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(54) **Method and machine for forming gripping openings in bags, and bag having two gripping openings**

(57) Machine comprising at least one station (F) for forming the bag (1) from a tubular element (101), at least one station (R) for filling the bag with the material (2) supplied from a supplying apparatus (200) and at least one station (S) for sealing the mouth (1a) of the bag, a

first and second die-cutting apparatus (500) being envisaged for forming at least one first opening (6b) in the zone of the bottom (1b) and at least one second opening (6a) in the zone of the mouth (1a) of the bag (1). The invention further relates to the method for forming said openings, and to a bag having two gripping openings.

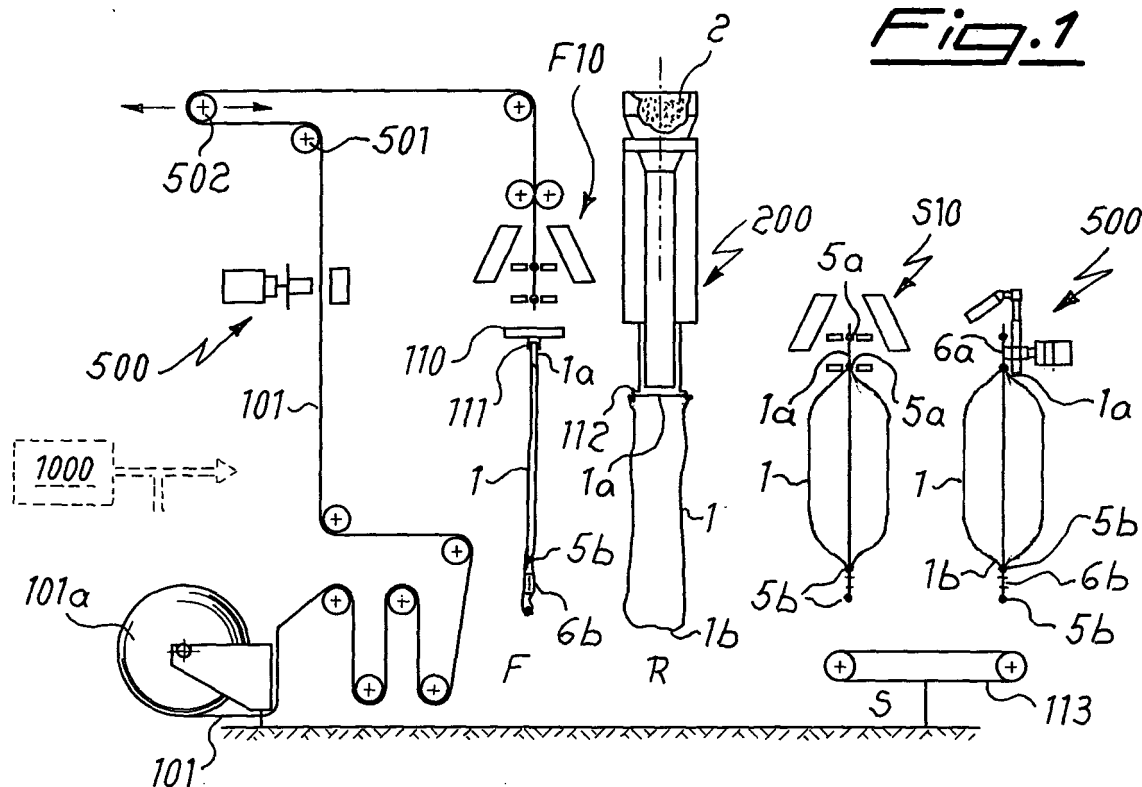


Fig. 1

Description

[0001] The present invention relates to a method and a machine for forming gripping elements in bags filled with bulk material.

[0002] It is known in the goods sector relating to the packaging of bulk material that there exists the need to arrange the same inside bags which must be filled with a given and certain quantity of material and then sealed.

[0003] It is also known that automatic bag filling machines have been provided for this purpose, an example of said machines consisting of so-called forming/filling/sealing (FFS) machines which are able to perform, at high speed, the cycle involving forming of the bag, filling of the bag and final sealing of the mouth of the latter.

[0004] The resultant final product is a filled and sealed bag which must be able to be handled with great ease during the various subsequent transportation, storage and distribution operations.

[0005] For this purpose, it is also known to form holes/eyelets along one side of the bag, normally along the side corresponding to the sealed mouth thereof, such that they form the handle allowing gripping of the bag by users.

[0006] Although fulfilling their function these bags nevertheless have drawbacks arising from the fact that the formation of said holes/eyelets involves considerable technical difficulties during execution, in particular in connection with said automatic forming/filling machines, which are normally used in the sector; in addition to this, there is also the need to reinforce the side on which said hole/eyelet which during gripping of the bag must support the entire weight of the bag is formed.

[0007] The technical problem which is posed, therefore, is that of providing a bag which has gripping means able to allow easy and safe manoeuvring during the various handling steps.

[0008] Within the context of this problem a further requirement is that the formation of said gripping means should not involve the need to increase the strength and therefore the thickness of the material of the entire bag, but if necessary only in the zone where the said gripping means are formed, and may be performed at high speed using an automatic machine without reducing substantially the production speed.

[0009] These technical problems are solved by means of a method according to the characteristic features of Claim 1, a machine according to the characteristic features of Claim 13 and a bag according to Claim 32.

[0010] Further details may be determined from the following description of a non-limiting embodiment of the subject of the present invention provided with reference to the accompanying drawings, in which:

Figure 1 shows a schematic side view of a filling machine with a die-cutting apparatus according to the present invention;

Figure 2 shows a front view of a bag according to

the present invention;

Figure 3 shows an example of embodiment of a machine according to the present invention; and

Figure 4 shows front views of the bag in the various stations of the machine according to Fig. 3.

[0011] As schematically shown in Figure 1 and with reference to two reference axes, conventionally and only for the sake of convenience of the description identified as the longitudinal axis X-X and transverse axis Y-Y, a non-limiting illustrative example of a machine for filling bags 1 with bulk material 2 may be of the forming/filling type which comprises substantially at least three working stations, respectively:

- a station F for forming the bag 1 from a tubular element 101 unwound from a reel 101a; in this station sealing of the bottom 1b of the bag and cutting to size of the tubular element resulting in formation of the mouth 1a of the bag 1 is performed;
- a station R for filling the bag with the material supplied from the filling apparatus (200);
- a station S for sealing the mouth 1a of the bag.

[0012] Transportation of the bag from one station to the other is performed by means of a slide 110 provided with gripping means 111, while conveying of the bag outside of the machine is obtained by means of a motor-driven belt or roller 113.

[0013] Fixed pairs of grippers 122 which have suitable dimensions in order to support the weight of the bag under full load are also arranged in the filling station.

[0014] In a preferred embodiment of the FFS/filling machine, which is conventional per se and therefore neither illustrated nor described in detail, the said bag transportation means consist of a slide 110 which is displaced with an alternating outward and return movement and provided with pairs of opposite grippers for gripping the bag along the opposite vertical edges thereof, said slide being able to impart to the grippers movements in a direction transverse with respect to that of feeding of the bag so as to cause opening of its mouth during its travel from the forming station F to the filling station R and closing thereof during its travel from the station R to the sealing station S.

[0015] According to the present invention it is envisaged that, upstream of the forming station E, an apparatus 500 for die-cutting the tubular element 101 is arranged, said apparatus being activated in accordance with a sequence controlled by the control means 1000 of the machine so as to form at least one opening 6b at constant intervals.

[0016] The interaxial distance of the openings 6b in the longitudinal direction is determined depending on the length of the bag 1 in the same direction.

[0017] As shown, the tubular element is supplied to the die-cutting apparatus 500 by means of at least two rollers 501 arranged on opposite sides with respect to

the said station and by a movable roller 502 for adjusting centring of the tubular element depending on the length of the bag envisaged so as to ensure the correct position of the tubular element 101 during die-cutting.

[0018] Once the said opening 6b has been formed, the tubular element 101 is conveyed to the abovementioned forming station F, where means F10 are provided for performing a weld 5b on the bottom 1b along two lines substantially parallel to the transverse direction Y-Y of the bag 1 and spaced from each other in the longitudinal direction X-X by an amount suitable for containing the opening 6b within two bag portions of suitable length for ensuring the necessary breakage resistance.

[0019] Once the formed bag 1 has been conveyed to the filling station R - which is conventional per se and therefore not described in detail - and filling performed, the bag 1 is conveyed to the sealing station where means S10 similar to those of the forming station F perform sealing of the mouth 1a of the bag by means of two welding lines 5a extending in a direction substantially parallel to the transverse direction Y-Y of the bag 1 and suitably spaced from each other in the longitudinal direction X-X.

[0020] Once the said double weld 5a has been performed, the bag 1 is conveyed to a second die-cutting station 500 where the formation of at least one hole/eyelet 6a along the side where the mouth 1a is situated and inside a strip of material situated between the two said welds 5a is performed so that the opening 6a is comprised within and integral with two bag portions of suitable length for ensuring the necessary breakage resistance.

[0021] As shown in Fig. 2, the resultant product consists of a bag 1 having gripping elements 6a, 6b along both the opposite transverse sides of the said bag which make gripping thereof easy and safe, both for a single user and for two users should the volume of the bag result in large dimensions and considerable weight.

[0022] According to the invention it is also envisaged providing a method for forming gripping means in bags, which comprises the following steps:

- a) supplying a tubular element 101a to a die-cutting apparatus;
- b) forming at least one opening 6b in a predefined area;
- c) supplying the tubular element 101 to a station for forming a bag 1;
- d) providing at least two welding lines 5b along the bottom zone 1b of the bag 1 and on opposite sides in the longitudinal direction X-X with respect to said opening 6b;
- e) transporting the bag 1 to the filling station R and filling the bag;
- f) feeding the bag S to a station S for closing said bag;
- g) providing at least two welding lines 5a, substantially parallel to the transverse direction Y-Y and at a suitable relative distance in the longitudinal direction X-X of the bag 1;
- h) forming at least one opening 6a in the zone com-

prised between the two welds 5a of the mouth 1a of the bag.

[0023] According to preferred embodiments of the method it is envisaged that the tubular element is supplied by means of unwinding thereof from a reel 101a; that the openings may be holes or eyelets extending in the transverse direction; that the openings along the side where the mouth 1a of the bag 1 is situated are formed separately from the step for forming the welds for closing the said bag.

[0024] It is also envisaged that the opening of the hole may be hot-formed following a step involving taking-in the edge of the said hole in order to provide a perimetral bead integral with the material of the bag and able to reinforce the gripping zone of the latter without the addition of materials.

[0025] Preferably this taking-in operation is performed by means of eccentric rotation of the hot die-cutting means around the edge of the hole.

[0026] In the event of the bag being of considerable weight, it is also envisaged being able to add reinforcing material in the die-cutting zone; according to preferred embodiments this material is in the form of an adhesive strip E1 applied (Fig. 3) by means of a machine of the labelling type arranged between the reel 101a and the apparatus 500 for performing first die-cutting of the bottom zone 1b of the bag 1.

[0027] As shown in Fig. 4, the label is applied (Fig. 4a) in a substantially symmetrical position (Fig. 4b) with respect to the line for cutting the bottom 1b of the bag so as to leave an adhesive strip along the first die-punched zone of the bottom (Fig. 4c) - formed before entry of the tubular element 101 into the filling machine - and an adhesive strip (Fig. 4d) along the second die-cutting zone of the mouth 1a of the bag 1, which will be performed when the bag 1 leaves the same machine.

Claims

1. Method for forming means (6a, 6b) for gripping bags

(1) to be filled with bulk products (2), **characterized in that** it comprises the following steps:

- a) supplying a tubular element 101a to a die-cutting apparatus;
- b) forming at least one opening 6b in a predefined area;
- c) supplying the tubular element 101 to a station for forming a bag 1;
- d) providing at least two welding lines 5b along the bottom zone 1b of the bag 1 and on opposite sides in the longitudinal direction X-X with respect to said opening 6b;
- e) transporting the bag 1 to the filling station R and filling the bag;

- f) feeding the bag S to a station S for closing said bag;
 g) providing at least two welding lines 5a, substantially parallel to the transverse direction Y-Y and at a suitable relative distance in the longitudinal direction X-X of the bag 1;
 h) forming at least one opening 6a in the zone comprised between the two welds 5a of the mouth 1a of the bag.
2. Method according to Claim 1, **characterized in that** the tubular element is supplied by means of unwinding thereof from a reel 101a.
 3. Method according to Claim 1, **characterized in that** the tubular element is centred in position during the step involving die-cutting thereof.
 4. Method according to Claim 1, **characterized in that** said at least one opening is a hole.
 5. Method according to Claim 1, **characterized in that** said at least one opening is an eyelet extending in the transverse direction.
 6. Method according to Claim 1, **characterized in that** the opening (6a) along the side where the mouth (1a) of the bag (1) is situated is formed during a step separate from that for performing welds (5a) for closing the said bag.
 7. Method according to Claim 1, **characterized in that** the die-cutting is performed in the hot state.
 8. Method according to Claim 7, **characterized in that** the die-cutting step comprises a step involving taking-in the edge of the opening.
 9. Method according to Claim 7, **characterized in that** said step of taking-in the edge of the opening is performed by means of eccentric rotation of the die-cutting apparatus around the centre of the opening.
 10. Method according to Claim 1, **characterized in that** it comprises an additional step involving application of a strip of material (E1) to the tubular element upstream of the first operation involving die-cutting of the bottom of the bag.
 11. Method according to Claim 10, **characterized in that** said strip of material is applied symmetrically with respect to the line for cutting the bottom during forming of the bag.
 12. Method according to Claim 1, **characterized in that** said strip of material is a label.
 13. Machine comprising at least one station (F) for forming the bag (1) from a tubular element (101), at least one station (R) for filling the bag with the material (2) supplied from a supplying apparatus (200) and at least one station (S) for sealing the mouth (1a) of the bag, **characterized in that** it comprises a first and a second die-cutting apparatus (500) for forming at least one first opening (6b) in the zone of the bottom (1b) and at least one second opening (6a) in the zone of the mouth (1a) of the bag (1).
 14. Machine according to Claim 13, **characterized in that** said die-cutting apparatus (500) is arranged upstream of the forming station (F).
 15. Machine according to Claim 13, **characterized in that** said first die-cutting apparatus (500) comprises means (501,502) for positioning the tubular element (101) in the longitudinal direction (X-X).
 16. Machine according to Claim 15, **characterized in that** said means (501) for positioning the tubular element (101) consist of at least one pair of fixed rollers (501) and a movable roller (502) for adjusting centring of the tubular element with respect to the apparatus for first die-cutting of the tubular element (101).
 17. Machine according to Claim 13, **characterized in that** said first die-cutting apparatus performs first successive openings (6b) at a predefined interaxial distance.
 18. Machine according to Claim 17, **characterized in that** said interaxial distance of the first openings (6b) in the longitudinal direction is predetermined depending on the length of the bag (1) in the same longitudinal direction.
 19. Machine according to Claim 13, **characterized in that** said first die-cutting apparatus is controlled by means (1000) for controlling and implementing the automatic machine cycle.
 20. Machine according to Claim 13, **characterized in that** means (F10) for welding the bottom (1b) of the bag are arranged in the forming station (F).
 21. Machine according to Claim 20, **characterized in that** said means (F10) for welding the bottom (1b) are able to form two welding lines (5b) extending in a direction substantially parallel to the transverse direction (Y-Y) of the bag and spaced from each other in the longitudinal direction (X-X) by a suitable amount able to contain the opening (6b) for gripping the bag.
 22. Machine according to Claim 13, **characterized in**

that means (S10) for sealing the mouth (1a) of the bag (1) are arranged in the sealing station (S).

23. Machine according to Claim 22, **characterized in that** said means (S10) for welding the mouth (1a) of the bag are able to form two welding lines (5a) extending in a direction substantially parallel to the transverse direction (Y-Y) of the bag and spaced from each other in the longitudinal direction (X-X) by a suitable amount able to contain a second opening (6a) for gripping the bag (1). 5
24. Machine according to Claim 13, **characterized in that** said second die-cutting apparatus (500) is arranged downstream of the sealing station (S). 10
25. Machine according to Claim 13, **characterized in that** said second die-cutting apparatus (500) is able to form openings (6a) in a strip of bag situated between the two seals (5a) of the mouth of the said bag. 15 20
26. Machine according to Claim 13, **characterized in that** said second die-cutting apparatus (500) is controlled by means (1000) for controlling and implementing the automatic machine cycle. 25
27. Machine according to Claim 13, **characterized in that** said die-cutting apparatus (500) is of the hot type. 30
28. Machine according to Claim 13, **characterized in that** said die-cutting apparatus (500) is associated with means able to impart an eccentric rotation of the apparatus about the centre of the opening. 35
29. Machine according to Claim 13, **characterized in that** it comprises an apparatus (E) for applying a layer of material to the tubular element (101). 40
30. Machine according to Claim 29, **characterized in that** it comprises an apparatus (E) for applying a layer of material which is arranged upstream of the apparatus (500) for first die-cutting the bottom of the bag. 45
31. Machine according to Claim 30, **characterized in that** said apparatus (E) for applying a layer of material is a labelling machine. 50
32. Bag filled with bulk material (2), **characterized in that** it comprises at least one first opening (6b) arranged on the bottom (1b) of the bag and at least one second opening (6a) arranged in the zone where the mouth (1a) of the said bag is situated, each gripping opening being delimited in the longitudinal direction (X-X) of the bag by at least two welding lines (5b,5a) extending in a transverse direction (Y-Y) of the bag and suitably spaced from each other in the 55

longitudinal direction (X-X) of the said bag.

33. Bag according to Claim 32, **characterized in that** it is made by means of a method according to Claim 1.
34. Bag according to Claim 32, **characterized in that** it is made by means of a machine according to Claim 13.
35. Bag according to Claim 32, **characterized in that** said at least one first and second openings consist of a hole.
36. Bag according to Claim 32, **characterized in that** said at least one first and second openings consist of an eyelet extending in the transverse direction (Y-Y).

Fig.1

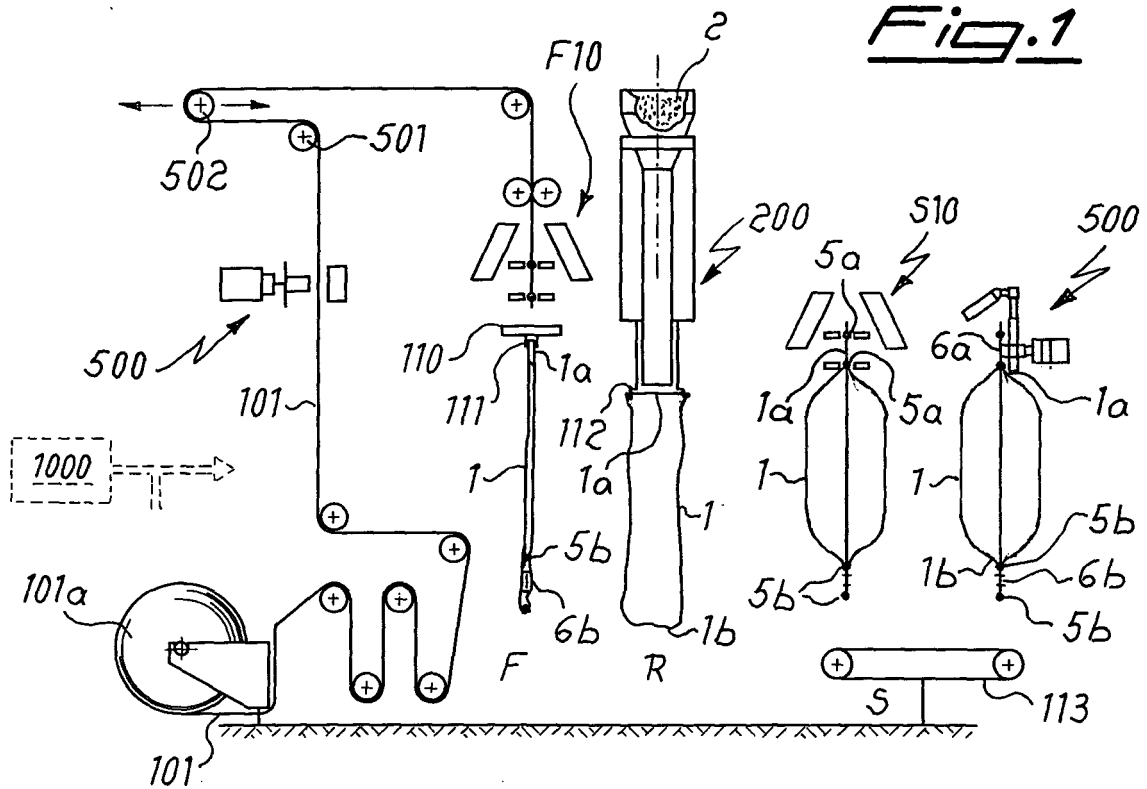


Fig.2

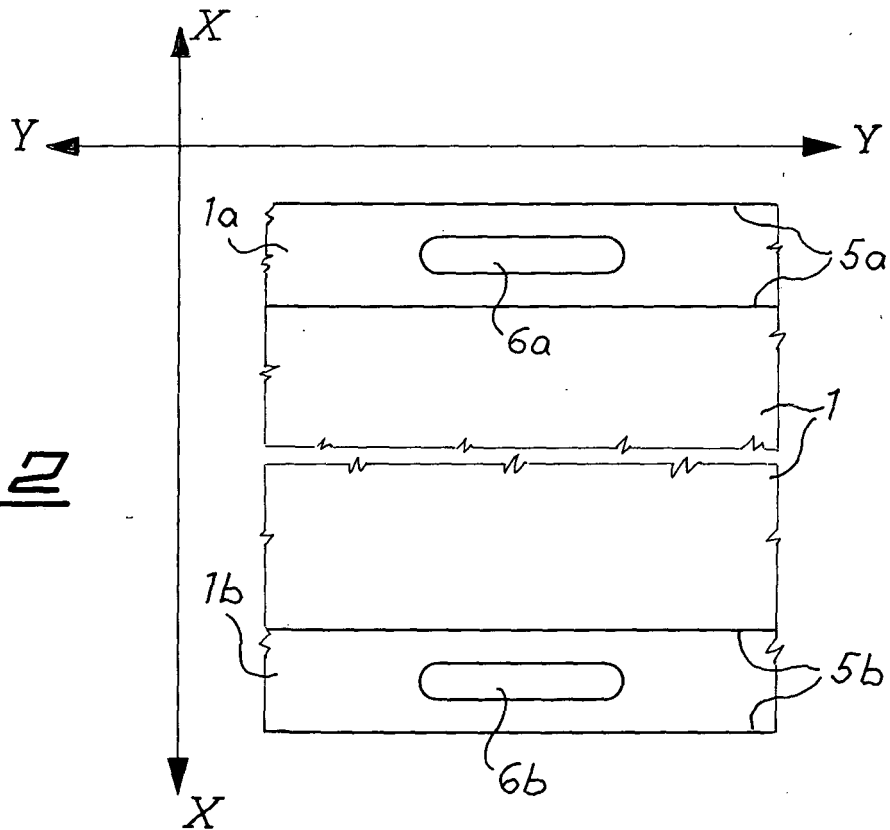


Fig. 3

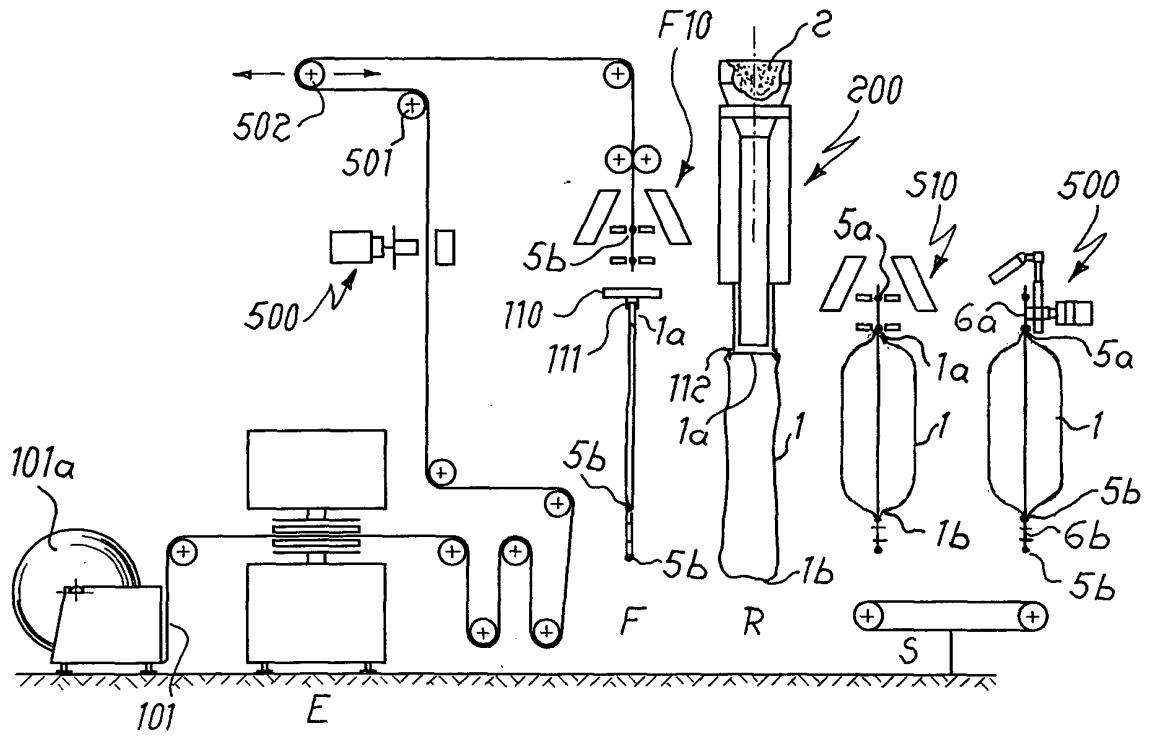
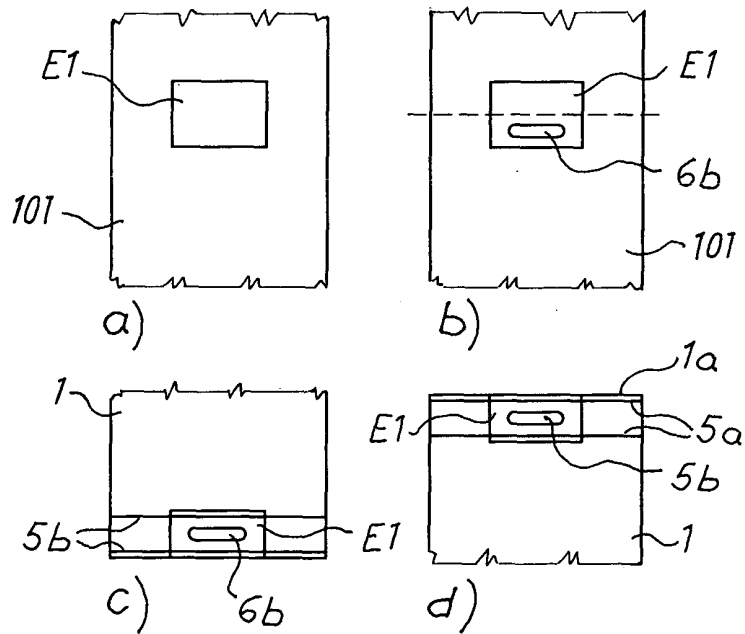


Fig. 4





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 07 6354

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Place of search Munich		Date of completion of the search 4 October 2005	Examiner Philippon, D
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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