


(12) PATENT
(19) AUSTRALIAN PATENT OFFICE

(11) Application No. AU 199910389 B2
(10) Patent No. 745091

- (54) Title
Form, fill and seal machine for bags, with transverse sealing sections, and resulting bags
- (51)⁷ International Patent Classification(s)
B65B 009/00
- (21) Application No: **199910389** (22) Application Date: **1998.11.06**
- (87) WIPO No: **WO99/24322**
- (30) Priority Data
- | | | |
|-----------------|-------------------|--------------|
| (31) Number | (32) Date | (33) Country |
| 97 13944 | 1997.11.06 | FR |
- (43) Publication Date : **1999.05.31**
(43) Publication Journal Date : **1999.07.29**
(44) Accepted Journal Date : **2002.03.14**
- (71) Applicant(s)
Flexico-France
- (72) Inventor(s)
Henri Georges Bois
- (74) Agent/Attorney
FREEHILLS CARTER SMITH BEADLE, Level 43, 101 Collins Street, MELBOURNE VIC 3000
- (56) Related Art
US 4923309
EP 441504
US 4736451

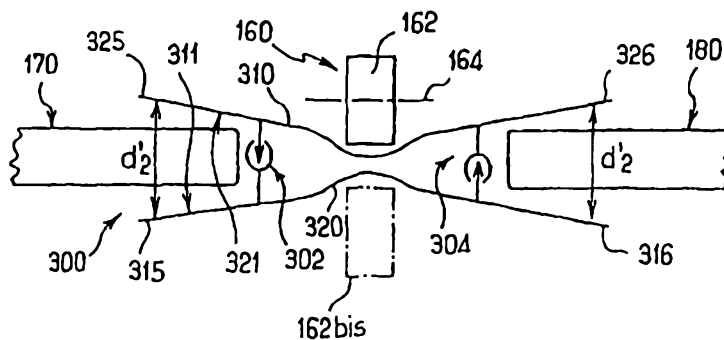
10389/99

DEMANDE INTERNATIONALE PUBLIÉE EN VERTU DU TRAITE DE COOPERATION EN MATIÈRE DE BREVETS (PCT)

(51) Classification internationale des brevets ⁶ : B65B 9/00	A2	(11) Numéro de publication internationale: WO 99/24322 (43) Date de publication internationale: 20 mai 1999 (20.05.99)
<p>(21) Numéro de la demande internationale: PCT/FR98/02377</p> <p>(22) Date de dépôt international: 6 novembre 1998 (06.11.98)</p> <p>(30) Données relatives à la priorité: 97/13944 6 novembre 1997 (06.11.97) FR</p> <p>(71) Déposant: FLEXICO-FRANCE [FR/FR]; F-60119 Henonville (FR).</p> <p>(72) Inventeur: BOIS, Henri, Georges; 61, boulevard d'Inkerman/ F-92200 Neuilly sur Seine (FR).</p> <p>(74) Mandataires: MARTIN, Jean-Jacques etc.; Cabinet Regimbeau, 26, avenue Kléber, F-75116 Paris (FR).</p>	<p>(81) Etats désignés: AU, BR, CN, IL, JP, MX, NZ, PL, ZW, brevet européen (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</p> <p>Publiée Sans rapport de recherche internationale, sera republiée dès réception de ce rapport.</p> <div data-bbox="877 515 1292 963">  </div>	

(54) Title: FORM, FILL AND SEAL MACHINE FOR BAGS, WITH TRANSVERSE SEALING SECTIONS, AND RESULTING BAGS

(54) Titre: MACHINE DE FORMATION, REMPLISSAGE ET FERMETURE AUTOMATIQUE DE SACS, A PROFILS DE FERMETURE TRANSVERSAUX, ET SACHETS OBTENUS



(57) Abstract

The invention concerns a machine for forming packages with a film (F) having matching sealing sections (300), which comprises: means for feeding, on the film (F), sealing means (300) including two support webs (310, 320) provided with a first longitudinal assembly (302) consisting of two matching sections (312, 322) and a second longitudinal assembly (304) arranged spaced from the first, means (160, 330) for urging together the support webs (310, 320) and two rectilinear guides (170, 180) capable of penetrating respectively in the space between each pair of the side edges (315, 325; 316, 326) of the support webs (310, 320). The invention also concerns a method, the resulting packages, and the sealing means therefor.

A B S T R A C T

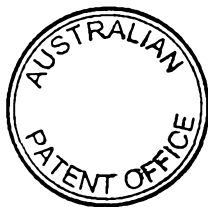
AN AUTOMATIC MACHINE FOR FORMING, FILLING, AND SEALING
BAGS HAVING TRANSVERSE CLOSURE STRIPS, AND BAGS OBTAINED
5 THEREBY

The present invention relates to a machine for forming packaging on the basis of film (F) that includes complementary closure strips (300), the machine
10 comprising: feeder means (200) for feeding onto the film (F) a closure means (300) comprising two support webs (310, 320) provided with at least a first longitudinal assembly (302) constituted by two complementary strips (312, 322) and with a second longitudinal assembly (304)
15 disposed at a distance from the first, urging means (160, 330) for urging the support webs (310, 320) towards each other between the two longitudinal assemblies (302, 304), and two rectilinear guides (170, 180) suitable for penetrating respectively into the gaps between each pair
20 of lateral edges (315, 325; 316, 326) of the support webs (310, 320). The present invention also provides a method, the resulting packages, and closure means for this purpose.

25

30

Translation of the title and the abstract as they were when originally filed by the
35 Applicant. No account has been taken of any changes that may have been made subsequently by the PCT Authorities acting ex officio, e.g. under PCT Rules 37.2, 38.2, and/or 48.3.



AN AUTOMATIC MACHINE FOR FORMING, FILLING, AND SEALING
BAGS HAVING TRANSVERSE CLOSURE STRIPS, AND BAGS OBTAINED
THEREBY

The present invention relates to the field of bags
5 or sachets comprising complementary closure strips
adapted to enable a user to open and close them
successively at will.

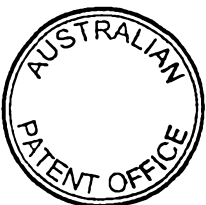
More precisely, the present invention relates to the
field of machines for this purpose, in particular
10 automatic machines adapted to form, fill, and close
packages based on film, in particular a film of
thermoplastic material, and having complementary closure
strips, e.g. complementary male and female closure
strips.

15 Such machines are often referred to by the initials
FFS for "form, fill, and seal" machine.

Numerous machines of this type have already been
proposed (see for example documents EP-A-528 721 and
US-A-4 894 975.

20 Most such machines comprise a forming neck which
receives at its input the film in the flat state taken
from a payout stand and which delivers at its output the
film shaped into a tube, a filler chute opening out into
the forming neck and consequently into said tube, means
25 for feeding closure means onto the film and for fixing
them to the film, longitudinal heat-sealing means for
closing the tube longitudinally, and means suitable for
generating sequentially a first transverse line of heat-
sealing before a product is inserted into the tube via
30 the filler chute, and then a second transverse line of
heat-sealing after the product has been inserted into the
tube, in order to close a package around the product.

Still more precisely, most machines that have been
proposed so far are designed to receive their closure
35 strips in the longitudinal direction, i.e. parallel to
the film travel direction. However, such machines with
longitudinal strips suffer from the drawback of limiting



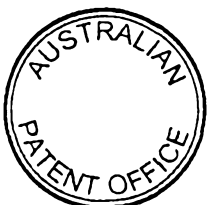
the height of the resulting bags. This height is equal to half the circumference of the forming neck. In addition, packages obtained on such machines sometimes leak. This is a result in particular of the fact that
5 the operation of the transverse heat-sealing means is disturbed by the extra thickness formed by the longitudinal strips.

Numerous attempts have been made to improve the above situation, by placing the closure strips not
10 longitudinally, i.e. parallel to the travel direction of the film, but transversely, i.e. perpendicular to the travel direction of the film.

The earliest attempt on those lines known to the inventors is described in documents US-A-4 617 683 and
15 US-A-4 655 862. Those documents, which are more than 10 years old, propose two solutions for bringing the transverse strips onto the film while it is in the flat state prior to reaching the forming neck. The first solution consists in moving segments of closure strip
20 laterally by drive wheels placed beside the edge of the travelling film, acting in combination with a transversely movable suction head. The second solution consists in placing closure strips on the film by using a rotary cylinder fitted with pneumatically controlled
25 temporary holding means.

Those proposals were found initially to be quite promising. Unfortunately, they did not give satisfaction and they have been abandoned by the person skilled in the art. In particular, it was found that the means
30 described in the above-mentioned documents did not always ensure that, when placed on the film, the strips were in an accurately rectilinear state. Consequently, it was often difficult to make the complementary strips cooperate with each other.

35 Other solutions were then proposed in an attempt to overcome the drawbacks that resulted from implementing the means described in the above-mentioned documents.



For example, in document US-A-4 666 536, it is proposed to wind a part of the film on a core and to bring a closure strip segment extending across the width of the film onto said wound part of the film by means of a heating tunnel that serves to fix the strips.

5 Theoretically, the means described in that document have the advantage of enabling forming to take place with a continuously travelling film. Unfortunately, such means have turned out to be very complex and difficult to
10 implement.

Document US-A-4 701 361 proposes forming a film which is provided sequentially with complementary closure strips by extruding a tubular film fitted with helically wound closure strips that are extruded therewith or that
15 are applied thereto, and then cutting the tubular film helically to obtain a tape that is provided with uniformly distributed transverse strips.

To reduce the length of the strips deposited on the film, and consequently to improve the positioning
20 thereof, document US-A-4 878 987 proposes supplying the strips not from a supply on one side only, as described in document US-A-4 617 863 and US-A-4 655 862, but from two supplies of strips disposed on respective sides of the film that is to form the bags. Thus, each of the two
25 strip segments displaced over the film, from the respective supplies on either side, no longer covers the entire width of the film, but only half the width.

Thereafter, document US-A-4 844 759 proposed two other solutions. The first proposed solution consists in
30 driving the closure strips by means of an endless belt onto a bracket superposed over the film and capable of pivoting through 180° in order to overturn the closure strips onto said film. Thus, the strips are initially conveyed with their relief directed towards the film but
35 on the bracket. After which they are turned over so that the relief is directed away from the film and so that they are ready to be fixed thereon. The second solution



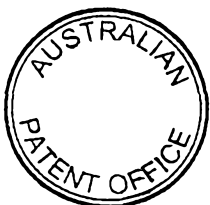
consists in conveying the strips transversely against a shoe superposed above the film and then in lowering the shoe against the film so as to fix the closure strips in place.

After observing that none of the techniques described in the above-mentioned documents gives satisfaction, proposals were made in document US-A-5 111 643 for an entirely different approach, consisting not in fixing the closure strips on the film prior to bringing the film to the forming neck as described in the above-mentioned documents, but in initially shaping the film into a tube on the forming neck, and then bringing the closure strips onto the tubular film. For this purpose, document US-A-5 111 643 proposes a complex installation including a chute which opens out in the base of the forming neck to bring the closure strips which are carried on a support tape, and a chute for taking away the support tape.

Other means designed to place the closure strips transversely onto a film are described in document US-A-4 709 398 and US-A-4 909 017.

The Applicant has itself defined in its patent application FR-A-2 745 261 a machine for forming film based packages, which machine has means for bringing closure strips transversely onto a film, which means comprise a combination of a rectilinear guide superposed over the film and extending transversely thereto in order to position at least one closure strip accurately and transversely over the film, together with means for taking hold of the leading end of the closures strip and suitable for moving transversely along the guide so as to bring the closure strip into the guide by pulling on the leading end of the closure strip.

Accordingly it is desirable to improve machines for forming film-based packages having complementary closure strips.



The present invention provides a machine characterized in that it comprises:

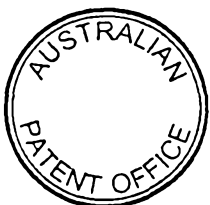
- feeder means for feeding onto the film a closure means comprising two generally-parallel support webs provided, on their facing inside surfaces and at a distance from their lateral edges, with at least a first longitudinal assembly
5 constituted by two complementary strips connected to respective ones of the two support webs, and with a second longitudinal assembly disposed at a distance from the first assembly in the width direction of the support webs;

- urging means for urging the support webs towards each other between the two longitudinal assemblies and at least at the ends of the support webs, so
10 that by deformation of the webs under the effect of said urging the distance between the lateral edges of the two webs increases; and

- two rectilinear guides suitable for penetrating into the respective spaces formed in this way between the two pairs of lateral edges of the support webs.

15 As explained below, the present invention applies particularly but not exclusively to machines in which the closure means are brought onto the film transversely to the direction thereof.

The invention preferably applies to an automatic machine for forming, filling, and sealing packages base don film, the machine, of conventional type,
20 comprising a forming neck which receives at its input the film in the flat state taken from a payout stand and which delivers at its output the film shaped into the tube, a filler chute opening out into the forming neck and consequently into said tube, means for feeding closure means onto the film and for fixing them to the film, longitudinal heat-sealing means for closing the tube longitudinally, and means
25 suitable for generating sequentially a first transverse line of heat-sealing before a product is inserted into the tube via the filler chute, and then a



second transverse line of heat-sealing after the product has been inserted into the tube, in order to close a package around the product.

5 According to another advantageous characteristic of the invention, the feeder means are adapted to take segments of closure means of length no greater than about half the width of the film, to feed them transversely over the film before the film reaches the forming neck, and to fix a first one of the support webs on the film, 10 and means are also provided suitable for fixing the second support web to the inside wall of the film once formed into a bag, after the bag has been filled, while the bag is being finished.

The above-mentioned urging means may be formed by 15 temporary urging means, e.g. in the form of a wheel, a clamp, or equivalent means.

In a variant or in combination with the above-mentioned means, they may be formed by permanent urging means, e.g. in the form of heat-sealing at the ends of 20 the segments of closure means.

To facilitate these operations of fixing support webs in two stages, the two support webs for the closure means are preferably of different widths.

The present invention also provides a method of 25 forming packages, packages obtained thereby, and closure means for this purpose.

The method is characterized in that it comprises the steps which consist in:

• feeding onto the film closure means comprising two 30 generally parallel support webs provided on their facing inside surfaces and at a distance from their lateral edges, with at least a first longitudinal assembly constituted by two complementary strips bonded respectively to the two support webs, and with a second 35 longitudinal assembly disposed at a distance from the first assembly in the width direction of the support webs;



• urging the support webs towards each other between the two longitudinal assemblies so that the distance between the lateral edges of the two webs increases under the effect of said urging, because of the webs being
5 deformed; and

• engaging the closure means on two rectilinear guides in such a manner that the guides penetrate into the respective gaps formed in this way between each pair of lateral edges of the support webs.

10 The closure means of the present invention is characterized by the fact that it comprises two generally parallel support webs provided on their facing inside surfaces and at a distance from their lateral edges with at least a first longitudinal assembly constituted by two
15 complementary strips bonded to respective ones of the two support webs, and with a second longitudinal assembly disposed at a distance from the first assembly in the width direction of the support webs, so that the gaps formed between the two pairs of side edges of the support
20 webs can be enlarged by urging the support webs towards each other between the two longitudinal assemblies.

The present invention also specifically provides bags comprising two pairs of closure strips of the complementary male/female type, located at the mouth of
25 the bag, with one male strip and one female strip on each of the sheets making up the bag.

The Applicant has observed that such bags lend themselves particularly well to packaging substances in powder form, for reasons that are explained below.

30 Other characteristics, objects, and advantages of the present invention appear on reading the following detailed description with reference to the accompanying drawings, given by way of non-limiting example, and in which:

35 • Figure 1 is a diagrammatic perspective view of an automatic machine of the present invention for forming, filling, and sealing bags;



• Figure 2 is a diagram of an embodiment of closure means of the present invention;

• Figure 3 is a view showing the same closure means under the effect of urging while being brought over the
5 film;

• Figures 4 and 4bis show two variants of the cylinder of the present invention adapted to positioning the closure means;

• Figure 5 is a cross-section view showing a variant
10 of the closure means of the present invention, in which urging of the support webs is performed by a line of heat-sealing;

• Figure 6 is a diagrammatic plan view of a bag constituting a variant embodiment of the present
15 invention; and

• Figure 7 is a diagram of a bag of the present invention having two pairs of complementary closure strips.

Accompanying Figure 1 shows the conventional general
20 structure of an automatic machine for forming, filling, and sealing bags having complementary closure strips, the machine comprising:

- means 10 for supplying film F;
- a forming neck 20;
- 25 • a filling chute 30;
- longitudinal heat-sealing means 40; and
- transverse heat-sealing and bag-separation means
50.

Since this structure is known, it is not described
30 in greater detail below.

However, as mentioned above, in a preferred embodiment of the invention, means are provided for bringing closure means 300 transversely over the film F before it reaches the forming neck 20 and for fixing said
35 closure means 300 to the film F.

Also, in the invention, the closure means 300 has two generally parallel support webs 310, 320 provided on



their facing inner surfaces 311, 321 and set back from the side edges thereof 315, 316, 325, 326, at least a first longitudinal assembly 302 constituted by two complementary strips 312, 322 connected to respective
5 ones of the two support webs 310, 320, and a second longitudinal assembly 304 disposed at a distance from the first assembly 302 in the width direction of the support webs 310, 320.

In the particular example in the accompanying
10 figures, the second assembly 304 is likewise constituted by two complementary strips 314, 324 respectively associated with the two support webs 310, 320.

However, in a variant, the second assembly 304 could be constituted by a single rib or reinforcement
15 projecting longitudinally from the inner surface of one of the webs 310 or 320, or indeed from each of the webs 310 and 320.

Still more precisely, and as shown in the accompanying figures, each of the support webs 310 and
20 320 carries a male strip and a female strip. Nevertheless, in a variant it is possible to envisage that one of the webs carries two male strips while the second web carries two female strips.

Also in the context of the present invention, the
25 film feed means 10 are associated with means 160 for urging the support webs 310 and 320 towards each other between the two longitudinal assemblies 302, 304 so that the distance between the lateral edges of the two webs 315 and 325 or 316 and 326 increases because of this
30 urging, with the webs 310 and 320 deforming, as can be seen in Figures 3 and 5.

For this purpose, the distance d_1 between the two longitudinal assemblies 302 and 304 is preferably greater than the distance d_2 that exists at rest between the webs
35 310 and 320 as defined by the assemblies 302 and 304. More precisely still, this distance d_1 preferably lies in the range one to five times the distance d_2 .



On comparing Figures 2 and 3 or 5, it will be observed that the urging means 160 typically enable the distance between the lateral edges 315 & 325 and 316 & 326 of the webs to be approximately doubled compared with their rest position (in Figures 3 and 5, $d'2$ is about twice $d2$).

By way of non-limiting example, the distance $d1$ at rest can be about 3 mm, while $d2$ can be about 2 mm.

The feed means are also associated with two fixed parallel rectilinear guides 170, 180 (extending orthogonally to the longitudinal travel axis of the film) and suitable for penetrating respectively into the space thus formed between each pair of lateral edges 315 & 325 and 316 & 326 of the support webs 310, 320, as can be seen in Figures 3 to 5.

The right section of the guides 170, 180 can exist in numerous variants. As shown in the accompanying figures, these guides 170, 180 may be rectangular or oblong in right section.

The urging means 160 may be constituted by temporary urging means constituted by a wheel 162 whose axis 164 is parallel to the longitudinal travel axis of the film, as shown in Figure 3, or by any equivalent means superposed over the closure means 300, immediately upstream from one of the guides 170, 180. The height of the urging means 160 relative to the closure means 300 is adapted so that the means 160 urge and deform at least one of the webs 310, 320 between the two assemblies 302, 304.

In another preferred embodiment of the invention, the urging means 160 can be formed by a clamp whose two jaws are suitable for urging the support webs 310, 320 towards each other between the two longitudinal assemblies 302, 304, as sketched at 162, 162bis in Figure 3.

In another variant of the present invention, which can be used in combination with the above-mentioned temporary urging means, provision is also made for



permanent urging means acting on the axial end of the webs 310, 320 between the two assemblies 305, 304, in the form of a line of heat-sealing as shown diagrammatically at 330 in Figure 5.

5 Such a line of heat-sealing 330 is made before feeding segments of closure means 300 over the film F. It may be performed downstream from the cutting station 206. Nevertheless, it is preferable for the line of heat-sealing 330 to be made upstream from the cutting
10 station 206, said cutting being performed through the middle of the line of heat-sealing made in this way, such that a line of heat-sealing 330 thus forms a bond both between the trailing ends of the webs for a first segment and between the leading ends of the webs for a second
15 segment of closure means.

In Figure 1, reference 220 designates a heat-sealing station suitable for performing the above-described line of heat-sealing 330.

Such a line of heat-sealing 330 also has the
20 advantage of improving bag leakproofing and of preventing the strips 312 & 322, 314 & 324 being completely separated or removed when a bag is opened, thereby making it easier to re-engage the strips subsequently.

The widths d_3 and d_4 of the support webs project
25 laterally from said assemblies 302 and 304 through distances that may be identical on both sides of the webs.

However these widths d_3 and d_4 can be different from one side to the other, while still being identical for
30 both webs 310, 320, or indeed they can be different from one web to the other, particularly to make it easier to heat-seal the webs 310 and 320 to the film.

By way of non-limiting example, the distance d_3 may be about 3 mm while the distance d_4 may be about 8 mm.

35 The means 10 for feeding the closure means 300 transversely over the film F before the film reaches the



forming neck 20 can themselves comprise numerous variants.

These feed means 10 are preferably as described in document FR-A-2 745 261.

5 More precisely, in this context, the feed means 10 thus preferably comprise:

• two parallel rectilinear guides 170 and 180 overlying the film F and extending transversely to the displacement direction thereof, upstream from the forming neck 20; and

10 • grasping means 150 for taking hold of the leading end of the closure means 300; which grasping means 150 are suitable for moving transversely along the guides 170, 180 to feed the closure means 300 along the guides 15 by pulling on the upstream end of the closure means.

The grasping means 150 can be implemented in various different ways.

As shown diagrammatically in accompanying Figure 1, the grasping means are preferably formed by a clamp 20 system that closes to take hold of the upstream end of a closure means 300 so as to feed it along the rectilinear guides 170, 180, and then opens in order to release the closure means 300 before returning to the initial position for taking hold as shown diagrammatically in 25 Figure 1.

In a variant embodiment, the grasping means 150 can be constituted by a suction head.

Naturally, and preferably, means are provided for moving the grasping means 150 in a transverse direction 30 synchronously with the displacement of the film F.

Auxiliary means are preferably provided to feed the means 300: drive wheels 200, 202, a guide 204 for the closure means 300 upstream from the film F, means 206 for cutting the closure means 300 into segments (with the 35 closure means 300 preferably being fed from a reel 208), and a position sensor 210.



The closure means 300 are fixed to the film F by any appropriate means, advantageously by heat-sealing jaws associated with the rectilinear guides 170 and 180, as shown diagrammatically under reference 120 in Figure 1.

5 More precisely and preferably, the segments of closure means are heat-sealed onto the film F by means of a heat-sealing jaw 120 underlying the film and controlled sequentially to move towards and away from the film F so as to clamp the film and the web 310 of the closure means
10 against the guides 170, 180 which thus serve as a backing plate during the heat-sealing step.

Various techniques can be implemented for placing the closure means 300 onto the film F.

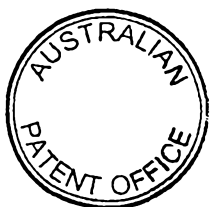
15 Preferably, the system of the present invention is adapted to place segments of closure means 300 directly on the film F so as to cover no more than half of the width of the film F.

The length of the segments of closure means 300 is preferably substantially equal to half the width of the
20 film F for bags that are simple, i.e. that do not include bellows.

In contrast, for bags that do include side bellows, the length of the segments of closure means 300 is considerably less than half the width of the film F.

25 In all cases, the length of the closure means 300 is advantageously equal to the width of the main faces of the bags.

The web 310 which is adjacent to the film is fixed to the film in the deposition station by the heat-sealing
30 jaws 120, while the other web 320 which is superposed thereon is fixed to the inside wall of the bag while the bag is being finished, i.e. after it has been filled. Under such circumstances, the second web 320 can be heat-sealed to the film F using the heat-sealing jaws 50, or
35 else by using additional transverse heat-sealing jaws provided specifically for this purpose.



The widths of the two webs 310 and 320 may be identical. In a variant, the two webs 310 and 320 can be of different widths in order to facilitate heat-sealing the webs on the film in the lateral portions of the webs that project relative to the facing web.

In this context, it is possible initially to secure the wider web or the narrower web.

Once the closure means 300 has been placed transversely over the film F and before it reaches the forming neck 20, means are preferably provided for facilitating the passage via the forming neck 20.

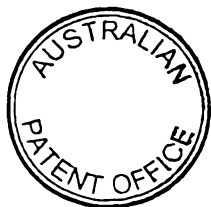
To this end, provision can be made either to have the forming neck 20 off-center relative to the vertical axis of the machine so as to allow the transverse closure means 300 to pass through, or else to provide appropriate clearance at the forming neck 20.

The resulting bags can also be implemented in a wide variety of ways, and mention can be made of the following:

- precut lines of perforations can be formed between the closure means 300 and the second transverse line of heat-sealing, as shown diagrammatically in Figure 5 of document FR 2 745 261 (where such a precut line can be implemented in conventional manner using toothed blades associated with the transverse heat-sealing jaws 50);

- "coat-hanger" type curved longitudinal lines of sealing can be made as shown likewise in Figure 5 of document FR 2 745 261, in particular for applications to liquid containers; such lines of heat-sealing are generally rounded in shape, and convex towards the inside of the bag, converging towards the top thereof which coincides with the second line of transverse heat-sealing; and

- bags can be made with lateral bellows, as shown diagrammatically in Figure 6 of document FR 2 745 261, by forming longitudinal folds in the film F before it enters the forming neck 20.



Means are preferably provided, in the form of support webs 310, 320 made of two materials, or equivalent means, to enable the melting temperature on the outside surfaces of the support webs 310, 320 to be lower than the melting temperature on the inside surfaces thereof.

The closure means 300 is preferably made by extruding a plastics material. Naturally, the closure means 300 must have webs 310 and 320 that are sufficiently fine and flexible to accept the deformation shown in Figure 3.

The film F that is used may also be the subject of numerous variants. It may be a single-layer or multilayer flexible film of plastics material, and it may optionally be coated, e.g. metallized.

The present invention provides numerous advantages over previously existing systems, and particular mention can be made of the following:

- the ease with which the closure means 300 are engaged on the rectilinear guide means 170, 180 because of the lateral openings of the webs 310, 320 as imposed when urging is applied thereto;
- because the closure means 300 are put into place by traction on rectilinear guides 170, 180, they can be positioned very accurately across the width of the film F and they can be positioned in the rectilinear state;
- the invention is very easy to implement; and
- the bags are leakproof (the closure means extend parallel to the transverse heat-sealing means 50 and do not disturb the operation thereof).

Naturally, the present invention is not limited to the particular embodiments described above, but extends to any variant in the spirit of the invention.

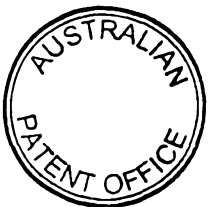
Thus, the invention is mentioned above as being applicable to automatic machines for forming, filling, and sealing film-based packages.



Nevertheless, the invention can also be applied to machines for preparing films that are fitted with strips, which strip-fitted films are subsequently fed to conventional automatic machines for forming, filling, and sealing bags.

According to another advantageous characteristic of the present invention, the installation of the present invention may include a cylinder 250 overlying the film, extending transversely to the displacement direction thereof, and mounted to rotate about its own axis which extends transversely to the displacement direction of the film F. The cylinder 250 possesses a plurality of stations each comprising a pair of rectilinear guides 170, 180 such that when one station having guides 170, 180 is being used for placing a closure means 300 on the film F, another station of guides 170, 180 is being fed with another closure means 300. As shown in Figure 4, it is possible, for example, to use a cylinder 250 that has two diametrically opposite stations of rectilinear guides 170, 180. While one of the stations having guides 170 and 180 adjacent to the film F is in use for placing a closure means 300 on the film, the other station of guides 170, 180 is being fed with the next closure means. The cylinder is then turned through 180° about its axis so that the station that has now received the closure means is adjacent to the film F and the now empty station is ready to receive a new closure means, etc.

To release the closure means 300 from the rectilinear guides 170, 180, once heat-sealed to the film F, it is possible either to place the guides 170, 180 on retractable means, e.g. the jaws of a part that is controlled sequentially to open as shown in Figure 4bis, or else to rely on the flexibility of the lateral edges of the webs 310, 320 by ejecting them from the guides 170, 180, e.g. by means of actuators incorporated in the cylinder 250 and under sequential control. Such



actuators are shown diagrammatically under reference 260 in Figure 4.

In a variant, the means 204 shown in Figure 1 and situated upstream from the film F and the cutting means
5 206 may also have two auxiliary rectilinear guides 170bis, 180bis in alignment with the guides 170, 180 respectively that are situated on the cylinder 250, and level with the loading station thereof.

In another variant, two clamps 150 can be provided,
10 one being used for displacing the closure means 300 along the guide means 204, and the other for displacing the closure means 300 along the cylinder 250.

In the embodiments of the invention described above, the closure means are placed on the film transversely to
15 the travel direction thereof.

However, the present invention is not limited to that disposition.

Thus, in other variants, the closure means 300 can be placed on the film F longitudinally, i.e. parallel to
20 the displacement direction thereof, either upstream or downstream from the forming neck 20, or indeed they can be placed at a slant relative to said displacement direction of the film F.

Under such circumstances, the closure means 300 can
25 be placed at a slant on the film F covering the entire width of the bags.

Nevertheless, in a preferred embodiment of the invention, as shown in Figure 6, the closure means 300 covers only a fraction of the width of a bag,
30 interconnecting two adjacent sides at right angles of the bags, as can be seen in Figure 6. Such a variant can be used in particular for packaging liquids, with the bag outlet defined by the closure means constituting a spout that can be opened and closed as necessary.

35 The means used for feeding the closure means 300, in particular for slanting dispositions of the kind shown in

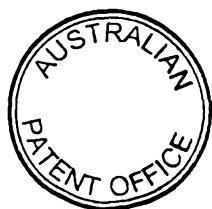


Figure 6, can be the subject matter of numerous variants. They may be as described in document EP-A-0 667 288.

As mentioned above, and as shown in Figure 7, the present invention also relates specifically to bags S
5 comprising two pairs 302, 304 of complementary male/female type closure strips 312 & 322 and 314 & 324 disposed at the mouth of the bag, with one male strip 322, 314 and one female strip 321, 324 being disposed on each of the sheets making up the bag.

10 The Applicant has observed that such bags are particularly well suited to packaging a substance in powder form.

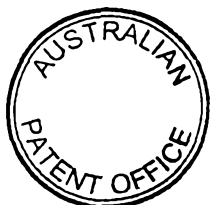
This disposition reduces the risk of the closure strips, and in particular the female closure strips 312, 15 324 becoming filled with powder while the bag is being filled or emptied. As a result, when a bag is emptied, at least one of the female strips 312 and 324, i.e. the strip located on the upper sheet, is kept clear of the substance in powder form as it leaves the bag.

20 More precisely still, such bags are particularly satisfactory when the distance d_1 between the two pairs of strips 302 and 304 is greater than 1 mm and/or when the female closure strips 312, 324 are of the type having converging edges, as shown in Figure 7.

25 The applicant has also observed that the resulting bags are particularly satisfactory when the ratio h/d_1 of the height of the strips over the spacing between them is greater than 1.5.

In this context, it should also be observed that in 30 a variant embodiment of the present invention, the closure strips 302, 304 can be extruded onto the film constituting the bag rather than being applied ready-made to the film as described above.

Also, in the context of the present invention, at 35 least for implementing packages of the type shown in Figure 7, the female closure strips are made of a flexible material enabling the converging edges to be



highly resilient, the material preferably being selected from the group comprising low density polyethylene and ethylene copolymers, e.g. pure or mixed E/VA copolymers, having a modulus of elasticity smaller than that of low
5 density polyethylene.



CLAIMS

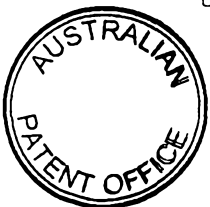
1/ A machine for forming packaging based on film (F) and including complementary closure strips (300), the machine being characterized by the fact that it comprises:

5 • feeder means (200, 202, 204, 206, 208) for feeding onto the film (F) a closure means (300) comprising two generally-parallel support webs (310, 320) provided, on their facing inside surfaces (311, 321) and at a distance from their lateral edges (315, 325; 316, 326), with at
10 least a first longitudinal assembly (302) constituted by two complementary strips (312, 322) connected to respective ones of the two support webs (310, 320), and with a second longitudinal assembly (304) disposed at a distance from the first assembly (302) in the width
15 direction of the support webs (310, 320);

 • urging means (160, 330) for urging the support webs (310, 320) towards each other between the two longitudinal assemblies (302, 304) and at least at the ends of the support webs, so that by deformation of the
20 webs under the effect of said urging the distance (d2) between the lateral edges (315, 325; 316, 326) of the two webs (310, 320) increases; and

 • two rectilinear guides (170, 180) suitable for penetrating into the respective spaces formed in this way
25 between the two pairs of lateral edges (315, 325; 316, 326) of the support webs (310, 320).

2/ A machine according to claim 1, characterized by the fact that it constitutes an automatic machine for
30 forming, filling, and sealing packages based on film (F), the machine comprising a forming neck (20) which receives at its input the film (F) in the flat state taken from a payout stand (10) and which delivers at its output the
35 film (F) shaped into a tube, a filler chute (30) opening out into the forming neck (20) and consequently into said tube, means (200) for feeding closure means (300) onto the film (F) and for fixing them to the film,



longitudinal heat-sealing means (40) for closing the tube longitudinally, and means (50) suitable for generating sequentially a first transverse line of heat-sealing before a product is inserted into the tube via the filler
5 chute (30), and then a second transverse line of heat-sealing after the product has been inserted into the tube, in order to close a package around the product.

3/ A machine according to claim 1, characterized by the
10 fact that the forming machine constitutes a machine for preparing film (F) fitted with closure strips (300), which film (F) fitted with closure strips (300) is subsequently fed to automatic machines for forming, filling, and sealing packaging.

15

4/ A machine according to any one of claims 1 to 3, characterized by the facts that the feeder means (200) are adapted to take segments of closure means (300) of length no greater than about half the width of the film
20 (F), to feed them transversely over the film before the film reaches the forming neck, and to fix a first one (310) of the support webs on the film (F), and that means (50) are also provided suitable for fixing the second support web (320) to the inside wall of the film (F) once
25 formed into a bag, after the bag has been filled, while the bag is being finished.

5/ A machine according to any one of claims 1 to 4, characterized by the fact that the urging means (160)
30 comprise temporary urging means.

6/ A machine according to claim 5, characterized by the fact that the urging means (160) comprise a clamp (162, 162bis) or equivalent means, such as a wheel.

35



7/ A machine according to any one of claims 1 to 6, characterized by the fact that the urging means (330) comprise permanent urging means.

5 8/ A machine according to any one of claims 1 to 7, characterized by the fact that the urging means (330) comprise a line of heat-sealing formed between the support webs (310, 320) and between the two longitudinal assemblies (302, 304) at each of the ends of the support
10 webs (310, 320).

9/ A machine according to claim 8, characterized by the fact that the urging line of heat-sealing (330) is made prior to feeding the segments of closure means (300) onto
15 the film (F).

10/ A machine according to claim 8 or 9, characterized by the fact that the urging line of heat-sealing (330) is made upstream from a cutting station (206), with the cut
20 being made through the middle of a line of heat-sealing made in this way so that a single line of heat-sealing (330) thus forms a bond both between the trailing ends of the webs (310, 320) of a first segment of the closure means (300), and between the leading ends of the webs
25 (310, 320) of a second segment thereof.

11/ A machine according to any one of claims 1 to 10, characterized by the fact that the second assembly (304) is also constituted by two complementary strips (314,
30 324) respectively bonded to the two support webs (310, 320).

12/ A machine according to any one of claims 1 to 10, characterized by the fact that the second assembly (304)
35 is formed by a single rib or reinforcement projecting longitudinally from the inside surface of one of the webs (310 or 320) or from each of the webs (310 and 320).



13/ A machine according to any one of claims 1 to 12, characterized by the fact that each of the support webs (310 and 320) carries a male strip and a female strip.

5

14/ A machine according to any one of claims 1 to 12, characterized by the fact that one of the webs (310) carries two male strips and the other web (320) carries two female strips.

10

15/ A machine according to any one of claims 1 to 14, characterized by the fact that the distance (d1) between the two longitudinal assemblies (302, 304) is greater than the distance (d2) defined at rest between the webs (310 and 320) by said assemblies (302 and 304).

15

16/ A machine according to any one of claims 1 to 15, characterized by the fact that the distance (d1) between the two longitudinal assemblies (302, 304) lies in the range one to five times the distance (d2) defined at rest between the webs (310 and 320).

20

17/ A machine according to any one of claims 1 to 16, characterized by the fact that the feeder means include at least one suction head (150) or a clamp suitable for moving the closure means (300) along guides (170, 180) by applying traction to the upstream end of the closure means.

25

18/ A machine according to any one of claims 1 to 17, characterized by the fact that the segments of closure means (300) are heat-sealed to the film (F) by a heat-sealing jaw (120) underlying the film and controlled sequentially towards and away from the film (F) to pinch the film and the web (310) of the closure means against the guides (170, 180) which thus serve as a backing plate during the heat-sealing step.

30

35



19/ A machine according to any one of claims 1 to 18,
characterized by the fact that the length of the segments
of closure means (300) is substantially equal to half the
5 width of the film (F) for simple bags, i.e. without
bellows, while the length of the segments of closure
means (300) is considerably less than half the width of
the film (F) for bags that include lateral bellows, in
all cases the length of the closure means (300) is of the
10 same order as the width of the main faces of the bags.

20/ A machine according to any one of claims 1 to 19,
characterized by the fact that the two support webs (310,
320) of the closure means (300) are of different widths.
15

21/ A machine according to claim 20, characterized by the
fact that the wider web (310) is the first web to be
fixed to the film (F).

22/ A machine according to any one of claims 1 to 21,
characterized by the fact that it includes a cylinder
(250) overlying the film transversely to the displacement
direction thereof, and mounted to rotate about its axis
which extends transversely to the displacement direction
25 of the film (F), the cylinder (250) having a plurality of
stations comprising rectilinear guides (170, 180) such
that while one station of guides (170, 180) is in use for
placing a closure means (300) on the film (F), another
station is being fed with closure means (300).
30

23/ A machine according to any one of claims 1 to 22,
characterized by the fact that the rectilinear guides
(170, 180) are placed on retractable means, e.g. on the
jaws of a clamp that is controlled in sequence to open,
35 thereby releasing the closure means.



24/ A machine according to any one of claims 1 to 23,
characterized by the fact that the rectilinear guides
(170, 180) are associated with actuators (260) suitable
for ejecting segments of closure means (300) so as to
5 release them.

25/ A machine according to any one of claims 1 to 24,
characterized by the fact that the closure means (300)
are placed on the film (F) transversely to the
10 displacement direction thereof.

26/ A machine according to any one of claims 1 to 24,
characterized by the fact that the closure means (300)
are placed on the film (F) parallel to the displacement
15 direction thereof.

27/ A machine according to any one of claims 1 to 24,
characterized by the fact that the closure means (300)
are placed on the film (F) at a slant relative to the
20 displacement direction thereof.

28/ A machine according to claim 27, characterized by the
fact that the closure means (300) cover a fraction of the
width of the bags, interconnecting two adjacent and
25 orthogonal sides thereof.

29/ A machine according to claim 22, characterized by the
fact that it has two auxiliary rectilinear guides
(170bis, 180bis) in alignment with the respective guides
30 (170, 180) situated on the cylinder (250) and level with
the loading station thereof, upstream from the cutting
means (206).

30/ A method of making packaging based on film (F) and
35 including complementary closure strips (300), the method
being characterized in that it comprises the steps
consisting in:



• feeding onto the film (F) closure means (300) comprising two generally parallel support webs (310, 320) provided on their facing inside surfaces and at a distance from their lateral edges, with at least a first longitudinal assembly (302) constituted by two
5 complementary strips (312, 322) bonded respectively to the two support webs (310, 320), and with a second longitudinal assembly (304) disposed at a distance from the first assembly in the width direction of the support
10 webs;

• urging the support webs (310, 320) towards each other between the two longitudinal assemblies (302, 304) so that the distance (d2) between the lateral edges (315, 325; 316, 326) of the two webs increases under the effect
15 of said urging, because of the webs (310, 320) being deformed; and

• engaging the closure means (300) on two rectilinear guides (170, 180) in such a manner that the guides penetrate into the respective gaps formed in this
20 way between each pair of lateral edges of the support webs (310, 320).

31/ A method according to claim 30, characterized by the fact that it is implemented on an automatic machine for
25 forming, filling, and sealing packages based on film (F), the machine comprising a forming neck (20) which receives at its input the film (F) in the flat state taken from a payout stand (10) and which delivers at its output the film (F) shaped into a tube, a filler chute (30) opening
30 out into the forming neck (20) and consequently into said tube, means (200) for feeding closure means (300) onto the film (F) and for fixing them to the film, longitudinal heat-sealing means (40) for closing the tube longitudinally, and means (50) suitable for generating
35 sequentially a first transverse line of heat-sealing before a product is inserted into the tube via the filler chute (30), and then a second transverse line of heat-



sealing after the product has been inserted into the tube, in order to close a package around the product.

32/ A method according to claim 30, characterized by the
5 fact that it is implemented to prepare a film (F) fitted with closure strips (300), which film fitted with closure strips (300) is subsequently fed to an automatic machine for forming, filling, and sealing packaging.

10 33/ A method according to any one of claims 30 to 32, characterized by the fact that the urging means (160) comprise temporary urging means.

15 34/ A method according to claim 33, characterized by the fact that the urging means (160) comprise a clamp (162) or equivalent means, such as a wheel.

20 35/ A method according to any one of claims 30 to 34, characterized by the fact that the urging means (330) comprise permanent urging means.

25 36/ A method according to any one of claims 30 to 35, characterized by the fact that it comprises a step consisting in forming a line of heat-sealing between the support webs (310, 320) and between the two longitudinal assemblies (302, 304) at the ends of the support webs (310, 320).

30 37/ A method according to claim 36, characterized by the fact that the urging line of heat-sealing (330) is made prior to feeding segments of closure means (300) onto the film (F).

35 38/ A method according to claim 36 or 37, characterized by the fact that the urging line of heat-sealing (330) is made upstream from a cutting station (206), said cutting being performed through the middle of a line of heat-



sealing made in this way, such that a single line of heat-sealing (330) forms both a bond between the trailing ends of the webs (310, 320) of a first segment of closure means (300), and between the leading ends of the webs (310, 320) of a second segment thereof.

5 39/ Packaging obtained by implementing a machine according to any one of claims 1 to 29 and/or a method according to any one of claims 30 to 38.

40/ Packaging characterized by the fact that it is obtained by using a machine according to any one of claims 1 to 29, and/or the method according to any one of claims 30 to 38.

10 41/ Closure means for forming a bag by means of a machine according to any one of claims 1 to 29 and/or a method according to any one of claims 30 to 38, the closure means being characterized by the fact that it comprises two generally parallel support webs (310, 320) provided on their facing inside surfaces (311, 321) and at a distance from their lateral edges (315, 325; 316, 326) with at least a
 15 first longitudinal assembly (302) constituted by two complementary strips (312, 322) bonded to respective ones of the two support webs (310, 320) and with a second longitudinal assembly (304) disposed at a distance from the first assembly (302) in the width direction of the support webs, so that the gaps formed between the two pairs of side edges of the support webs (310, 320) can be enlarged by
 20 urging the support webs (310, 320) towards each other between the two longitudinal assemblies (302, 304).

42/ Closures means according to claim 41, characterized by the fact that it includes respective lines of heat-sealing (330) formed between the support webs (310, 320) and between the two longitudinal assemblies (302, 304) at each of the
 25 ends of the support webs (310, 320).

43/ Closures means according to claim 41 or 42, characterized by the fact that the second assembly (304) is also constituted by two complementary strips (314, 324) bonded to respective ones of the two support webs (310, 320).



44/ Closures means according to any one of claims 41 to 43, characterized by the fact that the second assembly (304) is constituted by a single rib or reinforcement projecting longitudinally from the inside surface of one of the webs (310 or 320) or from each of the webs (310 and 320).

5 45/ Closure means according to any one of claims 41 to 44, characterized by the fact that each of the support webs (310 and 320) carries a male strip and a female strip.

46/ Closure means according to any one of claims 41 to 45, characterized by the fact that one of the webs (310) carries two male strips and the other web (320)
10 carries two female strips.

47/ Closure means according to any one of claims 41 to 46, characterized by the fact that the distance (d1) between the two longitudinal assemblies (302 and 304) is greater than the distance (d2) defined at rest between the webs (310 and 320) by said assemblies (302 and 304).

15 48/ Closure means according to any one of claims 41 to 47, characterized by the fact that the distance (d1) between the two longitudinal assemblies (302, 304) lies in the range one to five times the distance (d2) defined between the webs (310 and 320).

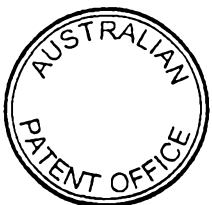
49/ Closure means according to any one of claims 41 to 42, characterized by
20 the fact that the two support webs (310, 320) of the closure means (300) are of different widths.

50/ A machine for forming packaging as claimed in claim 1 substantially as hereinbefore described with reference to the accompanying drawings.

51/ A method of making packages as claimed in claim 30 having the steps
25 substantially as hereinbefore described.

Flexico-France
By its Registered Patent Attorneys
Freehills Carter Smith Beadle

8 January 2002



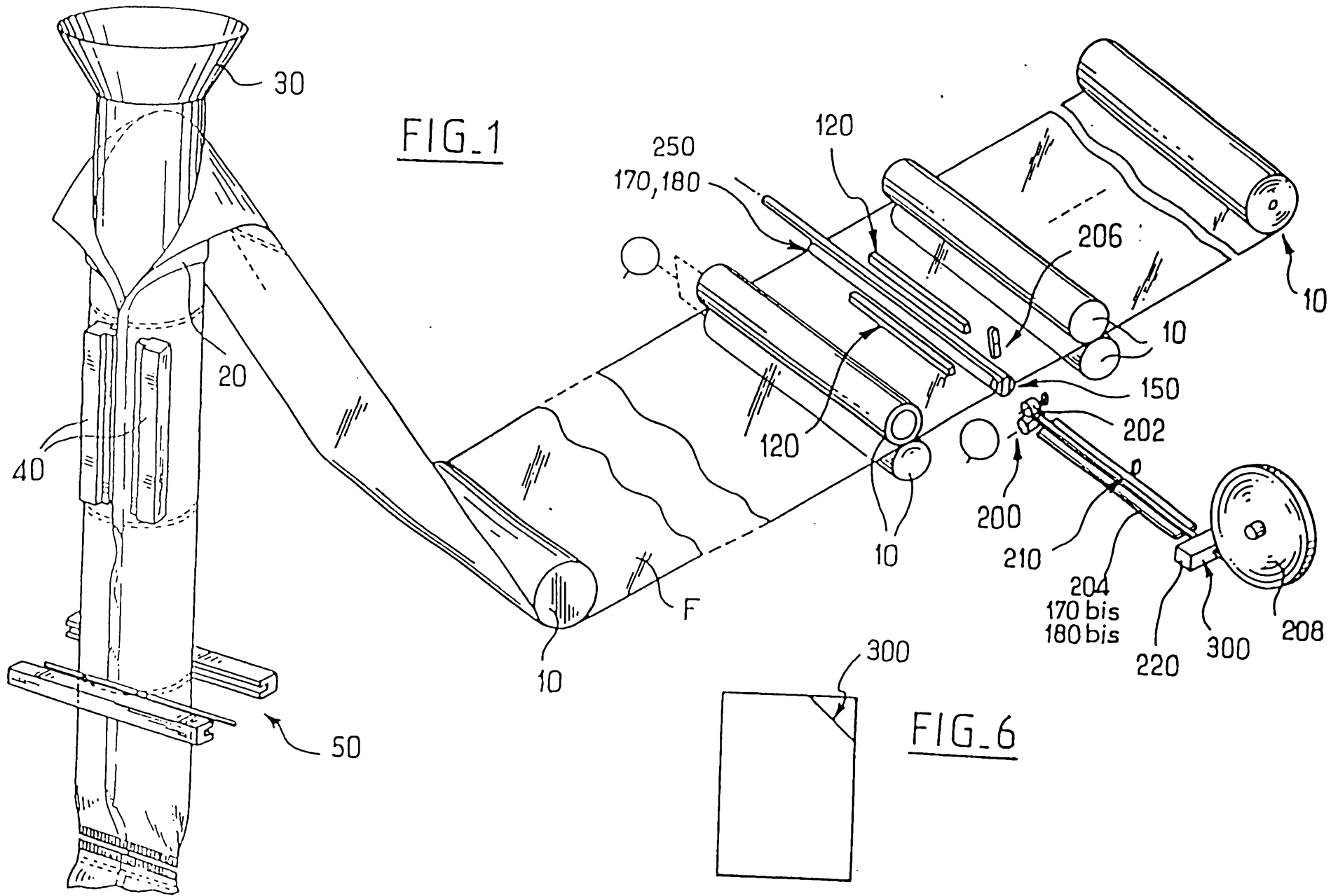


FIG. 1

FIG. 6

FIG. 2

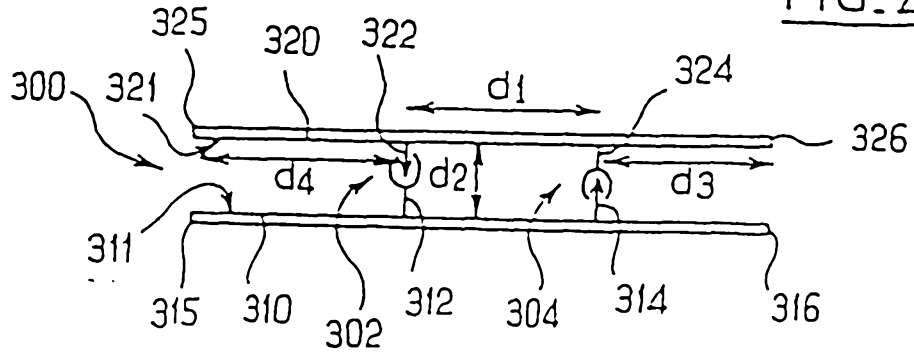


FIG. 3

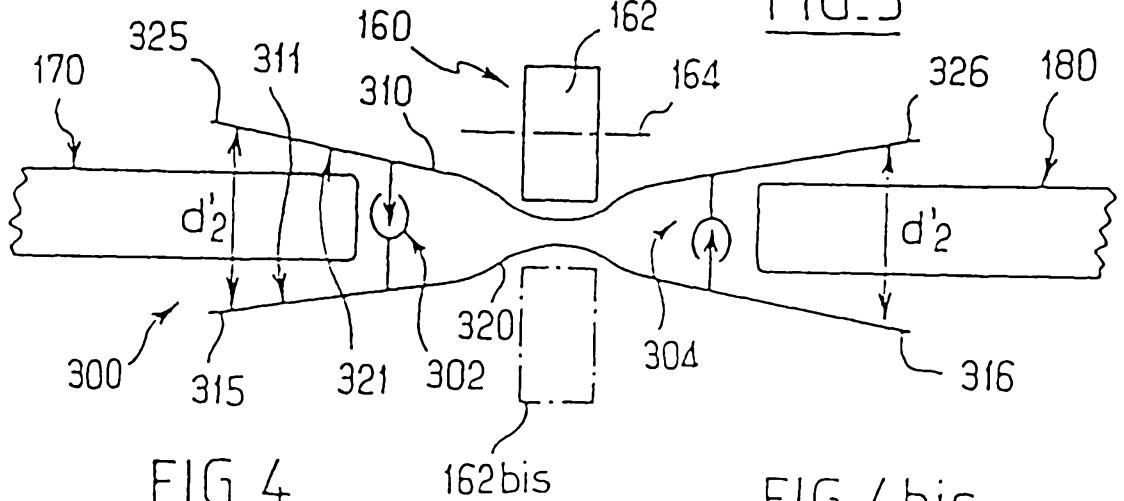


FIG. 4

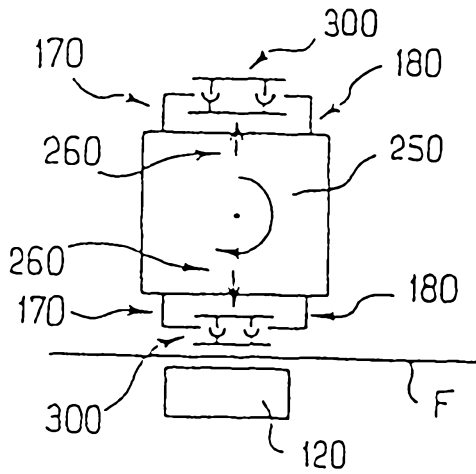


FIG. 4bis

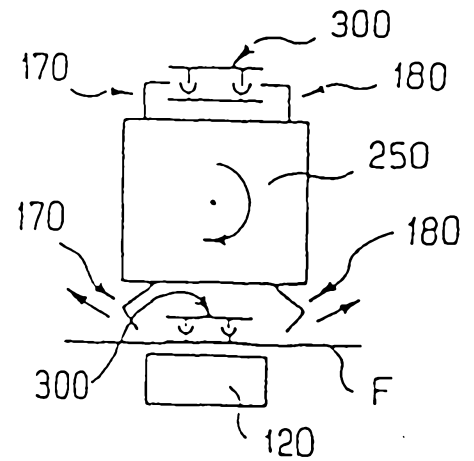


FIG. 5

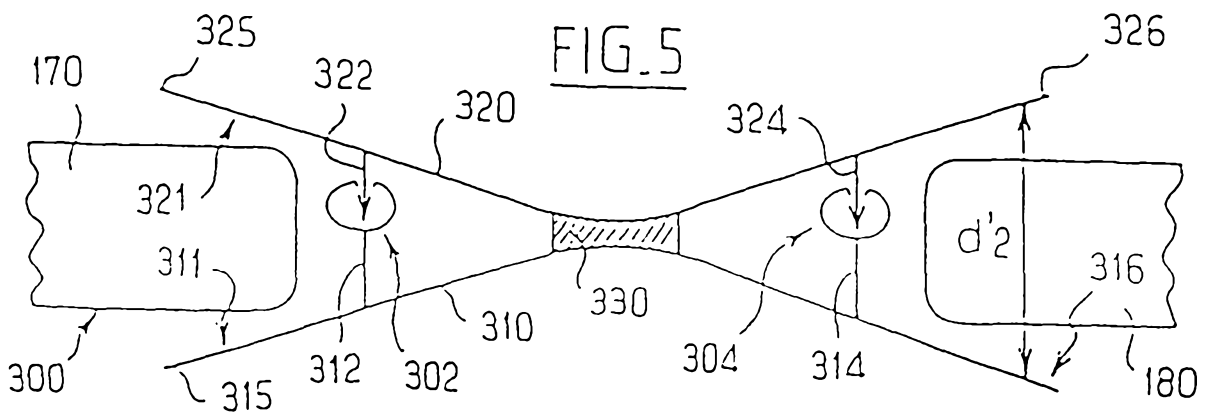


FIG. 7

