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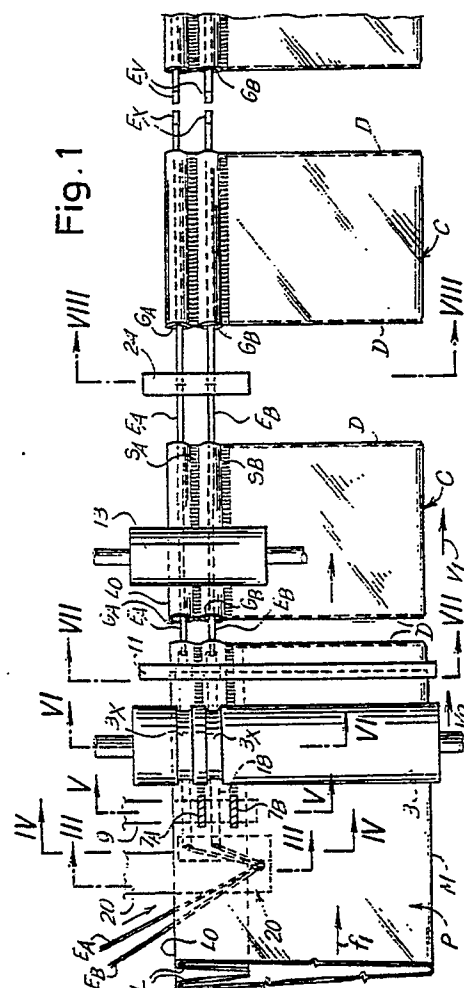
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(54) Method and device for production of bags made of thermoplastic film with annular strings for closure, and manufactures thus made.

(57) In production, beginning from continuous film (P), filiform elements (E_A, E_B) made of weldable material are supplied, in order to form the strings; the transverse welds and cuts of the film are formed so as not to involve in the welding the region of the strings; and after the separation between the bags under production, by means of accelerated sliding with respect to said filiform elements, the filiform elements are welded to one another in pairs and cut in the welding regions in order to form annular strings.



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METHOD AND DEVICE FOR PRODUCTION OF BAGS MADE OF THERMOPLASTIC FILM WITH ANNULAR STRINGS FOR CLOSURE AND MANUFACTURES THUS MADE

The aim of the invention is to accelerate the production, to simplify the devices and to reduce the quality requirements of the materials (and the associated costs) in the production of bags made of thermoplastic film comprising at least one housing for a string, usually annular, which slides in the housing and extends out of it, with supply of film which is separated by means of transverse welds and transverse cuts, and with supply of filiform elements for forming the strings.

For the above purposes, and the advantages which will become clear from the text which follows, according to the invention it is envisaged :

- that in production, beginning from continuous film, filiform elements made of weldable material are supplied, in order to form the strings,
- that the transverse welds and cuts of the film are formed so as not to involve in the welding the region of the string, and
- that after the separation (known per se) between the bags under production by means of accelerated sliding with respect to said filiform elements, the filiform elements are welded to one another in pairs and cut in the welding regions in order to form annular strings.

In practice, the filiform elements are thermoplastic and heat-sealing and are welded and cut by the operation of thermoplastification.

The filiform elements can be of tape type, and are then guided to draw near to one another for the welding.

According to a possible solution, in the regions of the strings, the film material of the bag is removed.

The invention also relates to a device for producing bags as defined and by means of the above method. Existing devices for such production comprise means of advance of a film of continuous thermoplastic material, means for welding folded longitudinal lips of said film to form slots or sheaths also the mouth of the bags to be produced, means for supplying continuous filiform elements which are housed in said slots, transverse welding and cutting means for the band-shaped film for the formation of the bags without welding and without cutting the filiform elements, means for separating from one another the bags formed, as well as means for cutting the filiform elements and forming annular strings with these. Known devices envisage the use, as filiform elements, of fine cords made of cotton or other material which prevents the adhesion to these of the material which is thermoplastified for the transverse welds and cuts, and necessarily envisage fastening mechanisms, which are slow and complex, for forming the annular strings from pairs of lengths of such fine cords. The material of the fine cords is also rela-

tively expensive.

According to the invention, the device comprises means for excluding the filiform elements from the action of the transverse welding and cutting means, and it also comprises means of welding and of cutting between pairs of contiguous filiform elements in order to form the annular strings.

According to a possible embodiment, said means for excluding the filiform elements from the action of the transverse welding and cutting means can comprise, for said filiform elements, tubular string-guides which extend in the station for transverse welding and cutting for the formation of the bags, and the means of welding and cutting are bars which have indentations in the area of the tubular string-guides. The profiles of the indentations of the welding bars advantageously interact with the external surfaces of the tubular string-guides in order to cut into the film so as to cause or at least favour separation between the bags. The tubular string-guides can be carried in a cantilevered manner in the area of the welding means for forming, with longitudinal welds, said slots, and by way of a pair of feed cylinders to the station for transverse welding and cutting ; moreover, at least one of said cylinders has annular indentations in the area of said tubular string-guides.

According to another possible embodiment, said means for excluding the filiform elements from the action of the transverse welding and cutting means can comprise, in the welding and cutting bars, indentations in the area of the filiform elements, and, in a position in front of the supply of the filiform elements, means for punching and removing material in regions which, in the station for transverse welding and cutting, come to correspond to said indentations.

The means of welding and of cutting for the continuous filiform elements comprise in practice members which draw near to one another in order to press the filiform elements, in order to plastify them so as to weld them to one another and in order to cut them in an intermediate position between two welding regions.

A further subject of the invention is a bag-type manufacture with two slots around the access mouth for annular strings which slide therein for closure, made by means of the method and the device as defined above.

The drawing illustrates schematically a non-limitative exemplary embodiment of the invention.

Figs 1 and 2 show a diagram in plan view and in longitudinal cross-section of a device which comprises the invention,

Figs 3, 4, 5, 6, 7 and 8 show schematically local transverse cross-sections according to III-III, IV-IV, V-

V, VI-VI, VII-VII, and VIII-VIII in Fig. 1, and

Figs 9 and 10 show an alternative embodiment with respect to Figs 1 to 7, Fig. 10 being a cross-section according to X-X in Fig. 9,

Fig. 11 shows in perspective a possible form of bag which can be made according to the invention,

Figs 12 and 13 show a cross-section according to XII-XII in Fig. 11 and a local view according to XIII-XIII also in Fig. 11, and

Figs 14 and 15 show alternative embodiments of the bag.

According to what is illustrated in the attached drawing, a film of thermoplastic material, which is indicated by P and is presented to the device to be described with a fold M along the longitudinal center line and with two folds in order to have the two longitudinal terminal edges L folded onto the film material on the inside (as shown in the drawing) or on the outside, is supplied according to the arrow f1. The film P is drawn moreover by a pair of cylinders 3 and 5 which make the material advance according to the arrow f1 at a linear speed V_0 which is continuous on average or with intermittent advances and with possible cyclical recovery. In a manner known per se, along the course according to the arrow f1 in the area of the folded edges L, means, indicated by 7A, 7B, are provided, which weld each of the edges L to the contiguous part of the film P adjacent to it so as to form two pairs of slots parallel to the longitudinal lines of folding; these slots are adjacent to the lines of folding Lo of the edges L with respect to the double layer of the film P. The means of welding 7A and 7B can be of sliding type or of rolling type and each of these has a part supported by a structure 9 which penetrates into the cavity delimited by the fold M of the film of thermoplastic material P, in the drawing between the two edges L folded towards the inside (see in particular Fig. 5); the external parts of the means of welding 7A and 7B can be mobile for moving together and apart reciprocally, but during functioning, with the advance according to the arrow f1 of the film P, these means of welding 7A and 7B are in operation in order to ensure the formation of longitudinal welds SA and SB which define the two longitudinal slots GA and GB which are adjacent to the folds Lo of the edges L. The means of welding 7A, 7B can also be of hot-air type, or of the type which uses adhesive or of any other suitable type.

Continuous filiform elements, such as those EA and EB, which are supplied during the advance according to f1 of the film P, are received in the slots GA and GB; the filiform elements are made to penetrate into the internal space of the film folded along the line M when the edges L are folded towards the inside. Said elements are guided expediently between the film and each of the edges in order to be brought into a position corresponding to the region of formation of the slots GA and GB and precisely in order to be

received in precisely these slots.

The film P, as it advances, is subdivided by means of transverse welding means, such as transverse welding and cutting bars 11, hot-air or other means, which cut and weld the material in order to create a plurality of packaging bags C of conventional type, to be fastened at the mouth delimited by the folding lines Lo. These welding bars 11 are situated immediately downstream of the feed cylinders 3 and 5. The transverse welding and cutting lines are indicated by D in the drawing. The filiform elements EA and EB have to be free to slide in the slots GA and GB and therefore must not be affected by the welds D and even less by the cuts along the welding lines D; in current solutions, this is brought about by avoiding the sticking of the material of the film P in the region of heat-sealing by selecting a suitable material, of which each filiform element EA and EB is formed, the filiform elements being made in particular of cotton or other material.

The system has a further pair of feed cylinders 13 and 15, developed at least in the region of the edges L and of suitable type, for example one knurled and the other smooth and rubberized, and/or made in the manner of rollers or other. These cylinders act on the material of the film P with an advance speed V_1 which is greater than the advance speed V_0 of the cylinders 3 and 5; these cylinders 13 and 15 act downstream of the transverse welding and cutting bars 11, as a result of which the single segments C, which constitute the bag-type packagings delimited by the welding and cutting lines D, are separated from one another precisely because of the greater speed V_1 imposed by the pair of feed cylinders 13 and 15, in such a manner that the single pieces of the bag-type packagings C are detached from one another, while the filiform elements EA and EB remain integral and with respect to these slide through the slots GA and GB as a result of the accelerated advance of the bag-type packagings C. Between one packaging C and another therefore there are sections of filiform elements EA and EB such as are visible on the right-hand side when looking at Figs 1 and 2. In the area of said sections, there is currently provided in conventional solutions a system of cutting and a system of fastening of the pairs of lengths of filiform elements in order to obtain two annular strings, each of which is inserted into the two slots GA, or into the two slots GB respectively, formed by the two edges L which are welded along the welding lines SA and SB formed by the welding members 7A and 7B.

In conventional solutions, filiform elements must be used which, by the very nature of their constitution are not subject to adhesion with the material which is plastified for the formation of the transverse welds and for the cutting along the welding and separation lines D, and this material is relatively very expensive because it is usually cotton-based; moreover, for the

formation of the annular strings, a relatively very complex and therefore slow mechanism is necessary for the cutting and the fastening of the lengths which are situated in the slots GA, or GB respectively, which flank one another, in order to form the annular strings themselves. This procedure is both expensive because of the material used for the filiform elements and slow and therefore expensive because of the slowness of the production due to the presence of the fastening mechanism which requires relatively long times, and difficult also because of the delicacy of this fastening mechanism, which can cause interruptions and therefore idle times for the production.

These disadvantages are all eliminated by means of the invention.

According to the invention, it is envisaged to use, as linear filiform elements EA and EB, elements made of thermoplastic material which are capable of being welded by thermal plastification; this entails on the one hand the possibility of using material which is not very expensive, and on the other, cutting and welding the ends of the filiform elements, which have been drawn near to one another, avoiding the expensive and slow means of fastening which are instead adopted with the cotton-based material of the prior art. In order to be able to use this heat-sealing material as linear filiform elements EA and EB, it is clear that it is necessary to avoid the welding of said filiform elements to the material of the film P in the area of the welding bars 11 which form the welding and cutting lines D for the formation of the bag-type packagings C and for the separation of the same. In order to achieve this, it is envisaged, according to the invention and according to what is illustrated in Figs 1 to 8, that, in the area of the line of action of the bars 11, there are present tubiform string-guides 18 to receive each of the filiform elements EA and EB; four tubiform string-guides 18 are therefore provided for the two filiform elements EA and for the two filiform elements EB. These tubular string-guides 18 are supported by a structure 20 inside the edges L which are folded onto the inside of the film P (or a structure outside said edges, when these are folded towards the outside) in order to bring about in any case a continuous supply of the filiform elements made of thermoplastic material to said tubiform string-guides 18 upstream of the welding members 7A and 7B which form the welds SA and SB and therefore the slots GA and GB. The tubes 18 are supported in a cantilevered manner by the structure 20 or by the external structures, and they extend between the drawing and feed cylinders 3 and 5 which, in a manner corresponding to the tubes 18, have annular grooves 3X and 5X respectively, so as to ensure the space for the tubes 18 themselves, which are side by side and contained in the slots GA and GB formed by the welding members 7A and 7B. The tubes extend as far as the region of the welding bars 11 and these latter (see also Fig. 7) have inden-

ted profiles, as indicated by 11X, in order to avoid the bulk of the tubes 18 which reach the region of welding of said bars 11. It follows from this that, while the material of the thermoplastic film P is welded and cut along the welding and cutting lines D, this material is not welded to the filiform elements EA and EB, as these are protected by the tubes 18, which end immediately after the transverse welding and cutting region of the bars 11. Moreover, said bars 11, in the indented regions 11X, ensure adequate cutting of the material of the film P in the area of the tubes, as a result of which the separation between the various bag-type packagings C also takes place in the area of the slots and of the tubes when the material of the film undergoes accelerated advance by the action of the cylinders 13 and 15 with the greater speed which is imposed by these cylinders on the material for the mutual separation of the packagings C.

In place of the systems of the prior art for cutting and for fastening the lengths of filiform elements, according to the invention it is only envisaged to provide welding and cutting members indicated by 24 which act on the filiform elements EA and EB side by side, as can be seen in particular in Fig. 8, as a result of which the lengths of filaments EA and EB are welded in the area of the end welds EX and EY, through the effect of the simple operation of welding and of cutting by the action of the welding members 24 in the region of the cross-section VIII-VIII illustrated in fig. 8. The welds EX and EY are clearly visible in Figs 11 to 13.

In order to avoid excessive increases in temperature, it can be envisaged to admit puffs of air into the tubes 18. It is also possible that more or less concentrated jets of air are provided on the outside also, in the region of the tubes, where the welding means 11 act.

In Figs 9 and 10, a modified embodiment of the invention is envisaged. In order to avoid welding between the filiform elements EA and EB and the material of the film P, rather than having recourse to the tubes 18, more or less indented profiles 111X in the blades 111, in the area of the filiform elements EA and EB, are envisaged, as well as a removal in advance of the film of material P in the regions which correspond to the intersection between the filiform elements EA and EB and the blades 111.

In particular, the components illustrated in Figs 1 and 2 being practically the same and drawn in the same manner, upstream of the position of the unit 20 for supplying the elements EA and EB, a punching system 140 is provided, of which two punching tools 142A, 142B form part, which are in alignment with the positions corresponding to the slots GA and GB and to the filiform elements EA and EB. These punching tools remove the material of the film in precisely the regions AM which during the advance come to correspond to the intersections between the bars 111 and

the slots GA and GB. The removals are of a size which is preferably at least equal to the extent of the indentations 111X, in such a way that in any case the separation between the successive bags is possible in the advance beyond the bars 111.

The punchings AM can have a square, oval or circular shape, not least for aesthetic requirements.

The absence of thermoplastic film material, due to the punchings, ensures that the welding of the film P to the filiform elements EA and EB is avoided.

In conclusion, it is possible to simplify and to accelerate the functioning of the devices, the fastenings being avoided, and to use material for the filiform elements which is more economical with respect to that envisaged until now.

figs 11 to 13 clearly illustrate, the bag C, which has been made by means of the process indicated above and which, in conventional manner, has lateral welds D and pairs of slots GA and GB delimited by welding lines SA and SB, which are parallel and contiguous with the access mouth BA of the bag of the packaging C. The slots GA, GA receive the annular string EA and the slots GB, GB receive the annular string EB ; said annular strings EA and EB are slidable in the respective slots in order to make possible, by means of pulling one of the strings in one direction and the other in the opposite direction, the closure of the access mouth BA and the possible stabilization of the closed state by means of a fastening of the annular strings. According to the process described above, the bag has the strings EA and EB made of filiform thermoplastic material and possibly and advantageously in the form of a filament, that is to say of a band, and each annular string is constituted by two lengths of this filiform material, which are welded to one another in the area of the two ends EX and EY, precisely so as to create the annular string without having to have recourse to a fastening which is expensive because it is complex and slow in industrial production.

In Figs 14 and 15, two bags of different form are shown, which can be made according to the invention. The body 201 or 301 of the bag has on its two faces a slot 203 or 303 adjacent to the access mouth 201A or 301A ; an annular string 205 or 305, formed by two lengths welded to one another at the ends 205A or 305A, can slide in the slots ; in the solution in fig. 15, one of the welding ends 305A is also engaged on the corresponding ends of the slot, being slidable therein ; in the solution in Fig. 14, the string is free to slide in the slots. The bag 201 or 301 has a hole 207 or 307 in the vicinity of one of the corners most distant from the slot 203 or 303, in which hole the string 205 or 305 can be engaged by means of a knot in order to constitute a convenient shoulder-strap or handle. The hole 207 or 307 can be suitably reinforced.

The drawing shows only an exemplary embodiment of the invention which can vary in form and

arrangement. For example, it is possible to provide only the indented welding and cutting blades in the region of the or of each filament, without the presence of the tubes, in order to avoid the welding of the strings, having recourse to possible means for weakening the film so as to carry out the separation between the contiguous manufactures.

Claims

1. A method for the production of bags made of thermoplastic film comprising at least one housing for a string, usually annular, which slides in the housing and extends out of it, with supply of film which is separated by means of transverse welds and transverse cuts, and with supply of filiform elements for forming the strings, wherein, in production, beginning from continuous film, filiform elements made of weldable material are supplied, in order to form the strings, wherein the transverse welds and cuts of the film are formed so as not to involve in the welding the region of the strings, and wherein after the separation, known per se, between the bags under production by means of accelerated sliding with respect to said filiform elements, the filiform elements are welded to one another in pairs and cut in the welding regions in order to form annular strings.
2. The method as claimed in claim 1, wherein the filiform elements are thermoplastic and heat-sealing and are welded and cut by the operation of thermoplastification.
3. The method as claimed in claim 1, wherein the filiform elements of tape type are used, which are guided to draw near to one another for the welding.
4. The method as claimed in claim 1, wherein, in the regions of the strings, the film material of the bag is removed.
5. A device for producing bags according to the method of one or more of claims 1 to 4 comprising means of advance of a film of continuous thermoplastic material, means for welding folded longitudinal lips of said film in order to form slots along the mouth of the bags to be produced, means for supplying continuous filiform elements which are housed in said slots, transverse welding and cutting means for the band-shaped film for the formation of the bags without welding and without cutting the filiform elements, means for separating from one another the bags formed, as well as means for cutting the filiform elements and forming annular strings with these, which com-

prises means for excluding the filiform elements from the action of the transverse welding and cutting means, and also comprises means of welding and of cutting between pairs of contiguous filiform elements in order to form annular strings.

6. The device as claimed in claim 5, wherein said means for excluding the filiform elements from the action of the transverse welding and cutting means comprise, for said filiform elements, tubular string-guides which extend in the station for transverse welding and cutting for the formation of the bags, and wherein the means of welding and cutting are bars which have indentations in the area of the tubular string-guides.

7. The device as claimed in claims 5 and 6, wherein the profiles of the indentations of the welding bars interact with the external surfaces of the tubular string-guides in order to cut into the film so as to cause or at least favour separation between the bags.

8. The device as claimed in claims 5 and/or 6 and/or, wherein said tubular string-guides are carried in a cantilevered manner in the area of the welding means for forming, with longitudinal welds, said slots, and by way of a pair of feed cylinders to the station for transverse welding and cutting, and wherein at least one of said cylinders has annular indentations in the area of said tubular string-guides.

9. The device as claimed in claim 5, wherein the means for excluding the filiform elements from the action of the transverse welding and cutting means comprise, in the welding and cutting bars, indentations in the area of the filiform elements, and, in a position in front of the supply of the filiform elements, means for punching and removing material in regions which, in the station for transverse welding and cutting, come to correspond to said indentations.

10. The device as claimed in claim 5 and the following claims, wherein the means of welding and of cutting for the continuous filiform elements comprise members which draw near to one another in order to press the filiform elements, in order to plastify them so as to weld them to one another and in order to cut them in an intermediate position between two welding regions.

11. A bag or small bag made of thermoplastic film with an annular string engaged slidably in a slot surrounding the access mouth to the bag and from which slot said string projects and extends at least on one side to engage in a hole at a dis-

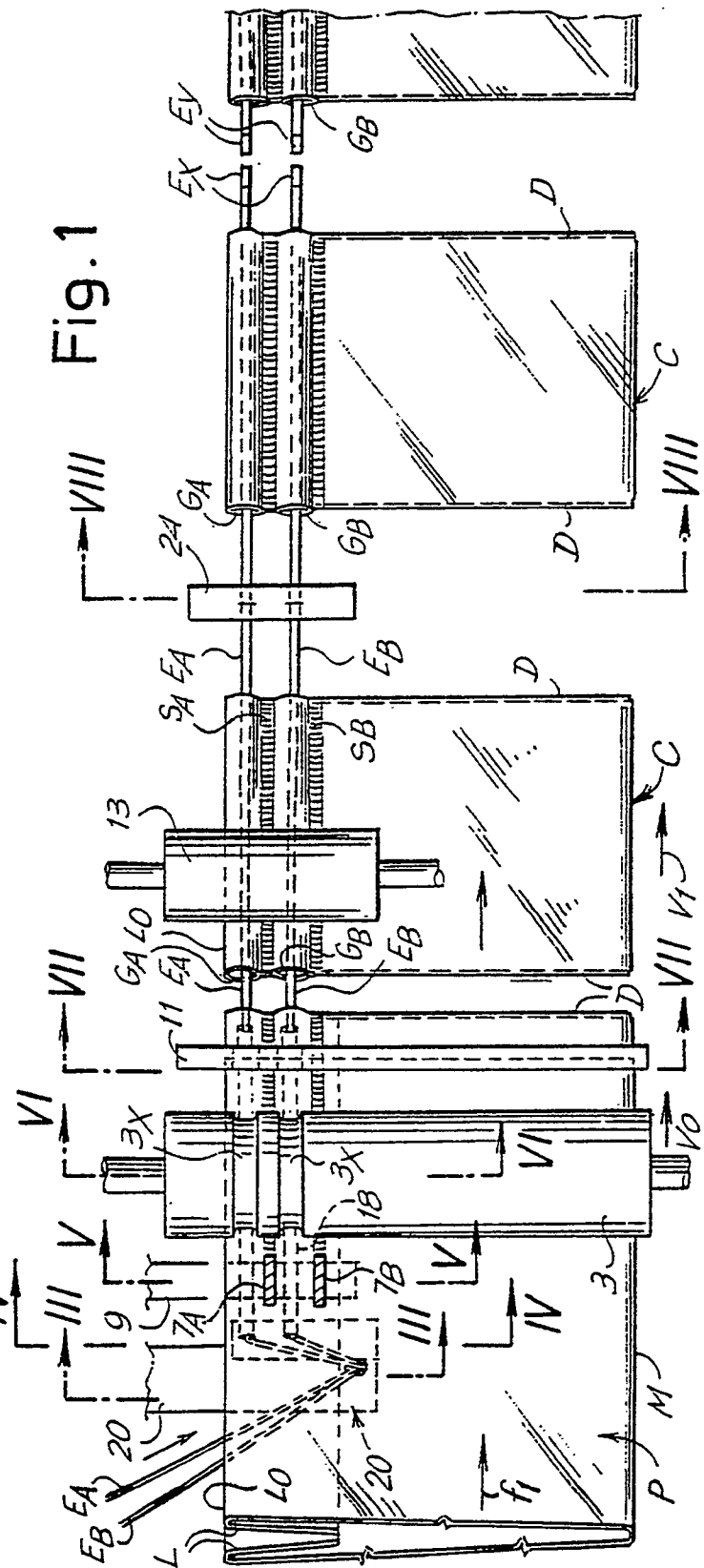
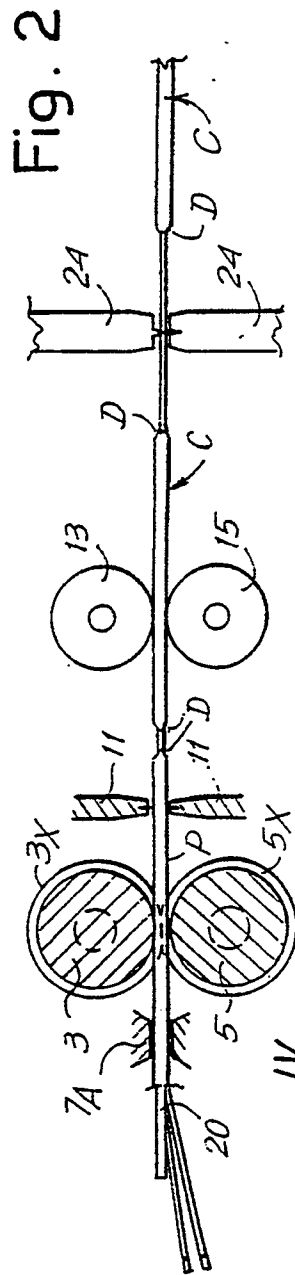
tance from the slot in order to form a shoulder-strap and/or handle, wherein said annular string is constituted by two sections of filiform elements made of thermoplastic material, which sections are welded to one another at the ends in order to form the annular string.

12. The bag as claimed in claim 11, wherein the annular string is slidable through two sections of the slot and can project on opposite sides of the bag itself.

13. The bag as claimed in claim 11, wherein the annular string is engaged at one point of the slot and can slide therein in order to allow the closure of the mouth, and projects from the slot at a point opposite that of engagement with the slot.

14. A bag-type packaging made of thermoplastic film with two slots side by side along and adjacent to the access mouth, and an annular string received slidably in each of said slots, in order to achieve closure by means of the contraction of the mouth by means of the pulling in opposite directions of portions of said two strings, which project oppositely, wherein each of the annular strings is formed by two lengths of filiform elements made of heat-sealing material, which lengths are welded to one another at the corresponding ends in order to create the annular string.

15. The bag or bag-type packaging as claimed in claim 11 or 14, wherein the filiform elements have a band-shaped filament form.



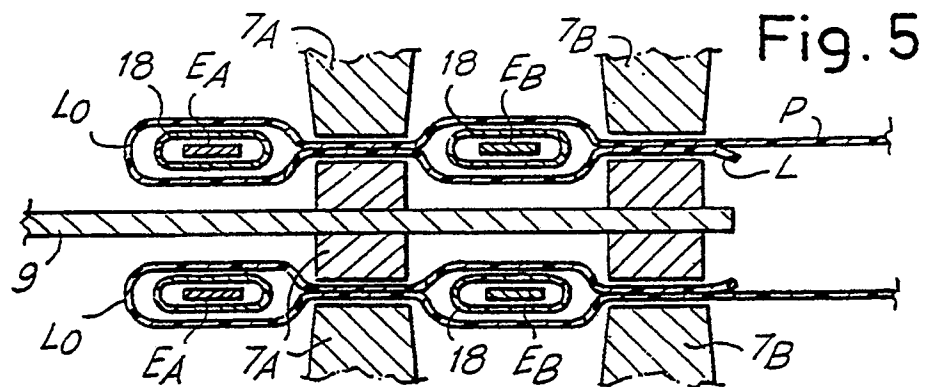
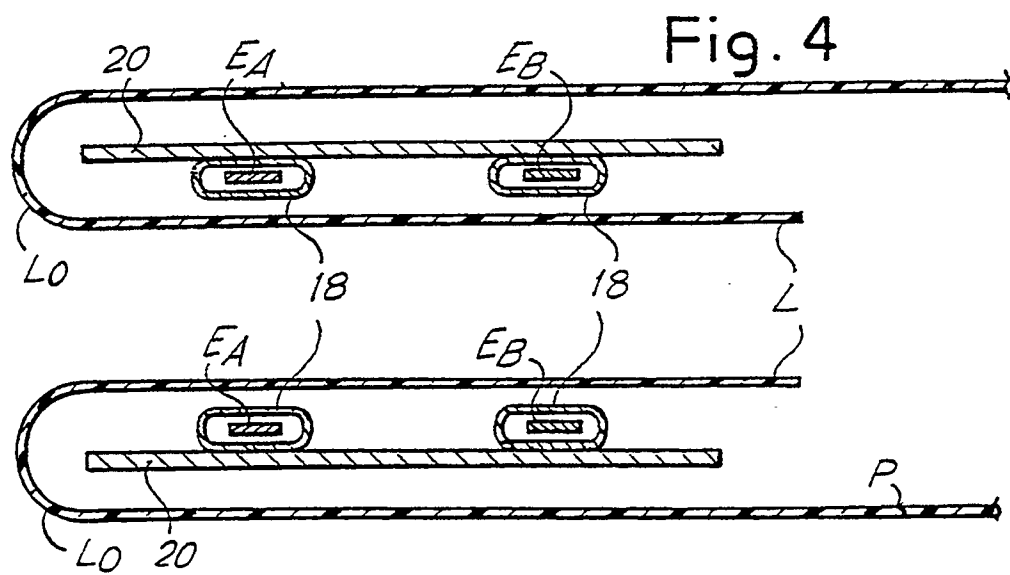
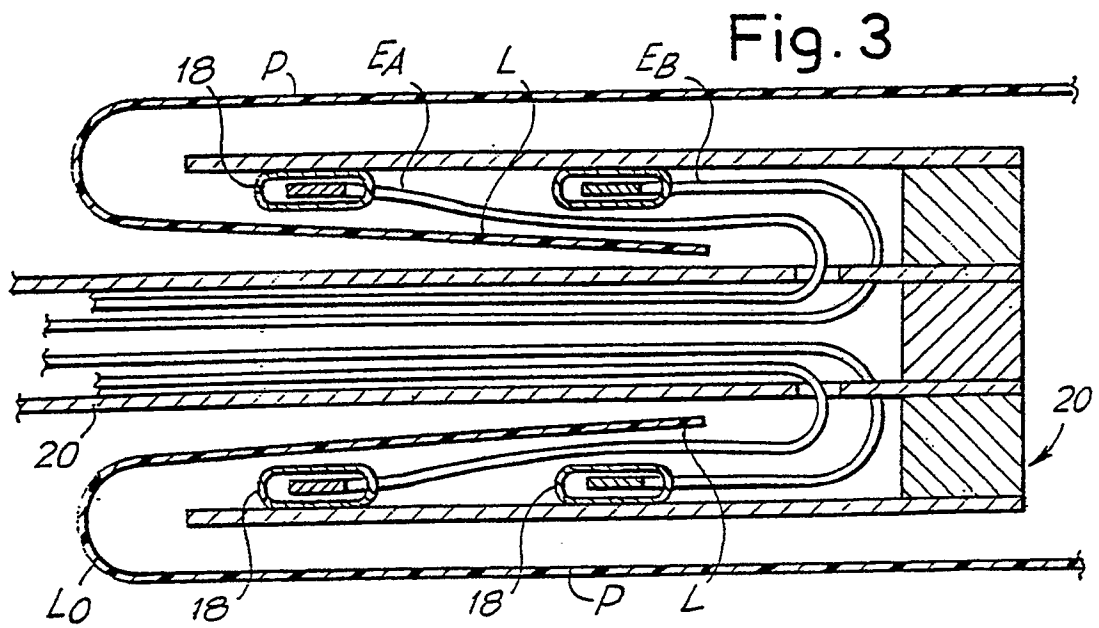


Fig. 6

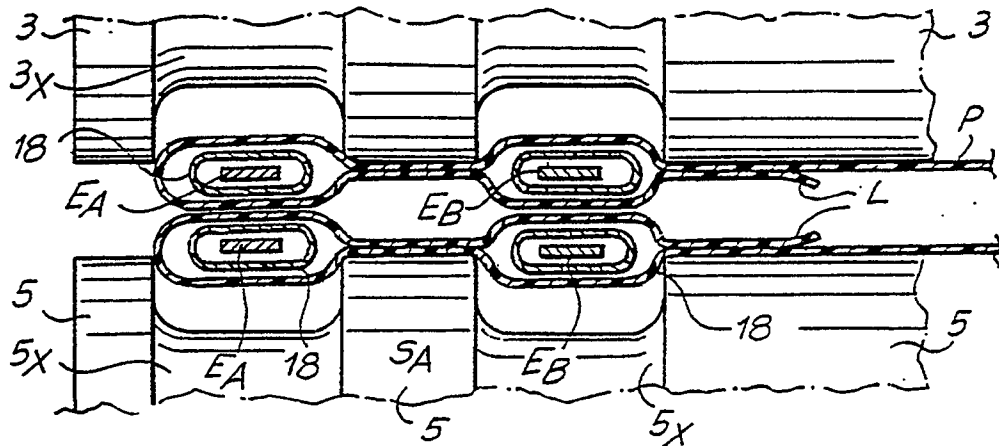


Fig. 7

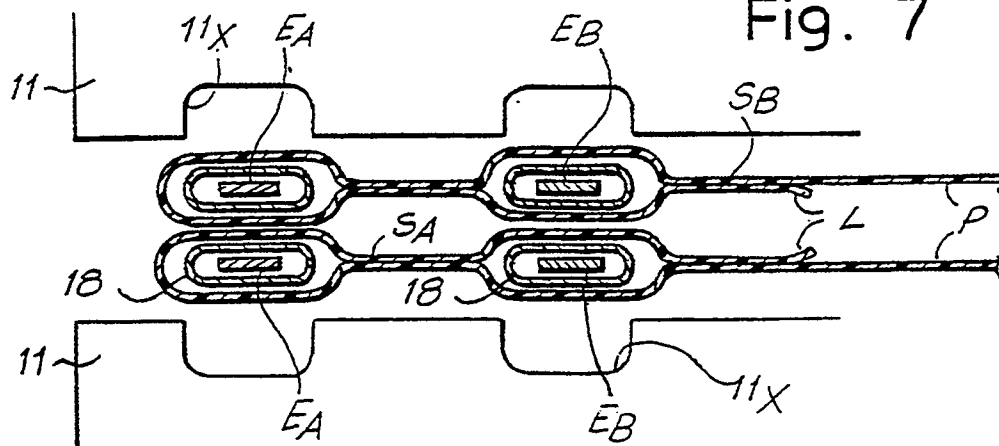
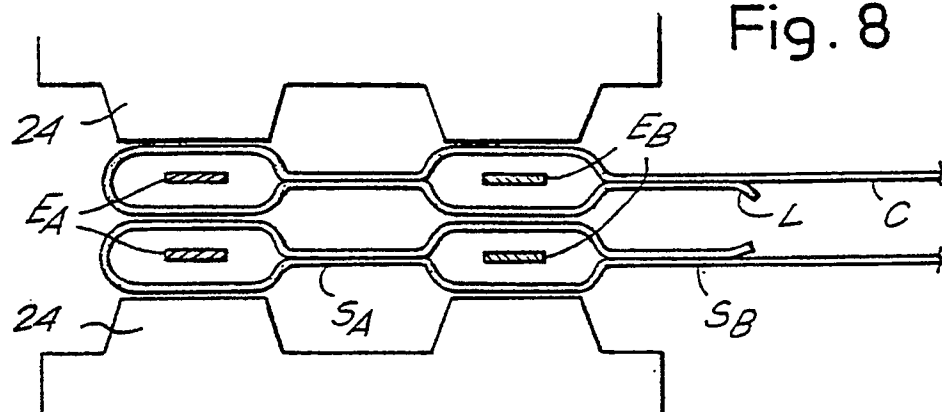
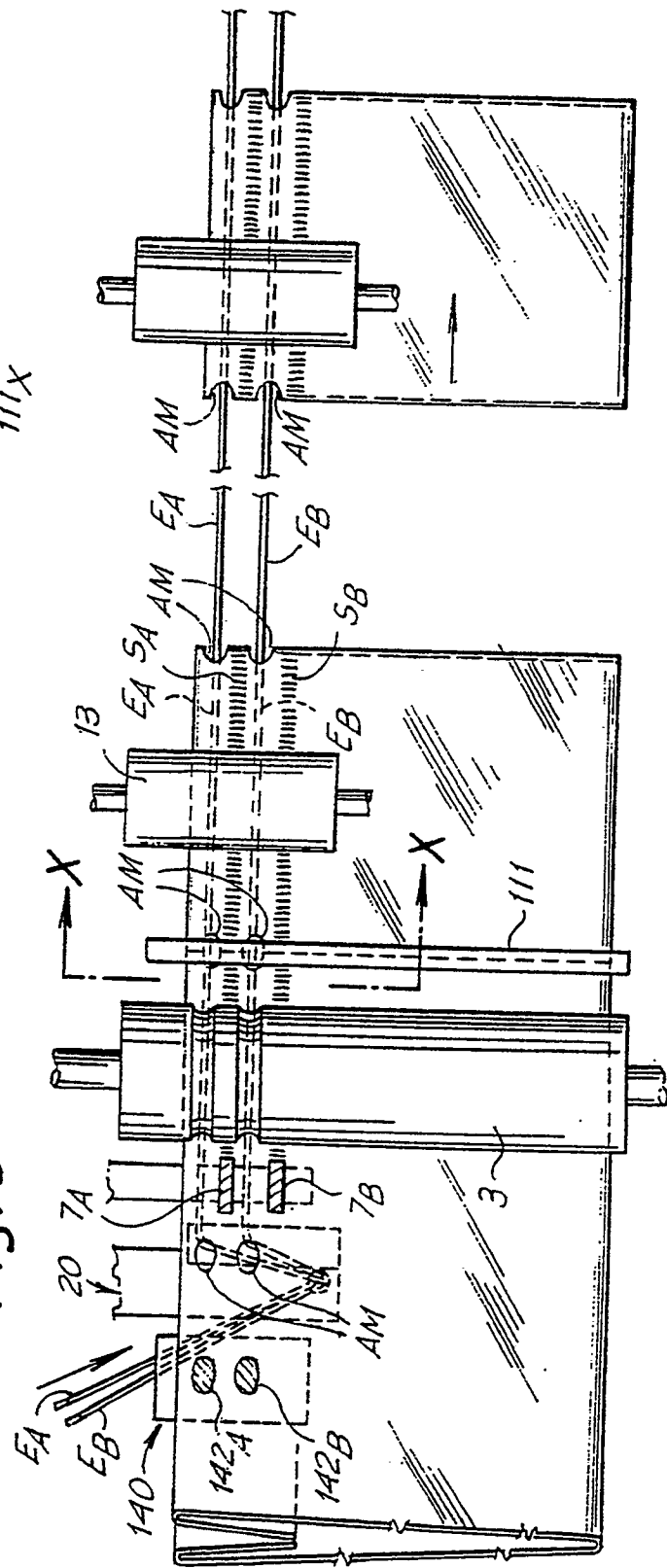
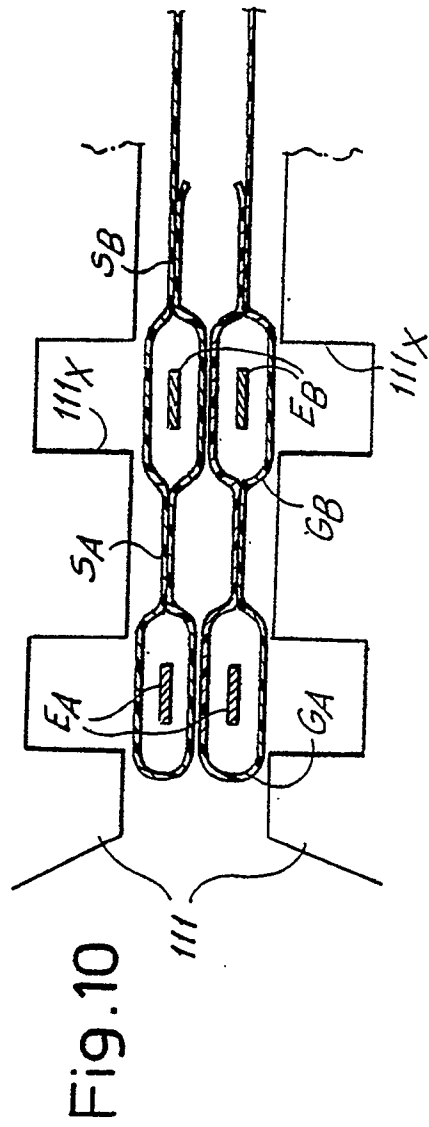


Fig. 8





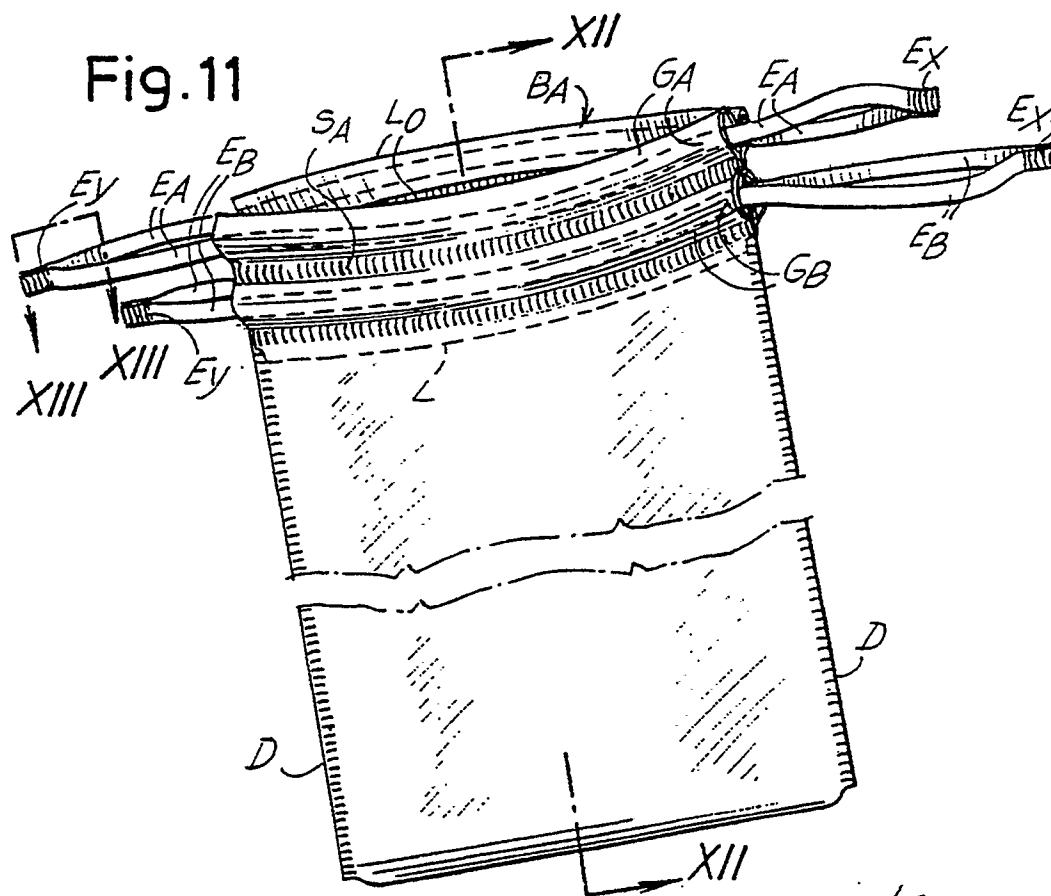


Fig.13

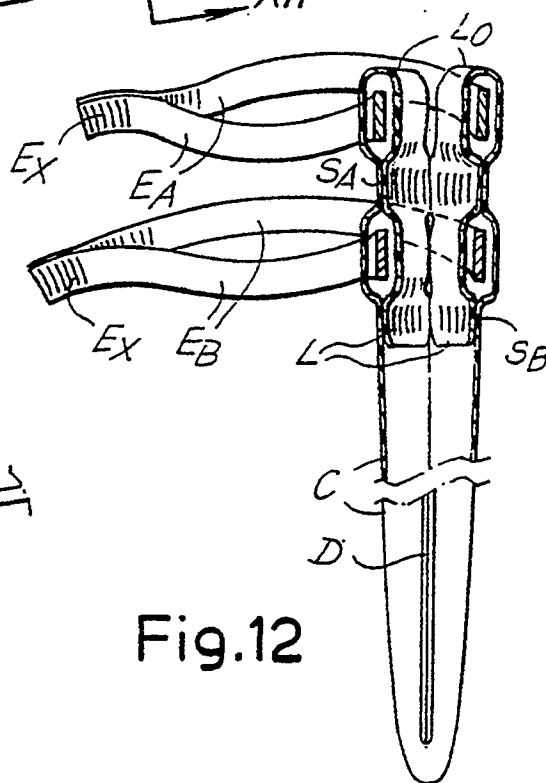
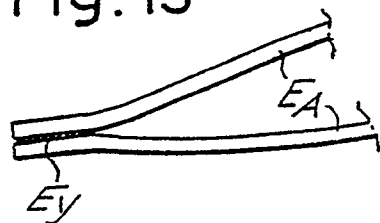
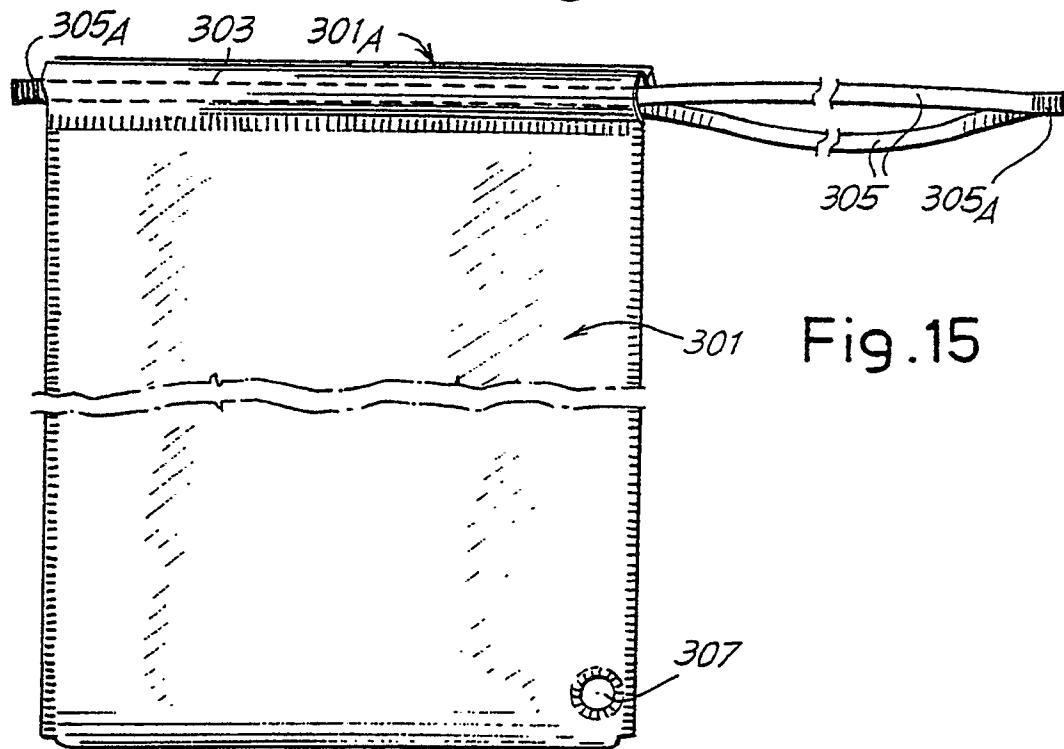
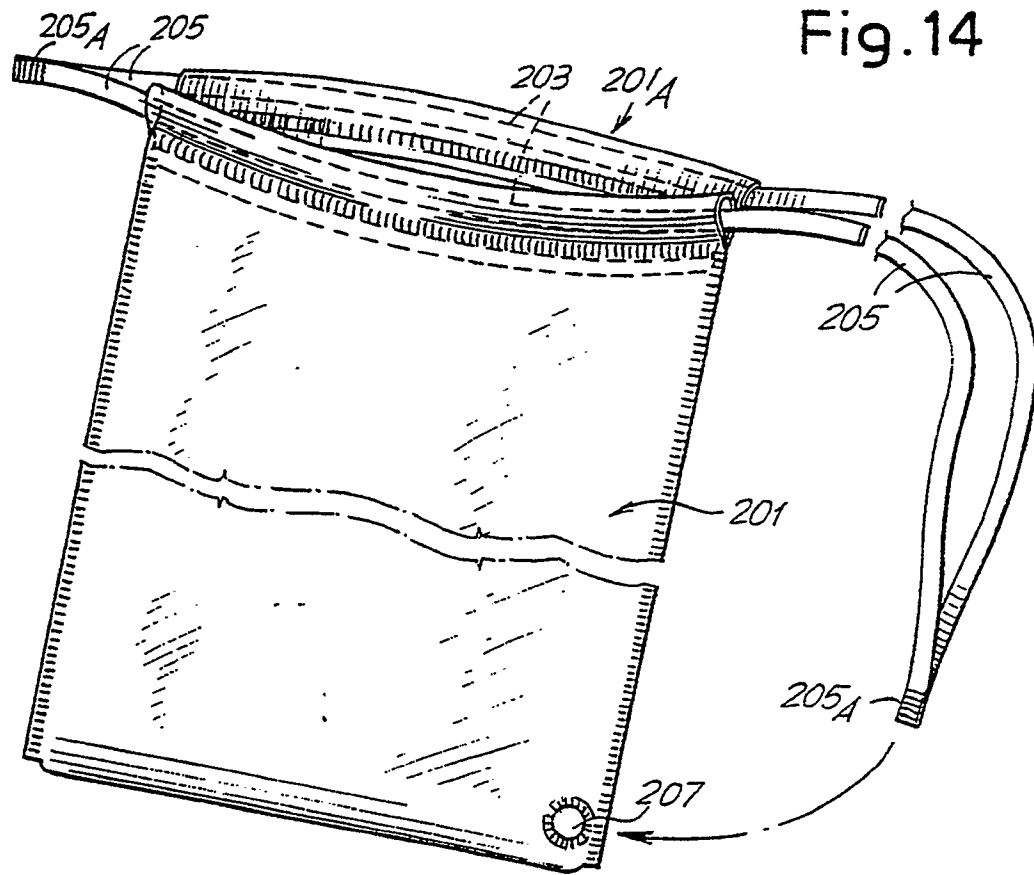


Fig.12





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 83 0566

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 5)
Y	US-A-3 058 403 (KUGLER) * Claim 18; figures * ---	1-5	B 31 B 19/90
Y	FR-A-2 291 025 (JANOWSKI) * Claim 1; figures * * Page 8, line 28 - page 9, line 13 *	1-5	
A	---	8-10	
X	---	11-15	
A	DE-A-1 778 734 (WIEDMANN) ---		
A	US-A-3 283 994 (MILLER) ---		
A	US-A-2 777 491 (ASHTON) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl. 5)
			B 31 B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 01-03-1991	Examiner PEETERS S.
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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