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Soman et al.(10) **Pub. No.: US 2008/0028577 A1**(43) **Pub. Date: Feb. 7, 2008**(54) **RESILIENT TWO STAGE CLIP FOR
AUTOMOTIVE APPLICATION****Publication Classification**(51) **Int. Cl.**
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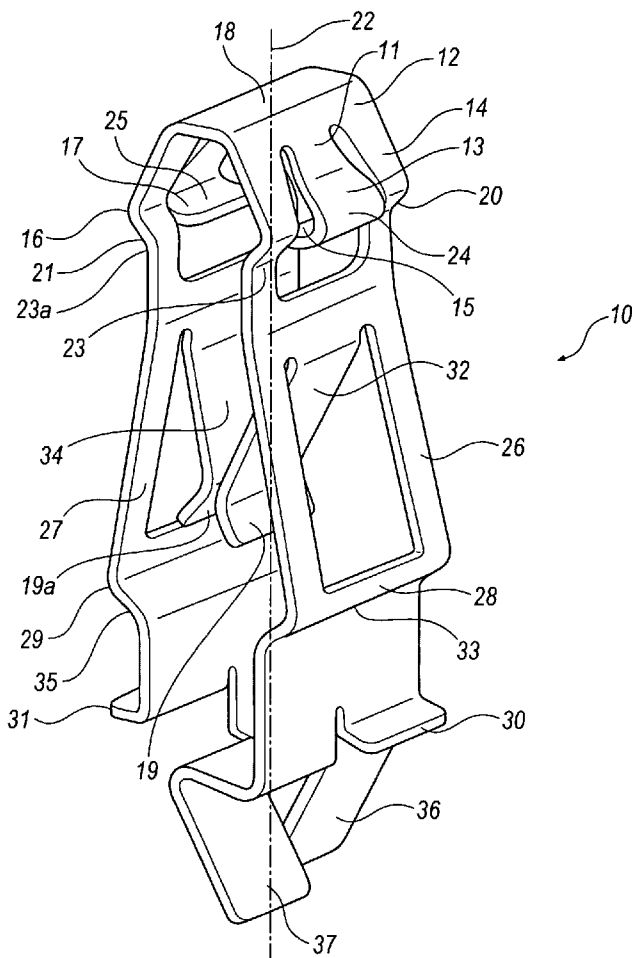
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(52) **U.S. Cl.** **24/293**(57) **ABSTRACT**

A two stage spring clip for moveably fastening a first substrate to a second substrate through an aperture. The clip is comprised of an insert nose portion with outwardly tapered legs to form a first retaining portion. The first retaining portion has a first retaining shoulder that extends at a first angle that is substantially perpendicular to a centerline. The outwardly extending legs extend from said first retaining shoulder to form a second retaining shoulder. The second retaining shoulder extends from said centerline at a second angle that is less than the angle of the first retaining shoulder. The legs are further equipped with stop flanges that extend from the outwardly extending legs at an angle that prevents the over insertion of the spring clip into an aperture by acting as a stop against the sides of said aperture. The outwardly extending legs terminate in opposed flanges and during deployment of an air bag side curtain. The clip is displaced any distance, and preferably 13-15 mm, yet retained in the aperture to prevent the trim cover from detachment from the pillar during air bag deployment.

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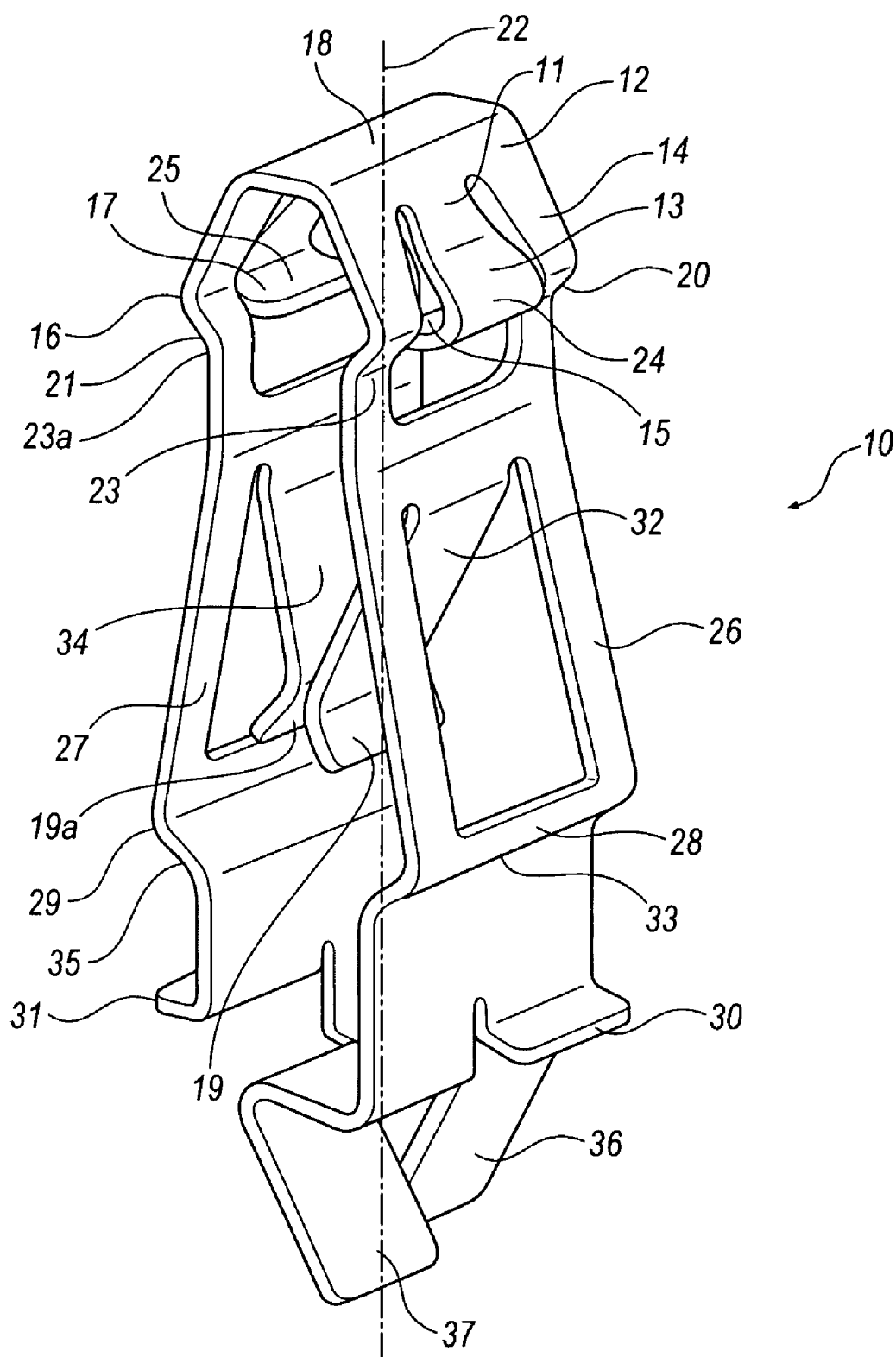


FIG. 1

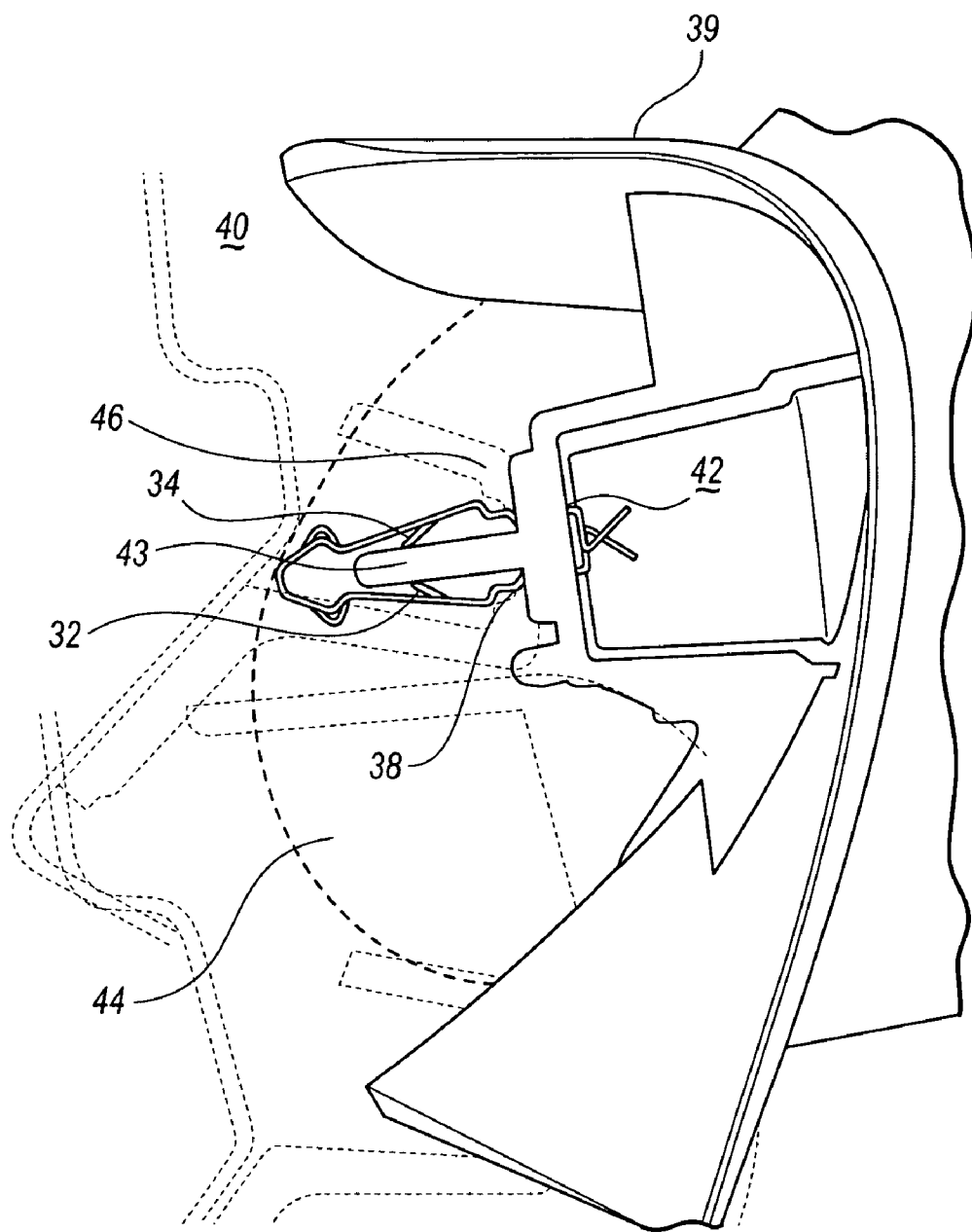
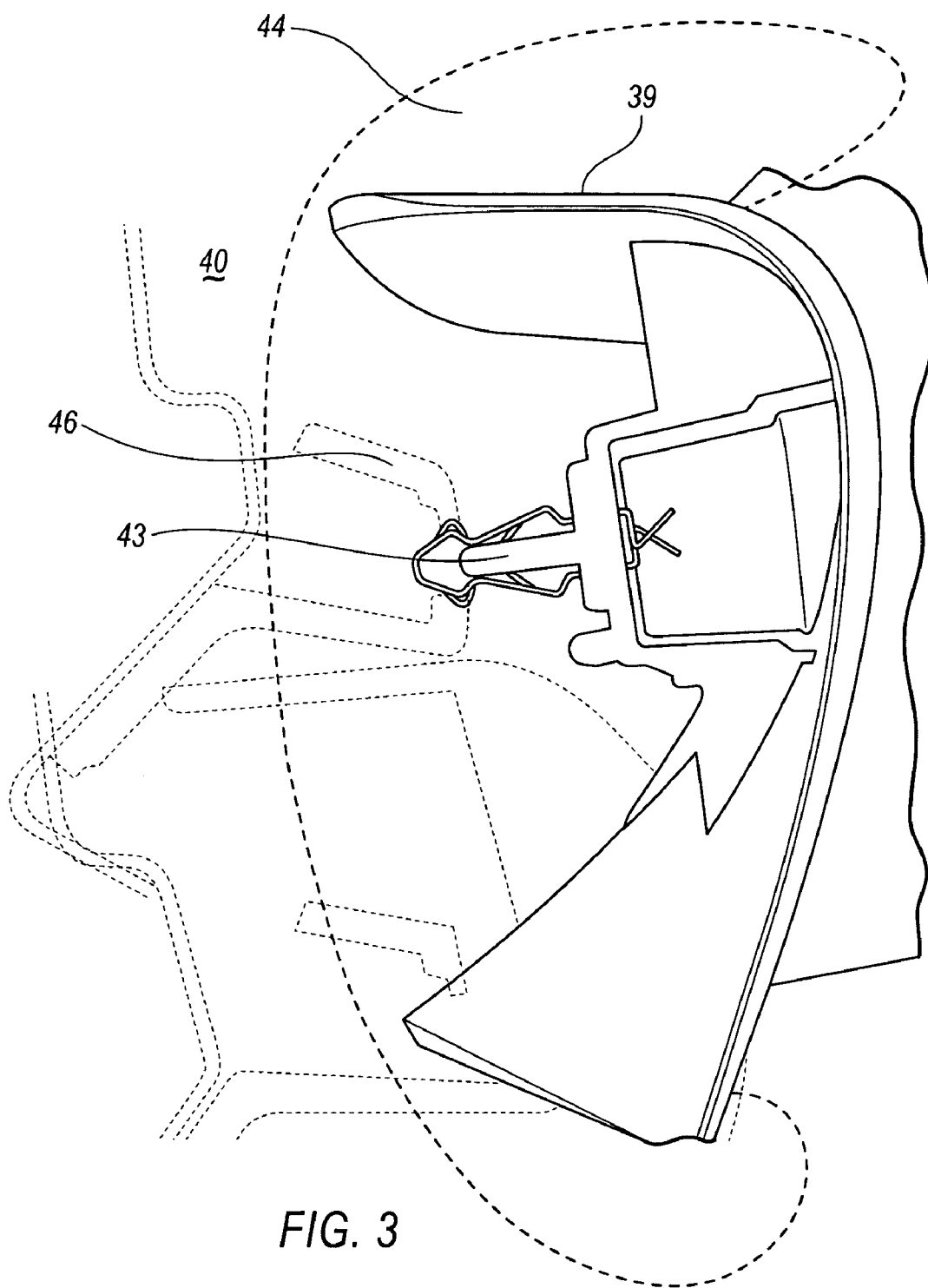


FIG. 2



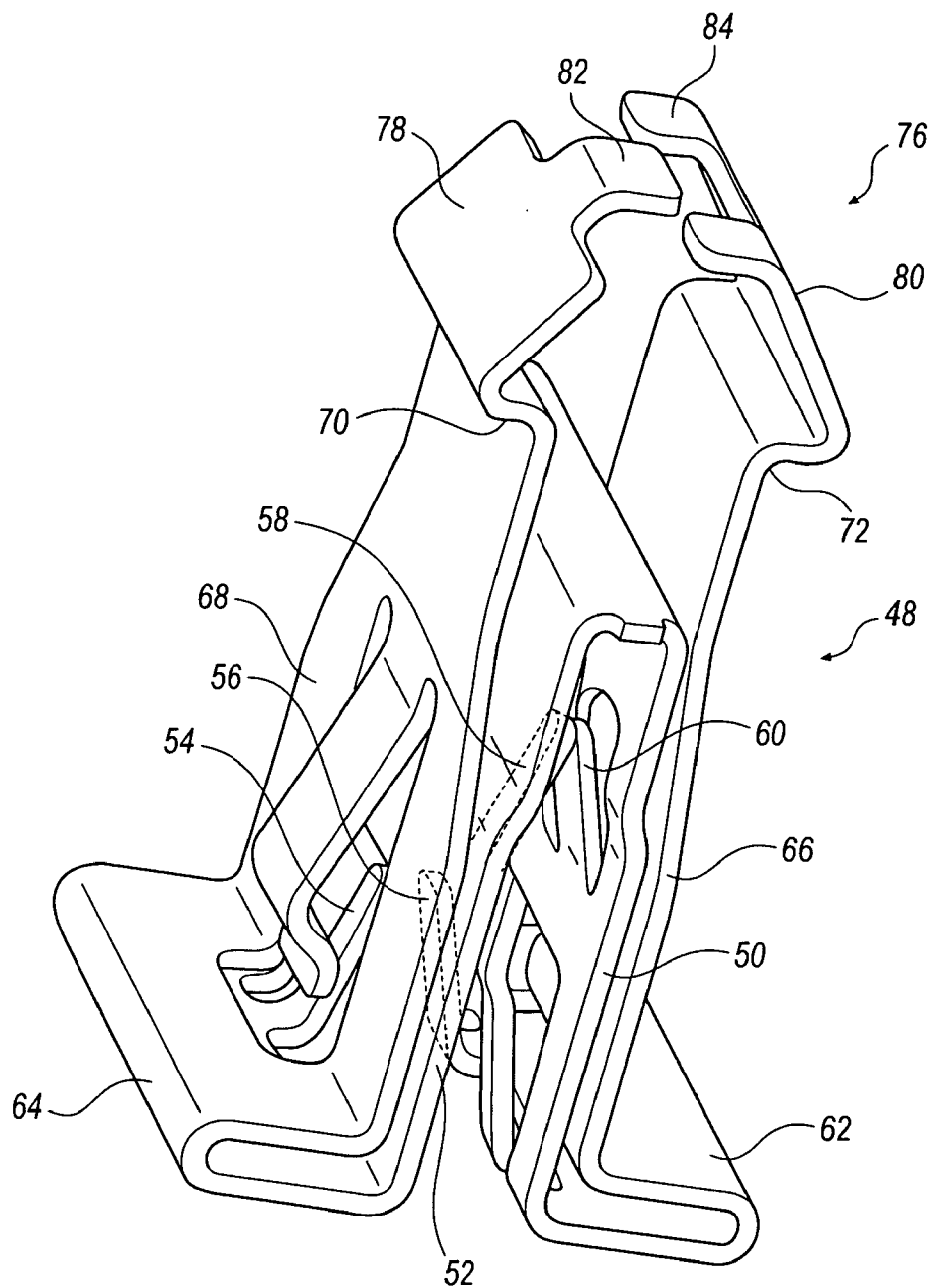


FIG. 4

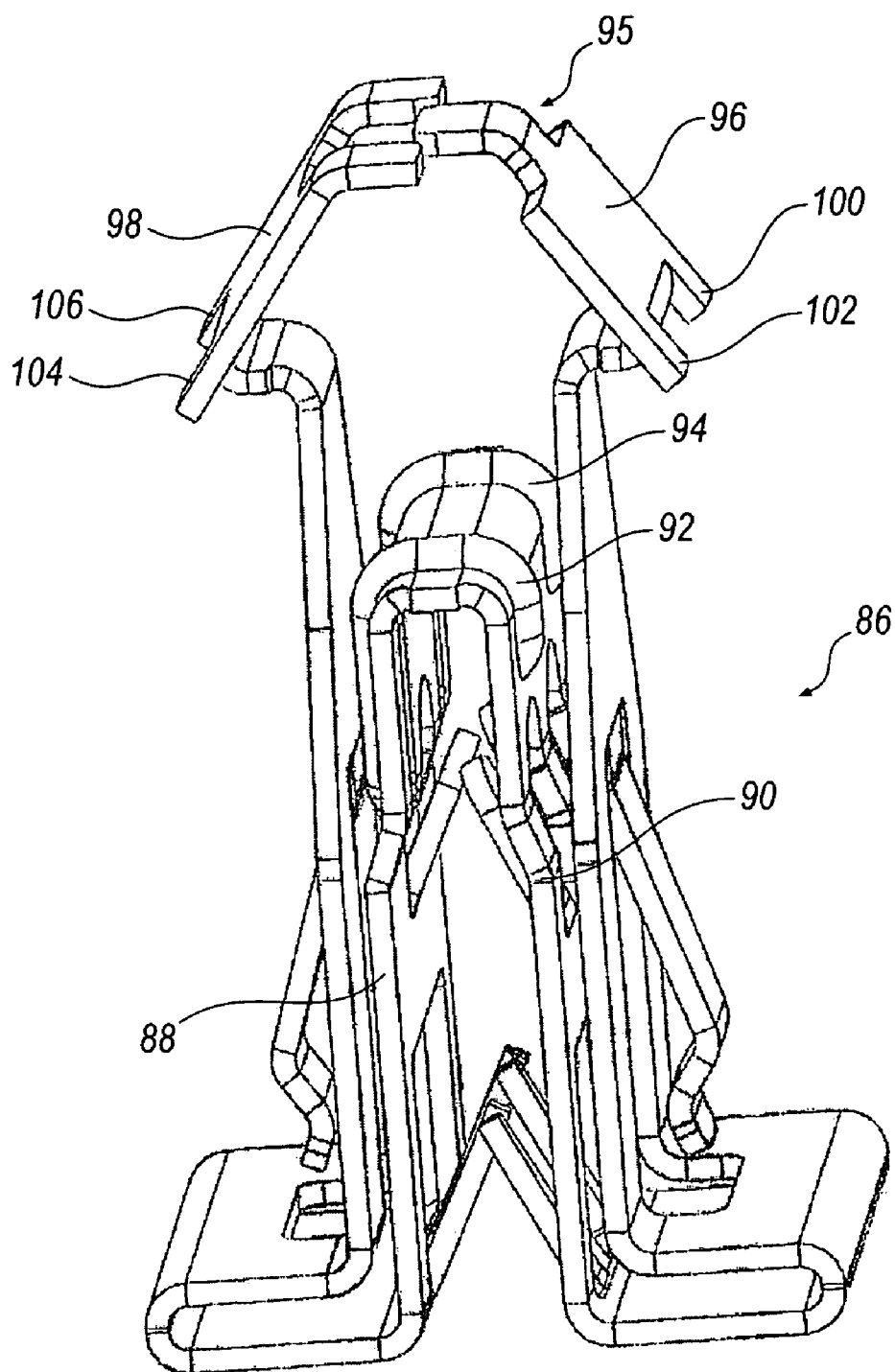


FIG. 5

RESILIENT TWO STAGE CLIP FOR AUTOMOTIVE APPLICATION

TECHNICAL FIELD

[0001] The present invention relates to a two stage clip for automotive application wherein it is desirable to provide for a clip that allows a defined movement of a trim cover to permit deployment of an air curtain without release of the trim cover into the passenger compartment. The two stage clip is equipped with two retention surfaces that permit the trim cover to move sufficient distance to allow deployment of an air curtain, but which does not permit the trim cover to become detached from a vehicle pillar when the air curtain deploys.

BACKGROUND OF THE INVENTION

[0002] The present invention relates to a fastener for use with an automotive trim cover on an automotive pillar, and more particularly, to a two stage retention clip for use in an automotive trim covering an air curtain.

[0003] In the automotive industry, parts are secured in place with a variety of automotive fasteners. Spring clips are particularly useful in this regard, as they offer ease of serviceability and provide excellent retention capabilities.

[0004] However, it has been a challenge in the industry to provide a spring retainer clip that may secure a trim piece into place and yet permit the trim piece to be moved a controlled distance to permit the deployment of an air curtain during impact situations. In addition, it has been a challenge to prevent the trim piece from becoming detached during deployment of the air curtain. The present invention meets these challenges.

SUMMARY OF THE INVENTION

[0005] The present invention is a one piece two stage clip used to secure trim covers in place in automotive interior applications wherein the trim cover overlays an air curtain or other safety deployment system. The two stage clip is preferably a unitary structure constructed of a resilient material such as steel or plastic and is configured such that the clip has two spring flanges in opposed relation to each other to provide an outward spring action to the clip and two retaining spring clip structures. Ordinarily, the spring clip of the present invention is stamped from a single piece of spring steel, or formed of any other resilient material to form a clip that is a unitary structure. The two stage spring clip is insertable into cooperatively aligned apertures in a first and second substrate and has an outwardly tapered insertion portion that has retaining shoulders that extend at an angle from the centerline of the clip. The two stage clip has a second insertion portion extending from the first shoulders that extends therefrom and forms a second retaining surface that extend from the outwardly tapered section at a second angle that may be the same or different than the first angle, and is shown as less than the first angle of the first retaining shoulders. Flange surfaces are provided as stops to prevent over insertion of the insert into an aperture. In addition, the stops prevent the trim piece from detachment during impact situations. When an air curtain is deployed, the force of the deployment will overcome the retention effected by the second retention shoulders and permit the trim piece to move a fixed distance and permit deployment of the air curtain. However, the force of the air curtain deployment is

not sufficient to overcome the retention force between the first retaining shoulders and the aperture into which it is inserted, thereby ensuring that the trim piece will not become a projectile when the air curtain deploys in an emergency situation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] FIG. 1 is a perspective view of the two stage retention spring clip of present invention showing its construction.

[0007] FIG. 2 is a cut away side view of the retention spring clip of FIG. 1 retaining an automotive trim piece in place.

[0008] FIG. 3 is another view of the two stage retention spring clip in FIG. 2 after the air curtain has deployed, showing the clip retaining the trim piece in place while allowing the air curtain to deploy.

[0009] FIG. 4 is another embodiment of the two stage retention spring clip of the present invention showing its construction.

[0010] FIG. 5 is another embodiment of the two stage retention clip of the present invention.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT(S)

[0011] Turning now to the drawings wherein like numerals refer to like structures, and particularly to FIG. 1, there is shown therein a perspective view of two stage retaining spring clip 10. Clip 10 is constructed in one piece and may be made of a resilient material such as metal, such as steel or any other metal, or plastic or any other resilient material to present a unitary structure.

[0012] The clip of FIG. 1 is equipped with an insert nose portion 12 having angled portions 14 and 16 that terminate in shoulder portions 20 and 21 respectively to form a first retaining portion 18. Shoulders 20, 21 terminating in base 23 and 23a, respectively extend at a first angle that is shown as obtuse to the centerline 22 of the two stage retaining spring clip 10, but which may be perpendicular to the centerline, or at any other angle according to the design requirements of the trim panels to be fastened together. Angled portions 14 and 16 of the insert nose portion may be equipped with optional spring flanges 24, 25. Each spring flange is a mirror of the other, and is formed of a first angled portion 11, which is oriented at the same angle as angled portion 14, and a second angled portion 13, which is angled at an angle less than the angled portion 11. Each said flange terminates in a shoulder portion 15, 17 respectively that may be angled relative to centerline 22 to provide for a more secure retention of the two stage spring clip in an aperture in a trim panel.

[0013] The outwardly extending legs 26, 27 extend from the bases 23 and 23a to form a second retaining shoulders 28, 29. The second retaining shoulders 28, 29 extend at a second angle that maybe the same or different that the angle of the first retaining shoulder, and is shown as less than the angle of the first retaining shoulder, and terminate in angled surfaces 33, and 35 respectively. Stop flanges 30, 31 extend from the outwardly extending legs at an angle that prevents the over insertion of the spring clip into an aperture by acting as a stop against the inner surface of the substrate proximal to the aperture. In addition, the stops cooperatively act to prevent the detachment of the trim piece fro the clip during

air curtain deployment. In one embodiment, the stops extend substantially perpendicular from the centerline of the two stage spring clip 10.

[0014] The outwardly extending legs are equipped with opposed spring flanges 32 and 34 to provide a resiliently deflective outwardly directed force when the legs are pressed together, or when an object is inserted between them. In addition, these flanges act to permit the insertion of a post 43 integral with the trim piece and grip the post during air curtain deployment so that the trim cover is prevented from complete detachment. These spring flanges are equipped with guides 19 and 19a to assure the proper directional travel of the two stage retention pin over a post 43, as seen in FIG. 3, during insertion of the pin to retain the trim cover in place. As seen in FIG. 1, the outwardly extending legs terminate in flanges 37 and 36, respectively.

[0015] As seen in FIG. 2, trim cover 39 has a pin 43 that is insertable between guides 19, 19a and opposed spring flanges 32 and 34. When the clip is inserted into aperture 38 of doghouse 46, the legs open in a scissor like manner as they ride over post 43. When the pin is inserted fully into the aperture 38, the legs snap back into their original configuration and act to secure the clip into the dog house and the trim cover in place.

[0016] Continuing with FIG. 2, there is shown the two stage spring clip of FIG. 1 in an automotive application. As shown therein, a first substrate, such as a trim cover 39, is secured into place on a second substrate, such as, for example, the A pillar 40 of an automobile. Specifically, the clip is inserted into an aperture 38 and retains the trim cover 39 in place on the A pillar 40 of an automobile interior. Those skilled in the art will recognize that only the second retaining shoulders 28 and 29 are actually retaining the trim cover tightly in place on the pillar. It is to be noted that the second shoulder has an inclined shoulder surface, and that the first retaining shoulder has an inclined shoulder that is preferably a perpendicular retaining surface, but may be any angle relative to the centerline, and is shown as greater than the angle incline of the second retaining shoulder. Both the first shoulder and the second shoulder, in their un-deformed states, are larger than the aperture 42 of the trim cover into which they are inserted. Air curtain 44 is shown by the dotted lines in its undeployed state.

[0017] Turning again to FIG. 3, when air curtain 44 is deployed, it exerts force against the trim cover, and the force against the trim cover causes the entire trim cover to move outwardly from the force, and forces the second retaining shoulder to engage the aperture. Because the second retaining shoulder is inclined at an angle that is small relative to the centerline of the clip, the force from the air curtain deployment forces the inclined surfaces of the clip to pass through the aperture and the clip slightly depresses, thereby freeing the clip from retention by the second retention shoulder. As the force from the air curtain continues to exert force against the trim cover, it separates from the pillar the length of the outwardly extending legs until the first retaining shoulders meet the aperture. Because the first retaining shoulders are inclined at an angle, shown as greater than the incline of the second shoulder, and preferably substantially perpendicular to the centerline of the clip, it acts as a shoulder stop and the clip does not deform or permit the first retaining shoulder to pass through the aperture. In addition, the trim cover is equipped with post 43 that engages the spring clip during deployment to prevent the clip from

compressing proximal to the first retaining shoulders, thereby preventing the first retaining shoulders from passing through the aperture 38. In addition, the flanges grip the post so that the trim cover does not disengage from the clip and become free during air curtain deployment. By way of explanation, during assembly, the post 43 is inserted through guides 17 and 19 and encounter flanges 24 and 25. Spring flanges 24 and 25 engage the post, thereby preventing disengagement of the spring clip from the post during air curtain deployment. The trim cover, positioned between the first retaining shoulder and the stop flanges on the clip cannot travel any further than the length of the outwardly extending legs of the clip and the trim cover does not become a projectile within the vehicle interior during deployment of the air curtain. Indeed, the clip is dimensioned such that the trim cover may be dislodged from about 13 mm to about 15 mm from the pillar to permit deployment of the air curtain and to prevent the trim cover from becoming freed from any attachment to the pillar.

[0018] FIG. 4 illustrates another embodiment of the spring clip of the present invention. Specifically, the two stage spring clip 48 is a unitary structure that is made of any resilient material and preferably is formed from a single piece of resilient spring steel.

[0019] A pair of legs 50, 52 is joined as a unitary piece and presents a substantially U shaped profile. Each of the legs 50, 52 is equipped with opposed deflection tabs 54, 56, and 58 and 60, respectively. The first set of deflection tabs may further operate a guide to ensure the pin 43 of the trim cover travels between the legs during deployment of the air bag as set forth with the embodiment of FIGS. 1-3 above. The deflection tabs further act to retain the post 43 in place so that, as described with the embodiment of FIGS. 1-3, the trim cover does not become free of the two stage retention clip. The legs terminate in stops 62 and 64. Each stop is equipped with a leg portion 66 and 68 that terminates in shoulder 70 and 72, respectively. Each shoulder is oriented to be substantially perpendicular to the centerline 74. The insert nose portion 76 is formed of angled inclined surfaces 78 and 80 that join shoulders 70 and 72, and the inclined surfaces are spaced apart from each other. Inclined surface 78 is equipped with at least one flange 82 and inclined surface 80 is equipped with a recess 84 cooperative to said flange. The flange and recess operate to limit the inward deflection of the nose portion during insertion of the clip into a recess.

[0020] In operation, the spring clip of this embodiment operates in a manner substantially the same as that described for the embodiment of FIGS. 1 through 3, with the exception that the pin on a trim cover as described above would be inserted between the legs 50, 52 of this embodiment and limited to the travel possible within the confines of the U leg shape structure of this embodiment instead of engaging the nose portion of the spring clip as described in the embodiment of FIGS. 1-3 above.

[0021] FIG. 5, shows another embodiment of the present invention, and may be seen as a variety of the embodiment shown in FIG. 4. Specifically, clip 86, is equipped legs 88 and 90 to present a substantially U shaped structure. This U shaped structure is equipped with at least one re-enforcement rib 92, and 94 at least partially overlying said U shaped legs to facilitate gripping of the post 43 (not shown) of the trim cover by the clip. In addition, nose portion 95 is equipped with least one, and preferably each inclined sur-

face **96** and **98** that has at least one flange, and preferably a pair of flanges **100**, **102** and **104** and **106**, respectively that engage the inner surface of the substrate proximal to the aperture into which the pin is inserted to provide for improved retention during air curtain deployments. In operation, this embodiment operates as set forth for FIGS. **1-4** above.

[0022] The unitary two way clip shown in the embodiments set forth above are of advantage in moveably fastening a first substrate to a second substrate through cooperatively aligned apertures in the substrates. The clip is configured such that one substrate can be fastened to the clip to permit the clip to be moved upon application of force to the substrate fastened to the clip and the clip partially disengages from the apertures, permitting the clip to pass through the aperture a predetermined distance until the first retaining shoulders come into contact with the area proximal the apertures and engages that area, thereby preventing the clip and aperture from completely disengaging.

[0023] The words used in the description of the invention are words of illustration and not words of limitation. Those skilled in the art will recognize that many modifications and variations are possible without departing from the scope and spirit of the invention as set forth in the appended claims.

We claim:

1. A unitary two stage spring clip for moveably fastening a first substrate to a second substrate through cooperatively aligned apertures in said substrates, said clip comprising an insert nose portion with outwardly tapered legs to form a first retaining portion; said first retaining portion having a first retaining shoulder that extends at a first angle relative to a centerline; said outwardly extending legs extend from said first retaining shoulder to form a second retaining shoulder; said second retaining shoulder extending from said centerline at a second angle from said centerline; said legs further equipped with spring flanges in opposed relation to each other; said spring flanges further adapted to permit insertion of a post on a trim piece between said flanges and prevent removal of the post; said legs equipped with stop flanges that extend from the outwardly extending legs at an angle that prevents over insertion of the spring clip into an aperture by acting as a stop against a substrate surface proximal said aperture; said outwardly extending legs terminating in opposed flanges, the clip may be inserted into the aperture and the resilient spring clip is retained in the aperture.

2. The two stage clip of claim **1**, wherein said clip is retained in an aperture by the interaction of the second retaining shoulder and the aperture.

3. The two stage retention clip of claim **1**, wherein said clip, in response to a force, may be dislodged from interaction of the second retaining shoulder with the aperture, thereby permitting the clip to be partially removed from said aperture and permitting said first retaining shoulder to engage said aperture.

4. The two stage retaining clip of claim **1**, wherein said clip is resilient and constructed of metal or plastic.

5. The two stage retaining clip of claim **1**, further including spring flanges formed in the nose portion of the outwardly extending legs to provide for a more secure fit and insertion into an aperture.

6. The two stage retaining clip of claim **3**, wherein said first substrate is a trim cover and said second substrate is a pillar in a vehicle, and said force is the deployment of an air curtain.

7. The two stage retaining clip of claim **6**, wherein said clip, in response to said force, is displaced from about 13 to about 15 mm, thereby permitting the air curtain to deploy without permitting the trim cover to become completely detached from said A pillar.

8. A two stage spring clip for moveably fastening a first substrate to a second substrate through cooperatively aligned apertures in said substrates, said clip being a unitary structure formed from a single piece of resilient material, comprising a pair of legs joined as a unitary piece to present a substantially U shaped profile; each said leg is equipped with opposed deflection tabs and terminated in a stop; said deflection tab acting as retention for a post on a substrate inserted therebetween; each stop equipped with a leg portion that terminates in a shoulder; each shoulder oriented to be at a first angle relative to a centerline; and an insert nose portion formed of angled inclined surfaces that join said shoulders, said inclined surfaces spaced apart from each other; one inclined surface equipped with at least one flange; said other inclined surface equipped with a recess cooperative to said flange.

9. The two stage clip of claim **8**, wherein said clip is retained in an aperture by the interaction of the second retaining shoulder and the aperture.

10. The two stage retention clip of claim **8**, wherein said clip, in response to a force, may be partially dislodged from interaction of the second retaining shoulder with the aperture, thereby permitting the clip to be partially removed from said aperture and permitting said first retaining shoulder to engage said aperture.

11. The two stage retaining clip of claim **8**, wherein said clip is resilient and constructed of metal or plastic.

12. The two stage retaining clip of claim **8**, further including spring flanges formed in the nose portion of the outwardly extending legs to provide for a more secure fit and insertion into an aperture in a trim panel.

13. The two stage retaining clip of claim **10**, wherein said first substrate is a trim cover and said second substrate is a pillar in a vehicle, and said force is the deployment of an air curtain.

14. The two stage retaining clip of claim **13**, wherein said clip, in response to said force, is displaced from about 13 to about 15 mm, thereby permitting the air curtain to deploy without permitting the trim cover to become completely detached from said retaining pin and said A pillar.

15. The two stage retaining clip of claim **8**, further including at least one reinforcement rib at least partially overlying said U shaped legs and at least one flange extending from at least one said inclined surface.

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