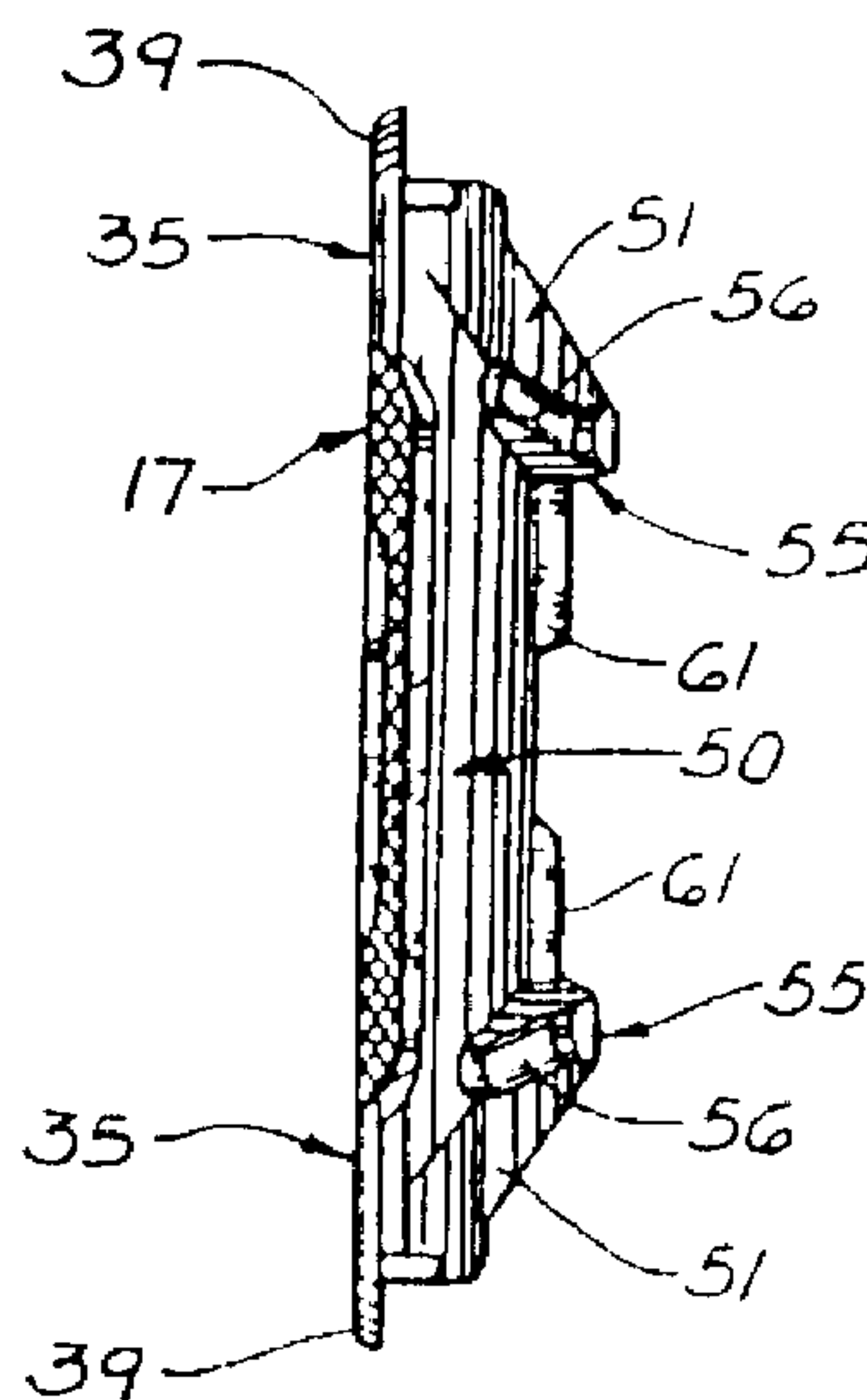




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 (54) Title: ROADWAY MARKER



(57) **Abrégé/Abstract:**

A low profile, bi-directionally snow-plowable road marker (15) having a cast metal base or body of generally square plan configuration formed on its underside with laterally spaced oppositely curved arcuate rib members (55) flanked by transversely extending webs (60) and protrusions (61) located centrally of the body and acting with the rib members to self-center the cast body in a shallow arcuate depression of single radius formed in a roadway pavement, the webs and protrusions being configured to evenly distribute adhesive over the bottom, sides, ends and over portions of the upper side of the cast body to encapsulate and lock the same securely in the pavement depression. The upper side of the cast body is distinguished by a pair of downwardly sloping sub road surface vision ramps extending inwardly of opposite ends of the cast body and terminating at their lower ends in co-planar mounting platforms which are separated by a vertically extending wall having a transversely protruding and overhanging canopy portion along its upper end. A reflective light signal assembly (17) is adapted to be mounted on either one or both of the platforms as selected, such being protectively captured and locked against vertical and lateral displacement by the overhanging canopy beneath which it is mounted. Locators having upper curvilinear surfaces and co-planar bottom surfaces are provided along opposite sides of the cast body to engage the roadway surface and thereby vertically locate the body casting in the pavement depression so that there is minimal protrusion of the marker above the roadway surface. The signal assemblies are protectively located on the bottom of the vision ramps and shielded from contact with vehicle tires and snowplow blades by the canopy.



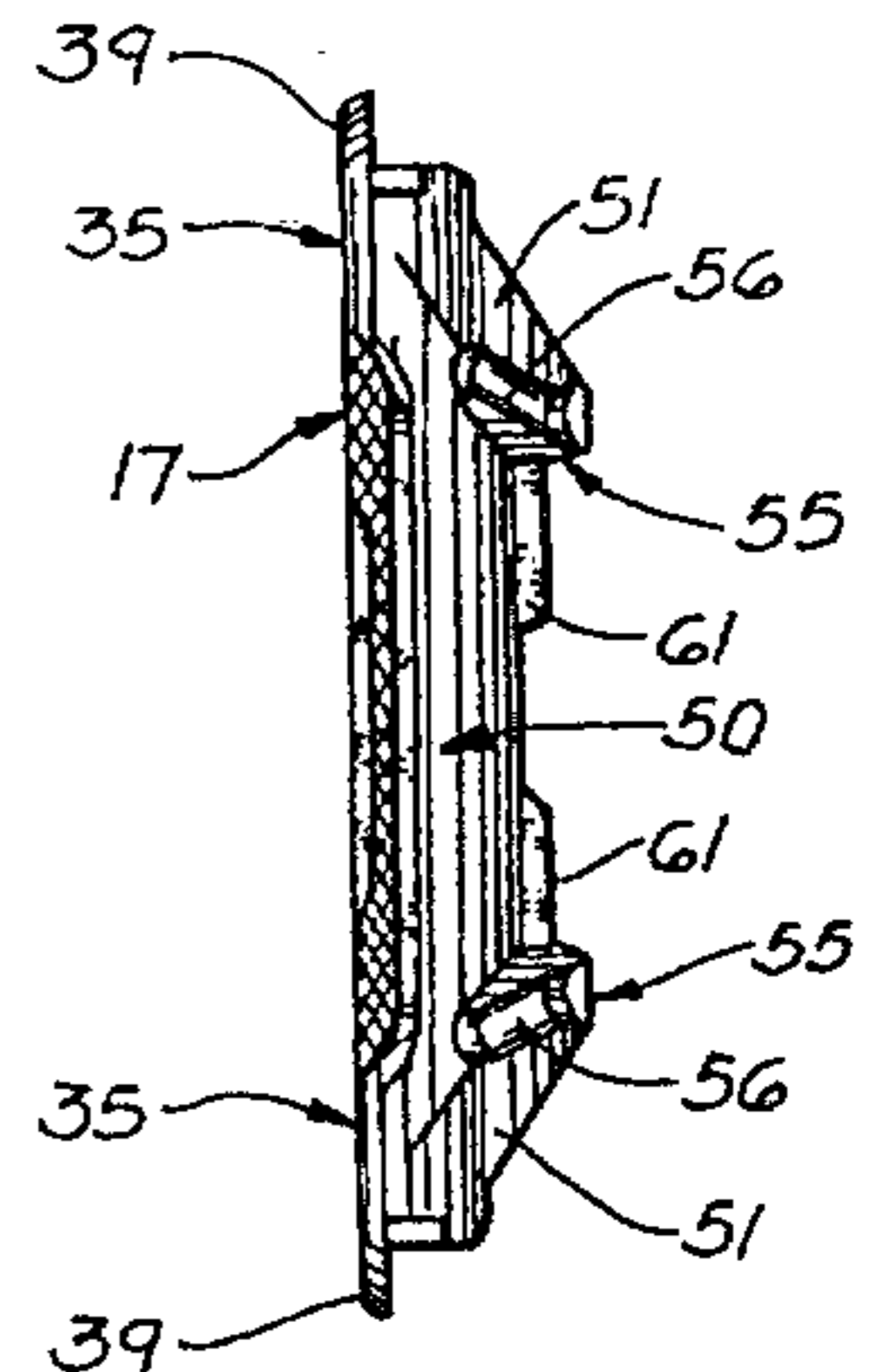
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(54) Title: ROADWAY MARKER

(57) Abstract

A low profile, bi-directionally snow-plowable road marker (15) having a cast metal base or body of generally square plan configuration formed on its underside with laterally spaced oppositely curved arcuate rib members (55) flanked by transversely extending webs (60) and protrusions (61) located centrally of the body and acting with the rib members to self-center the cast body in a shallow arcuate depression of single radius formed in a roadway pavement, the webs and protrusions being configured to evenly distribute adhesive over the bottom, sides, ends and over portions of the upper side of the cast body to encapsulate and lock the same securely in the pavement depression. The upper side of the cast body is distinguished by a pair of downwardly sloping sub road surface vision ramps extending inwardly of opposite ends of the cast body and terminating at their lower ends in co-planar mounting platforms which are separated by a vertically extending wall having a transversely protruding and overhanging canopy portion along its upper end. A reflective light signal assembly (17) is adapted to be mounted on either one or both of the platforms as selected, such being protectively captured and locked against vertical and lateral displacement by the overhanging canopy beneath which it is mounted. Locators having upper curvilinear surfaces and co-planar bottom surfaces are provided along opposite sides of the cast body to engage the roadway surface and thereby vertically locate the body casting in the pavement depression so that there is minimal protrusion of the marker above the roadway surface. The signal assemblies are protectively located on the bottom of the vision ramps and shielded from contact with vehicle tires and snowplow blades by the canopy.



ROADWAY MARKER

This invention relates generally to lighted pavement markers used to delineate highway traffic lanes and more particularly to very low profile pavement markers for presenting minimal interference with vehicular traffic and snow removal equipment, especially snow plows.

Pavement markers for delineating highway traffic lanes by means of a series of spaced visible light signals have gained wide spread use. Such markers commonly employ reflector devices which reflect light emanating from the head lights of oncoming automotive road vehicles. In other instances electrically powered lamps are substituted for the reflectors to provide the necessary light source. It is intended herein that "light signal assemblies" as hereinafter described include light reflectors, electrical lamps or other equivalent light sources.

One popularly used highway marker of the prior art described in United States Patent No. 4,147,447 issued April 3, 1979, employs an H-shaped metal body having parallel upwardly extending inclined ramps which are anchored by parallel depending portions extending into elongated slots cut in the pavement of the highway and between which is a horizontal support on which are mounted light reflectors. The ramps serve to guide a snow plow blade or other snow removal equipment upwardly away from and over the top of the reflectors in an effort to avoid impact damage to the reflectors and the anchored marker while leaving the reflectors accessible to wiping action from overpassing vehicle tires.

However, such prior known structures fail to eliminate the damaging impact of a heavy snow plow blade travelling even at moderate speed when it encounters the marker's ramp obstructions, either head on or at an angle. Consequently, although widely used, such elevating ramp type marker structures are frequently torn from their moorings and/or the reflectors are broken and dislodged by

snow removal equipment or the impact of normal vehicular traffic, rendering the marker assemblies ineffective for their intended purpose. Of similar importance is the impact damage to the snow plow blades created by the resistive characteristics of the raised ramp-type markers as well as other known marker structures of the prior art which project upwardly from the road surface a substantial distance.

The object of the present invention is to provide an improved low profile road marker assembly which alleviates, among others, the aforescribed problems related to raised ramp-type and similar known roadway markers that present objectional obstruction to vehicular traffic and snow removal equipment.

The present invention provides a low-profile snow plowable, pavement marker for delineating roadway traffic lanes, comprising a unitary metal base of substantially square rectangular plan configuration adapted to be mounted and adhesively secured in a single shallow arcuate depression of single uniform radius formed in a roadway surface, said base having a generally arcuately formed underside distinguished by a pair of oppositely laterally curved and generally vertically depending arcuate rib members protruding downwardly from said underside, a pair of planar vision ramps recessed in the upper side of said base to extend angularly downwardly from adjacent opposite ends of said base toward the middle thereof, a pair of mounting platforms at the lower ends of said ramps presenting a pair of co-planar mounting surfaces, a vertically extending wall traversing said ramps and separating said ramps and mounting platforms, a pair of parallel elongated side rails having arcuate upper surfaces of uniform radius laterally flanking said ramps, platforms and vertical wall and forming opposite lateral sides of said base, and locator means providing co-planar undersurfaces extending laterally outwardly of the said

side rails for engaging the roadway surface whereby to vertically locate said base in said depression, said locator means having arcuate upper surfaces which merge into and terminate in the upper surfaces of said rails.

Thus the invention provides an improved low-profile, snow plowable road marker for delineating highway traffic lanes. In a preferred embodiment the pavement marker may include one or more light signal assemblies which are protectively mounted in positions generally below the road surface. The pavement marker is substantially self locating in an arcuate mounting depression cut at a single radius in the roadway. The pavement marker may include one or more light signal assemblies which are protectively interlocked with the body of the marker to prevent vertical, horizontal and lateral displacement thereof. The pavement marker embodies light-reflective signal means which are protectively supported against compressive loading and engagement by vehicular traffic passing thereover. The pavement marker affords simplified and economical installation on paved roadways.

The foregoing and other features and advantages of the invention will appear from the following detailed description of a preferred embodiment, illustrated in the accompanying drawing and representing the best mode presently contemplated for enabling those skilled in the art to practice this invention.

In the drawings:

Figure 1 is a top plan view of a preferred form of road marker according to this invention;

Figure 2 is a side elevational view thereof in its installed position in a roadway;

Figure 3 is a full cross sectional view thereof, taken substantially along vantage line 3-3 of Figure 1 and looking in the direction of the arrows thereon;

Figure 4 is a right hand end elevational view

thereof taken substantially from vantage line 4-4 of Figure 5 and looking in the direction of the arrows thereon;

Figure 5 is a bottom plan view thereof;

Figure 6 is an enlarged front elevational view of a light signal assembly shown in Figure 1;

Figure 7 is a top plan view thereof;

Figure 8 is a right hand end elevational view thereof; and

Figure 9 is an enlarged partial cross sectional view taken substantially along vantage line 9-9 of Figure 1 and looking in the direction of the arrows thereon.

Referring now to Figures 1-5 of the drawings, it will be understood that a preferred roadway marker assembly 15 according to this invention is therein illustrated as comprising a base or body 16 carrying one or more light signal assemblies 17.

Base 16 preferably is a relatively heavy, unitary metal casting of generally square plan configuration having two downwardly sloping symmetrically disposed and oppositely inclined vision ramps 20, 20 inset in its upper side. Such ramps extend from opposite ends 21, 21 of the base toward the middle thereof. In the particular embodiment illustrated, each vision ramp comprises a generally horizontal planar surface portion 23 adjacent its outer or elevated end and a downwardly sloping planar surface portion 24 which intersects surface portion 23 and terminates at its lower end at a recessed or depressed rectangular shaped mounting platform 25. The two mounting platforms so provided present co-planar and operatively horizontal surfaces 26 for undersupporting signal assemblies 17 mounted thereon.

Separating the two mounting platforms 25, 25 as above noted, is a vertically extending web wall 30 located on the transverse center line of the base and preferably cast integral therewith. Importantly a transversely

extending canopy portion 31 extending part way along the central upper end of wall 30 partially overhangs the two mounting platforms 25. The canopy serves to protectively interlock with signal assemblies 17 mounted on the platforms 25 to prevent undesired vertical, horizontal and lateral displacement thereof. From Figure 3 it will be recognized that the vertical extent of wall 30 and its canopy portion 31 is slightly above the level of the road surface, indicated at R-S in that figure and at the crest of the arcuate top side form of the base (see Figure 3).

Laterally flanking the two mounting platforms 25, 25 and vision ramps 20, 20 are parallel linear side rail portions 35, 35 of the base having matching gently arcuate upper surfaces 36, 36 which are radiused downwardly at their opposite ends and crest at the transverse center line of the base coincident with the peak of the canopy 31.

Medially, surfaces 36, 36 are flanked along their outboard sides by angularly downward and generally planar sloping side surfaces 37, 37 which merge at their ends into gently crowned, semi-rounded surface formations 38 that project laterally outward from opposite sides of the base casting 16. These surfaces 38 form the upper sides of four locators or buttons 39 formed with co-planar undersurfaces 40, 40 arranged to engage the pavement surface R-S for the purpose of locating the base vertically in an arcuate cut-out or depression 45 formed at a single radius in the road surface R-S (see Figure 2). The upward extent of the surfaces 38 merge with surface 36 of the side rails 35 to maintain the low profile of the marker.

It is to be noted that the sloping side surfaces 37 extend downwardly from the rail surfaces to below the locating undersurfaces 40. Thus portions of such surfaces 37 are below the roadway surface R-S when the marker is mounted in a depression 45. Consequently, epoxy or other adhesive in depression 45 flows upwardly to partially

cover the sloping side surfaces 37 and encapsulate the same upon installation, thereby serving to tightly lock the base in recess 45.

It will be recalled that the two mounting platforms 25, 25 are separated by an intervening vertical upright web wall 30 having a transverse overhanging canopy portion 31. Additionally, as shown, platforms 25 may extend a short distance into the two side rail portions 35, 35 to form inset vertical recesses or pockets 46, 46. These pockets operate to protectively guard the outer ends of the elongated signal assemblies 17 mounted on the platforms 25 (see Figure 1).

In addition to the pockets 46, each signal assembly when mounted is uniquely guarded against plow blade contact and vehicular traffic damage by virtue of the rigid vertical web wall 30 and its protective overhanging canopy portion 31. With reference to Figures 3 and 9, for example, it will be appreciated that wall 30 is a substantial structure designed to withstand heavy traffic loads. Similarly the canopy portion 31 is a rugged structure formed with slightly downwardly sloping or arcuate top walls 47, 47 which are separated by and merged into the generally horizontal upper end surface 48 of the web wall 30 which lies co-planar with the upper surfaces 36, 36 of the side rails 35, 35. The underside of the canopy portion is distinguished by two downwardly angled convergent walls 49, 49 which intersect walls 47, 47 at their upper ends and slope downwardly to intersect the opposite sides of the web wall itself (see Figure 9). The opposite ends of the canopy walls 47 and 49 are formed to angularly intersect and merge with the opposite sides of wall 30.

Having set out the features of the upper side of the base casting 16 the underside thereof will now be described with particular reference to Figures 2, 3, 4, and 5 of the drawings. As shown best in Figures 2 and 3,

the side elevation of the underside of the cast base is generally arcuate, formed by a wide central arcuate portion 50 laterally flanked by two separated arcuate portions 51, 51 (see Figure 5). It is to be noted that portion 50 is formed at a larger arcuate radius than portions 51 and therefore extends vertically downwardly in an offset manner from portions 51, 51 (See Figure 3).

Projecting radially outwardly or operationally downward from the lateral margins of the central arcuate portion 50, substantially at the junction thereof with the laterally flanking portions 51, are a pair of generally arcuate shaped depending anchor rib members 55, 55 which have radially recessed or stepped end-portions 56, 56 along their bottom margins. Such rib members also are laterally arced in opposite directions to follow the curved margins 57 of body portion 50 with their stepped end portions 56 terminating well inwardly of ends 21 of the cast base (see Figure 5).

Located centrally of each of the ribs 55 and extending laterally thereof toward the opposite lateral sides of base 16 beneath rails 35, 35 is a semi-pyramidal shaped web 60 which helps to locate and center base 16 laterally in depression 45 and reinforces its adjacent ribs 55. Webs 60 also serves to disperse liquid adhesive upwardly over the sides 37 of the base when the latter is mounted in the pavement recess 45. A generally rectangular parallelepiped protrusion 61 is also formed adjacent the base of each of the ribs 55, but on the opposite sides thereof from the webs 60; the two protrusions 61, 61 so provided extending toward one another and partially across the crown of the central arcuate portion 50. Protrusions 61 serve to undersupport and reinforce the central arcuate portion 50 and the signal protective web wall 30 in operation, as well as to distribute liquid adhesive over the underside of base 16 when the later is mounted in a pavement recess 45.

Turning now to Figures 6-9, features of the signal assembly 17 follow. While a requisite light signal assembly may be produced by any of a number of conventional means, passive light reflectors capable of retro-reflecting light from the head lights of oncoming vehicles are preferred including air gap or potted structures in accordance with the herein illustrated embodiment.

As shown, each signal assembly 17 comprises a potted construction having an elongated molded plastic body 65 that is generally rectangular in front elevation and plan (see Figures 6 and 7), but which is substantially triangular in end elevation (see Figure 8). Consequently, body 65 has generally triangular end walls 66, 66 and an angularly sloping, rectangular, planar front wall 67 having a transversely extending horizontal top edge wall 68 and a vertical bottom edge wall 69. The end, front top and bottom walls are integrally formed to provide a transparent shell or casing open over its back and bottom sides as by casting or molding a suitable clear, hard plastic in the desired form. It is to be noted that the back face or underside of front wall 67 is further formed with a plurality of generally diamond or pyramidal shaped interstices 70 (see Figures 7 and 9), the surfaces of which are plated with reflective material such as chromium to provide light reflective faceted surfaces according to conventional practice. Potting material indicated at 72, such as sand filled epoxy or the like, capable of forming a hard generally rigid and solid interior support for the plastic shell body 65 is employed to fill the triangular or wedge-like interior and strengthen the same against compression loads (see Figure 9).

It will be recognized that planar top edge 68 of the front wall 67 and part of the solid interior filler support 72 are cut away intermediate the ends of assembly 17 at approximately right angles to the plane of front

wall 67 to provide a downwardly sloping surface portion 75 having angularly convergent end wall portions 76, 76 which mate with and are confronted respectively by the underside faces 49 and the angularly extending ends of the overhanging canopy 31. Thus when a signal assembly 17 is mounted on one of the mounting platforms 25 it is firmly interlocked with the canopy against vertical, horizontal and lateral movements.

In order to complete the installation of a light assembly with the cast base or body 16, pads or strips of butyl mastic are applied over the bottom and portions of the back wall of the signal assembly outboard of the canopy cut out portion 75; such mastic being indicated at 77 in Figures 1 and 9. If desired additional butyl mastic strips also may be applied over the end walls 66 as shown.

The butyl material is particularly characterized by very high tackiness, non-hardening, non-oxidizing, non-toxic properties. Mastic 77, of course, serves to strongly adhere the signal assembly to platform 26 of a socket 25 and to web wall 30 whereby the canopy portion 31 protectively overhangs a major medial portion of the upper end of the signal assembly, as shown best in Figure 9 of the drawings. In the event of damage to a signal assembly, such may be pried loose and removed from its mounting platform followed by replacement with a new assembly because of the non-hardening characteristics of the butyl mastic.

It will be understood that either one or two signal assemblies 17 may be mounted on the marker base, as selected, to provide either unidirectional or bidirectional retro-reflective signal activity for the marker as desired.

In general, a marker assembly in accordance with this invention provides several marked advantages over the prior art. In particular by interlocking the light signal assemblies with the base casting through the provision of

the canopy and the load resisting functioning of the web wall 30, each signal is locked in place both vertically and horizontally while the front to back movement thereof is substantially eliminated by virtue of wall 30 and the underlying mounting platform and mastic. It is to be noted in this regard that any impact with a passing vehicle tire tends to wedge the reflector assembly toward the web wall 30 thereby increasing the downward wedging action of the canopy. Additionally vertical loads are shielded from the light assemblies by virtue of the rigid canopy and rugged web wall 30. Direct vertical impact between the light assembly and a vehicle tire or a snow plow blade is prevented by the canopy particularly over the middle section thereof, while the top edge portions lying outboard of the canopy are purposely narrow and the spacing between such rails 35 is purposely less than the width of the vehicle tires so that tire contact of a light assembly is largely opposed and eliminated by the canopy and side rails of the marker body.

Although the heretofore described preferred embodiment of this invention specifies that the vertical web wall 30 with which the signal assembly or assemblies 17 are interlocked be formed integrally with the marker's cast base 16, it is fully contemplated that the web wall and its associated signal assemblies may be removably separate from base 16. In addition, although a specific signal assembly is hereinabove described air gap or other reflector structures are readily adaptable for the light reflective function of the assembly.

Due to the very low profile of the marker assembly of this invention minimal interference with snow plow blade and vehicle tire passage thereover is achieved.

Due to the square or rectangular configuration and overall rather shallow vertical dimensions of the cast base (approximately 1-1/2") the depression cut in the roadway is correspondingly small and shallow, creating

minimal disturbance of the roadway which affords simplified installation using a single depth cut by means of a gang of relatively small saw blades or uniform radius.

Because of the oppositely curved rib members 55 and related lateral protrusions and webs, improved resistance to longitudinal displacement of the installed marker is achieved as opposed to currently used anchor members which are straight or linear.

When installing a marker of this invention in the pavement recess, which is semi-filled with liquid epoxy or other suitable adhesive, the casting's bottom configuration, especially the protrusions and webs adjacent the rib members serve to evenly distribute the adhesive throughout the cavity and provide additional anti-displacement means once the adhesive is set.

Of added importance is the fact that the epoxy adhesive in filling the roadway depression 45, flows over the outer ends of the case base and partially over the outer ends of the ramp surfaces 23 as well as partially over the side rail surfaces 37. This serves to partially encapsulate the base casting and enhance retention thereof in the depression 45 in operation.

In view of the foregoing it is believed that those skilled in the art will appreciate that this invention represents a marked advancement over the prior art and will readily understand that while the same has been described herein and illustrated in association with a particular preferred embodiment, it is susceptible to variation, modification and substitution of equivalents without departing from the spirit and scope of the invention.

CLAIMS

1. A low-profile snow plowable, pavement marker for delineating roadway traffic lanes, comprising a unitary metal base of substantially square plan configuration adapted to be mounted and adhesively secured in a single shallow arcuate depression of single uniform radius formed in a roadway surface, said base having a generally arcuately formed underside distinguished by a pair of oppositely laterally curved and generally vertically depending arcuate rib members protruding downwardly from said underside, a pair of planar vision ramps recessed in the upper side of said base to extend angularly downwardly from adjacent opposite ends of said base toward the middle thereof, a pair of mounting platforms at the lower ends of said ramps presenting a pair of co-planar mounting surfaces, a vertically extending wall traversing said ramps and separating said ramps and mounting platforms, a pair of parallel elongated side rails having arcuate upper surfaces of uniform radius laterally flanking said ramps, platforms and vertical wall and forming opposite lateral sides of said base, and locators providing co-planar undersurfaces extending laterally outwardly of the said side rails for engaging the roadway surface whereby to vertically locate said base in said depression, said locators having arcuate upper surfaces which merge into and terminate in the upper surfaces of said rails.

2. The pavement marker of claim 1, including a light signal assembly mounted on at least one of said mounting platforms, adhesive means anchoring said assembly to said vertical wall and an associated mounting platform, each said signal assembly having a cutaway portion at the upper end thereof, and a canopy portion formed integral with said vertical wall to extend transversely outward thereof and protectively overhang the upper end of said signal assembly, said canopy portion having converging

undersurfaces which matingly engage and interlock with the cutaway portion of a said signal assembly whereby to substantially prevent displacement of said assembly.

3. The pavement marker of claim 2, wherein said vertical wall is integral with said side rails and said canopy portion extends partially along the upper end of said wall.

4. The pavement marker of claim 2 or 3, wherein the lateral spacing between said side rails and the extent of said canopy and wall cooperate to substantially prevent direct contact of said signal assembly by vehicle tires and snow plow equipment passing thereover.

5. The pavement marker of claim 2 or 3, wherein the upper side of said base is arcuate from front to back with the highest point of its arc occurring at and along its central transverse axis at the upper end of said canopy portion.

6. The pavement marker of claim 2, wherein said signal assembly comprises a planar transparent front wall extending across and angularly upwardly from adjacent the lower end of said vision ramp, said front wall having a plurality of light reflective facets along its underside for producing retro-reflective signals in the presence of light transmitted thereto along a related vision ramp.

7. The pavement marker of claim 1, 2 or 6, including web portions extending laterally from the outboard sides and additional protrusions extending from the inboard sides of said rib members for reinforcing said base and wall against vertical loads and for distributing liquid adhesive employed to anchor said base in said depression.

8. The pavement marker of claim 1, 2 or 6, wherein said underfaces of said locator means serve to position such base vertically in said roadway depression such that when the latter is semi-filled with liquid adhesive, the same is distributed over the underside of

said base and to the level of the roadway surface whereby to encapsulate the ends and sides of said base.

9. The pavement marker of claim 1, 2 or 6, wherein said vision ramps are located below the surface of said roadway pavement, and said rib members are operable to anchor said base firmly against longitudinal displacement when the same is adhesively secured in said depression.

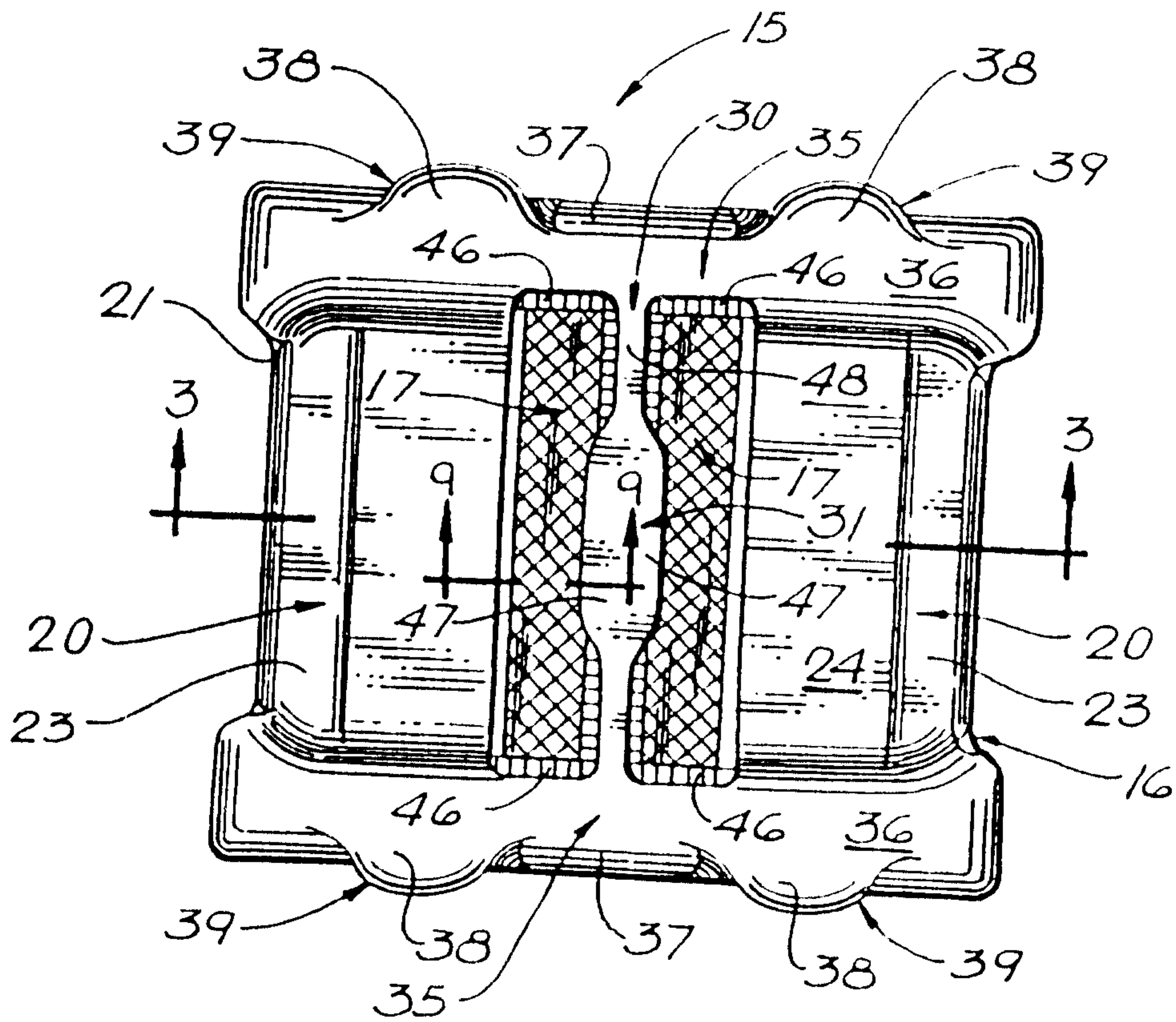


FIG. 1

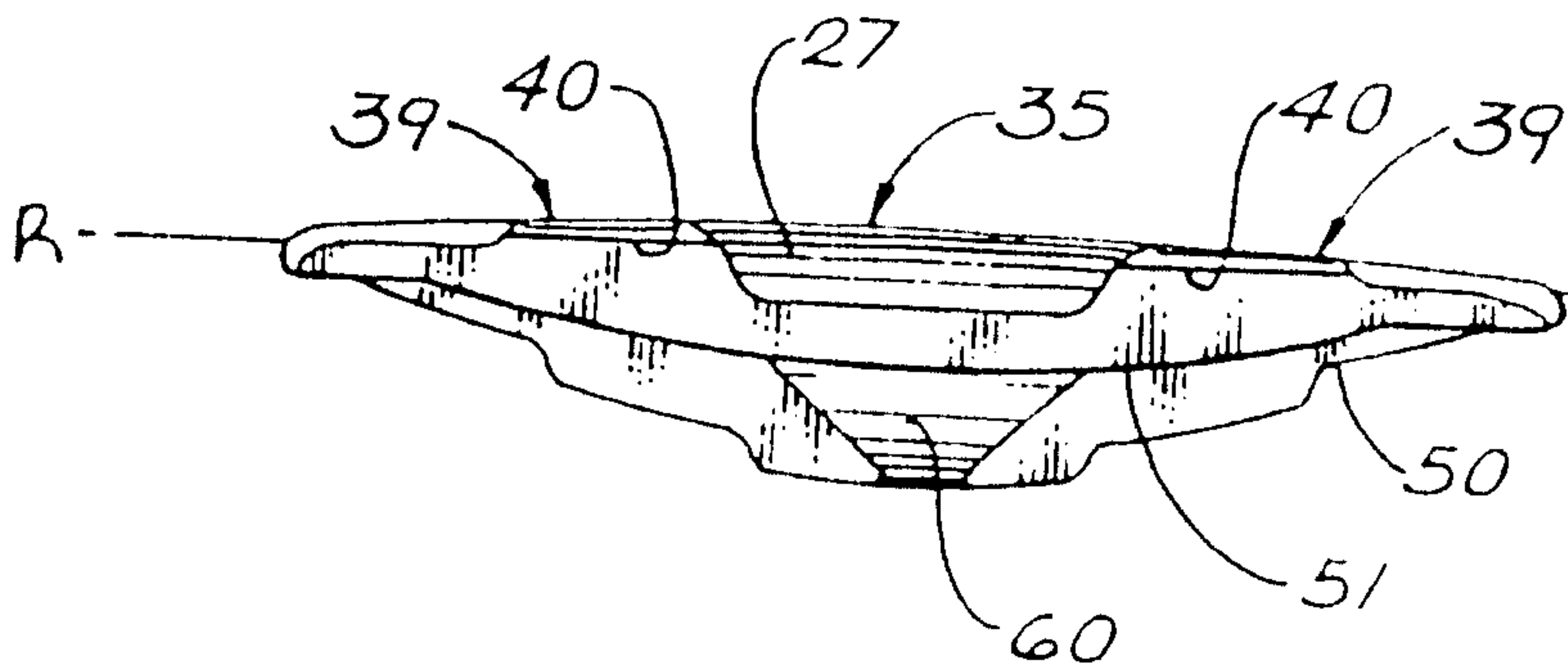


FIG. 2

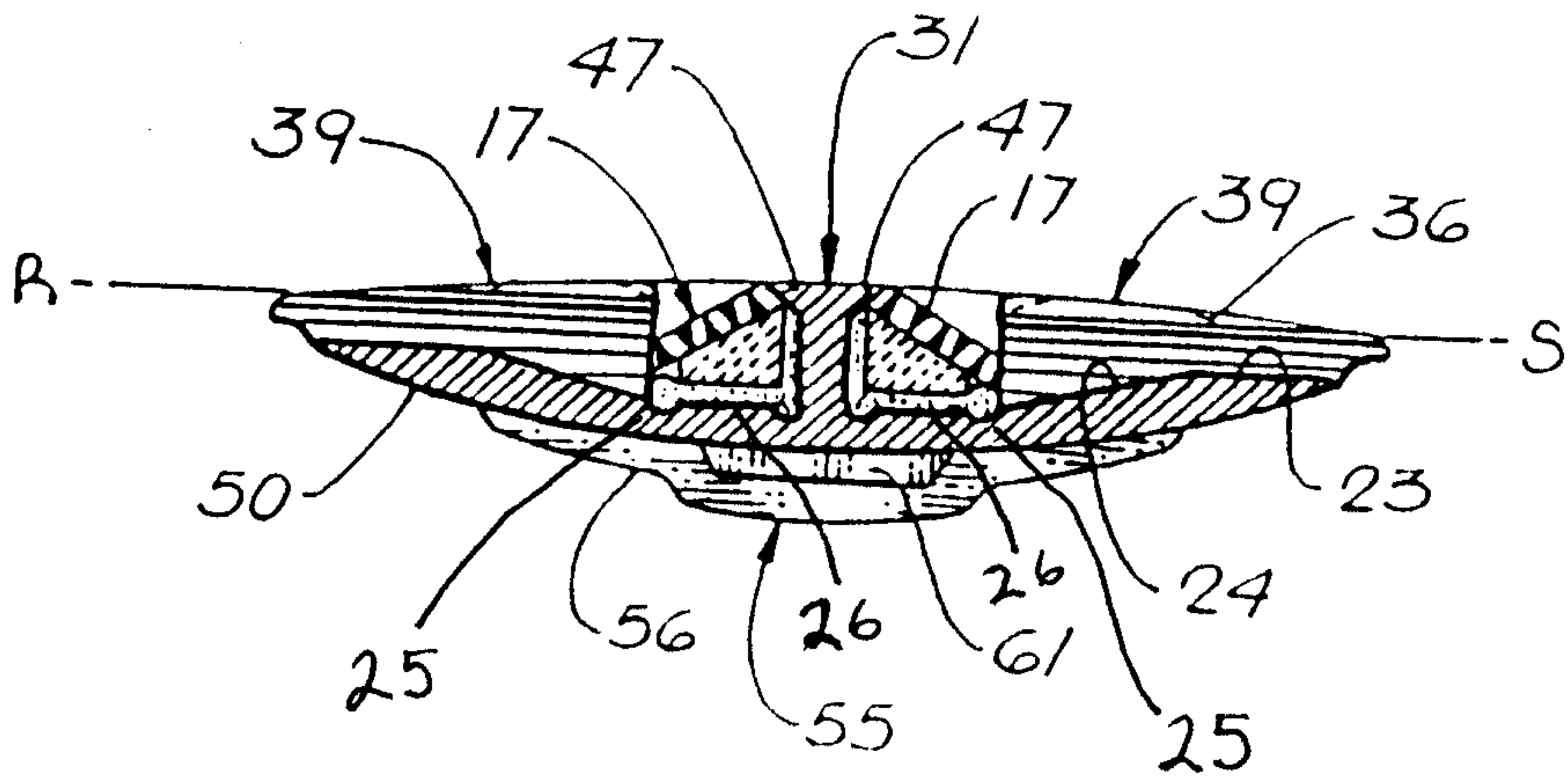


FIG. 3

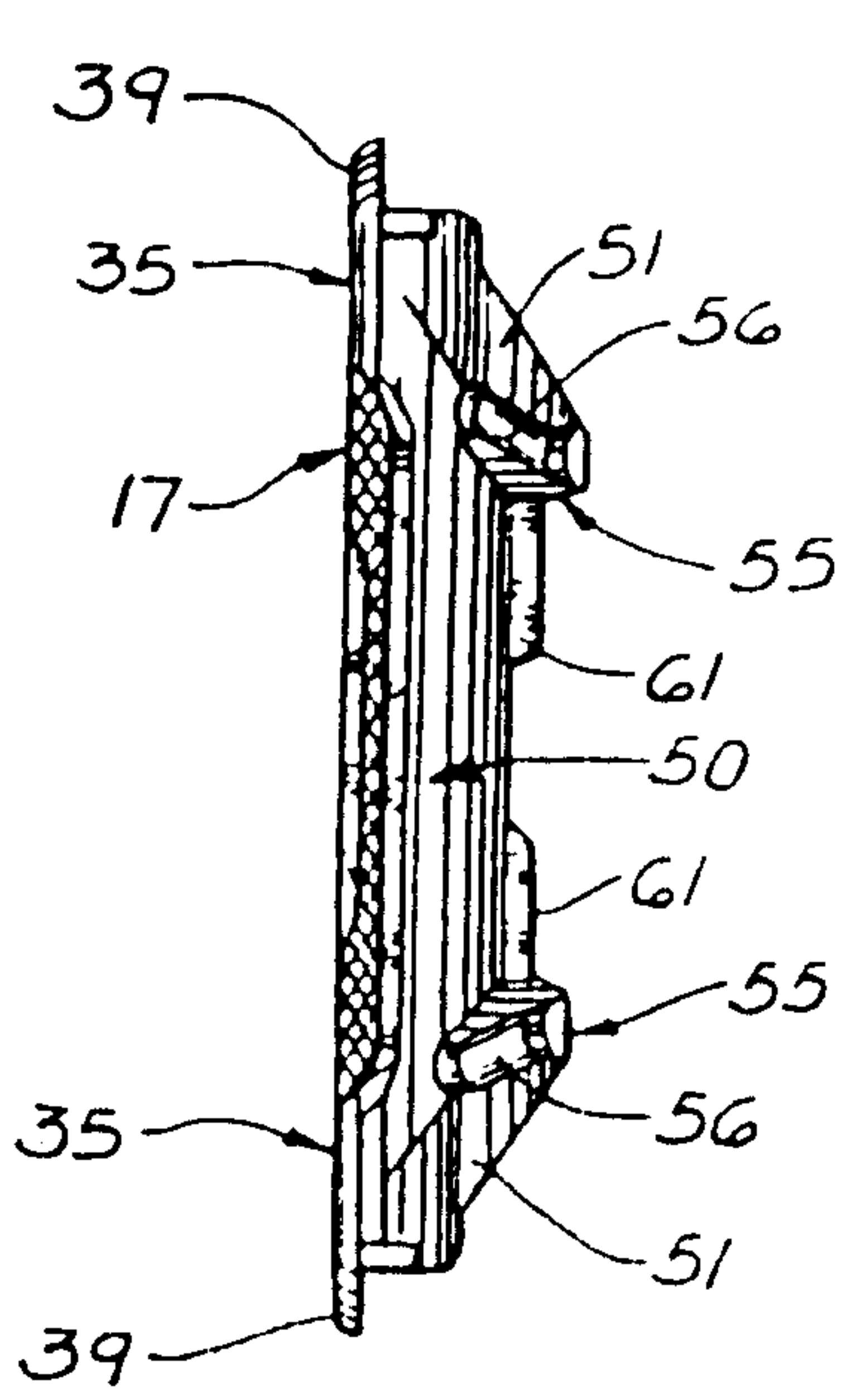


FIG. 4

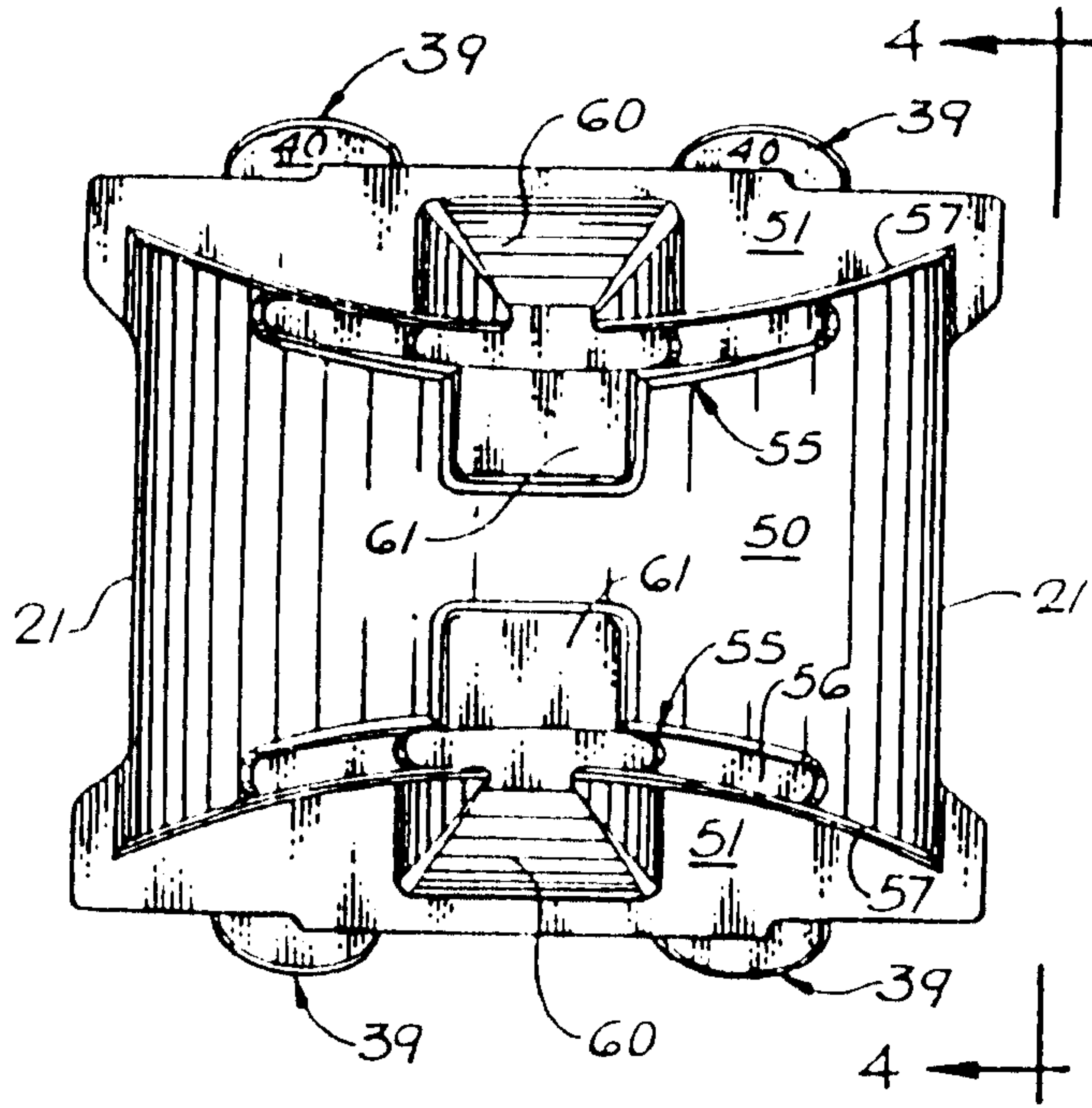


FIG. 5

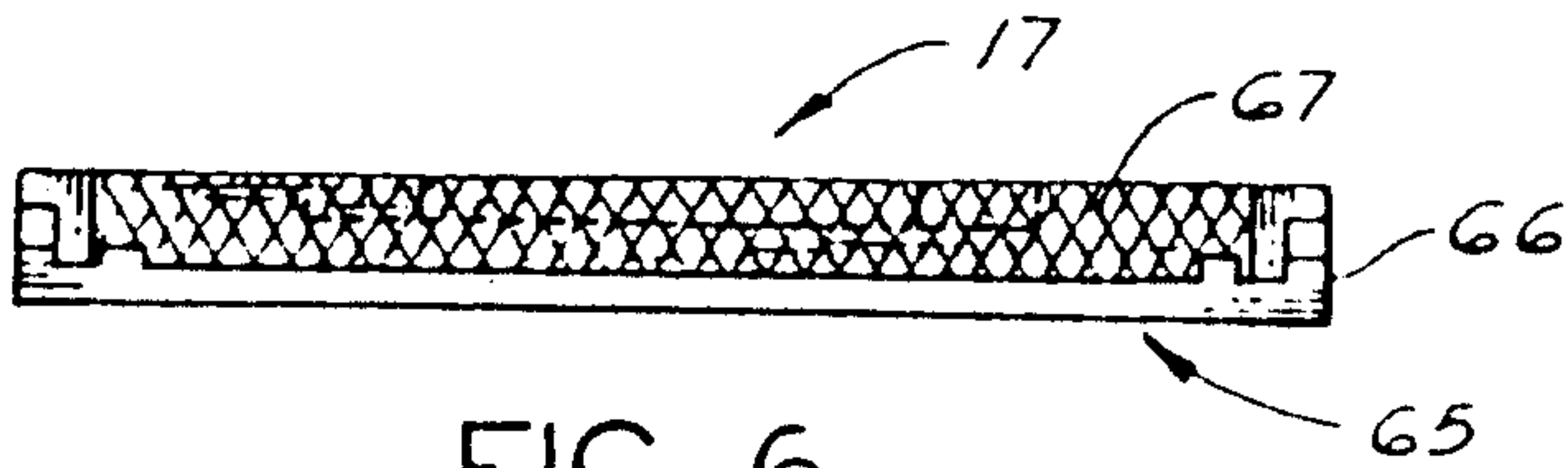


FIG. 6

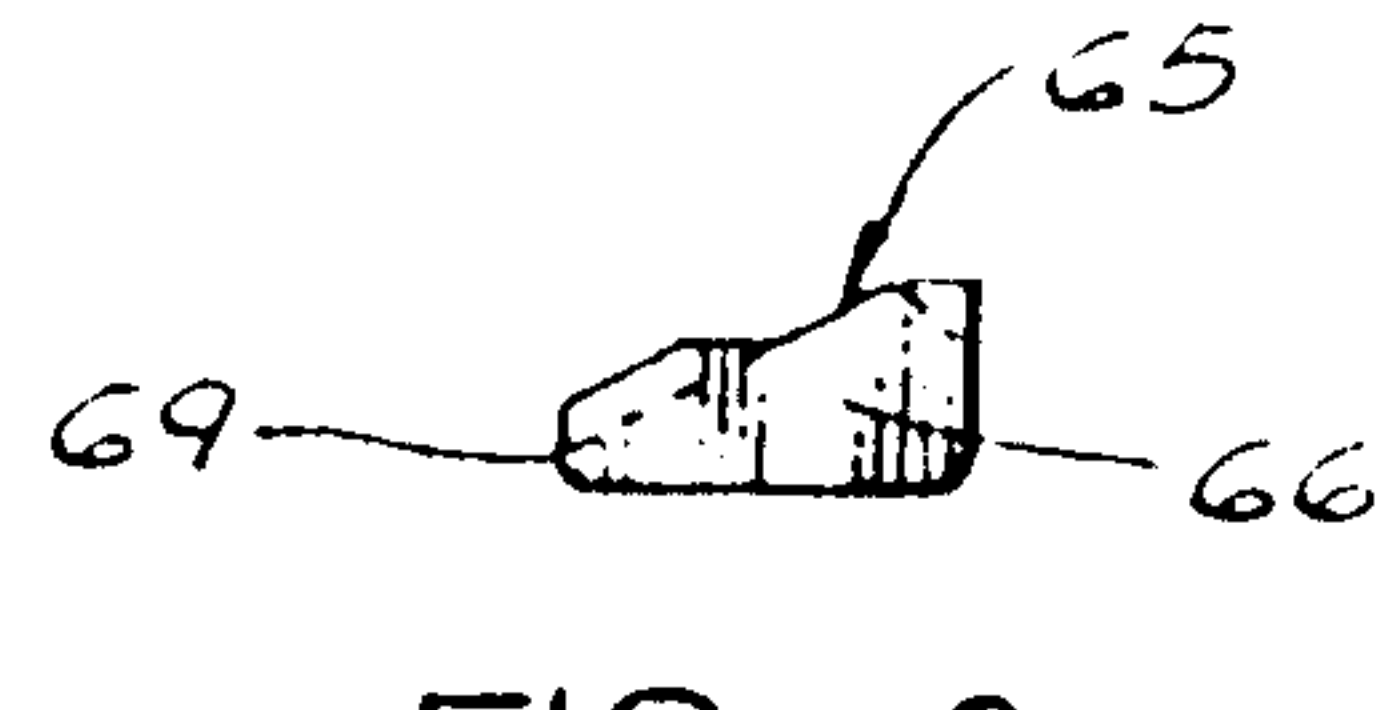


FIG. 8

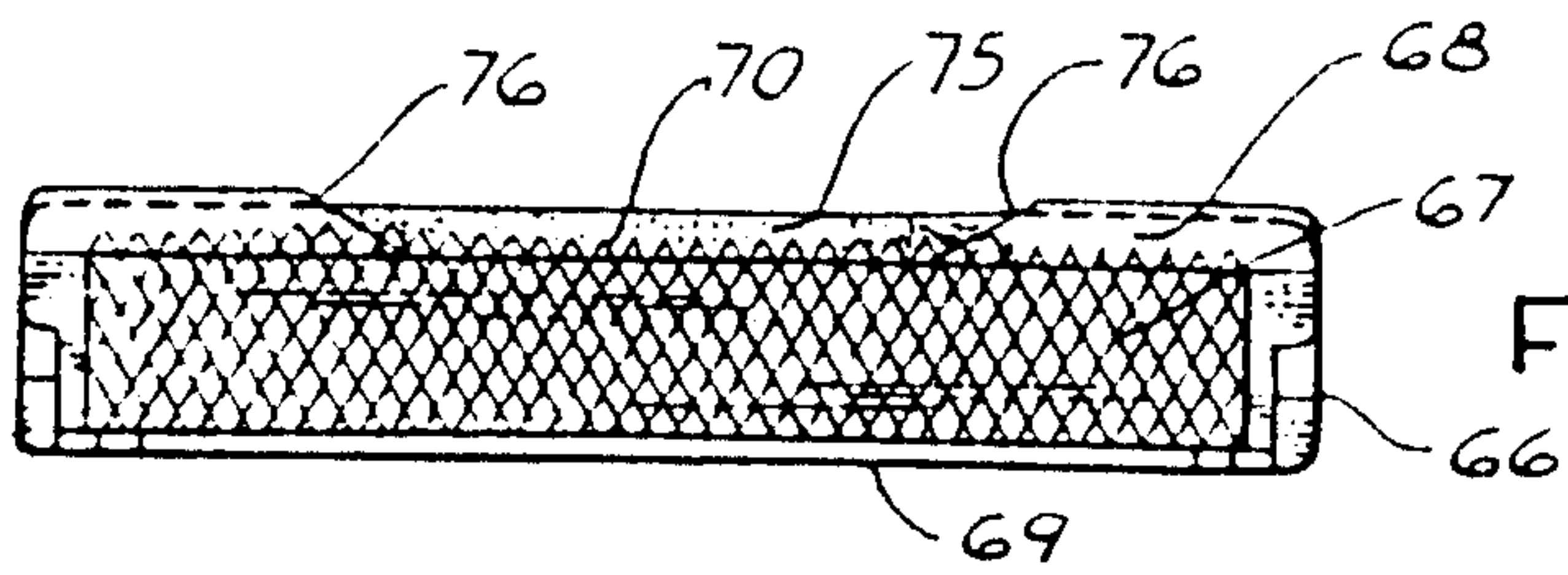


FIG. 7

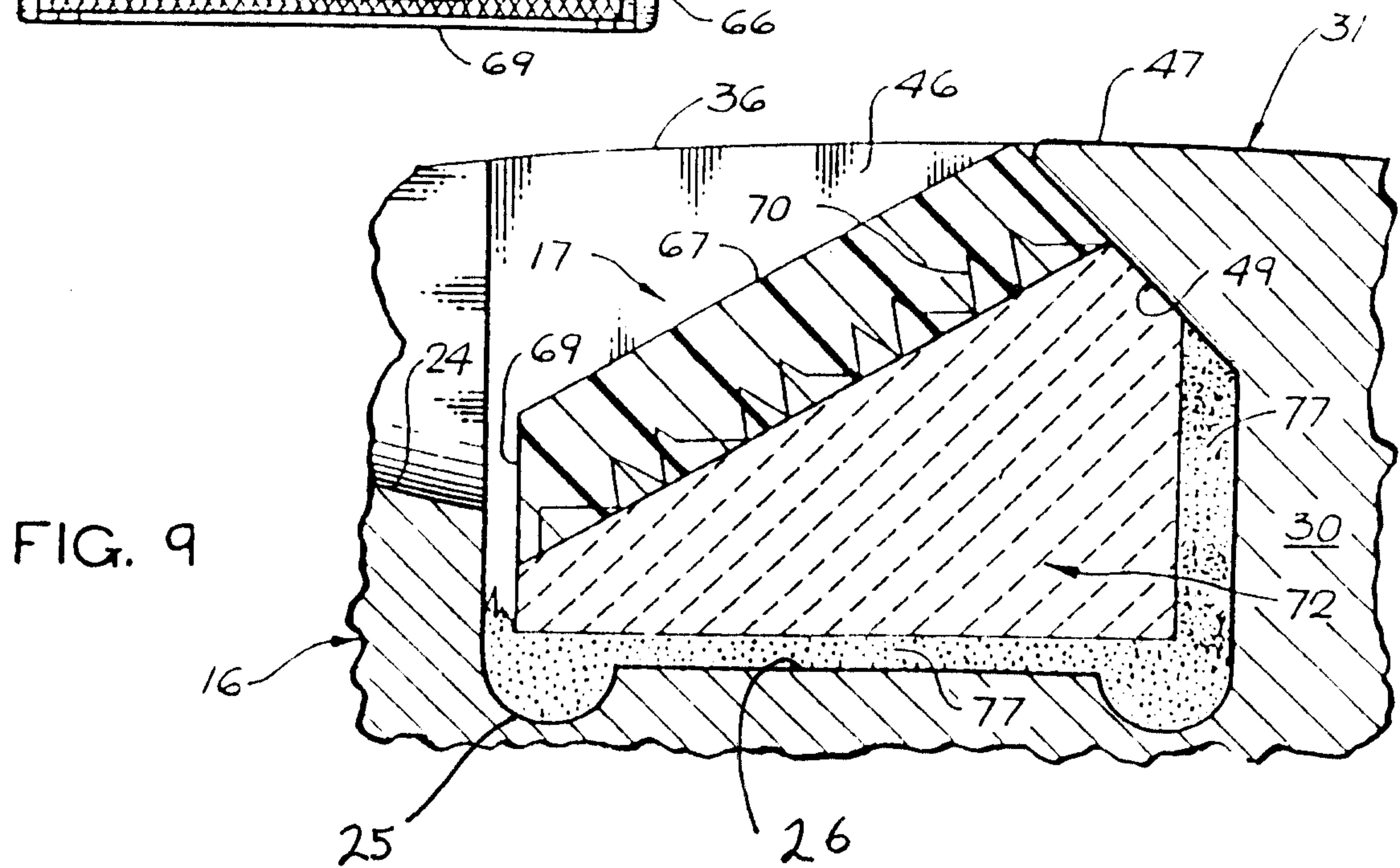


FIG. 9

