place, which would mean that the sides of the bag blank for the chambers of several bag parts become expanded before they reach up to the gas-filling nozzle.

In one embodiment of a device according to the invention, the device is provided with a pressing tool and a welding tool, which are placed so that they are passed by the bag blank after it has passed the gas-filling nozzle. The pressing tool is arranged to press together the openings of the chambers after gas-filling and keep the openings pressed together during the period when the bag blank with the gas-filled chambers passes said welding tool that seals the bag blank with the chambers in the sealing area and forms continuous bag-like packages. The advantage of the pressing tool is to keep the chambers sufficiently gas-filled until the bag blanks and thereby the chambers have been closed.

In one embodiment of a device according to the invention, a compressor and/or a pressure vessel are connected to the gas-filling nozzle via gas lines. A compressor can hold a continuous filling pressure for the chambers of the bag blank. By a pressure vessel, the filling pressure can be regulated more exactly than by just a compressor. The pressure vessel may, in combination with a compressor, work as a pressure accumulator, which accurately can regulate the filling pressure through the discharge holes of the gas-filling nozzle.

In addition, the invention concerns a method in packing of goods in a continuous bag blank. The bag blank is formed to slide on or in control arms and formed according to anyone of the embodiments of bag blank indicated above.

This bag blank is fed forward toward a gas-filling nozzle, which presses in gas through openings into chambers formed in the bag blank, after which the chambers and the bag blank are welded together into sealed packages. Thus, the method is adapted to said embodiments of bag blank in combination with said embodiments of packing device.

In one embodiment of the method in packing of goods, the openings of the chambers are pressed together after the gas-filling and are kept pressed together until welding together has been effected. This eliminates that gas leaks out from the chambers, which would result in a less shock-absorbing package.

In one embodiment of the method in packing of goods, the openings into the chambers are pressed together before the gas-filling is to be effected in order to prevent a premature gas-filling. This method allows a controlled filling of the chambers, which can be directly noticed by observation of the filling area of the packaging device.

The starting product for the bag blank according to the invention is manufactured of a plastic film, preferably of, for instance, polyethylene, wherein the plastic film is provided with double layers between which chambers are arranged. This starting product is delivered as piece goods in rolls of defined length. The starting product is then worked up to a bag blank according to the invention.

The device is formed to handle all weldable plastic films and laminates and also sheetings of plastic-coated aluminum and sheetings of plastic-coated paper, etc.

**DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS**

Now, the invention will be described in more detail, reference being made in connection with the accompanying drawing figures. The drawing figures show only explanatory sketches intended to facilitate the understanding of the invention.

FIG. 1 shows an embodiment of a package blank and a bag blank according to the present invention.

FIG. 2 shows a section through a second embodiment of a bag blank mounted in holder means according to the invention.

FIG. 3 shows a section through a third embodiment of a bag blank mounted in holder means according to the invention.

FIG. 4 shows a section through a fourth embodiment of a bag blank mounted on holder means according to the invention.

FIG. 5 shows a section through a fifth embodiment of a bag blank mounted on holder means according to the invention.

FIG. 6 schematically shows a top view of a device according to the present invention.

FIG. 7 schematically shows a side view of the device according to FIG. 6.

FIG. 8a shows a section A-A according to FIG. 7 of the second embodiment according to FIG. 2.

FIG. 8b shows a section 8-8 according to FIG. 7 of the second embodiment according to FIG. 2.

FIG. 8c shows a section C-C according to FIG. 7 of the second embodiment according to FIG. 2.

FIG. 9a shows a section A-A according to FIG. 7 of the fourth embodiment according to FIG. 4.

FIG. 9b shows a section 8-8 according to FIG. 7 of the fourth embodiment according to FIG. 4.

FIG. 9c shows a section C-C according to FIG. 7 of the fourth embodiment according to FIG. 4.

FIG. 10a shows a section A-A according to FIG. 7 of the third embodiment according to FIG. 3.

FIG. 10b shows a section 8-8 according to FIG. 7 of the third embodiment according to FIG. 3.

FIG. 10c shows a section C-C according to FIG. 7 of the third embodiment according to FIG. 3.

FIG. 11a shows a section A-A according to FIG. 7 of the fifth embodiment according to FIG. 5.

FIG. 11b shows a section 8-8 according to FIG. 7 of the fifth embodiment according to FIG. 5.

FIG. 11c shows a section C-C according to FIG. 7 of the fifth embodiment according to FIG. 5.

FIG. 12 shows a bottom view of an enlarged part from FIG. 6.

FIG. 13 shows an enlarged part of FIG. 7.

**DESCRIPTION OF THE INVENTION**

FIG. 1 shows an inflatable package blank 11, which is delivered on a running web. The package blank has a width that corresponds to twice the measure of the depth of bags 12 of a bag blank 13. The package blank 11 is folded along a centre line 14, wherein suspension arrangements 15 for the edges of the bag blank face in the same direction. The suspension arrangements are either connected to the package blank before folding is carried out or are connected after folding has taken place. The figure shows that the suspension
arrangements have been connected before folding and maybe even in the manufacture of the package blank 11. The package blank is provided with delimited transverse chambers 16 distributed over its entire surface. The chambers are provided with inlet openings 17 through which gas, usually air, can be introduced into the chambers 16. The chambers have been formed by the fact that welds 18 join surfaces from two plastic sheetings lying against each other. The bag blank is furthermore provided with transverse full-penetration weldings

[0061] 19, which are terminated a distance from the longitudinal suspension arrangements 15 with either a full hole penetration 20 or a full slot penetration welding directed parallel to the suspension arrangements 15. Accordingly, the formed bags 12 of the bag blank 13 are continuous at the suspension arrangements.

[0062] FIGS. 2-5 show sections through four different embodiments of package blanks where FIG. 2 shows a bag blank having a first plane plastic sheeting 21 connected to a second plane plastic sheeting 22, which plastic sheetings abut with their plane surfaces against each other and are connected to the welds 18 in such a way that chambers 16 are formed between the welds. The entire double plastic sheeting with the two plastic sheetings thereof is folded to form a delimitation A, which may be either the bottom of a bag or the top of a bag. The folding may also consist of a welding together of all four sheeting layers, i.e., the double sheeting layers of both sides. The figure also shows that the suspension arrangements are formed as two thickening 23a, 23b, each one connected to and joining the two plastic sheeting layers on the respective side of the bag blank 13 so that gas cannot penetrate out through the suspension arrangements. The figure also shows that the thickening 23a, 23b of the suspension arrangements run in support channels as holder means 24 in each control arm 25. Thus, the bag blank 13 slides in these control arms in a packing machine wherein the bags are filled, closed and separated into individual packages.

[0063] FIG. 3 shows a similar bag blank 13 where the only difference to the one shown in FIG. 2 is that each one of the suspension arrangements 23a, 23b is connected only to the first plastic sheeting 21, the edges of the second plastic sheeting 22 being free. In this embodiment, gas is allowed to be pressed into the chambers 16 from a space 31 between the two control arms 251,252. FIG. 3 shows that also the suspension arrangements according to this embodiment are made as thickening, which run in support channels as holder means in each control arm according to what has been shown in FIG. 2.

[0064] FIG. 4 shows a similar bag blank 13 according to what has previously been shown, but where the suspension arrangements are formed as channels 43a, 43b either connected to or formed of the first sheeting 21 and the second sheeting 22. In the shown embodiment, the respective channel 43a, 43b is accordingly connected to both sheetings 21,22. The two channels of the bag blank 13 slide on tabular control arms 41, 42 of a packing machine wherein the bags are filled, closed and separated into individual packages according to what has previously been described. In this embodiment, the control arms work also as holder means in the form of runners on which the bag blanks run.

[0065] FIG. 5 shows again a similar bag blank 13 according to what has previously been shown where the suspension arrangements are formed as channels 43a, 43b, which are connected or formed of only the first plastic sheeting 21, the edges of the second plastic sheeting 22 being free. The supply of gas to the chambers 16 is carried out in the same way as indicated in connection with FIG. 3.

[0066] FIG. 6 shows the principle of a packing device 60 according to the present invention. The device comprises two control arms 61, 62 provided with or formed as holder means arranged to hold up a continuous bag-shaped package blank 13. In the embodiment illustrated, the control arms 61, 62 are formed with slide tracks or runners for the package blank to slide in on in the direction shown by the arrow in the figure. The control arms 61, 62 are arranged to be distanced from each other at a filling area 63 so that the package blank should open and be filled with products 64. After the filling area, the control arms run again in parallel near each other up to a gas-filling area 65 wherein gas/air is filled into the previously described chambers in the package blank. Furthermore, the package blank slides to a sealing area wherein the bags 12 of the package blank are sealed when the same pass welding jaws 66. In the embodiment illustrated, notched belts 67, 68 are arranged, which on one hand pull/feed forward and on the other hand press together the continuous bags of the package blank by the notched belts abutting against each other. The shown bag blank 13 is provided with a longitudinal full-penetration welding 61, which terminates the transverse full-penetration welding 19 of the bag blank.

[0067] FIG. 7 shows a side view of the device of FIG. 6. The continuous bag blanks 13 are fed from a magazine 71, where they are being cutted, i.e., folded. From this magazine, they are fed forward along the control arms 61, 62 of the packing device 60 in the direction of the arrow via the filling area 63 to a gas-filling area 72. The control arms are shown only a short distance in the figure. In the gas-filling area 72, the device 60 is provided with at least one gas-filling nozzle 73 formed with discharge holes 74 directed toward the bag blanks 13. As is indicated in the figure, gas 75 is pressed in the direction of the arrow down into said chambers 16, which only have been schematically drawn as circles in the figure.

[0068] After gas has been pressed into the chambers, the same are sealed temporarily by the notched belts 67, 68 until the chambers are permanently sealed by the bag blanks 13 passing the welding jaws 66 where both the chambers and the rest of the bag blanks are welded together. The embodiment shows also suspension arrangements 23 in the form of thickening, which run in support channels as holder means in each control arm 61, 62 according to the suspension principle shown in FIGS. 2 and 3. Naturally, the suspension principle of the bag blanks according to FIGS. 4 and 5 can also be applied to the device according to FIG. 7. Furthermore, FIG. 7 shows that the device is provided with a rotating cleaning and trimming knife 76, which separates the waste strip 77 from the suspension arrangement from the bags. In addition, channel knives 78 are mounted on the gas-filling nozzles to slot up the gas filling channels in which the gas-filling nozzles slide.

[0069] In the following, the four shown embodiments of FIGS. 2-5 will be shown in sections taken in different positions according to what has been indicated in FIG. 6. FIGS. 8a-8c show the embodiment according to FIG. 2; FIGS. 9a-9c show the embodiment according to FIG. 4; FIGS. 10a-10c show the embodiment according to FIG. 3; and; FIGS. 11a-11c show the embodiment according to FIG. 5.

[0070] FIG. 8a shows the bag blank 13 when it has passed the filling area wherein a product 64 has been put down into the bag, the chambers 16 of which have not yet been filled with gas/air. The bag with the product and the suspension arrangements thereof slide further in the respective support channel
up to the position shown in Fig. 8b, i.e., when the bag blank 13 has slid past the two gas-filling nozzles of the device, the gas pipes 731, 732 of which are shown in the figure. In doing so, the gas-filling nozzles have slid into each a gas-filling channel 81, 82 in the bag blank 13. As seen in the figure, the chambers 16 of the bag blank have, after the passage of the gas-filling nozzles, been filled with gas so that protecting gas cushions have been formed around the packed product 64. After the chambers have been gas-filled and the openings into the chambers have been pressed together, the bag blank passes the previously mentioned channel knives, which cut up the gas-filling channels so that the bag blank can pass past the pipe lines. The bag blank slides further past the mentioned rotating cleaning and trimming knife, which separates the waste strip from the suspension arrangement, to the position shown in Fig. 8c. In this position, the welding jaws 661, 662 will seal the side of the entire bag blank, and thereby also the openings of the gas channels. During the entire transportation of the bag blank from the position in Fig. 8b until welding has been effected, the opening of the bag blank has been closed by the notched belts 67, 68 that have been pressed against each other around the bag blank. After the passage of the welding jaws, the bag blank has ended into separate bag packages wherein a fragile product 64 has been packed with surrounding gas occlusions. As seen in Fig. 8e, also the short side of the product 64 has been protected with a gas occlusion 83.

[0071] Fig. 9a shows the bag blank 13 of a further embodiment when it has passed the filling area wherein a product 64 has been put down into the bag. The chambers 16 of which have not yet been filled with gas/air. The bag with the product and the suspension arrangements thereof, in which this embodiment are formed as channels 43, slide further on the respective tubular control arms up to the position shown in Fig. 9b, i.e., when the bag blank 13 has slid past the two gas-filling nozzles of the device, the gas pipes 731, 732 of which are shown in the figure. In doing so, the gas-filling nozzles have slid into each a gas-filling channel 81, 82 in the bag blank 13. As seen in the figure, the chambers 16 of the bag blank have, after the passage of the gas-filling nozzles, been filled with gas so that protecting gas cushions have been formed around the packed product 64. After the chambers have been gas-filled and the openings into the chambers have been pressed together, the bag blank passes the previously mentioned channel knives, which cut up the gas-filling channels so that the bag blank can pass past the pipe lines to the gas pipes 731, 732. The bag blank slides further past the mentioned rotating cleaning and trimming knife, which separates the waste strip from the suspension arrangement, to the position shown in Fig. 9c. In this position, the welding jaws 661, 662 will seal the side of the entire bag blank, and thereby also the openings of the gas channels. During the entire transportation of the bag blank from the position in Fig. 9b until welding has been effected, the opening of the bag blank has been closed by the notched belts 67, 68 that have been pressed against each other around the bag blank. After the passage of the welding jaws, the bag blank has ended into separate bag packages wherein a fragile product 64 has been packed with surrounding gas occlusions. As seen in Fig. 9c, also the short side of the product 64 has been protected with a gas occlusion 83.

[0072] Fig. 10a shows the bag blank 13 of a further embodiment when it has passed the filling area wherein a product 64 has been put down into the bag, the chambers 16 of which have not yet been filled with gas/air. The bag with the product and the suspension arrangements thereof slide further in the respective support channel up to the position shown in Fig. 10b, i.e., when the bag blank 13 has slid up to the gas-filling nozzle of the device, the gas pipes 100 of which are shown in the figure. The gas pipe presses gas/air down between the first plastic sheeting and the free edge of the second plastic sheeting on both sides of the bag blank by a sheeting divider 101 being arranged to support the free sheeting edges. In doing so, the chambers 16 of the bag are gas filled with gas/air so that protecting gas cushions are formed around the packed product 64. After the chambers have been gas-filled and the openings into the chambers have been pressed together, the bag blank slides further past the mentioned rotating cleaning and trimming knife, which separates the waste strip from the suspension arrangement, to the position shown in Fig. 10c. In this position, the welding jaws 661, 662 will seal the side of the entire bag blank, and thereby also the openings of the gas channels. During the entire transportation of the bag blank from the position in Fig. 10b until welding has been effected, the opening of the bag blank has been closed by the notched belts 67, 68 that have been pressed against each other around the bag blank.

[0075] After the passage of the welding jaws, the bag blank has ended into separate bag packages wherein a fragile product 64 has been packed with surrounding gas occlusions. As seen in Fig. 10c, also the short side of the product 64 has been protected with a gas occlusion 83.

[0076] Fig. 12 shows an enlarged view from the underside of the device at the gas-filling area 65 where the thickenings 23a, 23b of the bag blank, which hold and join the two plastic sheeting layers on the respective side of the bag blank, are
schematically shown. Each thickening with its double sheetings passes an outer nip roll 121 and an inner nip roll 122, which nip rolls abut against each other for the channels of the bag blank to be pressed together and prevented from being gas-filled before they reach up to the respective gas-filling nozzle 73 with the discharge holes 74 thereof. As seen in the figure, the nip rolls and the gas-filling nozzles are doubled in order to handle both sides of the bag blank. The gas-filling nozzles 73 are formed as a cylindrical pin, which is horizontally disposed, biaxial to the holder means and terminated by a tapering rounded shape so that the nozzles should slide easily in the respective gas-filling channel in the bag blank. As seen in the figure, the discharge holes 74 of the nozzles are rectangular-shaped and having a length that corresponds to 3-5 times the width thereof. The discharge holes are shaped to obtain a discharge direction perpendicular to the direction of the cylindrical pin. Each gas-filling nozzle is connected to at least one gas pipe 731, 732, which is connected to a compressor, not shown, and/or gas accumulator for the gas supply of the nozzles. After gas has been pressed into the chambers of the bag blank through the inlet openings thereof, these are pressed together by the fact that they pass between the notched belts 67, 68 so that gas should not leak out from the chambers. The bag blank with the continuous bags passes the rotating cleaning and trimming knife 76, which removes the bag blank’s suspension arrangements, gas filling channels, and a part of the inlet openings in order to form separate bags. Furthermore, the bags pass the welding jaws 661, 662 in a sealing area 120 wherein the bags are sealed by being welded together, the packages being completed.

FIG. 13 shows a schematic side view of the gas-filling area 65 wherein a bag blank 13 has been fed up to a filling position wherein the gas-filling channel 82 of the bag blank has been pressed together by the nip rolls 121 in order to prevent gas supply to more chambers 16 than those that for the time being are situated at the gas-filling nozzle 73, i.e., that gas flows to the left in the gas filling channel 82 in the figure. Around the gas-filling nozzle 73, a gas seal 131 is mounted, which seals against the gas filling channel 82 and the gas-filling nozzle 73 in order to prevent gas being filled into the chambers from flowing past the gas-filling nozzle. The figure also shows that the channel knives 78 are mounted on either the gas-filling nozzle or on the connecting gas pipe 732 for allowing the bag blank to pass the gas pipe 732. When the inlet openings 17 of the chambers 16 are right opposite a first driving wheel 132 of the notched belt 68, the inlet openings will be pressed together and kept pressed together. The bag blank passes the rotating cleaning and trimming knife 76, the bag blank’s suspension arrangement 23b, gas filling channel 82, and parts of the inlet openings being removed, wherein separate gas-filled bags 133 including goods are formed. Said bags pass the welding jaws 662 where a sealing of the side of the entire bag takes place, after which the packaging is terminated.

As seen in FIG. 13, the bag blank can be formed in several different ways, for instance by the package blank being provided with chambers that are placed on both sides of a folding line, which means that the package then does not get a gas-filling on its edge.

What is claimed is:

1. Device in packing, which device comprises two control arms provided with holder means arranged to hold up a continuous bag blank by suspension arrangements arranged in the bag blank, which holder means are formed as slide tracks or runners for the suspension arrangements of the bag blank to slide on or in, the control arms being arranged to be distanced from each other so that the bag blank should open and be filled with a product at a filling area, and which control arms run parallel near each other to allow the package blank to be sealed at a sealing area, characterized in that the bag blank comprises a series of delimited chambers across the surface of the entire bag blank which chambers are provided with inlet openings, the bag blank being arranged to be fed forward along the control arms of the device from a magazine the device being provided with at least one gas-filling nozzle formed with discharge holes directed toward the inlet openings of the bag blank so as to through the same fill gas into the chambers, which thereby will form protecting gas cushions around the packed product.

2. Device according to claim 1, characterized in that the gas-filling nozzle is formed as a cylindrical pin oriented parallel to the holder means and the discharge holes of which are placed on the periphery of the cylindrical pin, forming a discharge direction perpendicular to the direction of the cylindrical pin.

3. Device according to claim 2, characterized in that the gas-filling nozzle is provided with an externally placed seal intended to seal between the gas-filling nozzle and a gas filling channel arranged in the bag blank.

4. Device according to claim 3, characterized in that a channel knife is mounted adjacent to the gas-filling nozzle in order to cut up the gas filling channel when the bag blank passes.

5. Device according to claim 1, characterized in that the gas-filling nozzle is formed with a gas divider, which is arranged to distribute filling gas to the inlet openings in the chambers formed in the bag blank.

6. Device according to claim 1, characterized in that nip rolls are arranged adjacent to the gas-filling nozzle to block the inlet openings into the chambers of the bag blank in order to prevent premature gas-filling of the same.

7. Device according to claim 1, characterized in that the device is provided with a pressing tool and a welding tool, which pressing tool is arranged to press together the inlet openings of the chambers after gas-filling and keep the inlet openings pressed together during the period when the bag blank with the gas-filled chambers passes said welding tool that seals the bag blank with the chambers in the sealing area and forms separate gas-filled bags.

8. Device according to claim 1, characterized in that a compressor and/or a pressure vessel are connected to the gas-filling nozzle via gas pipes.

9. Method in packing of goods in a continuous bag blank, which is formed to slide on or in control arms, characterized in that the bag blank is formed with a series of delimited chambers across the surface of the entire bag blank, which chambers are provided with inlet openings, the bag blank being filled with goods and fed further forward along the control arms of the device toward a gas-filling nozzle, which presses in gas through openings into the delimited chambers formed in the bag blank, after which the chambers and the bag blank are welded together into sealed packages.

10. Method according to claim 9, characterized in that the inlet openings of the chambers are pressed together after the gas-filling and are kept pressed together until welding together of the inlet openings has been effected.
11. Method according to claim 9, characterized in that the chambers are prevented from being gas-filled before they reach up to the gas-filling nozzle in order to prevent a premature gas-filling.