Nov. 19, 1968 M. J. STURTEVANT 3,411,245

FASTENER

Filed July 21, 1966

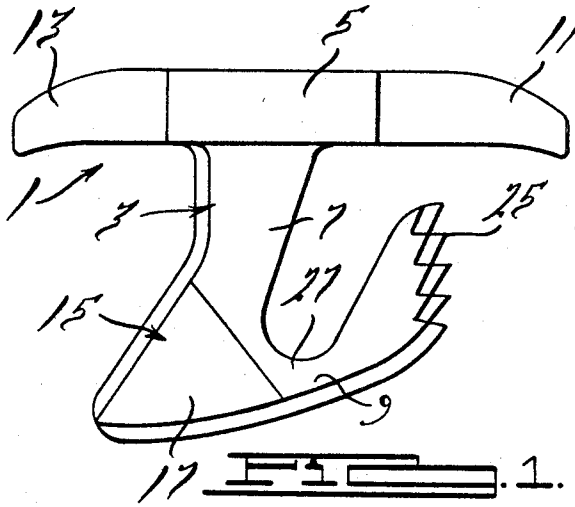


FIG. 1.

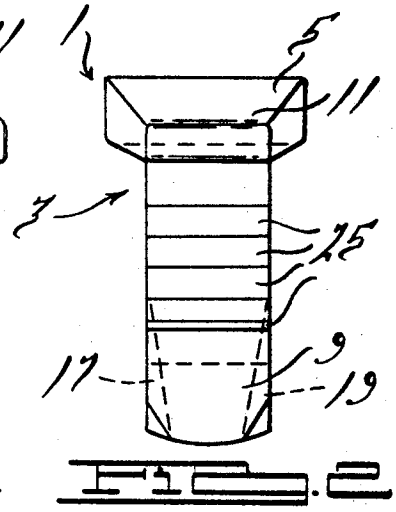


FIG. 2.

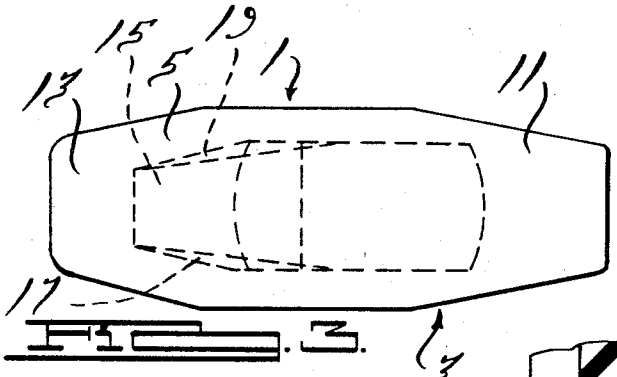


FIG. 3.

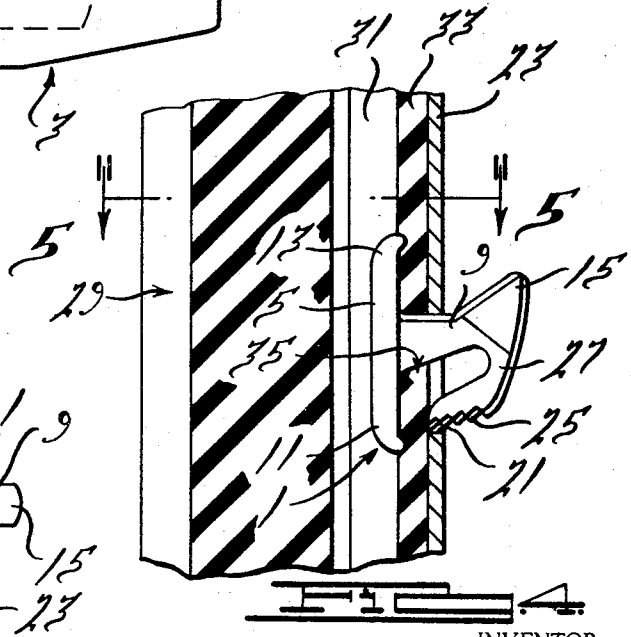


FIG. 4.

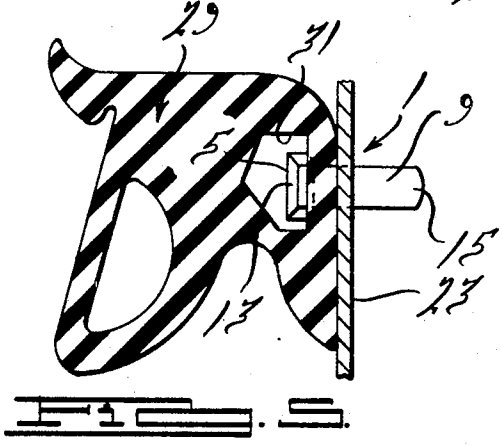


FIG. 5.

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3,411,245

Patented Nov. 19, 1968

3,411,245

FASTENER

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Filed July 21, 1966, Ser. No. 566,945

3 Claims. (Cl. 49—492)

ABSTRACT OF THE DISCLOSURE

A plastic material fastener including an elongated head, a leg portion extending away from the head, and a foot portion connected to the leg portion. The foot portion includes a heel section at the one end thereof adjacent the leg portion and an outer portion having plurality of ridges therein. The fastener extends through apertures in weatherstripping and a panel with the ridges engaging the edge of the aperture in the panel to secure the weatherstripping and panel together.

This invention relates to fasteners, and more particularly to fasteners for connecting weatherstripping to the edges of automotive vehicle doors and the like.

Many of the automobiles presently being manufactured utilize weatherstrip constructions which may be snapped onto the edge of the automotive vehicle doors, rather than being secured to the door by adhesive or the like. One type of fastener currently used for fastening the weatherstrips to the doors comprises a finger-shaped plastic connector having a head at one end embedded in the weatherstrip. The finger is of circular configuration and has a plurality of peripheral rings axially displaced from one another which are adapted to grip the peripheral sides of a hole in the door panel to which the weatherstrip is to be attached. The outer end of the finger is pushed into a respective hole in the door panel and then a hammering force is applied to the weatherstrip behind the fastener to force the latter farther into the hole and the peripheral rings into engagement with the peripheral side of the hole. Close tolerances of the diameters of the holes in the door panel and the diameters of the fingers must be maintained to insure that the latter will frictionally grip the peripheral sides of the holes. If the holes in the door panel are slightly larger than the diameter of the fasteners the latter will not grip the door panel. On the other hand, if the door holes are too small it becomes extremely difficult to force the fingers into the holes. To maintain the close tolerances required, extreme care must be taken during the manufacturing processes of the various parts. This increases the time for and the cost of production of the parts.

Briefly, this invention comprises a plastic fastener having a head portion, a leg portion, and a foot portion, the latter portion having a heel section, and a ridged portion adapted to grip one edge of an aperture in a panel through which the leg portion and foot portion are thrust, for securing weatherstripping to the panel.

One of the primary objects of the present invention is to provide a fastener for securing weatherstripping to an automotive vehicle door which is adapted to connect the weatherstripping securely to the door panel even though the holes in the door panels into which the fasteners extend are not uniform in size or diameter, i.e., extremely

close tolerances of the dimensions of the door panel holes need not be maintained.

Another object of the present invention is to provide a fastener of the class described which is adapted to connect the weatrehstripping securely to the door regardless of the distance the fastener is pushed into a hole in the door panel.

A further object of the present invention is to provide a fastener such as described which may be quickly and easily installed in the weatherstripping and which permits the weatherstripping to be rapidly connected to the automotive vehicle door.

Still another object of this invention is to provide a fastener of the class described which does not have to form a water tight connection due to its position with respect to the weatherstripping and the door.

A further object of this invention is to provide a fastener such as described which is simple and economical in construction and effective when installed.

Other objects and features of the present invention will become apparent as the description progresses.

In the accompanying drawings, in which one of various possible embodiments of this invention is illustrated,

FIG. 1 is an enlarged side elevation of a fastener of this invention;

FIG. 2 is an end view of the fastener shown in FIG. 1, taken from the right-hand end of FIG. 1;

FIG. 3 is a plan view of FIG. 1;

FIG. 4 is a side view of a fastener of this invention as it connects weatherstripping to a door panel, certain parts being broken away and shown in section for clarity; and

FIG. 5 is a section taken along line 5—5 of FIG. 4.

Referring now to the drawings, a fastener of this invention is generally indicated at **1** in FIG. 1. It basically comprises a body **3** having a head **5**, a leg portion **7** and a foot portion **9**. Body **5** is preferably formed of a plastic material such as a homopolymer or copolymer acetal resin, for example.

Head **5** is generally elongated and the end portions **11** and **13** are tapered slightly and turned downwardly slightly toward foot portion **9**. The portion of head **5** extending from leg **7** to end **11** is longer than the portion of head **5** extending from leg **7** to end **13** for a purpose described hereinafter.

The rearward end of foot **9** is formed as a heel section **15** which extends rearwardly from leg **7**. The opposite sides of heel **15** are tapered as indicated at **17** and **19** to facilitate the entry of the heel into a hole or aperture **21** (FIG. 4) in an automotive door panel **23**.

Foot portion **9** extends from the outer end of leg **7** generally back toward the end **11** of head **5**. A plurality of curved ridges or teeth **25** extend between opposite sides of foot **9** at the forward end of the latter. The ridges **25** may extend completely across or partially across the end of foot **9** between opposite sides thereof. However, by being curved completely across the end of foot **9**, as shown, a more secure grip may be accomplished. The portion of foot **9** between teeth **25** and heel **15** is of reduced thickness as indicated at **27** to permit the teeth **25** to be pivoted or swung toward and away from head **5**.

A typical piece of weatherstripping is indicated at **29** in FIGS. 4 and 5. Weatherstripping **29** is preferably formed of a resilient and pliable rubber material and may be spongy or it may be made of a material having a higher density than spongy material. In any event, weather-

stripping **29** has at least one elongate passage **31** running throughout the length thereof. A wall **33** of the weatherstripping is provided with a plurality or series of apertures or holes **35** which are adapted, upon slightly stretching the weatherstripping, to register with the holes **21** in panel **23**.

Although during actual production of the weatherstripping and fasteners the latter may be attached to the former by machines, each of the fasteners may be manually fastened to the weatherstripping **29** in the following manner:

The fastener is grasped and the end **11** is inserted through an aperture **35** in a generally longitudinal manner so that end **11** is headed toward the position shown in FIG. 4. Once the longer end portion **11** has been passed through aperture **35**, the resilient weatherstripping can be sufficiently deformed to permit the shorter end portion **13** to be pushed through the aperture to the position shown in FIG. 4.

After the end head **5** has been placed in passage **31** the resiliency of wall **33** causes the hole **35** to close around the inner end of leg **7** so that the hole **35** and leg **7** have substantially the same dimensions in the region of the hole.

Assuming a strip of weatherstripping has a sufficient number of fasteners connected thereto, installation of the weatherstripping on an automotive vehicle door is as follows:

The heel of one of the fasteners is first inserted in the proper aperture **21** in the door panel **23**. A slight amount of pressure applied to the outside of weatherstripping **29** behind fastener **1** causes the foot **9** to bend slightly as the teeth **25** engage the peripheral side of the respective aperture **21** in the panel. The foot portion **9** remains slightly bent after one or more of the teeth have engaged the peripheral side of aperture **21** so that the teeth **25** and the back of leg **7** are constantly forced outwardly to maintain engagement of the fastener with the sides of the aperture **21**. Normally, a slight amount of pressure on the back of weatherstripping **29** during installation of the fastener will cause the latter to assume the position shown in FIG. 4, i.e., the first few teeth **25** nearest to heel **15**, will slip over the edge of the aperture **21**. However, it is to be noted that the fastener will function just as well for securing the weatherstripping to the door if only the tooth **25** nearest heel **15** engages the side aperture **21**, or if the toothed end **25** is pushed completely through the aperture **21** since the foot **9** will flex back to its normal position and be prevented from being withdrawn through the aperture. The ends **11** and **13** compress the adjacent wall **33** slightly for securely gripping the latter. The remaining fasteners **1** are then sequentially inserted through a series of apertures **21** in the door.

The weatherstripping is preferably attached to a generally vertically extending panel portion of the door, particularly at the bottom of the door. Water flowing into the inside of the door through the space between the outer door panel and the window drains to the bottom of the door. Drain holes are normally provided at the bottom of the door outside the location of the weatherstripping for draining the water from the door. If the weatherstripping were attached to a horizontal panel at the bottom of the door, the connection made by each of the fasteners **1** would have to be waterproof to prevent water from draining through apertures **21** and over the weatherstripping back into the vehicle. By placing the weatherstripping adjacent a generally vertical panel outside and below the sealing juncture it becomes unnecessary to make the connections provided by fasteners **1** waterproof. Water flowing down the vertical panel would be more likely, due to gravity, to flow past the apertures than flow into them. Moreover, even if water did flow through the apertures, the location of the latter below and outside the sealing juncture would prevent the water from entering the vehicle.

It will be noted that the size of the apertures **21** in the door panel **23** may vary slightly without seriously affecting the connection made by the fasteners since the latter will yield different amounts depending upon the size of the particular hole into which a respective fastener is inserted. Thus, it is unnecessary to maintain the extremely close hole size tolerances heretofore required for snap-on weatherstrip fasteners.

In view of the foregoing it will be seen that the several objects of the invention are achieved.

It will be understood that the invention is not to be limited to the exact constructions shown and described, but that various changes and modifications may be made without departing from the spirit and scope of the invention, as defined in the appended claims.

I claim:

1. A fastener for connecting resilient weatherstripping having a plurality of apertures therein to an automotive vehicle door having a plurality of apertures therein with which the apertures in the weatherstripping are adapted to mate, comprising a plastic material body having a head inserted through one aperture in the weatherstripping, said head having a dimension which is substantially larger than the distance between opposite sides of said one aperture in the weatherstripping to hinder removal of said head from the weatherstripping, a leg portion extending from said head through the aperture in the weatherstripping and through one aperture in the door, the leg portion having substantially the same cross sectional dimensions as said one aperture in the weatherstripping after the leg portion has passed through said one aperture in the weatherstripping, the cross sectional dimensions of said leg portion in the region of said one aperture in the door being substantially smaller than the distance between opposite sides of said one aperture in the door, a foot portion extending from the outer end of said leg portion back toward one end of said head, the outer end of said foot portion having elongated teeth extending between opposite sides thereof, at least one of said teeth engaging the door adjacent said one aperture therein for fastening the weatherstripping to the door, said foot portion having a heel section at the end thereof opposite said teeth, the outer end of said heel section being further from said head than the outer end of said foot portion so that said heel section is the leading portion of said fastener when the latter is inserted through said one aperture in said door, said heel section extending from one side of said foot portion to the other side thereof and having side portions tapered inwardly toward the end of said heel section to facilitate entry thereof into said one aperture in said door, said heel section extending away from said leg for preventing removal of said fastener from said aperture in said door, said foot portion having a central portion of reduced thickness between said heel section and said teeth to facilitate pivoting movement of said teeth toward and away from said head.

2. A fastener for connecting apertured flexible material to an apertured panel comprising a plastic material body having a head insertable through an aperture in the material, a leg portion extending from said head and extendable through the material and through an aperture in said panel, a foot portion extending from the outer end of said leg portion generally back toward one end of said head, the outer end of said foot portion having a plurality of ridges extending between opposite sides thereof, at least one of said ridges being engageable with the peripheral side of said aperture in said panel, said foot portion having a heel section at one end thereof opposite said ridges, the outer end of said heel section being further from said head than said outer end of said foot portion so that said heel section is the leading portion of said fastener upon insertion thereof through the aperture in said panel, said heel section extending from one side of said foot portion to the other side thereof and having side

portions tapered inwardly toward the end of said heel section to facilitate entry thereof into the aperture in said panel, said heel section extending away from said leg for preventing removal of said fastener from said aperture in said panel, and said foot portion having a central portion of reduced thickness between said heel section and said ridges to facilitate pivoting movement of said ridges toward and away from said head.

3. A fastener as set forth in claim **2** wherein said head is generally elongated, the portion of said head on one side of said leg being longer than the portion of said head on the other side of said leg to facilitate insertion of said head through the aperture in said flexible material.

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