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E2A
Selected US specifications from IPC sub-class
F16B

(54) Push pin retainer

(57) A push pin retainer for securing light automotive trim components to portions of an automobile includes a base portion (12) and a shank (14) extending perpendicularly from the base portion and cantileverly supporting a pair of triangularly shaped locking legs (16, 18) from the free end of the shank. The locking legs (16, 18) are foldably deflectable and are supported on a bridge portion 33 between a pair of straight locking legs (28, 30) extending from the base portion.

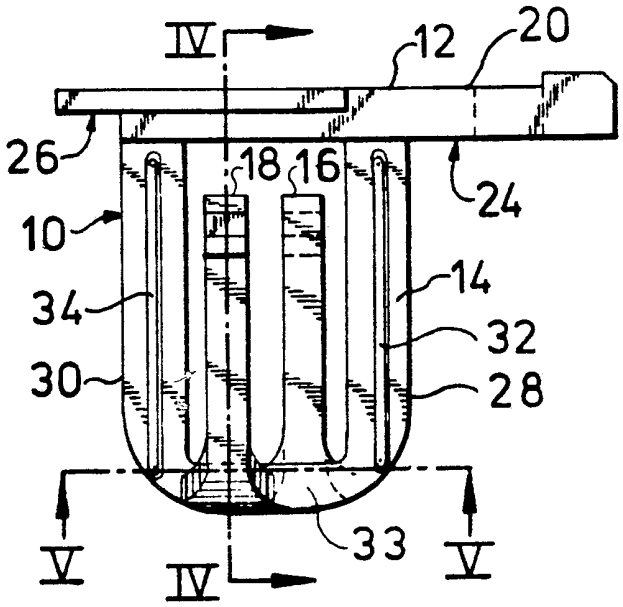

FIG 1

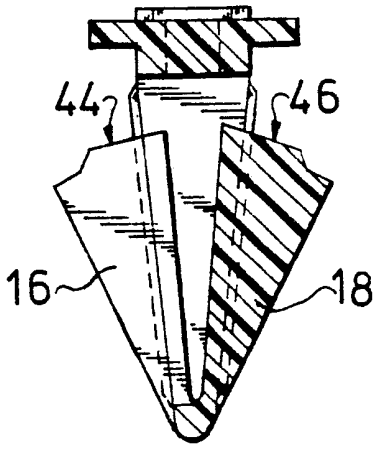

FIG 4

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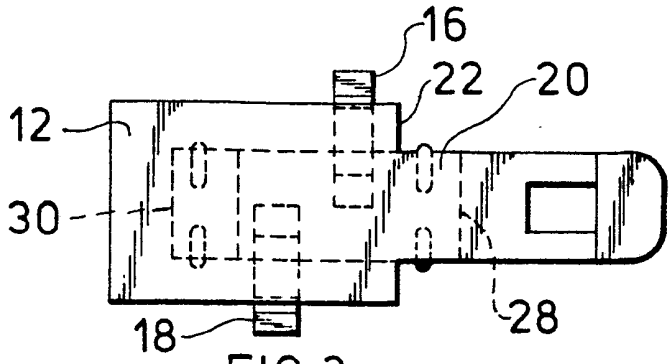


FIG 3

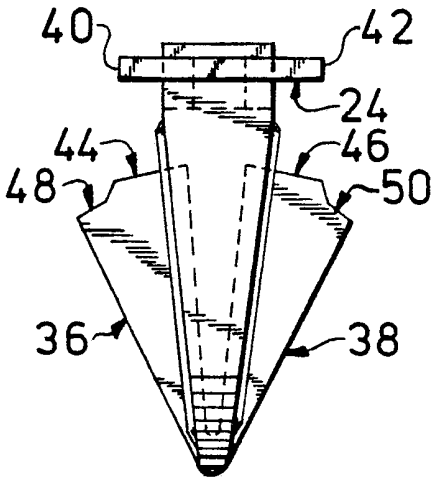


FIG 2

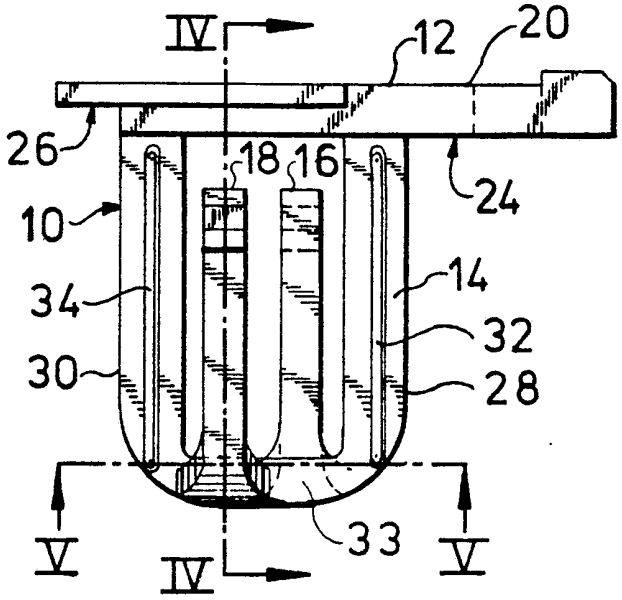
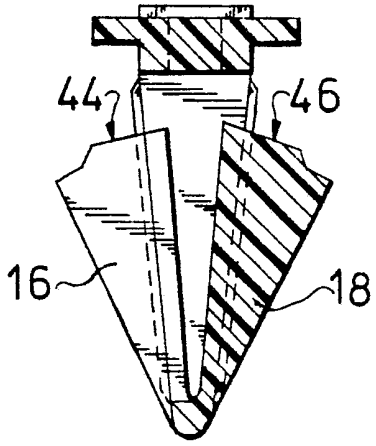


FIG 1



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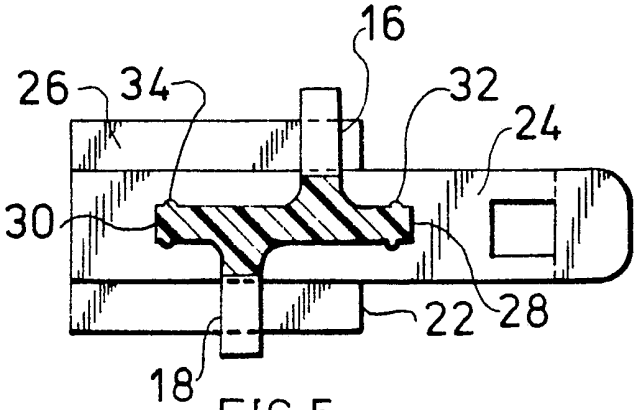

FIG 5

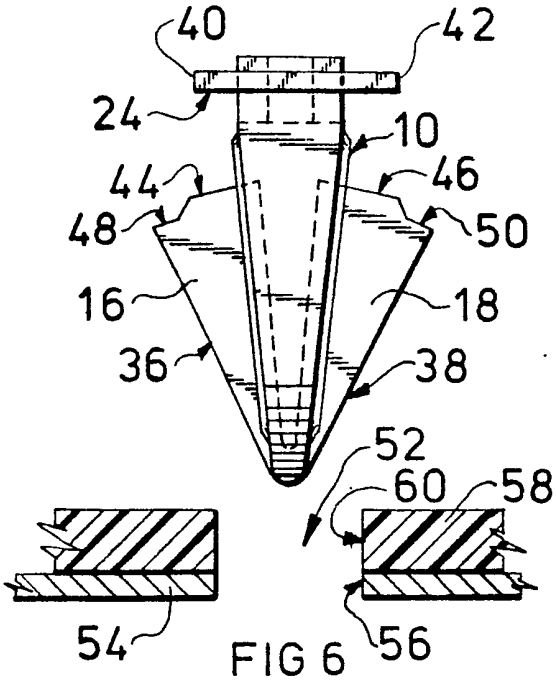

FIG 6

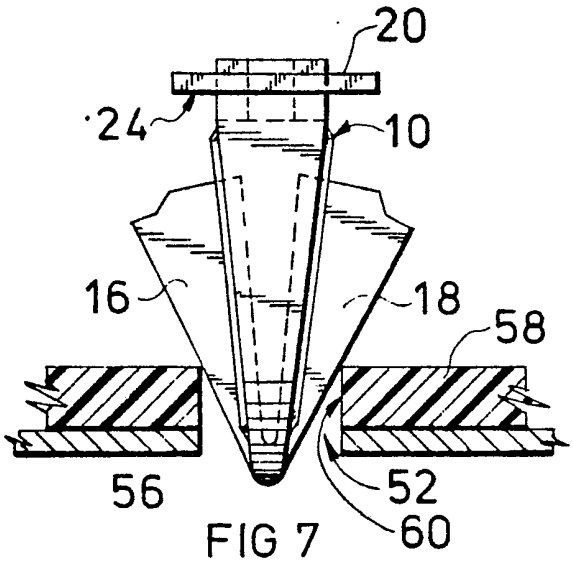

FIG 7

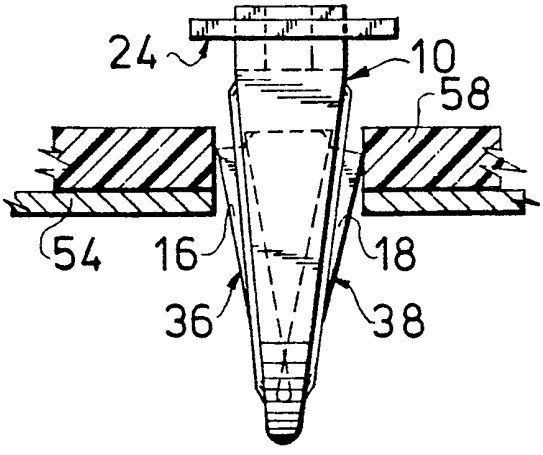

FIG 8

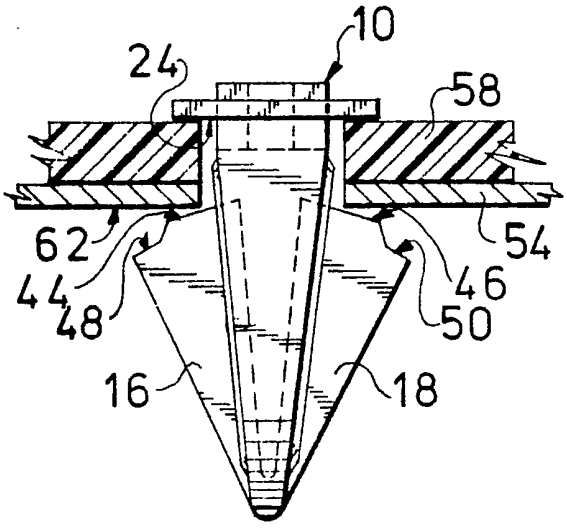

FIG 9

PUSH PIN RETAINER

The present invention relates to a push pin retainer for insertion into an aperture in a body panel of an automobile.

There is a great need in the assembly of automobiles to effect retention of relatively light components through the use of non-threaded fasteners which are generally specified to reduce the time required to secure the device for which the retainer is specified. Most of these retainers are formed as injection molded parts having a barbed shank whose diameter exceeds the bounds of the cooperating aperture in the vehicle body into which the fastener is inserted and a head of greater diameter. Retention is effected by inserting the shank into the aperture, deflecting the barbs during insertion and permitting the barbs relaxation into a vacant area. This area is typically the other side of the wall in which the aperture is formed. The retainer is configured to define a shank diameter greater than the aperture to resist removal.

A significant disadvantage in using retainers of this sort is that in order to achieve high resistance to pull-out removal of such a retainer, the retaining barbs or other locking device must be sized and shaped in a manner which adds to the resistance in insertion, typically the thickening or angling of barbs of the type shown in U.S. 3,810,279.

It is accordingly an object of the present invention to provide a non-threaded retainer which provides minimal resistance to insertion while providing significant resistance to removal. It is a further object of the present invention to provide these functions in a fastener which is unitarily formed such as in providing a one-piece injection molded part.

According to the present invention, there is provided a push pin retainer for insertion into an aperture in a body panel of an automobile, the retainer

comprising a generally rectangular base portion, a shank portion unitarily formed with the base portion and extending perpendicularly therefrom and defining a longitudinal axis extending in a direction parallel to the central axis of the aperture, a pair of locking lets, each cantileverly supported from the free end of the shank, the locking legs being formed of generally triangular shape and being foldable to deflect between a relaxed locking condition in which portions of the legs extend radially outwardly from the axis of the shank beyond the inner periphery of the aperture and an inner compressed condition permitting sliding insertion through the aperture.

The invention will now be described further, by way of example, with reference to the accompanying drawings, in which :

Figure 1 is a side elevational view of the push pin retainer of the present invention;

Fig. 2 is a left-side view of the retainer of Fig. 1;

Fig. 3 is a top view of the retainer of Fig. 1;

Fig. 4 is a cross-sectional view taken along line IV-IV of Fig. 1;

Fig. 5 is a cross-sectional view taken along lines V-V of Fig. 1;

Fig. 6 is an exploded view of the retainer prior to insertion into a body panel aperture;

Fig. 7 is a view similar to Fig. 6 showing the retainer as insertion begins;

Fig. 8 is a view similar to Fig. 6 showing the retainer during insertion; and

Fig. 9 is a view similar to Fig. 6 showing the retainer after insertion.

Turning now to the drawings, and in particular to Fig. 1 thereof, a unitary push pin retainer 10 is illustrated as comprising an enlarged head portion 12 and a shank portion 14 extending perpendicularly from head portion 12. The shank portion 14 is illustrated as including a pair of locking legs 16,18. The head portion 12 is here illustrated as being formed as a generally rectangular shape and includes a tab portion 20 extending perpendicularly outwardly from one side 22 thereof. This shape is particularly advantageous in one preferred embodiment of the present invention in which the shape cooperates with corresponding surfaces defined on an automobile body portion to effect component retention while securing the retainer 10 against rotation when assembled. Other shapes are possible for the head 12 however without departing from its essential feature. That is, the head 12 must describe bearing surfaces such

as indicated at 24,26 which extend outwardly beyond the periphery of an aperture into which the retainer 10 is inserted.

The shank portion 14 is unitarily formed with the head portion as a multi-legged structure having at least the previously mentioned locking legs 16,18 and a pair of support legs 28,30 positioned outward with respect to the locking legs 16,18 and joined with them through a bridge portion 32 positioned remote from the head portion 12. Both the support legs 28,30 and the locking legs 16,18 may be formed to define a generally triangular cross-section in at least one plane as is best shown in Fig. 2 to facilitate insertion of the retainer 10 into an aperture.

The support legs 28,30 are configured to provide a rigid member extending from the head 12. This function is enhanced by the provision of strengthening ribs such as indicated at 32,34 in Figs. 1 and 5. Another important function of the ribs 32,34 is their provision of a reduced surface area for sliding engagement during insertion in close fitting apertures. This reduces the effort required for insertion.

The locking legs on the other hand are constructed to impart structural rigidity to the retainer 10 only in the axial sense through providing resistance to the removal of the retainer 10 from an aperture wall into which the retainer is inserted. The locking legs 16,18 are configured to provide significant flexibility in directions normal to the major access of the shank portion 14 of the retainer 10. The locking legs 16,18 are cantileverly supported on the bridge portion 32 and are molded to extend radially outwardly in opposite directions from the central axial plane of the shank portion

14 as can be clearly seen in Fig. 2. The outer surfaces 36,38 of locking legs 16, 18 respectively extend at their free ends to beyond the outer surfaces 40,42 of the head portion 12 lying directly above them. Locking surfaces 44,46 extend inwardly from locking leg outer surfaces 36,38 respectively and may include secondary locking surfaces 48,50 respectively. The spacing of the legs 16,18 and consequently the locking surfaces 44,46, 48,50 from the bearing surfaces 24 of the head portion 12 is routinely determined for specific applications to provide for the height of the article to be retained.

Operation of the Preferred Embodiment

In the series of drawings in Figs. 6-9 the simple and advantageous assembly of the push pin retainer 10 of the present invention is effectively illustrated.

Fig. 6 illustrates the retainer 10 of Fig. 2 positioned adjacent an aperture 52 such as might be formed in an automobile vehicle to be assembled. The structural base such as an automotive body panel such as is indicated at 54 may include an aperture 56 and a component such as a plastic housing indicated in part at 58 may include an aligned aperture 60 thus forming the insertion aperture here referred to by the numeral 52. As the locking legs 16,18 of the retainer 10 contact the inner periphery of the aperture 52, insertion motion is resiliently resisted by the locking legs 16,18. The diverging triangular orientation of the opposed legs 16,18 facilitates insertion into the aperture 52, as do the ribs 32,34 in assemblies in which the aperture 52 is close fitting; and the legs 16,18 are folded inwardly with respect to the shank portion 14 as insertion

progresses as may best be seen in Fig. 8. When the locking surfaces 44,46 of locking legs 16,18 respectively have passed beyond the inner surface 62 of the body panel 54 the locking legs 16,18 spring back outwardly to an extent beyond the inner periphery of the aperture 52. Withdrawal of the retainer 10 therefore is effectively resisted since withdrawal is resisted by the legs 16,18 acting in columnar fashion against the bridge portion 32 which is in turn connected through support legs 28,30 to the base portion 12. In effect, removal is impossible without destruction of the retainer 10 unless the legs 16,18 are compressed to permit withdrawal through the aperture 52.

Supplementary locking surfaces such as those indicated at 48,50 may be employed in certain applications to permit a single push pin fastener 10 to accommodate a variety of aperture dimensions and retained part thicknesses.

CLAIMS

1. A push pin retainer for insertion into an aperture in a body panel of an automobile, the retainer comprising:

a generally rectangular base portion;

a shank portion unitarily formed with the base portion and extending perpendicularly therefrom and defining a longitudinal axis extending in a direction parallel to the central axis of the aperture;

a pair of locking legs, each cantileverly supported from the free end of the shank, the locking legs being formed of generally triangular shape and being foldable to deflect between a relaxed locking condition in which portions of the legs extend radially outwardly from the axis of the shank beyond the inner periphery of the aperture and an inner compressed condition permitting sliding insertion through the aperture.

2. A retainer as defined in Claim 1, wherein the locking legs each include flat primary locking surfaces formed on the free ends thereof.

3. A retainer as defined in Claim 2, wherein the legs further comprise secondary locking features formed adjacent the primary locking features proximate the radial outer terminus of the locking legs.

4. A retainer as defined in Claim 1, wherein the shank portion comprises a generally U-shaped portion having a pair of spaced locking legs interconnected by a bridge portion, the locking legs extending in cantilever fashion from the bridge portion.

5. A retainer as defined in Claim 4, wherein the support legs include ribs extending longitudinally thereof and integrally formed therewith.

6. A retainer as defined in Claim 1, wherein the shank portion is formed to define a generally triangular shape substantially identical to the shape of the locking legs to receive the locking legs when the legs are deflected to the compressed position.

7. A push pin retainer for insertion into an aperture in a body panel of an automobile, the retainer comprising:

a generally rectangular base portion;

a shank portion unitarily formed with the base portion and extending perpendicularly therefrom and defining a longitudinal axis extending in a direction parallel to the central axis of the aperture, the shank portion including a pair of straight locking legs in the plane of the longitudinal axis and joined at their ends distal the base portion by a bridge portion;

a pair of locking legs, each cantileverly supported from the free end of the bridge portion, the locking legs being formed of generally triangular shape and being foldable to deflect between a relaxed locking condition in which portions of the legs extend radially outwardly from the axis of the shank beyond the inner periphery of the aperture and an inner compressed condition permitting sliding insertion through the aperture.

8. A retainer as defined in Claim 7, wherein the locking legs each include flat primary locking surfaces formed on the free ends thereof.

9. A retainer as defined in Claim 8, wherein the legs further comprise secondary locking features formed adjacent the primary locking features proximate the radial outer terminus of the locking legs.

10. A retainer as defined in Claim 7, wherein the support legs include ribs extending longitudinally thereof and integrally formed therewith.

11. A retainer as defined in Claim 7, wherein the shank portion is formed to define a generally triangular shape substantially identical to the shape of the locking legs to receive the locking legs when the legs are deflected to the compressed position.

12 A push pin retainer for insertion into an aperture in a body panel of an automobile substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawings.

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