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(54) Perforated packaging for food casing

(57) This invention is an easily opened shirred food casing packaging and, in particular, a package including a bundle of shirred casings (23) retained in an easy opening container formed of a resilient stretch or shrink film (1) having a specific arrangement of rows of perforations (2) and removable film panels (5).

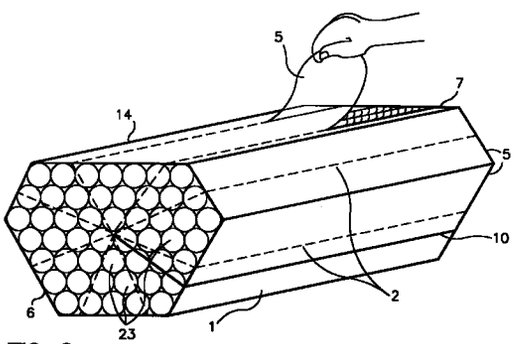

FIG. 2

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Description

Field of the Invention

The present invention relates to an easily opened shirred food casing packaging and, more particularly, to a package including a bundle of shirred casings retained in an easy opening container formed of a resilient stretch or shrink film having a specific arrangement of rows of perforations and removable film panels.

Background of the Invention

Small diameter sausages such as frankfurters or the like usually are made using cellulosic food casings. These casings or the like customarily are manufactured in long, continuous tubes. For handling convenience, these long tubes are gathered into pleats by shirring and are longitudinally compressed by known techniques to obtain a shorter, relatively rigid tube known in the industry as a shirred casing stick. The coherency of the shirred stick is derived in part from the shirring operation which forms the casing into generally conical pleats which nest one within another.

During a stuffing operation, the stick is loaded onto a stuffing horn and a food emulsion is fed through the horn and into casing, which is drawn forward from the stick by the stuffing pressure. It is not uncommon for a shirred stick 50 cm long to contain upwards of 50 meters or more of casing, allowing a large number of individual frankfurters to be made with each stick.

Packaging and shipping of shirred sticks presents several problems, particularly for the type of casings used for frankfurters, which generally have a wall thickness of only about 0.025 to about 0.05 mm. For example, shirred sticks of this casing are relatively fragile in that the nested pleats of casing formed by the shirring operation are easily separated or pulled apart. If the pleats separate, the stick is said to break or lose "coherency". The result is one or more rigid shirred sections connected by loose unshirred sections. Sticks in this condition are not easily loaded onto a stuffing horn and are not at all suitable for automatic stuffing operations wherein the stick is loaded onto a stuffing horn by mechanical means. Accordingly, the packaging for the shirred sticks must be able to minimize stick breakage.

Shirred sticks also are susceptible to damage if made wet. Since stuffing machines frequently are hosed down with water after a stuffing operation, any sticks in the area should be retained in packaging that protects the sticks from damage due to water overspray.

In commercial practice it generally is customary to package sticks in tight bundles of fifty sticks. Bundling sticks together accomplishes several functions. For example, if the sticks are tight together, there is less likelihood of relative motion between the sticks so the sticks do not rub one against another. Rubbing together of sticks tends to produce undesirable pinhole damage in shirred casing. Also, a tight bundle helps to prevent bowing of individual sticks. Bowing is the result of a number of factors known in the art and is cause for concern because a bowed stick may not load onto a stuffing horn. A tight bundle further tends to reduce the likelihood of stick breakage as long as the bundle remains intact.

Conventional packaging for retaining a stick bundle generally is a carton or box comprising a combination of corrugated fiber board (cardboard) and a plastic wrap such as a shrink or stretch film. Packages of this type are rigid, but contain a large amount of cardboard packaging material that must be, generally after a single usage, disposed of, most often in a landfill. Besides generating a potentially large expense for the end user of the product in terms of waste handling and disposal, it is an environmental concern. In addition, certain end users of these casings have been prohibited from having cardboard in the meat stuffing area of their processing plant due to an increased risk of biological contamination on the cardboard, as opposed to plastic packaging, which in turn can contaminate the meat product. It is desirable to remove the cardboard while providing a functional, easy to use packaging system of these stick bundles.

In another packaging system to replace the corrugated fiber board, as shown in U.S. Patent No. 3,764,351, rigid end panels are placed against the end of the stack and the stack is then bundled together with the rigid end panels by a shrink film. Since opening a strong shrink film as used in '351 is generally difficult, a tear strip was built into the package.

This illustrates another problem seen in packaging casing sticks bundles, that is, easily opening the packaging. The end user of casing sticks is the operator on the factory floor who puts the individual sticks on a stuffing machine. This person also handles meat emulsions, which are wet and leave the operator with wet and greasy hands. To use the package of casing sticks, the operator must pick it up with wet hands, manipulate it by turning it around, look for a way to open the packaging, and finally opening it, all while under time pressure.

Generally, it is difficult to open packaging made of a shrink film or stretch film, especially quickly. A number of solutions have been offered to overcome this problem, including providing two lines of perforations on one side of the packaging, where the film must be pulled off or torn out between the perforations or by providing a tear strip, either alone or between perforations, thereby making a hole in the film to open the package. Problems with these solutions include finding the perforations in the first place and then finding a place to begin tearing out the film between the perforations. In order to overcome some of these problems a tab can be placed at the beginning of the tear strip, which the user can pull on to begin the opening process. Or a string or wire can be placed under the tear strip and attached to the tab, making for a stronger tear strip. However, these are difficult to grasp and pull if the operators hands are wet or greasy.

Another solution to the easy opening problem is shrink wrapping the packaging around the goods to be packaged in such a way that an open space is left at a place on the packaging. The operator can grasp the edges of the open space and pull off the plastic packaging. The problem with this solution is that the tough plastic must be manually ripped, which generally does not follow a straight line, or cut with a sharp object, lending itself to damage of the casing underneath. In both cases, there is only one narrow opening left making removal of the sticks very difficult.

Still another solution, as seen in US 4,586,312, is placing two rows of perforations longitudinally down the film and multiple rows of perforations transversely between the longitudinal rows to form squares. Various sized openings are made when one or more squares of film are removed. This type of opening has a drawback in that the operator is limited to one orientation of the packaging for opening and emptying at the stuffing machine, which can be difficult in a high pressure situation.

What is needed is an easily opening package that substantially maintains the integrity of a bundle of shirred casing sticks without the use of bulky corrugated fiberboard or the like.

The package should further provide protection from water spray, be easily formed, and be easy to open. Finally, such packaging should help to reduce the amount of waste sent to a landfill as compared to the amount sent when cardboard is used.

Brief Description of the Invention

Accordingly, the present invention is characterized in one aspect by a easily opened package of shirred food casing comprising

a) a stack of tubular shirred sticks of food casing, all of substantially equal length and diameter, arranged in rows stacked one on another with the longitudinal axes of the sticks parallel and the stick ends coplanar, the stack having at least four sides and two opposite ends;

b) a retainer of a plastic film disposed in tension around the stack to form a bundle, the film having longitudinal side edges extending in a direction transverse to the longitudinal axes of the sticks and opposite transverse ends connected to each other; and

c) the film has at least four transversely spaced rows of perforations extending between the longitudinal edges of the film, the film being frangible along each of the rows of perforations and the portion of film between adjacent rows comprises removable panels, and the spacing between the rows of perforations in relation to the perimeter of the bundle is sufficient to locate one or more of the panels in each of at least two sides of the bundle,

whereby the package is easily opened by starting the removal of any panel at any point along a longitudinal edge of the film.

Another aspect of the invention is a film for use in wrapping any goods, but in particular multiple shirred casing sticks in a multisided bundle, comprising an oriented heat shrinkable thermoplastic film that has transversely spaced rows of frangible perforations that extend between the longitudinal edges of the film, where the film between any adjacent rows forms a removable panel, and the spacing between the rows of perforations in relation to the perimeter of the bundle is sufficient to locate at least one of the panels in each of at least two sides of the bundle and is also sufficient so that when the film is wrapped around the bundle at least four rows of perforations occur around the bundle.

This invention makes it unexpectedly easier for users of casing, or any goods, wrapped in a resilient film, to open the package with a simple pull at any point along a side edge of the package, so a panel is removed completely from the package leaving a substantial opening from which casing, or any other goods, can be removed from the package as needed. As the film is a plastic, it provides a degree of protection from water, and once the container is empty, it can be disposed of using much less landfill space than does cardboard.

Brief Description of the Drawings

Figure 1 is a plan view of a sheet of film showing at least one arrangement of rows of perforations according to the present invention.

Figure 2 is a perspective end view showing one embodiment of an easy open shirred food casing package of the present invention.

Figure 3 is a view similar to Figure 3 only from an opposite end and showing another embodiment of the invention.

Detailed Description of the Invention

This invention in one aspect comprises a mono-or bioriented heat shrinkable or stretch plastic film that contains transverse rows of frangible perforations, where a panel of film is formed between the rows. This film is used to package

goods, such as multiple shirred sticks of sausage casing, in a tight bundle. At least one end of the bundle is partially open and provides a film edge for grasping to tear open the package.

The rows of perforations are spaced apart and arranged in such a way that when the film is disposed about the shirred sticks to form the bundle, there are at least four rows of perforations disposed about the perimeter of the bundle. This provides at least one panel that spans adjacent sections of two sides of the package. Preferably, the rows of perforations will be such that at least one row will be placed on each side of the package, and one or more of the panels overlap two adjacent sides of the bundle. The panels can be torn from the package by a user grasping the film edge at any point at the partly open end of the package and pulling. It has been found that on a typical bundle of fifty shirred casing sticks, no more than twelve rows of evenly spaced perforations, or six panels, are useful. Increasing the number of rows of perforations and panels weakens the film strength to the point where unintended opening of the package may occur by spontaneous tearing along a line of perforations.

Referring now to the drawings, Figure 1 shows the film of the present invention indicated at 1. Film 1 is shown as having two longitudinal edges 3 and two transverse edges 4, only one of which is shown. The film further has multiple transverse rows of perforations 2 extending across the width of the film, or transversely, from one film side edge 3 to the other. The rows of perforations 2 are spaced apart so that the distance "D" between them forms a panel 5 large enough to remove the goods that will be wrapped by film 1. Preferably, for purposes of packaging shirred casing sticks commonly used for producing frankfurters, the rows of perforations 2 are spaced from about 50 mm to about 100 mm apart and more preferably about 70 mm apart.

The film that can be used in the present invention is any plastic film of appropriate gauge for tightly wrapping foods and that can be either heat shrunk or is stretchable and is preferably heat sealable. If the package of goods is to be large and/or heavy, a stronger, possibly heavier gauge film will be needed as opposed to a light or smaller package of goods. Preferably polyethylene films can be used. These films are oriented in the transverse direction and/or the machine (longitudinal) direction by methods well known to those skilled in the art. Various heat shrink films were tested after being wrapped around stacks of shirred casing sticks, and it was found that the functional range of film retraction on the bundle was from about 70% to about 90% longitudinal and from 0% to about 30% transverse shrink. The preferred film has a shrink of about 70% in the longitudinal direction and about 30% in the transverse direction.

The rows of perforations 2 can be made as either holes or slits, but slits lying in the transverse direction or having a "v" shape are preferable. It has been found that the use of holes for the perforations yield poor tear efficiencies in that the tear line wanders into the packaging and does not continue on the line of perforation. This may result in the removal of only a part of the panel preventing easy, quick emptying of, and may provoke damage to, the packaged goods.

Holes have been made previously with, for example, hot needles and cold needles. The preferred slits are from about 1 to about 3 millimeters (mm) long, spaced at intervals of about 1 to about 3 mm and can be made with, for example, a sharp edged blade or with a roll provided with appropriately spaced apart knife blades on its surface, as described in US 4,879,124 and 5,086,924. The "v" shaped slits are preferably about 2 mm long and spaced at about 2 mm intervals.

Figure 2 shows one embodiment of the package of the present invention. In this package, fifty shirred casing sticks 23 are arranged to form a six sided stack, which is tightly wrapped with the film 1 to bundle the sticks together and form package 14. The two transverse ends of the film are connected to each other to maintain tension around the stack and to transversely seal the package shut. This can be accomplished, for example, by heat sealing the edges together to form a seal 10 or by folding the transverse edges of the film and taping them. End 6 of package 14 is completely enclosed by film 1, which can be either stretched or heat shrunk around the bundle. The opposite end 7, not shown in this figure, is partially open. A partly open end 9 in shown in the embodiment of Figure 3.

Complete enclosure of end 6 can be accomplished, for example, by having an excess of film that folds on itself around the end, which on heat shrinking will seal to itself. Also, an excess of film may be folded over an end of the stack in such a manner where it can be heat sealed shut. Another method is by gathering an excess of film at one end and placing a metal or plastic clip around the gathered plastic so that an end is fully enclosed.

To partially enclose end 7 of the package, the length of film folded over the end of the stack of the shirred casing sticks is not enough to fold the film over on itself. On heat shrinking, a portion of the stack end is left uncovered. Various amounts of film will be left on the partially open end of the container, with about 40% to about 70% being preferred.

Figure 2 also shows eight rows of perforations 2 so that at least one row of perforations 2 is disposed on each of the six sides and a panel 5 is formed between each set of adjacent rows of perforations.

Figure 3 shows another embodiment of the present invention where multiple sticks of casing 23 are arranged on top of each other to form a square stack, which is tightly wrapped by film 1 to form package 30. As described above, the transverse edges 4 of the film have been connected to each other by heat sealing to form seal 10. Both end 9 and the opposite end (not shown) are partially enclosed by film 1, substantially as described above. Six rows of perforations are shown on the film on end 9, so that at least one row of perforations 2 is disposed in each of the four sides and at least one of the panels 5 formed between each set of adjacent rows extends over portions of two adjacent sides of the package.

In order to open the package of the present invention as shown in the figures, a person needing to access the casing sticks 23 inside the package, such as shown in Figure 3, grasps the longitudinal edge 3 of the film at any point at the

partially or fully opened end 9 of the package and pulls. This initiates tearing along two adjacent rows of perforations that extend completely across the package. Once the tearing is complete, a full panel 5 can be removed and the casing sticks, or any other goods that have been so packaged, can be removed.

This invention is an improvement over most conventional plastic packaging in that in order to access the packaged goods, the user of the goods does not need to cut or rip the plastic or to find the one spot on the plastic film that contains a weakened area, such as a single row of perforations, to open the package. This is a disadvantage especially when time is critically short, as in a high speed manufacturing environment where frankfurters are made.

As the packaging is plastic, it is water resistant and will protect the sticks from incidental water exposure.

The following examples illustrate the various properties of the present invention.

Example 1. Shrink Rates.

A number of monooriented and bioriented transparent heat shrinkable polyethylene films of 80 microns thickness were tested to determine the usable and the optimum amount of shrink needed in the film. Stacks of fifty shirred casing sticks arranged in the six-sided stack of Figure 2 were wrapped with these films and the transverse film edges were heat sealed together. An excess of film was left on one side of the bundle to shrink and weld to itself and completely enclose one end of the bundle, while the opposite end was left 50% open. The entire bundle was exposed to heat sufficient to heat shrink and retract the plastic. Upon cooling, bundle performance was evaluated, with the results as shown in Table 1.

TABLE 1

Film Type	% Longitudinal Shrink	% Transverse Shrink	Results
Monooriented	40	10	Fail[1]
Monooriented	10	40	Fail[2]
Bioriented	70	30	Very Sat.[3]
Bioriented	30	70	Fail[4]
Bioriented	90	10	Very Sat.[3]
Bioriented	10	90	Fail[4]
Monooriented	70	0	Very Sat.[3]
Monooriented	70	10	Very Sat.[3]
Bioriented	60	50	Satisfac.[5]

The results are further explained in light of the following.

The film rated Fail[1] did not have enough shrink, and therefore tension, in both longitudinal and transverse directions to hold the stack of sticks tightly together.

The film rated Fail[2] did not have enough shrink in the longitudinal direction to hold the stack of sticks tightly together.

The films rated Very Satisfactory[3] had good shrink in both directions and held stacks of sticks tightly together.

The films rated Fail[4] did not have enough shrink in the longitudinal direction, and too much in the transverse direction, so much so that the packages would not easily release the sticks on opening, causing some sticks to break.

The film rated Satisfactory[5] showed that there was a slight excess of shrink in the transverse direction and some sticks were not easily released when the package was opened.

These results show that the functional range of film shrink on the caddy is about 70% to about 90% longitudinal and 0% to about 30% transverse shrink, with the optimum being about 70% longitudinal and about 30% transverse shrink.

Example 2. Type of Perforations and Tear Efficiency

A number of sheets of bioriented polyethylene film with 70% longitudinal and 30% transverse shrink were perforated with rows of either needle holes or slits with various spacings between each perforation. The rows were made in one direction, transversely along the film, from one longitudinal edge to the other. The film was used to wrap bundles of fifty casing sticks each, as described in Example 1 above. After cooling, the packages of casing sticks were grasped at the 50% open edge and pulled.

The % of tear efficiency of each of these rows was measured as the percentage, on average, of the length of perforated line that pulled apart before the tear would propagate into the plastic film away from the rows of perforation.

1. The first set of packages were wrapped with film having ten to fourteen rows of perforations per linear meter of film. The perforations were rows of slits of about 1 mm in length at about 3 mm intervals. On opening the package, 100% tear efficiency was seen.

2. The second set of packages was formed from film having ten rows of perforations per linear meter. The rows were made of about 8 mm slits at intervals of about 8 mm. On opening, 50% tear efficiency was shown.

3. The third set of packages was formed from film having 10 rows of perforations per linear meter. The rows were made of about 1 mm slits separated by about 1 mm intervals. On opening, 100% tear efficiency was seen.

4. The fourth set of packages was formed from film having 14 rows of perforations per linear meter. The rows were made of about 2 mm slits, each slit shaped as a "v", and separated by about 2 mm intervals. On opening, 100% tear efficiency was shown.

5. The fifth set of packages was formed from film having ten rows of perforations per linear meter. The rows were made of groups of two needle holes at intervals of about 3 mm. Only 50% tear efficiency was shown on opening.

6. The sixth set of packages was formed from film having 10 rows of perforations per linear meter. The rows were made of a needle hole of about 1 mm diameter at intervals of about 3 mm. Only 20% tear efficiency was shown on opening.

The results of this test showed that acceptable performance was seen only with slits, including the "v" shaped one, of about 1 to about 3 mm long separated by intervals of about 1 to about 3 mm.

A similar set of testing was done with the same parameters as with casing sets 1, 4, and 5 above, except that the perforated lines were made in the longitudinal direction around the bundle rather than the transverse direction. In each of these tests, although it was more difficult to initiate the tearing open of the package, tear efficiencies remained unchanged compared to having the transverse perforated lines.

Experiment 3. Numbers of Rows of Perforations.

Stacks of fifty shirred casing sticks of small, medium, and large diameter casings used to manufacture frankfurters were packaged as described in Example 2, using polyethylene film having a 70% longitudinal and 30% transverse shrink. Rows of perforations were made of slits of about 1 mm long separated at intervals of about 3 mm on the film. These rows were made with various distances between them to identify the optimum number of rows needed around a bundle of casing sticks. The results are shown in below in Table 2.

TABLE 2

Space (mm)	Lines per linear m.	Bundle size		
		Small*	Medium*	Large*
250	4	I	I	O
100	10	Y	O	O
70	14	O	O	O
50	20	O	O	X

Small* = used 485 mm of film to wrap bundle.
Medium* = used 635 mm of film.
Large* = used 815 mm of film.

The observations are more fully described as:

I = Impossible to use for wrapping the stack of sticks as only two or three rows of perforations were disposed around the sticks and on opening there was no control of the sticks. Upon opening, the bundle would deteriorate and the sticks would fall out uncontrollably and break.

O = Satisfactory, as the packaging was easy to open, the encased sticks stayed under control, and were only released from the packaging when expected to.

X = Unsatisfactory, as thirteen or more rows of perforations were disposed around the sticks and the packaging would spontaneously break open during heat shrinking or handling.

Y = Unsatisfactory, because for bundles of small diameter casing, there were insufficient rows of perforations in the film to assure at least four rows of perforations disposed about the bundle, giving rise to the conditions "I" above.

These results showed that an acceptable number of rows of perforations on the packaging around a bundle of casing sticks ranges from 4 to 12, with the spacing between the rows of perforation ranging from about 70 mm to about 100 mm. With these parameters, the packaging around the bundle withstands the strains of normal handling without opening

on its own while still having the property of being easy to open by a user of the package from any point at the end of the package.

While a number of embodiments of the present invention are described and exemplified, a number of other useful modifications, derivations, and extensions of such embodiments and uses are possible that are within the spirit and scope of the present invention, and that are intended to be encompassed within the following claims.

Claims

1. An easily opened package containing shirred casing sticks comprising:

   a) a stack composed of tubular shirred sticks of food casing all of substantially equal length and diameter arranged in a plurality of rows stacked one on another with the longitudinal axes of said sticks parallel and the stick ends coplanar, said stack having at least four sides and two opposite ends;
   b) a retainer comprising a plastic film disposed in tension around a stack to form a bundle, said film having longitudinal side edges extending in a direction transverse to the longitudinal axes of the sticks, and opposite transverse ends connected one to the other; and
   c) the film having at least four transversely spaced rows of perforations extending between the longitudinal edges of the film, the film being frangible along each of said rows of perforations, with the film portion between adjacent rows defining removable panels, and the spacing between the rows of perforations is sufficient to locate one or more of said panels in each of at least two sides of the bundle,
   whereby the package is easily opened by initiating the removal of a said panel at any one of a plurality of points along the longitudinal edge of the film.

2. A package according to claim 1, wherein the perforations are selected from the group of needle holes, elongated slits that lie in the transverse direction, and v-shaped slits.

3. A package according to claim 2, wherein the slits are about 1 to about 3 mm long and spaced at intervals of from about 1 to about 3 mm long.

4. A package according to claim 2, wherein the v-shaped slits are about 2 mm long and spaced at intervals of about 2 mm.

5. A package according to claim 1, wherein the rows of perforations are spaced from about 50 mm to about 100 mm apart.

6. A package according to claim 5, wherein the rows of perforations are spaced about 70 mm apart.

7. A package according to claim 1, wherein there are no more than 12 rows of perforations disposed about the perimeter of said package.

8. A package according to claim 1, wherein said retainer at least partly occludes at least one end of said bundle.

9. A package according to claim 1, wherein said film is an oriented heat shrinkable thermoplastic film.

10. A package according to claim 9, wherein said film retracts on the bundle with from about 70% to about 90%, preferably about 70%, longitudinal shrink and with from 0% to about 30%, preferably about 30%, transverse shrink.

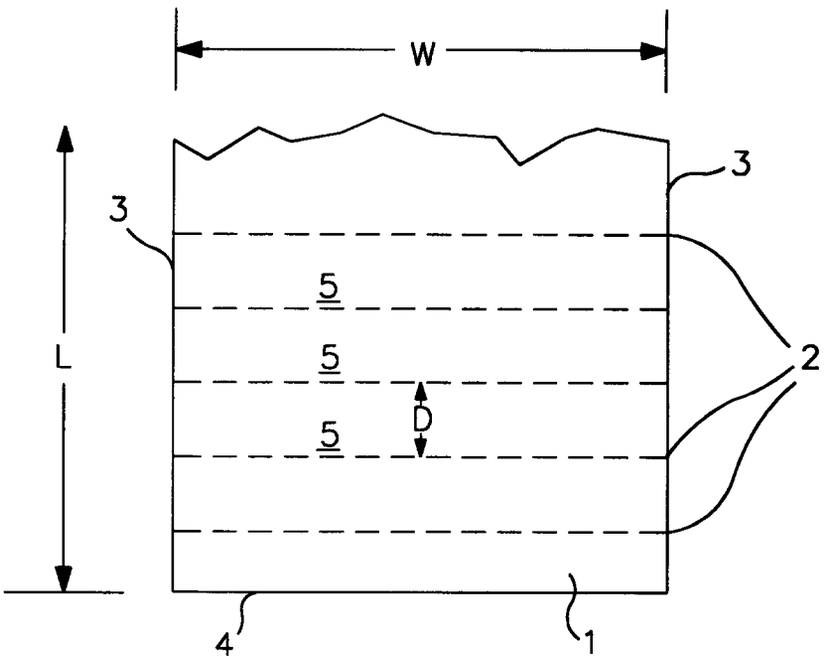

FIG. 1

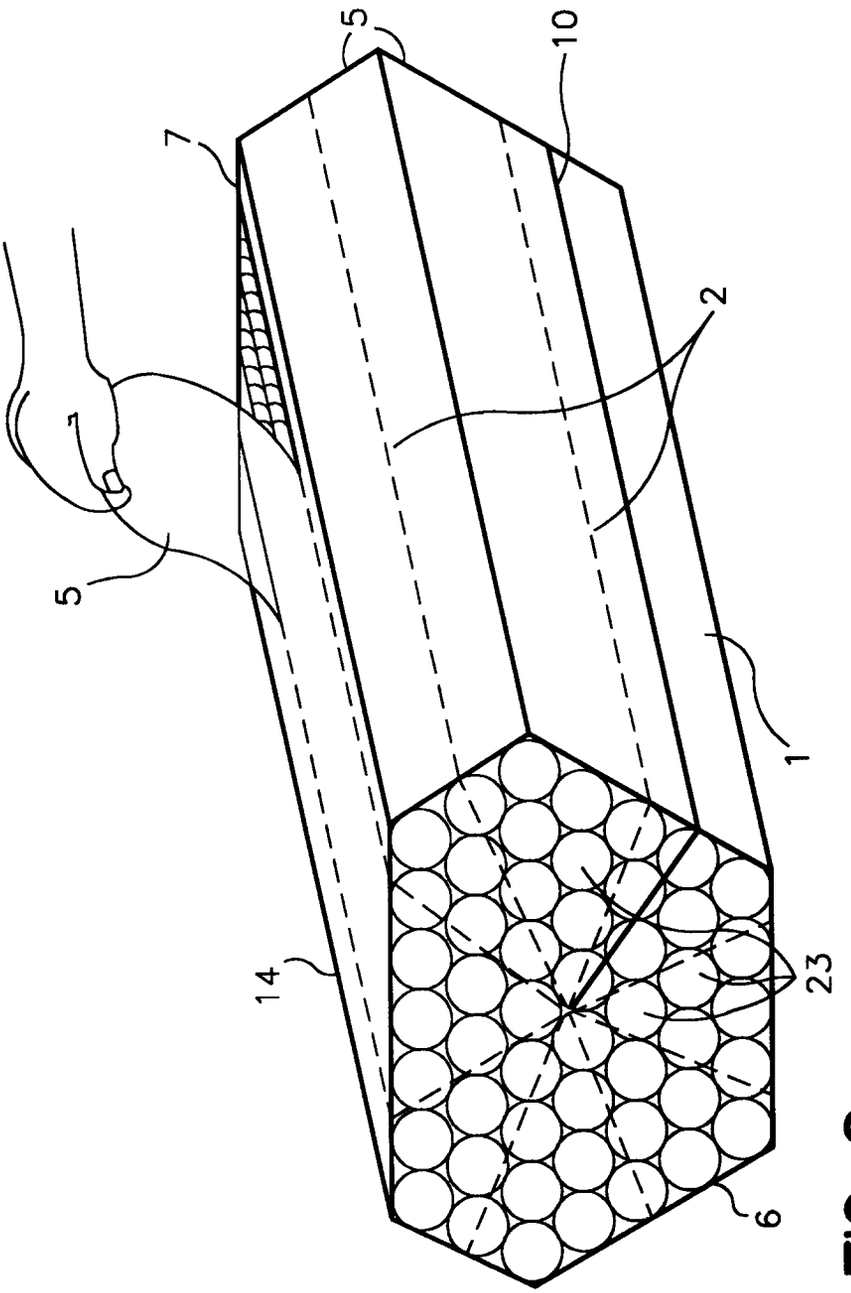

FIG. 2

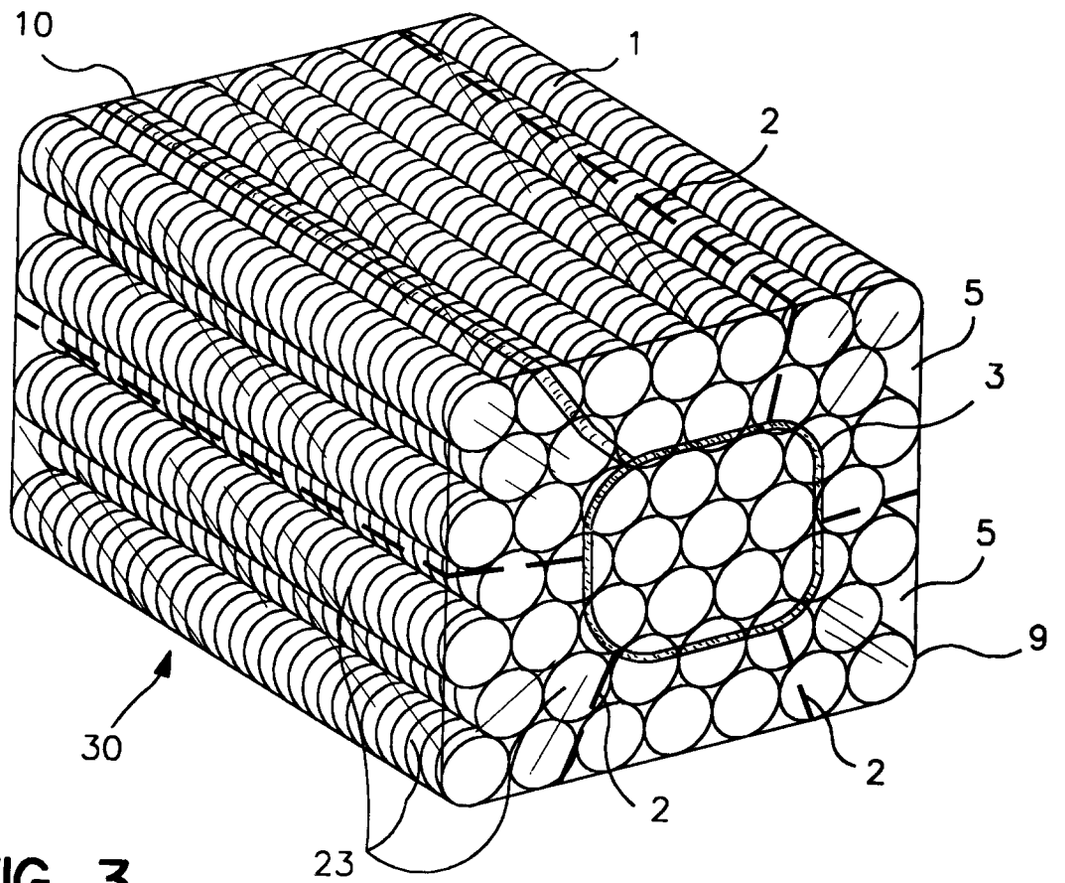

FIG. 3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 11 2413

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.6)
X Y	FR-A-2 199 319 (UNION CARBIDE CORP.) * page 5, line 12 - page 9, line 15; claim 1; figure 1 *	1,3,5-10 2,4	B65D71/00
A	FR-A-2 201 219 (TETRA PAK INTERNATIONAL) * page 4, line 26 - line 34; figure 4 *	1	
A,P	EP-A-0 614 610 (VISKASE CORPORATION) * column 9, line 24 - line 29; figures 1-10 *	1,9,10	
Y	GB-A-488 743 (HILDNER) * figures 1-5 *	2,4	
A	FR-A-1 191 548 (DARVAL)		

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B65D
A22C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	6 November 1995	Berrington, N

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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