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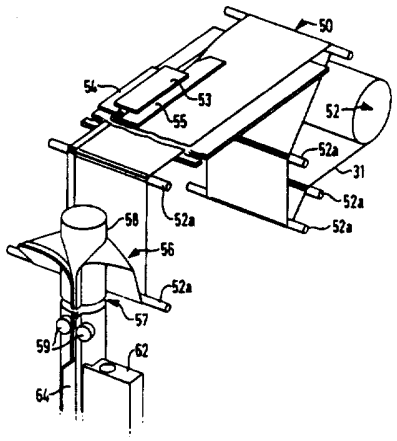
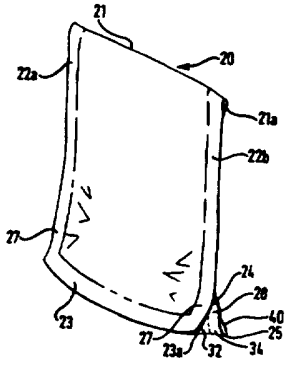
(54) Title: A STAND-UP PACK AND A METHOD AND APPARATUS FOR MANUFACTURING SUCH A PACK

(57) Abstract

A stand-up pack (20) has front and rear walls joined in a fold (21) at their upper end and secured one to another along mutually spaced seams (22a, 22b) extending between the top and bottom of the pack and a further seam (23) extending across the front of the pack, the front seam (23) being formed between the front wall and a portion (32) of the rear wall, the latter being folded forwardly to form a base to support the pack (20). This pack is advantageously quick, simple and efficient to manufacture and fill, and provides a large surface area for the imprinting thereon of advertising material. The disclosure also relates to a method of forming a pack, and apparatus including tooling (53, 54, 55) for forming the folds in the bottom of the pack and a shoulder (56) combined with a forming tube (58) and suitable seam heaters to form the pack and permit its filling with produce while in a part-completed state.





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A STAND-UP PACK AND A METHOD AND APPARATUS FOR MANUFACTURING SUCH A PACK

This invention relates to a stand-up pack, a method and apparatus for manufacturing such a pack.

So-called stand-up packs are known in the packaging and retailing industries as a means of storing and displaying for sale various food and other products that behave like fluids when they are packed.

Such products include granular foodstuffs such as pet foods and sweets; powdered products such as flour, sugar, dehydrated food powders, dehydrated beverages such as cocoa powder and baking soda; and liquid products such as soft drinks, flavouring syrups, sauces and some solid foods such as mozzarella cheese that have to be packed in a liquid (water). Furthermore, stand-up packs are gaining acceptance for the storage and display of products that hitherto have been stored in rigid containers. In this category are included herbs, spices, salt, rice and pasta. Large stand-up packs can be produced for storing e.g. animal litter, wild bird seed and domestic cleaning agents such as soap powder and dishwasher powder.

Hitherto it has been known to produce a various kinds of stand-up packs using a horizontally extending production line.

One example is shown in Figure 1A; the pack having a top seam 10 and left- and right-hand seams 11 and 12. The front and rear panels at their lower ends are bent out as illustrated, to provide stand-up capability.

Packs such as those shown in Figure 1A can only be produced on horizontal production lines because it is necessary to form the upper end of the pack as shown in Figure 1A in an initially open form to permit filling of products into the pack prior to forming of seal 10. If a pack such as shown in Figure 1A were to be manufactured in a vertical machine, the open end would be positioned at an edge of the pack as

formed and filling of the pack from above would not be possible. Horizontal machines as are required to form the pack of Figure 1A suffer disadvantages.

A second form of known pack is shown in Figure 1B. This pack includes side gussets so a gusset-forming step must be included in the manufacturing process. This pack can be formed on a vertical machine. It has seams 10B, 11B and 12B. The presence of seam 11B extending vertically along the centre of the rear of the pack limits the kinds of advertising matter that can be printed on the rear face. Moreover any printed matter must be accurately positioned in this region.

A third known form of pack is shown in Figure 1C. This is known in the art as "block bottom" pack. This can also be formed on a vertical machine. It has seams 10C, 11C and 12C.

Since some prior art packs are manufactured on horizontal manufacturing lines, it is common for the filling of the packs to take place along further horizontal production lines that are integrated with or form part of the manufacturing line. The empty packs are moved along the filling line and are arrested at the fill tube. The product is then dispensed into the packs which are then moved further along the line and arrested at an appropriate point.

This method of filling the packs is disadvantageous when the packs are to be filled with liquid. The halting of the packs followed by their subsequent movement along the line causes jolting of the packs and spillage of liquid contents therefrom.

Certain products when packed in stand-up packs such as shown in Figure 1A are too light or too fluid in nature to permit the folded bottom of the pack to fill out properly and become a stable support for the pack. This is partly because the folded bottom of the pack of Figure 1A is intended simply to provide extra space in the pack for receipt of products, and consequently its ability to support the pack is limited. Thus, there

is a need for a stand-up pack and a method of manufacturing such a pack that obviates the various disadvantages of known packs.

According to the invention in a first aspect, there is provided a stand-up pack comprising front and rear walls joined at their upper ends and secured one to the other along mutually spaced seams extending between the top and bottom of the pack and a further seam extending across the front of the pack, the front seam being formed between the front wall and a portion of the rear wall, the pack including a base formed from a portion of the rear wall folded forwardly, said forwardly folded portion including the front seam.

A pack of this kind has numerous advantages over the prior art.

Firstly, the pack can be readily manufactured using a modified vertical form fill and seal machine. This machine takes up much less floor space than a horizontal stand-up pack production machine, and vertical filling of the packs followed by sealing of the packs without further movement thereof (as is possible in vertical form fill and seal machines) means that jolting of liquid products does not occur and consequently the filling of liquid products into stand-up packs can be more readily achieved.

It is possible with the packs of the invention to create folded bottoms of virtually any width, thereby advantageously allowing the packs to be made inherently stable. Furthermore, the manufacturing of the folded bottoms of the packs of the invention does not involve the formation of a gusset per se and consequently the manufacturing process to create the packs is quicker.

The front face of a pack according to the invention is in a preferred embodiment arranged to be bounded on the vertical side edges and across the horizontal lower edge by seams, with no seam across the top of the pack unless this is specifically desired for presentation purposes. As a result, the appearance of the packs is significantly neater than the prior art

packs.

Since there are no seams overlying the display area to be printed on in the packs of the invention, the disadvantages associated with the seam 11B of the Figure 1B pack are obviated.

Preferably, the front and rear walls of the pack are constituted by a single sheet. This feature advantageously minimises the number of seams necessary to create the pack.

Conveniently, the joint between the upper ends of the front and rear walls of the pack is or includes a fold. This feature advantageously neatens the appearance of the pack.

Preferably the mutually spaced seams extend along the respective vertical side edges of the pack when the pack is upright. As mentioned above, this feature also improves neatness of the pack. However, packs in accordance with the invention could be manufactured with the seams spaced from the outer edges of the pack, and of course it is not a pre-requisite that the seams referred to extend parallel to the edges of the pack. For example, one could envisage making a tapered pack in which the seams converge towards the top or bottom of the pack. One could also envisage packs according to the invention in which the mutually spaced seams do not extend for the entire distance between the top and bottom of the pack; or in which the mutually spaced seams are stepped, curved or otherwise shaped.

Preferably, the front seam is made between aligned lower ends of the front and rear walls of the pack.

This feature confers speed and economy on the manufacture of the packs.

Conveniently, the forwardly folded portion of the rear wall is further folded rearwardly whereby to provide a portion of the rear wall adjoining the front wall to constitute the front seam. This feature ensures reliable formation of the front seam.

Conveniently, the portion of the rear wall abutting the front wall lies on the underside of the forwardly folded portion when the pack is upright. Thus the underside of the pack includes a dart that tends to fill out as the pack is filled with product. This in turn means that, for example, the packs can be supplied flattened down when empty and can be subsequently filled and sealed, with the product being inserted into the packs serving to "inflate" the pack by causing the dart to fill out.

According to a second aspect of the invention, there is provided a method of manufacturing a pack in particular comprising the steps of, in any suitable order,

(i) doubling an edge portion of a sheet;

(ii) further doubling said edge portion to form a double fold along the edge of the said sheet;

(iii) feeding the sheet via a forming shoulder whereby to position one edge portion of the sheet adjacent the opposite edge portion thereof;

(iv) securing said two adjacent edge portions together whereby to form a transverse, front seam of the pack;

(v) forming a second seam extending from the front seam of the pack in a direction transverse thereto; and

(vi) forming a third seam extending from the front seam of the pack in a direction transverse thereto and spaced from the second seam.

This method has advantages over the prior art.

For example, the method of the invention is faster than the prior art method for providing packs such as shown in Figure 1C.

Furthermore, when the method of the invention is carried out on a vertical form fill and seal machine, the filling of the packs can advantageously occur from what becomes a side when the pack is upright. This advantageously provides a larger area into which the fill tube of e.g.

a vertical form fill & seal machine can be inserted, thereby allowing more rapid filling of the packs and also minimises the drop that goods being inserted into the packs have to fall when the packs are rectangular. This is because the forming of the transverse, front seam in a direction parallel to the axis of the fill tube shortens the length of the sealing element needed compared with existing vertical form fill and seal machines (since the front seam extends only for the width of the pack when upright) and consequently allows the use of a shorter fill tube. The reduction in the drop minimises damage to delicate goods.

Conveniently the second and third seams are formed by a sealing element of a form fill and seal machine, the sheet being advanced in the time between the forming of the second and third seams whereby to space the second and third seams one from the other. This feature allows the maximum throughput of the form fill and seal machine to be attained.

Conveniently the second and third seams are formed by a sealing element of the form fill and seal machine, the sealing element being moveable in the direction of feeding of the sheet whereby to permit spacing of the second and third seams.

Preferably the sealing element is driveable and is capable of gripping the sheet, whereby to advance this sheet on driving of the sealing element and permit spacing of the second and third seams one from another.

The use of the sealing element as a driving element for the sheet constitutes an advantageously efficient manner of advancing the sheet through the apparatus.

In preferred embodiments of the invention, the forming of the second and third seams is accomplished by plural sealing elements of the form, fill and seal machine. If the sealing elements are appropriately positioned, the use of plural sealing elements does not slow the throughput of the apparatus.

Preferably the method includes the further step of filling the pack with goods before the forming of the third seam. Filling at this stage is advantageous because the pack is virtually completely formed and therefore has structural rigidity, yet the pack can still be filled via a large filling aperture constituted by the edges that are intended to form the third seam.

The method of the invention may optionally include the further step of securing a portion of the initially double edge portion of the sheet and the remainder of the sheet together, whereby to form a transverse, rear seam on the pack.

As indicated above this feature confers an attractive appearance on the pack.

According to a third aspect of the invention there is provided apparatus for forming a stand-up pack in particular as specified hereinabove or for performing a method in particular as specified hereinabove comprising:

an infeed area for sheet material;

a drive for feeding sheet material through the apparatus;

a folding tool for doubling an edge portion of the sheet material in the apparatus;

a folding tool for further doubling the edge portion in the apparatus, whereby to form a double fold along said edge portion;

a former for forming the sheet material into an orientation such that one edge portion of the sheet lies adjacent the opposite edge portion of the sheet;

a sealer for sealing the adjacent edge portions together whereby to form a front, transverse seam of the pack;

a sealer for forming a second seam extending from the front seam in a direction generally transverse thereto;

a sealer for forming a third seam extending from the front seam in

a direction generally transverse thereto and spaced from the second seam; and

a filler for inserting goods into the pack.

Whilst it is not essential that an apparatus of this kind is used to manufacture the pack or to perform the method of the invention, such apparatus is advantageous since it can readily be constructed as a modified version of e.g. a vertical form, fill and seal machine. Such a machine is of benefit in the practising of the invention not least because it has a high throughput, because the vertical filling facility means that liquids and solids can be filled into the packs with equal ease, and because the "footprint" of the machine on the factory floor is small.

Preferably, the folding tools serve to form the folds before the sheet material is formed on the former.

Conveniently, the infeed area is adapted to receive a roll of sheet material for dispensing the sheet therefrom.

In its simple form the invention may include separate tools for doubling and subsequently further doubling the edge portion of the sheet. Alternatively, the apparatus may include a combined folding tool for doubling and subsequently further doubling the edge portion as aforesaid. Such a tool is advantageously efficient since the doubling and further doubling operations can be accomplished within a short distance of travel of the sheet through the apparatus.

In preferred embodiments of the invention, the former includes a forming shoulder and a fill tube. These features further advantageously permit the apparatus to be constructed as a modified form of vertical form, fill and seal machine.

Preferably the apparatus includes a sealer operable on the sheet at spaced locations whereby to form the second and third seams respectively. The apparatus may also optionally include a reciprocative gripper capable of gripping and releasing the sheet, alternate gripping and releasing of the

sheet during reciprocation of the gripper causing feeding of the sheet through the apparatus whereby to permit the forming of spaced second and third seams by the sealer.

In particularly preferred embodiments of the invention, the sealer includes the gripper. The use of a combined gripper and sealer element ensures an efficient feeding of the sheet material through the apparatus whilst allowing the simultaneous forming of the second and third seams.

Apparatus according to the invention may also optionally include a sealer operable to secure a portion of the initially doubled edge portion of the sheet and the remainder of the sheet together. This feature allows the forming of a transverse rear seam as aforesaid.

In preferred embodiments of the invention the apparatus is constituted as a form, fill & seal machine, particularly a vertical form, fill and seal machine.

The references herein to sealing elements and sealers are intended to embrace any device that is capable of forming a seam, seal or joint in the sheet material being employed for the manufacture of the packs. For example, it is known to use plastics laminate materials that are coated on their inner faces with an adhesive material that is heat curable. When such materials are employed the sealer may conveniently be constituted as a clamp-type heater element that clamps about two portions of the material that are to be secured together so as to melt the adhesive on the inner face of one at least of the surfaces of the portions to be joined and thereby form a seal, seam or joint.

It should also be appreciated that whilst preferred embodiments of the pack of the invention are intended to be fluid-tight, it is not a pre-requisite that packs manufactured in accordance with the invention be so characterised. For example, it is possible to manufacture the packs of the invention from porus or perforated materials or from e.g. paper that is not liquid-proof.

Moreover, other methods of forming the seams can be employed within the scope of the invention. In this regard the term sealer may embrace e.g. an adhesive dispenser that causes adhesive to be applied to surfaces of the material of the pack to be adhered together.

There now follows a description of preferred embodiments of the invention, by way of example, with reference being made to the accompanying drawings in which:

Figure 1 shows a perspective view of a prior art stand-up pack;

Figure 2 shows a perspective view of a first embodiment of the stand-up pack according to the invention;

Figure 3 shows a perspective view of a second embodiment of the stand-up pack of the invention;

Figures 4 to 13 show the essential steps of a method, in accordance with the invention, of manufacturing a stand-up pack such as that shown in figures 2 & 3;

Figures 14 to 19 show various aspects of a first embodiment of apparatus in accordance with the invention for manufacturing packs such as those shown in Figures 2 & 3 and for practising the method described in relation to Figures 4 to 13;

Figures 20, 21 and 22 illustrate packs made by such apparatus; and

Figures 23, 24 and 25 show a second embodiment of apparatus in accordance with the invention.

Referring to the drawings and in particular to Figures 2 and 3, there are shown two embodiments of stand-up pack 20 in accordance with the invention.

The stand-up pack is manufactured from a sheet of flexible material such as plastics laminate, paper, paper/plastics composite laminate or similar materials.

In the Figure 2 embodiment, the top 21 of the pack is constituted by a fold or crease (which need not be a sharp fold) in the sheet of

material. The sheet of material is rectangular, and the fold at position 21 extends generally perpendicular to the longer sides of the rectangular sheet at a position slightly offset from the mid-point of the said longer edges.

Respective side seams 22a, 22b extend from the top fold 21 down the left-hand and right-hand edges of the pack 20, towards the base thereof which is of "folded bottom" form. Each seam 22a, 22b is formed by joining the adjacent portions of the respective longer edges of the rectangle to one another as a result of doubling of the rectangular sheet of material about fold 21.

The lowermost edge of the front face of the pack is joined along the width of the pack in seam 23 to the other end of the rectangular sheet, that has been brought to lie parallel to and adjacent the lower end of the front of the sheet. This feature is illustrated in the region 23A shown in Figures 2 & 3, at which the seam 23 is shown partially separated for illustration purposes. Of course, in practice in the majority of cases seam 23 would be constructed as a continuous seam.

The material of the rectangular sheet forming the folded bottom of the pack 20 extends upwardly parallel to the lower portion of the front of the pack when the pack is empty. A further fold 24 is formed in the material of the bottom of the pack extending across the width of the base of the pack. From fold 24, the material of the bottom of the pack extends downwardly towards the bottom of the rear of the pack, where at a further fold 25 the material of the pack turns to extend upwardly as the rear face of the pack.

The side seams 22a and 22b cause the material of the bottom of the pack to be rigidly adhered respectively to the front and rear faces of the pack in the regions 27 and 28 as shown in Figure 2. (Only one region 28 is visible in Figure 2 on the right hand side thereof although it is to be understood that a similar region exists on the left hand side of the pack as shown.)

In general, the seams are formed by adherence of parts of the surface of the sheet material that constitute the interior surface of the pack to one another. This is achieved e.g. by applying a heat curable adhesive to the said surface.

In the region of the base of the pack between the side seams 22a and 22b, the material of the base is not adhered to the front and rear faces of the pack except in the region of the seams, and consequently such material is free to deflect downwards to form a folded bottom when the pack is upright and filled with products.

It is known to provide means whereby parts of the external surface of a pack can additionally be adhered one to another. Such means could be employed e.g. in the Figure 3 embodiment to secure the regions 26 and 30 together at either side of the base of the pack, thereby modifying the shape of the base.

In Figure 2, the edges of the pack are shown separated in the regions 23a, 24, 25 and 21a. These separations of the edges are for illustrative purposes only and in most embodiments of the pack the seams would be formed as continuous seams.

However, it may be desirable to manufacture the pack e.g. with incomplete seams or interrupted seams for various purposes. For example, it might be desirable to allow access of air to a product and this could be achieved by interrupting the various seams perhaps in the manner illustrated at points 23a, 24, 25 and 21a in Figure 2.

The pack of Figure 3 is identical to the Figure 2 pack except that there is an additional seam 29 extending across the lowermost portion of the rear face of the pack. Seam 29 is formed to mirror the appearance of seam 23 at the base of the front of the pack, and consequently provides a neat appearance for the pack. Seam 29 is an optional feature of the pack.

Referring now to Figures 4 to 13, there is shown a method of manufacturing a pack as shown in Figure 2. The pack of Figure 3 can be

manufactured using a similar method, with an additional seam-forming step.

In Figure 4, there is shown a sheet 31 of a suitable, flexible material from which the packs 20 are to be manufactured.

Sheet 31 is elongate, and one elongate edge 31 of the sheet 31 is shown in Figure 4 being doubled under the main body of the sheet 31 to form a folded strip.

The doubling of the edge portion 32 can be achieved by feeding the sheet 31 in the direction of arrow A in Figure 4 and passing one elongate edge portion 32 of the sheet through a folding tool (not shown in Figure 4) that buckles the edge portion 32 under the main part of the sheet 31 to form the doubled portion as the sheet travels in the direction of arrow A.

Sheet 31 is conveniently fed from e.g. a roll of sheet material supported on a pay out stand. The folding tool might suitably be located at the point 33 in Figure 4.

In Figure 5 the effective edge portion 34 of the sheet resulting from the operation shown in Figure 4 is designated by the numeral 34. Effective edge portion 34 is doubled by means of a folding tool operative at the point 36 so that the effective edge portion 34 overlies the main body of sheet 31 and the initially folded edge portion 32 overlies the double, effective edge portion 34.

The result of this operation is shown in profile in Figure 6. It will be seen from Figure 6 that the operations of figures 4 and 5 form an upper-case "Z" fold along one elongate edge of the sheet 31, with the initially uppermost surface 32a of initially folded edge portion 32 lying uppermost on the main body of the sheet 31.

Of course the double fold can alternatively be created by initially folding a portion of the edge of sheet 31 upwardly onto itself and subsequently folding the thus folded portion onto itself again to create the double fold referred to.

The sheet of Figure 5 & 6 is fed in the direction of arrow A via a forming tool such as a forming shoulder of a form, fill and seal machine so that the sheets adopt the generally circular cross section shown in Figure 7. It will be seen from Figure 7 that the unfolded, elongate edge 37 of the sheet 31 is brought into proximity with folded edge portion 32.

This effect is achieved by virtue of the sheet 31 being wrapped around a former such as the fill tube of a vertical form, fill and seal machine that occupies the region 38 shown in Figure 7.

Figure 8 shows the cross sectional view of the sheet 31 after it has advanced forwardly beyond the position shown in Figure 7. The forming tool has in Figure 8 brought the edge portions 37 and 32 closer together.

In Figure 9 a pair of jaws shown diagrammatically at 62 and 64 constituting a sealer element are shown closing about the edge portions 32 and 37 to form the seal 23 shown in Figures 2 and 3.

In preferred embodiments of the invention, the upper surface of sheet 31 as shown in Figures 4, 5 and 6 is coated with a heat-curable adhesive material and the sealer elements 62, 64 include heater elements that serve to heat the adhesive material on the edge portions 32 and 37 to form the seam 23.

Optionally, either simultaneously with the forming of seam 23 or after the sheet 31 has advanced forwardly from the position shown in Figure 9, further sealer elements such as elements 62 and 64 can be brought to operate on the portion 34 of sheet 31 so that a further seam is formed between surface 34a of portion 34 and the adjacent part 40 of the main body of the sheet 31.

In Figure 10, the sheet 31 is shown advancing down a former such as the fill tube of a form, fill and seal machine after formation of the seam 23 between the edge portions 32 and 37. The arrangement shown in Figure 10 is that used for producing a pack such as that shown in Figure 2. Consequently, in Figure 10 the edge portion 34 has not been secured

to the edge portion 40 and consequently there exists merely a fold 25 running along the length of the sheet. On completion of the pack, the fold 25 would be positioned extending along the rear of the folded bottom of the pack as shown in Figure 2.

A further pair of sealer elements 42a, 42b is shown in Figure 10 operable to seal across the lowermost portion of sheet 31 in a direction transverse to the elongate direction of seam 23.

The sealer elements 42a, 42b optionally also include a guillotine or other cropping mechanism for cutting the sheet 31 in the direction perpendicular to the elongate direction of seam 23.

Initial operation of the sealer/guillotine elements 42a, 42b results in the arrangement shown in Figure 11. In Figure 11, the sheet material below the point of operation of the elements 42a, 42b has been cut away. In practice, unless the pack shown being formed in Figure 11 is the first pack of a run to be produced, the material cut-off from below the element 42a, 42b would be a completed pack.

Initial operation of the elements 42a, 42b on the pack 20 shown being formed in Figure 11 produces the seam 22b of Figure 2. In Figure 11 the seam 23, the sheet portions 32, 34 and 40 and the fold 25 of Figure 2 are visible because of splaying of the seam 23 away from fold 25 in the region of the partly formed pack 20 spaced from seam 22b.

After formation of seam 22b, the material 31 of the pack 20 is advanced in the direction of arrow A a distance corresponding to the desired spacing between seams 22b and 22a. If as in preferred embodiments of the method of the invention the pack 20 is formed about the fill tube of 43 of a vertical form, fill and seal machine, it will be appreciated that product to be stored in the pack 20 can readily be inserted therein via the open end of the partly formed pack which is uppermost in Figure 11.

Filling of the pack 20 is represented schematically by the arrows B

in Figure 12.

After filling of the pack 20, the elements 42a, 42b are operated again to form the seam 22a as shown in Figure 13 and complete the pack. If the elements 42a, 42b incorporate guillotine members the completed pack 20 is freed from the remainder of the sheet material 31 which is then used to form the next pack 20.

For use in display or marketing, once completed, the pack shown in Figure 13 would be rotated through 90° so that the seam 23 and fold 25 constitute the base of the pack, as seen in Figure 2. The fold 21 resulting from operation of the elements 42a, 42b becomes the top fold 21 of the pack shown in Figure 2.

Although the invention has been described in relation to the use of a single pair of sealer elements 42a, 42b for forming the edge seams 22a, 22b of the pack, it is equally possible that two pairs of sealer elements be employed at spaced locations in the apparatus for forming the pack. This would obviate the need to advance the pack material 31 in the machine between the forming of seam 22b and the forming of seam 22a.

Thus, it should be appreciated that in other preferred embodiments similar to that shown in Figure 10, heaters 42a and 42b could be replaced by a number of other components. In particular, there could be a lower heater element for forming the seam 22a in a filled pack 20; an upper heater element for forming the seam 22b in a pack 20 yet to be filled and finally sealed; and a guillotine, blade or similar cutting device above the upper heater element.

Referring now to Figures 14 to 22 there is shown (inter alia) a preferred form of apparatus for manufacturing stand-up packs such as pack 20 described herein.

The apparatus 50 includes a pay out station on which a roll 52 of sheet material 31 is rotatably mounted.

The sheet material 31 is fed from the roll 52 via guide spindles 52a

and then via first 53, second 54 and third 55 folding tools operating respectively at locations 33 and 36 shown schematically in Figures 4 and 5 to create the Z form profile of the right hand edge of the sheet as shown in Figures 6 and 14. The folding tool 54 is adjustable, i.e. it can be withdrawn if desired. The sheet material 31 is fed forwardly over a forming shoulder 56 of conventional design, through a forming collar which is located substantially at 57 but is not illustrated in Figure 14 for reasons of clarity. The material 31 is then fed about the vertical tube 58 of a form, fill and seal machine. Just below the collar 57, a pair of nip rollers 59 guide and hold the folded portion of the sheet material 31 in position as the sheet material moves downwardly to heat sealing elements 62, 64 constituted by a seam heater 62 and an anvil plate 64. The heat sealing elements 62, 64 form the seam 23 previously referred to. The nip rollers or a suitable ironing roller could of course be located elsewhere on the apparatus if desired.

The sealing/guillotine elements 42a, 42b (Fig. 10) are positioned on a vertically reciprocating carriage (not shown) at a position below the free end of the fill tube 58 of the form, fill and seal machine. In addition to their functions in forming the seams 22b and 22a and in cropping the sheet material 31, the elements 42a and 42b serve to grip the sheet material 31. The carriage reciprocates in a vertical direction. The elements 42a, 42b are arranged to grip the sheet material 31 at the top of the travel of the carriage, and subsequent downward movement of the carriage will draw sheet material 31 through the apparatus thereby obviating the need for a separate feeder mechanism. Once the seam 22b of a given pack 20 is formed, the elements 42a, 42b can be caused to release the sheet material 31 thus allowing the carriage to return to its upper position for gripping of a further portion of the sheet material 31 to form a seam 22a of the next pack, to crop a completed pack from the bottom of the sheet material and to draw a further length of sheet material downwardly over the end

of the fill tube 58. Of course it is not essential for the heater elements 42a, 42b to perform the sheet drawing operation referred to, or even for the elements 42a, 42b to be mouted on a reciprocating carriage. Numerous other methods for drawing the sheet material through the apparatus are possible in embodiments of the invention.

According to Figure 15, which shows alternative positions for the anvil plate 64, in position 64a a front seam only is achieved, whereas if it is placed in position 64b, seams at the front and rear of the base of the package are obtained.

Figures 16 and 17 show packs manufactured by the apparatus described, Figure 16 showing the orientation of the pack when it comes off the vertical form, fill, and seal machine, and Figure 17 showing the pack in its usual orientation on, for example, a sales counter.

Figure 18 is a view similar to Figure 14 but shows folding guides located below the forming shoulder 56. As seen in Figure 18, these folding guides 66, 67 and 68 are staggered longitudinally of the fill and form tube 58, and a further set of folding guides 69, 70 and 71 (more clearly seen in Fig. 19) are disposed above the nip rollers 59.

A number of different configurations of pack can be made using the apparatus described above. For example, the pack diagrammatically illustrated in side view in Figure 21 has a smoothly rounded curve 73 at its lower rear edge, obtained for example by placing the anvil plate 64 in position 64a in Figure 15, whereas the pack diagrammatically illustrated, also in side view, in Figure 22 has a front and a rear seam projecting at respective lower edges of the pack, obtained by positioning the anvil plate at 64b.

In an alternative embodiment not shown in the drawings, the anvil is positioned at 64a and a second heater element is provided acting in the region 64b. The respective heater elements then act against opposite sides of the anvil (in position 64a) to produce the seams. This embodiment is

of particular utility when the material from which the pack is formed is thick and/or a poor heat conductor.

Referring to Figures 23 to 25, there is shown a further embodiment of apparatus in accordance with the invention. This apparatus includes, at the lower end of the fill tube 43, front and rear pairs of spaced, downwardly projecting spreading fingers 66a, 66b. A pivotable forming blade 67 is mounted to be selectively moveable into and out of the region between the front spreading fingers 66a. A seam heater 68 is disposed above the lower end of fill tube 43 with its longitudinal axis generally aligned with the longitudinal axis of the fill tube 43. Operation of seam heater 68 is described below.

The sealing elements 42a, 42b are mounted, in a similar manner to those shown in Figure 10, below the lower end of fill tube 43. The sealing elements 42a, 42b are capable of movement in the direction of arrows A for forming the seams 22a, 22b of the pack. The sealing elements 42a, 42b are also optionally mounted on a reciprocatable carriage that is moveable parallel to the longitudinal axis of the fill tube 43 so that the sealing elements 42a, 42b can be used repeatedly to grip the sheet material 31 and draw lengths of it through the apparatus for the forming of packs.

A conventional gusset finger assembly 70 is mounted between the carriage parts 42c, 42d on which the sealing elements 42a, 42b are secured. The gusset finger assembly 70 is a scissor action device the tip 71 of which moves in the direction of arrow B (Figure 24) as the sealing elements 42a, 42b move closer together in the direction of arrows A.

In use of the apparatus of Figures 23 to 25, the sheet material 31 is fed over the forming shoulder 56 without having first been doubled and further doubled in the manner described in relation to Figures 4 to 6. This action results in the sheet material 31 being simply wrapped around the fill tube 43 such that there exists a simple overlap 72 of the

longitudinal edges of the sheet material 31.

As the overlapping sheet material edges pass the seam heater 68, this heater is operated to form a longitudinally extending seam 23 in the sheet material 31. This action tends to flatten the seam 23 against the fill tube as shown.

The forming blade 67 is biassed in use of the apparatus to press the sheet material 31 between the front spreading fingers 66a. Blade 67 contacts the sheet material in such a way as to tend to form a folded pack bottom, similar to the folded bottom of pack 20 (Figures 2 and 3), extending longitudinally along the sheet material 31. This is best shown in Figure 25.

When the sheet material advances to the sealing elements 42a, 42b it is sealed in longitudinally spaced locations to form the seams 22a, 22b of the pack in a similar manner to the apparatus of Figure 10. Since the tip 71 of finger 70 advances in the direction of arrow B when the sealing elements 42a, 42b move closer together, the tip 71 moves into the longitudinally extending folded region of the sheet material 31 to complete as necessary the formation of the folded bottoms of the packs.

It should be understood that in practice the gusset finger 70 may not be strictly necessary to form the packs of the invention, and in some embodiments would serve primarily to confirm the folds made by the blade 67 and fingers 66a. Moreover the blade/fingers assembly 66a/67 and/or the gusset finger 70 or similar devices may theoretically be incorporated into other embodiments of the apparatus, such as that shown in Figure 14, if desired.

The packs are filled between formation of second seam 22a and third seam 22b, and are cropped from the sheet material 31 after forming of the third seam 22b. Any of the methods and apparatuses previously discussed for forming the seams and cropping the packs from the sheet

material 31 can be included in the apparatus of Figures 23 to 25. Any other optional features of the invention may also be so included, if necessary after suitable modification.

It will be appreciated that use of the apparatus of Figures 23 to 25 results in the method steps of the invention being carried out in a different order from that described in relation to Figures 4 to 13. The method steps of the invention may be carried out within the scope of the invention in any suitable order that results in production of a stand up pack in accordance with the invention.

It will be appreciated that the packs, methods and apparatus described herein are merely exemplary of many ways in which the invention could be put into effect. Numerous variations on the embodiments described herein are possible.

Furthermore, the apparatus of Figures 14 and 15 could additionally incorporate sealing elements that may optionally be employed at an appropriate point in the manufacture of a pack 20 to produce the seam 29 shown in Figure 3.

Moreover, the guillotine or the other cutter mechanism carried by the carriage need not be integral therewith but may be spaced from the elements 42a, 42b. Moreover, the guillotine or equivalent need not be of a contact type. For example, ultrasound, laser or heat cutters could be employed.

The elements 42a, 42b, 62 and 64 need not incorporate heaters designed for heat curing of a curable adhesive. In an alternative version, the elements 42a, 42b, 62 and 64 may for example press the material 31 into form-locking engagement, or may apply an air-curing adhesive; yet a further possibility is to employ ultrasound welding heads to make the seams. Yet a further possibility is for the sealing elements referred to to be suitable for the pressure joining of so called "cold seal" materials.

Similar variants on the types of seam-forming members may be

employed in the elements 39a, 39b if desired and also in any additional such elements for forming the seam 29.

CLAIMS

1. A stand-up pack comprising front and rear walls joined at their upper ends and secured one to the other along mutually spaced seams extending between the top and bottom of the pack and a further seam extending across the front of the pack, the front seam being formed between the front wall and a portion of the rear wall, the pack including a base formed from a portion of the rear wall folded forwardly, said forwardly folded portion including the front seam.

2. A pack according to Claim 1 wherein the front and rear walls are constituted by a single sheet.

3. A pack according to Claim 1 or Claim 2 wherein the joint between the upper ends of the front and rear walls is a fold.

4. A pack according to any preceding claim wherein the mutually spaced seams extend along the respective vertical side edges of the pack when the pack is upright.

5. A pack according to any preceding claim wherein the front seam is located between aligned, lower ends of the front and rear walls.

6. A pack according to any preceding claim wherein the forwardly folded portion of the rear wall is further folded rearwardly in order to provide a portion of the rear wall adjoining the front wall.

7. A pack according to Claim 6 wherein the portion of the rear wall abutting the front wall lies on the underside of the forwardly folded

portion when the pack is upright.

8. A method of manufacturing a pack in particular in accordance with any of Claims 1 to 7, comprising the steps of, in any suitable order,

(i) doubling an edge portion of a sheet;

(ii) further doubling said edge portion to form a double fold along the edge of the said sheet;

(iii) feeding the sheet via a forming shoulder whereby to position one edge portion of the sheet adjacent the opposite edge portion thereof;

(iv) securing said two adjacent edge portions together whereby to form a transverse, front seam of the pack;

(v) forming a second seam extending from the front seam of the pack in a direction transverse thereto; and

(vi) forming a third seam extending from the front seam of the pack in a direction transverse thereto and spaced from the second seam.

9. A method according to Claim 8 wherein:

(i) the method steps are carried out in the order specified therein;

(ii) the sheet fed via the forming shoulder is in its double folded condition so that the double fold lies adjacent the opposite edge portion of the sheet; and

(iii) said opposite edge portion is secured to a pleat of the double fold.

10. A method according to Claim 8 or Claim 9 wherein the step of feeding the sheet via a forming shoulder and subsequently listed steps take place in a form, fill and seal machine.

11. A method according to Claim 10 wherein the second and third seams are formed by a sealing element of the form, fill and seal machine, the sheet being advanced in the time between the forming of the second and third seems whereby to space the second and third seams one from the other.

12. A method according to Claim 10 wherein the second and third seams are formed by a sealing element of the form, fill and seal machine, the sealing element being moveable in the direction of feeding of the sheet, whereby to permit spacing of the second and third seams.

13. A method according to Claim 11 or Claim 12 wherein the sealing element is driveable and is capable of gripping the sheet, whereby to advance the sheet on driving of the sealing element and permit spacing of the second and third seams from one another.

14. A method according to any of Claims 10 to 13 wherein the forming of the second and third seams is accomplished by plural sealing elements of the form, fill and seal machine.

15. A method according to any of Claims 8 to 14 including the further step of filling the pack with goods before the forming of third seam.

16. A method according to any of Claims 8 to 15 including the further step of securing a portion of the initially doubled edge portion of the sheet and the remainder of the sheet together, whereby to form a transverse, rear seam of the pack.

17. Apparatus for forming a stand-up pack in particular according to any of Claims 1 to 7, or for performing a method in particular according

to any of Claims 8 to 16, comprising:

an infeed area for sheet material;

a drive for feeding sheet material through the apparatus;

a folding tool for doubling an edge portion of the sheet material in the apparatus;

a folding tool for further doubling the edge portion in the apparatus, whereby to form a double fold along said edge portion;

a former for forming the sheet material into an orientation such that one edge portion of the sheet lies adjacent the opposite edge portion of the sheet;

a sealer for sealing the adjacent edge portions together whereby to form a front, transverse seam of the pack;

a sealer for forming a second seam extending from the front seam in a direction generally transverse thereto;

a sealer for forming a third seam extending from the front seam in a direction generally transverse thereto and spaced from the second seam; and

a filler for inserting goods into the pack.

18. Apparatus according to Claim 17 wherein the folding tools serve to form the folds before the sheet material is formed on the former.

19. Apparatus according to Claim 17 or Claim 18 wherein the infeed area is adapted to receive a roll of sheet material for dispensing the sheet therefrom.

20. Apparatus according to any of Claims 17 to 19 including a combined folding tool for doubling and further doubling the edge portion.

21. Apparatus according to any of Claims 17 to 20 wherein the former includes a forming shoulder and a fill tube.

22. Apparatus according to any of Claims 17 to 21 including a sealer operable on the sheet at spaced locations whereby to form the second and third seams respectively.

23. Apparatus according to Claim 22 including a reciprocative gripper capable of gripping and releasing the sheet, alternate gripping and releasing of the sheet during reciprocation of the gripper causing feeding of the sheet through the apparatus whereby to permit the forming of spaced second and third seams by the sealer.

24. Apparatus according to Claim 23 wherein the sealer includes the gripper.

25. Apparatus according to any of Claims 17 to 24 including a sealer operable to secure a portion of the initially doubled edge portion of the sheet and the remainder of the sheet together.

26. Apparatus according to any of Claims 17 to 25 when constituted as a form, fill and seal machine.

27. Apparatus according to Claim 26 when constituted as a vertical form, fill and seal machine.

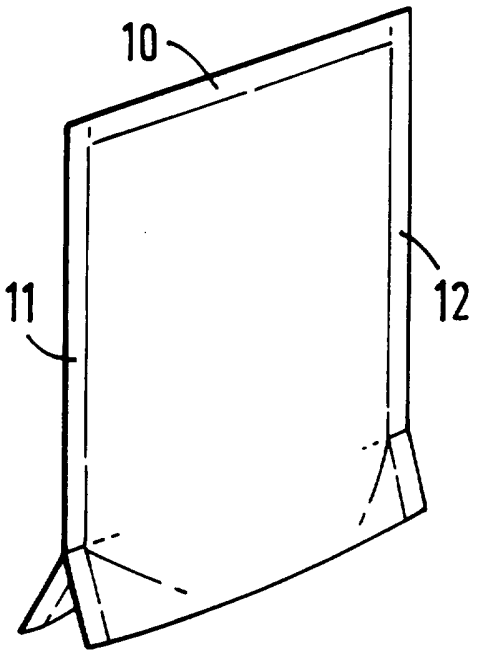


FIG.1A.

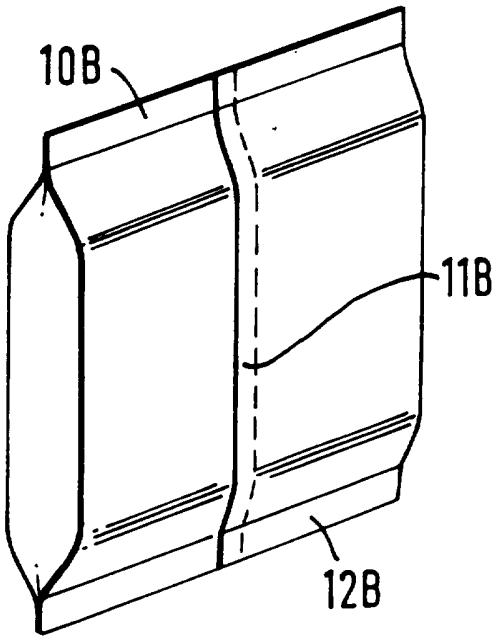


FIG.1B.

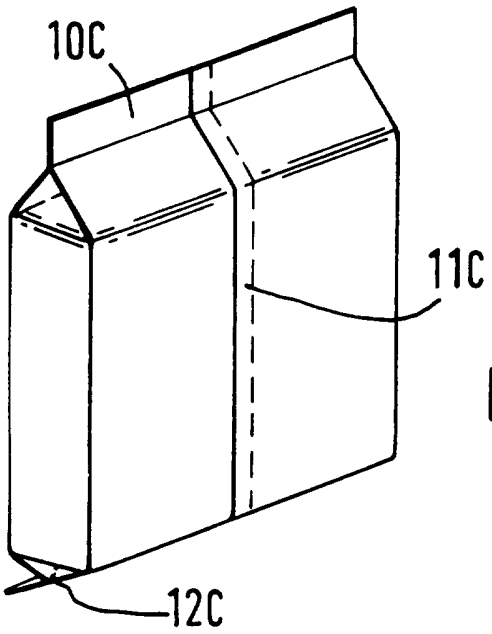


FIG.1C.

FIG. 3

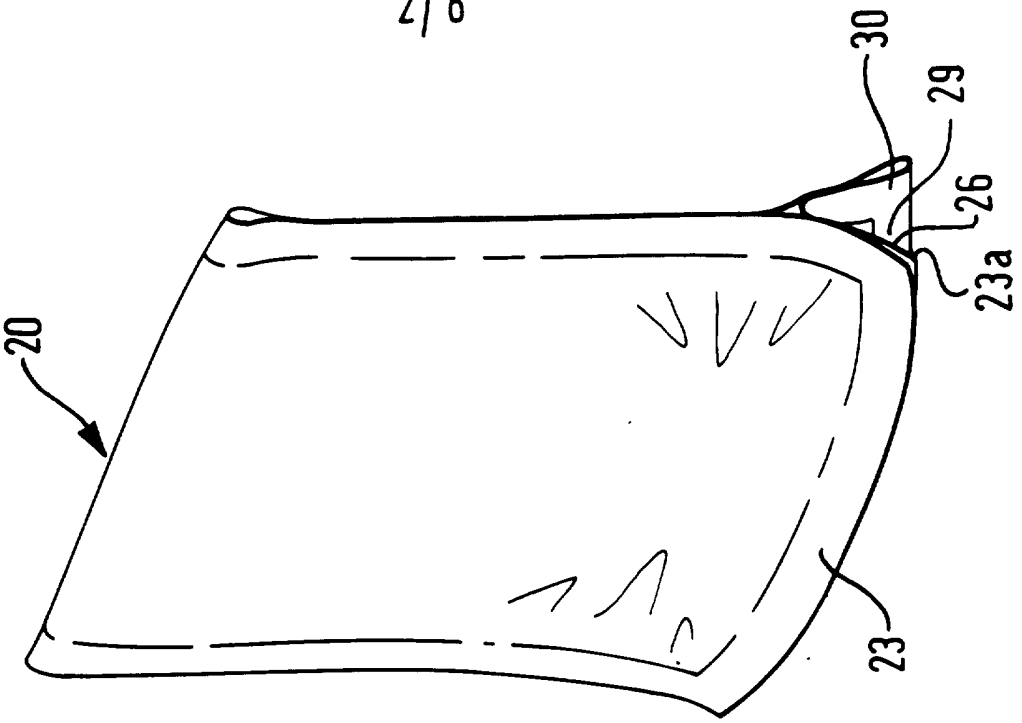


FIG. 2

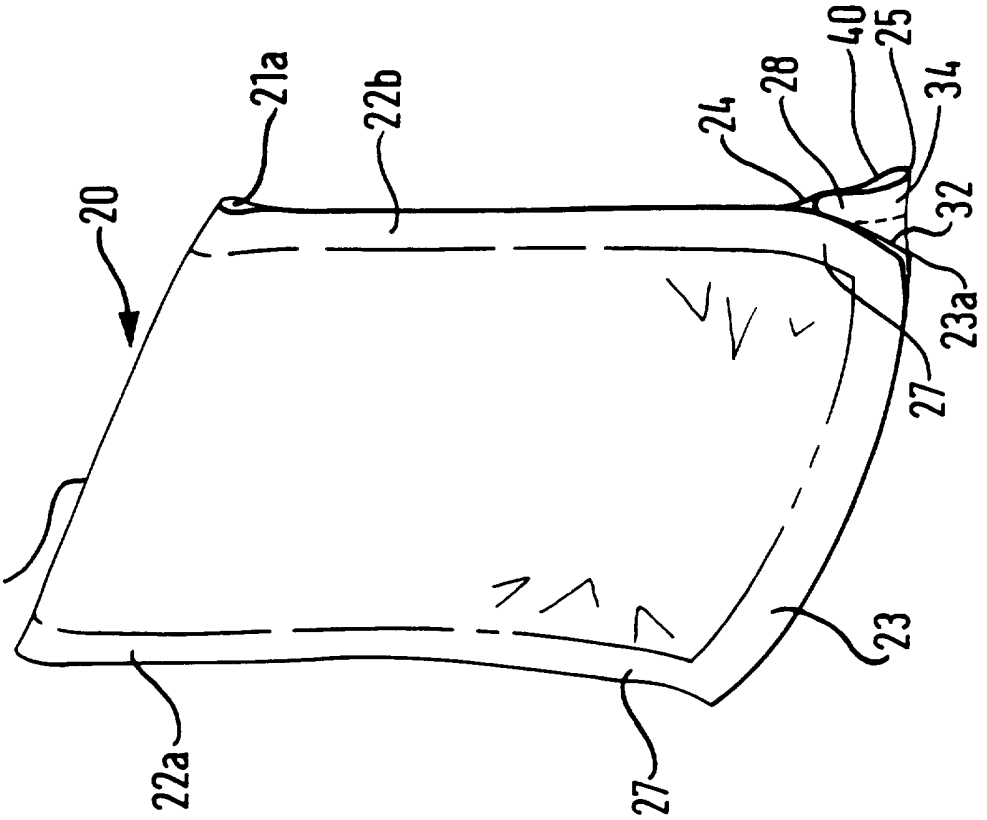


FIG. 4

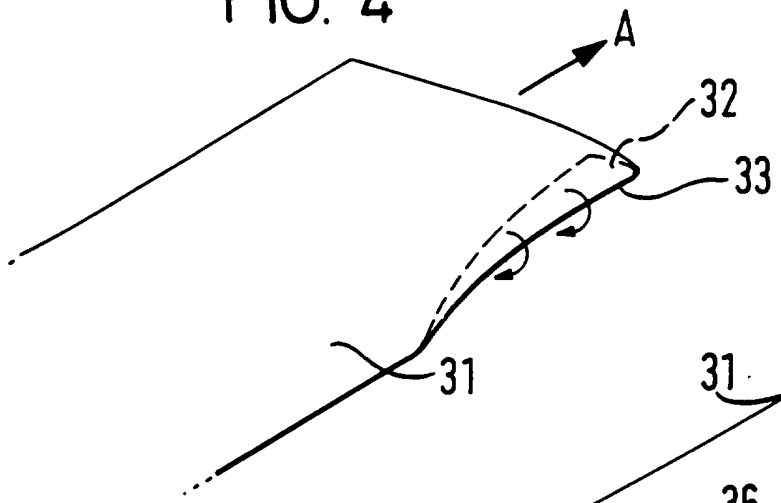


FIG. 5

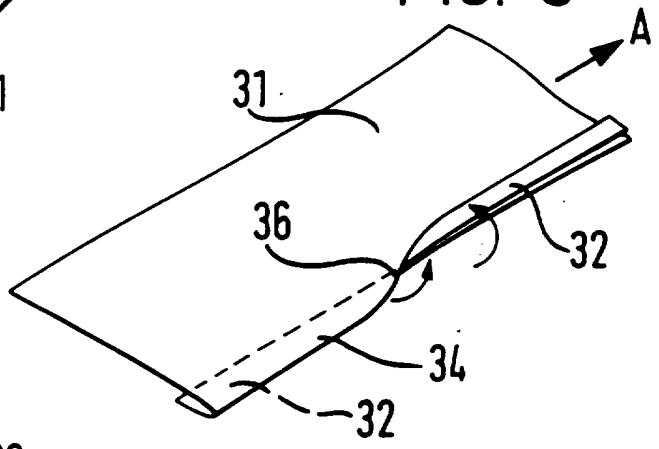


FIG. 6

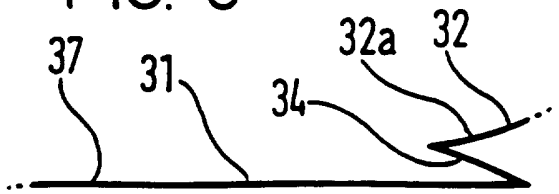


FIG. 7

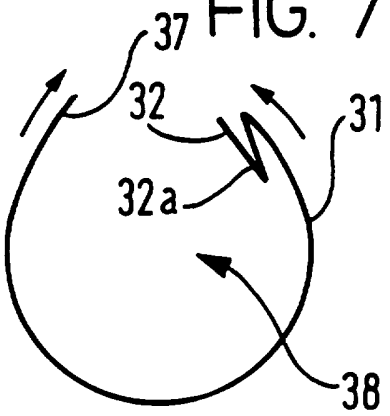
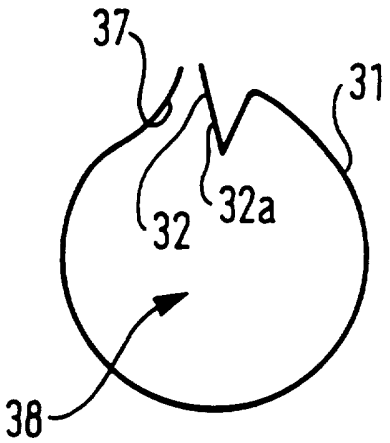


FIG. 8



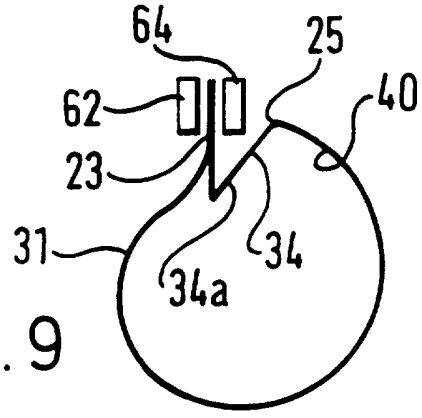


FIG. 9

FIG. 11

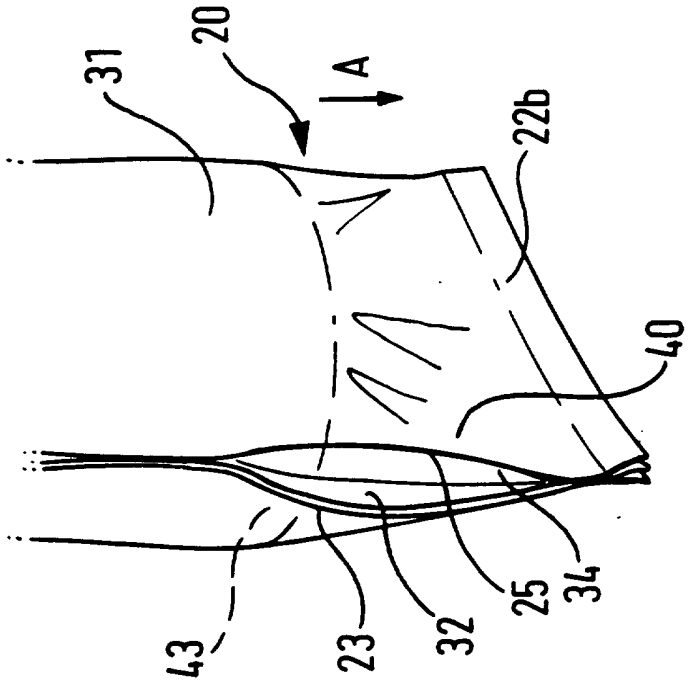


FIG. 10

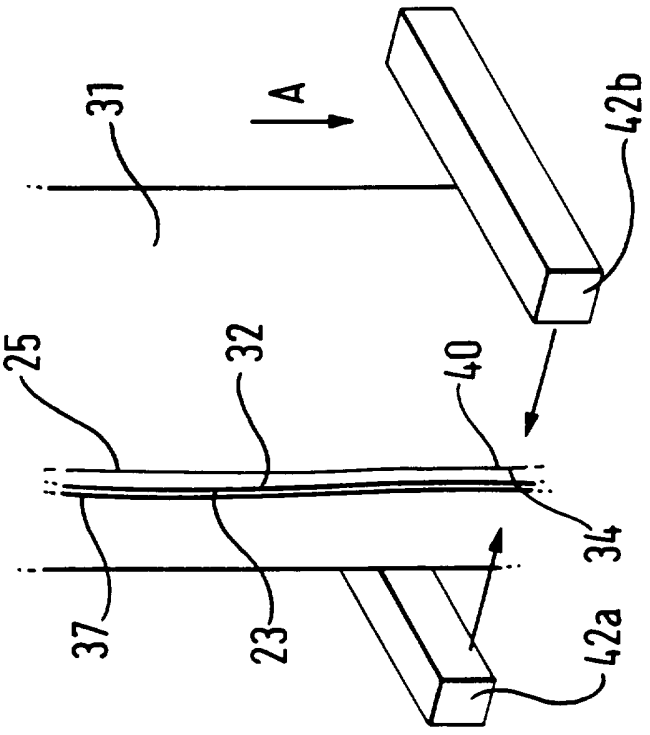


FIG. 13

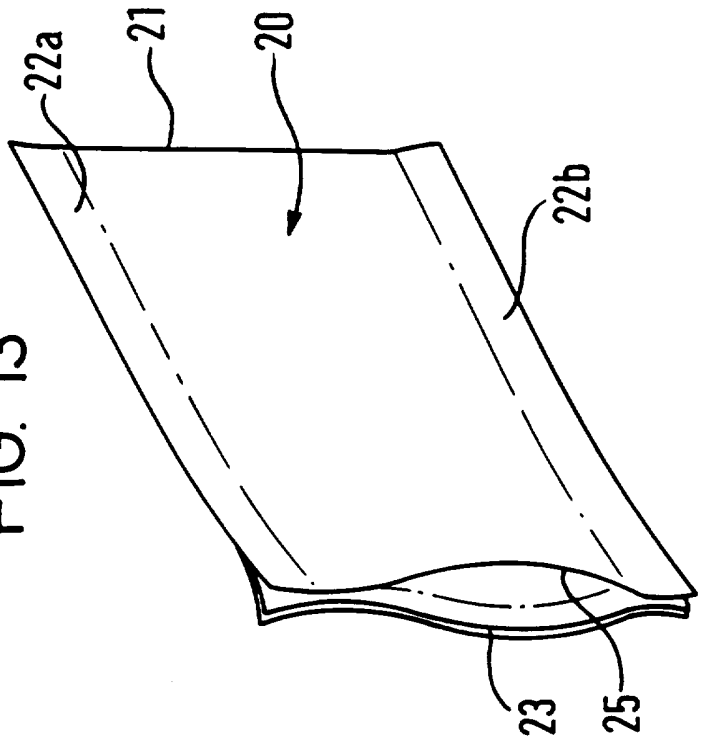


FIG. 12

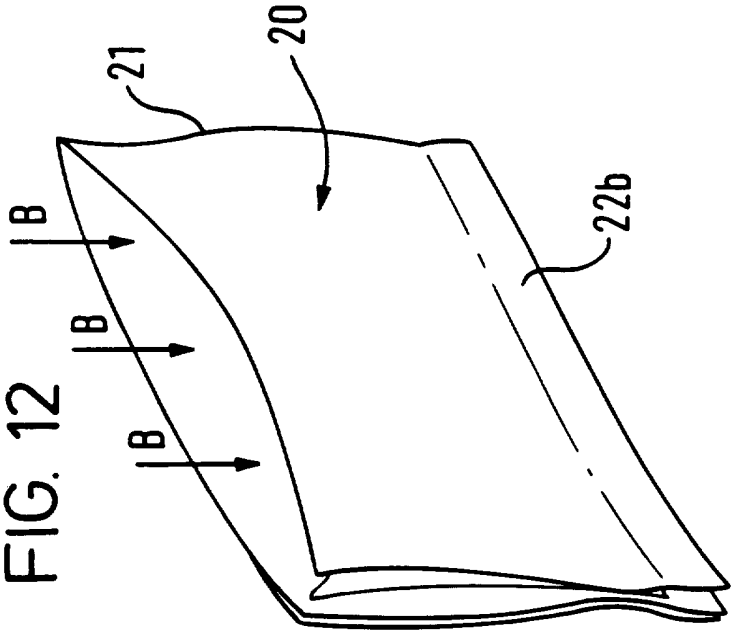


FIG.14

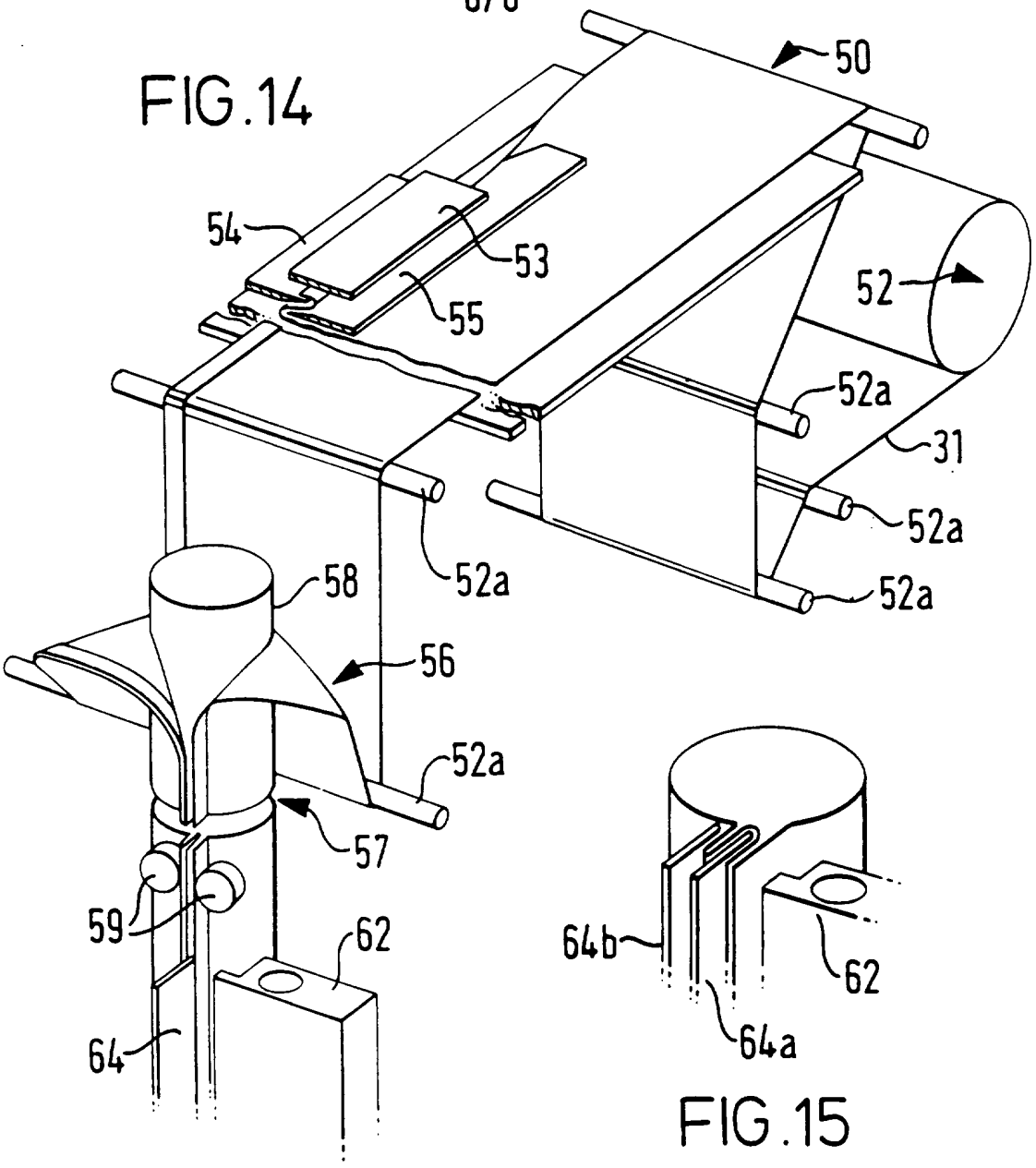


FIG.15

FIG.16

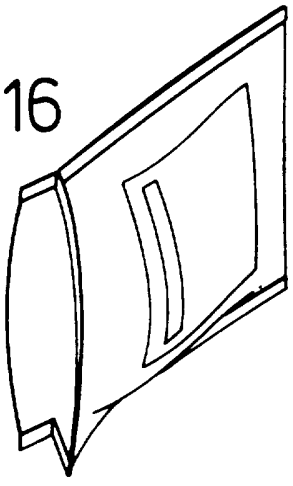


FIG.17

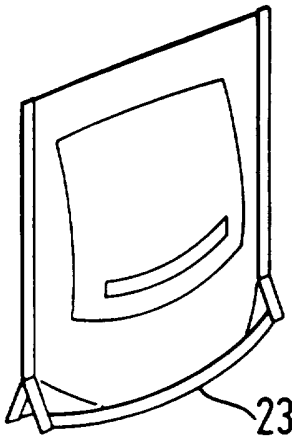


FIG.18

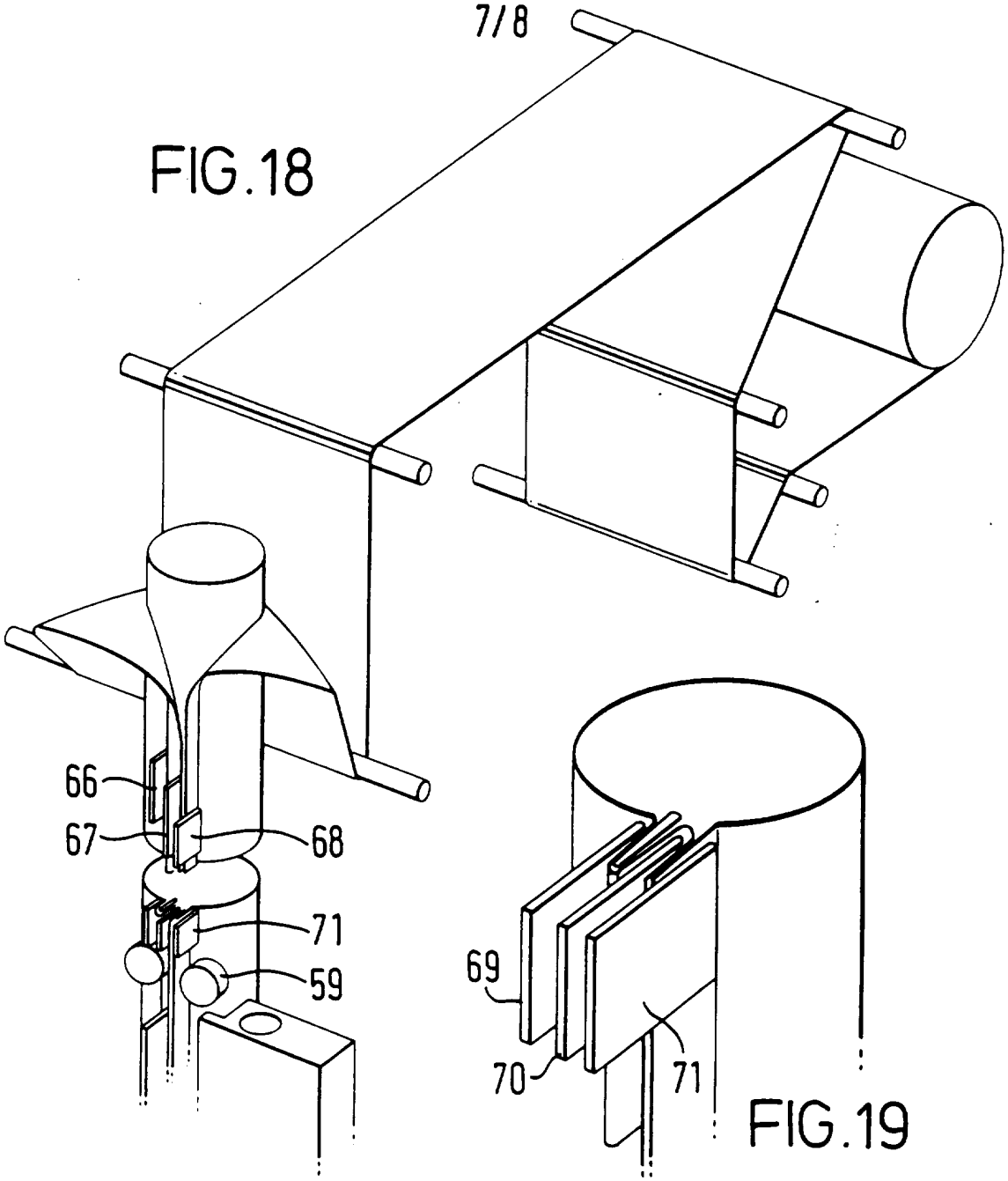
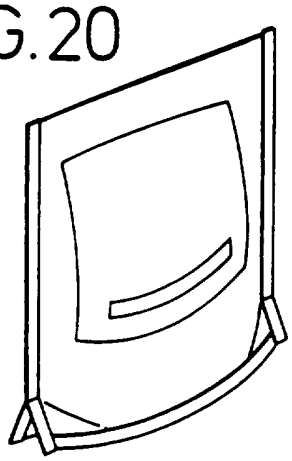


FIG.19

FIG.20



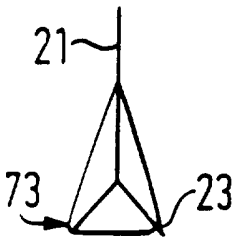


FIG.21

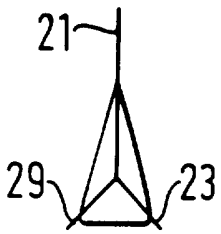


FIG.22

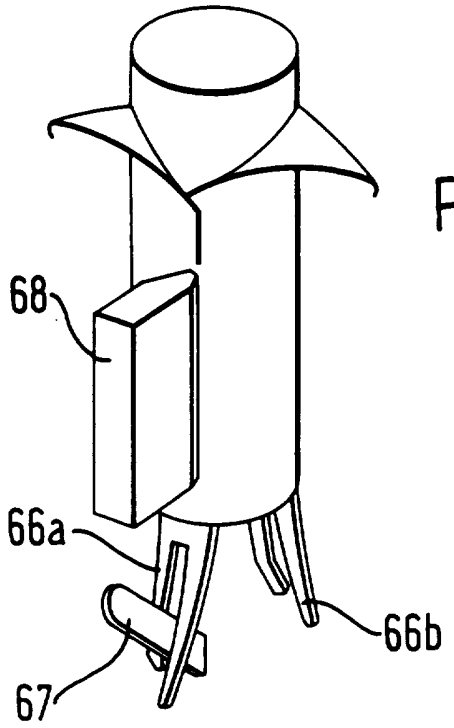


FIG. 23

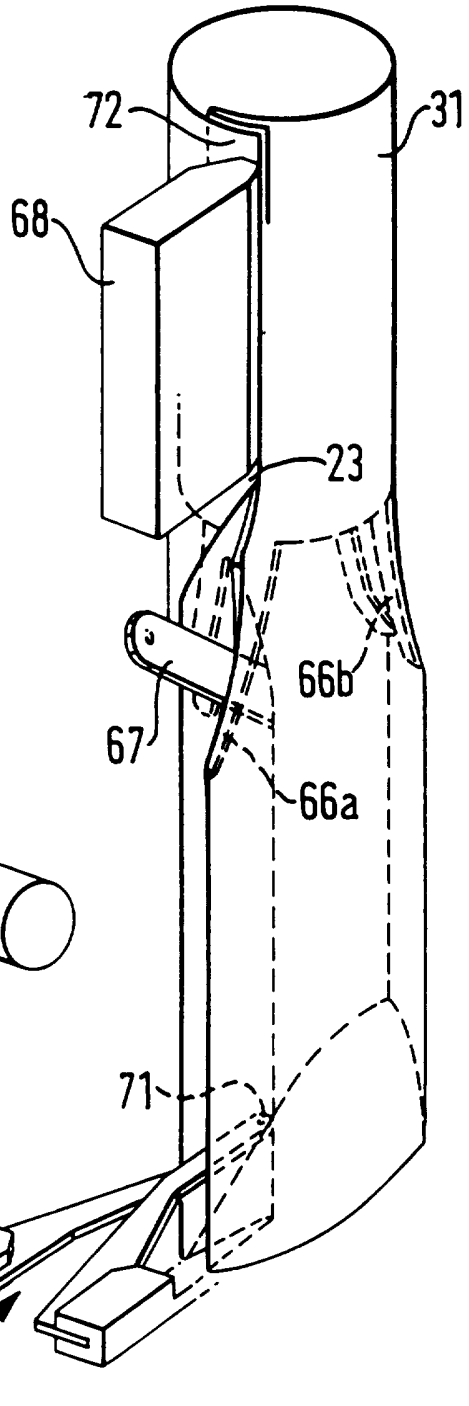
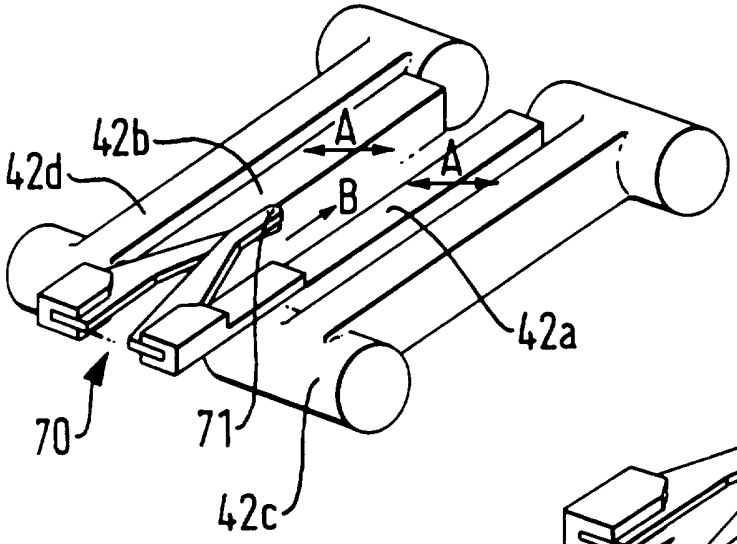


FIG. 25

FIG. 24



INTERNATIONAL SEARCH REPORT

Inter nal Application No
PCT/GB 96/00554

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B65B9/20 B65D75/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B65B B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	WO,A,89 00949 (ROVEL) 9 February 1989 see page 9, line 26 - page 11, line 30; figures	1,2,4-7 3,8-22, 25-27
X A	GB,A,1 481 378 (DAI NIPPON INSATSU) 27 July 1977 see page 4, line 129 - page 6, line 103; figures	1,2,4-7 8,17,19
Y	US,A,3 838 549 (C. PEPMEIER) 1 October 1974 see column 4, line 40 - column 7, line 2; figures	3,8-22, 25-27
A	US,A,3 855 907 (K. JOHNSON) 24 December 1974	
A	US,A,3 437 258 (E. KUGLER) 8 April 1969	

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19 July 1996	26.07.96

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax (+31-70) 340-3016	Jagusiak, A

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INTERNATIONAL SEARCH REPORT

Interr ial Application No
PCT/GB 96/00554

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP,A,0 052 151 (CH. KESSEL) 26 May 1982	

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter nal Application No
PCT/GB 96/00554

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
WO-A-8900949	09-02-89	DE-D-	3751786	30-05-96
		EP-A-	0324739	26-07-89
GB-A-1481378	27-07-77	JP-A-	51082178	19-07-76
		AU-B-	8365675	10-02-77
		CA-A-	1048834	20-02-79
		CA-A-	1049461	27-02-79
		DE-A-	2534306	08-07-76
		FR-A,B	2295879	23-07-76
		NL-A-	7509081	29-06-76
		NL-A-	7809637	29-12-78
		US-A-	3980225	14-09-76
US-A-3838549	01-10-74	US-A-	3844090	29-10-74
US-A-3855907	24-12-74	NONE		
US-A-3437258	08-04-69	NONE		
EP-A-52151	26-05-82	NONE		