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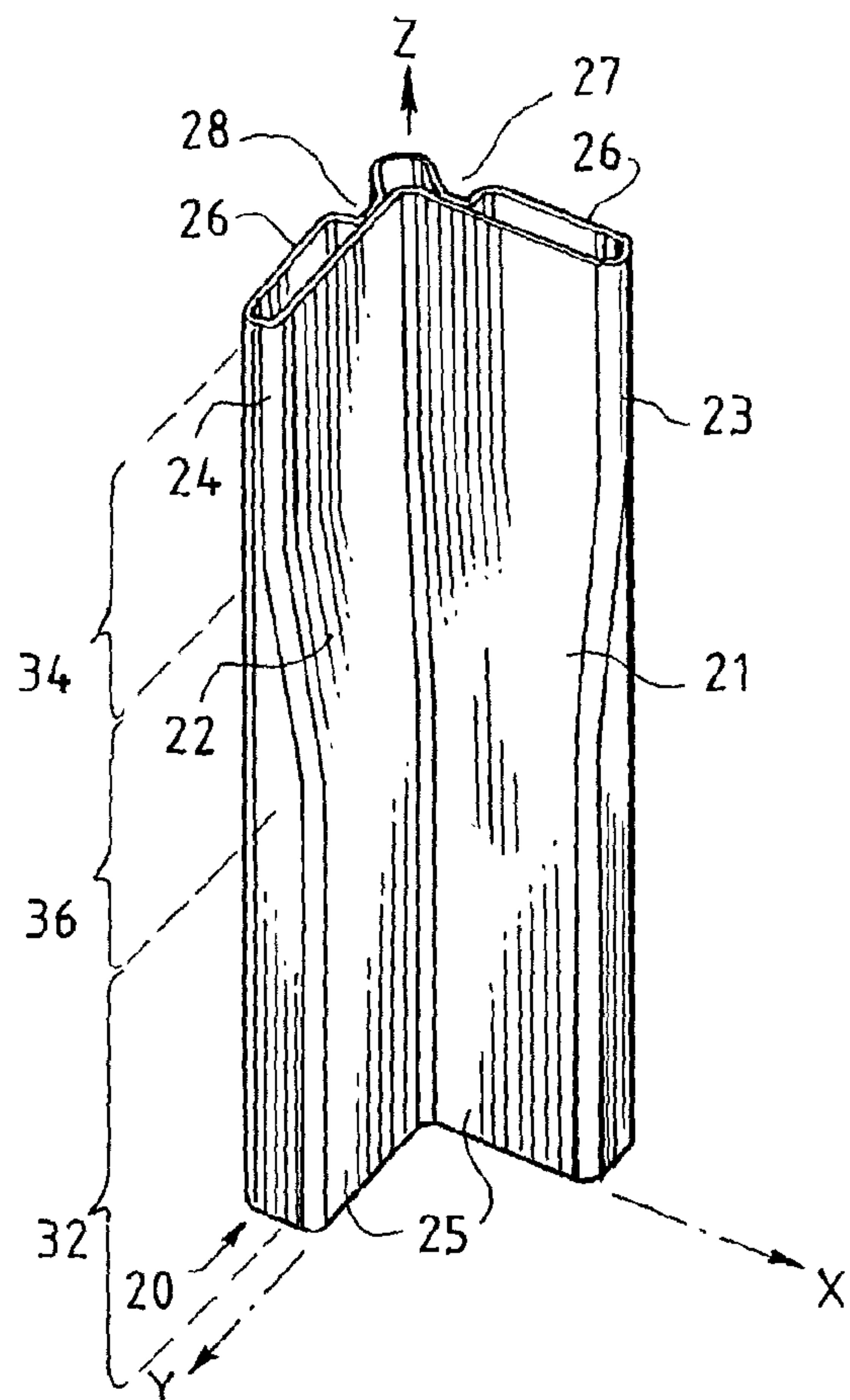
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(54) Title: VARIABLE PROFILE CORNER POST



(57) Abrégé/Abstract:

A laminated paper corner post (20, 40, 60) for protecting a packaged article, the corner post having a variable cross-sectional profile in the axial direction.

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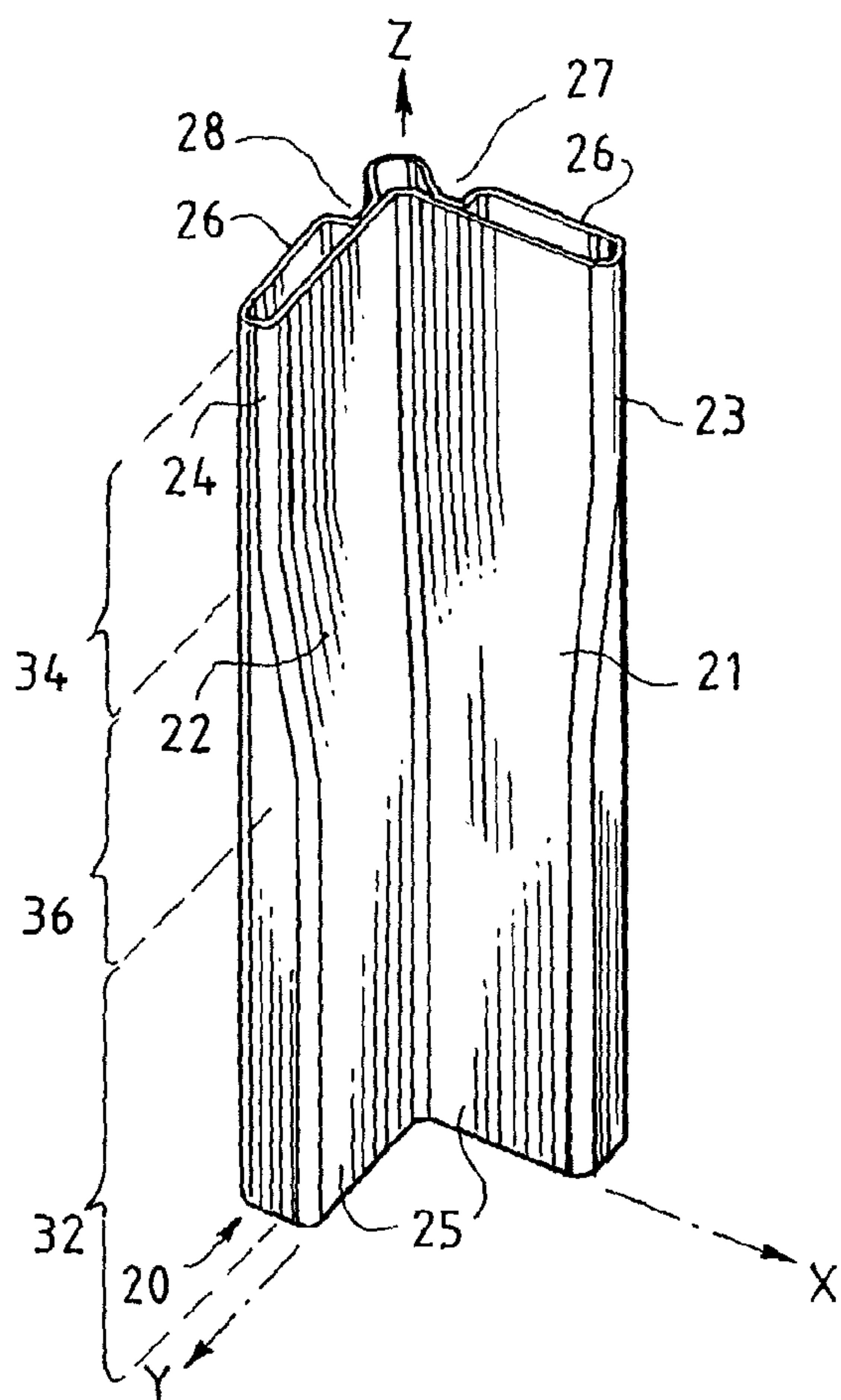
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TITLE

VARIABLE PROFILE CORNER POST

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BACKGROUND

Field Of The Invention

This patent relates to a tubular corner post of the type used to cushion and protect a packaged article, such as a desk or appliance. More particularly, this patent relates to a 10 tubular laminated paper corner post that has a variable cross-sectional profile along its height to accommodate irregularities in the shape of the packaged article.

Description Of The Related Art

Conventional corner posts are made by applying adhesive 15 to paper, winding the wet paper around a mandrel and cutting the wound paper to a desired length to form one or more cylindrical tubes having a substantially circular cross-section, sliding the wound paper tubes onto a forming tool while the tubes are still malleable, forming the tubes into a 20 desired shape, and allowing the adhesive between the paper layers to set up to form the finished tubes. Although conventional tubular corner posts may be cut to any length, they all have a uniform cross-sectional profile.

Many examples of conventional laminated corner posts are 25 known in the art. For example, Gardner U.S. Patent No. 4,482,054 discloses a laminated paper corner post having longitudinally-extending beads that provide improved resistance to longitudinally directed compression forces and enhanced cushioning against laterally directed forces. The 30 corner post has a constant cross-sectional profile.

Gardner U.S. Patent No. 4,483,444 discloses a corner post

having a cross-sectional profile that accommodates overhang of the post relative to a bottom board without substantially reducing the resistance of the post to compressive forces. The cross-sectional profile is constant along the height of 5 the post.

Hughes U.S. Patent No. 5,267,651 discloses a corner post having laterally directed stiffening beads extending at an acute angle into free engagement with the opposite wall. When subjected to sufficient lateral force, the beads collapse onto 10 themselves, forming intermediate layers between the inner and outer walls.

Qiu et al. U.S. Patent No. 6,186,329 discloses a laminated corner post made from multiple sheets of paper. Like all the prior art corner posts described above, the Qiu 15 corner post has a constant cross-sectional profile.

While each of these prior art corner posts is useful for its particular purpose, none has a variable cross-sectional profile to accommodate irregularities in the contours of the article being protected.

20 Thus it is an object of the present invention to provide a laminated paper corner post having a variable cross-sectional profile that can better accommodate the irregular contours of packaged articles.

25 Further and additional objects will appear from the detailed description, accompanying drawings, and appended claims.

SUMMARY OF THE INVENTION

The present invention is a new style of laminated paper corner post in which the cross-sectional profile varies along the length of the post. This variability improves the protective and cushioning properties of the post by allowing the post to mate better with certain features of the product being protected, such as trim lips, fragile contact points, protruding knobs, screw heads, etc.

Like conventional corner posts, the variable profile corner post is made by winding adhesive coated paper around a mandrel to form a cylindrical tube having a substantially circular cross-section, then sliding the still-wet tube onto a forming tool to form the desired shape. However, unlike conventional corner post manufacture, the forming tool has a variable cross-sectional profile, so that when the outer forming elements press the paper tube against the forming tool, the resulting corner post also has a variable cross-sectional profile.

In the preferred embodiment, the variable profile corner post has a lower section having a constant cross-sectional profile, an upper section having a different cross-sectional profile, and a middle section interposed between the first and second sections where the post transitions from one cross-sectional profile to the other cross-sectional profile. Because the variable profile corner post starts out as a cylindrical tube having a constant cross-section, the finished variable profile corner post has a constant circumference along its length.

THE DRAWINGS

Figure 1 is a top perspective view of a prior art corner post.

5 Figure 2 is a top plan view of the prior art corner post of Figure 1.

Figure 3 is a side elevational view of the prior art corner post of Figure 1.

Figure 4 is a top perspective view of a first embodiment of the variable profile corner post of the present invention.

10 Figure 5 is a bottom perspective view of the corner post of Figure 4.

Figure 6 is a top plan view of the corner post of Figure 4.

15 Figure 7 is a side elevational view of the corner post of Figure 4.

Figure 8 is a bottom plan view of the corner post of Figure 4.

Figure 9 is a top perspective view of a second embodiment of the variable profile corner post of the present invention.

20 Figure 10 is a bottom perspective view of the corner post of Figure 9, shown in an inverted position.

Figure 11 is a left side view of the corner post of Figure 9.

25 Figure 12 is a top plan view of the corner post of Figure 9.

Figure 13 is a right side view of the corner post of Figure 9.

Figure 14 is a bottom plan view of the corner post of Figure 9.

30 Figure 15 is a top perspective view of a third embodiment

of the variable profile corner post of the present invention.

Figure 16 is a bottom perspective view of the corner post of Figure 15.

Figure 17 is a top plan view of the corner post of Figure 15.

Figure 18 is a side view of the corner post of Figure 15.

Figure 19 is a bottom plan view of the corner post of Figure 15.

DETAILED DESCRIPTION OF THE INVENTION

Turning to the drawings, a prior art corner post is shown in Figures 1-3. The corner post is made by applying wet adhesive to paper, winding the wet paper around a mandrel having a substantially circular cross-section, cutting the wound paper to a desired length to form one or more cylindrical tubes having a substantially circular cross-section, sliding the wound paper tubes onto a forming tool while the tubes are still malleable, forming the tubes into the shape shown in Figures 1-3, and allowing the adhesive between the paper layers to set up to form the finished tubes.

The finished corner posts are usually placed at each corner of an article between the article and the inside corners of the package. The corner posts protect the article against vertical (axial) and horizontal (lateral) forces.

As the paper is wound around the mandrel, the paper forms multiple, adjacent, completely contiguous layers. That is, the layers are in contact across their entire facing surfaces.

The conventional corner post 10 of Figures 1 -3 comprises two legs 11, 12 substantially perpendicular to each other that terminate in integrally formed ends 13, 14. The legs 11, 12 are defined by an inner wall 15 (the wall nearest the article) and an outer wall 16 in generally parallel spaced relation to each other. Inwardly directed beads 17, 18 are formed in the outer wall 16 along each leg 11, 12 and extend the entire vertical length of the corner post 10. The beads enhance the resistance of the corner post to vertical forces.

As shown in the Figure 1, the finished corner post has a constant cross-sectional profile throughout its length (height). That is, the post has two-dimensional variability

only (variability in the x-y plane).

By contrast, the present invention is a paper corner post having three-dimensional variability, including variability along its length (height). This variability improves the protective and cushioning properties of the post by allowing the post to mate better with certain features of the product being protected, such as trim lips, fragile contact points, protruding knobs, screw heads, etc.

Figures 4-8 illustrate a first embodiment of a variable profile corner post according to the present invention. Like the prior art corner post 10, the variable profile corner post 20 comprises two legs 21, 22 substantially perpendicular to each other that terminate in integrally formed ends 23, 24. The legs 21, 22 are defined by an inner wall 25 and an outer wall 26 in generally parallel spaced relation to each other. Inwardly directed beads 27, 28 are formed in the outer wall 26 along each leg 21, 22, and extend the entire axial length of the corner post 20. It will be appreciated that the variable profile corner post can have beads formed in the inner wall 25, both walls, or have no beads at all.

The corner post 20 comprises a lower section 32 having a constant profile when viewed in cross-section taken transverse to the longitudinal axis of the post (i.e. a constant cross-sectional profile), an upper section 34 having a cross-sectional profile that is constant yet different from the lower section 32, and a middle or transition section 36 interposed between the lower and upper sections where the post 20 continuously transitions from one cross-sectional profile to the other cross-sectional profile. That is, the post 20 transitions from one profile to another without any

discontinuities in the surface of the post, such as holes or other openings in the surface of the post.

The variability in the cross-sectional profile of the corner post 20 in the axial direction is a result of the variable cross-sectional profile of the inner wall 25, since the outer wall 26 preferably has a constant cross-sectional profile. This three-dimensional variability allows the post to work in situations where two-dimensional variability is inadequate to mate with the article being protected.

For example, in the corner post of Figures 4-8, the portion of the inner wall 25 that forms the lower section 32 is vertical; the shape of the inner wall 25 does not vary within the x-y plane as the height (z coordinate) changes. However, the portion of the inner wall 25 that forms the middle section 36 is not perfectly vertical; its profile changes within the x-y plane as the height changes. This is the transition section of the post. Moving further up the corner post, the portion of the corner post that forms the upper section 34 is vertical, but it occupies a different orientation within the x-y plane than the portion of the inner wall 25 that forms the lower section 32.

Like conventional corner posts, the variable profile corner post is made by first winding adhesive-coated paper around a mandrel to form a cylindrical tube having a substantially circular - and constant - cross-section, sliding the tube onto a forming tool to form the tube into the desired shape, then cooling the tube to set the adhesive. Unlike conventional (constant profile) corner post manufacture, the forming tool has a variable cross-section along at least a portion of its length. In order to for the corner post to be

able to slide off the forming tool, the cross-section of the forming tool must constrict (get smaller) toward the end where the corner post slides off, which is the top of the post in the figures. This is perhaps most apparent in Figures 6 and 5 8, where it can be seen that the corner post profile at the top fits within the profile at the bottom of the corner post.

Because the variable profile corner post is formed from a cylindrical tube initially having a constant cross-sectional profile, and because the paper used to make the corner post is not stretched, shrunk, torn or folded over on itself, the 10 finished variable profile corner post has a constant circumference (i.e., the distance around the periphery of any cross-section).

Figures 9-14 illustrate a second embodiment of the 15 variable profile corner post of the present invention. Like the prior art corner post 10 and the first embodiment 20, the second embodiment 40 comprises two legs 41, 42 substantially perpendicular to each other that terminate in integrally formed ends 43, 44. The legs 41, 42 are defined by an inner 20 wall 45 and an outer wall 46 in generally spaced relation to each other. Optional inwardly directed beads 47, 48 are formed in the outer wall 46 along each leg 41, 42, and extend the entire axial length of the corner post 40.

As in the first embodiment 20, the corner post 40 25 comprises a lower section 52 having a constant cross-sectional profile, an upper section 54 having a cross-sectional profile that is constant yet different from the lower section 52, and a middle or transition section 56 interposed between the lower and upper sections where the post 40 transitions from one 30 cross-sectional profile to the other cross-sectional profile.

Unlike the first embodiment, the legs are not symmetrical. Instead, leg 41 is wider at its end 43 than is leg 42. Also, the middle portion 56 of the inner wall 45 of leg 41 is not vertical (it varies within the x-y plane as the height changes). Furthermore, the ends 43, 44 are not vertical. Instead, they taper inward toward the top of the corner post 40. In other words, the horizontal lengths of the legs 41, 42 change.

Figures 15-19 illustrate a third embodiment of the variable profile corner post of the present invention. Like the previously described corner posts, the third embodiment 60 comprises two legs 61, 62 substantially perpendicular to each other that terminate in integrally formed ends 63, 64. The legs 61, 62 are defined by an inner wall 65 and an outer wall 66 in generally spaced relation to each other. Optional inwardly directed beads 67, 68 are formed in the outer wall 66 along each leg 61, 62, and extend the entire axial length of the corner post 60.

As in the first two embodiments 20, 40, the corner post 60 comprises a lower section 72 having a constant cross-sectional profile, an upper section 74 having a cross-sectional profile that is constant yet different from the lower section 72, and a middle or transition section 76 interposed between the lower and upper sections where the post 60 transitions from one cross-sectional profile to the other cross-sectional profile. Like the first embodiment 20, the legs are the same shape.

In all three embodiments, the variable cross-sectional profile of the inner wall is intended to accommodate outwardly protruding features of the product being protected, such as

trim lips, handles, knobs, and screw heads. The outer wall, on the other hand, typically abuts two flat, perpendicular sides of a rectilinear package, and therefore need not have a variable cross-sectional profile.

5 Other modifications and alternative embodiments of the invention are contemplated which do not depart from the scope of the invention as defined by the foregoing teachings and appended claims. It is intended that the claims cover all such modifications that fall within their scope.

I CLAIM AS MY INVENTION:

1. An elongated corner post (20, 40, 60) for protecting a packaged article, the corner post comprising paper wound around a mandrel to form multiple, adjacent, completely contiguous layers adhered together with adhesive, the length of the corner post defining an axis, the corner post having a variable cross-sectional profile in the axial direction wherein the cross-sectional profile continuously transitions from one cross-sectional profile to another.
2. The corner post of claim 1 wherein the transitional area is interposed between sections (32 and 34, 52 and 54, 72 and 74) having a constant cross-sectional profile.
3. The corner post of claim 1 wherein the corner post comprises two legs (21 and 22, 41 and 42, 61 and 62) oriented substantially perpendicular to each other, each leg terminating in a vertical end (23 and 24, 43 and 44, 63 and 64), the legs being defined by an outer wall (26, 46, 66) and an inner wall (25, 45, 65) in generally parallel spaced relation to each other and joined at their respective ends to form the vertical ends of the legs, the inner wall being the wall facing the packaged article.
4. The corner post of claim 3 wherein the outer wall (26,

46, 66) has a constant cross-sectional profile and the inner wall (25, 45, 65) has a variable cross-sectional profile.

5. The corner post of claim 1 wherein the corner post has a constant horizontal circumference.

6. The corner post of claim 3 wherein the corner post (20, 60) is symmetrical about a vertical plane dividing the two legs (21 and 22, 61 and 62).

7. The corner post of claim 3 wherein the corner post (40) is asymmetrical about a plane dividing the two legs (41 and 42).

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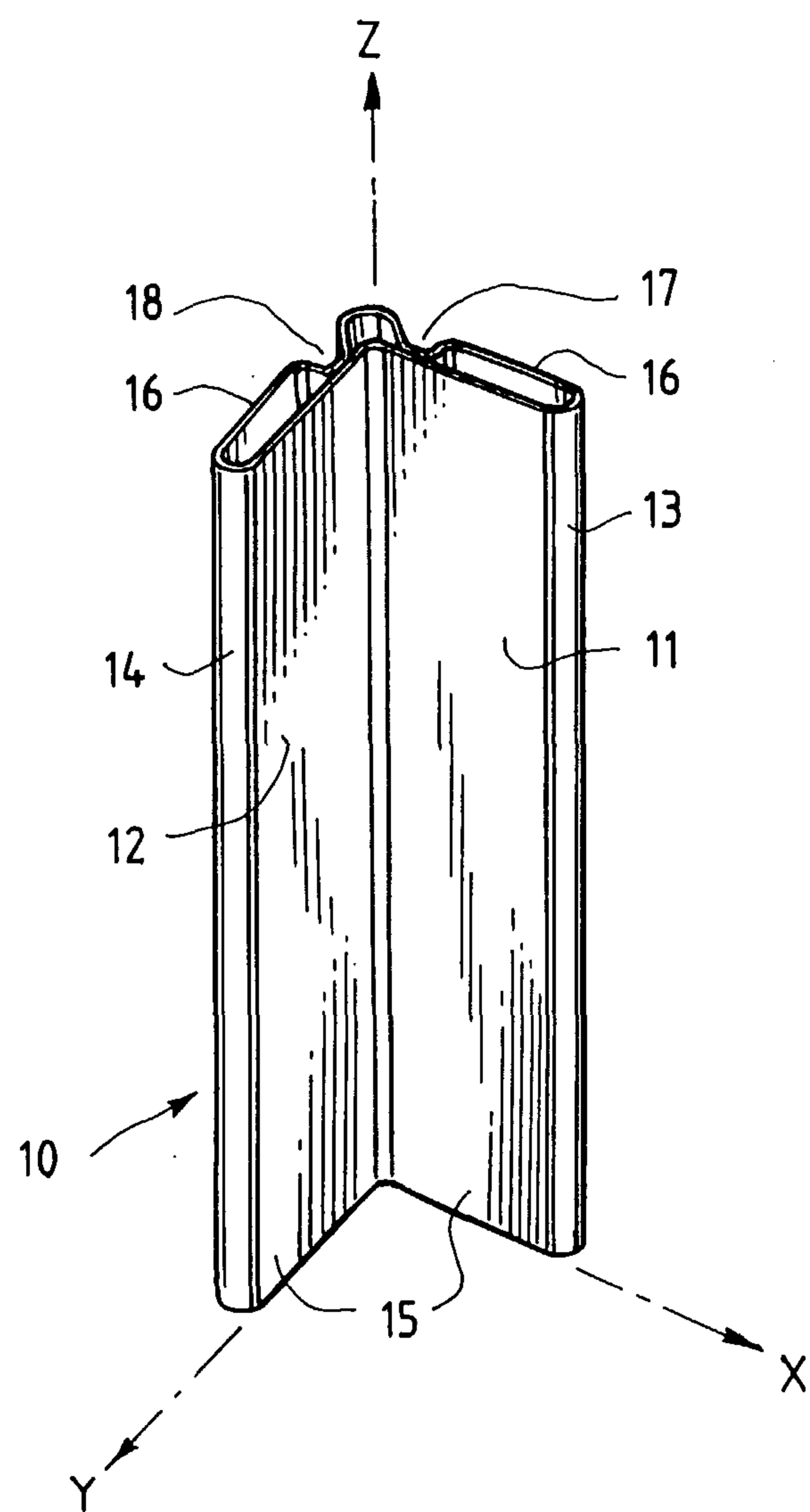
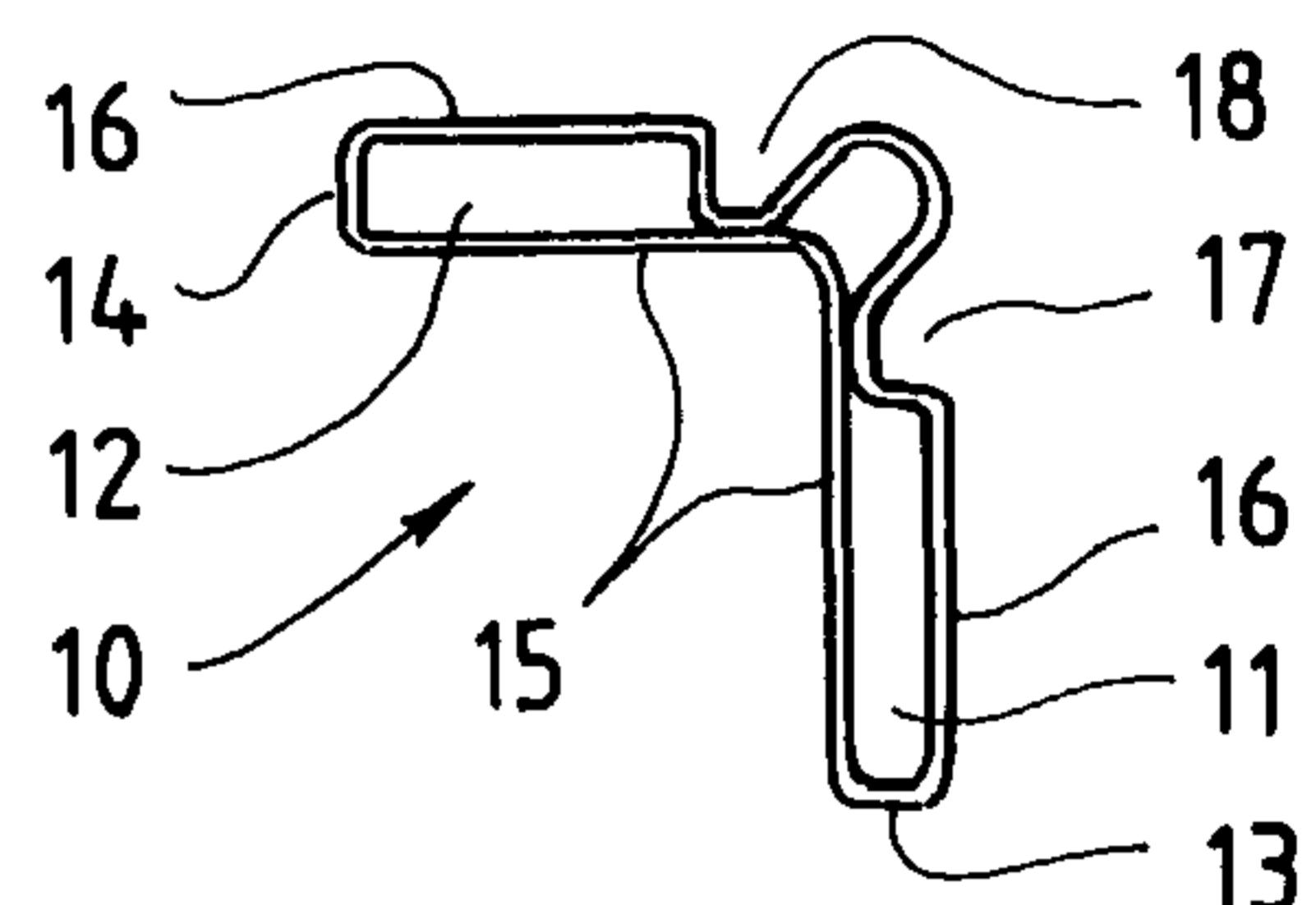
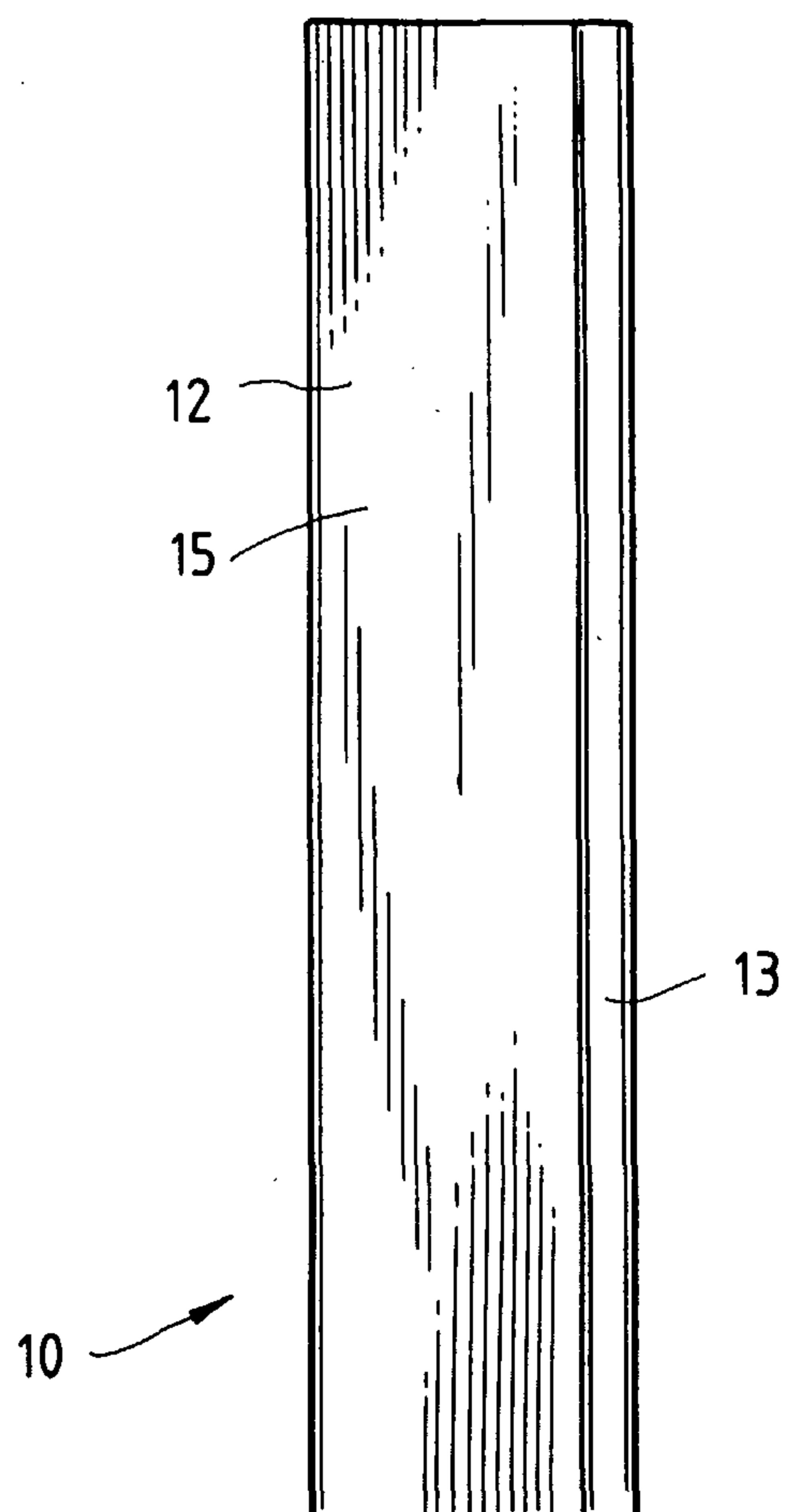
FIG. 1 PRIORITY ART**FIG. 2 PRIORITY ART****FIG. 3 PRIORITY ART**

FIG. 4

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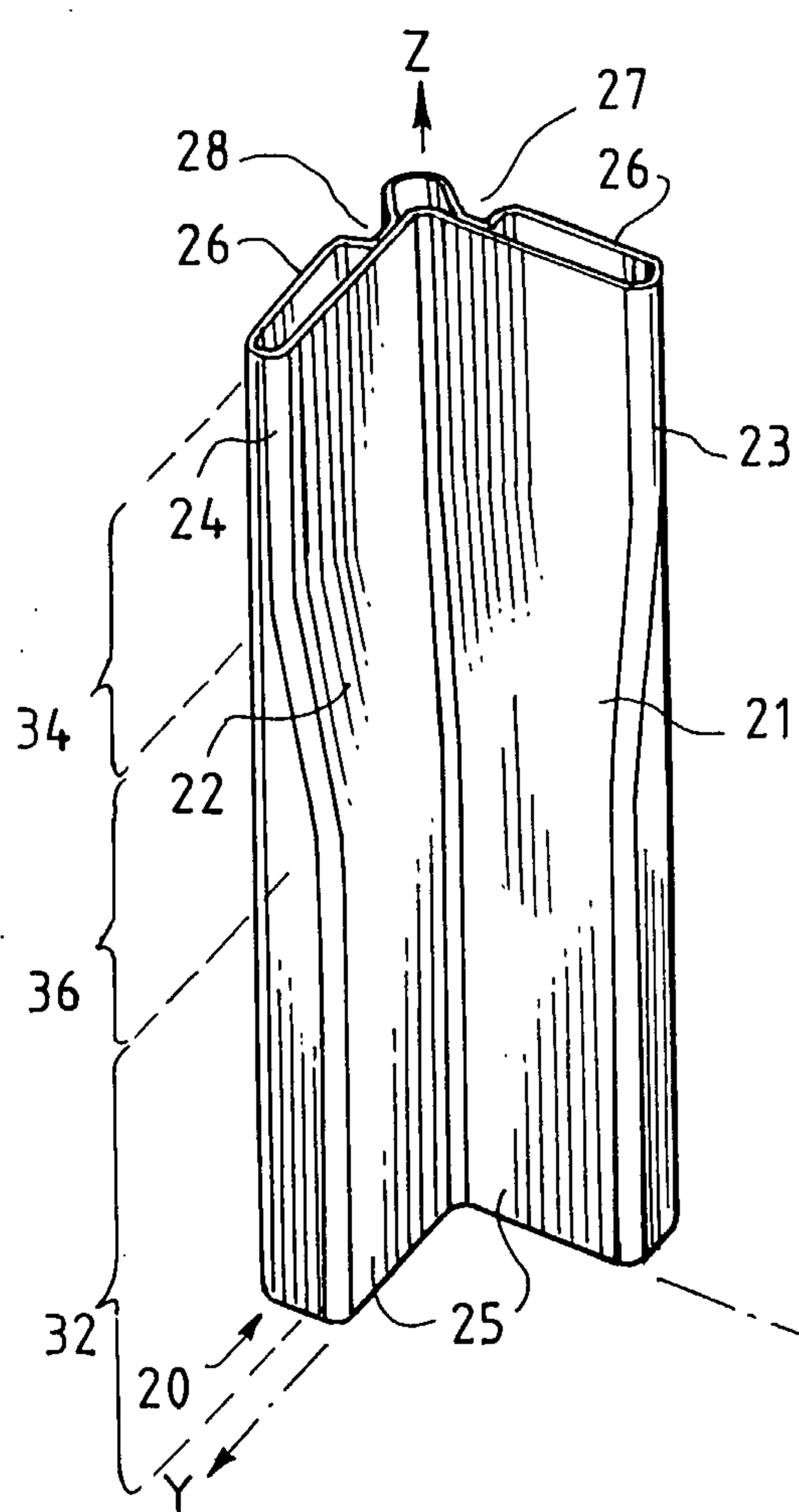
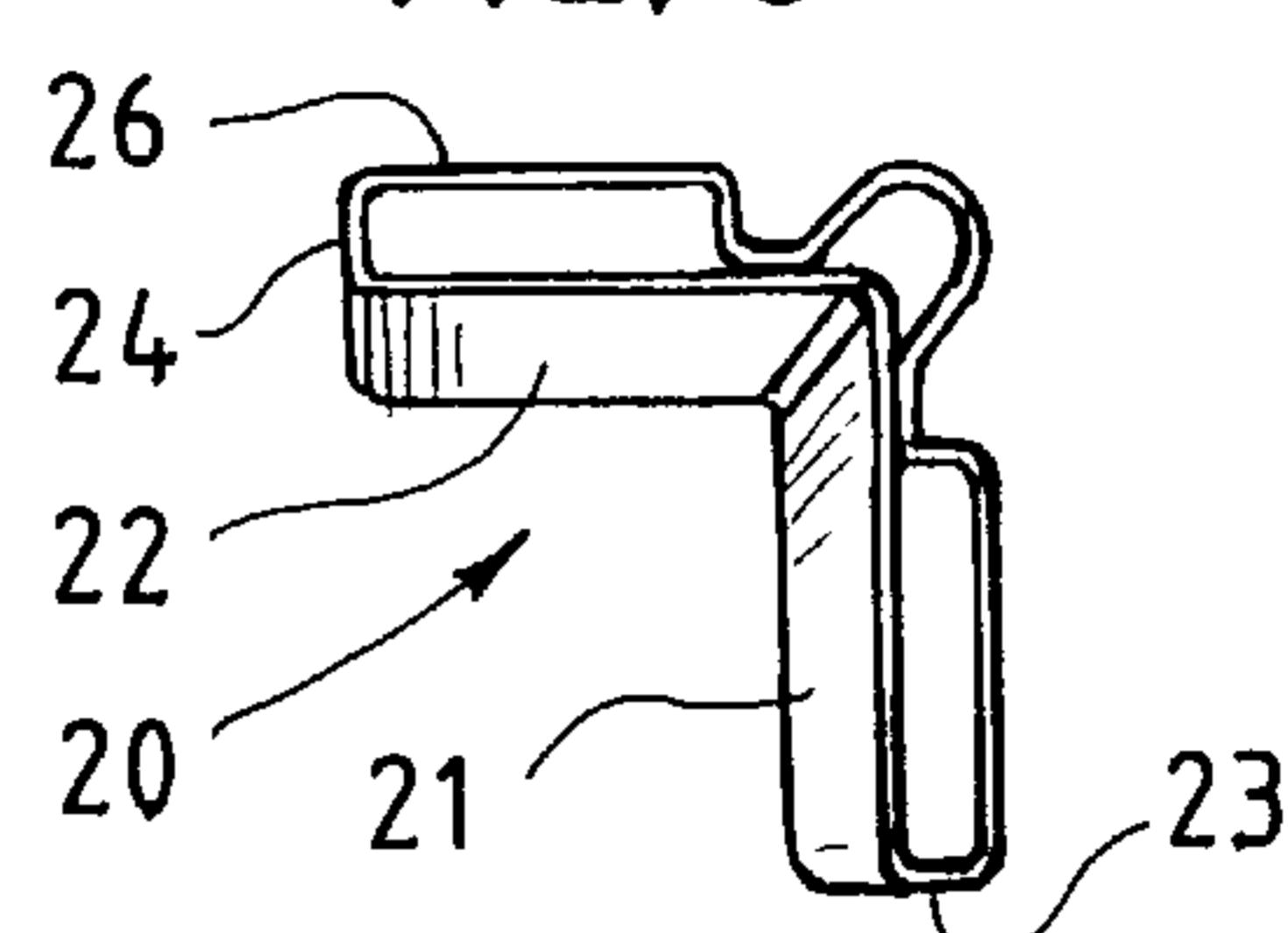
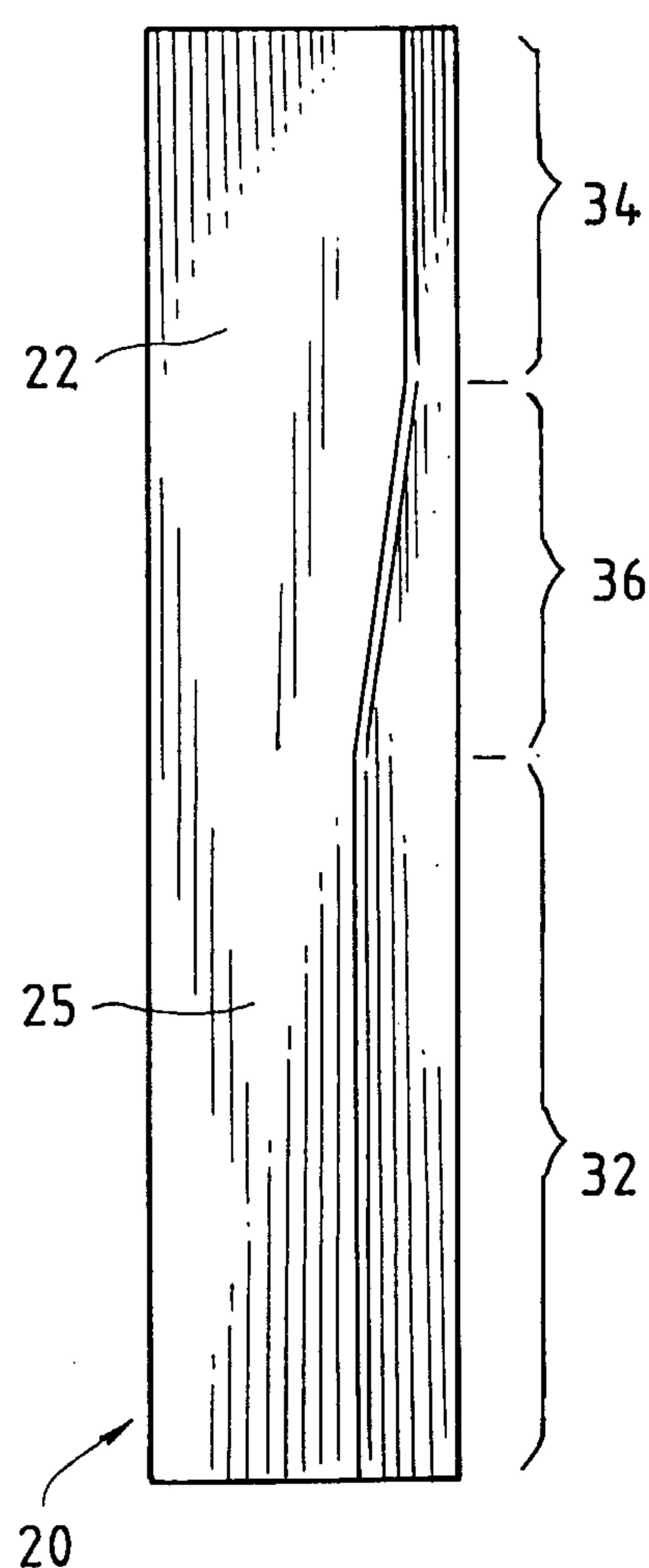
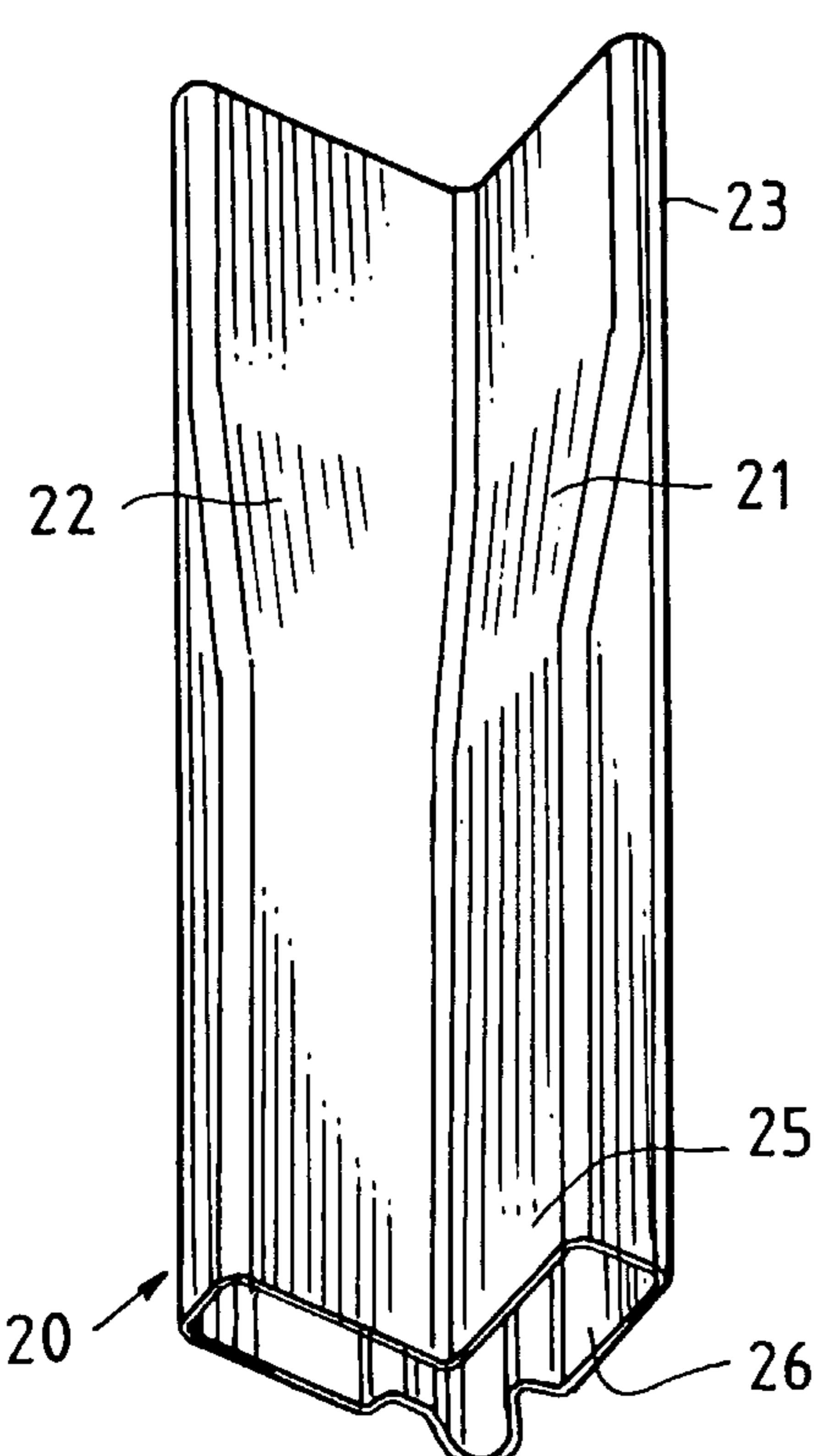
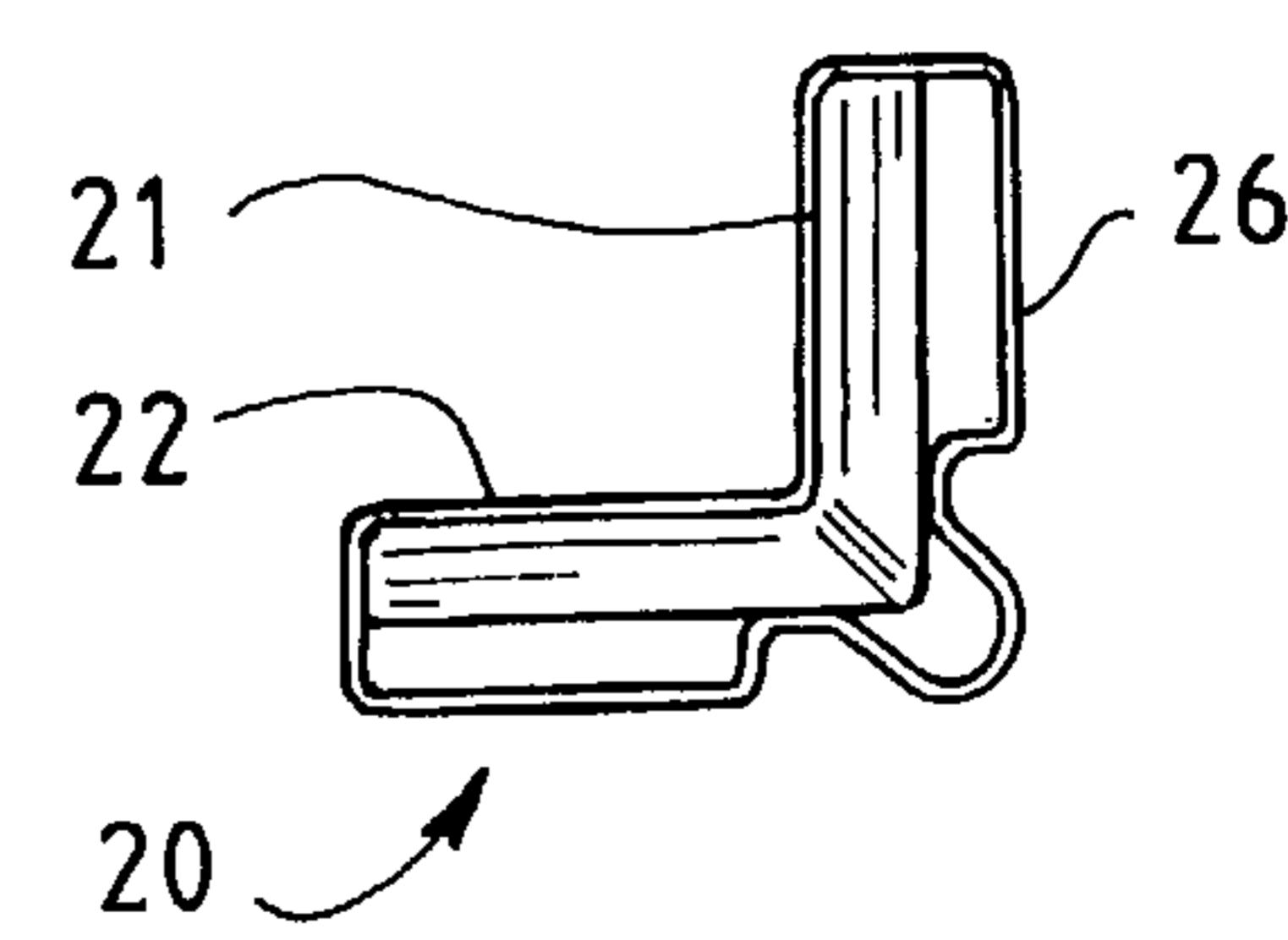
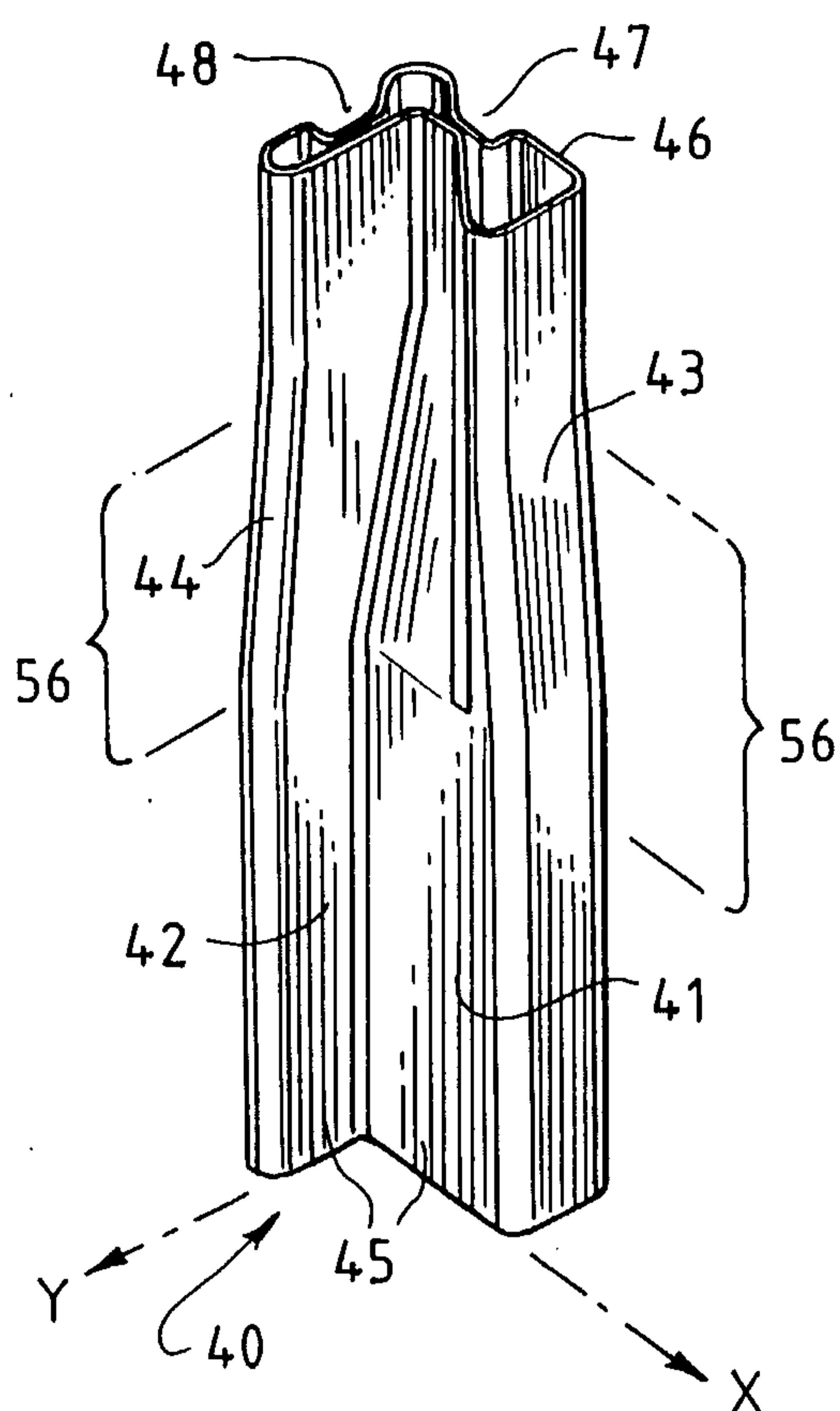
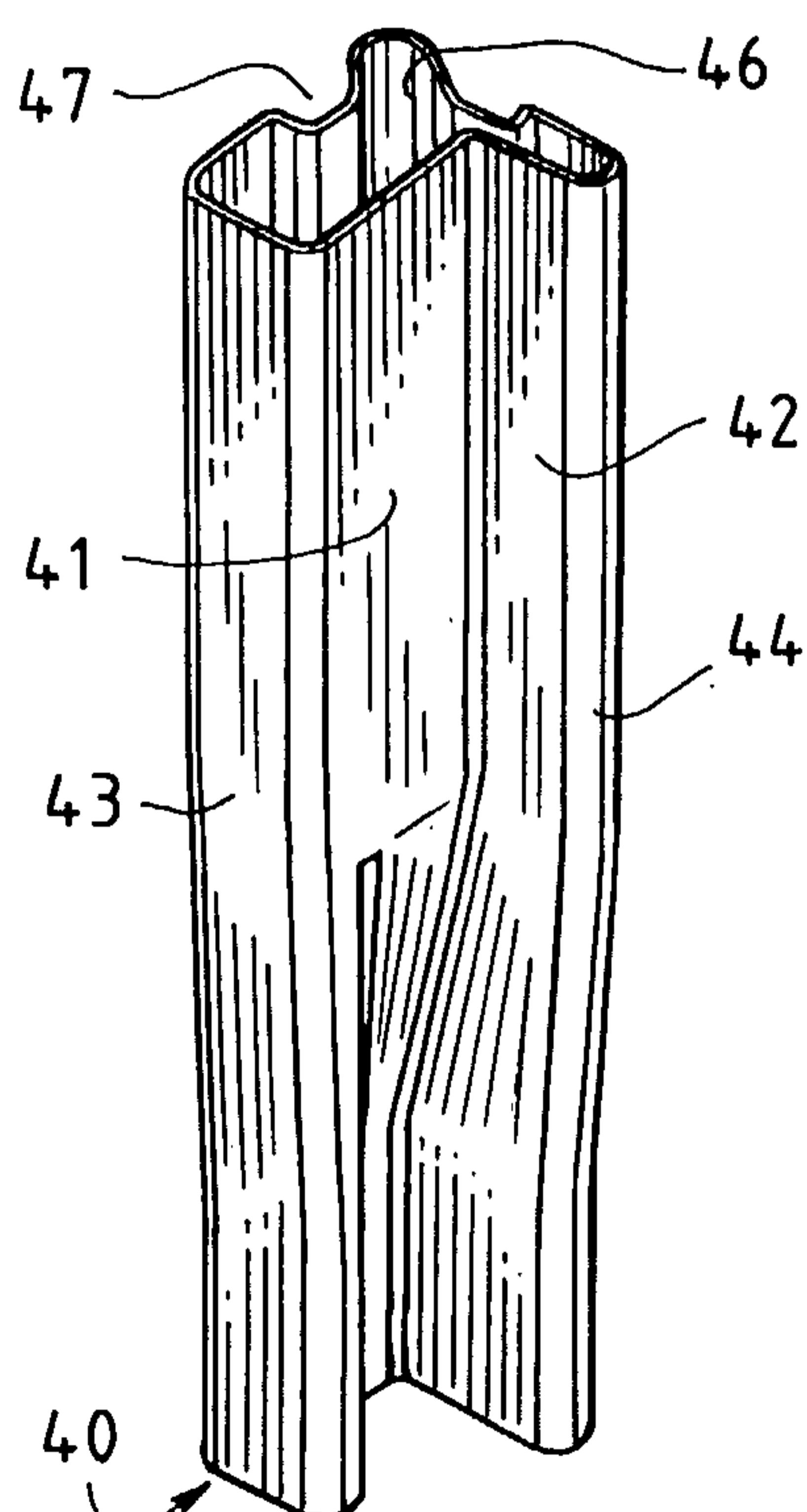
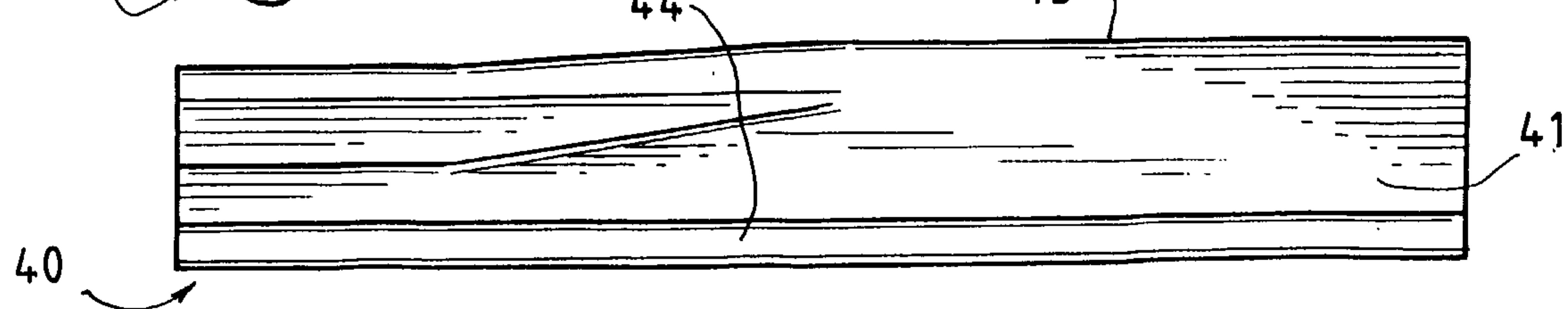
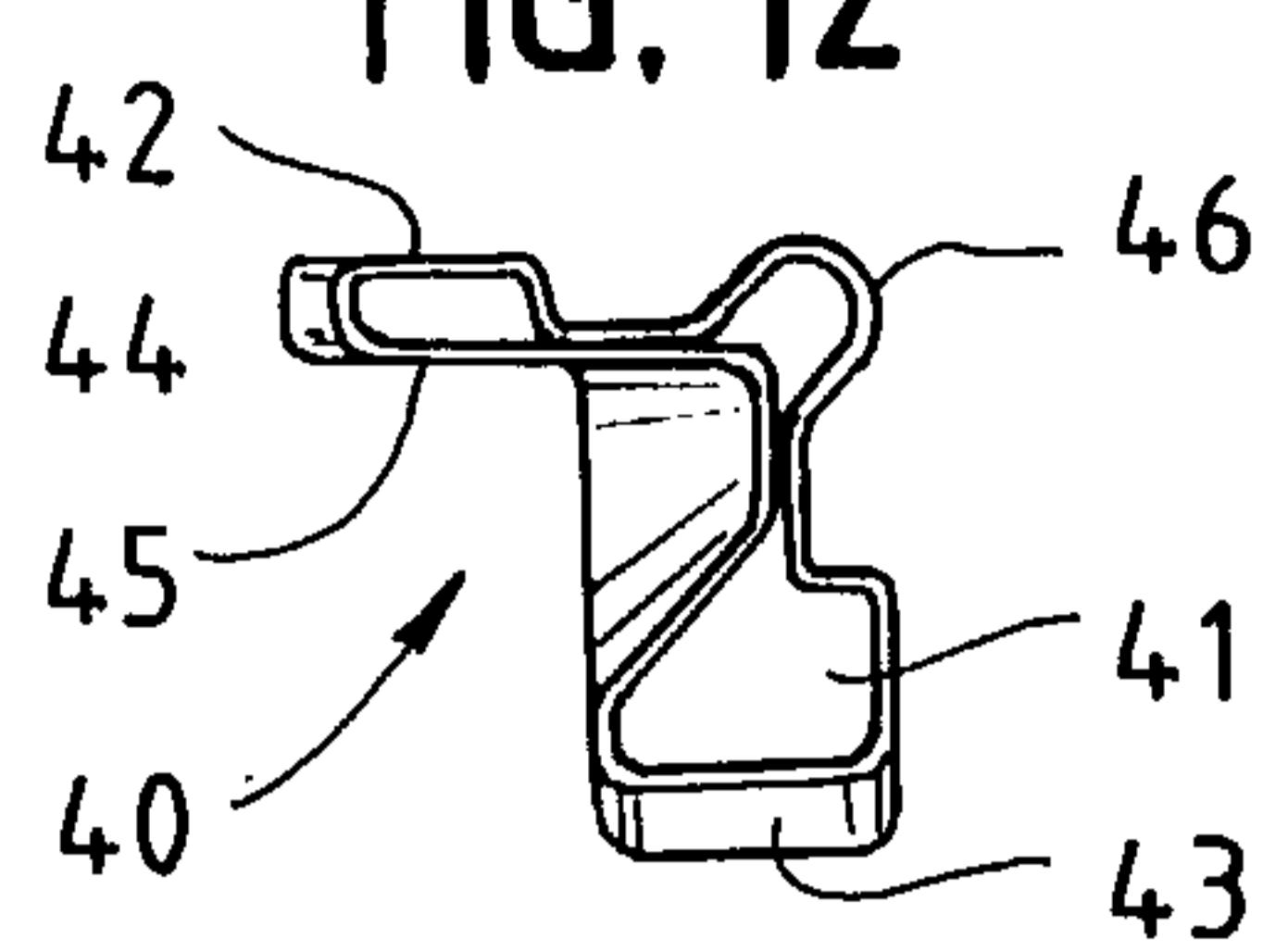
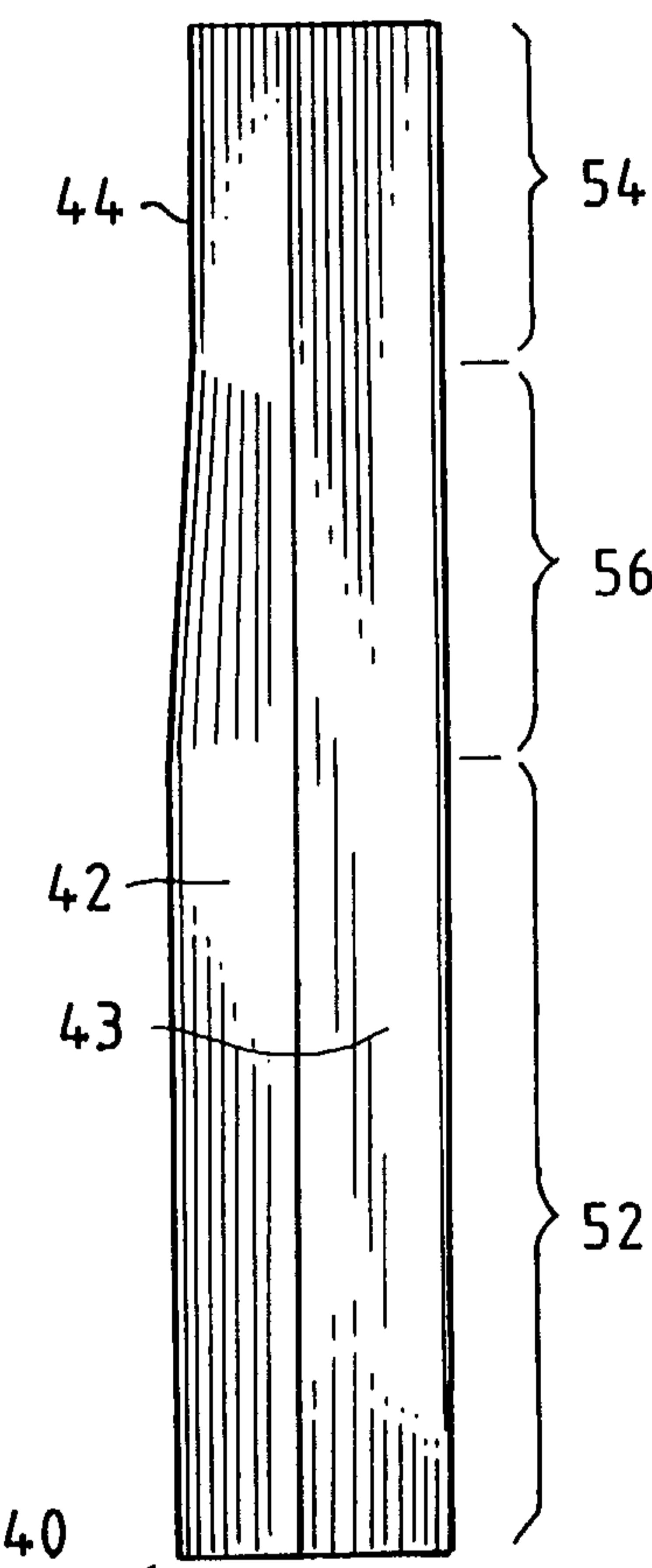
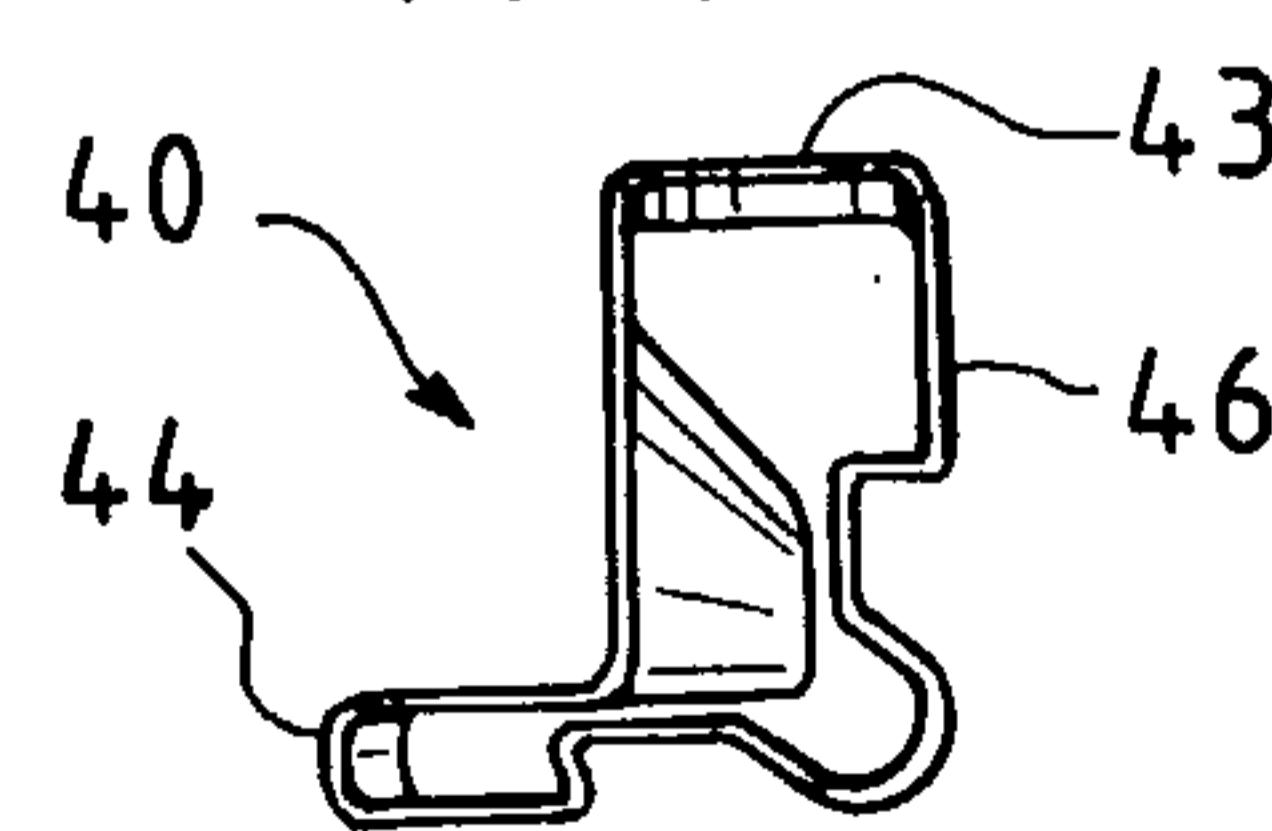
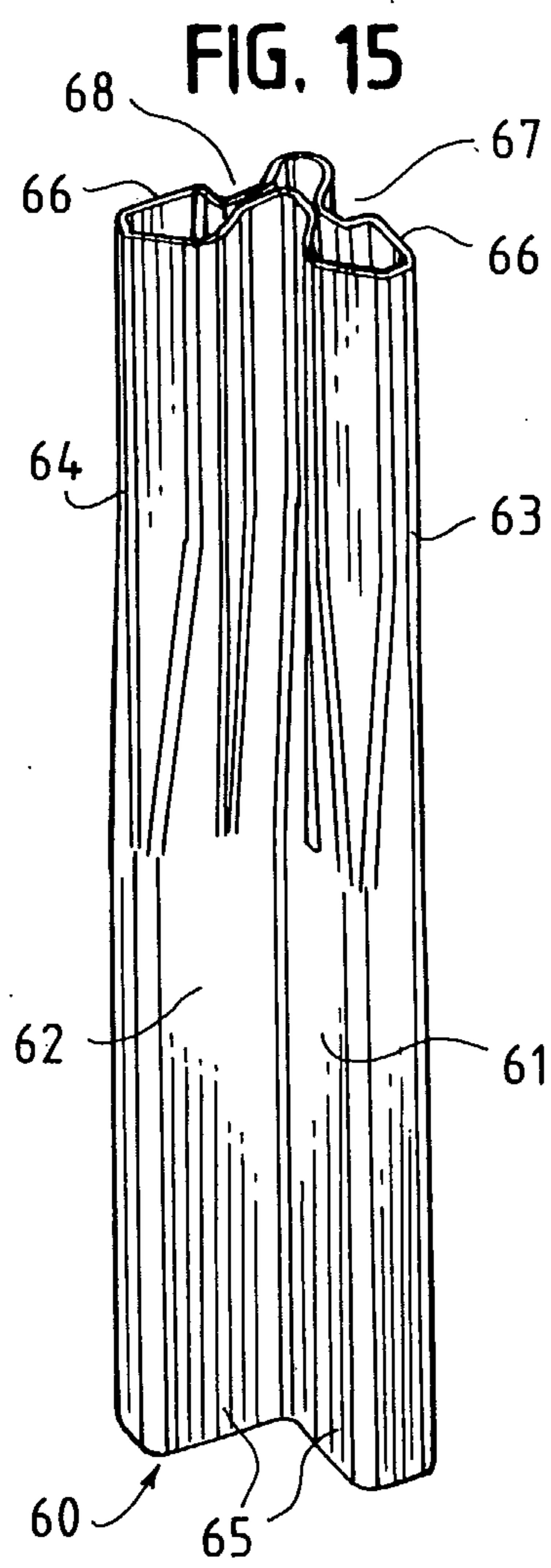
**FIG. 6****FIG. 7****FIG. 5****FIG. 8**

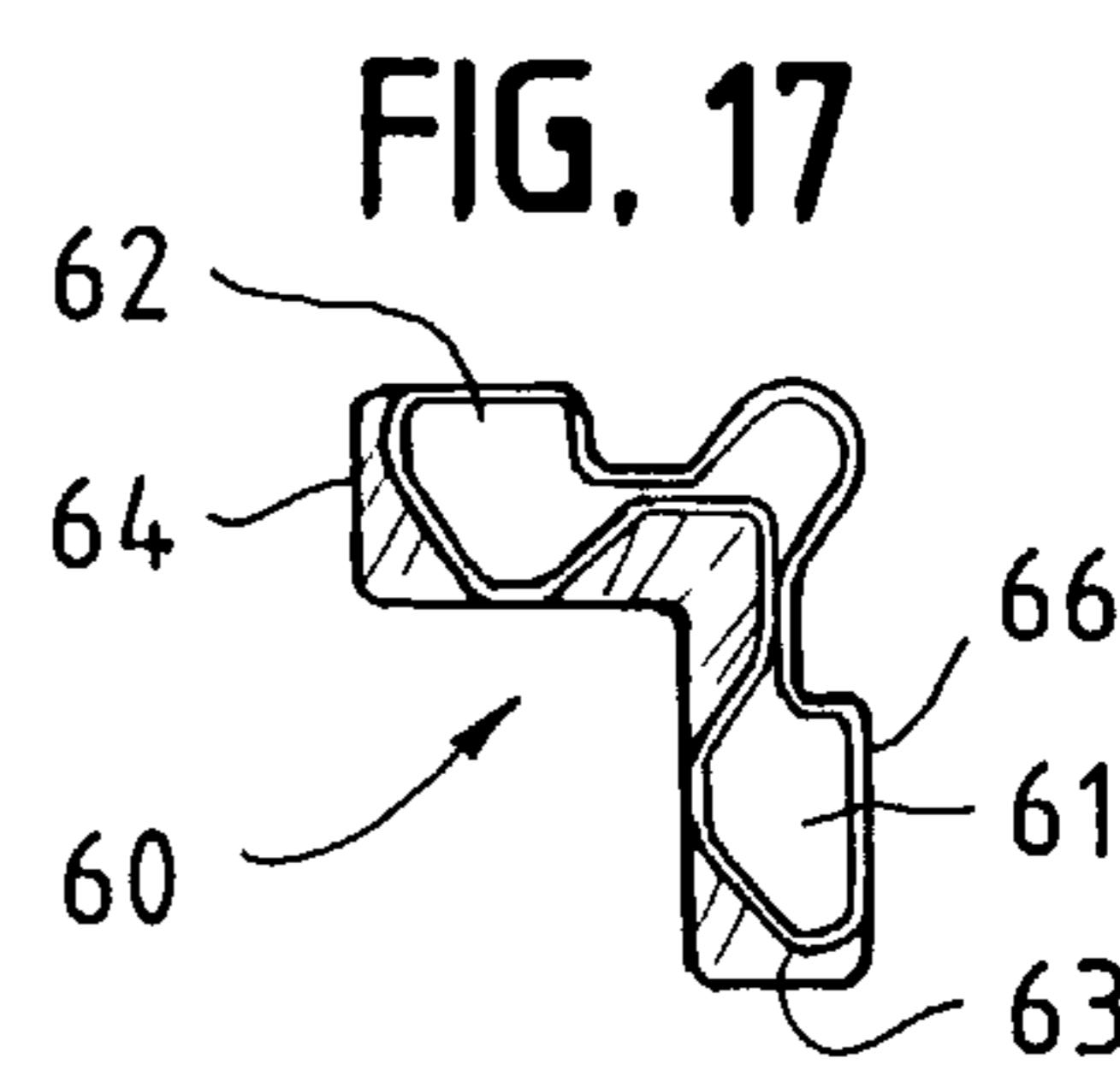
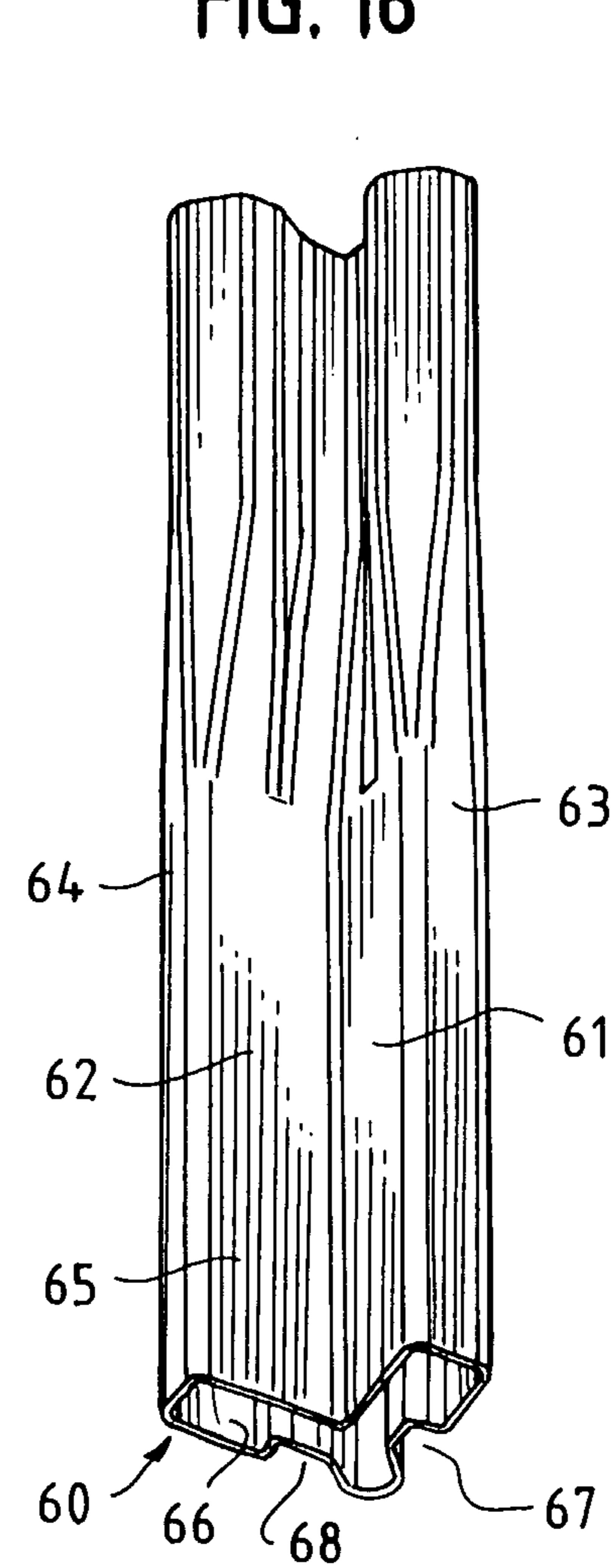
FIG. 9

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**FIG. 10****FIG. 11****FIG. 12****FIG. 13****FIG. 14**



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**FIG. 18**