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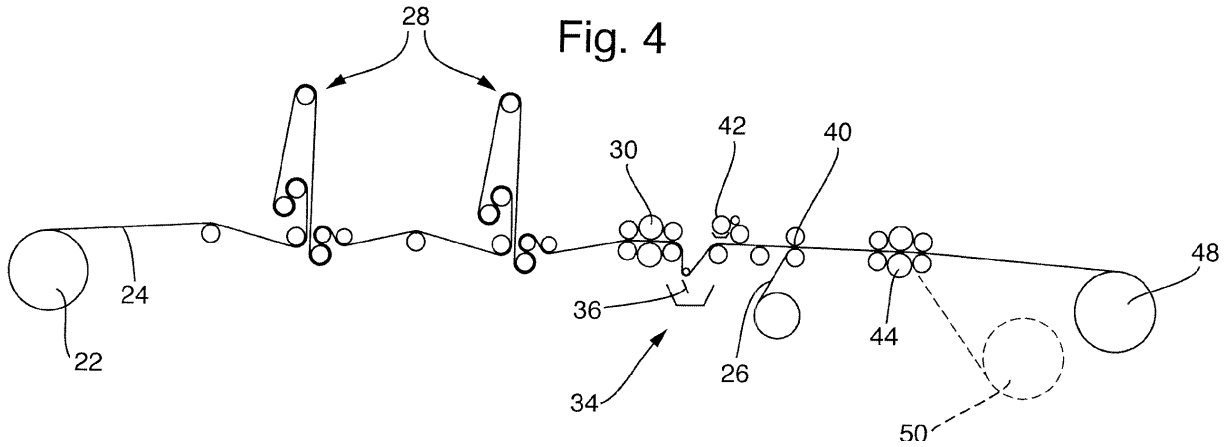
(54) Method of producing a container

(57) A method is disclosed for forming containers having an inner bag and a surrounding outer jacket. The method comprises conveying a sheet 26 for forming the bags of the containers, conveying a sheet 24 for forming the outer jackets of the containers and joining said sheets 24,26 to each other to form a laminate. A series of jacket blanks are then cut in the sheet 24 for forming the jackets by a cutting mechanism 44 and so as to define the outer perimeters of the jacket blanks, wherein said cutting is performed after said sheets have been joined and such that said jacket blanks are joined to said sheet for forming the bags.

Fig. 4



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Description

[0001] The present invention relates to methods of producing containers which have an inner bag and an outer jacket.

[0002] The present invention aims to provide an improved method of forming a container of the type having an inner bag and an outer jacket.

[0003] From a first aspect the invention provides a method of forming containers each having an inner bag and a surrounding outer jacket, the method comprising:

> conveying a laminate which comprises a sheet for forming the bags of the containers joined to a sheet for forming the outer jackets of the containers; and
> cutting a series of jacket blanks in the sheet for forming the jackets so as to define the outer perimeters of the jacket blanks, wherein said cutting is performed after said sheets have been joined and such that said jacket blanks are joined to said sheet for forming the bags.

[0004] The present invention cuts the jacket blanks in the sheet for forming the jackets after the sheet has already been joined to the sheet for forming the bags. As such, individual jacket blanks are not required to be conveyed, aligned and registered with the sheet for forming the bags.

[0005] The method preferably comprises forming the laminate by conveying the sheet for forming the bags of the containers, conveying a sheet for forming the outer jackets of the containers and joining said sheets to each other. The method of joining is preferably by using adhesive, although alternative or additional methods of joining may be used, such as ultrasonics, or heat and/or pressure.

[0006] The sheet for forming the bags is preferably a plastics sheet, such as a plastics film. However, other materials are contemplated, such as paper. Preferably, the sheet for forming the bags is transparent or translucent. The sheet may be a gas and/or liquid impermeable material. This is advantageous if the bag is to be used for storing, for example, food products. The sheet for forming the jackets is preferably card, although it may alternatively be plastics.

[0007] The step of cutting the blanks is carried out so as to cut through only the sheet for forming the blanks and not through the sheet for forming the bags. Preferably, the cutting of the blanks is carried out such that the blanks are spaced apart from each other in the sheet for forming the outer jackets, the blanks being spaced apart in the machine direction. This is particularly advantageous, for example, when the sheet for forming the bags is required to be sealed between adjacent jacket blanks, as will be described later herein.

[0008] The sheet for forming the bags preferably has a width in the cross-machine direction that is greater than the maximum width of each of the blanks in the cross-machine direction. It will be appreciated that the machine direction is the direction that the sheets are conveyed in during production, that is, in a downstream direction. In contrast, the cross-machine direction is the direction in the plane of the sheets that is perpendicular to the machine direction. The cutting of the blanks is carried out such that the sheet for forming the bags extends laterally outwards beyond the sides of the blanks in the cross-machine direction. Preferably, the cutting of the blanks is carried out such that the outer perimeter of each blank is entirely surrounded by material of the sheet for forming the outer jackets.

[0009] The method preferably comprises stripping away the material of the sheet for forming the jackets that is outside of the outer perimeters of blanks. This material may be stripped away by winding the material onto a reel.

[0010] It may be desirable to form containers wherein the outer jacket provides a particular shape of structural support. This may be achieved by forming panels in the jacket blank. The method therefore preferably comprises passing the laminate through a creasing mechanism so as to form fold lines in the jacket blanks. These fold lines enable the jacket to be folded into the desired shape in the final container. Fold lines may be provided for forming one or more closure flaps on the outer jacket of the container.

[0011] Once the jacket blanks have been cut and any surrounding waste material from the sheet for forming the blanks has been removed, the method preferably further comprises folding or wrapping the laminate so that the edges of the sheet for forming the bags and which run in the machine-direction meet each other. The laminate is folded such that the jacket blanks are on the outer side of the folded laminate and the sheet for forming the bags is folded inside of the jacket blanks. The edges of the sheet for forming the bags are then sealed together. This may be achieved, for example, by using heat and/or pressure, adhesives, ultrasonics or combinations of the foregoing.

[0012] According to one set of embodiments, the sheet for forming the bags is folded or wrapped around a hollow mandrel and the edges are then sealed. After, the edges of the sheet have been sealed together, the sheet for forming the bags is sealed closed in the cross-machine direction between a first jacket and a second adjacent jacket. This seal forms a first lateral seal in a first partially formed container. Goods may then be introduced into the partial enclosure formed by sealing said edges of the sheet and the first lateral seal, the goods preferably being introduced through the hollow mandrel. The sheet for forming the bags is then preferably sealed closed in the cross-machine direction between the first jacket and a third, adjacent jacket for forming a second lateral seal of the first container and such that the goods are fully enclosed by the sealed sheet. The sheet for forming the bags is preferably then severed in the cross-machine direction within the second lateral seal so that an individual container comprising a bag and the first jacket is formed.

[0013] In an alternative set of embodiments, the jacket blanks and sheet for forming the bags are folded about one or more axes extending in the machine-direction so that the folded blanks are flat with the sheet for forming the bags inside the folded blanks. The blanks are folded such that the edges of the sheet for forming the bags extend outwards beyond the corresponding edges of the blanks in the cross-machine direction and so that the sheet edges meet and are then sealed together. The strip of blanks and sheet for forming the bags is then preferably severed in the cross-machine direction between adjacent jacket blanks so as to form a plurality of partially formed containers. An open end of the bag material in each said partially formed container is preferably sealed closed, goods are introduced into the partially enclosed bag material and the other end of the bag material is sealed closed so as to form a container having a fully enclosed bag.

[0014] In all of the above embodiments the outer jacket of each container preferably comprises at least one aperture so that one can see directly into the bag of the container. This is useful, for example, if the bag material enables one to see the contents of the bag. The method therefore preferably comprises cutting apertures in the sheet for forming the jackets, wherein at least one of said apertures is formed within the perimeter of each of the blanks. The windows are preferably cut prior to any seals being formed in the sheet for forming the bags and preferably prior to the sheets passing through the blank cutting and/or creasing mechanisms.

[0015] The laminate may be supplied already pre-joined. Alternatively, the method of the invention may include joining the sheets to form the laminate. In either case, the apertures are preferably cut whilst the sheet for forming the blanks and the sheet for forming the bags are superimposed and such that the apertures are cut only in the sheet for forming the jackets and not the sheet for forming the bags. Alternatively, the two sheets may be provided unjoined but superimposed, the sheets are then temporarily separated from each other prior to being joined, the apertures are cut in the sheet for forming the jackets whilst the sheets are temporarily separated, and the sheets are then joined so as to form the laminate.

[0016] The process of joining the two sheets to provide the laminate preferably comprises providing the two sheets superimposed, the sheets may then be temporarily separated from each other, adhesive applied to at least one of said sheets and the sheets are then recombined to provide said joined laminate. Alternatively, the sheets may be supplied from separate sources, adhesive applied to one or both of said sheets and the sheets are then superimposed for the first time so as to provide said joined laminate. In this embodiment, the apertures for forming the windows may be formed after the sheets have been adhered, but cutting through only the sheet for forming the jackets and not the sheet for forming the bags. Alternatively, the apertures may be cut in the sheet for forming the jackets and within the perimeters of the blanks prior to the sheets being superimposed for the first time.

[0017] The waste material formed by cutting the window apertures is preferably removed from the sheet for forming the jackets. This may be achieved by gas blowing or suction of the waste material. Alternatively, or in addition, the sheet for forming the jackets (or both sheets) may be passed around a roller. The sheet(s) is fed around the roller such that it changes direction as it passes around the roller and the resulting tension in the sheet for forming the jackets causes the window waste material to be ejected. The window waste material may be removed directly downstream of the window cutting operation or may be removed at any other downstream stage.

[0018] It may also be desirable to print images and/or text on one or both sheets. Such images and/or text is preferably printed on the surfaces of the sheets prior to the sheet for forming the bags being folded and sealed. The printing is preferably conducted on the surface of one or both sheets that will form the outer surface of the container. The printing on the sheet for forming the jackets is preferably conducted only on the portions that will form the jackets blanks.

[0019] The inventors have also recognised that the sheet for forming the bags may be used to form the continuous enclosure of each container, but that it may not be desirable for the outer jacket to completely enclose the bag.

[0020] Accordingly, from a second aspect the present invention provides a method of forming containers each having an inner bag and a surrounding outer jacket, the method comprising:

conveying a laminate comprising a sheet for forming the bags of the containers and a series of blanks for forming the outer jackets of the containers, wherein the blanks are joined to said sheet such that the longitudinal edges of the sheet extend beyond the longitudinal edges of the blanks in the cross-machine direction;

folding or wrapping the laminate about at least one axis extending in the machine direction such that the sheet is arranged inside of the blanks and such the edges of said sheet that extend beyond the edges of the blanks meet;

sealing together the edges of the sheet that extend beyond the edges of the blank so that the sheet material forms, or is capable of forming, a tubular structure; and

cutting the sheet material in the cross-machine direction between adjacent blanks so as to form individual partially formed containers.

[0021] Preferably, said edges of the blanks are not joined to each other and are preferably spaced apart from each other after said sealing.

[0022] The laminate is preferably provided by using the method steps described above in relation to the first

aspect of the present invention. The features described above in relation to the first aspect of the invention may therefore also be preferred features of the second aspect of the present invention.

[0023] It has also been recognised that in a less preferred embodiment the outer profile of each jacket blank need not to be cut prior to the sheet for forming the bags being severed. Rather, the sheet for forming the jacket blanks may be provided being narrower in the cross-machine direction than the sheet for forming the bags and such that the longitudinal edges of the sheet for forming the jacket blanks will provide the longitudinal edges of the jacket blanks. The transversely extending ends of the jacket blanks can then be cut at the same time as severing the sheet for forming the bags in the cross-machine direction.

[0024] Accordingly, from a third aspect the present invention provides a method of forming containers each having an inner bag and a surrounding outer jacket, the method comprising:

providing a laminate comprising a sheet for forming the bags of the containers adhered to a sheet form forming the outer jackets of the containers, wherein the sheets are adhered to each other such that the longitudinal edges of the sheet for forming the bags extend laterally beyond the longitudinal edges of the sheet for forming the jackets in the cross-machine direction;

folding or wrapping the laminate about at least one axis extending in the machine direction such that the sheet for forming the bags is arranged inside of the sheet for forming the jackets and such that the edges of said sheet for forming the bags that extend beyond the edges of the sheet for forming the jackets meet each other;

sealing together said edges of the sheet for forming the jackets that extend beyond said edges of the sheet for forming the jackets so that the sheet for forming the bags forms, or is capable of forming, a tubular structure; and

cutting the laminate in the cross-machine direction so as to form individual partially formed containers having inner bag material and outer jacket material adhered thereto.

[0025] As the sheet for forming the bags is cut at the same time as the sheet for forming the jackets, the outer perimeter of the jacket blanks can be cut simultaneously with the cutting of the sheet for forming the bags. This may be useful in cutting portions of the jacket blanks such as closure flaps for the container at the same time as cutting the sheet for forming the bags.

[0026] This method may have the features described in relation to the first and second aspects of the invention, except that the jacket blanks are not formed until the same time that the sheet for forming the bags is severed.

[0027] For example, the sheet for forming the bags is preferably a plastic sheet, such as a plastic film. However, other materials are contemplated, such as paper. Preferably, the sheet for forming the bags is transparent or translucent. The sheet may be a gas and/or liquid impermeable material. The sheet for forming the jacket blanks is preferably card or may be plastic.

[0028] The sheet for forming the bags has a width in the cross-machine direction that is greater than the width of the sheet for forming the jackets.

[0029] The method comprises folding or wrapping the sheet for forming the jacket blanks and the sheet for forming the bags so that the edges of the sheet for forming the bags and which run in the machine-direction meet each other. The edges of the sheet are then sealed together. This may be achieved, for example, by using heat and/or pressure, adhesives, ultrasonics or combinations of the foregoing.

[0030] The sheet for forming the jacket blanks and the sheet for forming the bags may be folded about one or more axes extending in the machine-direction so that the folded blank material is flat with the sheet for forming the bags inside of it. After the sealing, the laminate is then preferably severed in the cross-machine direction so as to form a plurality of partially formed containers. An open end of the bag material in each said partially formed container is then preferably sealed closed, goods are introduced into the partially enclosed bag material and the other end of the bag material is sealed closed so as to form a container having a fully enclosed bag.

[0031] The outer jacket of each container preferably comprises at least one aperture for forming a window so that one can directly see the bag of the container. Such apertures are preferably formed in the sheet for forming the jacket blanks as described above in relation to the first aspect of the invention.

[0032] The two sheets may be joined, preferably adhered, together as described above in relation to the first aspect of the invention.

[0033] Various embodiments of the present invention will now be described, by way of example only, and with reference to the accompanying drawings, in which:

Fig. 1 shows a container according to a preferred embodiment of the present invention;

Figs. 2A and 2B show part of the production process for two preferred methods of forming the container of Fig. 1, during which the blanks for the container jackets are being formed;

Fig. 3 shows a portion of the laminate for forming the jacket blanks of the container at one stage in a preferred embodiment;

Fig. 4 shows part of the production process for another preferred method of forming the container of Fig. 1, during which the blanks for the container jackets are being formed;

Fig. 5 shows part of the production process of a preferred method of the present invention during which the container bags are being sealed, filled and sev-

ered to form individual containers;

Fig. 6A shows the bottom of a container bag being sealed and Fig. 6B shows the simultaneous formation of the top seal of one container and the bottom seal of another container;

Fig. 7 shows the method of Figs. 6A and 6B at a subsequent stage wherein the lowermost bag is severed to release a fully formed container;

Fig. 8 shows a container according to a preferred embodiment of the present invention; and

Figs. 9A and 9B show part of the production process for a forming the container of Fig. 8, during which the blanks for the container jackets are folded and the bag material sealed.

Figure 1 shows a rear view of a container 1 manufactured according to a preferred embodiment of the present invention. The container comprises an outer jacket 2 that partially surrounds an inner bag 4. The inner bag 4 is formed from a flexible, transparent film and is used to contain and sealingly enclose goods. The inner bag 4 is fully sealed, including lateral seals 6,8 at the top and bottom of the container 1 and a vertical seal 10 extending longitudinally up the rear of the container 1.

[0034] The jacket 2 is arranged around the outside of the bag 4 and is adhered to the outer surface of the bag 4 in the regions where they overlap. The jacket 2 is formed from a number of interconnected panels and flaps that are configured to leave certain areas of the bag 4 uncovered so as to provide windows so that one can see into the bag 4. The jacket 2 has a front panel (not shown) defined by upper and lower wide portions that are interconnected by a narrow vertical portion. Upper and lower side panels 12,13 are connected to the upper and lower wide portions of the front panel, respectively, at fold lines.

[0035] The jacket comprises two separate rear panels 14,15. Each rear panel 14,15 has an upper and lower portion that is connected to the upper and lower side panels 12,13, respectively, at fold lines. The upper side panels 12 include central vertical fold lines so as to enable to the front panel and rear panels 14,15 to be folded close to one another, forming a gusset between front and rear panels 14,15.

[0036] The upper end of the front panel is connected to a closure flap 16 along its top edge. The closure flap 16 includes cut lines 18 that define projections. The upper region of each back panel 14,15 includes a slit 20 for receiving each projection 18 on the closure flap 16 once it has been folded over and against the back panels 14,15. The projections 18 and slits 20 are arranged and configured so as to provide a releasable closure to the top of the container 1. This is particularly useful after the top of the inner bag 4 has been opened so as to dispense some of its contents, and when it is desired to close the container 1.

[0037] The inner bag 4 is formed from sheet material and has laterally extending seals 6,8 along its upper and lower ends. A vertical seal 10 is also provided in the bag 4 at the region between the rear flaps 14,15 and so as to fully seal the bag 4.

[0038] Figure 2A shows a schematic of a production line used in forming the container 1 and according to one embodiment of the present invention. A reel 22 is provided for supplying a continuous sheet of card 24 which is overlaid by a continuous sheet of transparent film 26. Portions of this card sheet 24 will ultimately form the outer jacket 2 of the container 1 and the film 26 will be formed into the inner bag 4. The process is driven such that the reel 22 is unrolled and the sheets 24,26 pass through one or more printing units 28. The printing units 28 are arranged and configured so as to print the desired text and images onto the portions of the card 24 that will ultimately form the outer surface of the jacket 2. The portions of the card sheet 24 that will ultimately form the jacket 2, and which are printed onto, are shown as the darkened area in Figure 3.

[0039] Referring back to Figure 2A, the overlaid card and film sheets 24,26 then pass into a window cutting unit 30. This cutting unit 30 cuts apertures 32 in the card sheet 24, the apertures 32 eventually forming the windows in the outer jacket 2. These windows 32 in the card sheet 24 are shown in Figure 3 and are surrounded by the portion of the card sheet that will ultimately form the jacket 2. The window cutting unit 30 is configured such that it only cuts through the card sheet 24 and not the overlaying film 26 as the two sheets pass therethrough. The film sheet 26 therefore remains continuous, uncut and covers the card sheet 24, including the windows 32 that have been cut in the card 24. Cutting units 30 capable of performing this procedure are well known in this field of technology and will not be discussed further herein.

[0040] After the window cutting station 30 the overlaid sheets 24,26 pass downstream to a window waste material removal station 34. At this station the sheets 24,26 pass around a roller with the film sheet 26 between the card sheet 24 and the roller. The sheets change direction as they pass around the roller and the resulting tension causes the card 36 that was cut for forming the windows 32 to be ejected from the card sheet 24.

[0041] The sheets 24,26 then pass to a separating mechanism 38 that lifts the film sheet 26 away from the card sheet 24. The film sheet 26 and card sheet 24 travel downstream along two different paths that are separated from each other until they are combined at a sheet combining nip 40. Adhesive is applied to the card sheet 24 by an applicator 42 after the two sheets have been separated and prior to them being combined at the nip 40. The adhesive is applied to the surface of the card sheet 24 that will contact the film sheet 26 at the sheet combining nip 40. The adhesive is only applied to areas of the card sheet 24 that will form the outer jacket 2 of the container 1. The adhesive is set either at or downstream of the sheet combining nip 40. Alternatively, adhesive may be applied to areas of the card sheet 24 that will form the outer jacket 2 as well as areas outside of the

jacket forming parts. In this modification of the process, an adhesive setting agent is applied to said areas of the card sheet 24 outside of the jacket forming parts so as to render the adhesive outside of the jacket forming parts inactive prior to the card and film sheets 24,26 being superimposed at the recombining nip 40.

[0042] The combined sheets 24,26 are then supplied to a cutting and creasing mechanism 44 for forming the final profile of the outer jacket 2 from the card sheet 24. More specifically, the mechanism 44 cuts the card sheet 24 so as to form the outer perimeter of each blank that will ultimately form a jacket 2. The cut line 46 extends around the outer perimeter of the shaded area of each blank shown in Figure 3. The mechanism 44 may also form the projections 18 in the closure flap 16 and the slots 20 in the rear panels 14,15 (see Figure 1). The cutting mechanism 44 is configured such that it only cuts through the card sheet 24 and not the film sheet 26. As the sheets 24,26 move through the cutting mechanism 44 separate jacket blanks 2 are intermittently cut in the card sheet 24, the blanks being spaced apart from each other on the card sheet 24.

[0043] The sheets 24,26 then pass to the creasing mechanism 44. This mechanism serves to impart creases into each jacket blank 2 as it passes through the mechanism. The jacket blank is creased so as to form fold lines that correspond to the fold lines shown in Figure 1. As such, the mechanism creates a fold line between the front panel and closure flap 16, fold lines between the front panel and side panels 12,13, fold lines midway along the upper side panels 12 and fold lines between the side panels 12,13 and rear panels 14,15.

[0044] Although only the jacket blanks are adhered to the film sheet 26, the remaining card material 3 of the card sheet 24 continues to pass out of the cutting and creasing mechanisms 44 along with the jacket blanks 2 and film sheet 26. The sheets 24,26, including the waste card outside of the jacket blanks 2, may be wound up on a roll 48 for transport to the container construction process. Alternatively, the sheets 24,26 may pass directly to a container construction process. In both cases, the waste card 3 around the jacket blanks 2 may be separated from the film sheet 26 and the jacket blanks 2 attached thereto prior to the film sheet 26 and blanks 2 being wound up on the roll 48 or being passed directly to the container construction process. The waste card material 3 around the blanks may be wound up on a roll 50 as shown by the dashed lines in Fig. 2A.

[0045] Figure 2B shows another processing line that is similar to Fig. 2A and wherein like elements are designated with the same reference number. However, in the process shown in Fig. 2A the card sheet 24 is superimposed below the film sheet 26, whereas in Fig. 2B the card sheet 24 is superimposed above the film sheet 26. The reel 22 of card and superimposed film is unwound and the sheets 24,26 pass through one or more printing units 28, as described in relation to Fig. 2A. The sheets then pass to a separating mechanism 38 that temporally lifts the film sheet 26 away from the card sheet 24 and subsequently recombines the two sheets at a downstream combining nip 40. Adhesive is applied to the card sheet 24 after the two sheets have been separated and prior to them being joined again at the nip 40. The adhesive is applied to the surface of the card sheet 24 that will contact the film 26 at the nip 40 and in the same manner as described in relation to Fig. 2A. According to the process shown in Fig. 2B, the window cutting unit 30 is located between the sheet separation mechanism 38 and the sheet recombining nip 40. This has the advantage that the window cutting unit 30 can cut the windows 32 in the card sheet 24 without any possibility of cutting through the film sheet 26. As such, the window cutting unit 30 need not be configured so as to cut through only one of the two superimposed sheets 24,26. The window waste material removal may occur between the window cutting unit 30 and the recombining nip 40 or may occur downstream of the cutting and creasing mechanism 44. In the latter option, the window waste material is preferably removed via air blowing or suction. The remaining operations of the process shown in Fig. 2B correspond to those described in relation to Fig. 2A.

[0046] Figure 4 shows another modification to the embodiment of Figure 2A. The embodiment shown in Figure 4 operates in an identical manner to the embodiments described in relation to Figure 2A, except that the film sheet 26 is not supplied with the card sheet 24, but is rather superimposed on the card sheet 24 for the first time at a location downstream of the adhesive applicator 42. The film sheet 26 is supplied from a film supply roll and superimposed on the card sheet 24 at a sheet combining nip 40. It will be apparent that in the embodiment of Figure 4 only the card sheet 24, and not the film sheet 26, passes through the window cutting unit 30. As such, the window cutting unit 30 is not required to be configured to avoid cutting through the film sheet 26 as it cuts windows 32 in the card sheet 24. This method also avoids the need to lift the film sheet 26 away from the card sheet 24 in order to apply adhesive between the two sheets. Rather, the film sheet 26 is only supplied onto the card sheet 24 downstream of the adhesive application 42. The adhesive is applied to the surface of the card sheet 24 that will be joined to the film sheet 26 downstream of the nip 40, and in the same manner as described above in relation to Fig. 2A.

[0047] Figure 5 shows a schematic of the container construction and filling process. In the depicted embodiment, the film sheet 26 and the card sheet 24 including the jacket blanks 2 formed therein have been wound on a roll 48 and are supplied therefrom. However, the card jacket blanks 2 and film sheet 26 may alternatively be supplied directly from the blank forming process into the container construction and filling process without being wound on a roll at an intermediate stage. In the depicted embodiment, the waste card 3 around the jacket blanks 2 has not previously been removed. In order to do this the sheets are passed over a roller 52 at which the waste

card 3 around the jacket blanks 2 is stripped away from the film sheet 26. The film sheet 26 together with its adhered jacket blanks 2 continues to pass downstream to a hollow mandrel 54.

[0048] Although Figure 5 depicts the removal of the waste card 3 from around the jacket blanks 2, this may have been performed at an earlier stage in the process, as described in relation to Figures 2A, 2B and 4. For example, this waste material 3 may have been removed prior to the film sheet 26 and jacket blanks 2 being wound onto the roll 48.

[0049] As shown in Figure 5, the film 26 and card blanks 2 (without the waste material) pass downstream to a hollow mandrel 54. The film sheet 26 is then wrapped around the mandrel 54 with the jacket blanks 2 on the outer side. The side edges of the film sheet 26 (which run along the machine direction) are overlapped with one another and so as to form a tubular construction around the mandrel 54 with the longitudinal axis of the tube in the machine direction. The overlapping edges of the film sheet 26 are then sealed together. This may be achieved by arranging the overlapping edges to form an upstanding fin along the tubular construction and pressing a sealing device 56 against either side of the fin to seal the overlapping parts of film sheet 26 together. This seal ultimately corresponds to the vertical seal 10 of the container 1 shown in Figure 1 and which is arranged between the rear panels 14,15 of the jacket 2.

[0050] Returning to Figure 5, the sealed film tube then passes to a sealing device 58 that seals the film tube in the lateral direction between subsequent card jackets 2. This can be seen more clearly in Figure 6A. The seal 60 is formed in the film 26 at a point below the open end of the hollow mandrel 54. This forms the bottom seal 8 of a first bag 4a shown in Figure 1. Once the vertical seal 10 and bottom seal 8 have been formed then goods are passed through the hollow mandrel 54 and into the partially formed first bag 4a. The film tube then passes downstream by the length, measured in the machine direction, of one card jacket 2. The sealing station 58 then performs the same sealing operation so as to form another lateral seal 62 between adjacent card blanks 2. This lateral seal 62 will form the top seal 6 of the first bag 4a located downstream of the sealing device 58 and the bottom seal 8 of a second bag 4b that is located upstream of the sealing device 58. This is shown more clearly in Figure 6B. At this stage the bottom seal 8 of the upper second bag 4b and the top seal 6 of the first bag 4a are formed simultaneously. The goods in the first bag 4a are then fully sealed. At this stage, goods are introduced from the hollow mandrel 54 into the open top of the second bag 4b.

[0051] Referring to Figure 7, the film 26 then passes downstream again by a length in the machine direction of one card jacket 2. The sealing device 58 forms another seal 64 corresponding to the bottom seal 8 of a third bag 4c and the top seal 6 of the second bag 4b between their jackets 2. The goods in the second bag 4b are then fully sealed and goods are introduced from the hollow mandrel 54 into the open top of third bag 4c. In addition, a cutting device 66 severs the film sheet 26 between the jackets 2 of the first and second bags 4a,4b at a location such that the lateral top seal 6 on the first bag 4a and the bottom seal 8 on the second bag 4b are preserved. As such, the first bag 4a is cut free and a fully formed first container 1 is formed having the first sealed bag 4 and a surrounding jacket 2. The first container is then moved downstream along a conveyor 68, as shown in Figure 5.

[0052] The above-described sealing, filling and cutting steps are repeated each time the film is moved downstream by one jacket length such that the final bag in the process is cut free, the upstream adjacent bag has its upper seal formed, and the second bag upstream from the final bag has its bottom seal formed and is filled with goods.

[0053] Fig. 8 shows a partially formed container 70 manufactured accordingly to another embodiment of the present invention. The container 70 is similar to that shown in Figure 1 and comprises an outer jacket that partially surrounds an inner bag 4. The inner bag 4 is formed from a flexible transparent film and is used to contain and sealingly enclose goods. The inner bag 4 is fully sealed, including lateral seals 6,8 at the top and bottom of the container 70 and a vertical seal 10 extending longitudinally up the rear of the container 70.

[0054] The jacket 2 is arranged around the outside of the bag 4 and is adhered to the outer surface of the bag in the regions where they overlap. The jacket is formed from a front panel (not shown), two side panels 12a,12b, two rear panels 14,15 and preferably closure flaps 16. The various panels are interconnected by fold lines. The invention also contemplates the jacket having no closure flaps 16.

[0055] In order to completely form the container the bottom side closure flaps 16a are folded inwards across the bottom of the container. The front and rear bottom closure flaps 16b,16c are then folded in and joined to the side closure flaps 16a so as to form a substantially closed bottom of the container. The top closure is performed in a corresponding manner.

[0056] In the closed container 70 the vertical seal 10 is located between the two rear panels 14,15. The top and bottom seals 6,8 may also protrude out of the container 70 between the front and rear closure flaps 16b,16c.

[0057] In order to form the container of Figure 8 the process forms jacket blanks 2 joined to a film sheet 26. This may be achieved in substantially the same manner as has been described above in relation to Figs. 2A, 2B and 4. The process differs, however, in that windows 32 may not be cut in the card sheet 24. Also, the cutting and creasing mechanisms 44 form jacket blank profiles having closure flaps 16 and the fold lines shown in Fig. 8. As in the Figure 3 embodiment, the jacket blank profiles 46 are cut such that their outer edges, running in the machine direction, are spaced inwardly from the outer edges of the film sheet 26. The jacket blanks 2 may or

may not be spaced apart in the longitudinal machine-direction on the card sheet 24.

[0058] The film sheet 26 and jacket blanks 2 adhered thereto then pass to the process illustrated in Fig. 9A. The film sheet 26 and jacket blanks 2 may be provided on a wound reel 48 or may pass continuously from the cutting and creasing mechanism 44.

[0059] The film sheet 26 and blanks 2 then pass through a folding mechanism 72 that folds the film sheet 26 and card blanks 2 in half about an axis extending in the machine direction. The card blanks 2 and film sheet 26 are folded such that the film sheet 26 is sandwiched between the two halves of each card blank 2. This folding process is illustrated schematically in Figs. 9B and shows the various stages of folding as viewed looking down the machine direction. As the film sheet 26 is wider in the cross-machine direction than the jacket blanks 2 are, the edges 74 of the film sheet 26 protrude outwards from the open side of the folded blank 2.

[0060] Referring back to Fig. 9A, the strip of folded blanks 2 and film sheet 26 then pass to a sealing section 76 that seals the edges 74 of the film sheet 26 together with heat and pressure or by ultrasonic methods. This corresponds to the vertical seal 10 shown in Fig. 8.

[0061] The folded film sheet 26 and blanks 2 then pass to a rotary or flat bed cutter 78 that severs the film sheet 26 between the jacket blanks 2. The individual blanks 2 are then conveyed to a stacking unit 80. The blanks can then be erected into the tubular form shown in Fig. 8 and having the vertical seal 10. The bottom seal 8 may be formed before or after this step. Once in a tubular form the bottom closure flaps 16 are closed and the bag 4 is filled, the top seal 6 is then formed and the top closure flaps 16 closed.

[0062] It will be appreciated that in this embodiment the folding process leaves the jacket blank with a vertical fold line extending down the centre of the front panel. If this is not desired then the folding section 72 may by configured not to fold the jacket blanks 2 and film sheet 26 as described above, but to fold the blanks and film sheet inwards along the fold line between the right rear flap 14 and the right side panel 12a and along the fold line between the front panel and the left side panel 12b. The folded blank then has the front panel and right side panel 12a lying flat and adjacent one another, with the right rear panel 14 folded inwardly from one side and the left side panel 12b and left rear panel 15 folded inwardly from the other side. The film sheet 26 is folded in the same manner and inside of the jacket blank 2. The overlapping longitudinal edges of the film sheet 26 are exposed between the blank panels that form the rear panels 14,15. The edges of the film sheet are then sealed together in this gap. The film 26 may then be severed by cutter 78 to cut the blanks and the container erected as shown in Fig. 8.

[0063] Less preferably, the folding section 72 may be configured to fold the jacket blanks 2 into a tubular form and seal the film edges whilst in the tubular form.

Statements of invention (not claims):

[0064]

1. A method of forming containers each having an inner bag and a surrounding outer jacket, the method comprising:

conveying a laminate which comprises a sheet for forming the bags of the containers joined to a sheet for forming the outer jackets of the containers; and

cutting a series of jacket blanks in the sheet for forming the jackets so as to define the outer perimeters of the jacket blanks, wherein said cutting is performed after said sheets have been joined and such that said jacket blanks are joined to said sheet for forming the bags.

2. The method of statement 1, further comprising conveying said sheet for forming the bags of the containers, conveying said sheet for forming the outer jackets of the containers and joining said sheets to each other to form said laminate.

3. The method of statement 1 or 2, wherein said cutting of the blanks is carried out so as to cut through only the sheet for forming the blanks and not through the sheet for forming the bags.

4. The method of statement 1, 2 or 3, wherein said cutting of the blanks is carried out such that the blanks are spaced apart from each other in the sheet for forming the outer jackets, the blanks being spaced apart in the machine direction.

5. The method of any preceding statement, wherein the sheet for forming the bags has a width in the cross-machine direction that is greater than the maximum width of each of the blanks in the cross-machine direction.

6. The method of any preceding statement, wherein said cutting of the blanks is carried out such that the sheet for forming the bags extends laterally outwards beyond the sides of the blanks in the cross-machine direction.

7. The method of any preceding statement, wherein said cutting of the blanks is carried out such that the outer perimeter of each blank is entirely surrounded by material of the sheet for forming the outer jackets.

8. The method of any preceding statement, wherein the material of the sheet for forming the jackets that is outside of the outer perimeters of blanks is removed from the blanks and from the sheet for forming the bags.

9. The method of any preceding statement, further comprising passing the jacket blanks and the joined sheet for forming the bags through a creasing mechanism so as to form fold lines in the jacket blanks for use in erecting the jackets into a tubular form.

10. The method of any preceding statement, further comprising folding or wrapping the jacket blanks and sheet for forming the bags so that the edges of the sheet for forming the bags and which run in the machine-direction meet each other, the method further comprising sealing said edges of the sheet together.

11. The method of statement 10, wherein the sheet for forming the bags is wrapped around a hollow mandrel and said edges then sealed.

12. The method of statement 10 or 11, wherein the sheet for forming the bags is sealed closed in the cross-machine direction between a first jacket blank and a second adjacent jacket blank for forming a first lateral seal for a first container.

13. The method of statement 12, wherein content is introduced into the partial enclosure formed by sealing said edges of the sheet and the first lateral seal, the content preferably being introduced through the mandrel.

14. The method of statement 12 or 13, wherein the sheet for forming the bags is sealed closed in the cross-machine direction between the first jacket blank and a third adjacent jacket blank for forming a second lateral seal for the first container and such that said content is fully enclosed by the sealed sheet.

15. The method of statement 14, wherein the sheet for forming the bags is severed in the cross-machine direction within the second lateral seal so that an individual container comprising a bag and the first jacket is formed.

16. The method of statement 10, wherein the jacket blanks and sheet for forming the bags are folded about one or more axes extending in the machine-direction so that the folded blanks are flat with the sheet for forming the bags inside the folded blanks, wherein the blanks are folded such that the edges of the sheet for forming the bags extend outwards beyond the corresponding edges of the blanks so that the sheet edges meet and are sealed together.

17. The method of statement 16, wherein the laminate of jacket blanks and sheet for forming the bags is severed in the cross-machine direction between adjacent jacket blanks so as to form a plurality of partially formed containers.

18. The method of statement 17, wherein an open end of the bag material in each said partially formed container is sealed closed, content is introduced into the partially enclosed bag material and the other end of the bag material is sealed closed so as to form a container having a fully enclosed bag.

19. The method of any preceding statement, further comprising cutting apertures in the sheet for forming the jackets, wherein at least one of said apertures is formed within the perimeter of each of the blanks, the apertures for forming windows in the jackets.

20. The method of statement 19, wherein the apertures are cut whilst the two sheets are superimposed and such that the apertures are cut only in the sheet for forming the jackets and not the sheet for forming the bags.

21. The method of statement 19, further comprising providing the two sheets superimposed, temporarily separating the two sheets from each other prior to the sheets being joined, cutting the apertures in the sheet for forming the jackets whilst the sheets are temporarily separated, and joining the two sheets to form said laminate.

22. The method of any preceding statement, comprising providing the two sheets superimposed, temporarily separating the sheets from each other, applying adhesive to at least one of said sheets and recombining the sheets to provide said joined laminate.

23. The method of any one of statements 1-20, comprising supplying said sheets from separate sources, applying adhesive to one or both of said sheets and then superimposing the sheets for the first time so as to provide said joined laminate.

24. The method of statement 23, wherein apertures are cut in the sheet for forming the jackets and within the perimeters of the blanks prior to the sheets being superimposed for the first time, the apertures for forming windows in the jackets

25. A method of forming containers each having an inner bag and a surrounding outer jacket, the method comprising:

conveying a laminate comprising a sheet for forming the bags of the containers and a series of blanks for forming the outer jackets of the containers, wherein the blanks are joined to said sheet such that the longitudinal edges of the sheet extend beyond the longitudinal edges of the blanks in the cross-machine direction;
folding or wrapping the laminate about at least

one axis extending in the machine direction such that the sheet is arranged inside of the blanks and such that the edges of said sheet that extend beyond the edges of the blanks meet each other;
sealing together the edges of the sheet that extend beyond the edges of the blanks so that the sheet material forms, or is capable of forming, a tubular structure; and
cutting the sheet material in the cross-machine direction between adjacent blanks so as to release individual partially formed containers.

26. The method of statement 25, further comprising the method steps of any of statements 1-24, wherein the laminate of statement 25 corresponds to the laminate of statement 1.

27. A method of forming containers each having an inner bag and a surrounding outer jacket, the method comprising:

providing a laminate comprising a sheet for forming the bags of the containers adhered to a sheet form forming the outer jackets of the containers,
wherein the sheets are adhered to each other such that the longitudinal edges of the sheet for forming the bags extend beyond the longitudinal edges of the sheet for forming the jackets in the cross-machine direction;
folding or wrapping the laminate about at least one axis extending in the machine direction such that the sheet for forming the bags is arranged inside of the sheet for forming the jackets and such the edges of said sheet for forming the bags that extend beyond the edges of the sheet for forming the jackets meet each other;
sealing together the edges of the sheet for forming the bags that extend beyond the edges of the sheet for forming the jackets so that the sheet for forming the bags forms, or is capable of forming, a tubular structure; and
cutting the laminate in the cross-machine direction so as to release individual partially formed containers having inner bag material and outer jacket material adhered thereto.

Claims

1. A method of forming containers each having an inner bag and a surrounding outer jacket, the method comprising:

conveying a laminate comprising a sheet for forming the bags of the containers and a series of blanks for forming the outer jackets of the containers, wherein the blanks are joined to said sheet such that the longitudinal edges of the sheet extend beyond the longitudinal edges of the blanks in the cross-machine direction;
folding or wrapping the laminate about at least one axis extending in the machine direction such that the sheet is arranged inside of the blanks and such that the edges of said sheet that extend beyond the edges of the blanks meet each other;
sealing together the edges of the sheet that extend beyond the edges of the blanks so that the sheet material forms, or is capable of forming, a tubular structure; wherein said edges of the blanks are not joined to each other and are spaced apart from each other after said sealing step; and
cutting the sheet material in the cross-machine direction between adjacent blanks so as to release individual partially formed containers.

2. The method of claim 1, comprising forming the laminate by:

conveying the sheet for forming the bags of the containers joined to a sheet for forming the outer jackets of the containers; and
cutting a series of jacket blanks in the sheet for forming the jackets so as to define the outer perimeters of the jacket blanks, wherein said cutting is performed after said sheets have been joined and such that said jacket blanks are joined to said sheet for forming the bags.

3. The method of claim 2, wherein said cutting of the blanks is carried out so as to cut through only the sheet for forming the blanks and not through the sheet for forming the bags.

4. The method of claim 2 or 3, wherein said cutting of the blanks is carried out such that the blanks are spaced apart from each other in the sheet for forming the outer jackets, the blanks being spaced apart in the machine direction.

5. The method of any one of claims 2-4, wherein the sheet for forming the bags has a width in the cross-machine direction that is greater than the maximum width of each of the blanks in the cross-machine direction.

6. The method of any one of claims 2-5, wherein the material of the sheet for forming the jackets that is outside of the outer perimeters of blanks is removed from the blanks and from the sheet for forming the bags.

7. The method of any one of claims 2-6, further comprising cutting apertures in the sheet for forming the jackets, wherein at least one of said apertures is

formed within the perimeter of each of the blanks, the apertures for forming windows in the jackets.

8. The method of claim 7, wherein the apertures are cut whilst the two sheets are superimposed and such that the apertures are cut only in the sheet for forming the jackets and not the sheet for forming the bags.

9. The method of claim 7, further comprising providing the two sheets superimposed, temporarily separating the two sheets from each other prior to the sheets being joined, cutting the apertures in the sheet for forming the jackets whilst the sheets are temporarily separated, and joining the two sheets to form said laminate.

10. The method of any preceding claim, wherein the laminate is wrapped around a hollow mandrel and said edges then sealed.

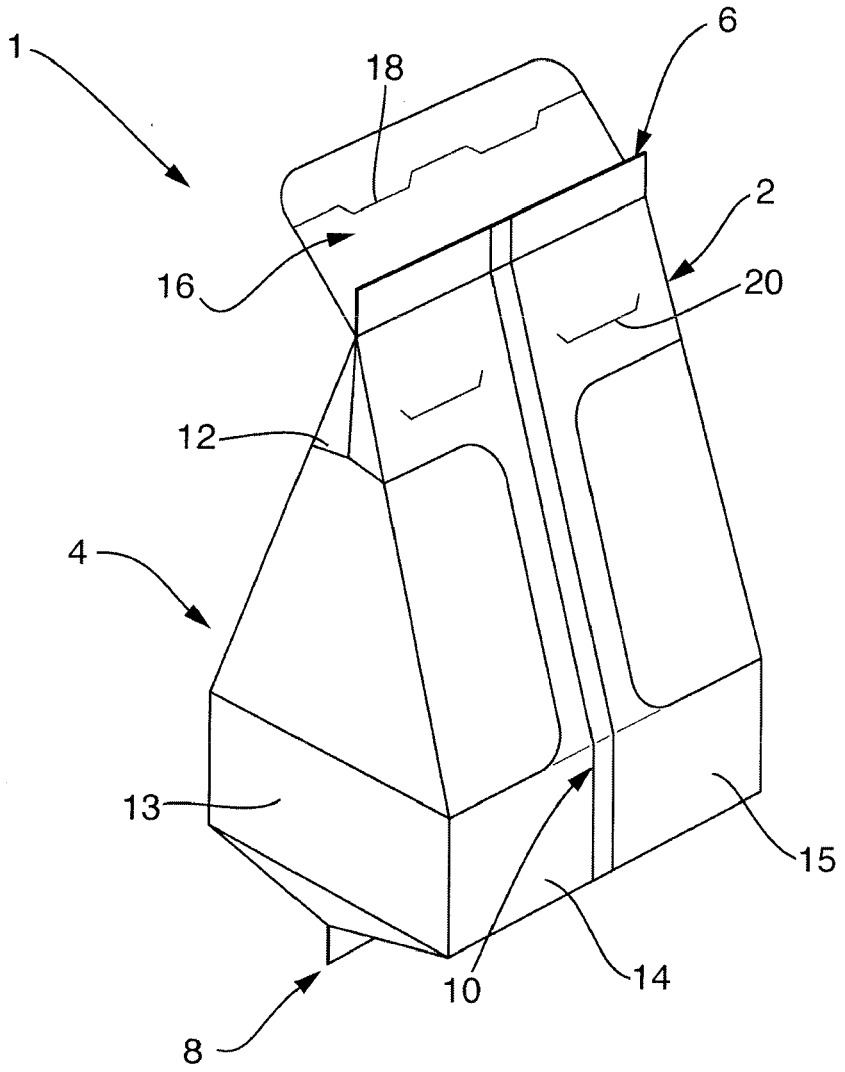
11. The method of claim 10, wherein the sheet for forming the bags is sealed closed in the cross-machine direction between a first jacket blank and a second adjacent jacket blank for forming a first lateral seal for a first container.

12. The method of claim 11, wherein content is introduced into the partial enclosure formed by sealing said edges of the sheet and the first lateral seal, the content preferably being introduced through the mandrel.

13. The method of claim 11 or 12, wherein the sheet for forming the bags is sealed closed in the cross-machine direction between the first jacket blank and a third adjacent jacket blank for forming a second lateral seal for the first container and such that said content is fully enclosed by the sealed sheet.

14. The method of claim 13, wherein the sheet for forming the bags is severed in the cross-machine direction within the second lateral seal so that an individual container comprising a bag and the first jacket is formed.

Fig. 1



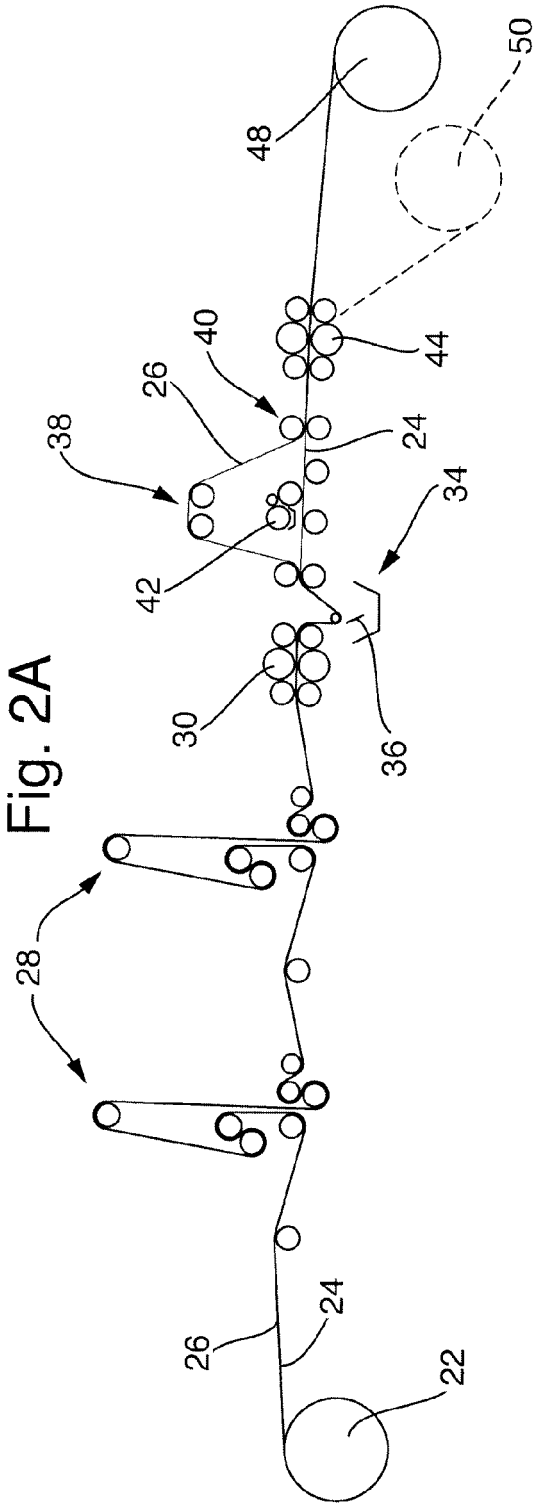

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Fig. 2A

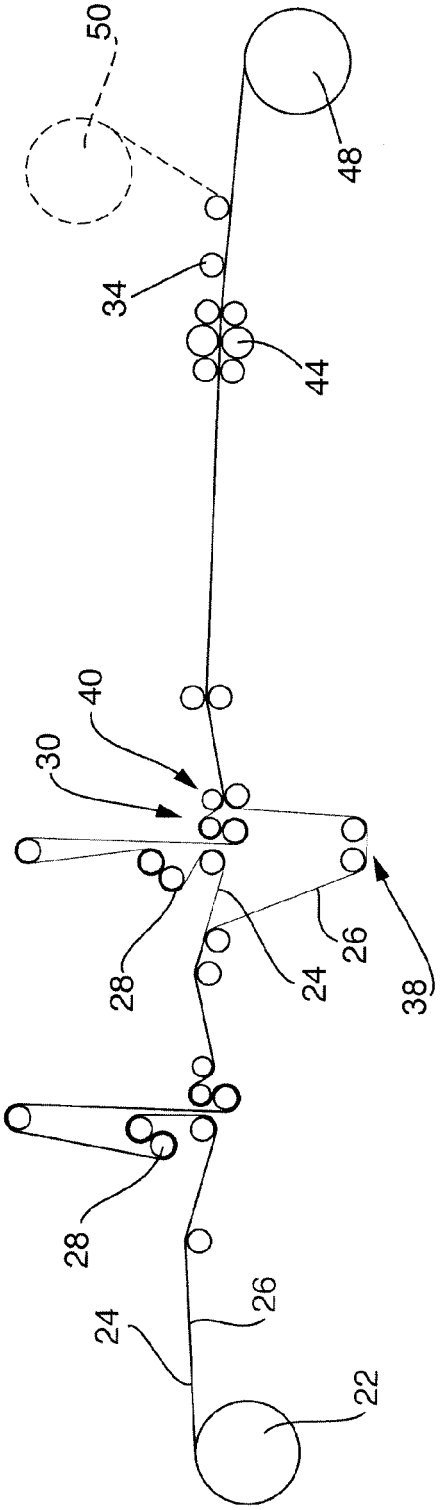
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Fig. 2B

Fig. 3

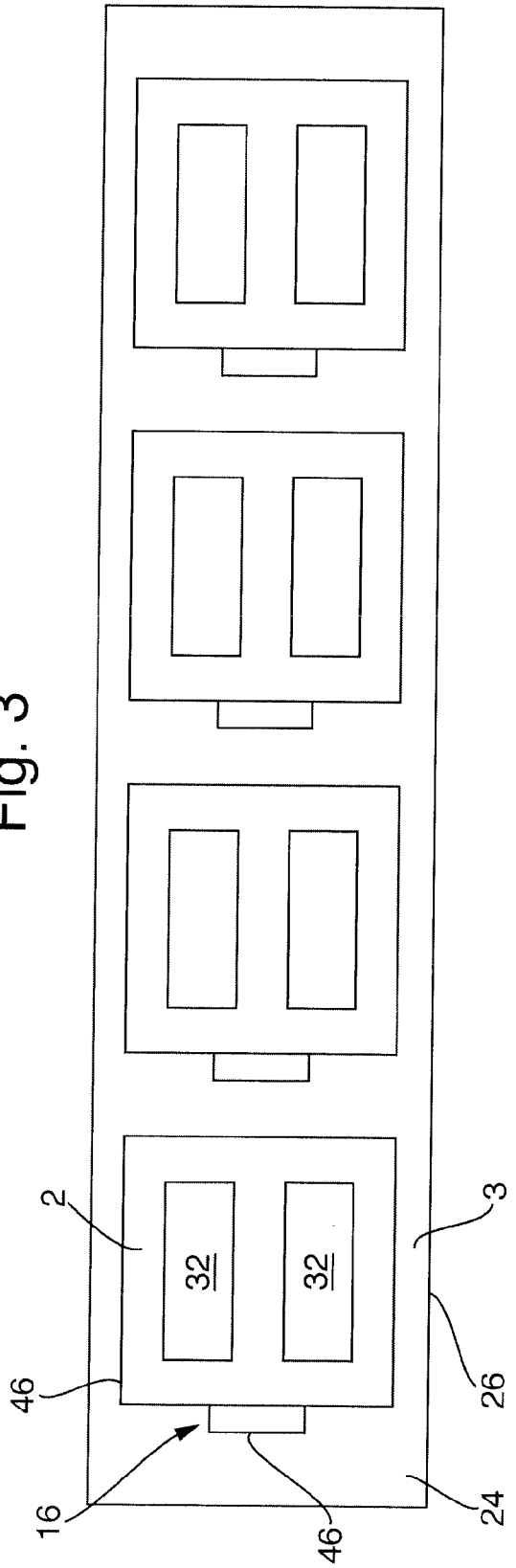

Fig. 4

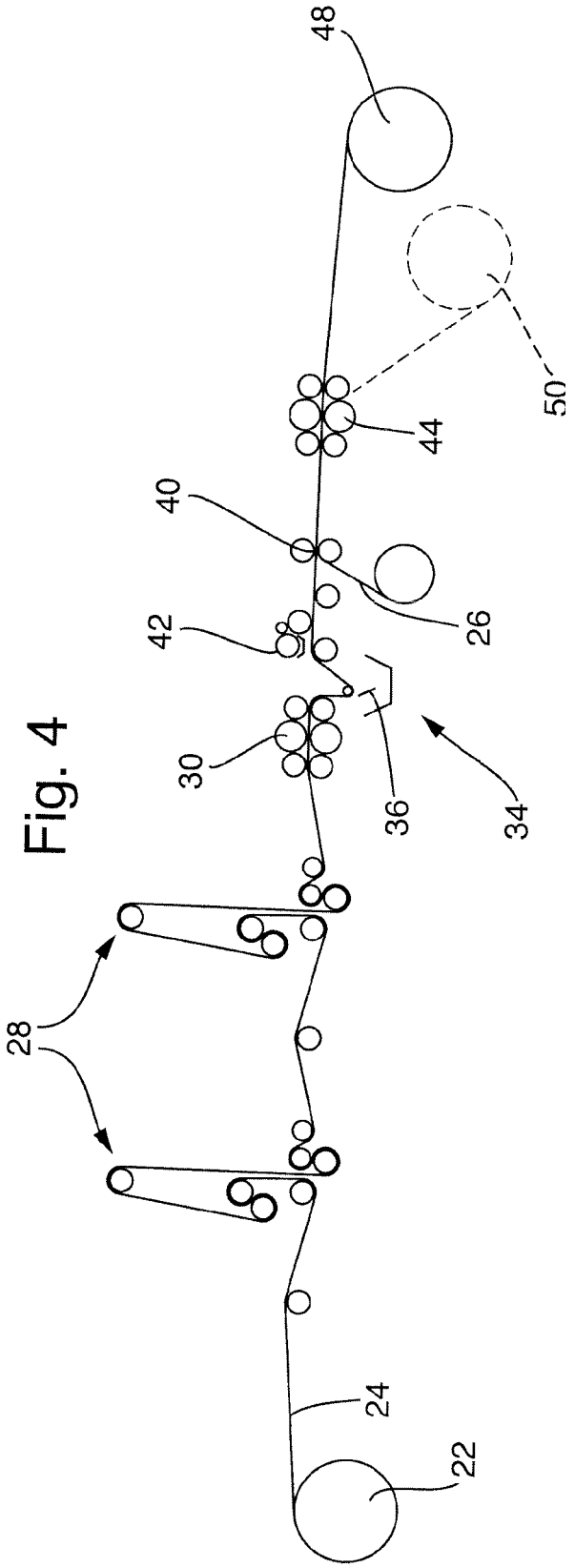

Fig. 5

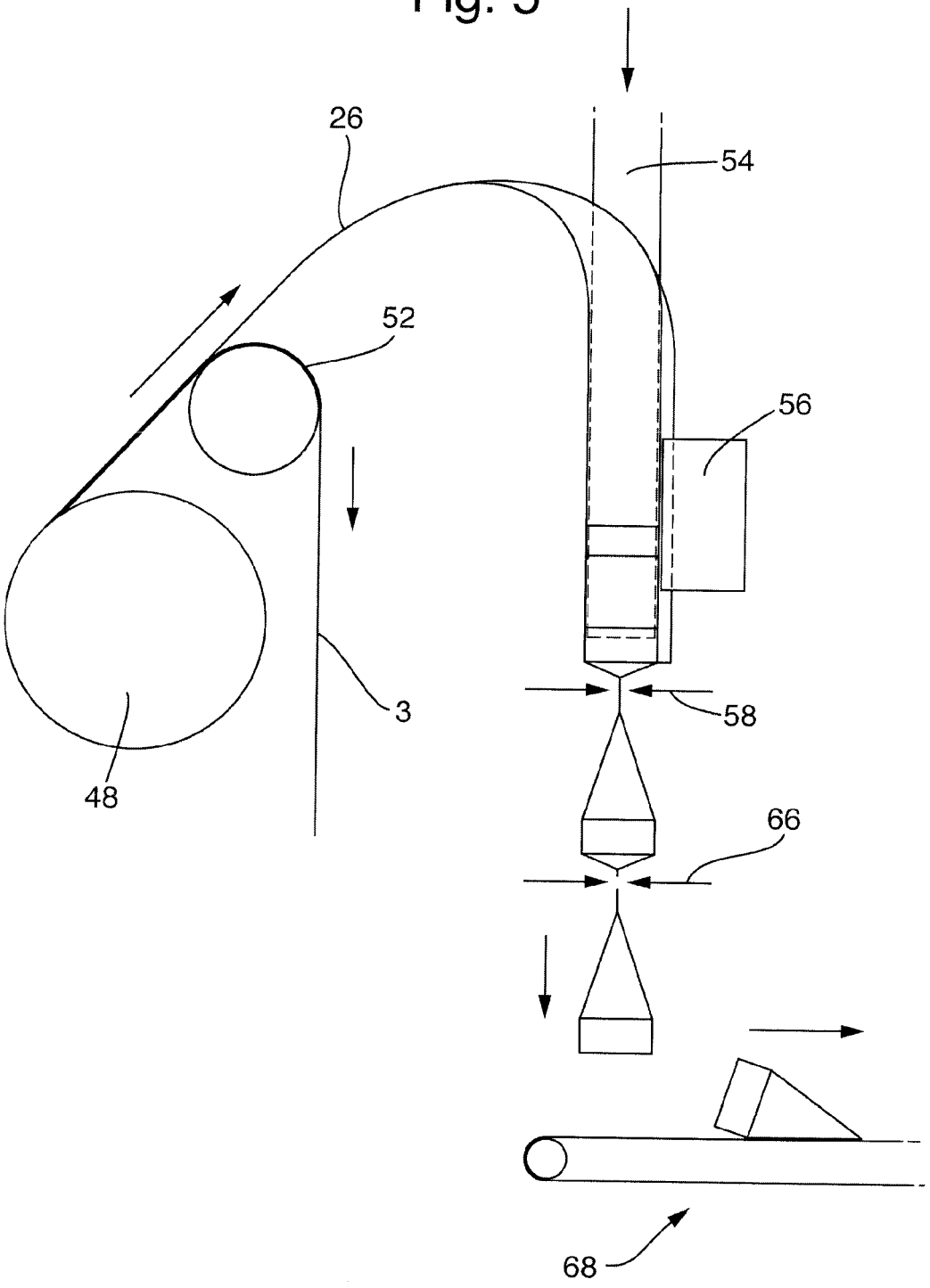

Fig. 6A

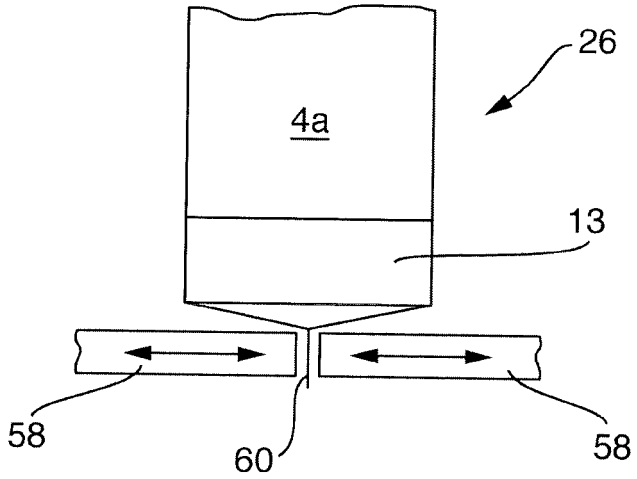

Fig. 6B

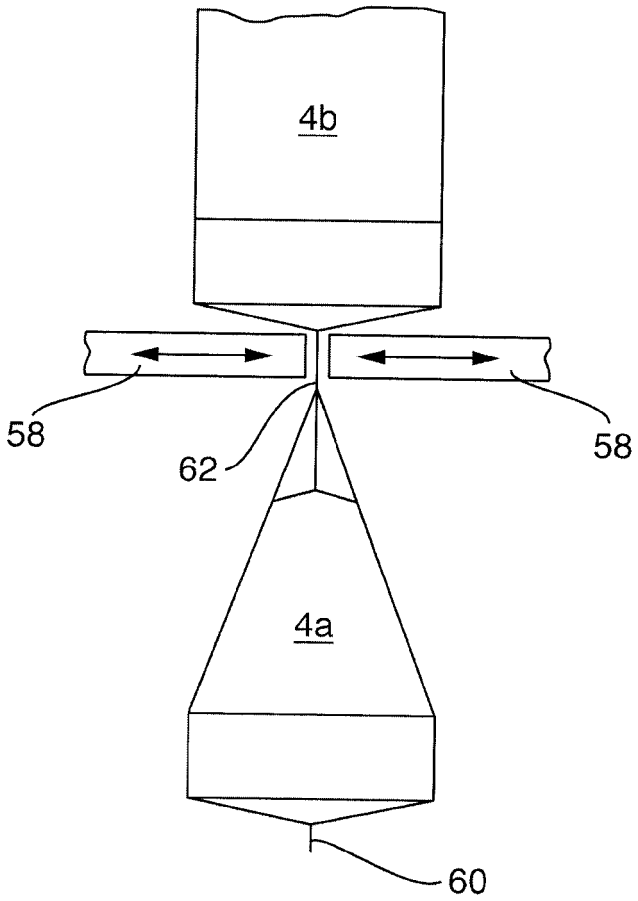

Fig. 7

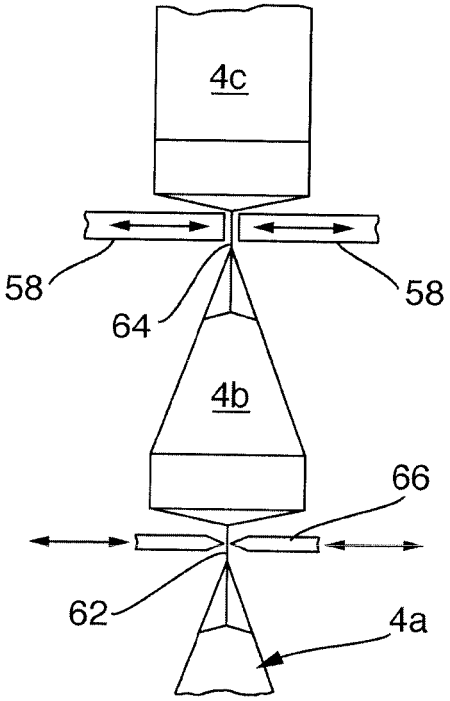

Fig. 8

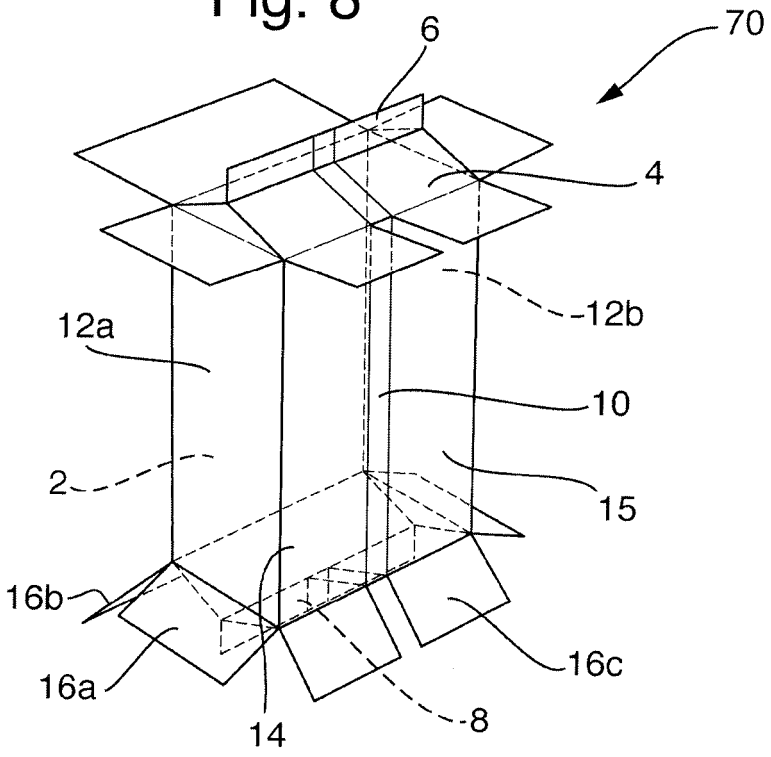

Fig. 9A

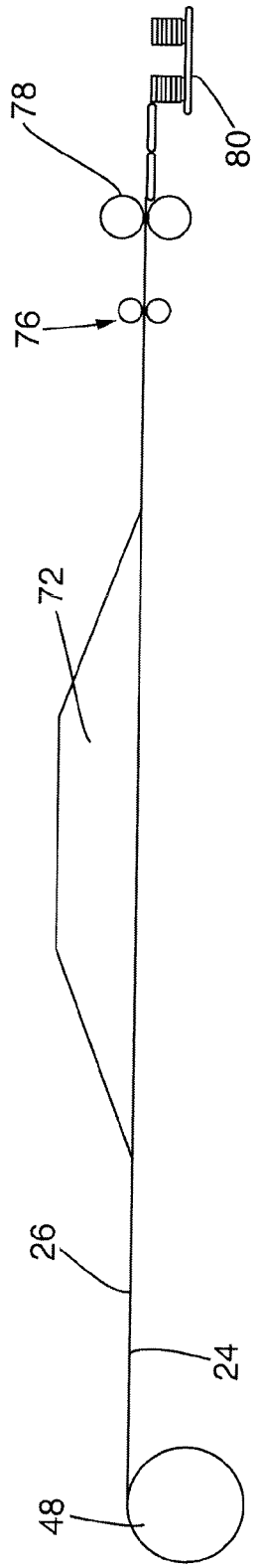

Fig. 9B