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(54) Panel interlocking arrangement.

(57) Panel interlocking means (45, 46) for securing together a pair of panels (13, 28) in overlapping relationship includes a locking tab (45) struck from one of the panels (12) and arranged to be driven through a locking aperture (46) struck from the other panel (28). The opposed lateral edges (45a, 45b) of the locking tab have deformable marginal portions (a) formed by cut lines (b, c) which are deformed by the opposed lateral edges (46a, 46b) of the locking aperture when the locking tab is driven through the locking aperture.

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Description

PANEL INTERLOCKING ARRANGEMENT

This invention relates to a panel interlocking arrangement and to cartons, particularly foldable wrappers, having such interlocking means. Known wrappers often comprise a blank which has a top wall panel, two side wall panels and two base panels hinged together by means of fold lines, one base panel having locking tabs which can be folded up from said one base panel for engagement in associated openings of the other base flap portion, the locking tabs then being supported in position by retaining tabs which are folded up from the edges of the openings.

The articles which are to be packed with such foldable wrappers usually have in fact approximately the same dimensions. In practice however, the dimensional tolerances of the articles which arise within an individual package are relatively high. This applies especially to multi-way bottles, because numerous types of bottles whose dimensions are in fact similar but not absolutely identical, are in circulation. Manufacturing tolerances are not the only reason for this, but in particular there is also the fact that there has not been hitherto an adequate standardisation for bottle dimensions. Even after the introduction of a standard for the dimensions of bottles, bottles which differ from this standard and which have to be packaged with foldable wrappers are still in circulation.

In a foldable wrapper it is known from GB 2 019 804B to compensate for tolerances by providing locking tabs on base panel with lateral edges which are of undulatory configuration over substantially their entire length, with the two undulatory lateral edge parts of each locking tab running parallel to each other over their whole length and each opening in the other base panel having lateral edges which diverge towards a base of a respective retaining tab provided at the opening for holding the associated locking tab engaged within the opening.

Because of the form of the openings for receiving the locking tabs, relatively long closure tabs can be introduced unhindered into these openings. Consequently, the locking tabs can be made as long as is desirable for compensation of the tolerance range. For closing the wrapper, it is sufficient to draw together the two base flap portions with a force which is defined by the strength of the foldable wrapper and to close the panels in the relative position which is set by the articles.

Although the prior arrangement disclosed in GB 2 019 804B has been found effective, in some applications it is thought that it would be advantageous to even further reduce the so-called "engagement spacing" of the locking tab and also to increase the locking strength by minimising twisting of the locking tab. In the prior arrangement, some twisting of the locking tab occurs because of the alternate relationship of the corrugations at respective opposed edges of the locking tab.

To this end, one aspect of the invention provides panel interlocking means for securing together a pair of panels in overlapping relationship including a locking tab struck from one of the panels and arranged to be driven through a locking aperture struck from the other panel, characterised in that each lateral edge of the locking tab is formed with a plurality of deformable marginal portions which are selectively deformable by engagement with the opposed lateral edges of the locking aperture dependent upon the extent to which said locking tab is driven into said locking aperture whereby said locking tab may be locked in the locking aperture in a plurality of selected positions.

According to a feature of this aspect of the invention, the breadth of the locking tab as measured from one of its lateral edges to the other of its lateral edges may be greater than the breadth of the locking aperture.

According to another feature of this aspect of the invention, the deformable portions each may be defined by a pair of successive cut lines in the marginal edge portions of the locking tab. Preferably, the cut lines in one lateral edge are aligned with the cut lines in the opposite lateral edge. The opposed cut lines may be convergent in a direction towards a base of the locking tab.

According to yet another feature of this aspect of the invention, the locking aperture may be defined by a retaining tab for supporting the locking tab in a locked position within the locking aperture. Preferably, the locking aperture has lateral edges which diverge towards a base of a respective retaining tab for holding the associated locking tab engaged within the locking aperture.

According to a still further feature of this aspect of the invention, the lateral edges of the locking tab may be longer than the lateral edges of the locking aperture.

Another aspect of the invention provides panel interlocking means for securing together a pair of panels in overlapping relationship, includes a locking tab struck from one of the panels and arranged to be driven into a locking aperture struck from the other panel characterised in that at least one of the opposed lateral edges of the locking tab has deformable marginal portions which selectively are deformed by a corresponding lateral edge of the locking aperture dependent upon the extent to which said locking tab is driven into said locking aperture whereby said locking tab may be locked in the locking aperture in a plurality of selected positions.

Yet another aspect of the invention provides a carton blank for forming a carton of the wrap-around type which blank has a pair of panels for providing a pair of overlapping base panels of the carton, said pair of panels having panel interlocking means according to any of the five immediately preceding paragraphs for adjusting the girth of the carton.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

FIGURE 1 is a schematic perspective view of a wrapper blank formed into its tubular configuration with its base panel overlapped and one of its locking tabs engaged;

FIGURE 2 is a fragmentary plan view of the overlapped base panel showing a single locking tab in position to be driven through a locking opening;

FIGURE 3 is a perspective fragmentary view in part cross-section showing a single locking tab interlocked within a locking aperture.

FIGURE 4 is a schematic plan view of a preferred male locking tab having marginal edge cut lines according to the invention;

FIGURE 5 is a schematic view of the cutting rule arrangement, partly broken away, required in order to form the marginal cuts shown in Figure 4; and

FIGURE 6 is a cross-sectional view of the die plate taken along the line 6-6 in Figure 5.

Referring to the drawings, the wrapper 10 is formed from a blank of paperboard or similar foldable sheet material and comprises in series a first base panel 12, a first lower side wall panel 14, a first main side wall panel 16, a first upper side wall panel 18, a top wall panel 20, a second upper side wall panel 22, a second main side wall panel 24, a second lower side wall panel 26 and a second base panel 28 hinged one to the next by fold lines 30-44. In practice, the sloping upper and lower side wall panels are formed with openings for receiving portions of articles e.g. neck and heel portions to be packaged. Also, the base panels normally include triangular handling openings used to draw the two base panels towards one another into overlapping relationship prior to locking.

A series of locking tabs 45 are struck from the base panel 12 adjacent its free edge and each tab includes opposed lateral edges 45a, 45b respectively and a base part 45c by which it is hinged to the base panel 12 and an opposed leading nose portion 45d. A series of retaining tabs 46 are struck from the other base panel 28 adjacent its free end and each retaining tab defines a locking aperture 48 at locations arranged so as to correspond with the locking tabs 45 when the wrapper is formed. Each locking aperture 48 has opposed lateral edges 48a, 48b respectively. Figures 1 and 3 show that when the wrapper is formed and the base panels 12, 28 interlocked, the locking tabs 45 are folded about their base portions 45c and driven into the locking aperture 46 where they are supported in this position by the retaining tabs. The particular form of the locking tabs can be seen in Figures 2 and 3. At each of their lateral edges, the locking tabs are formed with a series of cut lines which extend into marginal edge portions of the tab. However, it is envisaged that score lines may suffice in the stead of cut lines. Successive cut lines define between them a deformable portion e.g. deformable marginal portion 'a' is defined by successive cut lines 'b' and 'c'. Thus, a plurality (in this embodiment three) of deformable marginal portions are provided along the marginal lateral edge portions of each locking tab so that it can engage in a locking aperture in a plurality of different positions.

The lateral edges 46a, 46b of each locking aperture 46 diverge towards the base of the associated retaining tab 48. These edges may be parallel at their ends remote from the base of each retaining tab as can be seen by the broken lines in Figure 2. The breadth (as measured between the opposed lateral edges) of each opening is selected so that it is approximately in alignment with the 'roots' of the deformable edge portions of the locking tabs i.e. the parts of the deformable portions remote from the lateral edges of the locking tabs across the ends of adjacent cut lines.

When locking of the base panels is effected, each locking tab 45 is caused to penetrate into a corresponding locking aperture and thereby displace the retaining tab. Since the breadth of the locking tab is greater than that of its locking aperture, as implied above, the opposed deformable edge portions of the locking tab are displaced by abutment against the lateral edges of the locking aperture until the lateral edges of the locking aperture are engaged between the locking edges of the locking tab formed by the cut lines upon displacement of the deformable portion therebetween. Figure 3 shows the locking tab less than fully inserted into the locking aperture to an intermediate locked position whereby the wrapper girth will have a dimension somewhere between its maximum and minimum girth position. In practice, the relative position of the base panels which dictates the extent to which the locking tabs are engaged is set by the articles to be packaged.

The cut lines of the locking tabs are shown to be convergent in a direction towards the base 45c of the locking tab. Whereas the cut lines may also be normal to the lateral edges or convergent in a direction towards the base 45a the particular arrangement shown is thought to facilitate the displacement of the deformable portions defined by the cut lines. Moreover, it is envisaged that the cut lines need not necessarily be either parallel, equidistant from one another nor indeed straight.

The divergent portion of the retaining tab provides a broader initial entry portion in the locking aperture for the locking tab which also facilitates insertion of the locking tab. It is therefore possible for the length of the lateral edges 45a, 45b to be substantially longer than the lateral edges 46a, 46b of the locking apertures so as to accommodate a larger range of bottle sizes.

The 'engagement spacing' is represented by distance 'a' between two adjacent cut lines and this distance can be varied by different cut patterns so that the spacing is more cognizant of small tolerance differences in bottle diameters. For any given lateral edge length a greater number of deformable portions may be provided by decreasing the spacing between cut lines so that the locking tab may be engaged at a greater number of location than was possible heretofore.

In some arrangements where space is limited 'half' locks may be provided, that is where the locking tab includes deformable portions along only one of its lateral edges.

However, it has been found that difficulties have arisen in the production of a satisfactory die cutting rule arrangement for forming the locking tab described above and a preferred form of locking tab is shown in Figure 4.

Referring to Figure 4, the locking tab 'T' has lateral edges E1 and E2, marginal portions of each of which are formed with a succession of cut lines C1 and C2 respectively. Each cut line has a first portion P1 which meets the associated lateral edge of the tab at an angle of 90 degrees and a second contiguous portion P2 which is directed towards the hinged base 'B' of the tab at an angle which is greater than 90 degrees with respect to the first portion. In the arrangement shown, the angle subtended between the first and second portions of each cut line is substantially 135 degrees. Thus, the first portions are parallel to the hinged base whereas the second portions are convergent towards the base of the tab.

Figures 5 and 6 are schematic plan and cross-sectional views respectively of a die-cutting rule arrangement for forming the locking tab illustrated in Figure 4 in which Figure 6 is a view along the line 6-6 in Figure 5.

Referring now to Figures 5 and 6, a single cutting rule R3 is formed for each pair of aligned marginal cut lines adjacent the opposed lateral edges of the lock. Thus, cutting rule R3 has opposed cutting edges e1 and e2 which meet the main peripheral rule R4 at substantially 90 degrees thereby allowing the cutting edges of rules R3 and R4 to mate correctly at their adjoining faces. The central portion of the cutting rule R3 is recessed at Pc so that no cut is made across the central portion f the locking tab. The cutting rule R3 is formed with a slot 'S' extending from the end thereof opposite its cutting edges centrally of the rule which received a ridge portion Rp of the die cutting plate P1 when the rule is embedded in the plate. Thus, the rule P3 is of inherently strong configuration and the central plate ridge enhances the rigidity of the fixture of the rule in the die cutting plate. It is envisaged that locking tabs may be required which have marginal cut lines along only one of its lateral edges in which case the recessed portion Pc of the rule, is extended to eliminate one of its cutting edges.

Claims

1. A panel interlocking means for securing together a pair of panels in overlapping relationship comprising a locking tab struck from one of said panels and an elongate locking aperture provided in the other of said panels and arranged to receive and retain said locking tab, said locking tab being hinged to said one panel at a base and having opposed lateral edges, said locking aperture comprising spaced lateral edges which are generally aligned with the lateral edges of said locking tab when the locking tab is engaged within the locking aperture, characterised in that each lateral edge of the locking tab is formed with a plurality of deformable marginal portions which selectively are deformed by engagement with the lateral edges of the locking aperture at a location dependent upon the extent to which said locking tab is driven into said locking aperture whereby said locking tab may be locked in a plurality of selected positions.

2. Panel interlocking means according to claim 1, further characterised in that the lateral edges of the locking tab are substantially parallel with each other.

3. Panel interlocking means according to claim 1, further characterised in that the width of the locking tab as measured from one of its lateral edges to the other of its lateral edges is greater than the width of the locking aperture.

4. Panel interlocking means according to claim 3, further characterised in that said deformable portions are defined by successive cut lines in the marginal edge portions of the locking tab.

5. Panel interlocking means according to claim 4, further characterised in that the cut lines in the respective edge portions are substantially parallel with each other and the cut lines in one lateral edge portion are generally aligned with the cut lines in the opposite lateral edge portion.

6. Panel interlocking means according to claim 4, further characterised in that the cut lines are convergent in a direction towards the base of the locking tab.

7. Panel interlocking means according to claim 4, further characterised in that the cut lines are divergent with respect to the base of the locking tab.

8. Panel interlocking means according to claim 4, further characterised in that the locking aperture is defined by a retaining tab arranged to support the locking tab in locked position within the locking aperture, said retaining tab being hinged to said other panel at a base which is spaced from the base of the locking tab when said panels are disposed in overlapping relationship and the locking tab is engaged within the locking aperture.

9. Panel interlocking means according to claim 8, further characterised in that the lateral edges of the locking aperture diverge towards the base of the retaining tab.

10. Panel interlocking means according to claim 3, further characterised in that the lateral edges of the locking tab are longer than the lateral edges of the locking aperture.

11. Panel interlocking means for securing together a pair of panels in overlapping relationship comprising a locking tab struck from one of the panels and a locking aperture struck from the other panel and arranged to receive and retain said locking tab, said locking tab being hinged to said one panel at a base and having opposed lateral edges, said locking aperture comprising spaced lateral edges which are generally aligned with the lateral edges of said locking tab when the locking tab is engaged

within the locking aperture, characterised in that at least one of the lateral edges of the locking tab has deformable marginal portions which selectively are deformed by a cooperating lateral edge of the locking aperture at a location dependent upon the extent to which said locking tab is driven into said locking aperture whereby said locking tab may be locked in the locking aperture in a plurality of selected positions.

12. A blank for forming a carton of wraparound type including a pair of panels which are secured in overlapping relationship when the carton is assembled, said pair of panels having panel interlocking means according to claim 1 or claim 9.

13. In panel interlocking means for securing together a pair of panels in overlapping relationship comprising a locking tab struck from one of said panels and an elongate locking aperture provided in the other of said panels and arranged to receive and retain said locking tab, said locking tab being hinged to said one panel at a base and having opposed lateral edges, said locking aperture comprising spaced lateral edges which are generally aligned with the lateral edges of said locking tab when the locking tab is engaged within the locking aperture, a locking tab which has at least one lateral edge formed with a plurality of deformable marginal portions which selectively are deformed by engagement with the lateral edges of the locking aperture at a location dependent upon the extent to which said locking tab is driven into said locking aperture whereby said locking tab may be locked in the locking aperture in a plurality of selected positions, characterized in that said deformable marginal portions are defined by a succession of cut lines each of which has a first portion which meets its associated lateral edge of the locking tab at an angle of substantially 90 degrees and has a second portion contiguous therewith which is directed towards said base of the locking tab at an angle greater than 90 degrees with respect to said first portion.

14. A locking tab according to claim 1, further characterized in that the angle subtended between the first and second portions of each of said cut lines is substantially 135 degrees.

15. A die cutting rule arrangement for forming a locking tab according to claim 1 comprises a single cutting rule to cut the outline periphery of said locking tab and a succession of spaced transverse cutting rules extending between opposed lateral edges of said peripheral cutting rule each of said transverse rules having a cutting edge at at least one of its lateral extremities which cutting edge has a first portion which meets the adjacent cutting edge of said peripheral rule at an angle of substantially 90 degrees and a second portion inclined with respect to said first portion.

FIG.1.

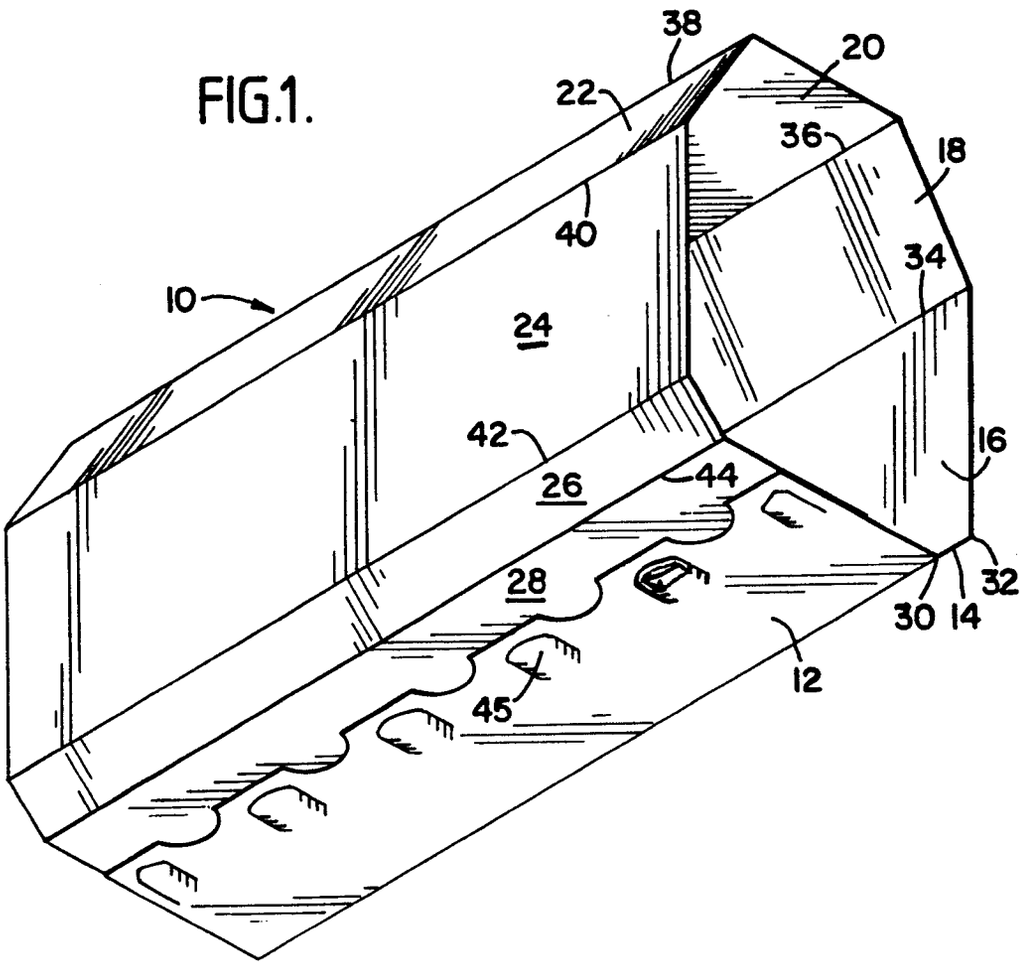


FIG.2.

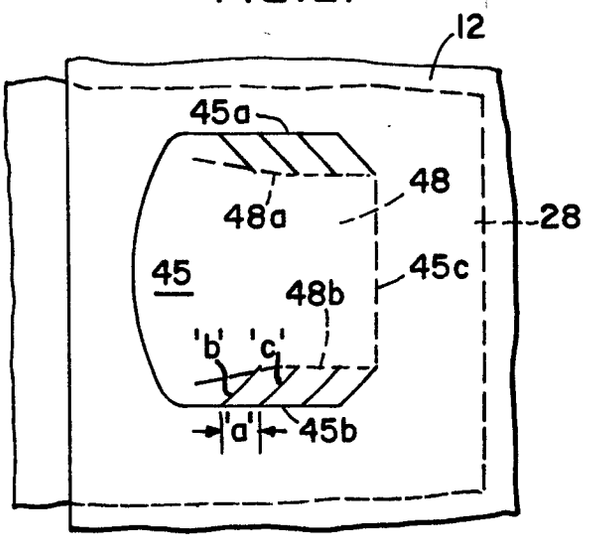

12
45a
48
48a
28
45
45c
48b
'b'
'c'
'a'
45b

FIG.3.

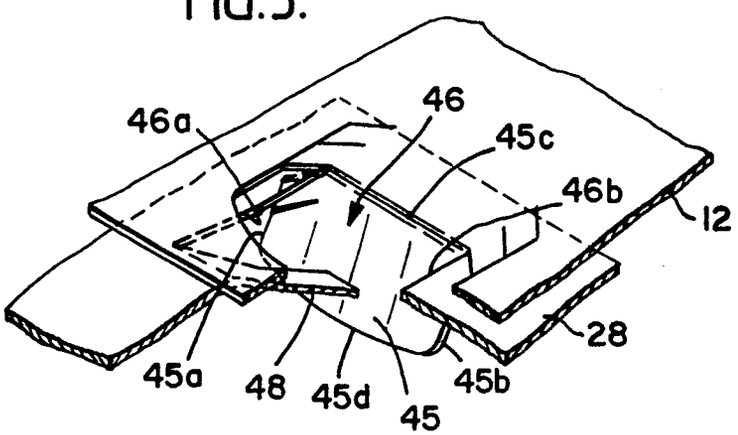
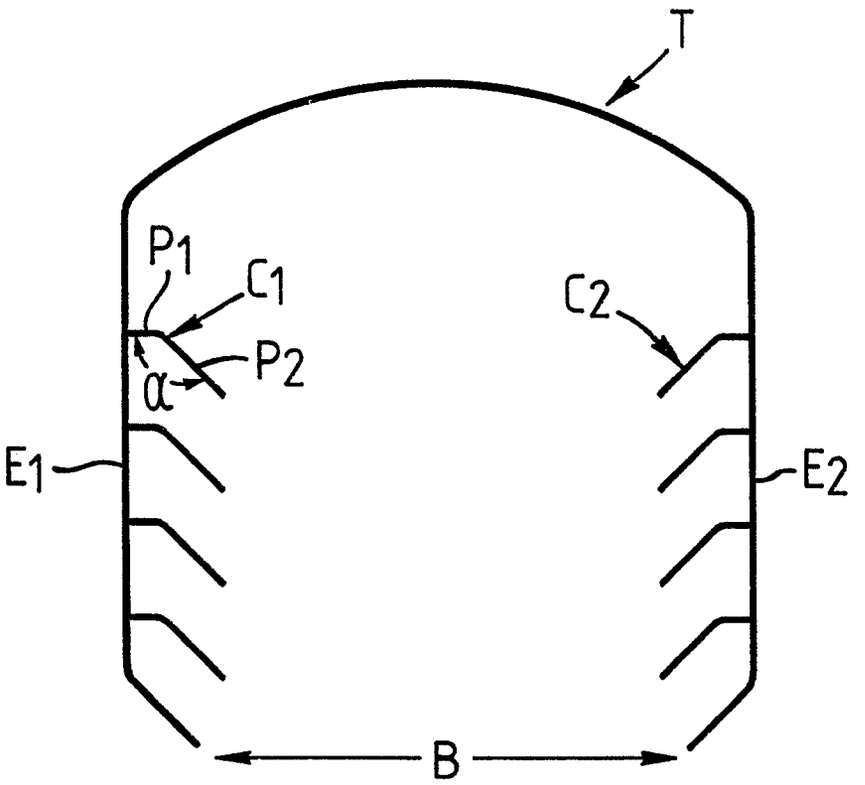

46a
46
45c
46b
12
28
45a
48
45d
45
45b

FIG. 4



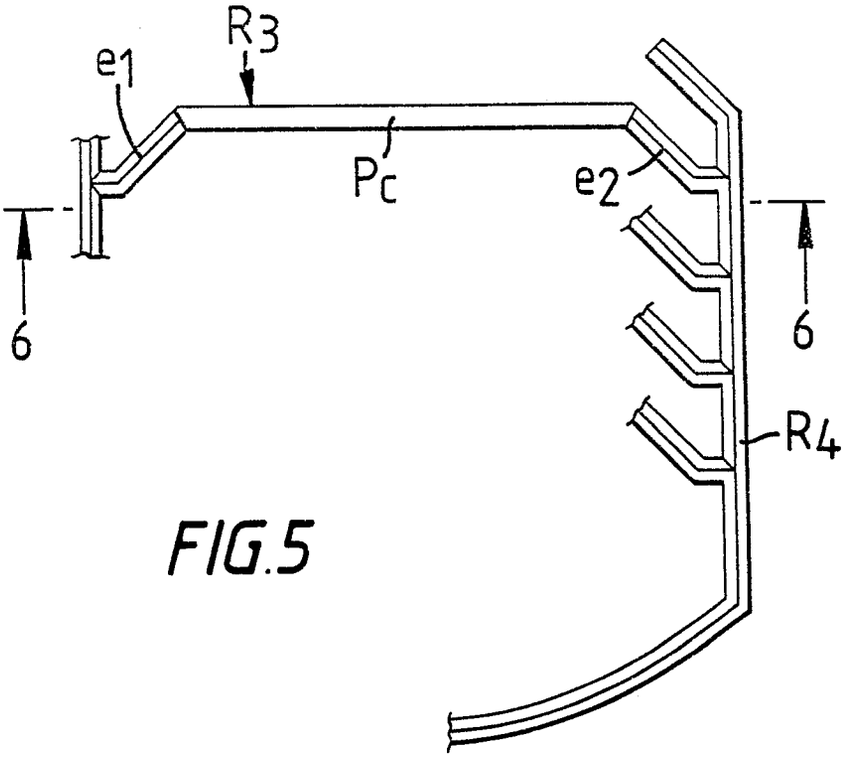


FIG.5

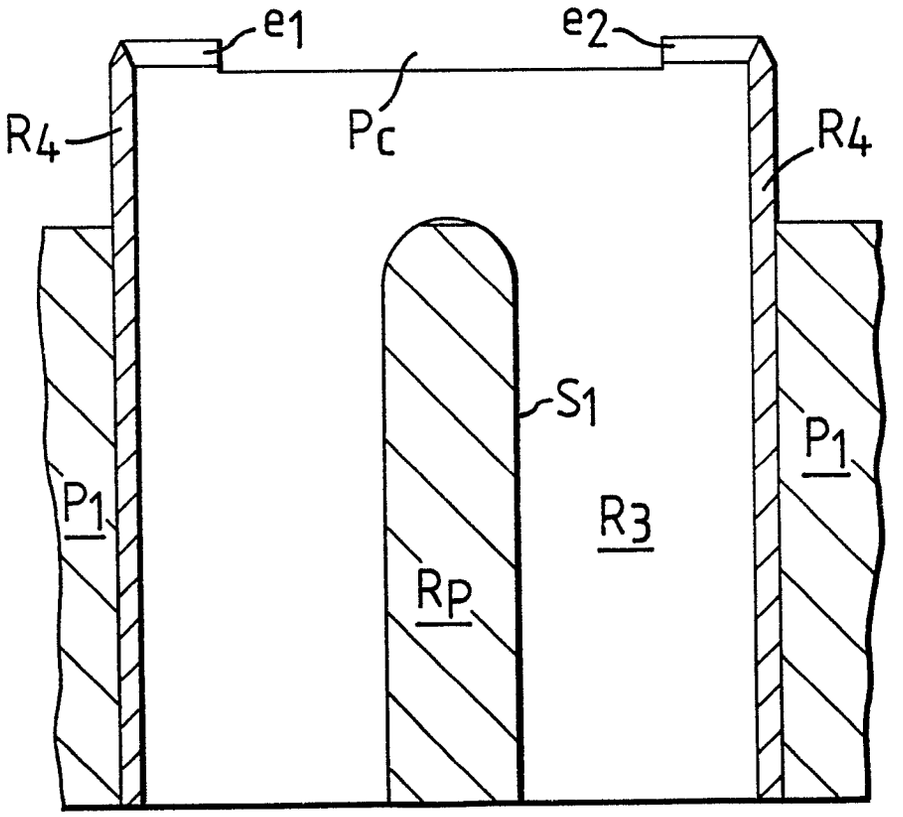


FIG.6