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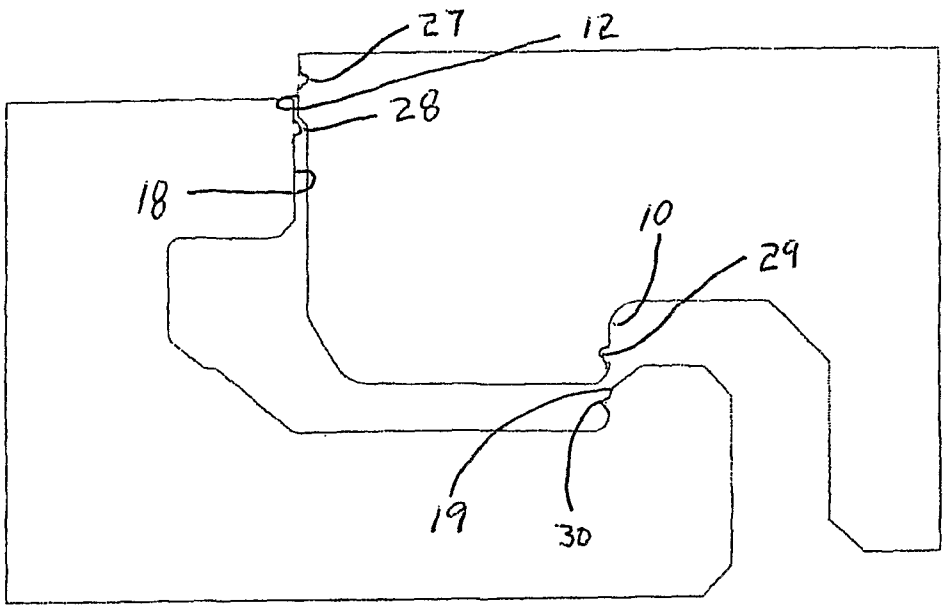
(54) Title: WIDE WIDTH LOCK AND FOLD LAMINATE



(57) Abstract: Lock and fold floor covering panels can be installed by angling a long locking edge into a previously installed row of panels and dropping or locking the projection of the tongue of the short side into the depression of the lower lip forming the groove in the short side. By incorporating a force increasing means in the fold joint, the width of the panels that can be installed with a lock and fold system can be increased beyond the conventionally accepted 3.5 inches. The fold joint is designed to permit it to be engaged, disengaged and reengaged without damaging the fold joint.

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WIDE WIDTH LOCK AND FOLD LAMINATE

The present invention relates generally to the field of flooring including wood laminate flooring, such as high density fiberboard (HDF) laminate flooring and medium density fiberboard (MDF) laminate flooring, solid wood flooring and engineered wood flooring, which includes a plurality of wood layers. More particularly, the present invention relates flooring having locking edge profiles

Floor covering panels, including wood laminate flooring, solid wood flooring and engineered wood flooring are well known in the prior art. To increase the ease of installation by removing the need for glues or adhesives, these floor coverings have been made with locking edges having a tongue with a projection and a groove with a corresponding depression in the core of the floor covering panel that together form coupling parts or means, which prevents substantial movement perpendicular to the major surfaces of the laminate flooring and perpendicular to the locking edges. In some embodiments the projection may be in the groove and the corresponding depression in the tongue.

Earlier locking laminates had locking edges on all four sides of the laminate. While installation of these laminates was easier than prior laminates that required the edges to be glued, installation was somewhat cumbersome since previously laid laminate panels had to be angled away from the subfloor on which the laminate was laid to permit and an additional panel to lock into place.

To overcome this problem, a lock and fold or lock and drop laminate was developed in which two of the opposite long edges had the standard locking profile in the core and the other two short opposite edges had a profile in the core, such as shown in Figure 1. These lock and fold panels were installed by angling a long locking edge into a previously installed row of panels and dropping or locking the projection of the tongue of the short side into the depression of the lower lip forming the groove in the short side.

This worked well for laminate panels of about 3 ½ inches in width. However, due to the surfaces of the short lock and fold edges which engage each other being vertical, the flooring elements not being substantially urged together, the dimensions of panels, particularly the thickness of the panel, the depth of the depression and the height of the

projection, and the cushion effect of the underlayment between the laminate and the substrate, the joints at the short lock and drop edges of wider panels, such as 5 inch wide and greater widths, tend to disengage when the laminate was stepped upon near the short edge. This causes ridges to form in the upper horizontal surface between the laminate panels resulting in an uneven walking surface.

The prior art also discloses a flooring material with conventional locking profiles on two opposite edges with the other two opposite edges being a male vertical assembly joining member and a female vertical assembly joining member which mate by only vertical motion. The male vertical assembly joining member includes an inclined lower cheek surface and at least one snapping hook. The female vertical assembly joining member includes an inclined upper cheek surface and at least one under cut.

On assembly, the snapping hook and under cut interact to prevent the floor elements from disengaging vertically. The lower and upper inclined cheek surfaces engage to prevent the elements from disengaging horizontally. The inclined cheek surfaces also urge the floor elements together, which prohibit disengagement of the snapping hook and under cut without substantial damage to the snapping hook and/or under cut.

The present invention overcomes this problem by controlling the friction between the short edges of adjacent installed laminate panels. The friction is small enough to permit easy installation, i.e. requiring a minimum of pressure near the short edge during installation to engage the coupling parts, while being sufficiently great to deter disengagement during normal use when the installed panel is step on near the short end. However, the structure of the present lock and fold edge permits the laminate panels to be disengaged and reassembled, at least a number of times, without permanent damage to the lock and fold edges resulting in the loss of the desired friction.

Various embodiments are shown in the enclosed drawings. These include a small projection and groove feature on one or two vertical surfaces (perpendicular to the major, or upper and lower, surfaces of the laminate panel) of the second opposed side edges that are folded into engagement. The profile of the small projection and groove can be rectangular or rounded or an elongated projection. The projection can be formed as one panel from the coupling projection or groove, or be adhered to the vertical surface of the second opposed side edges.

In another embodiment, the projection can have a flat surface parallel to the upper surface of the laminate on the side of the projection toward the upper decorative surface and a

curved surface opposite the flat surface. The curved surface reduces the pressure necessary to engage the short ends of the laminate panels and the flat surface, which engages a corresponding flat surface in the surface of the corresponding second side edge, increases the pressure necessary to disengage the panels.

Rather that a small projection and groove, the vertical or perpendicular surfaces of the second opposed side edges can be roughened, such as by a saw tooth profile or the application of a particulate containing composition. In another embodiment, a pressure sensitive adhesive can be applied to one or both of the adjacent perpendicular surfaces of the second opposed side edges.

The disengaging pressure can also be increased by modifying the horizontal surfaces (surfaces parallel to the upper surface of the laminate). A hook material can be adhered to one horizontal surface on one of the second opposed side edges and a loop material adhered to the corresponding adjacent side edge.

In another embodiment, the hook and loop material can be replaced with a pressure sensitive adhesive on one or both of the surfaces parallel to the upper surface of the laminate panel. In still another embodiment, one parallel surface may have a wedge projecting from the surface with the distal portion of the wedge having a greater cross-section than the portion adjacent the surface, and the adjacent parallel surface may have a correspondingly shaped groove. In yet another embodiment, the projection from the parallel surface can be in the shape of an arrowhead and the corresponding groove may have a simple rectangular cross-section.

In one embodiment, one or more of the surfaces perpendicular to the upper surface of the laminate panel may have an "S-shaped" or double-curved profile. If the double-curved profile intersects the upper or lower surfaces of the laminate, it may be beveled to deter damages as the panels are engaged.

Other profiles are also shown. The key features in some embodiments are that at least one pair of the corresponding surfaces of second two opposed edges are perpendicular to the upper surface and the corresponding perpendicular surfaces are non-planar, whereby one of the corresponding surfaces engages the other corresponding surface and the pressure to engage and disengage the laminate panel is increased slightly. In other embodiments corresponding surfaces parallel to the upper decorative surface have features that increase the force to disengage the panels. One of ordinary skill in the art

can determine, without undue experimentation, the dimensions and tolerances necessary to permit easy installation, while deterring disengagement during normal use.

Figure 1 is a cross-section showing the long and short edges of a prior art lock and fold profile.

Figures 2 and 3 are cross-sections showing short folding edge of two other prior art lock and fold profiles. .

Figures 4 to 21 are cross-sections showing eighteen embodiments of the present folding edge.

Figure 1 shows the lock and fold profile of the prior art. The opposite long edges had the standard locking profile as shown on panels 1 and 2 in Figure 1. The other two short opposite edges are shown on panels 3 and 4 in Figure 1. These lock and fold panels were installed by angling a long locking edge of panel 2 into a previously installed row of panels such as panel 1. Panel 2 is then rotated about the contact point 5 between panels 1 and 2, thereby dropping or locking the locking projection 6 of the short side into the locking groove 7 in the other short side.

The upper lip locking projection 6 is formed on the upper lip 8 of the short side of panel 4 between the distal end 9 and the upper lip proximal groove 10. The upper lip proximal groove 10 is formed between the upper lip locking projection 6 and the body of the panel 4 adjacent the lower surface 11. The upper lip 8 includes an upper lip distal contact surface 12 and an upper lip proximal contact surface 14. The upper lip distal contact surface 12 is adjacent the upper decorative surface 13. The upper lip proximal contact surface 14 is between the lower surface 15 of the upper lip locking projection 6 and the upper surface 10" of the upper lip proximal groove 10. The upper lip contact surfaces 12 and 14 are substantially perpendicular to the upper decorative surface 13.

The lower lip locking groove 7 is formed on the lower lip 16 of the short side of panel 3 between the lower lip distal projection 17 and the body of the panel 3 adjacent the upper decorative surface 13. The lower lip 16 includes a lower lip proximal contact surface 18 and a lower lip distal contact surface 19. The lower lip proximal contact surface 18 is adjacent the upper decorative surface 13. The lower lip distal contact surface 19 is between the lower surface 20 of the lower lip locking groove 7 and the upper surface 21 of the lower lip distal projection 17. The lower lip contact surfaces 18 and 19 are substantially perpendicular to the upper decorative surface 13.

The fold joint on the short side of panels 3 and 4 can be freely engaged, disengaged and reengaged. However, if the panels 3 and 4 are greater then 3.5 inches in width, they tend to disengage when the laminate was stepped upon near the short edge, particularly if the panels are laminate panels. This causes ridges to form in the upper horizontal surface between the laminate panels resulting in an uneven walking surface.

Figures 2 and 3 show other prior art short side fold joints of a lock and fold panel. The long side joints can be similar to the long side joint of panels 1 and 2 of Figure 1. The short side joints in Figures 2 and 3 are similar to the short side joint of panels 3 and 4 of Figure 1 except the upper lip proximal contact surface 10' and lower lip distal contact surface 19' are slanted, that is not substantially perpendicular to the upper surface 13; the upper lip distal contact surface 12' includes a snapping hook 22; and the lower lip proximal contact surface 18' includes an under cut 23.

The slanted contact surfaces 10' and 19' urge the panels 3' and 4' together. This ensures locking of the snapping hook 22 and under cut 23, but makes disengagement of the short side fold joint prohibitive without damaging the snapping hook 22 and/or under cut 23. Therefore, if the panels 3' and 4' are disengaged, they cannot be reengaged without loss of the desired force which deters ridges forming in the upper horizontal surface between the panels when one panel is stepped on near the fold joint. Therefore, if the panels are disengaged and reengaged an uneven walking surface results.

This problem is overcome in the present invention by keeping the contact surfaces substantially perpendicular to the upper decorative surface, while increasing and controlling the friction between the contact surfaces as the panels are engaged, disengaged and reengaged. The increased friction results from a number of different force increasing means shown in Figures 4 to 20.

In Figure 4, the upper lip distal contact surface 12 includes a small projection 24 and the lower lip proximal contact surface 18 includes a corresponding small groove 25. When the short side fold joint is engaged, the small projection 24 lies within the small groove 25, providing increased friction or force if the panels are urged to disengage.

The embodiment shown in Figure 5 includes a small projection 24' in the upper lip proximal contact surface 10 and a corresponding small groove 25' in the lower lip distal contact surface 19. When the short side fold joint is engaged, the small projection 24' lies within the small groove 25', providing increased friction or force if the panels are urged to disengage.

The locations of the small projections and small grooves in Figures 4 and 5 can be reversed, as shown in Figure 6. Also, small projections and corresponding small grooves can be included in all four contact surfaces, as shown in Figure where the upper lip distal contact surface 12 includes a small groove 27, the lower lip proximal contact surface 18 includes a corresponding small projection 28, the upper lip proximal contact surface 10 includes a small groove 29 and the lower lip distal contact surface 19 includes a corresponding small projection 30. Each small projection may have a corresponding groove or the grooves may be omitted.

Figure 7 show an embodiment where a loop material 31 is adhered to the locking projection 15 on the upper lip and a hook material 32 is adhered to the locking groove 20 on the lower lip. Again, the locations of the loop material and hook material can be reversed. It may be possible to adhere the hook material and loop material to the upper lip distal contact surface and the lower lip proximal contact surface or to the upper lip proximal contact surface and the lower lip distal contact surface.

As shown in Figures 8 and 9, pressure sensitive adhesive can provide the increased friction or force. Pressure sensitive adhesive 34 can be adhered to the lower lip proximal contact surface 18 and pressure sensitive adhesive 33 can be adhered to the upper lip distal contact surface 12, as in Figure 8.

In Figure 9, pressure sensitive adhesive 35 can be adhered to the locking groove 20 and pressure sensitive adhesive 36 can be adhered to the locking projection 15. As with the hook material and loop material, pressure sensitive adhesive can be adhered to the upper lip proximal contact surface and the lower lip distal contact surface. The pressure sensitive adhesive can be adhered to all four contact surfaces; to two of the corresponding contact surfaces, the locking projection and the locking groove; or to all three corresponding surfaces.

Figure 10 shows an embodiment where the lower lip proximal contact surface 18 and the upper lip distal contact surface 12 are roughened at 37 and 38, respectively. The upper lip proximal contact surface 10 and the lower lip distal contact surface 19 could be roughened in a similar manner as shown at 39 and 40, respectively, as shown in Figure 11. In another embodiment, all four the contact surfaces could be roughened.

Figures 12 and 13 are similar to Figures 4 and 5, except the projections 24" and 25" in Figures 12 and 13 are adhered to the upper lip distal contact surface 12 and lower lip distal contact surface 19 rather than being integral with the upper lip and lower lip. The

projections can be made from a resilient material, such as rubber or thermoplastic. Of course, similar the integral projections, the adhered projections can be adhered to lower lip proximal contact surface, the upper lip proximal contact surface, or two of the non-corresponding contact surfaces. Each adhered projection may have a corresponding groove or the grooves may be omitted.

Figure 14 shows a projection 41 and groove 42 which are generally rectangular in cross-section. Such a projection can be substituted for the small projections discussed with regard to the Figures 4 and 5 embodiments.

The embodiment shown in Figure 15 includes an upper lip distal contact surface 12' and a lower lip proximal contact surface 18' which have a double curved profile. Such a profile can also be used on the lower lip distal contact surface and an upper lip proximal contact surface, or on all four contact surfaces.

Figure 16 shows an embodiment where the locking groove 20 has a wedge 43 projecting from the surface with the distal portion of the wedge having a greater cross-section than the proximal portion of the wedge. The locking projection 15 has a correspondingly shaped groove 44. The wedge could also be located in the locking projection and the correspondingly shaped groove could be located in the locking groove.

The embodiment shown in Figure 17 is similar to the embodiment of Figure 16 except the projection 45 is shaped like and arrow and the groove 46 has a simple rectangular cross-section. The width of the arrowhead must be greater than the width of the groove. Again, the locations of the arrowhead projection and groove can be reversed.

In the embodiments in which the force increasing means is located on the upper surface of the locking groove and the lower surface of the locking projection (Figures 7, 9, 16 and 17), the lower lip distal projection and the upper lip proximal groove are not required. The force increasing means in these embodiments not only deter separation in a direction perpendicular to the upper decorative surface, but also deter separation in a direction parallel to the upper decorative surface. These embodiments are shown in Figures 18 to 21, where the force increasing means include loop material 31 and a hook material 32 (Figure 18), pressure sensitive adhesive 35 and 36 (Figure 19), wedge 43 and correspondingly shaped groove 44 (Figure 20), and arrowhead projection 45 and groove 46 (Figure 21).

Claims

1. A floor covering panel comprising (a) a core, (b) an upper decorative surface, (c) a lower surface, the lower surface being parallel and opposed to the upper decorative surface with the core interposed between the upper decorative surface and the lower surface, and (d) first and second opposed side edges interposed between the upper decorative surface and the lower surface;

the first opposed side edges having coupling parts configured to cooperate by coupling with cooperative coupling parts of another panel, whereby the panels lock together in a direction perpendicular to the plane of the upper surface when cooperative coupling parts of the panels are engaged; the coupling parts being capable of engagement by engaging one of the first two opposed side edges in an edge of a first previously installed panel with the other of the first two opposed side edges out of the plane of the upper surface of the panel and rotating the other of the first two opposed side edges into and below the plane of the upper decorative surface of the panel;

wherein the second two opposed edges comprise mating profiles,

the first of the second opposed edges comprising (a) a lower lip extending substantially parallel to the plane of the upper surface past the edge of the upper decorative surface, (b) an upper surface on the lower lip, the upper surface being substantially parallel to the upper decorative surface, and (c) a lower lip proximal contact surface adjacent the upper decorative surface, the lower lip proximal contact surface being substantially perpendicular to upper decorative surface;

the second of the second opposed edges comprising (a) an upper lip extending substantially parallel to the plane of the upper surface past the edge of the lower surface, (b) a lower surface on the upper lip, the lower surface being substantially parallel to the upper decorative surface, and (c) an upper lip distal contact surface adjacent the upper decorative surface, the upper lip distal contact surface being substantially perpendicular to the upper decorative surface;

wherein when the floor covering panel is assembled with other floor covering panels, the lower lip proximal contact surface is adjacent an upper lip distal contact

surface of a first adjacent panel, and the upper lip distal contact surface is adjacent a lower lip proximal contact surface of a second adjacent panel;

the second two opposed edges further comprising force increasing engagement and disengagement means, whereby the second two opposed edges can be engaged, disengaged and reengaged with the force required to engage, disengage and reengage the second two opposed side edges being greater than the force required to engage, disengage and reengage panels having second opposed side edges without the force increasing means.

2. The floor covering panel of claim 1, wherein the panels lock together in a direction parallel to the plane of the upper surface when cooperative coupling parts of the panels are engaged,

the first of the second opposed edges comprising (a) a lower lip extending substantially parallel to the plane of the upper surface past the edge of the upper decorative surface, (b) a lower lip distal projection located at the end of the lower lip distal to the panel, the lower lip and lower lip distal projection forming a lower lip locking groove, (c) a surface between the lower surface of the locking groove and the upper surface of the distal projection forming a lower lip distal contact surface, the lower lip distal contact surface being substantially perpendicular to the upper decorative surface, and (d) a lower lip proximal contact surface adjacent the upper decorative surface, the lower lip proximal contact surface being substantially perpendicular to upper decorative surface;

the second of the second opposed edges comprising (a) an upper lip extending substantially parallel to the plane of the upper surface past the edge of the lower surface, (b) an upper lip distal locking projection located at the end of the upper lip distal to the panel, the body of the panel adjacent the lower surface and upper lip distal locking projection forming an upper lip proximal groove, (c) a surface between the upper surface of the proximal groove and the lower surface of the locking projection forming an upper lip proximal contact surface, the upper lip proximal contact surface being substantially perpendicular to the upper decorative surface, and (d) an upper lip distal contact surface

adjacent the upper decorative surface, the upper lip distal contact surface being substantially perpendicular to the upper decorative surface;

wherein when the floor covering panel is assembled with other floor covering panels, the lower lip distal contact surface is adjacent an upper lip proximal contact surface of a first adjacent panel, the lower lip proximal contact surface is adjacent an upper lip distal contact surface of the first adjacent panel, the upper lip distal contact surface is adjacent a lower lip proximal contact surface of a second adjacent panel, and the upper lip proximal contact surface is adjacent a lower lip distal contact surface of the second adjacent panel;

the second two opposed edges further comprising force increasing engagement and disengagement means, whereby the second two opposed edges can be engaged, disengaged and reengaged with the force required to engage, disengage and reengage the second two opposed side edges being greater than the force required to engage, disengage and reengage panels having second opposed side edges without the force increasing means.

3. The floor covering panel of claim 2, wherein the force increasing means is a contact surface projection in at least one of the contact surfaces of the panel whereby when the panels are engaged, the contact surface projection on the panel engages the corresponding contact surface in the adjacent panel.

4. The floor covering panel of claim 2, wherein the force increasing means is a contact surface projection in at least one of the contact surfaces of the panel and a contact surface groove in the adjacent contact surface of an adjacent panel, whereby when the panels are engaged, the contact surface projection on the panel engages the corresponding contact surface groove in the adjacent panel.

5. The floor covering panel of claim 4, wherein the contact surface projection and contact surface groove have a rectangular profile.

6. The floor covering panel of claim 4, wherein the contact surface projection and contact surface groove have a curved profile.

7. The floor covering panel of claim 3, wherein the contact surface projection is formed as one piece from the panel core.

8. The floor covering panel of claim 3, wherein the contact surface projection is adhered to one of the panel core.

9. The floor covering panel of claim 2, wherein at least one pair of the corresponding contact surfaces are roughened.

10. The floor covering panel of claim 2, wherein at least one pair of the corresponding contact surfaces have a double curved profile.

11. The floor covering panel of claim 10, wherein the corresponding contact surfaces are beveled.

12. The floor covering panel of claim 2, wherein at least one pair of the corresponding contact surfaces or locking groove and locking projection have a pressure sensitive adhesive applied thereto.

13. The floor covering panel of claim 2, wherein at least one of the corresponding contact surfaces or locking groove and locking projection has a loop material adhered thereto and the other adjacent corresponding contact surface or locking groove and locking projection has a hook material adhered thereto.

14. The floor covering panel of claim 2, wherein at least one pair of the corresponding contact surfaces or locking groove and locking projection has a pressure sensitive adhesive adhered thereto.

15. The floor covering panel of claim 1, wherein at least one of the upper surface on the lower lip and lower surface on the upper lip has a wedge projecting from the surface with the distal portion of the wedge having a greater cross-section than the proximal portion of the wedge, and the other of the upper surface on the lower lip and lower surface on the upper lip has a correspondingly shaped groove.

16. The floor covering panel of claim 1, wherein at least one of the upper surface on the lower lip and lower surface on the upper lip has a projection in the shape of an arrowhead, and the other of the upper surface on the lower lip and lower surface on the upper lip has a corresponding groove with a simple rectangular cross-section.

17. The floor covering panel of claim 1, wherein at least one of the upper surface on the lower lip and lower surface on the upper lip has a loop material adhered thereto and the other of the upper surface on the lower lip and lower surface on the upper lip has a hook material adhered thereto.

18. The floor covering panel of claim 1, wherein the upper surface on the lower lip and lower surface on the upper lip have pressure sensitive adhesive adhered thereto.

19. The floor covering panel of claim 1, wherein the floor covering panel is selected from the group consisting of a HDF laminate floor panel, a MDF laminate floor panel, a solid wood floor panel and an engineered wood floor panel.

20. The floor covering panel of claim 2, wherein the floor covering panel is selected from the group consisting of a HDF laminate floor panel, a MDF laminate floor panel, a solid wood floor panel and an engineered wood floor panel.

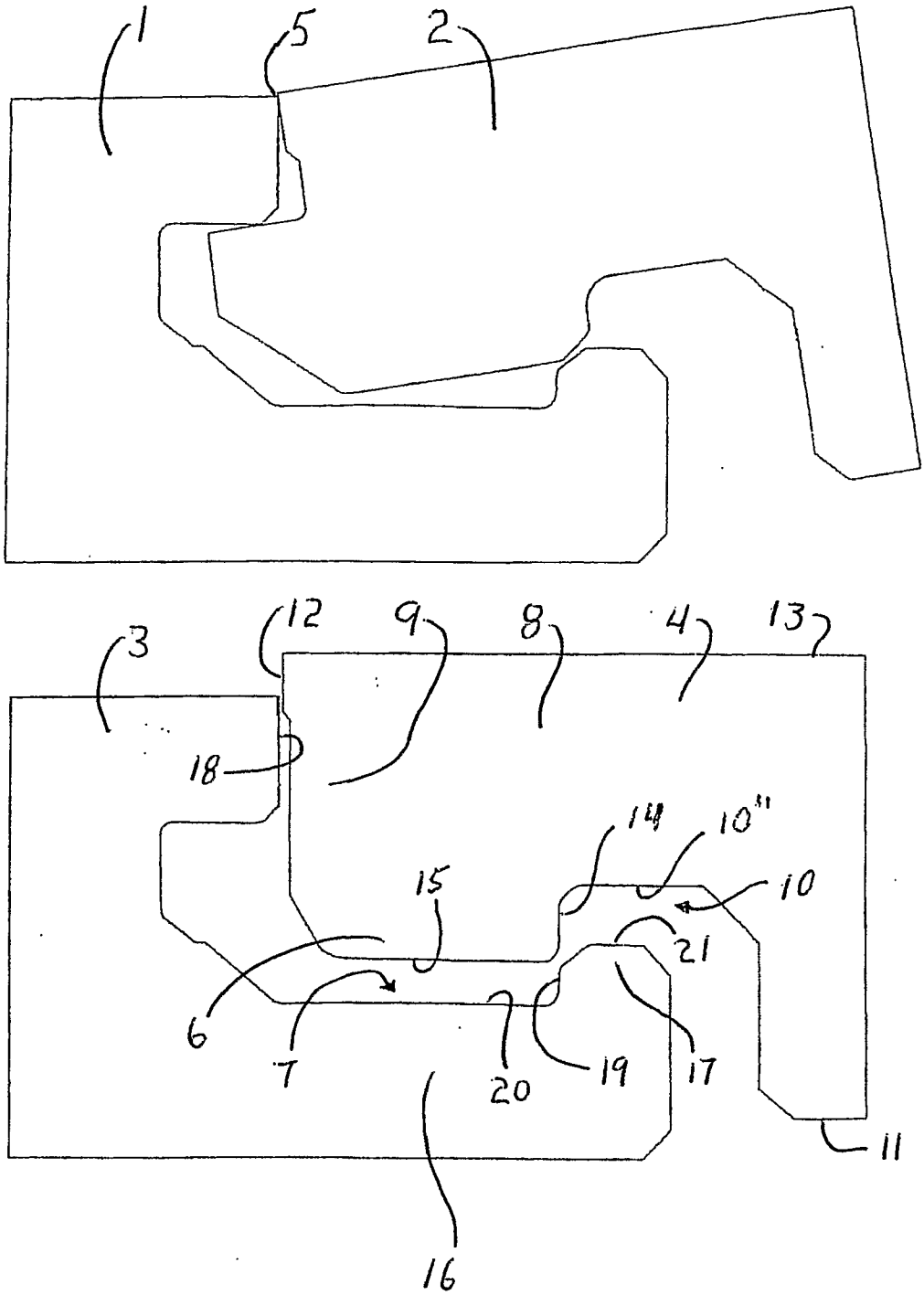


Figure 1
(PRIOR ART)

Figure 2 (PRIOR ART)

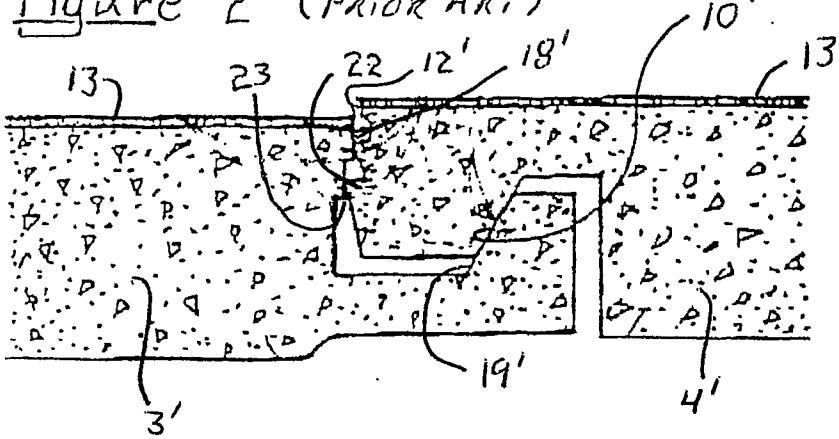
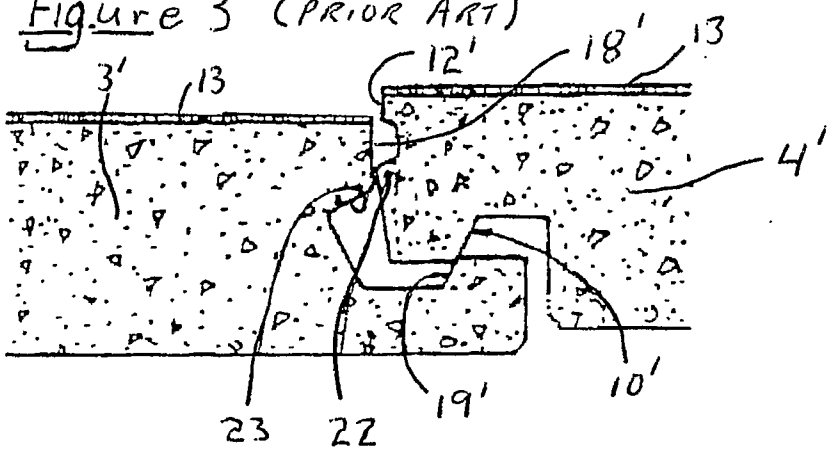


Figure 3 (PRIOR ART)



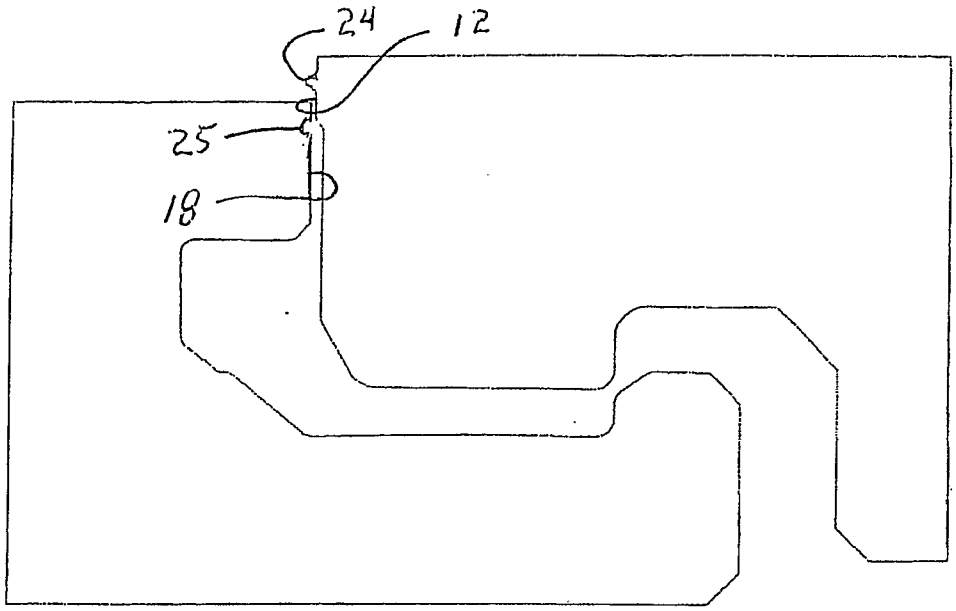


FIGURE 4

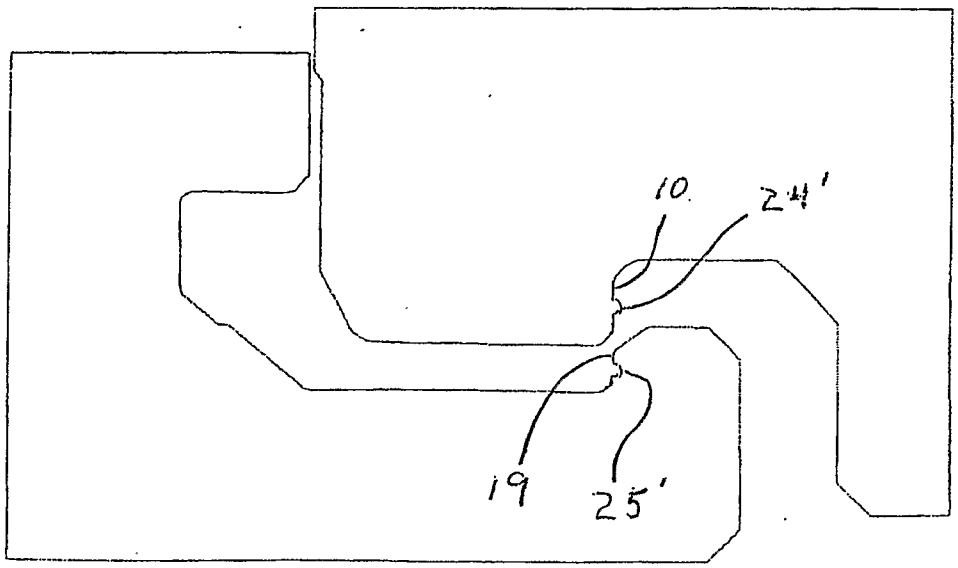


FIGURE 5

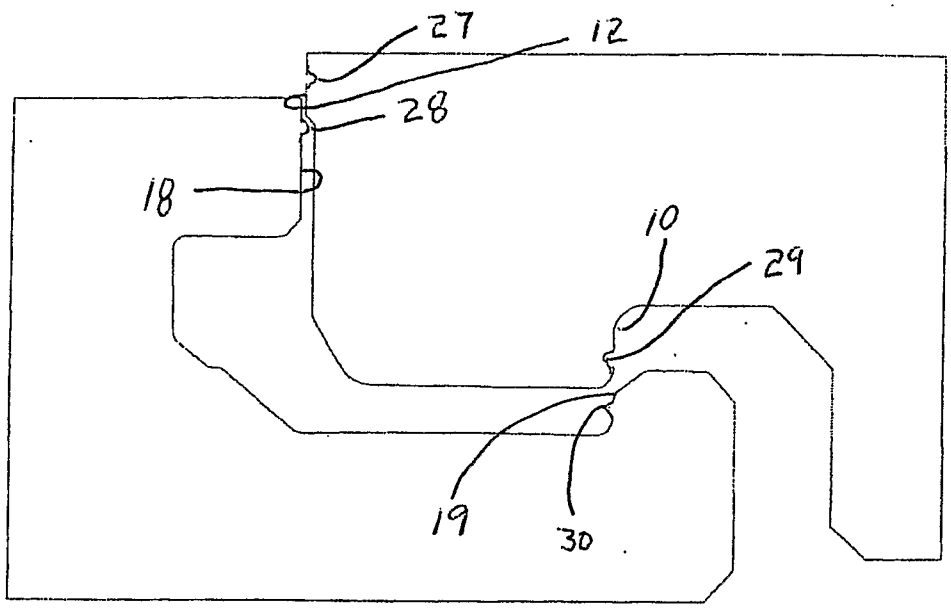


FIGURE 6

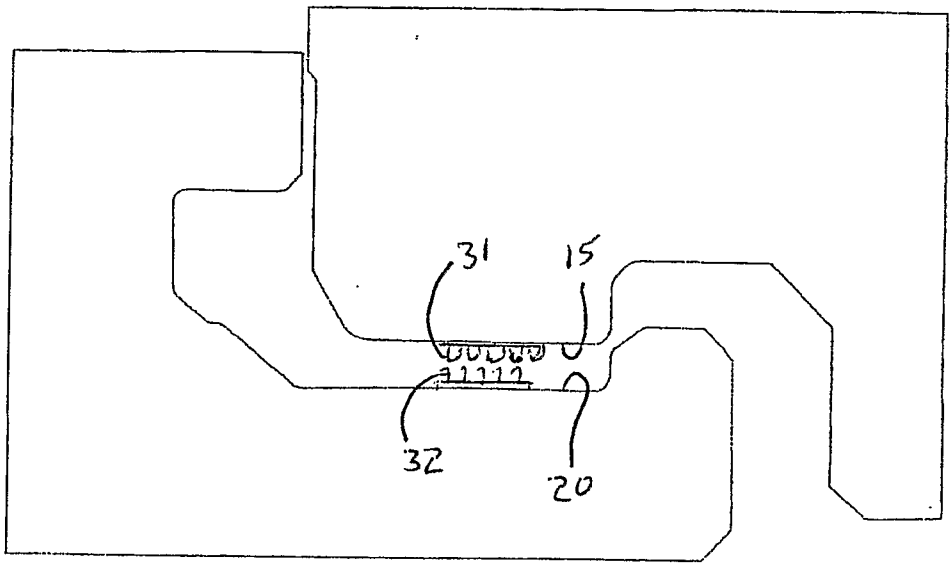


FIGURE 7

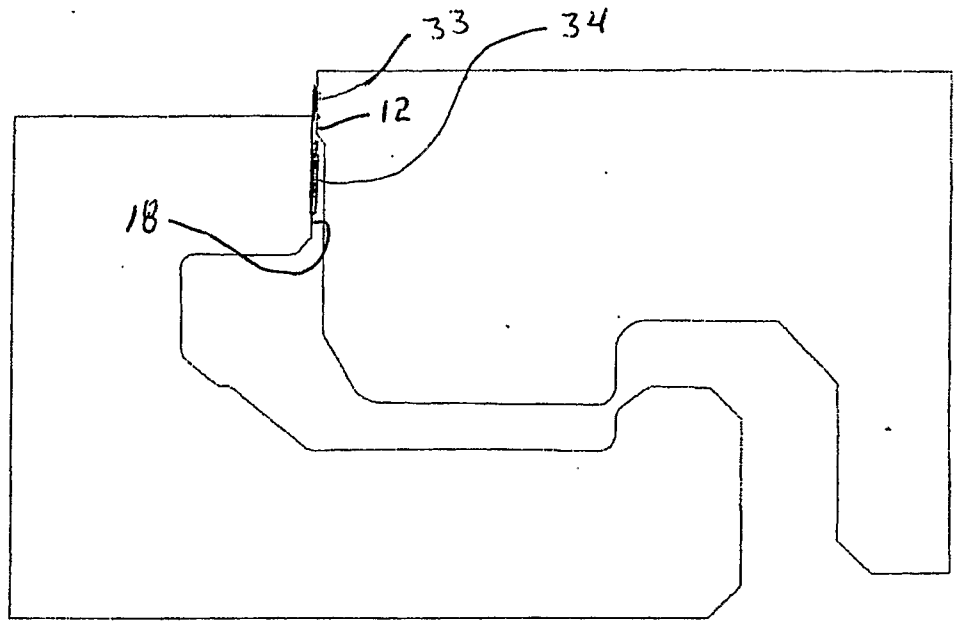


FIGURE 8

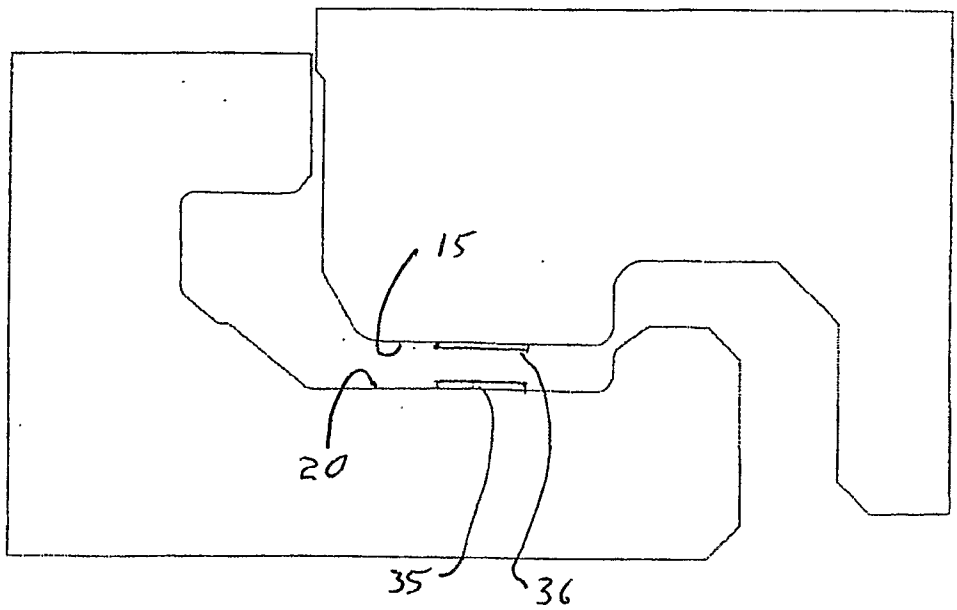


FIGURE 9

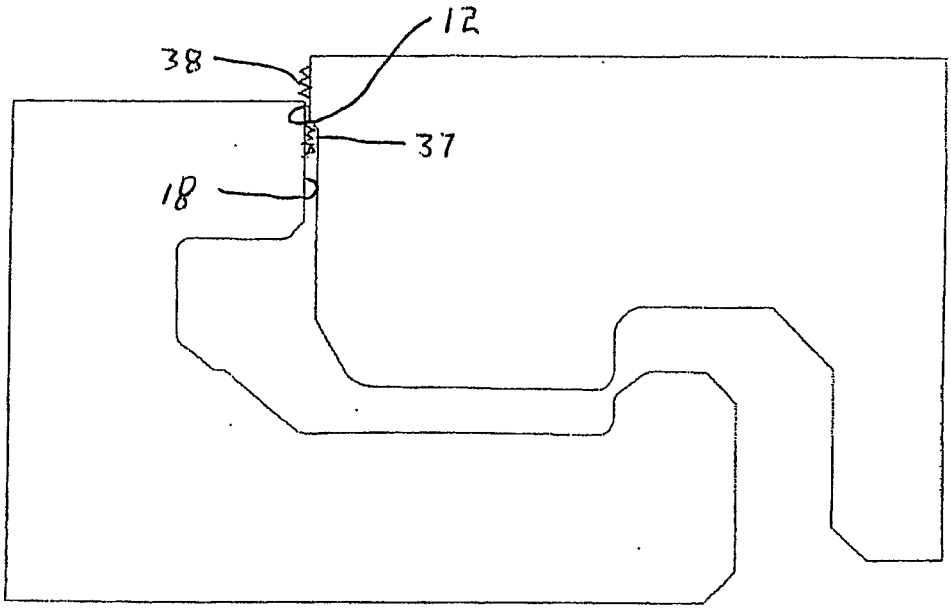


FIGURE 10

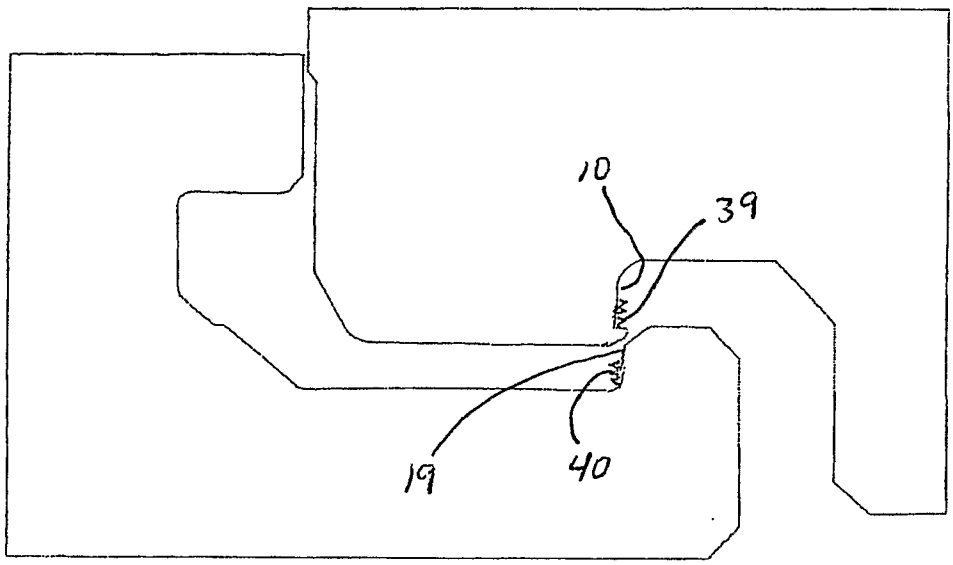


FIGURE 11

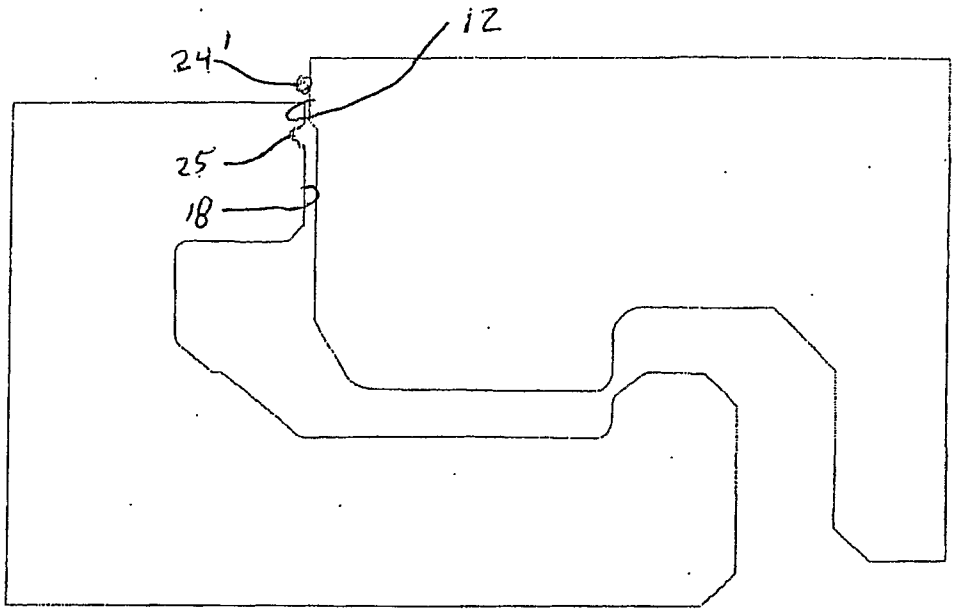


FIGURE 12

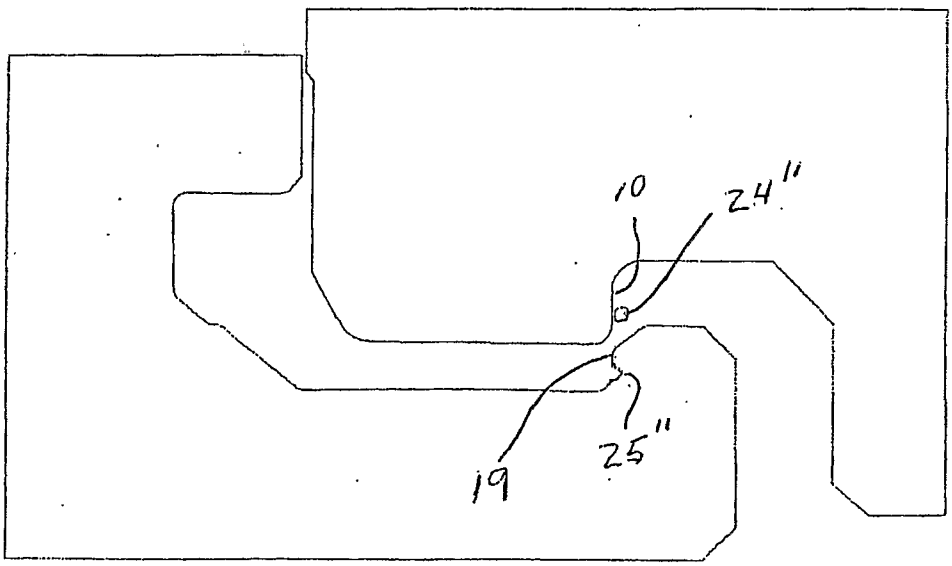


FIGURE 13

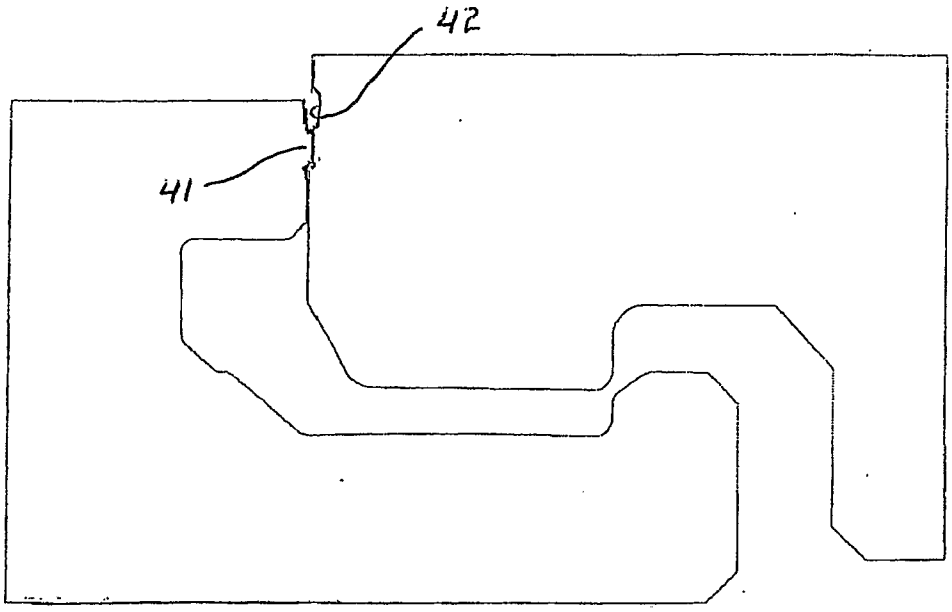


FIGURE 14

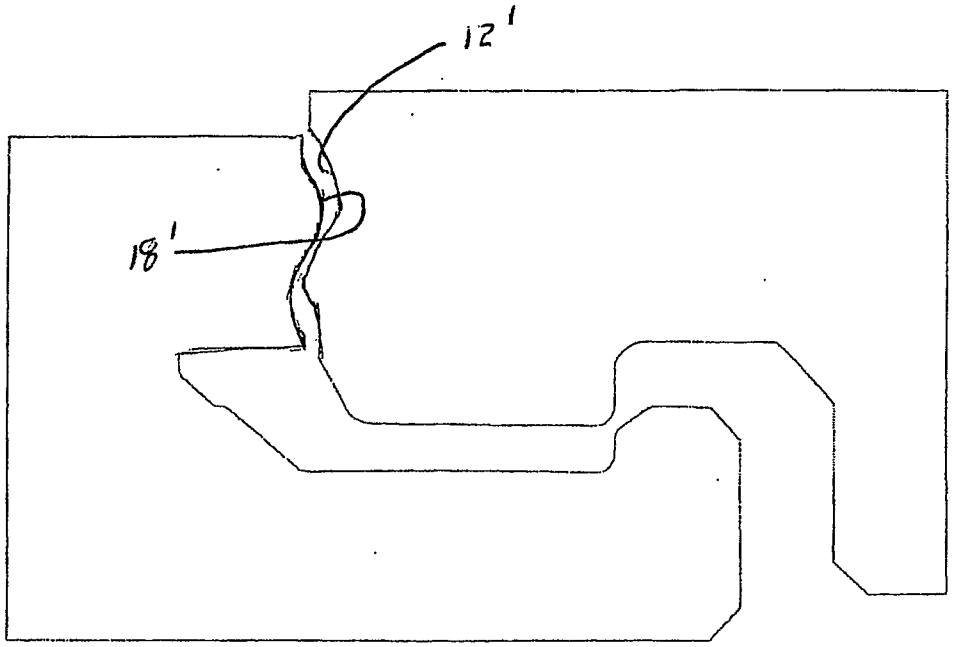


FIGURE 15

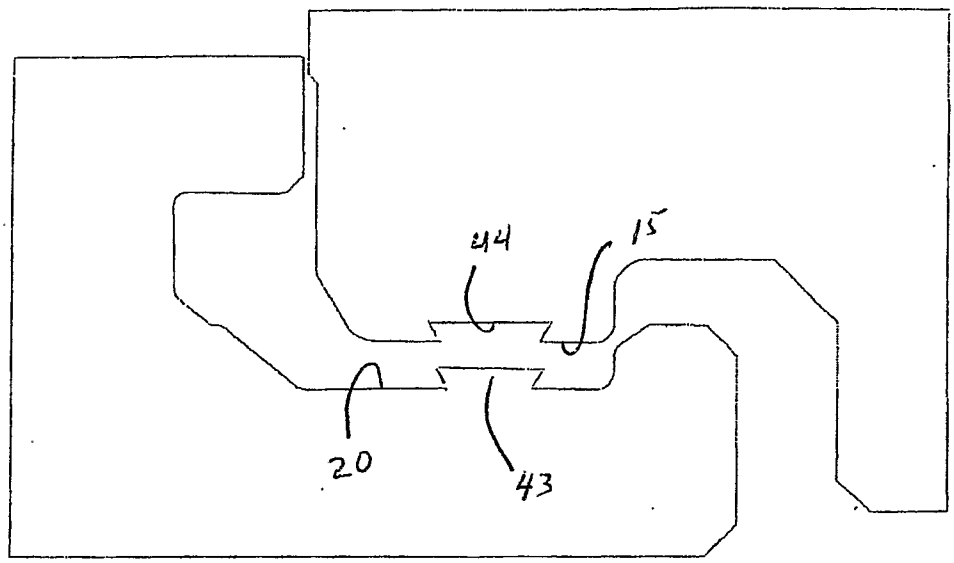


FIGURE 16

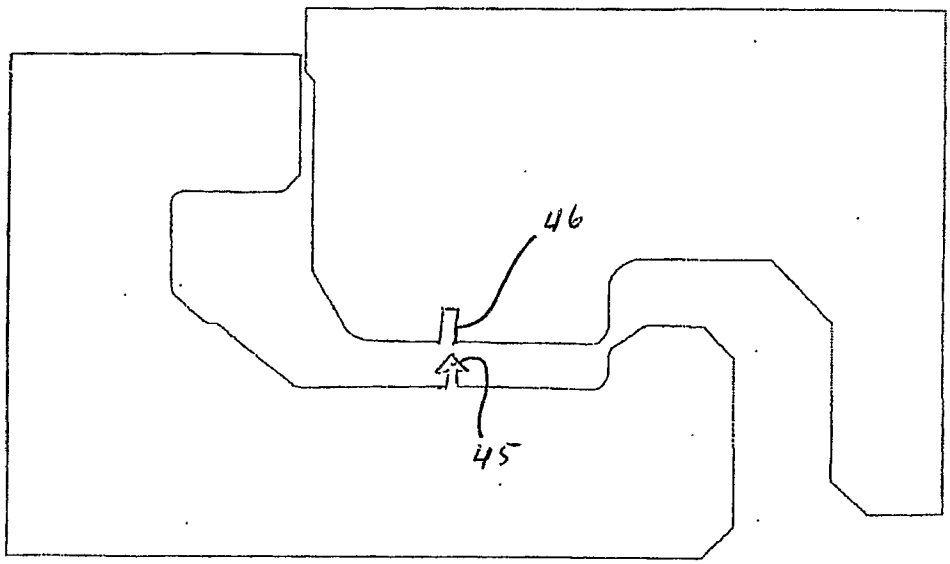


FIGURE 17

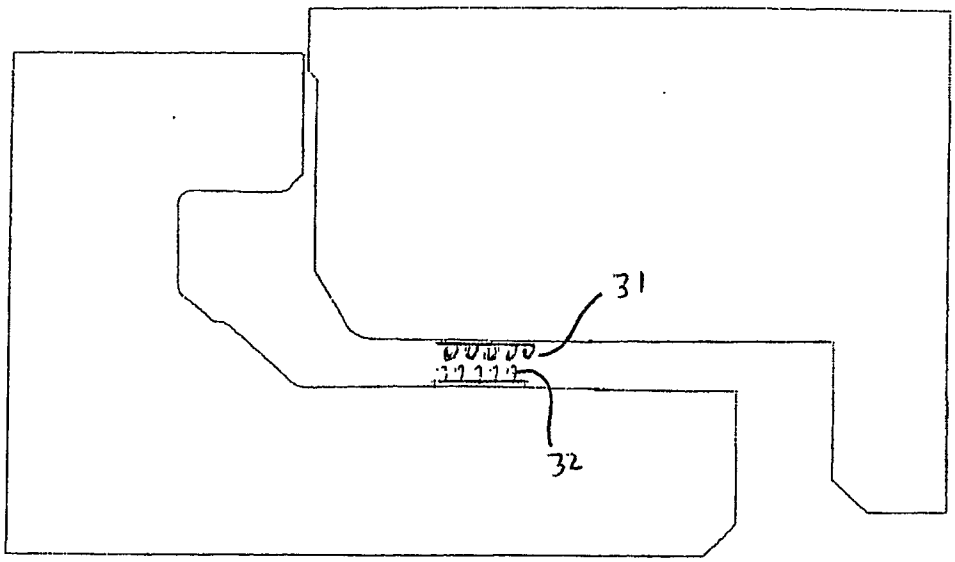


FIGURE 18

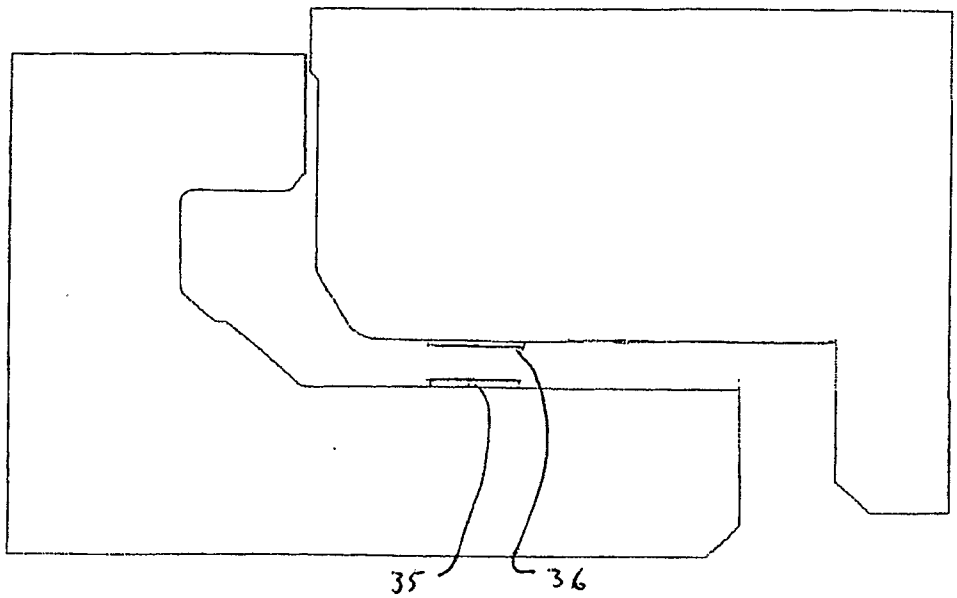


FIGURE 19

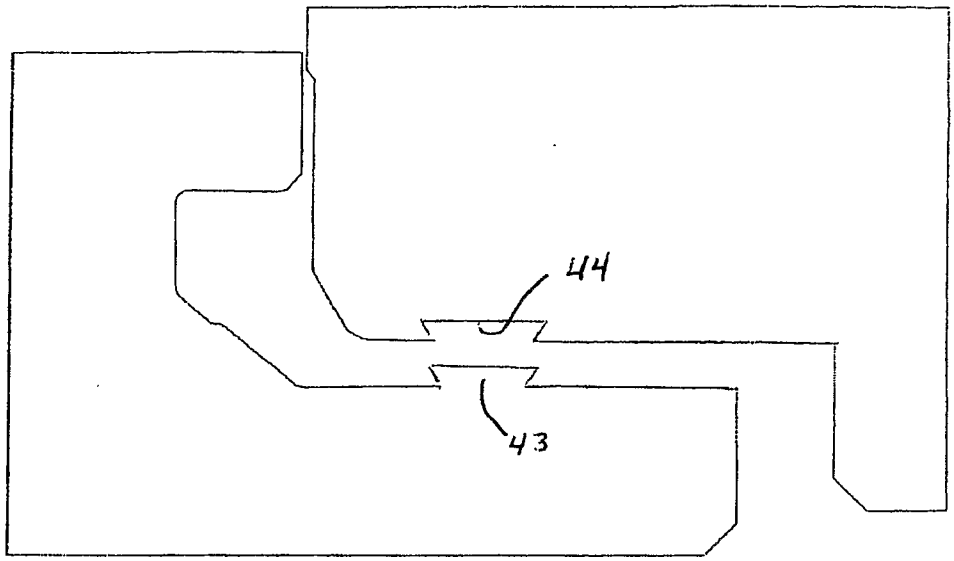


FIGURE 20

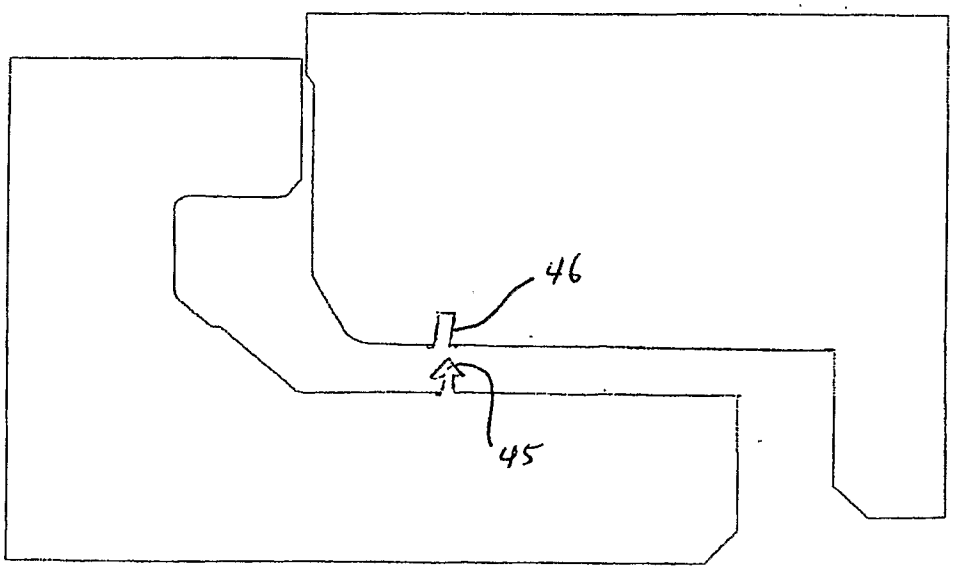


FIGURE 21