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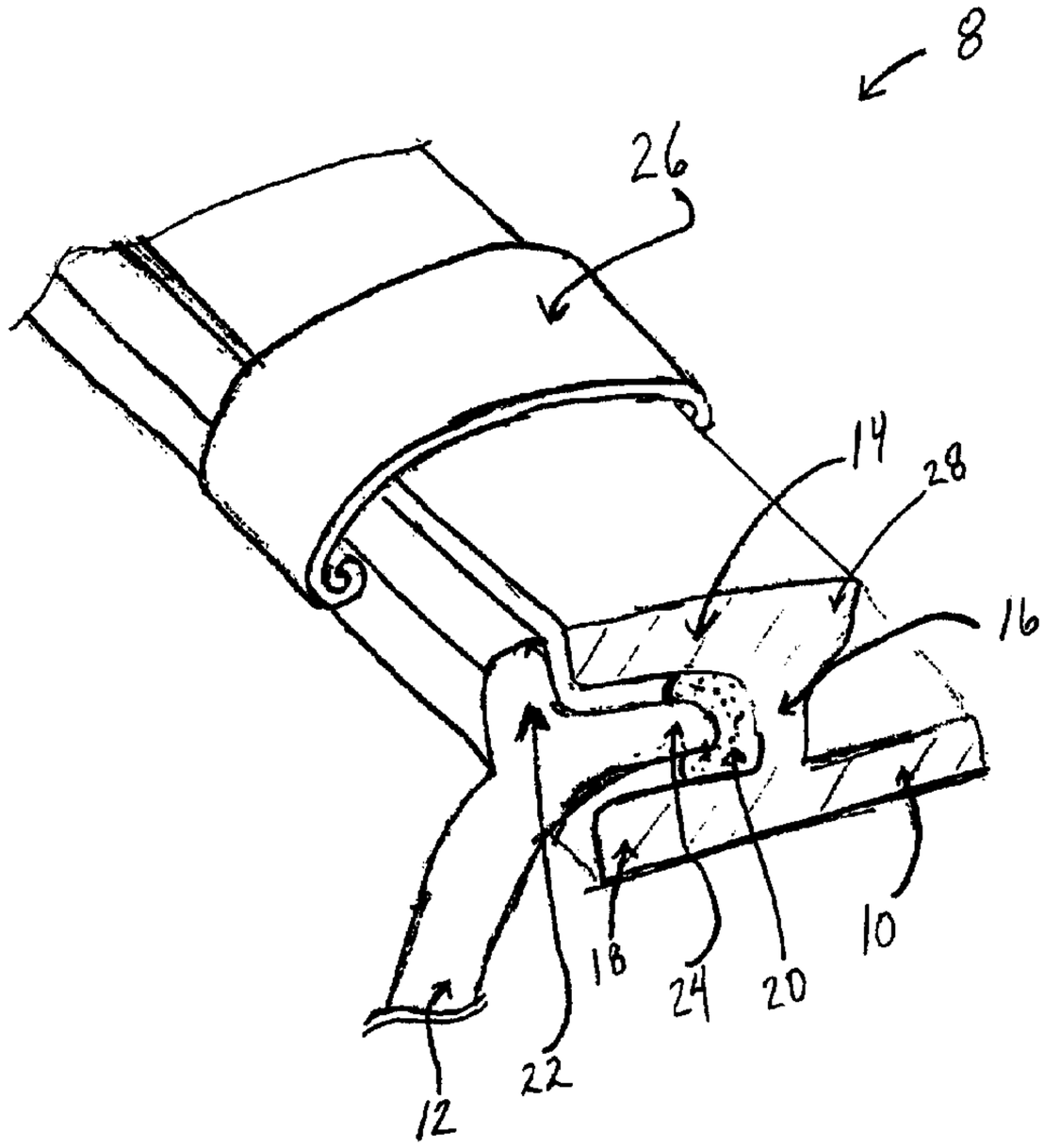


(57) Abrégé/Abstract:
A retention clip for a vehicle lamp assembly, such as the headlamp of an automobile, is provided. A lamp housing is joined to a lens or clear plastic cover through the use of the retention clip that is an integrated part of the housing. The lateral end of the retention clip pivots about an elastically deformable base of the retention clip. Under force, the lateral end of the retention clip will snap into a latch receptacle on the lens, thus holding the lens securely to the housing.

ABSTRACT

A retention clip for a vehicle lamp assembly, such as the headlamp of an automobile, is provided. A lamp housing is joined to a lens or clear plastic cover through the use of the retention clip that is an integrated part of the housing. The lateral end of the retention clip pivots about an elastically deformable base of the retention clip. Under force, the lateral end of the retention clip will snap into a latch receptacle on the lens, thus holding the lens securely to the housing.

INTEGRATED RETENTION CLIP FOR A VEHICLE LAMP ASSEMBLY

FIELD OF INVENTION

The present invention relates generally to a vehicle lamp assembly. More particularly, the present invention relates to a vehicle headlamp, which includes a lens that can be readily connected to a reflector housing by use of an integrated retention clip.

BACKGROUND

Commonly, a vehicular lamp body includes two primary parts: a housing and a lens. A lamp bulb is installed within the housing, which is lined with a reflective material and formed in a concave parabolic shape to direct light toward the lens. In turn, the lens can direct the light in a desired direction. The lens and housing are joined together to provide mechanical protection for the lamp bulb, and to properly direct and focus light emitted by the lamp bulb.

According to most current assembly methods, headlamp lenses are attached to the housing with adhesive or hot-melt and held in place with metal clips while the adhesive sets or is cured. The housing is usually formed with a housing groove and the lens has a lens tongue that fits within the housing groove. During manufacture, seal material is first placed in the housing groove. Immediately afterwards, the lens tongue is inserted into the housing groove. A metal clip is then placed over both a portion of the housing and a portion of the lens to hold the lens in place. In some cases, the metal clip is necessary only during the curing of the seal material. In other cases, however, the metal clips are retained in place to provide a constant mechanical force for holding the lens in place. Ordinarily, multiple metal clips are used on each lamp assembly. For example, in the

1995 Chrysler Cirrus, Model No. 938 200-01/02, four metal clips are used on each lamp assembly.

The use of the metal clips adds additional costs to the product, adds time to the assembly process and, in some cases, requires manual installation, which further increases labor costs and assembly time.

SUMMARY OF THE INVENTION

A vehicular lamp assembly and a method for its manufacture are provided. In an exemplary embodiment, an integrated retention clip for a vehicle lamp assembly is provided. The integrated retention clip includes a latch extending laterally from a housing of the vehicle lamp assembly, and a pivot point connecting the integrated retention clip to the vehicle lamp assembly. The integrated retention clip has a first position where the latch extends laterally from the housing and a second position where the latch is secured to a lens of the vehicle lamp assembly to hold the lens securely to the housing.

In another embodiment, a vehicle lamp assembly is provided. The assembly includes a lens that has a lens tongue and a latch, and a housing that has a housing groove that receives the lens tongue and an integrated retention clip. The integrated retention has a first position and a second position. In the second position, the integrated retention clip latches to the latch to secure the lens to the housing.

In still another embodiment, a method of assembling a vehicle lamp is provided. The method includes providing a housing that has a housing groove and an integrated retention clip extending laterally from the housing, and positioning a portion of a lens into the housing groove. The method further includes rotating the integrated retention clip towards a latch of the lens, and securing the integrated retention clip of the housing to the latch of the lens to secure the lens to the housing.

By integrating a clip feature into the lens and the housing, the costs incurred by using standard clips are lessened, and the time for installing the clips, and failure rate are greatly reduced. Installation only requires a simple rotation of the clip into a slotted opening on the lens. Moreover, all tooling can be completed in die pull or draw, which allows for a simple and less costly die tool.

In the exemplary embodiment, the retention clip is part of the housing and is constructed of the same continuous piece of material as the housing itself, such as plastic or resin. Likewise, the integrated latch element of the lens is constructed of the same continuous piece of material as the lens itself. The construction method for both the lens and the housing can be through an injection molding process that injects plastic or resin into space between two sections of tooling. After the housing and lens are formed, they are joined together by inserting an adhesive into a groove of the housing and subsequently inserting the tongue of the lens into the groove and into the adhesive material. The lens-housing combination is then held together by deflecting the latching mechanism of the housing toward the lens until the latch has snapped into place.

These as well as other features and advantages will become apparent to those of ordinary skill in the art by reading the following detailed description, with appropriate reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Exemplary embodiments of the present invention are described herein with reference to the drawings, in which:

Figure 1 is a plan view of one embodiment of a lamp assembly;

Figure 2 is a side view of the lamp housing of Figure 1;

Figure 3A is a sectional view of one embodiment of a vehicle lamp assembly with an integrated retention clip;

Figure 3B is a three-dimensional view of the vehicle lamp assembly of Figure 3A;

Figure 3C illustrates one embodiment of a lens latch of the vehicle lamp assembly of Figure 3A;

Figure 4 is a sectional view of one embodiment of a die layout used to manufacture a lens portion of the vehicle lamp assembly;

Figure 5 is a sectional view of one embodiment of a die layout used to manufacture a housing and an integrated retention clip of the vehicle lamp assembly; and

Figure 6 is a sectional view of another embodiment of a vehicle lamp assembly with an integrated retention clip.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

In an exemplary embodiment, a vehicular lamp assembly and a method for its manufacture are provided. The lamp assembly includes a lens, a housing, and an integrated latching mechanism for attaching the lens to the housing. Installation of the lens simply requires a rotation of the latching mechanism into a slotted opening. By integrating a clip feature into the lens and housing, the costs incurred by using standard metal clips are reduced, and the time for installing the clips, and failure rate are also reduced. Moreover, all tooling can be completed in die pull or draw, which allows for a less costly die tool.

Referring now to the figures, and more particularly to Figure 1, a plan view of one embodiment of a lamp assembly 8 is illustrated. It should be understood that the lamp assembly 8 illustrated in Figure 1 and other arrangements described herein are set forth for purposes of example only, and other arrangements and elements can be used instead and some elements may be omitted altogether, depending on manufacturing and/or consumer preferences.

By way of example, the lamp assembly 8 includes a housing 10 and a lens 12. The housing 12 is formed with a housing groove. The housing groove is defined by space between a lateral groove wall 14, a medial groove wall 16, and a bottom groove wall 18. The lens 12 is connected to the housing 10 and held in place by a seal material 20. The lens 12 has a lens flange 22 that abuts the lateral groove wall 14 and a lens tongue 24 that fits within the housing groove.

Figure 2 illustrates a side view of the lamp housing 8. During manufacture, the seal material 20 is first placed in the housing groove. Next, the lens tongue 24 is inserted into the housing groove. A metal clip 26 is then placed over both a housing flange 28 and the lens flange 22 to hold the housing 10 and lens 12 in place. In some cases, the metal

clip 26 is necessary only during the curing of the seal material 20. In other cases, however, the metal clip 26 is retained in place to provide a constant mechanical force for holding the housing 10 and lens 12 in place.

As illustrated in Figures 1 and 2, the metal clip 26 is a separate component attached to the housing 10 and the lens 12 after arranging the housing 10 and lens 12 together. In an exemplary embodiment, the metal clip 26, or a similar latching mechanism, is integrated with the housing 10.

Figure 3A is a sectional view of one embodiment of a vehicle lamp assembly 30 with an integrated retention clip 40. The vehicle lamp assembly 30 includes a housing 32 and a lens 50. The housing 32 includes a lateral wall 34, a medial wall 36, and a bottom wall 38. The housing further includes a retention clip 40 connected to housing via a retention clip base 42. The retention clip 40 comprises a retention clip body 44, a retention clip latch 46, and a retention clip stopper 48. The lens 50 includes a lens tongue 52, a lens stopper 54, and a lens latch 56.

The vehicle lamp assembly 30 is constructed as follows. An adhesive 58 is placed in a housing groove defined by the lateral wall 34, the medial wall 36, and the bottom wall 38. Subsequently, the lens tongue 52 of the lens 50 is inserted between the lateral wall 34 and the bottom wall 38 of the housing 32. The adhesive 58 forms a seal between the housing 32 and the lens tongue 52. The retention clip 40, which is an integral part of the housing 32 and is made in the same injection molding process as the housing 32 itself, is shown in a first position by solid lines. After the lens tongue 52 is placed into the adhesive 58 in the housing 32, the retention clip 40 is rotated to a second position as shown by arrow A. The second position is shown in Figure 3A by dashed lines. The rotation is facilitated by the retention clip base 42, which allows the retention clip 40 to pivot about the retention clip base 42.

A force applied to the retention clip 40 causes the pivoting process to take place. The force applied to the retention clip 40 also causes the retention clip 40 to latch in place against the lens 50 in its second position. A latching mechanism, defined by the retention clip latch 46 and the lens latch 56, is also triggered by the force on the retention clip 40. The force on the retention clip 40 causes the retention clip latch 46 to slip or snap under the lens latch 56. The retention clip stopper 48 will abut the lens stopper 54 once the retention clip 40 has snapped in place. The latching mechanism can hold the housing 32 and the lens 50 in place and serves as a securing means to insure that the lens 50 and the housing 32 remain attached together.

Once the retention clip latch 46 is under the lens latch 56, the retention clip 40 is held securely in place. In one embodiment, both the retention clip latch 46 and the lens latch 56 have a curved or slanted side to facilitate snapping the retention clip 40 in place as the retention clip 40 is forced from its first position to its second position. Both the retention clip latch 46 and the lens latch 56 may also have flat surfaces for holding the retention clip 40 in place after achieving the second position.

The force applied to the retention clip 40 is applied to the retention clip body 44. The retention clip stopper 48 and the lens stopper 54 are also employed to sturdy the joint between the housing 32 and the lens 50. The retention clip stopper 48 and the lens stopper 54 can be created in the same injection molding process as the housing 32 and lens 50 respectively.

In one embodiment, the lens latch 56 is a protrusion from the lens 50 with a slotted opening that allows the retention clip latch 46 to snap into place. The latching mechanism as defined by the lens latch 56 and retention clip latch 46 may take a form other than that illustrated in Figure 3A. For example, instead of having the curved edge of the retention clip latch 46 extend laterally, it could extend in other directions. In that

case, the direction of the lens latch 56 would also be altered. In addition, the lens latch 56 could be combined with the lens stopper 54 into a single protrusion. In another embodiment, the integrated retention clip 40 could have two retention clip latches that extend outward on either side of the integrated retention clip. In this embodiment, there would also be two corresponding lens latches to attach the integrated retention clip to the lens.

In Figure 3A, the distances marked **a**, and **a′**, are as follows. In one embodiment, the foot or base, **a**, of the retention clip latch 46 measures in length approximately 3.5 mm and the length of the lens engagement base, **a′**, located between the lens latch 56 and the lens stopper 54 is approximately 3.2 mm. The actual distance of either feature, **a**, **a′**, is not crucial. However, the lens engagement base **a′** may be slightly smaller than the foot of the retention clip **a**, to allow the lens latch 56 to pass through the lens engagement base **a′** with slight interference, and subsequently to lock in place. In other words, the distances **a** and **a′** may be such that some elastic deformation can occur to allow the retention clip latch 46 to pass into its locked position. However, The distances **a** and **a′** should not be so small that the retention clip 40 would be prevented from passing through the gap **a′**. In one embodiment, an edge of the lens latch 56 is rounded to assist the snapping of the retention clip 40 as it passes through the opening.

Figure 3B illustrates a three-dimensional view of the vehicle lamp assembly 30 with the integrated retention clip 40. As shown, the retention clip 40 is of the same width as the lens latch 56. However, the retention clip 40 may be narrower to create a more sleek design. Figure 3C illustrates one embodiment of the lens latch 56 in detail. The lens latch 56 comprises a top 60 and two legs 62, 64. The height of the legs 62, 64 can be

made to match the thickness of the retention clip latch 46 so that the retention clip latch 46 fits snugly underneath the top 60 and between the legs 62, 64.

The housing 32 of the vehicle lamp assembly 30 may also have a means to attach to a body of a vehicle and a means for attaching to a light bulb. A reflective lining may be on the inner surface of the housing 32 to reflect light rays emitted from a light bulb, and can be formed by aluminum vapor deposition or by other means. While the housing 32 may comprise opaque plastic, the lens 50 should be translucent to allow light to pass through its wall.

The vehicle lamp assembly 30 may be employed within a headlight of an automobile. In addition, the vehicle lamp assembly 30 may be used within other automotive lamps. Furthermore, the retention clip 40 assembly can be employed within other lighting assemblies to assist in manufacturing lighting housings.

In one embodiment, the retention clip 40 is made of a flexible resin and is elastically deformed by the pivoting process when the retention clip 40 is moved from its first position to its second position. The housing 32 and the lens 50 can be made of a synthetic resin in a plastic injection molding process that pushes melted plastic or resin into a mold under high pressure. Once the plastic has been injected into the mold, the plastic quickly cools and hardens. The hardened plastic is then removed from the mold by opening the mold and ejecting the plastic piece. The mold, commonly referred to as tooling or dies, are two halves and are usually constructed of steel, but can be made of other materials such as aluminum. Steel is preferred for its durability. The tooling is constructed such that joining the two halves together forms an empty space in the form of the part. Each half of the mold is placed inside the injection-molding machine and clamped together. Plastic is then injected into the mold through runners that serve to

move the plastic out to all sections of the mold. When the plastic is sufficiently cooled, it is ejected by opening the molds.

Figure 4 illustrates a die layout according to one embodiment of manufacturing the lens 50. The crosshatched areas represent a core 66 and a cavity 68 of the lens tool. The space remaining between the core 66 and cavity 68 of the lens tooling forms a shape of the lens 50. The core 66 and the cavity 68 are designed so that they can be easily removed by separating the dies. The core 66 has a thin blade of steel protruding into the cavity 68 of the tool, which has a void of similar proportions and forms the lens latch 56. When filled with polyurethane or other thermal plastics, the dye layout forms the lens 50 and its associated parts, e.g., lens latch 56 and lens stopper 54. The front of the blade from the core 66 forms the front half of the lens stopper 54, and a notch in the cavity 68 forms the rear and top of the lens stopper 54.

Figure 5 illustrates a die layout according to one embodiment of manufacturing the housing 32. The crosshatched areas represent a core 70 and cavity 72 of the housing tool. The core 70 and the cavity 72 have adjoining protrusions and voids. When filled with material such as polyurethane, or other thermal plastics these protrusions and voids form the housing 32 and its associated retention clip 40. The core 70 and the cavity 72 of the housing tooling are designed so that they can be easily removed by separating the dies. The integrated retention clip 40 is shown in its original state by the solid outline. Figure 5 illustrates the integrated retention clip 40 in its "locked" position by a dashed line. The material at the integrated retention clip base 42 is thin to allow the retention clip 40 to pivot. When the retention clip 40 pivots, the retention clip base 42 elastically deforms. In one embodiment, the retention clip base 42 has a thickness of approximately between about 0.4 mm and about 0.5 mm. This small width allows for more flexibility and the retention clip 40 may be referred to as a "living hinge."

When the retention clip 40 is pivoted around it's living hinge to connect with the engagement feature of the lens 52, the filleted end of the retention clip 40 will interfere with the top of the lens latch 56, causing the retention clip 40 to elastically deform. Further pressure on the retention clip 40 will cause the retention clip 40 to snap into its locking position.

In one embodiment, the lens stopper 54 provides a stop feature to prevent the retention clip 40 from sliding out of its locked position. In another embodiment, there is no lens stopper. In that case, the distances a and a′ are no longer applicable. Instead, the design should be such that the end of the retention clip latch 46 extends past an opposing edge of the lens latch 56.

Figure 6 is a sectional view of another embodiment of a vehicle lamp assembly 80 with an integrated retention clip 86. The vehicle lamp assembly 80 includes a housing 82 and a lens 84. The housing 82 includes a retention clip 86 that comprises a clip stopper 90 and a clip latch 88. The lens 84 includes a lens latch 92. In Figure 6, the retention clip 86 is in a first position, illustrated using solid lines, and can be pivoted to a second position, illustrated by dotted lines.

The general assembly of the vehicle lamp assembly is as follows. An adhesive 94 is inserted into a cavity 96 of the housing 82. The adhesive 94 may be hot melt or a silicone material. The lens 84 is then secured to the housing 82 by placing a pre-molded flange 98 (tongue) of the lens 84 into the cavity 96 of the housing 82. The retention clip 86 is then pivoted from its first position to its second position. In the second position, the clip latch 88 snaps over the lens latch 92, and the clip stopper 90 abuts the flange 98 of the lens 84. The assembly of the housing 82 and the lens 84 is then held together by the retention clip 86 and lens latch 92.

In addition, one or more light bulbs can then be inserted into a back of the housing 82 and attached to a reflector by either a key-in feature pre-molded into the reflector or by using screws to attach them separately to the housing 82. The completed headlamp assembly is then attached to complementary features on a vehicle using screws or clips. The assembly of other lamp assemblies of the vehicle are similar. For example, tail lights or lateral lights can be made in a similar fashion.

Other arrangements of the vehicle lamp assembly are also possible. The retention clip and associated lens latch can be configured in a number of ways. While exemplary embodiments have been described, persons of skill in the art will appreciate that variations may be made without departure from the scope and spirit of the invention. This true scope and spirit is defined by the appended claims, which may be interpreted in light of the foregoing.

CLAIMS

What is claimed is:

1. An integrated retention clip for a vehicle lamp assembly, the integrated retention clip comprising:

a latch extending laterally from a housing of the vehicle lamp assembly; and

a pivot point connecting the integrated retention clip to the vehicle lamp assembly,

wherein the integrated retention clip has a first position where the latch extends laterally from the housing and a second position where the latch is secured to a lens of the vehicle lamp assembly to hold the lens securely to the housing.

2. The invention claim 1, wherein the latch is manufactured in the same die as the housing.

3. The invention of claim 1, wherein the retention clip is moved from the first position to the second position by applying a force to the latch.

4. The invention of claim 1, wherein the pivot point allows for rotation of the latch about the housing.

5. The invention of claim 1, wherein in the second position, the latch snaps over a lens latch to secure the lens to the housing.

6. The invention of claim 1, wherein in the second position, the latch snaps under a lens latch to secure the lens to the housing.

7. The invention of claim 1, further comprising a retention clip stopper positioned adjacent the latch, wherein when the retention clip is in the second position, the retention clip stopper abuts the housing.

8. A vehicle lamp assembly comprising:

a lens having a lens tongue and a latch; and

a housing having a housing groove for receiving the lens tongue and an integrated retention clip, the integrated retention having a first position and a second position, wherein in the second position the integrated retention clip latches to the latch to secure the lens to the housing.

9. The invention of claim 8, wherein the integrated retention clip and the housing are constructed of one continuous piece of plastic.

10. The invention of claim 8, wherein the integrated retention clip is coupled to the housing through an elastically deformable hinge section, wherein the integrated retention clip pivots at the elastically deformable hinge section to latch to the latch.

11. The invention of claim 8, wherein the latch of the lens is a protrusion from the lens with a slotted opening that allows the integrated retention clip to snap into place.

12. The invention of claim 8, wherein after the lens tongue is received by the housing groove, the integrated retention clip is moved from the first position to the second position to mechanically attach the lens to the housing.

13. The invention of claim 8, wherein in the second position, the integrated retention clip snaps over the latch of the lens.

14. The invention of claim 8, wherein in the second position, the integrated retention clip snaps under the latch of the lens.

15. The invention of claim 8, wherein the housing and the integrated retention clip are manufactured in a single injection molding process.

16. The invention of claim 8, wherein the integrated retention clip extends laterally from the housing in the first position.

17. The invention of claim 8, wherein the integrated retention clip comprises a stopper for preventing separation of the lens and the housing.

18. The invention of claim 8, wherein the lens includes a lens stopper for preventing separation of the lens and the housing.

19. The invention of claim 8, further comprising more than one integrated retention clip incorporated within the housing to secure the lens to the housing.

20. The invention of claim 8, wherein the vehicle lamp assembly is an assembly selected from the group consisting of a headlight assembly of an automobile, a tail light assembly of an automobile, and a lateral light assembly of an automobile.

21. A method of assembling a vehicle lamp comprising:

providing a housing having a housing groove and an integrated retention clip extending laterally from the housing;

positioning a portion of a lens into the housing groove;

rotating the integrated retention clip towards a latch of the lens; and

securing the integrated retention clip of the housing to the latch of the lens to secure the lens to the housing.

22. The method of claim 21, wherein rotating the integrated retention clip comprises pivoting a lateral end of the integrated retention clip medially towards the lens.

23. The method of claim 21, wherein rotating the integrated retention clip comprises applying a force to the integrated retention clip sufficient to cause the integrated retention clip to move toward the latch of the lens.

24. The method of claim 21, further comprising placing a layer of adhesive into the housing groove before positioning the portion of the lens into the housing groove.

FIG. 1

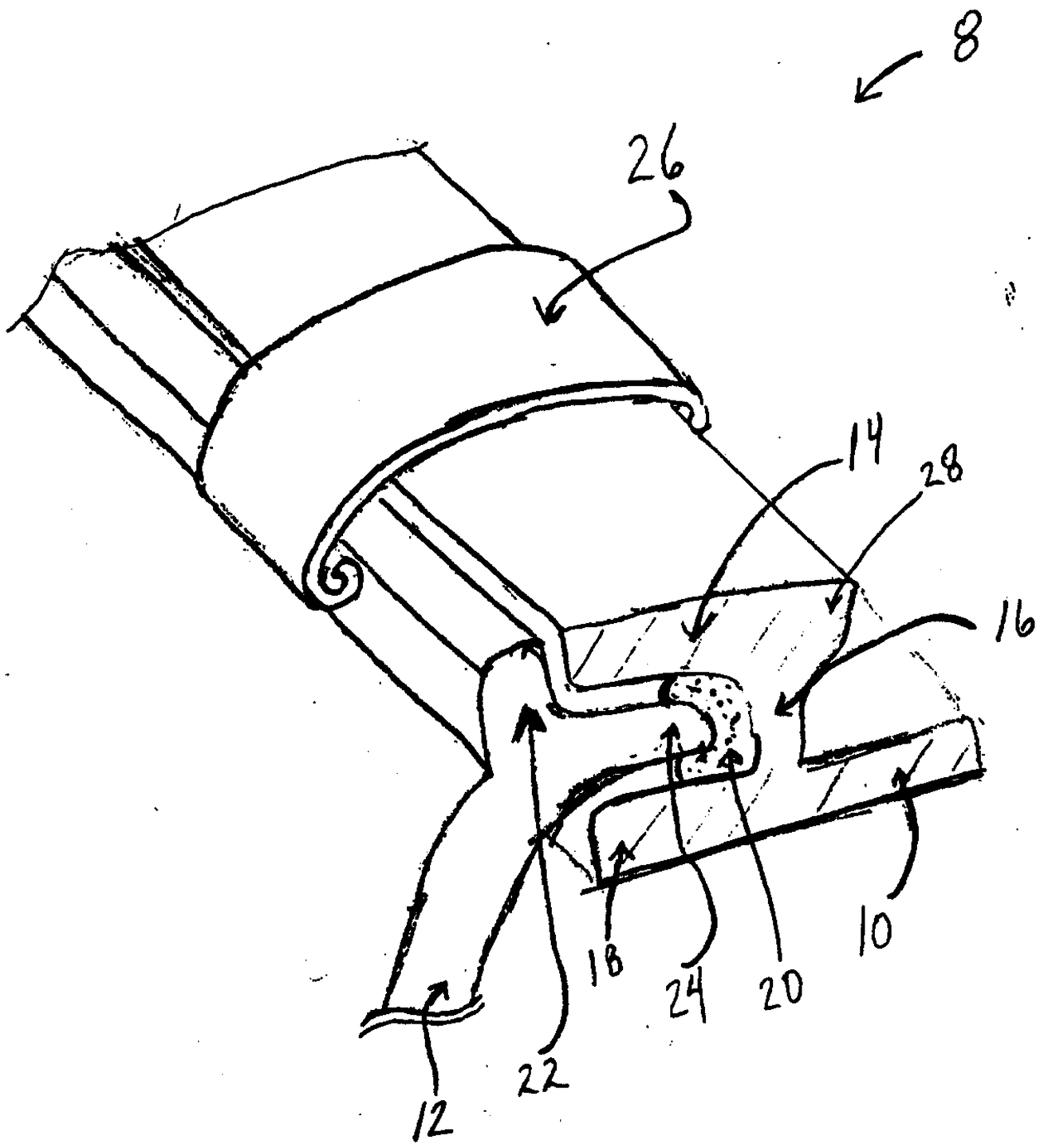
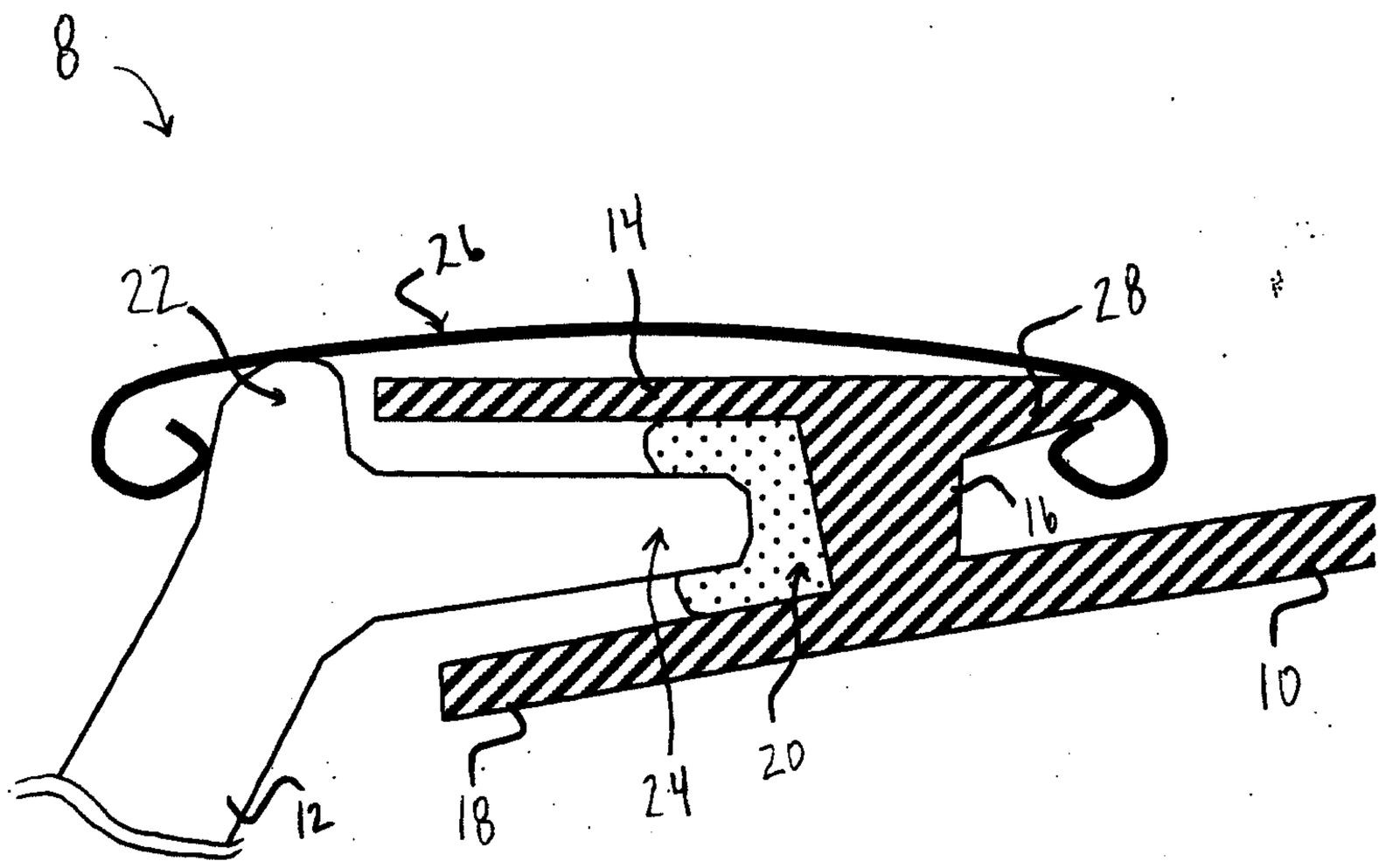


FIG. 2



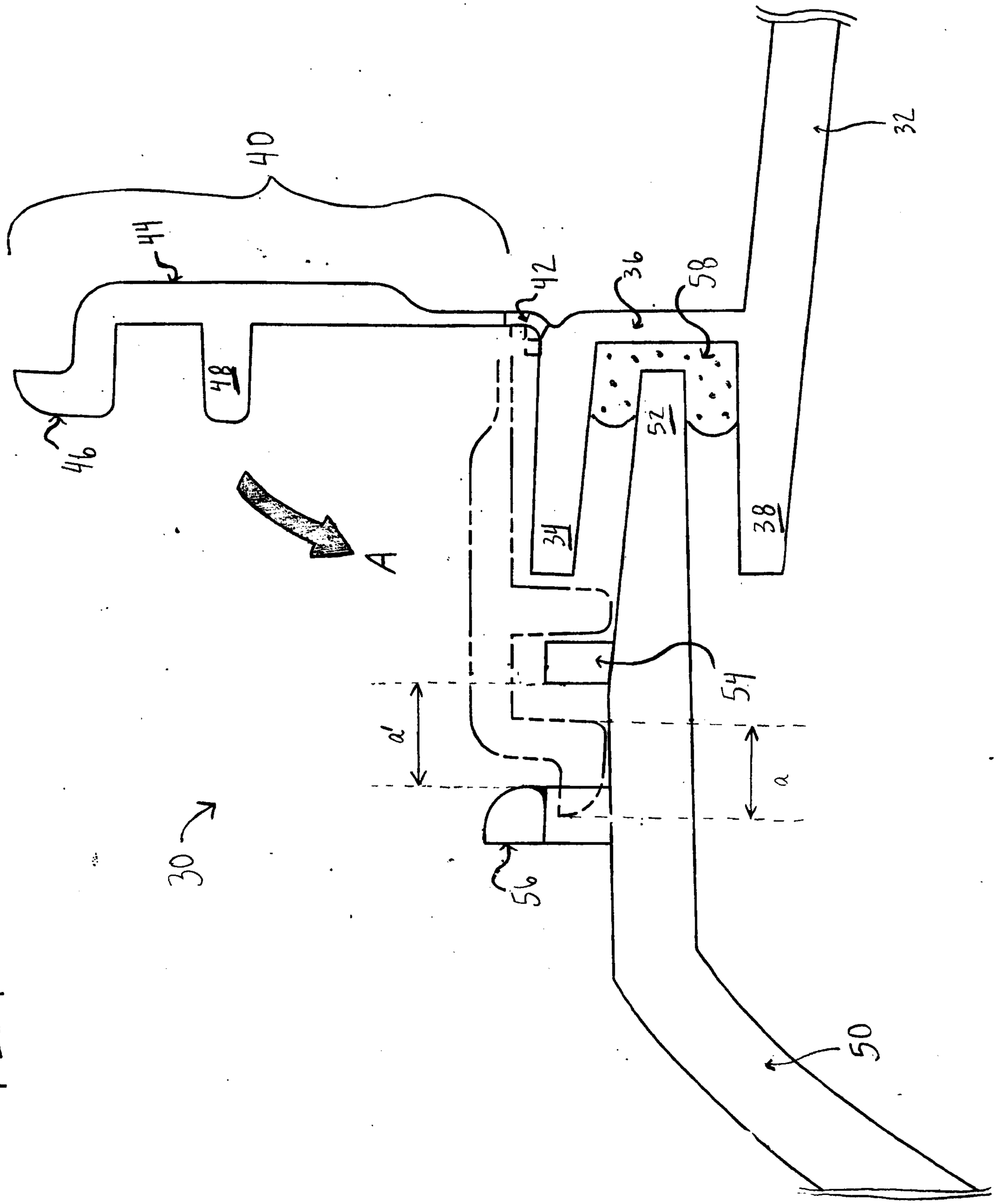


FIG. 3A

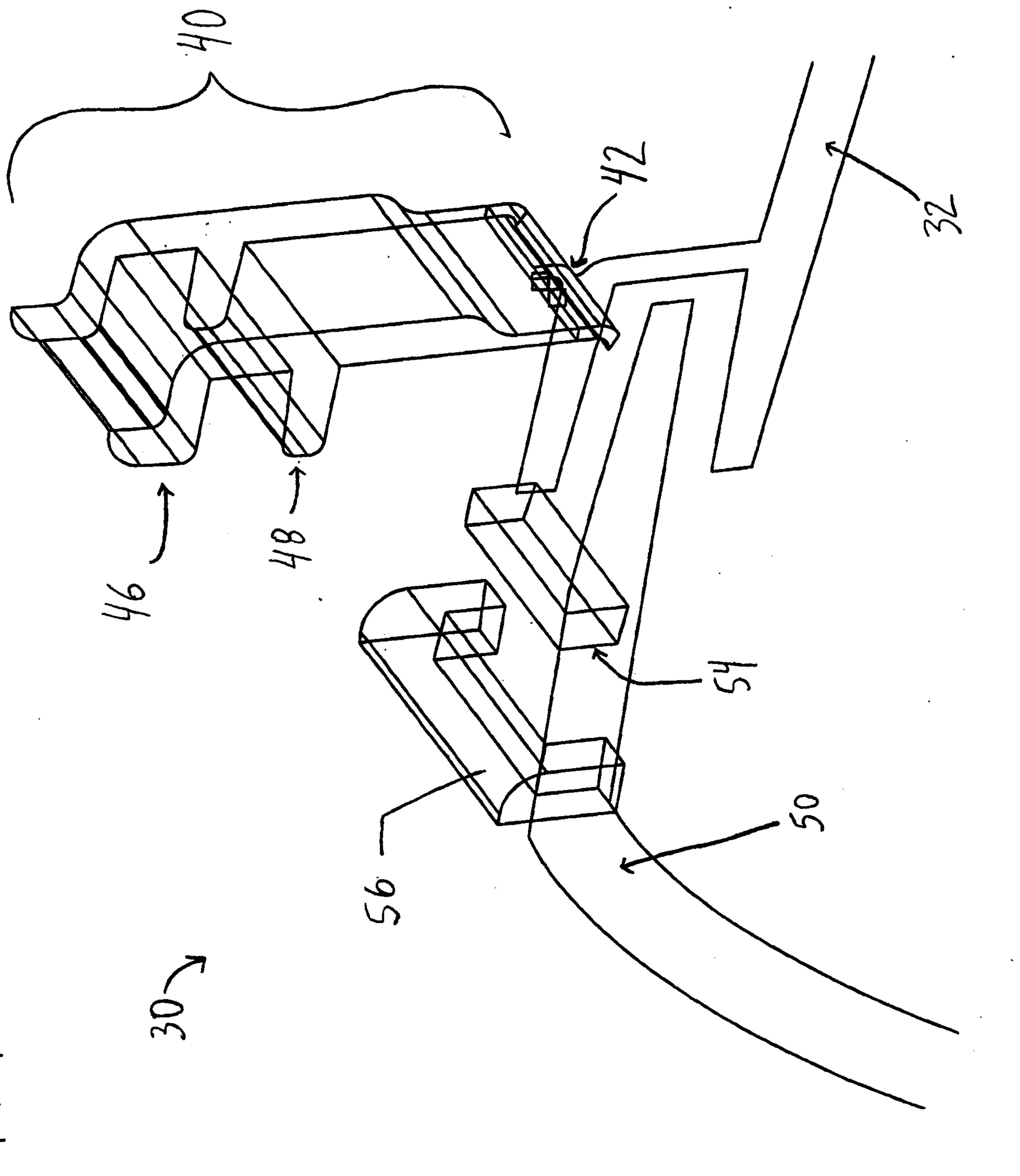
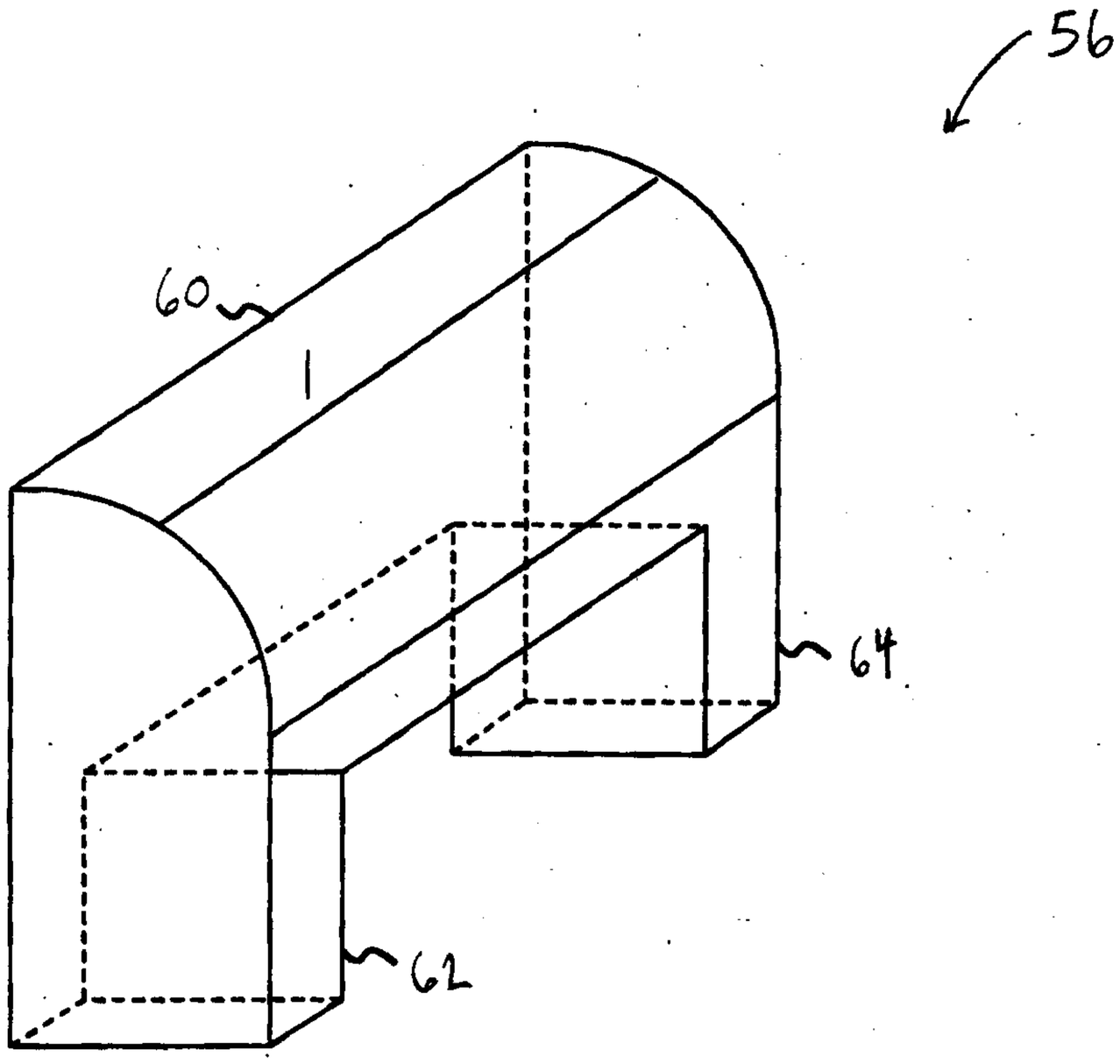


FIG. 3B

FIG. 3C



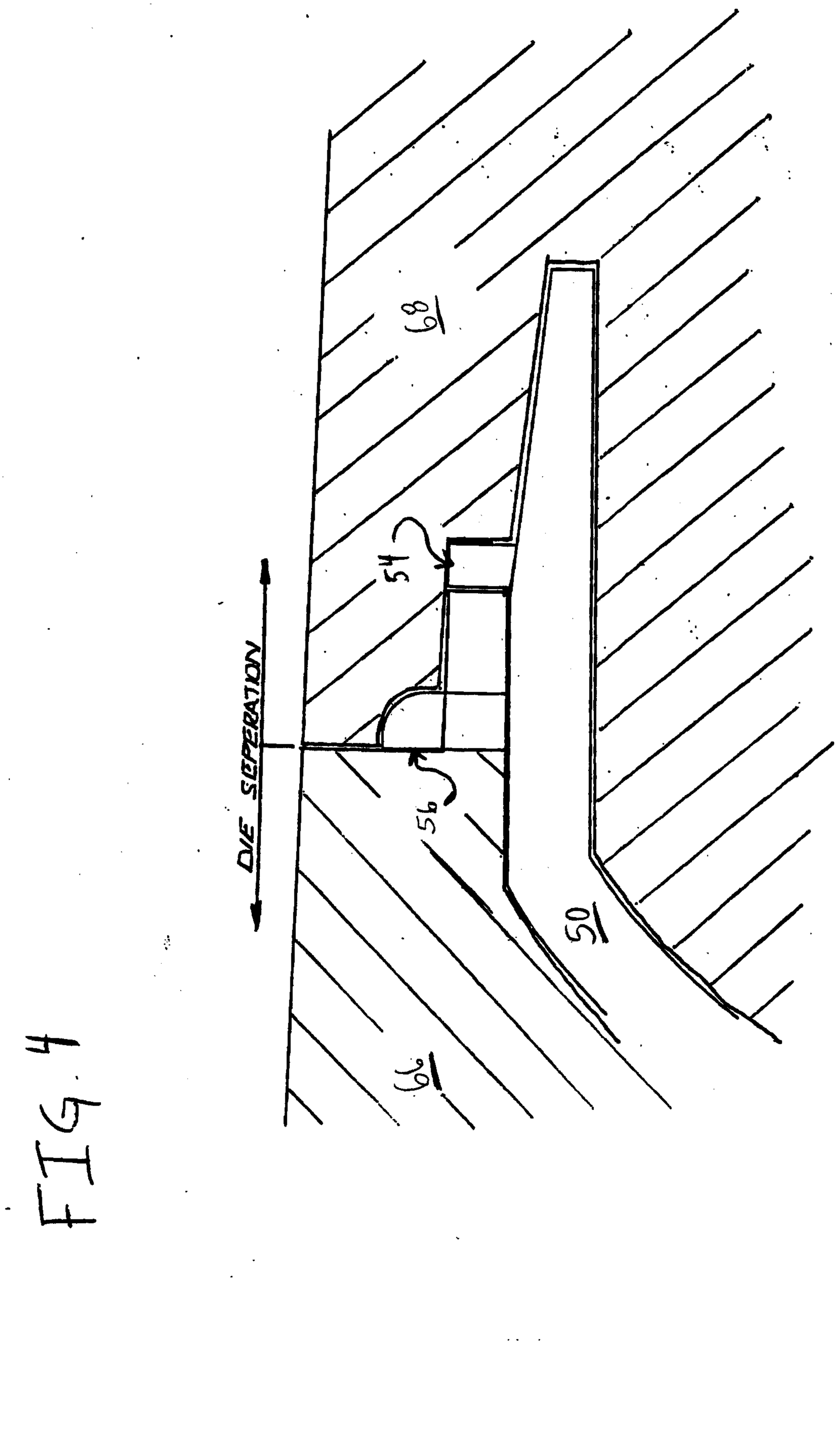


FIG 4

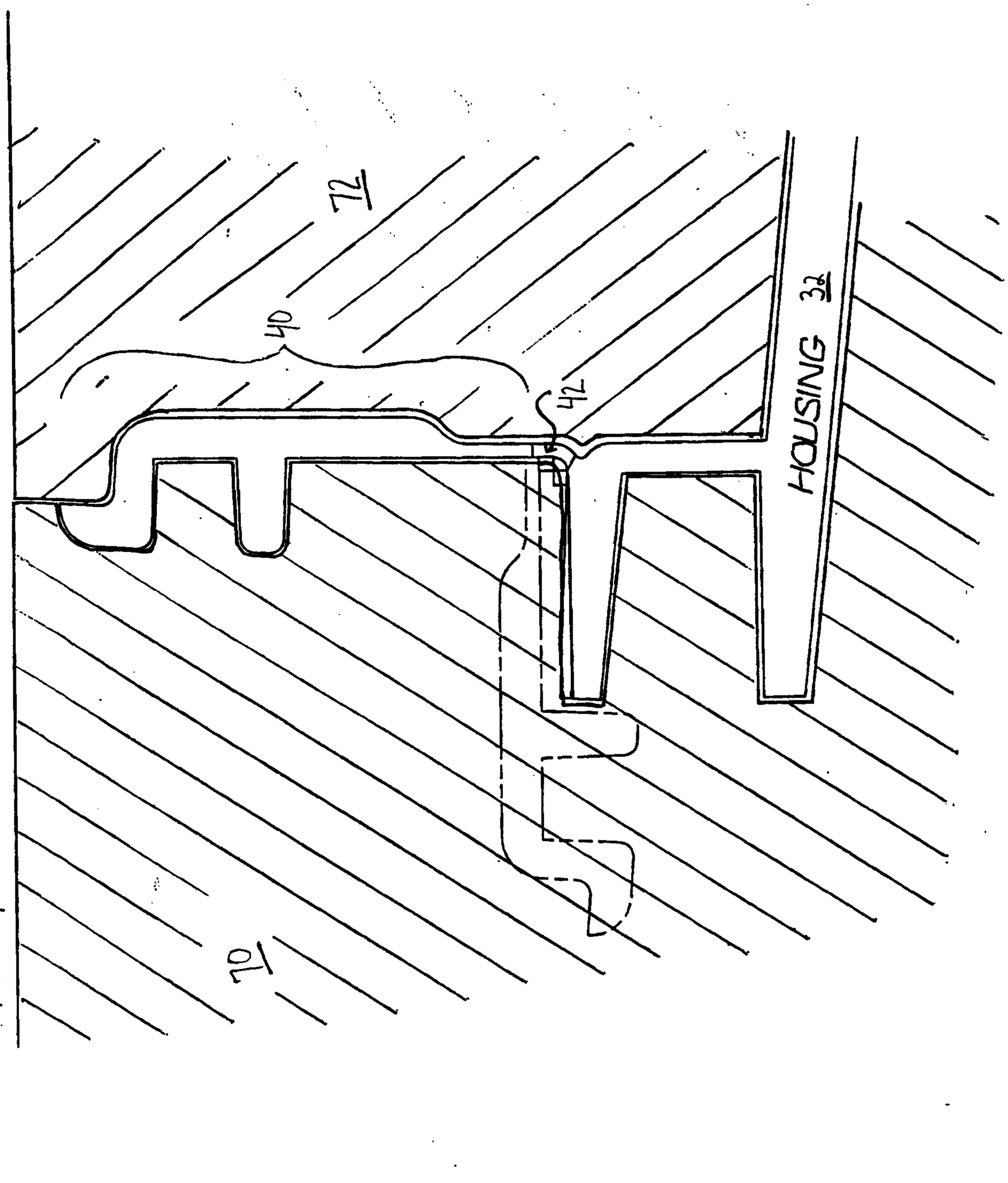
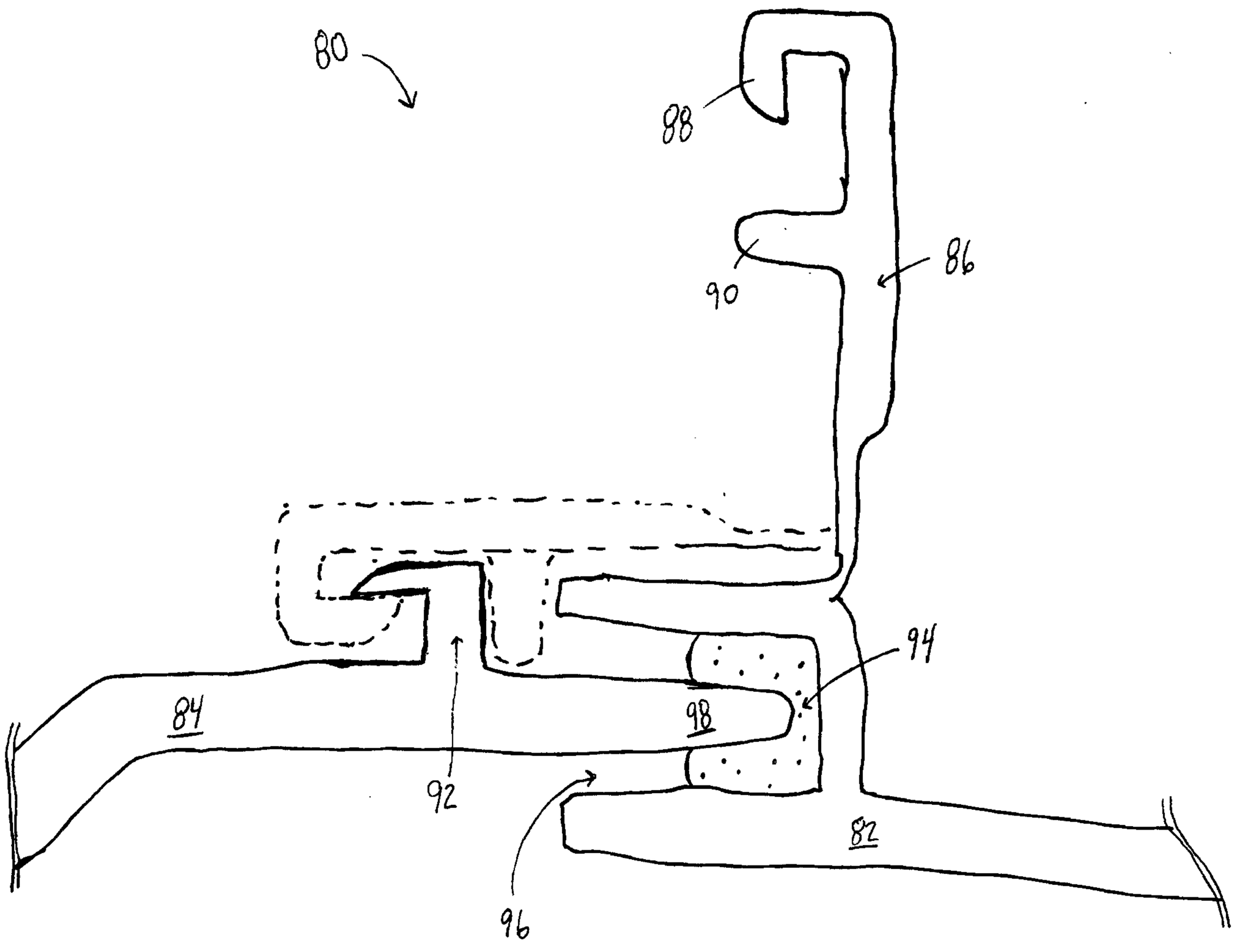
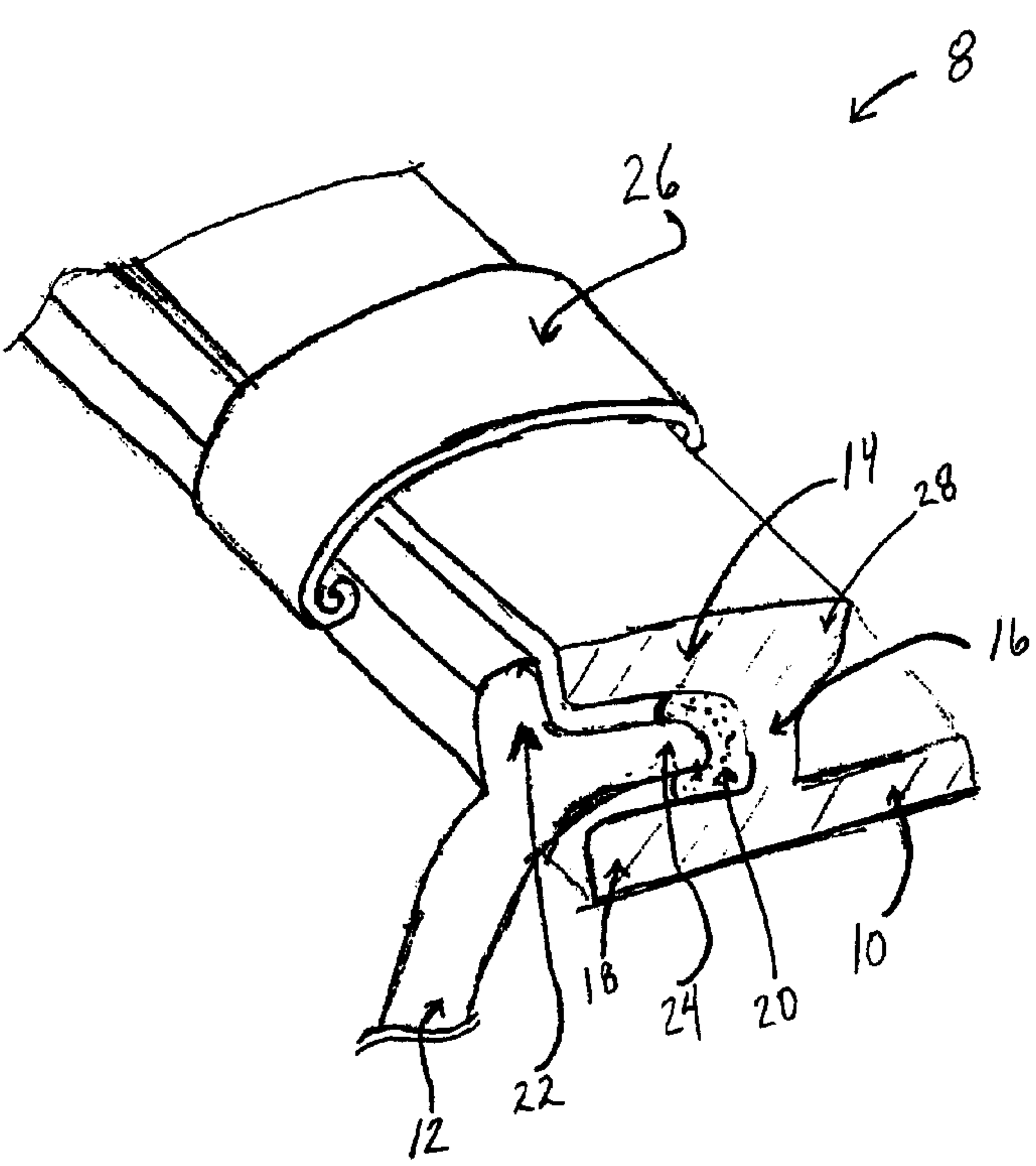


FIG. 5

FIG. 6

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