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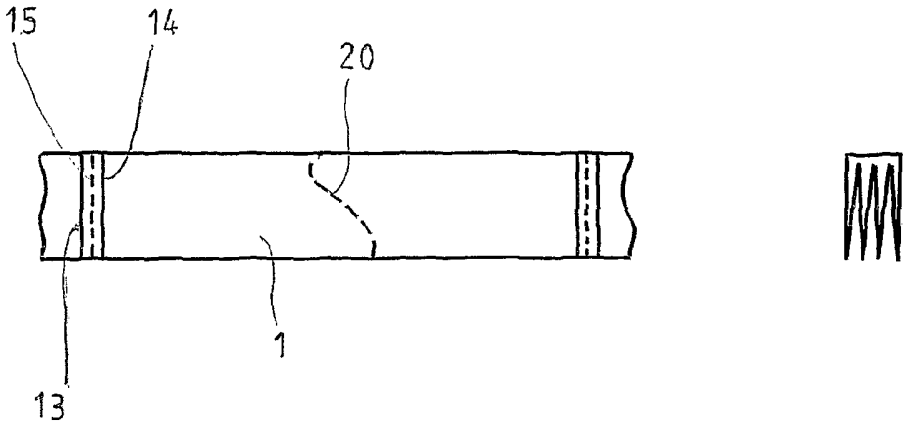
(54) Title: PLASTIC GARBAGE BAG, METHOD OF MANUFACTURING A PLASTIC GARBAGE BAG, APPARATUS FOR MANUFACTURING A PLASTIC GARBAGE BAG



(57) Abstract: A plurality (1) of plastic film bags, preferably bags for use as garbage bags, comprising, in flat condition a transverse weld 13 or 14 extending from a first lateral edge to a second opposed lateral edge to form a substantially straight bottom edge of the bag, an opening at the end opposed the closed bottom edge defined by an opening edge that in the open condition of the bag defines a curved shape 20 with alternating peaks and troughs, for instance a generally sinusoidal shape, and lateral gussets extending inwards from the first and second lateral edges, the plurality of bags constituting an integral strip of bags arranged such that a bottom edge of one bag abuts the bottom end of the next bag in the strip, the abutting bottom edges being separated by an intermediate line of perforations 15 extending from the first lateral edge to the second opposed lateral edge and substantially parallel to the bottom edges, and an opening of one bag abuts the opening of the next bag in the strip, the bags being folded along a longitudinal line of symmetry such that that the first lateral edge overlies the second lateral edge, the opening edge being defined by a series of perforations 20 extending through the strip and performed after the bags have been folded along said line of symmetry, the plastic film being made of a plastic material that is produced from recycled plastic material, for instance recycled polyethylene.

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PLASTIC GARBAGE BAG, METHOD OF MANUFACTURING A PLASTIC GARBAGE BAG, APPARATUS FOR MANUFACTURING A PLASTIC GARBAGE BAG

The present invention relates to a plurality of plastic film bags, preferably bags for use as garbage bags, comprising, in flat condition a transverse weld extending from a first lateral edge to a second opposed lateral edge to form a substantially straight bottom edge of the bag, an opening at the end opposed said closed bottom edge defined by an opening edge that in the open condition of the bag defines a curved shape with alternating peaks and troughs, for instance a generally sinusoidal shape, and lateral gussets extending inwards from said first and second lateral edges, said plurality of bags constituting an integral strip of bags arranged such that a bottom edge of one bag abuts the bottom end of the next bag in the strip, said abutting bottom edges being separated by an intermediate line of perforations extending from said first lateral edge to said second opposed lateral edge and substantially parallel to said bottom edges, and an opening of one bag abuts the opening of the next bag in said strip, the bags being folded along a longitudinal line of symmetry such that that said first lateral edge overlies said second lateral edge, said opening edge being defined by a series of perforations extending through said strip and performed after said bags have been folded along said line of symmetry, and said plastic film being made of a plastic material that is produced from recycled plastic material, for instance recycled polyethylene.

According to the invention, said plastic film has a thickness of more than 20 microns, preferably more than 25 microns, more preferably more than 30 microns, even more preferably more than 32 microns.

The advantage of the bags according to the invention is that recycled plastic material, for instance so-called regranulate, is used for this type of bags. The use of recycled plastic has environmental advantages as well as economical advantages.

Known gusseted bags for garbage are made of new or virgin plastic material with the thickness of the film being less than 20 microns.

In another aspect, the invention relates to a method of manufacturing a plurality of plastic film bags as specified above, and comprising the steps of providing a continuous tube of plastic film, said plastic film being made of a plastic material that is produced from recycled plastic material, for instance recycled polyethylene, providing a flattening and gusseting device, feeding said tube to said flattening and gusseting device in the direction of the tube axis, flattening said tube by pressing the sides thereof against each other in the direction of a first diameter of said tube substantially perpendicular to said tube axis, forming said lateral gussets, preferably during said flattening step, by applying a first and a second pressing means of said device to said tube for pressing generally opposed regions of film material inwards in the direction of a second diameter substantially perpendicular to said first diameter, providing said transverse welds defining said closed bottom edges of said bags, folding said bags along said longitudinal line of symmetry to provide said strip, and subsequently providing said series of perforations for defining said opening edge, the perforations being made such that they extend completely through all film layers of said strip.

According to the invention, the method preferably comprises the steps of providing a serrated cutting edge for carrying out said perforations and a counterfoil surface, adjustable mechanical means being provided for ensuring that said cutting edge can be brought into firm contact with said counterfoil surface whatever the degree of wear of said cutting edge is, transporting said strip into a position between said cutting edge and said counterfoil surface, and bringing said cutting edge into firm contact with said counterfoil surface for providing said perforations.

In a yet further aspect, the present invention relates to an apparatus for producing a plurality of plastic film bags as specified above and according to the method specified above, the apparatus comprising a serrated cutting edge

for carrying out said perforations, a counterfoil surface, and adjustable mechanical means for ensuring that said cutting edge can be brought into firm contact with said counterfoil surface whatever the degree of wear of said cutting edge is.

Preferably said apparatus further comprises a first and a second roller arranged mutually spaced and arranged for rotation on respective shafts that are arranged mutually parallel, said cutting edge being arranged on the surface of said first roller, and said counterfoil surface being arranged on the surface of said second roller, the shafts of said rollers being arranged for relative movement towards each other by means of mechanical means that are adapted for being fixed in different positions depending on the wear on said cutting edge such that said cutting edge may be brought into firm contact with said counterfoil during rotation of said shafts no matter how much has been worn off said cutting edge by said contact during rotation of said rollers.

In a yet further aspect, the present invention relates to the use of a plastic material that is produced from recycled plastic material, for instance recycled polyethylene for producing a plurality of plastic film bags as specified above

The invention furthermore relates to the use of a plastic film of a plastic material that is produced from recycled plastic material, for instance recycled polyethylene and that has a thickness of more than 20 microns, preferably more than 25 microns, more preferably more than 30 microns, even more preferably more than 32 microns for producing a plurality of plastic film bags as specified above.

In a final aspect, the present invention relates to a plastic film bag, preferably a bag for use as a garbage bag, comprising, in flat condition:

- a transverse weld extending from a first lateral edge to a second opposed lateral edge to form a substantially straight bottom edge of the bag,
- an opening at the end opposed said closed bottom edge defined by an opening edge that in the open condition of the bag defines a curved shape

with alternating peaks and troughs, for instance a generally sinusoidal shape, and

- lateral gussets extending inwards from said first and second lateral edges,
- said plastic film being made of a plastic material that is produced from recycled plastic material, for instance recycled polyethylene.

In the following, the invention will be explained more in detail with reference to the currently preferred embodiment of the invention shown, solely by way of example, in the drawings, where

Fig. 1 is a diagrammatic view illustrating the method according to the invention of producing a plurality of bags according to the invention,

Figs. 2-6 are diagrammatic views illustrating different phases of the method according to the invention,

Fig. 7 is a schematic, perspective, partly broken-away view of a flattening and gusseting device suitable for carrying out the method according to the invention,

Fig. 8 is a schematic, perspective view of a roller for carrying a cutting edge according to the invention.

Fig. 9 is a schematic, elevational, broken-away view of a serrated cutting blade for being attached to the roller of Fig. 8 for providing said cutting edge, and

Fig. 10 is a schematic, elevational end view of two rollers according to the invention for providing the perforations defining the open ends of the bags of the plurality of bags according to the invention.

Referring now to Fig. 1, a method for manufacturing a plurality of plastic film gusset bags is illustrated. This method comprises extruding a tube 1 of recycled plastic film from an extruder at 2 and moving the tube upwards in the

direction of the tube axis 3 to a flattening and gusseting device (see Fig. 7) where the tube 1 is flattened at 4 in the direction of the axis 3 while at the same time being pressed inwardly in the direction of the axis 3 by means of wedge shaped gusseting boards 5 and 6.

Hereby the gusseted cross section of the flattened tube 1, also shown in Fig. 3, is formed with front panel 7, rear panel 8, and lateral gussets 9 and 10.

At a welding and perforating station symbolised by a dotted box 12, transverse welding seams 13 and 14 (see Fig. 4) as well as a transverse series of perforations 15 are carried out with a spacing corresponding to twice the length of each bag of the plurality of bags in the form of a strip 1 of bags.

At a folding station symbolised by a dotted box 16, the strip is folded along the longitudinal axis thereof to form the folded strip 1 shown in Fig. 5 where 8 layers of film are superimposed.

Thereafter, the strip 1 passes through a gap between a cutting roller17 having a cutting edge knife 18 mounted on the surface thereof and a counterfoil or anvil roller 19.

Here, a line of perforations 20 (Fig. 6) is made through all 8 layers of film such that all layers are perforated. by the cutting edge knife 18 contacting the surface of the counterfoil roller 19 with sufficient force to penetrate all the way through all 8 layers of film.

Thereafter, the strip 1 is rolled on to a storage roller for subsequent subdivision into strips of 10-20 bags that either are dispensed in harmonica like folded packets or, preferably, as rolls.

In use, the single bags are separated from one another by ripping along the perforated lines 15 and 20.

Referring now to Fig. 7, a flattening and gusseting device for carrying out part of the method according to the invention comprises a double converging array of flattening rollers 21 for flattening the extruded plastic film tube 1 as explained above, one of the flattening rollers being cut away in the Figure so as to show the pressing edge 22 of a gusseting board 23. The gusseting boards 23 and 24 are arranged displaceable (mutually offsetable) in the directions R4, R5, respectively, which is illustrated symbolically by the suspension of the gusseting boards on axles 25 having adjustment screws 26 for displacing the top and bottom of the boards to and fro in the direction of the axles 25 (in the direction of a radius of the circular cross section of the tube) for varying the inward extent of the gussets, i.e. the width of the panels thereof.

Referring now to Figs. 8-9, the elements used in perforating the opening defining line of perforations 20 in Fig. 6 are illustrated. The cutting edge knife 18 having a serrated cutting edge 30 is mounted on a curved plate 31 with the bottom edge 18a of the knife attached to the plate 31 along the curved line 31a.

The plate 31 is releasably attached to the surface of the roller 17 by means of screws 32 such that the cutting knife may be replaced easily either because of wear or because another shape of line 31a and thereby shape of the perforation line 20 is desired.

The roller 17 has a shaft 33 arranged for rotation in bushings 34 and the roller 17 is connected to a not shown motor for being rotated in the direction of arrow R1.

The roller 19 has a shaft 35 arranged for rotation in not shown bushings and the roller 19 is connected to a not shown motor for being rotated in the direction of arrow R2.

The bushings 34 are mounted in a bracket 36 that is mounted displaceable to and fro in the direction of the arrows R6 by means of not shown screws symbolised by the arrows 37 and 38 indicating the force exerted by the screws

when the cutting edge 30 of the knife 18 forcefully contacts the surface of the counterfoil roller 19 during rotation of the rollers 17 and 19 with the strip 1 of 8 layers of film being transported between said rollers in the direction of the arrow R3 by not shown transport means.

During production, the perforations 20 are inspected regularly to observe whether all the 8 films are perforated. If this is not the case because of wear of the cutting edge 30, the screws pushing the bracket 36 and roller 17 towards the roller 19 are tightened so as to again obtain a sufficiently forceful contact between the cutting edge 30 and the surface of the roller 19.

The mechanical means to ensure sufficient pressure of the roller 17 against the roller 19 may be modified and varied in many ways. For instance, the bushings 34 may be mounted on one arm of a two-armed lever, where a screw is arranged for exerting pressure on the other arm of the lever.

The shape of the perforation line 20 is shown as being sinusoidal so that a sinusoidal edge of the bag opening with four peaks and four troughs will result when tearing along the perforation line 20. However, the shape of the line 20 can be varied so that the peaks and troughs become more rectangular or more triangular.

The circumference of the roller 17 can be equal to the linear distance between adjacent perforation lines 20, in which case the rollers 17 and 19 will rotate continuously. Alternatively, the circumference of the roller 17 may be smaller in which case the roller 17 rotates intermittently.

Claims

1. A plurality of plastic film bags, preferably bags for use as garbage bags, comprising, in flat condition:
- a transverse weld extending from a first lateral edge to a second opposed lateral edge to form a substantially straight bottom edge of the bag,
- an opening at the end opposed said closed bottom edge defined by an opening edge that in the open condition of the bag defines a curved shape with alternating peaks and troughs, for instance a generally sinusoidal shape, and
- lateral gussets extending inwards from said first and second lateral edges

- said plurality of bags constituting an integral strip of bags arranged such that a bottom edge of one bag abuts the bottom end of the next bag in the strip, said abutting bottom edges being separated by an intermediate line of perforations extending from said first lateral edge to said second opposed lateral edge and substantially parallel to said bottom edges, and an opening of one bag abuts the opening of the next bag in said strip, the bags being folded along a longitudinal line of symmetry such that that said first lateral edge overlies said second lateral edge, said opening edge being defined by a series of perforations extending through said strip and performed after said bags have been folded along said line of symmetry,
- said plastic film being made of a plastic material that is produced from recycled plastic material, for instance recycled polyethylene.

2. A plurality of bags according to claim 1, wherein said plastic film has a thickness of more than 20 microns, preferably more than 25 microns, more preferably more than 30 microns, even more preferably more than 32 microns.

3. A method of manufacturing a plurality of plastic film bags according to claim 1 or 2 and comprising the following steps:
- providing a continuous tube of plastic film, said plastic film being made of a

plastic material that is produced from recycled plastic material, for instance recycled polyethylene.

- providing a flattening and gusseting device,
- feeding said tube to said flattening and gusseting device in the direction of the tube axis,
- flattening said tube by pressing the sides thereof against each other in the direction of a first diameter of said tube substantially perpendicular to said tube axis,
- forming said lateral gussets, preferably during said flattening step, by applying a first and a second pressing means of said device to said tube for pressing generally opposed regions of film material inwards in the direction of a second diameter substantially perpendicular to said first diameter,
- providing said transverse welds defining said closed bottom edges of said bags,
- folding said bags along said longitudinal line of symmetry to provide said strip, and
- subsequently providing said series of perforations for defining said opening edge, the perforations being made such that they extend completely through all film layers of said strip.

4. A method according to claim 3, comprising the steps of:

- providing a serrated cutting edge for carrying out said perforations and a
- counterfoil surface, adjustable mechanical means being provided for ensuring that said cutting edge can be brought into firm contact with said counterfoil surface whatever the degree of wear of said cutting edge is,
- transporting said strip into a position between said cutting edge and said counterfoil surface, and
- Bringing said cutting edge into firm contact with said counterfoil surface for providing said perforations.

5. A plurality of plastic film bags produced by a method according to any of the claims 3-4.

6. A plastic film bag produced by a method according to any of the claims 3-4.

7. An apparatus for producing a plurality of plastic film bags according to claim 1, 2 or 5 and according to the method of claim 3 or 4, the apparatus comprising:

- a serrated cutting edge for carrying out said perforations,
- a counterfoil surface, and
- adjustable mechanical means for ensuring that said cutting edge can be brought into firm contact with said counterfoil surface whatever the degree of wear of said cutting edge is.

8. An apparatus according to claim 7 and further comprising a first and a second roller arranged mutually spaced and arranged for rotation on respective shafts that are arranged mutually parallel, said cutting edge being arranged on the surface of said first roller, and said counterfoil surface being arranged on the surface of said second roller, the shafts of said rollers being arranged for relative movement towards each other by means of mechanical means that are adapted for being fixed in different positions depending on the wear on said cutting edge such that said cutting edge may be brought into firm contact with said counterfoil during rotation of said shafts no matter how much has been worn off said cutting edge by said contact during rotation of said rollers.

9. The use of a plastic material that is produced from recycled plastic material, for instance recycled polyethylene for producing a plurality of plastic film bags according to any of the claims 1-2 or 5.

10. The use of a plastic film of a plastic material that is produced from recycled plastic material, for instance recycled polyethylene and that has a thickness of more than 20 microns, preferably more than 25 microns, more preferably more than 30 microns, even more preferably more than 32 microns for producing a plurality of plastic film bags according to any of the claims 1-2 or 5.

11. A plastic film bag, preferably a bag for use as a garbage bag, comprising, in flat condition:

- a transverse weld extending from a first lateral edge to a second opposed lateral edge to form a substantially straight bottom edge of the bag,
- an opening at the end opposed said closed bottom edge defined by an opening edge that in the open condition of the bag defines a curved shape with alternating peaks and troughs, for instance a generally sinusoidal shape, and
- lateral gussets extending inwards from said first and second lateral edges,
- said plastic film being made of a plastic material that is produced from recycled plastic material, for instance recycled polyethylene.

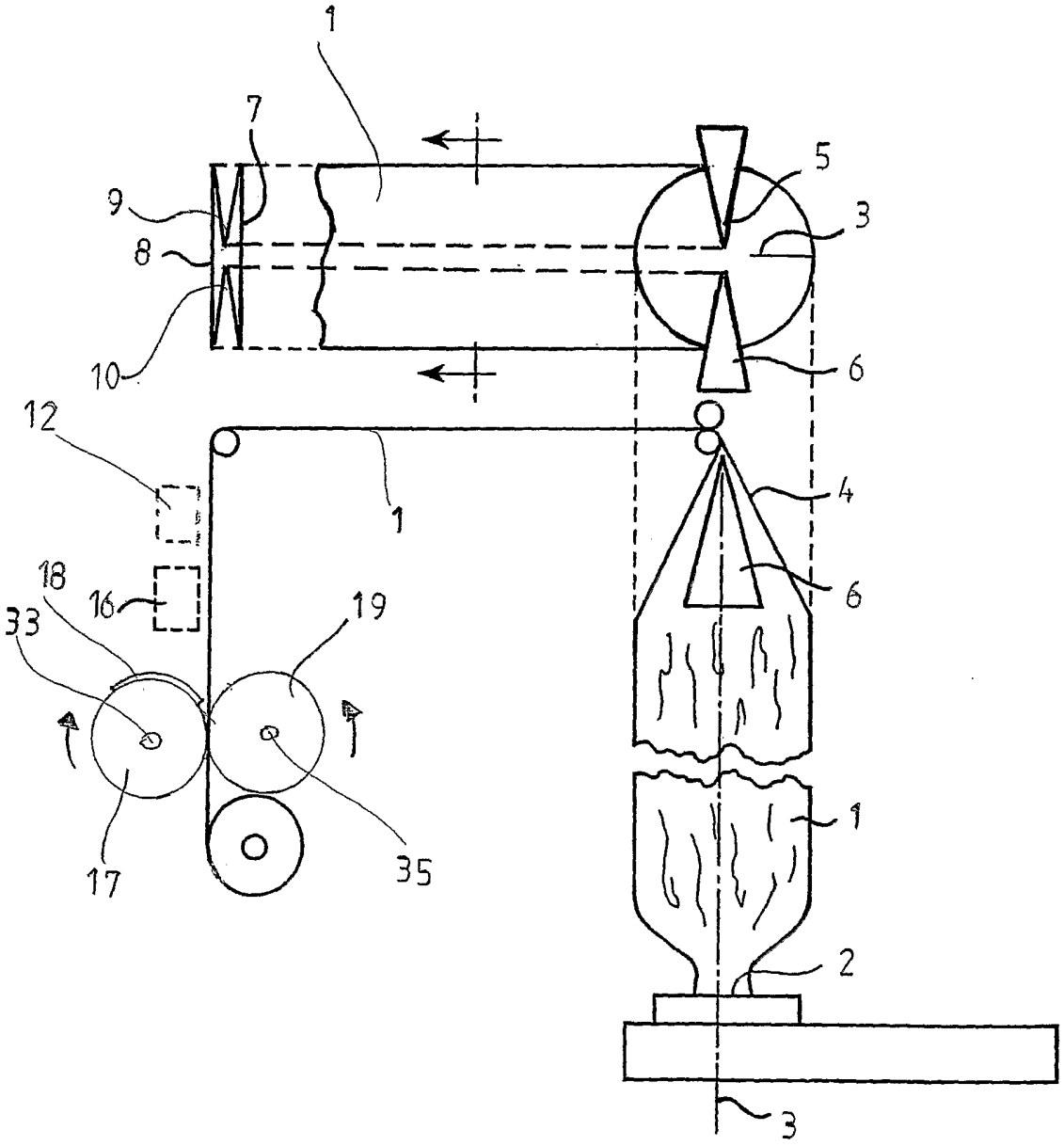


Fig. 1

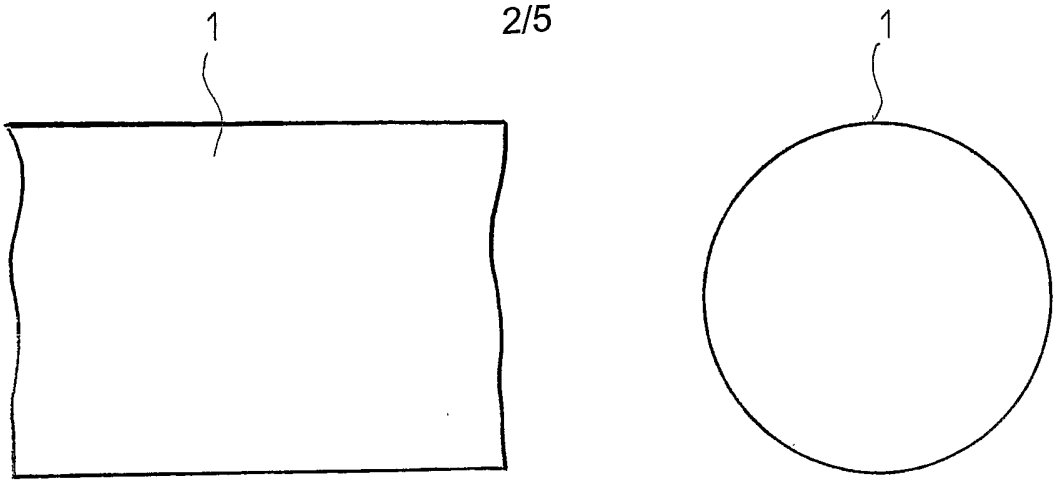


Fig. 2

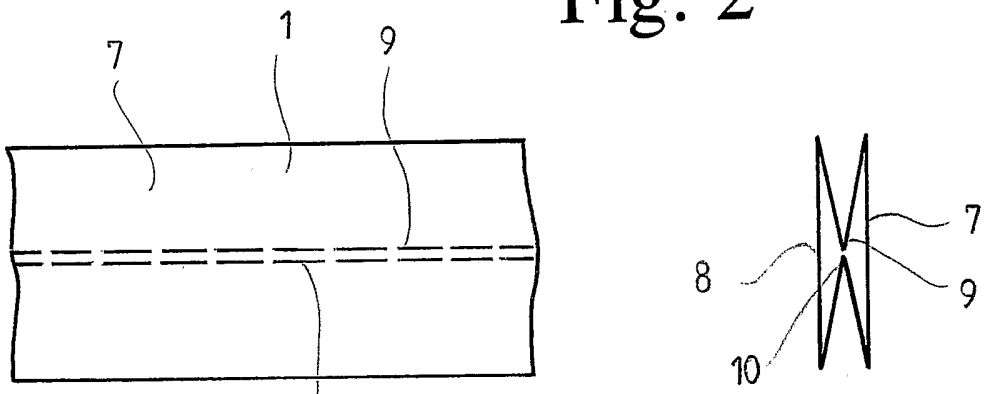


Fig. 3

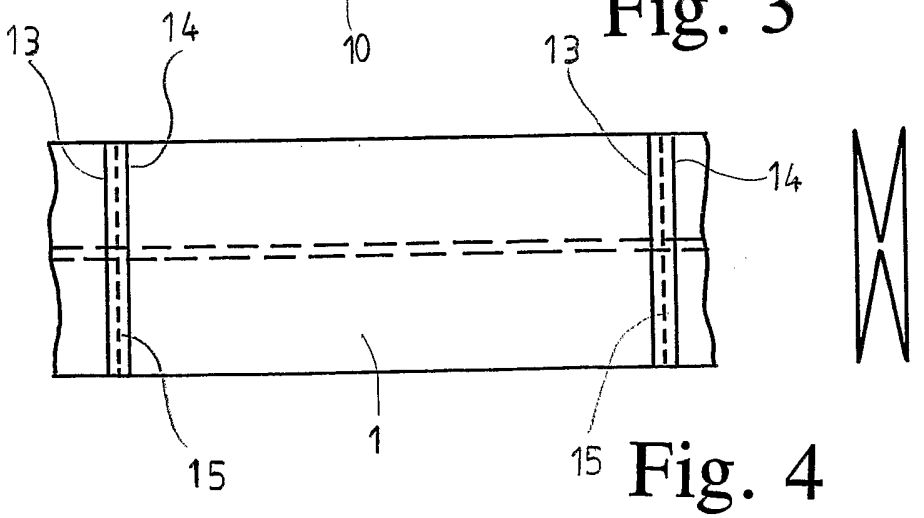


Fig. 4

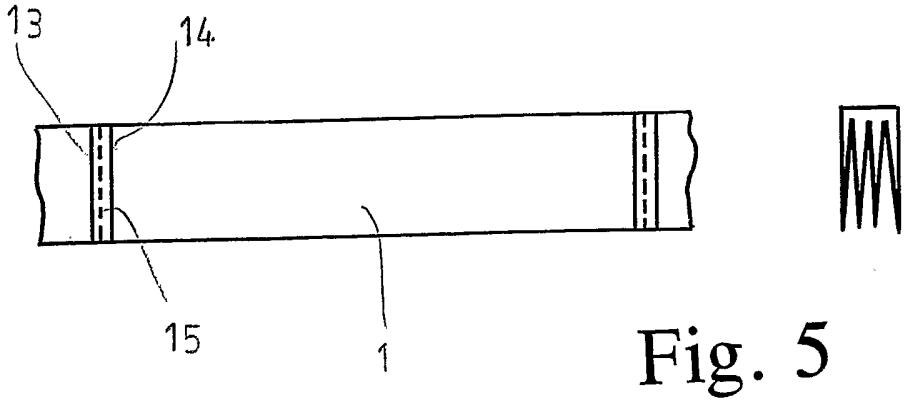
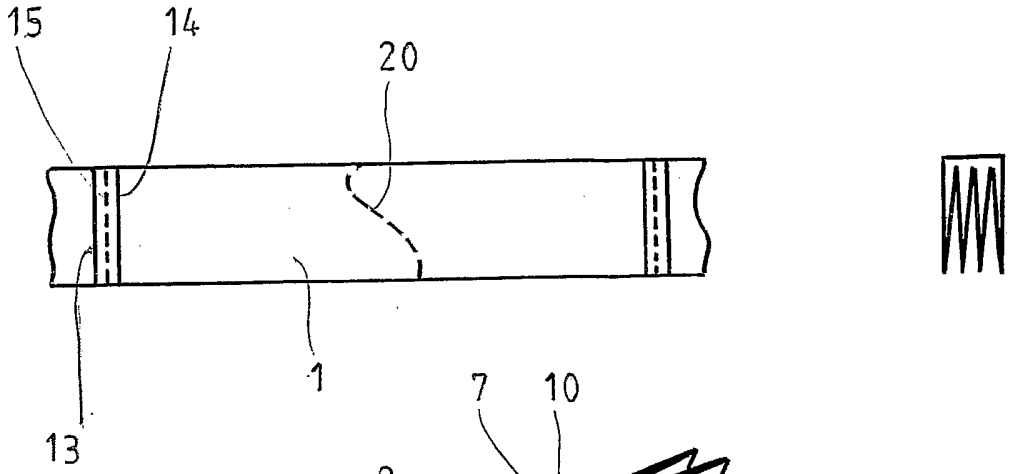


Fig. 5

Fig. 6



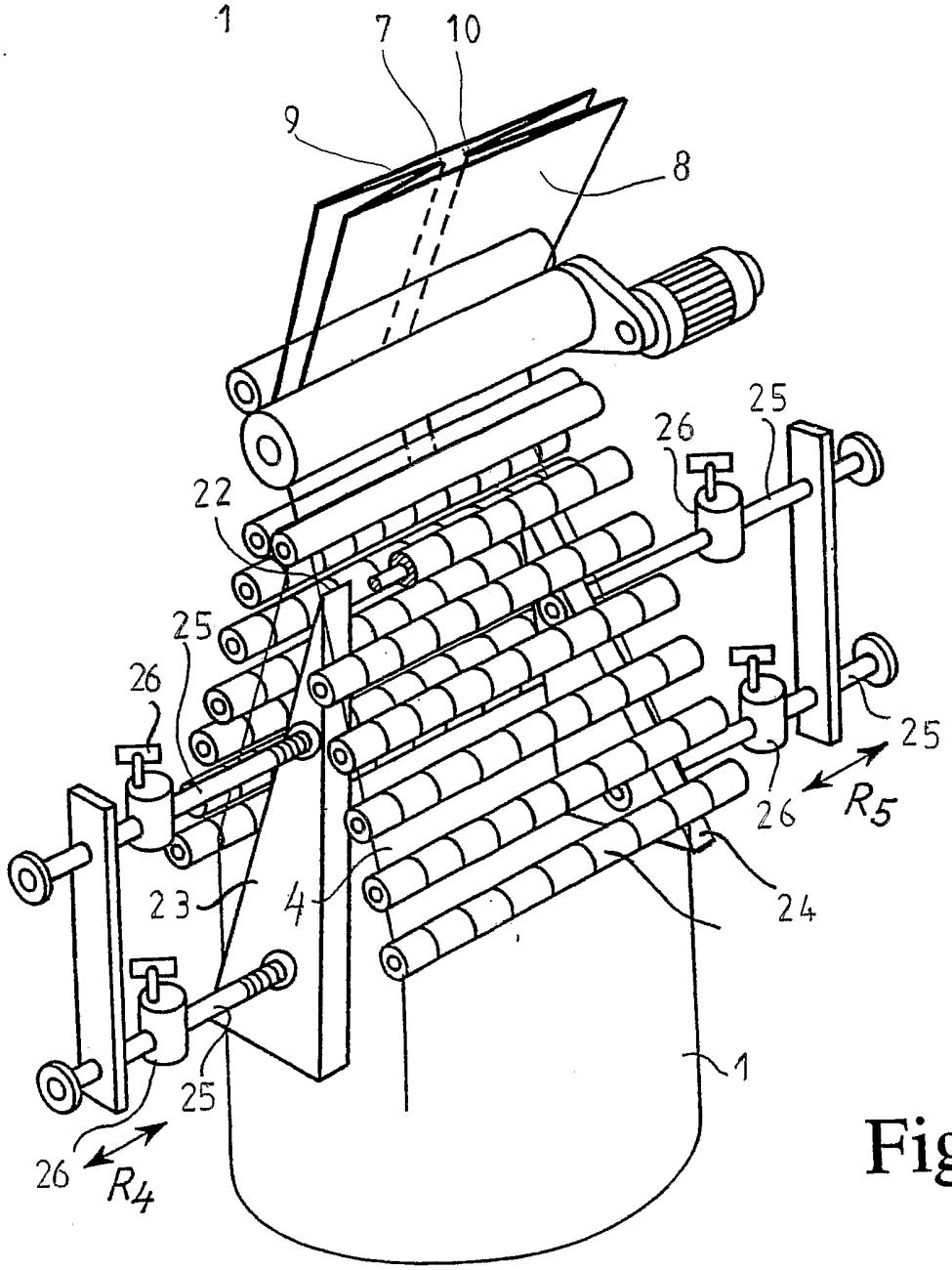


Fig. 7

Fig. 8

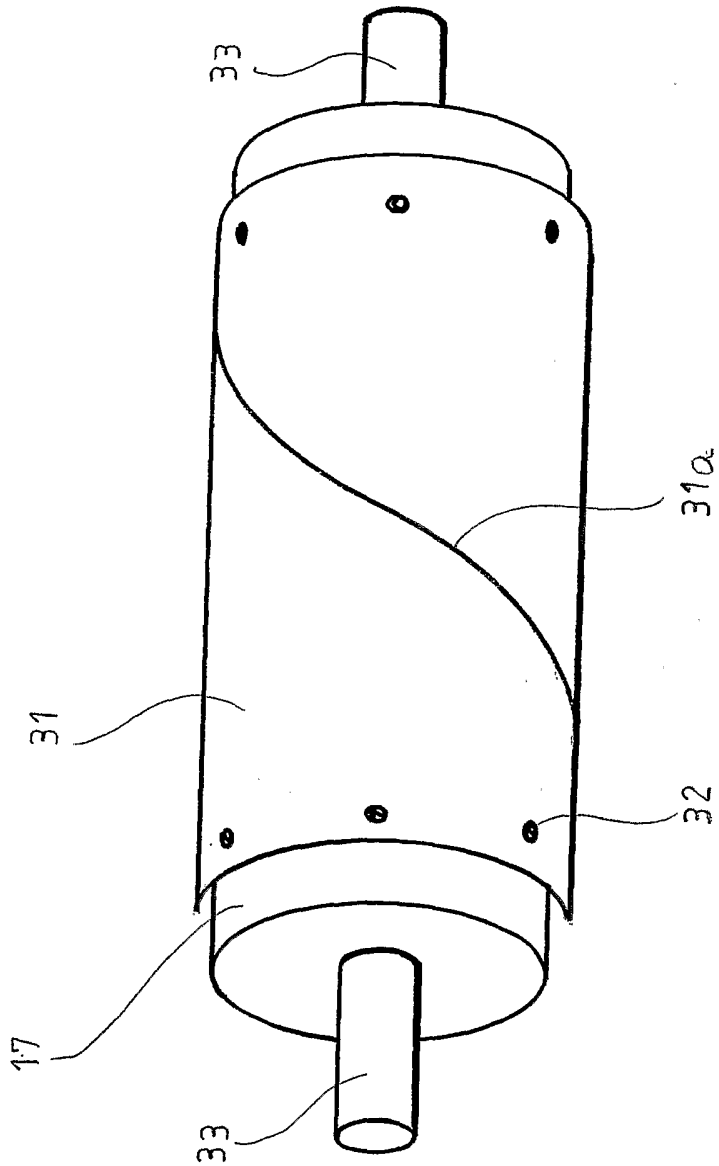
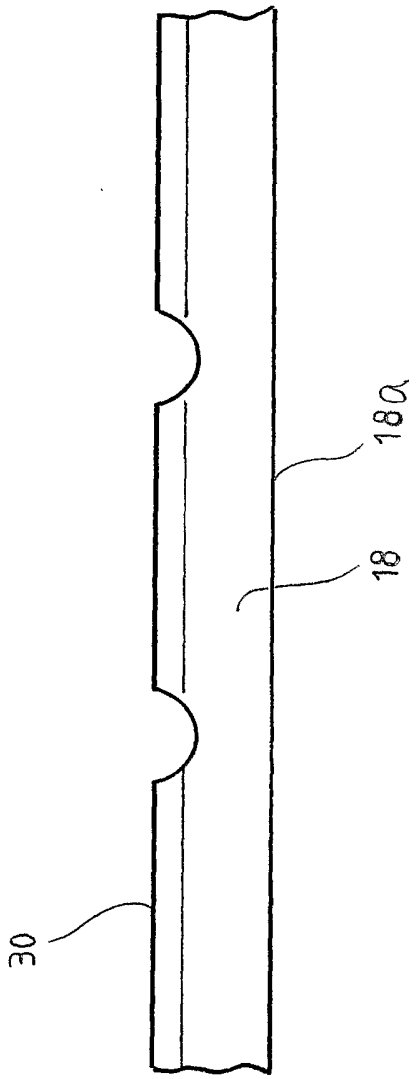


Fig. 9



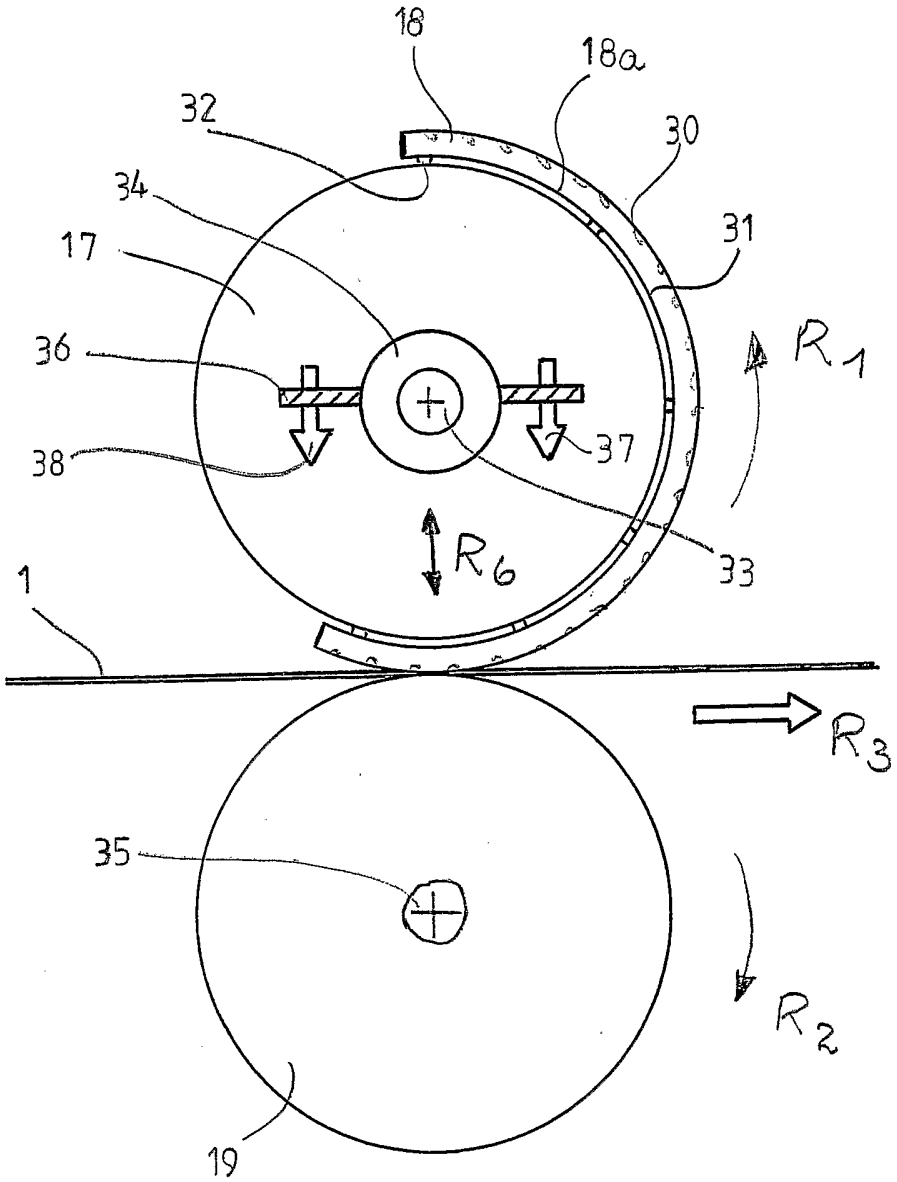


Fig. 10

INTERNATIONAL SEARCH REPORT

ational Application No
/IB2004/002600

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B31B23/00 B31B19/36 B31B19/94 B65D33/00 B26D7/26
B65F1/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B31B B65D B65F B26D B26F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	US 5 246 119 A (HEFFNER KEITH A) 21 September 1993 (1993-09-21) column 4, line 9 - line 12; figures 3,15-18	1-3,5,6, 9-11
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A	US 2 735 488 A (HAROLD S. ANDERSON ET AL) 21 February 1956 (1956-02-21) the whole document	4,7,8

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
2 December 2004	15/12/2004

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Damiani, A

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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