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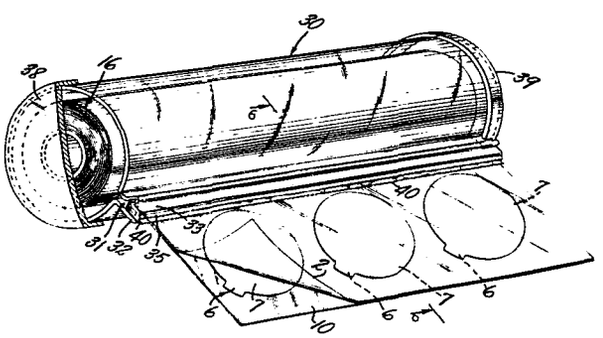
(54) Package for individual plastic membrane discs and process for preparing the same.

(57) A package is provided for individual plastic membrane discs (7) which makes it possible to remove the discs one at a time without damage to the discs and without disturbing other discs in the package, comprising, in combination, a spirally wound roll (16) of at least two plies (2, 10) of sheet material having facing surfaces to which the plastic membrane discs do not adhere; and a plurality of individual plastic membrane discs (7) interleaved between and supported upon the sheet material and spaced apart from each other on the sheet material so that the discs can be removed one at a time individually without disturbing adjacent discs.

A process is also provided for preparing packages of this type, which comprises distributing the discs in spaced-apart relationship upon a surface to which the discs are not adherent of one ply of sheet material (1); placing a second ply of sheet material (10) having a surface facing the discs to which the discs are not adherent atop the first, so that the discs are protectively sandwiched between the sheets; and then spirally rolling up the two plies of sheet material to form a roll package (16) with the discs sandwiched between the sheets.

A protective container (30) for the roll can be provided, with means permitting unrolling the two-ply sandwich a little at a time, sufficient to expose and remove one disc at a time, or more, as required.



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PACKAGE FOR INDIVIDUAL PLASTIC MEMBRANE DISCS AND PROCESS FOR PREPARING THE SAME

The packaging of plastic membrane discs has long posed a considerable problem. Such membranes are extremely fragile, being quite thin and weak. They are normally packaged in stacks, with separating sheets therebetween, to prevent the stacked discs from adhering one to another in the stack. However, because of the thinness of the discs and their fragility, it is quite difficult to separate the discs, and remove one disc at a time from the stack. Frequently, several layers of discs are peeled off at the same time, because of the difficulty of separating discs in the stack. Moreover, the discs frequently are damaged in the course of their removal from the stack.

In accordance with the invention, a package is provided for individual plastic membrane discs, which makes it possible to remove the discs one at a time without damage to the discs and without disturbing other discs in the package, comprising, in combination, a spirally wound roll of at least two plies of sheet material having facing surfaces to which the plastic membrane discs do not adhere; and a plurality of individual plastic membrane discs interleaved between and supported upon the sheets, and spaced apart from each other on the sheets, so that the discs can be removed one at a time individually without disturbing adjacent discs.

A process is also provided for preparing packages of this type, which comprises distributing the discs in spaced-apart relationship upon a surface to which the discs are not adherent of one ply of sheet

material; placing a second ply of sheet material having a surface facing the discs to which the discs are not adherent atop the first, so that the discs are protectively sandwiched between the sheets; and then spirally rolling up the two plies of sheet material to form a roll package with the discs sandwiched between the sheets.

A protective container for the roll can be provided, with means permitting unrolling the two-ply sandwich a little at a time, sufficient to expose and remove one disc at a time, or more, as required.

The package and process of the invention are applicable to plastic membrane discs of all types of plastic material including particularly polyamides, but also including polyimides; polyethers; polycarbonates; polyesters; cellulose esters, such as cellulose acetate; cellulose ethers such as ethyl cellulose; polyolefins, such as polypropylene and polyethylene; polyvinyl chloride; polyvinylidene chloride; and regenerated cellulose.

The supporting sheet for each of the two plies can be any sheet having a surface of or made of a material to which the plastic membrane material is not adherent. Plastic sheets and plastic coated sheets, especially transparent or translucent sheets, are preferred. Of the available plastic materials, polyolefins such as polyethylene and polypropylene and polyesters such as polyethylene glycol terephthalate are suitable for all of the plastic membranes mentioned above except polyolefins and polyesters. Polycarbonates can be used for any membrane except polycarbonates. Polyamides can be used for any membrane

except polyamides. Cellulose acetate can be used for any membrane except cellulose acetate, and polyvinylidene chloride and polyvinyl chloride for any nonpolyhalocarbon resin membrane. Sheets of cellulose derivatives such as regenerated cellulose (cellophane) and cellulose acetate can be used.

Also useful are release-coated papers, glassine paper, wax-coated papers, and woven and nonwoven fabrics of any sort of fibrous material, such as regenerated cellulose, cellulose acetate, polyamides, polyesters, polyacrylonitrile, cotton, jute, sisal, ramie, and linen, coated with such plastics.

The roll of two plies of sheet material can be packaged in a wrapper of sheet material such as paper or plastic film or in any kind of rigid or semi-rigid container made of cardboard, plastic or metal. Any kind of container used for plastic film or wax paper can be used.

A plastic container can be of molded or extruded plastic sheet, in a box or tube shape. Transparent and translucent containers of rigid clear or translucent plastics are preferred.

To avoid contamination, for pharmaceutical applications, the container should be hermetically sealed.

The container suitably has a dispenser slot opening or a flip-top lid through which the two plies of sheet material can be withdrawn, a little at a time, so as to separate them and peel off one or several membrane discs, as required.

An extruded or molded shape can be provided with a continuous open slot lengthwise of the extrusion or molding and cut off in sections

corresponding to the width of the two plies of sheet material, with the open ends closed off by end caps of metal or plastic bonded to the container section by heat-fusing, solvent-welding or adhesive. The slot can be open, or provided with abutting resilient lips that grip each side of a two-ply composite withdrawn therebetween and thus close off the interior of the container to entry of contamination, while also preventing accidental discharge of more of the two-ply composite than is needed or desired.

A cutting edge or knife, preferably serrated, can be provided at the opening, extending all or part way along the opening, so that the sheet layers can be torn off against the edge, to facilitate detachment of the membrane sheet composite and handling of the membrane without contamination. One can thus cut off a length of the plies of the sheet material with the plastic discs contained thereon, for removal of the plastic discs later on, and wherever and whenever required. The plastic supporting sheets also can be provided with weakened portions, perforations, or tear lines, to facilitate rupture at the demarcations of a portion containing one or a row of the discs. In this way, the discs can be conveyed to a sterile receptacle, for example, without being touched by the hands, in transfer from the package to the receptacle.

The package is particularly applicable to plastic membrane filter discs, but membrane discs suitable for any purpose can be packaged in this way, such as discs for dialysis, ultrafiltration, osmosis, chromatography, and similar uses typical of membranes. The discs

are usually round, but they can have any polygonal shape, such as square, hexagonal, etc., as the equipment prescribes, or other irregular shape, such as with tabs, as an indication of origin, or for other purposes.

Preferred embodiments of the invention are illustrated in the drawings, in which:

Figure 1 shows schematically in flow sheet form the sequence of stages in the process of the invention, to prepare a plastic membrane disc package of the invention;

Figure 2 is a top view, looking down at the plastic sheet bearing membrane discs thereon at stage A of the flow sheet of Figure 1;

Figure 3 is a perspective view of one embodiment of a package in accordance with the invention having a housing in a molded box configuration with the housing partially cut away to show the cross section;

Figure 4 is another view of the package of Figure 3, with the two-ply plastic sheet sandwich partially unrolled, and the sheets separated at the end, to expose the membrane discs supported therewithin for removal;

Figure 5 is a perspective view of another embodiment of a package in accordance with the invention, having an extruded tubular housing, with the housing partially cut away to show the cross section, and with the two-ply plastic sheet sandwich partially unrolled and the sheets separated at the end, to expose the membrane discs supported therewithin for removal;

Figure 6 is a cross section on an enlarged scale and taken along the line 6-6 of Figure 5; and

Figure 7 is a partial section, similar to Figure 6, but showing the sealing of the tubular housing.

In the flow sheet of Figure 1, the support 1 bears a single ply of plastic sheet material 2, such as of polypropylene or polyester film, unrolled over the idler roll 3 from the sheet supply roll 5. The roll 5 is rotatably carried on the roller 4, which can be provided with a brake, such as an electromagnetic brake, if desired. Thus, the sheet material 2 can be unrolled at will, and passes across the top of the support 1, to stage A.

In stage A, with the plastic sheet 2 in position on the support 1, the membrane discs 7, such of polyamide membrane, are laid down on the sheet, spaced apart, but in close proximity, as many abreast as desired, according to the width of the sheet and the diameter of the discs. In this case, the discs are laid evenly in rows, three abreast, as seen in Figure 2.

The membrane discs 7 can of course have any desired shape. As shown the discs 7 are round for easy insertion in a disc filter frame assembly requiring them. In this instance, the discs 7 are provided with tabs 6, as an indication of origin. These tabs of course can be omitted.

In stage B, a second roll supply 8 of plastic sheet material 10, also of polypropylene or polyester, rotatably mounted on the roller 11, which also can be provided with a brake such as an electromagnetic

brake, passes over the idler roll 12 and is carried thus into contact with the discs and sheet 2, thus completing the protective sandwich enclosure for the membrane discs 7 supported on the sheet 2.

The composite sandwich 9 is then carried over the guide roll 15, and, entering stage C, is rolled up at the finishing station on the rotating core 14 by operation of the power-driven carrier shaft 13. For this purpose, the shaft is keyed to accept the plastic core 14 on which the sandwich is wound. The rotating shaft 13 thus draws the sheets 2, 10 through the entire apparatus, stages A, B and C, from the supply 5, 8.

When the roll 16 wound up in stage C has reached the desired size, the sheet sandwich 9 is cut by the knife 17, and the core 14 and roll 16 thereon are then transferred to a suitable container.

One suitable type of rectangular box container is shown in Figures 3 and 4.

The container 20 is of rigid clear thermoplastic material, such as polyvinyl chloride or polyacrylic resin, and has two sides 21, a bottom 22 and a top 23, and two end caps 24, heat-bonded together with an open longitudinal slot 25. The open slot can be closed off by a strip of tape 26 when not in use, which is peeled off by the user when the container is to be opened, exposing the slot. The roll 16 is simply slipped into the open-topped box 20, with the tip end 27 of the sandwich 9 in the slot 25. The tape 26 is then applied over the slot and tip end 27, so that when the tape 26 is peeled off, the end 27 is exposed and can be grasped by the user.

When the user desires to open the package, he simply peels off the tape 26, exposing the slot 25, and end 27, which can be grasped and a disc withdrawn with the sandwich, as seen in Figure 4. After withdrawal of a suitable length of sandwich, the sheets can be separated, exposing the first row of three membrane discs, and the discs removed.

Another embodiment of container is shown in Figures 5 to 7. The container 30 is an open-ended extruded tube of for example thermoplastic rigid clear or translucent material such as polyvinyl chloride, polyacrylic, resin, polyamide or polystyrene resin.

The tube is extruded with a longitudinal slot 31, defined by the projecting lips 32, 33, of which lip 33 is curved at the end into abutment at 35 with lip 32, closing off the slot. The lip 33 also includes a longitudinal recess 34, receiving a metal edge cutter 36 at one end of the slot.

The roll 16 is simply slipped into the tube 30, with the tip end 27 of the sandwich 9 in the bite at 35 between lips 32, 33, where it is held. A tape 36 can be placed along the slot at 35, sealing it. The open ends of the tube 30 are capped by end caps 38, 39 of metal such as aluminum and sealed thereto by adhesive. The end caps can also be of like plastic material to the tube 30, and sealed thereto by solvent-bonding or an adhesive. Thus, roll 16 slipped in the tube, and the tube is sealed, completing the container.

When the user desires to open the package, he simply peels off the tape 36, seen in Figure 7, exposing the slot 25 and end 27, which can be grasped and the disc withdrawn with the sandwich, as shown in Figures 5 and 6. After withdrawal of a suitable length of sandwich,

the sheets can be separated, exposing the first row of three membrane discs, and one or more of the discs removed. The serrated-edge metal cutter 40 on the outside of the package makes it possible to cut off a selected length of the sandwich, if the user so desires.

Claims:

1. A package of individual plastic membrane discs from which the discs can be removed one at a time without damage to the discs and without disturbing other discs in the package, comprising, in combination, a spirally wound roll of at least two plies of sheet material having facing surfaces to which the plastic membrane discs do not adhere; and a plurality of individual plastic membrane discs interleaved between and supported upon the sheets and spaced apart from each other on the sheets.

2. A package according to claim 1 in which the discs are polyamide membranes.

3. A package according to claim 2 in which the sheet material plies are each of polypropylene sheet.

4. A package according to claim 3 in which the sheet material plies are each of polyester sheet.

5. A package according to claim 1, comprising a protective container for the roll having means permitting unrolling the two-ply sandwich a little at a time, sufficient to expose and remove one or more discs at a time.

6. A package according to claim 5, in which the protective container is a box having side, bottom and top walls and having a longitudinal slot through one wall, through which the two-ply sandwich can be withdrawn.

7. A package according to claim 5, in which the protective container is a tube having open ends sealed off by end caps and having a longitudinal slot through which the two-ply sandwich can be withdrawn.

8. A package according to claim 7, in which the tube is of extruded plastic and the longitudinal slot is defined between longitudinally extending end portions of the tube in which the slot is defined by outwardly extending lips which are abutting at their end portions and one of the lips carries a metal edge cutter for severing the two-ply sandwich.

9. A process for preparing packages of individual plastic membrane discs from which the discs can be removed one at a time without damage to the discs and without disturbing other discs in the package, which comprises distributing the discs in spaced-apart relationship upon a surface to which the discs are not adherent of one ply of a sheet material; placing a second ply of sheet material having a surface facing the discs to which the discs are not adherent atop the first, so that the discs are protectively sandwiched between the sheets; and then spirally rolling up the two-ply sandwich to form a roll package with the discs sandwiched between the sheets.

10. A process according to claim 9, comprising placing the roll in a protective container having means permitting unrolling the two-ply sandwich a little at a time, sufficient to expose and remove one or more discs at a time.

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FIG. 1

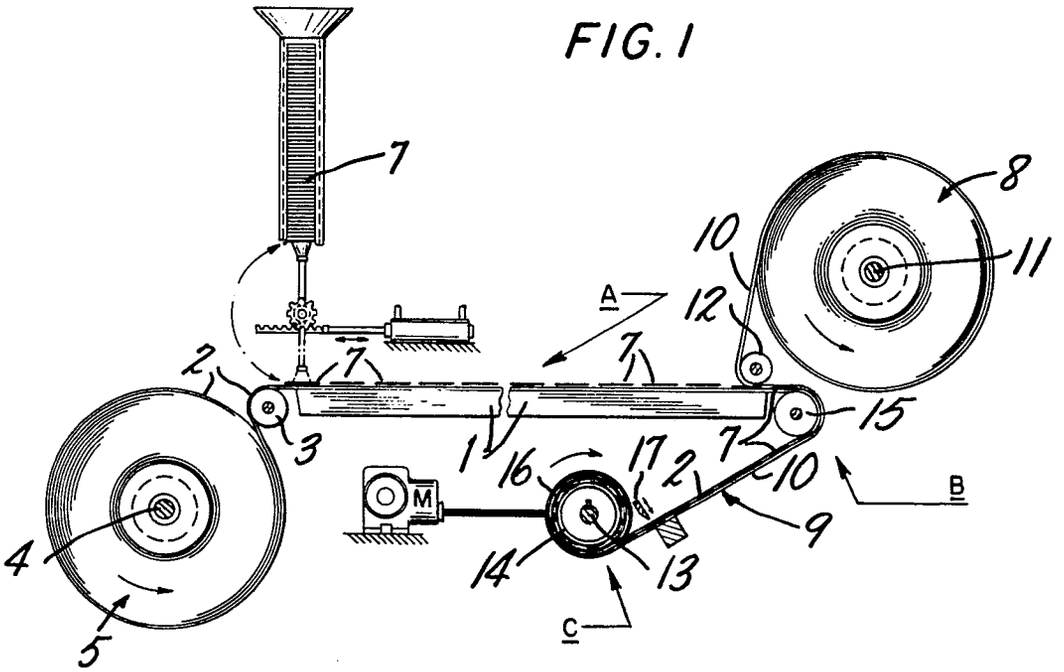

FIG. 2

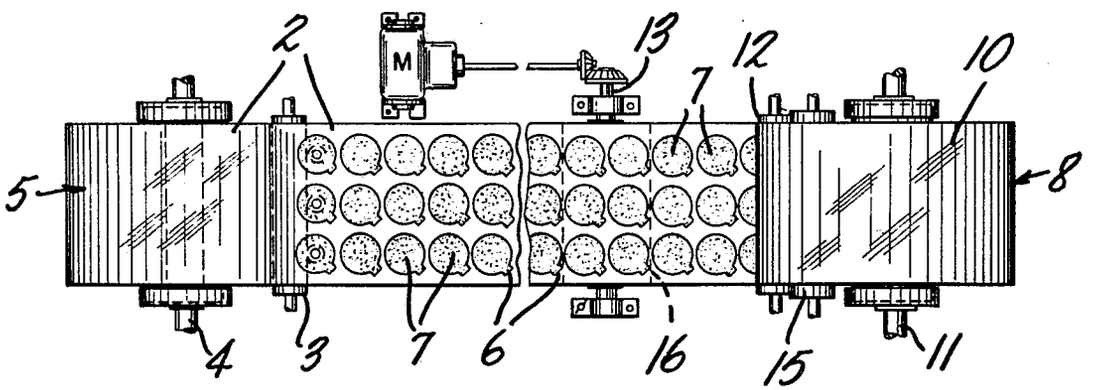

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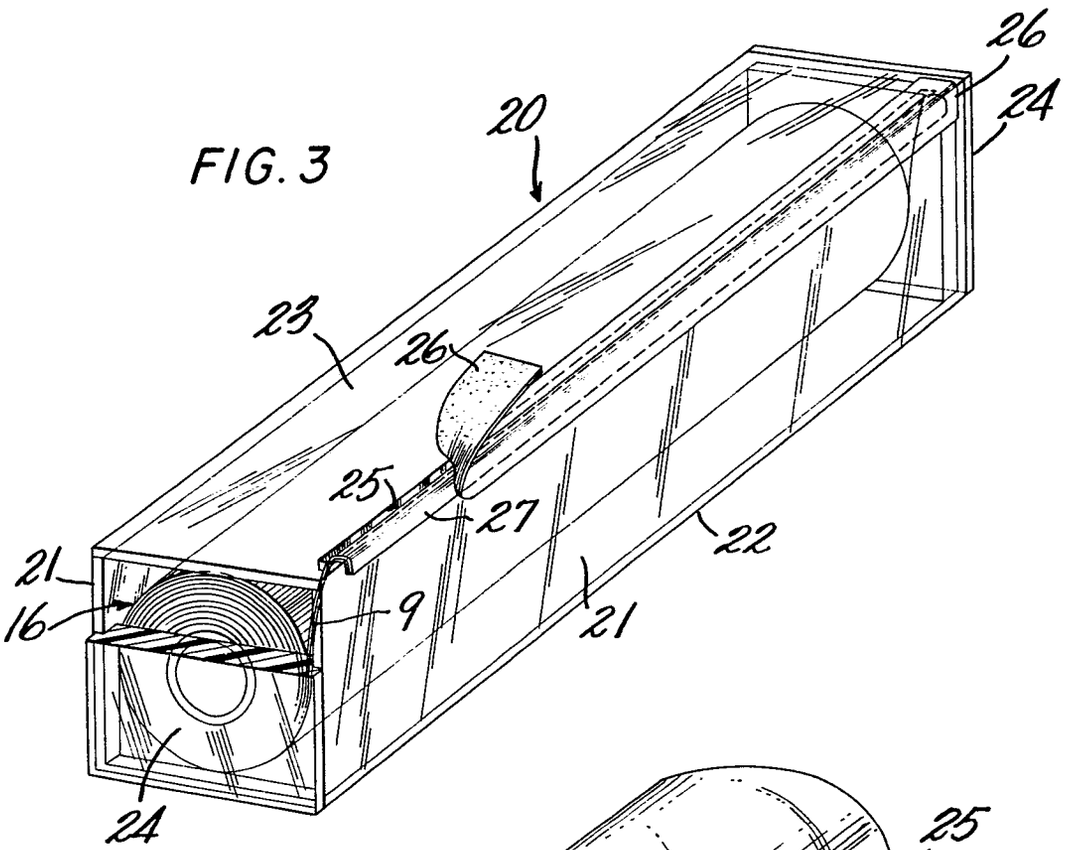
FIG. 3



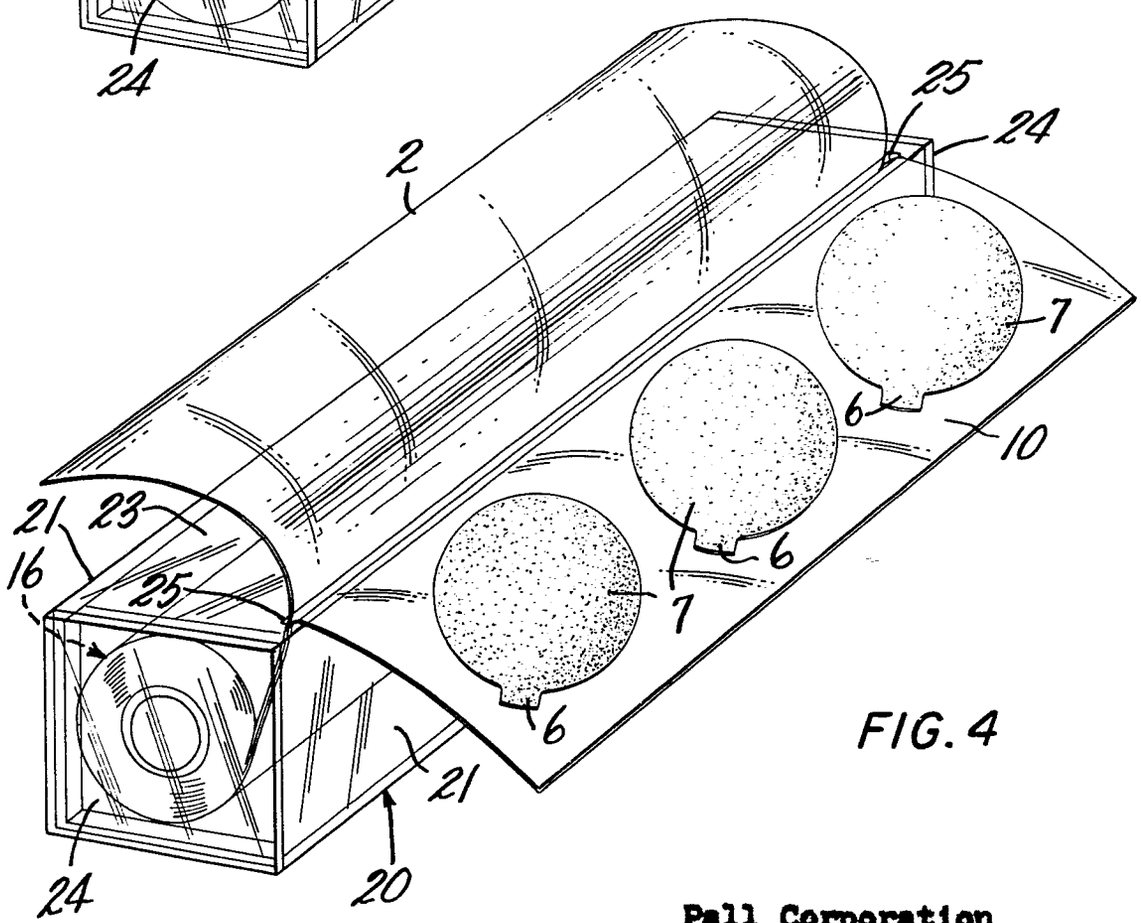


FIG. 4

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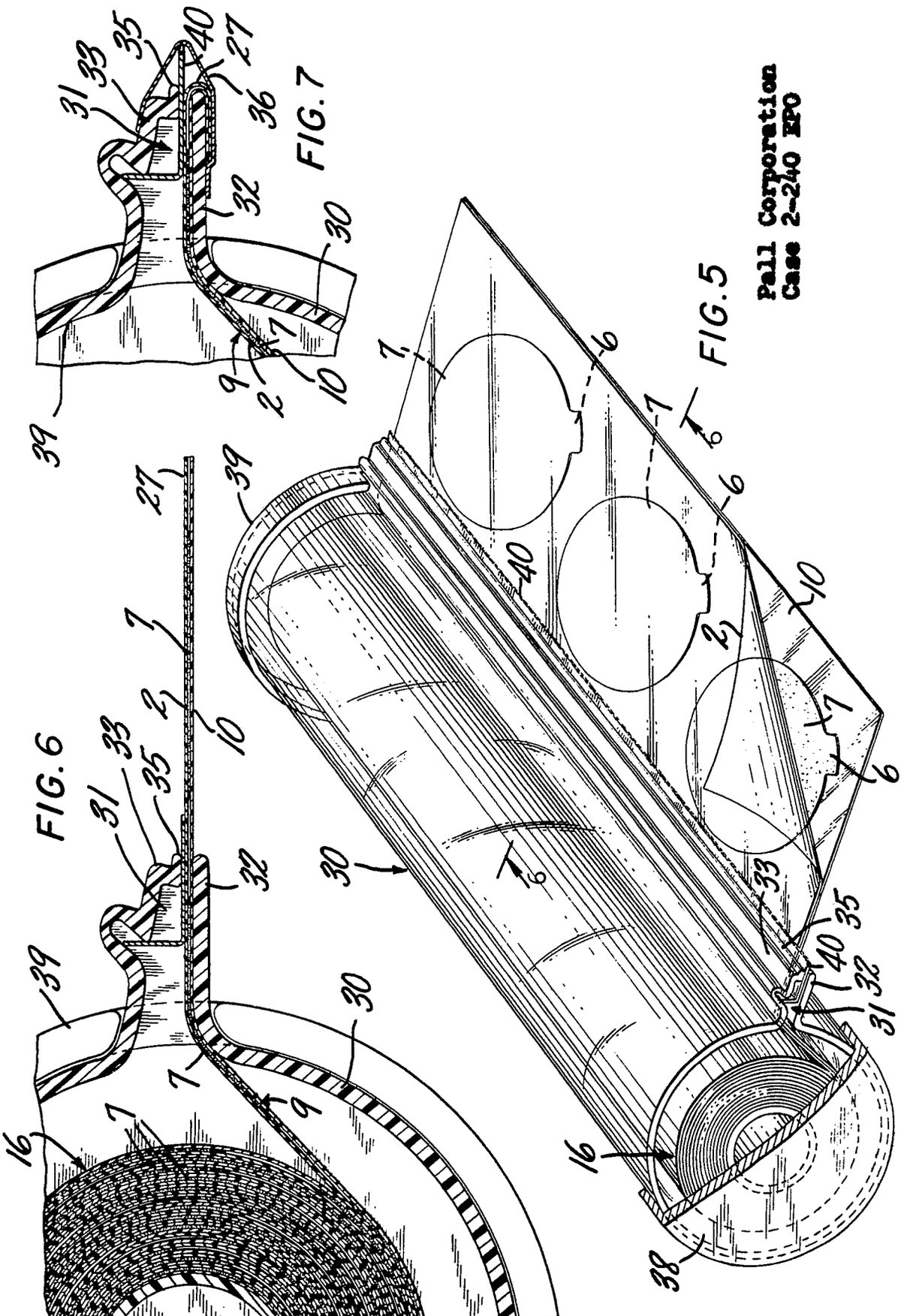

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EUROPEAN SEARCH REPORT

Application number
0010744
EP 79 10 0153

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
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	US - A - 3 537 767 (JAMES) * Patent specification * --	5,6
	FR - A - 1 030 345 (GAUT BLANCAN) * Patent specification * --	5,6
	US - A - 3 386 619 (DOUGLAS) * Patent specification * --	5,7,8
	FR - A - 1 019 387 (HAAS) * Patent specification * --	5,7,8
	US - A - 3 490 578 (SPEAKMAN) * Patent specification * ----	5,7,8

CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)

B 65 D 39/672

TECHNICAL FIELDS SEARCHED (Int.Cl. ³)

B 65 D
B 65 B

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
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P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	04-02-1980	VANT OMME

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