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Process for forming chain of interconnected plastic bags.

A process for forming two chains (24) of interconnected plastic bags in which a pair of plastic webs (31,32) of different widths are superposed in such a way that the wider web or layer (32) extends beyond the edges of the narrower web or layer (31); flaps (22) are then formed at intervals along both sides of the wider layer; the flaps are folded inward over the narrower layer and headers (13) are formed along the folded over edges by sealing along lines (43) inward of the edges; adhesive (23) is applied between the flaps (22) and narrower web or layer (31); the layers are then sealed at intervals together along transverse spaced lines (49) between adjacent flaps and transverse lines of weakness (25) are formed to weaken the transverse seals (49); the webs (31,32) are then divided longitudinally and end connections (29) are formed in each of the two chains.

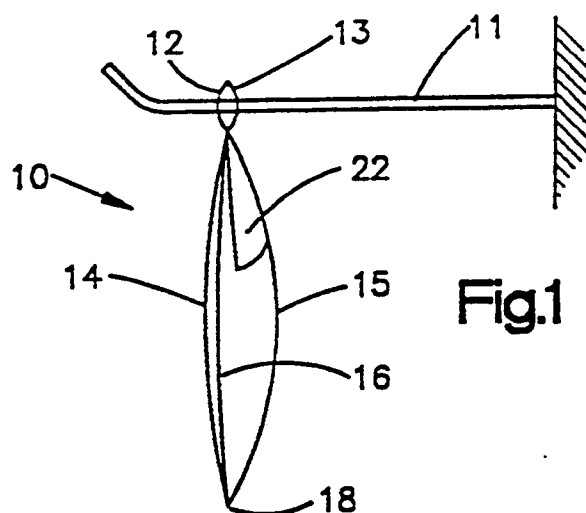


Fig.1

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The present invention relates to a process for forming chains of interconnected plastic bags.

Production of chains of flexible plastic bags is now well known. Some such chains are formed of one row of interconnected bags joined side by side. For example one proposal folded a single layer of flexible plastic back on itself leaving a fold edge and an open edge. Seals were provided to form headers and sides to the individual bags. The individual bags were filled from the open edge and then sealed to close the bag. The bags were then separated from the chain. This arrangement had no recloseability and lacked a desirable appearance when filled with a bulky product.

Other known chains of flexible bags did not lend themselves to efficient production in volume or a high volume filling operation. Other known proposals lacked recloseability and the ability to hang in a display.

A process for forming two chains of interconnected plastic bags according to the invention comprises the steps of moving a pair of plastic webs of differing widths along a path of travel in superposed relationship, positioning the layers with their longitudinal centers aligned such that as the layers are moved along the path the wider projects in both lateral directions past edges of the narrower layer, forming flaps at intervals along both side edge portions of the wide layer, folding both of the side portions and adjacent header portions of the wider layer including said flaps inward over the narrower layer in overlapping relationship to form folded edges along both sides of said wider layer, forming laterally spaced longitudinal seals between said folded over portions and said narrower layer along lines located predetermined distances inward from said folded edges to form headers, applying adhesive between each of said flaps and portions of said narrower layer confronting said flaps, sealing said layers together along transverse seal lines at longitudinally spaced intervals, said seal lines being located between adjacent flaps, forming transverse lines of weakness to weakening said transverse seals, and longitudinally dividing said layers to form two chains of bags and simultaneously forming an end connection between said layers in each of said two chains.

The resulting chains of bags with lines of weakness between individual bag formations enable bag chains to be produced at high volume rates which are well suited for use with a high volume bag filling machine such as that disclosed in our corresponding European Patent Application No. 89 311 191.4 (Publ. No. 0396838A).

In one embodiment of the invention a pair of plastic webs is formed by conveying a single continuous web of plastic film along a path, folding said web lengthwise to form a double layer continuous web having a folded edge, and, continuously cutting said web at an off-center position to produce said pair of webs.

A hole for hanging a resulting bag may be formed at the approximate center of each said header and said transverse seal lines may be interrupted near the centre of the continuous layered web.

The individual plastic bags when separated from the chains provide bags which when loaded with bulky material to form a package are enabled to hang on a display rack each with a substantially flat front wall and a bulged rear wall.

This produces an attractive commercial product.

The provision of a package for products such as nylon stockings that are bulky that can hang from a point of purchase display with a relatively flat front produces one of the outstanding advantages of the bags resulting from the process of the invention. Point of purchase display packages are typically imprinted to provide a prospective purchaser with source identity through a trademark and information as to the contents of the package. A flat package facilitates customer discernment of a message imprinted on the package. By contrast circular packages often used for bulky products provide limited information to a prospective customer unless that customer in one way or another scans around the circular package. Moreover a flat hanging package with an attractive presentation of source identification and of a product information enhances the potential for an impulse purchase of a product.

In addition, the individual bags are reclosable. This feature permits the product to be examined in the store by a prospective buyer without destruction of the packaging. The reclosable bag may be reused after the sale since it is not destroyed by opening.

The finished plastic bag includes a front wall which remains substantially flat when the bag is loaded and a rear wall joined to the front wall along its bottom and sides. When the bag is loaded with a bulky product, the rear wall bulges outwardly in response to pressure from the bag contents more than the front wall. The bag includes a header and an opening formed near the top of the rear wall and adjacent the header. A flap extends downwardly from the header partially overlapping the rear wall and overlying the opening. A resealable adhesive between the flap and an adjacent portion of the rear wall releasably secures the two together to close the opening.

A preferred process according to the invention will now be described with reference to the accompanying drawings in which:-

Figure 1 is a side elevation view of a single bag produced from a chain according to the invention; Figure 2 is a perspective view of a chain of connected plastic bags produced according to the present invention;

Figure 3 is a schematic perspective view of process steps according to the invention showing a web being folded, cut and unfolded;

Figure 4 is a schematic perspective view of a pro-

cess of flaps being formed and folded in the web of Figure 3;

Figure 5 is a schematic perspective view of the step of folding flaps inward;

Figure 6 is a schematic perspective view showing a process step of forming headers in the web of Figure 5;

Figure 7 is a schematic perspective view of a process step of raising a flap, applying adhesive to the web of Figure 6, and punching a hole in the header; and

Figure 8 is a schematic perspective view showing process steps of forming side connections, forming lines of weakness, and dividing the web of figure 7.

Referring to Figures 1 and 2, a package in the form of a finished and loaded plastic bag 10 is provided. The bag 10 is shown hanging from a display hanger 11 projecting through a hole 12a in a header 13. The bag includes a front wall joined to and depending from the header 13. The front wall 14 remains substantially flat when the bag 10 is loaded with a light but bulky product such as nylon stockings. The bag includes a rear wall 15 which bulges outwardly in response to pressure from the bag contents more than the front wall 14.

The bag 10 includes side connections 16, 17 defining side edges and, once loaded and sealed to form a package, a permanent bottom connection 18 joining the front and rear walls 14, 15. The bag 10 has a top end 19 and bottom end 20.

The bag 10 includes an access opening 21 formed in a rear wall 15 immediately below the header 13. The flap 22 extends from the base of the header 13. The flap 22 partially overlaps the rear wall 15 and covers the access opening 21. An adhesive 23 placed between the flap 22 and an adjacent portion of the rear wall 15 resealably connects the flap 22 to the rear wall 15. The resealable flap 22 allows the contents of the bag to be examined by prospective purchasers and removed after purchase without breaking the bag. Further, it provides the purchaser with a bag that may be subsequently used for other purposes.

Referring to Figure 2, a chain 24 of interconnected plastic bags 10 is shown. The bags are connected together by lines of weakness 25. First and second temporary openings 26, 27 are formed in each bag 10 near the bottom end 20 for conveying the bag on a mandrel in a subsequent filling operation. The openings 26, 27 do not survive the bag filling process and are not a part of the final product seen by the customer. The first and second side connections 16, 17 terminate a predetermined distance from the bottom end 20 of the bag leaving a small unsealed distance along the sides of each bag between termination point 28 of the side connections 16, 17 and a temporary end connection 29. The temporary openings 26, 27 and connection 29 serve to allow conveyance of the bag

on a mandrel in a bag-filling process. The bag filling process is described more fully in the referenced related application.

An important feature of the plastic bag 10 is the substantially flat appearance of the front wall 14 when the bag 10 hangs on a display hanger 11. The rear wall 15 bulges in response to the force of the bag contents more than the front wall 14. This gives the bag a pleasing appearance. The front wall 14 is directly secured to the header 13 while the rear wall 15 is not. The rear wall 15 is secured indirectly to the header 13 through the adhesive 23 and the flap 22. This results in the rear wall 15 expanding and taking up the bulge of the bag contents.

Figure 3-8 illustrate the steps of a process for forming two chains 24 of inter-connected plastic bags. The process begins by creating a continuous layered web 30 of two confronting layers 31, 32. This may be accomplished by feeding separate webs of plastic film from two sources and placing the separate webs in a confronting relationship to form a layered web 30. In the preferred and illustrated embodiment, however, the layered web 30 is created by feeding a single continuous web 33 of plastic film from a single supply to a V-board 34. The film 33 is fed off center over the V-board 34 as shown in Figure 3. The film 32 is continuously cut longitudinally at an off-center position dividing the web into two parts 31, 32 of unequal width. The V-board 34 and a set of V-board rollers 35 achieve the step of folding the web 33 lengthwise forming a double-layer continuous two-part folded web 30 of plastic film having a fold 36. The narrower part has been referred to as the first layer 31 and the wider part as the second layer 32.

The step of cutting the film longitudinally is preferably done by a conventional slitting knife 37 as the film is crossing the V-board 34. Thus, the film is in two parts before it is folded and the fold 36 is placed in the part that becomes the second layer 32.

After leaving the V-board rollers 35, the second layer 32 of the double-layer web 30 is unfolded leaving two confronting separate layers 31, 32 of differing widths. The second layer 32 is unfolded by passing the continuous web across an unfolded roller 38. The resulting two layers 31, 32 are now positioned in a confronting relationship with the center of the first layer 31 being aligned with the center of the second layer 32. The proper alignment of the two layers 31, 32 is achieved by fixing the positions of the fold 36 and the knife 37 with conventional web alignment mechanisms.

The web 30 next passes through a notch cutter 39 where notches 40 are formed at intervals along both sides of the second layer 32 as seen in Figure 4. The notches 40 define the flaps 22 of the individual bags 10.

After leaving the notch cutter 39, the web 30 contacts a folding roller 41 having a length less than the

width of the second layer 32. The outer edges of the second layer 32, including the flaps 22, fold inward as the web contacts the folding roller 45 as seen in Figure 5. The outer edges of the second layer 37 are further folded and pressed by conventional hold-down members 42. The outer edges of the second layer 32, including the flaps 22, now overlap the outer edges of the first layer 31. The folding step is done at a predetermined position so the resulting folds define the top ends 19 of the bags 10.

The next step is to form the header seal lines 43. The header seal lines 43 seal the second layer 32 upon itself along lines located at a predetermined position to form headers 13. The header seal lines 43 are formed by conventional heat seal rollers 44. The header seal lines 43 run parallel to the side of web 30 defining headers 13 on the individual bags 10. The flaps 22 and headers 13 are locked in position by the header seal lines 43. Thus a single sheet of film, the second layer 32, forms the front wall 14, the header 13, and the flap 22 of each bag 10.

The next step is to apply adhesive 23 between each of the flaps 22 and a portion of the first layer 31 on both sides of the web 30. The step of applying the adhesive 23 comprises raising the flaps 22 and applying a bead of adhesive material 23 to the first layer 31 at spaced intervals, or what will become the rear walls 15 of the individual bags 10. The flaps 22 may be raised by any number of conventional means. In the preferred embodiment, the flaps are raised by jets of air emitted from compressed air nozzles 45. The flaps 22 are held in a raised position for a short while by fingers 46 while the adhesive 23 is being applied. The adhesive 23 is applied by conventional glue guns 47. In the preferred embodiment, the adhesive 23 is first heated, and then applied with glue guns sold under the trademark NORDSON SWIRLGUN by Nordson Corporation of Westlake, Ohio.

After the headers 13 are formed in the web 30, the holes 12 are punched at spaced intervals along both sides of the web 30 at positions corresponding to the center of each bag by a conventional punch 43. The holes 12 permit the bags 10 to be hung from hangers 11.

The next step is to form side connections 16, 17. The side connections are formed by transverse seals 49 of the layered web at spaced intervals located longitudinally speaking, between adjacent flaps 22. The transverse seals 49 are heat seals joining the first and second layers 31, 32 together. The seals 49 are formed at positions which correspond to the side connections 16, 17 on the individual bags. The transverse seals 49 are not continuous across the width of the layered web. Each transverse seal is interrupted near the center of the layered web to form the first and second temporary openings 26, 27 in the individual bags. The transverse seals 49 do not extend across the headers 12. The transverse seals 49 are formed with

a reciprocating interrupted heater bar 50. Opposing the heater bar 50 is a back-up drum 51.

The lines of weakness 25 are formed between the bags 10. The lines of weakness 25 are formed along the center line of the transverse heat seals 49. The lines of weakness 25 allow the bags 10 to be separated from one another without damaging the bags. In the preferred and illustrated embodiment, the lines of weakness are perforated lines formed by a conventional perforating roller 52. Opposing the perforating roller is a perforating back-up roller 53.

The final step is to longitudinally cut the continuous layered web with a hot knife 54 along its center to form two identical chains of bags. The hot knife 54 seals the first and second layers 31, 32 together forming the temporary end connections 29.

Claims

1. A process for forming two chains of (24) of interconnected plastic bags according to the invention comprising the steps of:-
 - (a) moving a pair of plastic webs of differing widths along a path of travel in superposed relationship;
 - (b) positioning the layers (31,32) with their longitudinal centers aligned such that as the layers are moved along the path the wider (32) projects in both lateral directions past edges of the narrower layer (31);
 - (c) forming flaps (22) at intervals along both side edge portions of the wide layer(32);
 - (d) folding both of the side portions and adjacent header portions (13) of the wider layer (32) including said flaps (22) inward over the narrower layer (31) in overlapping relationship to form folded edges along both sides of said wider layer (32);
 - (e) forming laterally spaced longitudinal seals between said folded over portions and said narrower layer along lines located predetermined distances inward from said folded edges to form headers (13);
 - (f) applying adhesive (23) between each of said flaps (22) and portions of said narrow layer (31) confronting said flaps (22);
 - (g) sealing said layers (31,32) together along transverse seal lines (49) at longitudinally spaced intervals, said seal lines being located between adjacent flaps (22);
 - (h) forming transverse lines of weakness (25) to weakening said transverse seals (49); and,
 - (i) longitudinally dividing said layers (31,32) to form two chains of bags (24) and simultaneously forming an end connection (29) between said layers in each of said two chains.

2. A process according to claim 1, wherein said pair of plastic webs is formed by conveying a single continuous web of plastic film along path; folding said web lengthwise to form a double layer continuous web having a folded edge; and, continuously cutting said web at an off-center position to produce said pair of webs (31,32). 5
3. A process for forming two chains of interconnected plastic bags (24) according to Claim 1, and further comprising the step of forming a hole (12) in the approximate center of each said header (13) for hanging said bag (10) in a display. 10
4. A process for forming two chains of interconnected plastic bags (24) according to Claim 1, and further comprising the step of interrupting said transverse seal lines (49) near the center of said continuous layered web (30). 15
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5. A process according to claim 1, wherein the dividing step is performed along the approximate center of the layered web (30). 25

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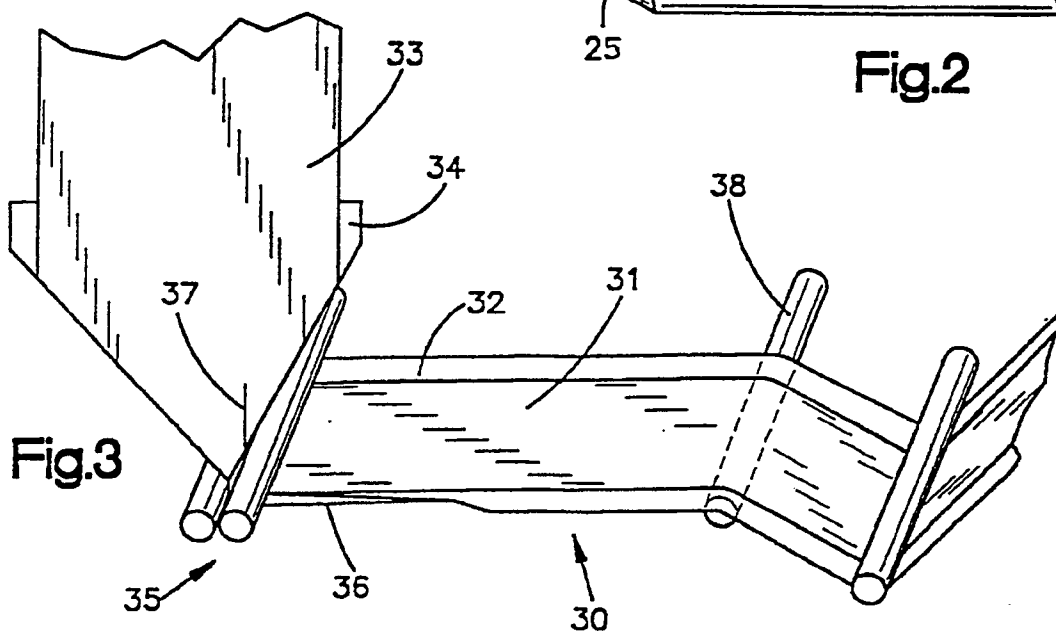
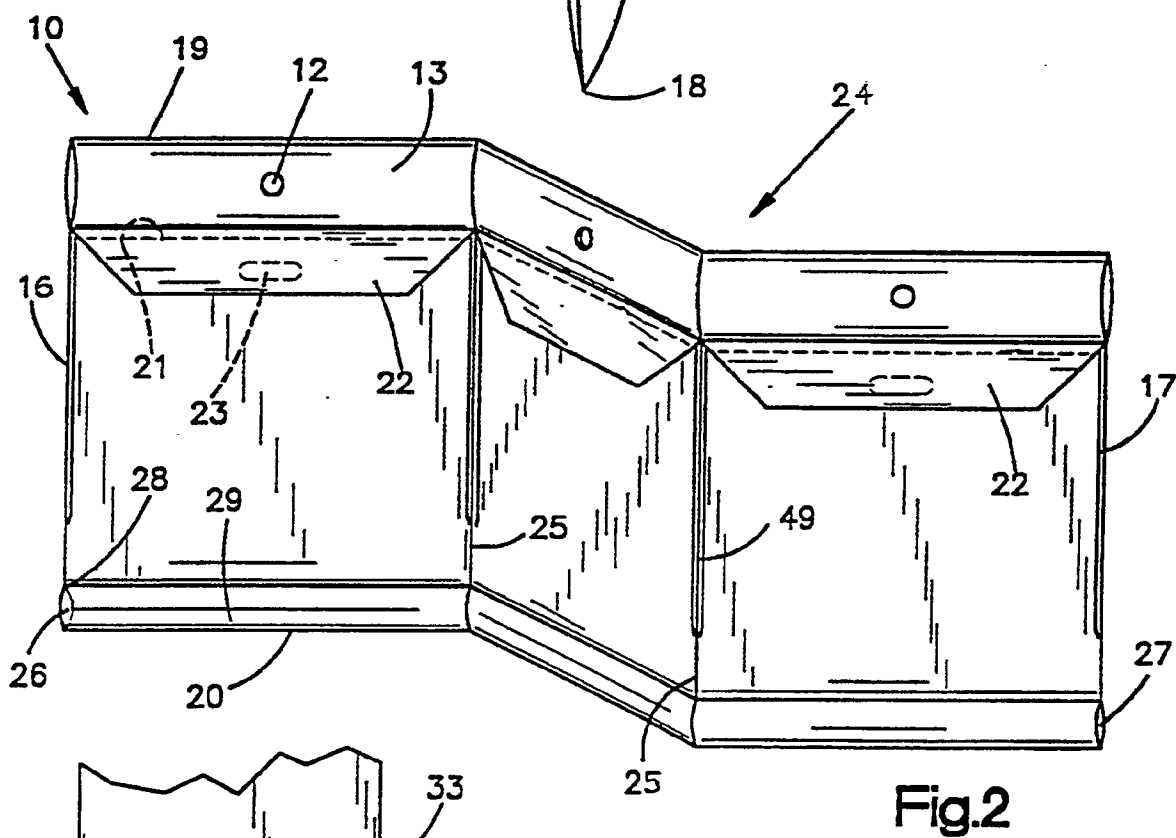
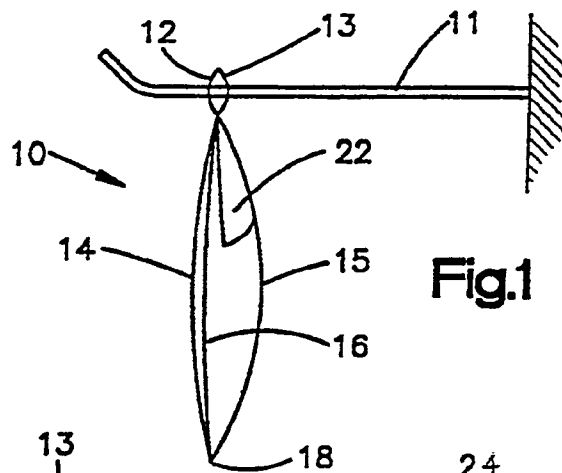
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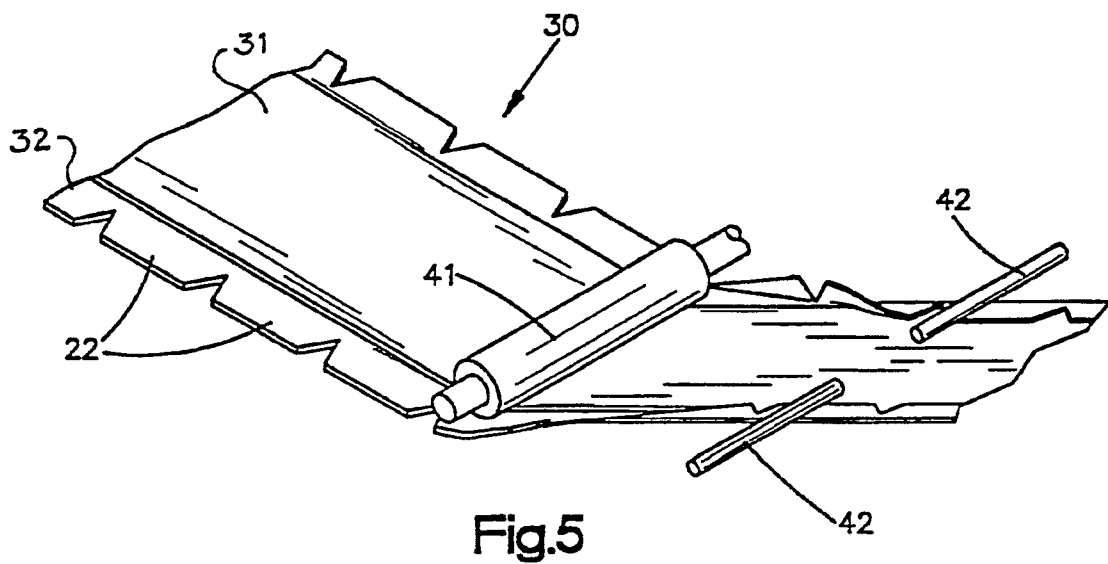
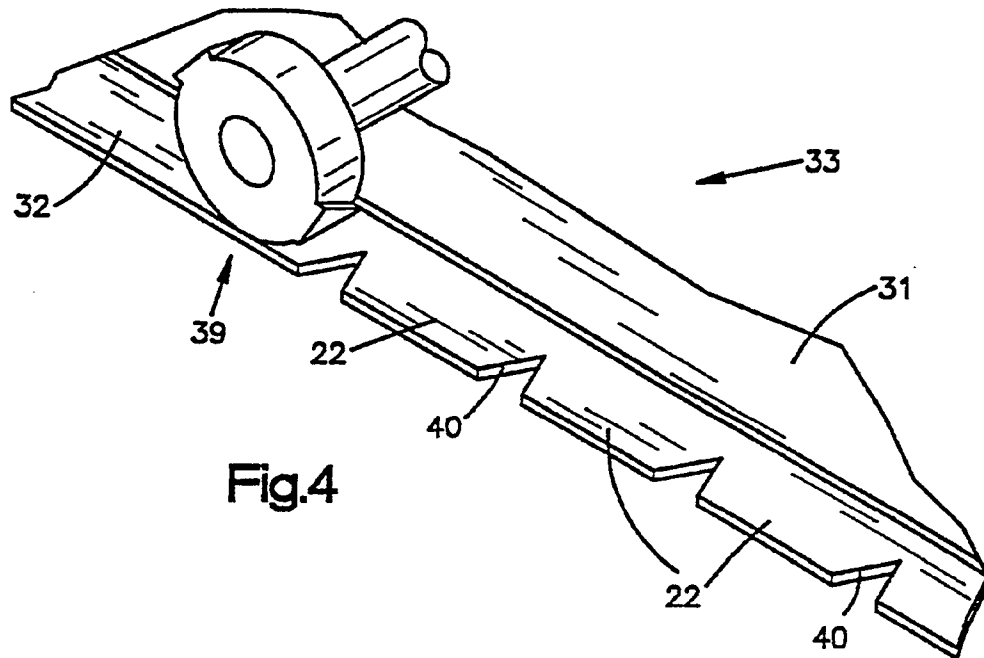
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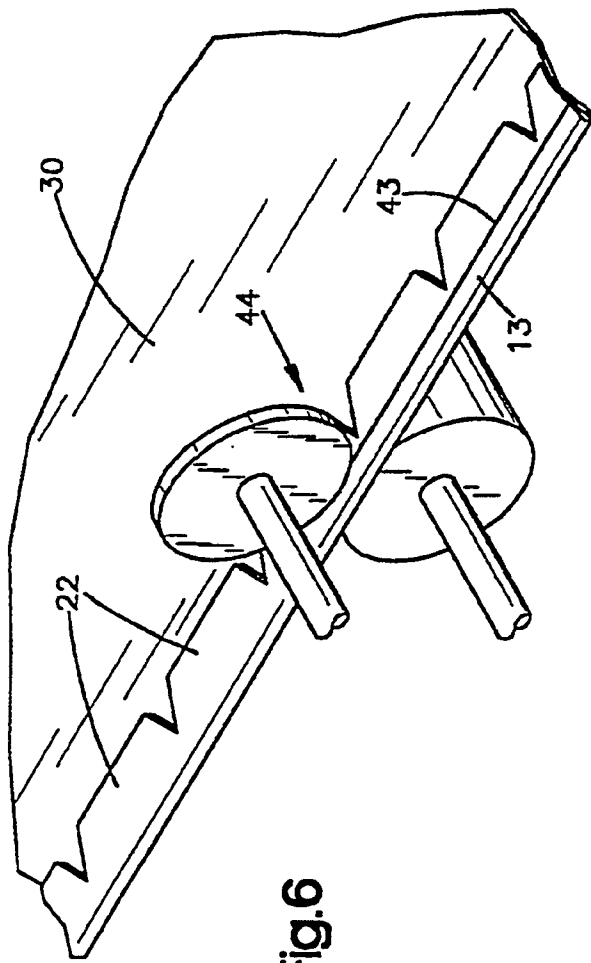


Fig.6

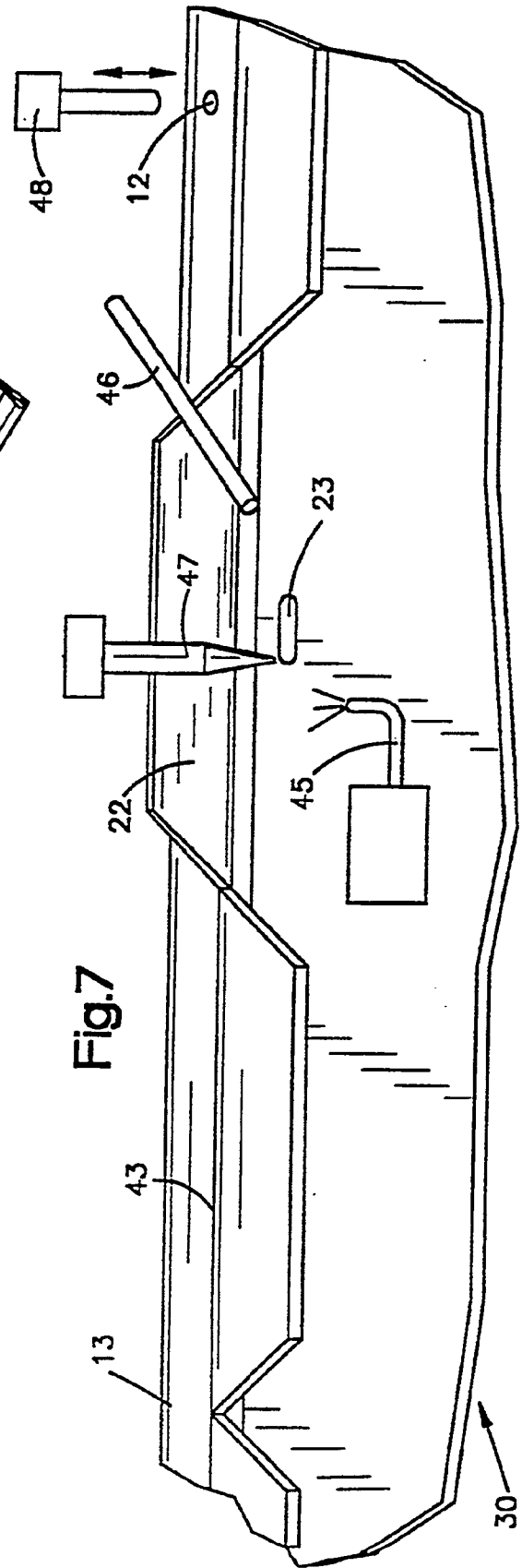


Fig.7

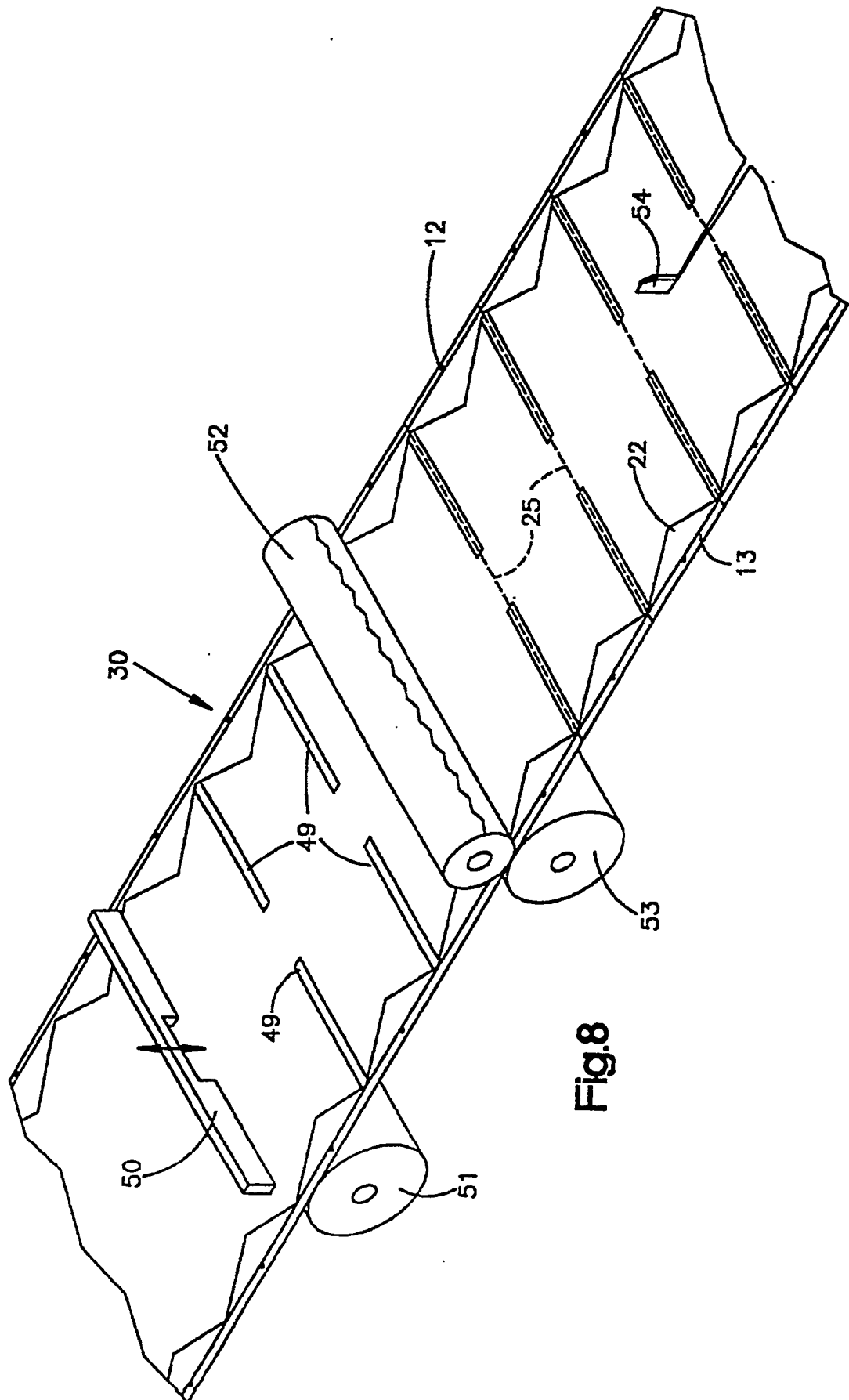


Fig. 8



European Patent
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EUROPEAN SEARCH REPORT

Application Number

EP 91 30 2419

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)
A	GB-A- 800 289 (DICKINSON) * Page 2, lines 8-46; figures 1,2 *	1	B 31 B 27/00
A	GB-A- 868 215 (DICKINSON) * Page 6, lines 84-106; figure 29 *	1,3	
A	US-A-4 360 355 (SUOMINEN) * Abstract; fig. *	1	
A	US-A-4 015 771 (SENCEWALD)		
A	US-A-3 954 049 (BRIESKE)		
A	FR-A-1 344 448 (HERVE)		
A	CA-A-1 126 701 (CINRAN)		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B 31 B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		18-06-1991	PEETERS S.
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