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(54) **NUT CONNECTOR FOR VEHICLE CLOSURE HARDWARE**

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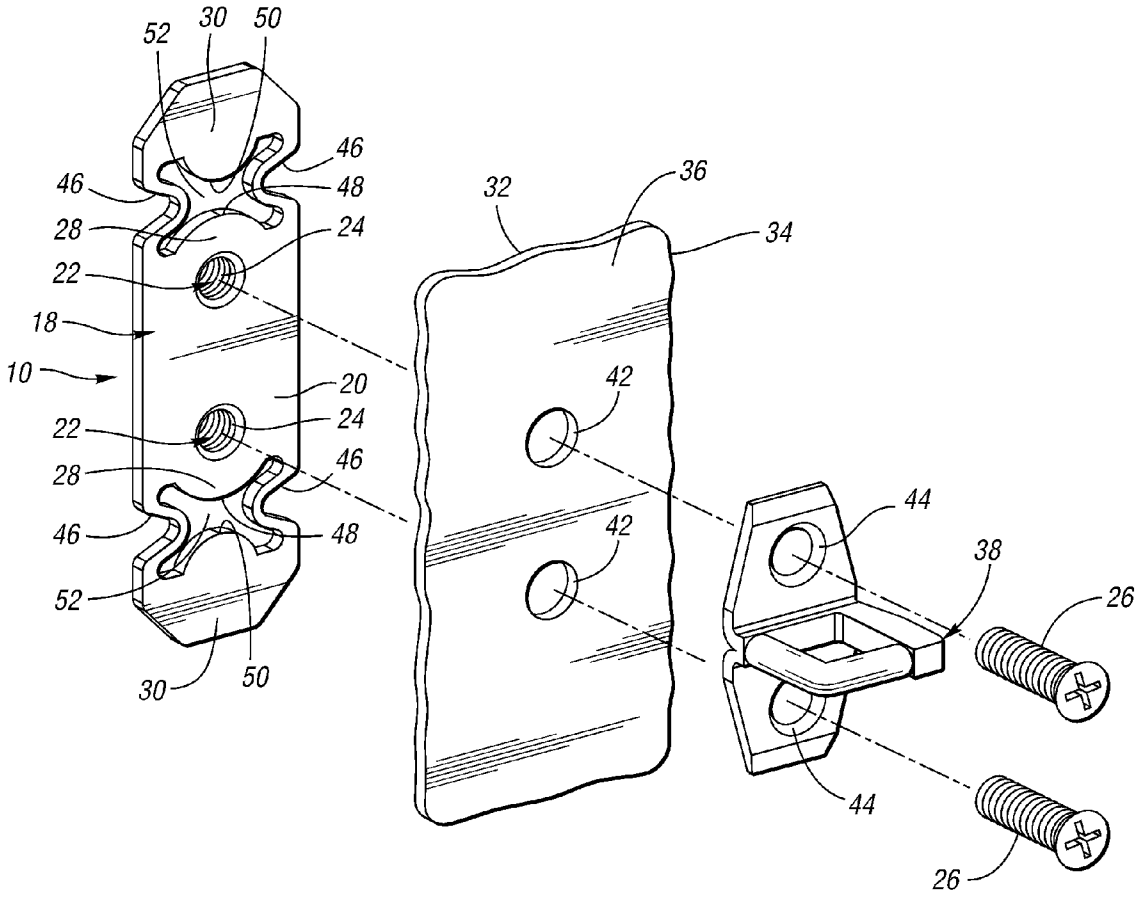
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(57) **ABSTRACT**

A vehicle closure hardware nut connector (**10**) is embodied by a unitary, one-piece stamping (**18**) including a generally flat nut portion (**20**) having at least one stamped nut (**22**), at least one connection tab (**30**) shaped from the nut portion in a coplanar relationship, and at least one deformable connection portion (**46**) that extends between the nut portion and the connection tab coplanar with both and being deformed to provide adjustment of positioning of a vehicle closure hardware component (**38**) on a vehicle body component (**34**). One embodiment of the nut connector (**10**) has a pair of the connection tabs (**30**) and another embodiment of the nut connector (**10'**) has a single connection tab (**30**).



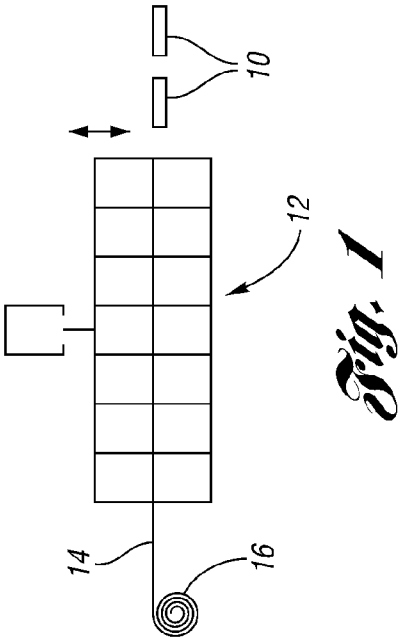


Fig. 1

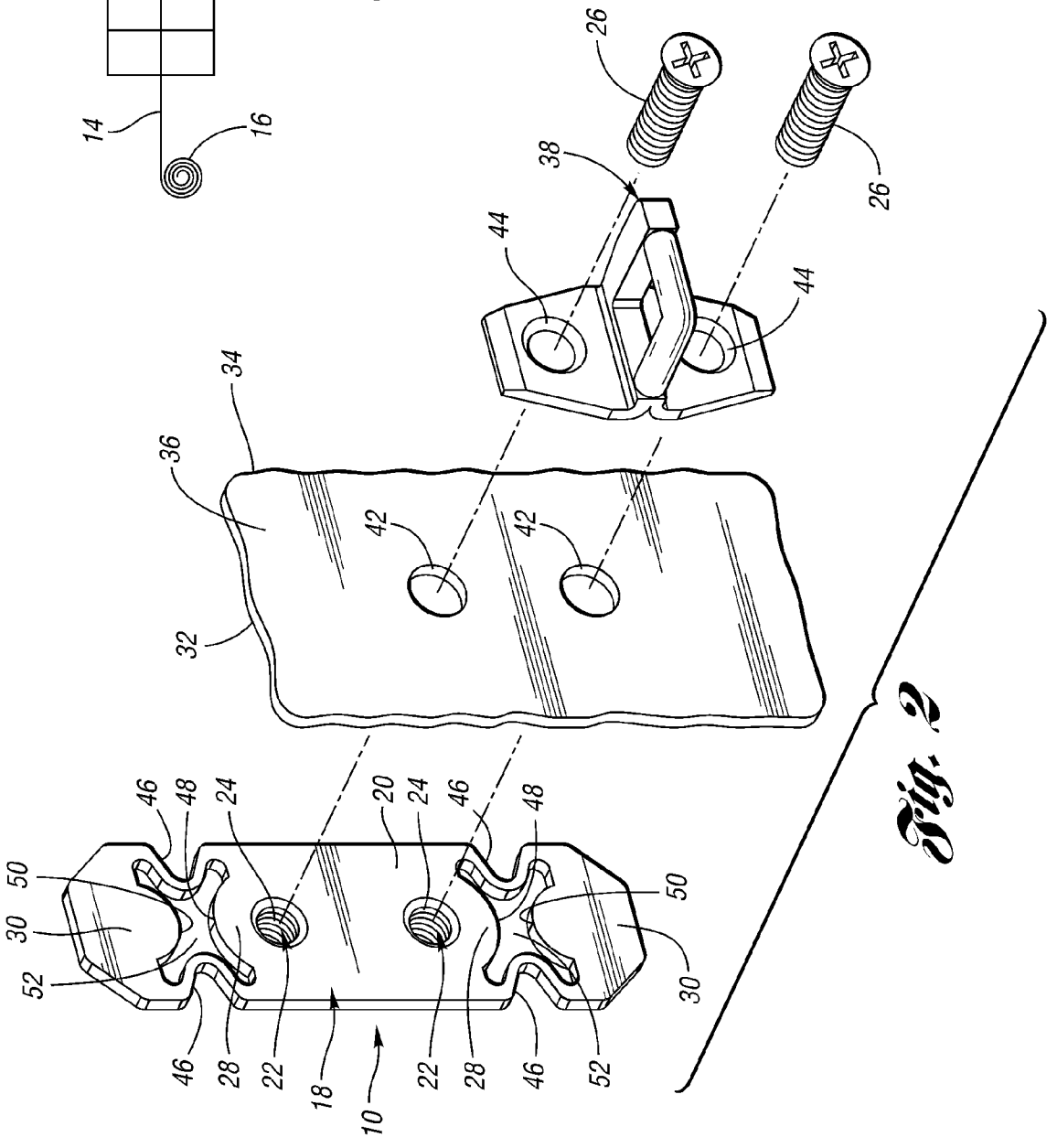


Fig. 2

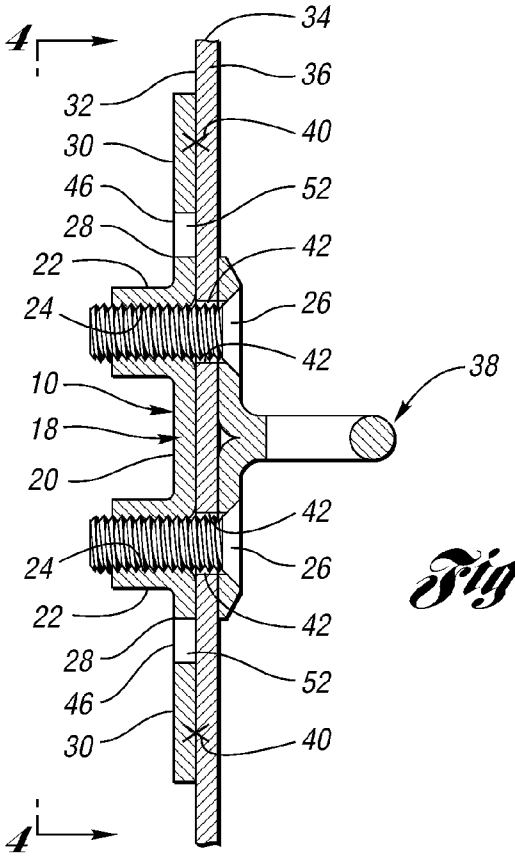


Fig. 3

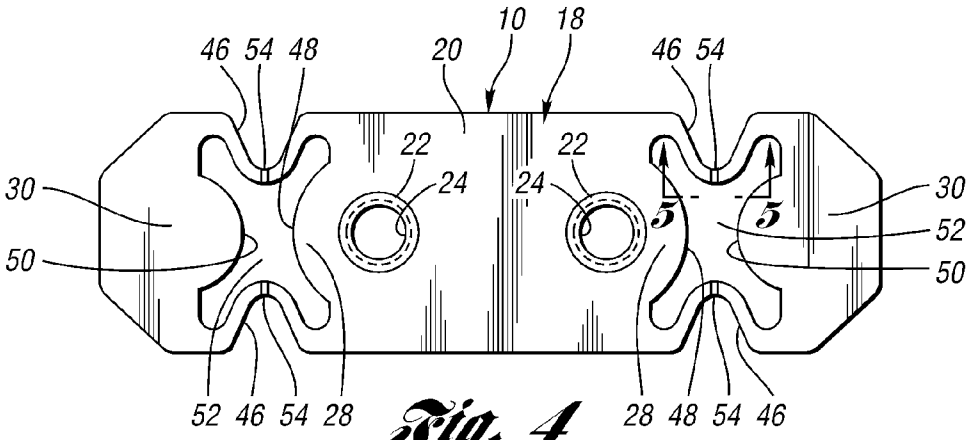


Fig. 4

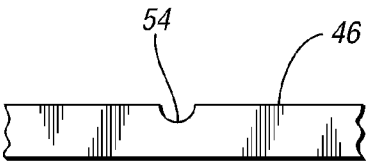


Fig. 5

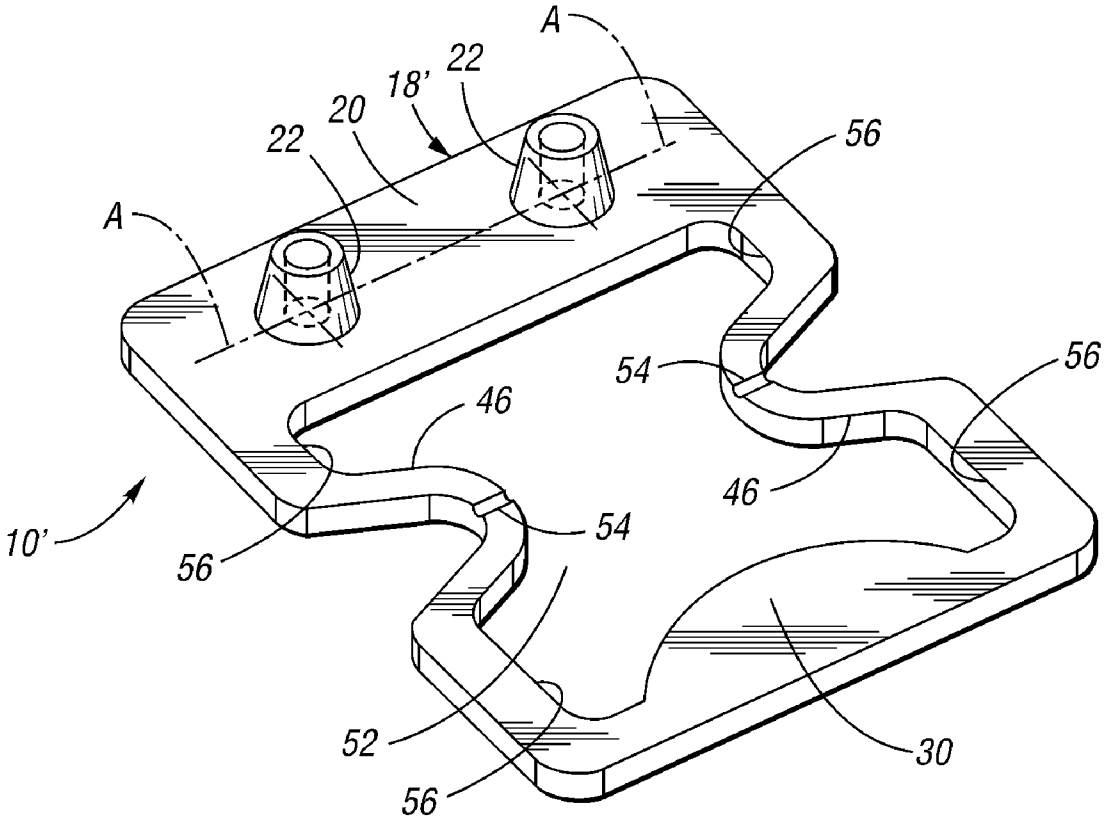


Fig. 6

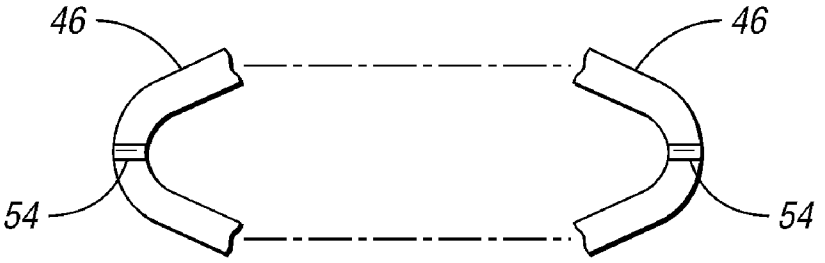


Fig. 7

NUT CONNECTOR FOR VEHICLE CLOSURE HARDWARE

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] This invention relates to a nut connector for vehicle closure hardware.

[0003] 2. Background Art

[0004] Vehicle closures such as doors, front hoods, rear deck lids, rear drop gates, rear lift gates, rear side gates, etc. are supported for movement between open and closed positions and selectively secured in the closed position by hardware including latches, latch strikers, hinges, etc. One way in which such hardware is secured is by nut connectors which can be made as a unitary one-piece stamping made from sheet metal by progressive stamping. Such nut connectors have previously included a generally flat nut portion having at least one stamped nut projecting from its flat shape and having a pair of flat connection tabs that are connected to the nut portion in a coplanar relationship by deformable connection portions that project from the flat shape of the nut portion and the connection tabs. During assembly, the connection tabs are initially secured such as by welding or otherwise to an associated vehicle body portion which has oversized holes aligned with each nut of the nut portion so that a threaded fastener(s) that secures closure hardware on the other side of the vehicle body portion from the nut connector can be threaded to provide a clamped relationship that secures the closure member hardware component.

[0005] If positioning adjustment of the mounted hardware component is necessary, the hardware component can be adjusted, sometimes even without any bolt untightening, merely by an adjusting pound with a hammer. The deformable connection portions of the nut connector deform to permit such adjustment while the connection tabs remain secured by the welds. Since these deformable connection portions project from the plane of the nut portion and the connection tabs, there are space considerations involved. Furthermore, such deformable connection portions require a greater length of metal in order to stamp the nut connector.

SUMMARY OF THE INVENTION

[0006] An object of the present invention is to provide an improved vehicle hardware nut connector.

[0007] In carrying out the above object, the vehicle closure hardware nut connector of the invention is a unitary, one-piece stamping made from sheet metal and includes a generally flat nut portion having at least one stamped nut projecting from its flat shape to receive a threaded fastener. The stamped nut connector also includes a flat connection tab spaced from the nut portion coplanar with its generally flat shape and adaptable to provide initial attachment of the nut connector to one surface of an associated vehicle body portion that has an oppositely facing surface against which a vehicle closure hardware component is contacted and secured by the threaded fastener upon threading into the stamped nut with the vehicle body portion clamped between the nut connector and the vehicle closure hardware component. The stamped nut connector also includes at least one deformable connection portion that extends between the flat nut portion and the connection tab coplanar with both and being deformed while remaining coplanar therewith to provide adjustment of the positioning of the hardware component on the vehicle body portion.

[0008] As disclosed, the generally flat nut portion includes a pair of stamped nuts projecting from its flat shape adjacent its opposite ends for respectively receiving a pair of threaded fasteners that cooperate with each other to secure the vehicle closure hardware component.

[0009] Two preferred embodiments each have a pair of the deformable connection portions connecting the nut portion and the adjacent connection tab in a coplanar relationship. The pair of deformable connection portions have shapes that project either toward each other between the nut portion and the adjacent connection tab or away from each other, and the projecting shapes of the deformable connection portions of each pair have rounded V shapes. These rounded V shapes of the deformable connection portions may each have a notch that affects its deformation upon adjustment of the position of the hardware component on the vehicle body portion.

[0010] In one of the preferred embodiments, the nut portion of the nut connector has a pair of opposite ends and also includes a pair of the connection tabs respectively located adjacent each of the opposite ends of the nut portion. This embodiment also has a pair of the deformable connection portions extending between each end of the flat nut portion and the adjacent connection tab coplanar with both and being deformed while remaining coplanar therewith to provide adjustment of the positioning of the hardware component on the body portion. The opposite ends of the nut portion of this embodiment have rounded shapes that respectively project toward the adjacent connection tabs, and the pair of connection tabs have rounded portions that respectively project toward the rounded shapes of the opposite ends of the nut portion. Each pair of the deformable connection portions have shapes that project toward each other between the adjacent rounded end of the nut portion and the round portion of the adjacent connection tab to provide a generally X-shaped opening.

[0011] In another embodiment, the nut connector includes a single connection tab. This embodiment has the flat nut portion provided with a pair of stamped nuts spaced from each other and projecting from its flat shape to receive a pair of threaded fasteners that cooperate with each other to secure the associated vehicle closure hardware component in the same manner previously described with the first embodiment. Furthermore, the nut connector of this embodiment has a four lobed opening between the flat nut portion and the connection tab. In addition, the projecting deformable connection portions have rounded V shapes that project toward each other and each may include a notch for affecting deformation.

[0012] The second embodiment of the nut connector has the connection tab spaced from the nut portion in a direction perpendicular to a axis extending between the spaced nuts.

[0013] The objects, features and advantages of the present invention are readily apparent from the following detailed description of the preferred embodiments when taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] FIG. **1** is a schematic view illustrating the manner in which a nut connector of the invention is manufactured by progressive stamping.

[0015] FIG. **2** is an exploded perspective view illustrating one embodiment of a vehicle closure hardware nut connector

that cooperates with a pair of threaded fasteners to provide mounting of a closure hardware component on an associated vehicle body portion while permitting adjustment as necessary.

[0016] FIG. **3** is a sectional view taken through the vehicle body component and the nut connector and hardware component to illustrate the manner in which the mounting takes place.

[0017] FIG. **4** is a view of the nut connector taken along the direction of line **4-4** in FIG. **3**.

[0018] FIG. **5** is a partial view taken along the direction of line **5-5** in FIG. **4** through a deformable connection portion of the nut connector.

[0019] FIG. **6** is a perspective view of another embodiment of the nut connector.

[0020] FIG. **7** illustrates the manner in which the deformable connection portions of either embodiment may project away from each other instead of toward each other as shown in the other views.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0021] With reference to FIGS. **1** and **2** of the drawings, a vehicle closure hardware nut connector **10** is made by a progressive stamping system **12** shown in FIG. **1** by progressively stamping sheet metal **14** supplied from a roll **16** which is preferably mild steel. As disclosed, the sheet metal is cold or hot rolled mild steel and after the progressive stamping of the nut connector **10** there is normally no need to perform any heat treating.

[0022] As illustrated in FIGS. **2-4**, one embodiment of the nut connector **10** is a unitary, one-piece stamping **18** made from sheet metal as described above and includes a generally flat nut portion **20**. This flat nut portion **20** as shown in FIG. **3** has at least one stamped nut **22**, and actually two nuts as shown, projecting from its flat shape. Each nut **22** has an interior **24** that may be threaded or unthreaded for receiving a threaded fastener **26** such as a headed and threaded bolt or the like, a self threading fastener being used when the nut is unthreaded. The flat nut portion **20** also has a pair of opposite ends **28** that are respectively located adjacent the pair of nuts **22** as shown in FIGS. **2-4**.

[0023] The nut connector stamping **18** as shown in FIGS. **2** and **3** also includes a pair of connection tabs **30** respectively located adjacent the opposite ends **28** of the nut portion coplanar with its generally flat shape. These connection tabs **30** are used to provide initial attachment of the nut connector to one surface **32** of an associated vehicle body portion **34** that has an oppositely facing surface **36** against which a vehicle closure hardware component **38** is contacted as illustrated by the striker shown in FIGS. **2** and **3**. This striker component **38** is secured by the threaded fasteners **26** upon threading into the stamped nuts **22** with the vehicle body portion **34** clamped between the nut connector and the striker component. More specifically, the connection tabs **30** are conventionally initially secured to the vehicle body portion **34** by welds **40** or otherwise fastened or secured such that the interior of each nut **22** is aligned with an oversize hole **42** of the vehicle body portion in alignment with striker component holes **44** through which the threaded fasteners **26** are inserted to provide the threading and clamping.

[0024] As best illustrated in FIGS. **2** and **4**, the nut connector stamping also includes deformable connection portions **46** that extend between the opposite ends **28** of the flat nut portion **20** and the connection tabs **30** coplanar with both. After the striker component **38** is attached as shown in FIG. **3**, adjustment of its position is possible by deformation of the connection portions **46** while remaining coplanar with the nut portion **20** and the connection tabs **30** which are secured in any suitable manner as previously mentioned to the vehicle body portion **34** such as by the welds **40** shown. This adjustment can be accomplished by an impact blow on the striker component **38** sometimes with and sometimes without unthreading of the fasteners **26** to slightly unclamp the vehicle body portion with respect to the striker component and the nut connector.

[0025] As discussed above, the preferred embodiment of the stamped nut connector **10** as shown includes a pair of the threaded nuts **24** respectively adjacent the ends **28** of the nut portion **20**. These nut portion ends **28** as illustrated in FIGS. **2** and **4** have rounded shapes **48** extending around the adjacent nuts **22** and respectively projecting toward the adjacent connection tabs **30**. Furthermore, the pair of connection tabs **30** have rounded portions **50** that respectively project toward the rounded portions **48** of the opposite ends **28** of the nut portion **20**.

[0026] With continuing reference to FIGS. **2** and **4**, a pair of the deformable connection portions **46** are disclosed as connecting each end **28** of the nut portion **20** and the adjacent connection tab **30** in a coplanar relationship. These deformable connection portions **46** of each pair have shapes that project toward each other between the adjacent end **28** of the nut portion **20** and the adjacent connection tab **30**. It is also possible for the deformable connection portions **46** to project away from each other as shown in FIG. **7**. Furthermore, the projecting shapes of the deformable connection portions **46** of each pair have rounded V shapes that project toward each other and cooperate with the adjacent rounded end **48** of the nut portion **20** and the rounded portion **50** of the connection tab **30** to provide an X-shaped opening **52** which is stamped from the sheet metal roll during the progressive stamping. During adjustment of the striker component as previously described, deformation of the deformable portions **46** permits movement of the nut portion **20** to be adjusted while the connection tabs **30** remain welded in their initial position to the vehicle body portion on which the striker component and nut connector are clamped for positioning. It should be noted that the nuts **22** are initially stamped, the exterior of the nut connector is then stamped to define the interiors of the rounded V shapes of the deformable connection portions **46**, and the holes **52** are then finally stamped into the nut connector.

[0027] As illustrated in FIGS. **4** and **5**, the deformable portions **46** may have notches **54** that provide a reduced thickness so as to affect the extent of deformation for any given impact applied to the hardware component mounted by the nut connector.

[0028] The coplanar relationship of the deformable connection portions **46** with the nut portion **20** and the connection tabs **30** permits the nut connector **10** to be stamped from a metal strip having a smaller distance between the ends of connection tabs than when the connection portions project from the plane of the nut portion and the connection tabs. This coplanar relationship can also be a packaging advantage which is helpful in some applications.

[0029] With reference to FIG. **6**, another embodiment of the vehicle closure hardware nut connector **10'** has the same construction as the previously described embodiment except

as will be noted and thus much of the prior description is applicable and will not be repeated. In this embodiment, the stamping **18'** of the nut connector **10'** has a single connection tab **30** utilized to provide the initial connection to the vehicle body in preparation for the threaded securement in the same manner previously described by threaded fasteners to secure a vehicle closure hardware component. In this embodiment, the opening **52** between the nut portion **20** and the single connection tab **30** is of a four lobed shape including four lobes **56**. Furthermore, the stamped nuts **22** on the nut portion **20** are positioned along an axis A and the connection portion **30** is located in a perpendicular direction to axis A.

[0030] The single connection tab nut connector **10'** of FIG. **6** may also have its deformable connection portions **46** projecting away form each other as shown in FIG. **7** just like the nut connector **10** of FIGS. **2-4**.

[0031] While the preferred embodiments of the invention have been illustrated and described, it is not intended that these embodiments illustrate and describe all possible forms of the invention. Rather, the words used in the specification are words of description rather than limitation, and it is understood that various changes may be made without departing from the spirit and scope of the invention.

What is claimed is:

1. A vehicle closure hardware nut connector comprising:

a unitary, one-piece stamping made from sheet metal and including:

a generally flat nut portion having at least one stamped nut projecting from its flat shape to receive a threaded fastener;

a flat connection tab spaced from the nut portion coplanar with its generally flat shape and adaptable to provide initial attachment of the nut connector to one surface of an associated vehicle body portion that has an oppositely facing surface against which a vehicle closure hardware component is contacted and secured by the threaded fastener upon threading into the stamped nut with the vehicle body portion clamped between the nut connector and the vehicle closure hardware component; and

at least one connection portion that extends between the flat nut portion and the connection tab coplanar with both and being deformed while remaining coplanar therewith to provide adjustment of the positioning of the hardware component on the vehicle body portion.

2. A vehicle closure hardware nut connector as in claim **1** wherein the generally flat nut portion includes a pair of stamped nuts projecting from its flat shape adjacent its opposite ends for respectively receiving a pair of threaded fasteners that cooperate with each other to secure the vehicle closure hardware component.

3. A vehicle closure hardware nut connector as in claim **2** wherein a pair of the deformable connection portions connect the nut portion and the connection tab in a coplanar relationship therewith.

4. A vehicle closure hardware nut connector as in claim **3** wherein the deformable connection portions are selected from the group consisting of deformable connection portions having shapes that project toward each other and deformable connection portions having shapes that project away from each other.

5. A vehicle closure hardware nut connector as in claim **4** wherein the projecting shapes of the deformable connection portions have rounded V shapes.

6. A vehicle closure hardware nut connector as in claim **5** wherein the rounded V shapes of the deformable connection portions each includes a notch that affects its deformation upon adjustment of the position of the hardware component on the vehicle body portion.

7. A vehicle closure hardware nut connector as in claim **1** wherein each connection portion includes a notch that affects its deformation upon adjustment of the position of the hardware component on the vehicle body portion.

8. A vehicle closure hardware nut connector as in claim **1** wherein the nut portion has a pair of opposite ends, further including a pair of the connection tabs respectively located adjacent each of the opposite ends of the nut portion, and a pair of the deformable connection portions extending between each end of the flat nut portion and the adjacent connection tab coplanar with both and being deformed while remaining coplanar therewith to provide adjustment of the positioning of the hardware component on the vehicle body portion.

9. A vehicle closure hardware nut connector as in claim **8** wherein the opposite ends of the nut portion have rounded shapes that respectively project toward the adjacent connection tabs, and the pair of connection tabs having rounded portions that respectively project toward the rounded opposite ends of the nut portion.

10. A vehicle closure hardware nut connector as in claim **8** wherein the generally flat nut portion includes a pair of stamped nuts projecting from its flat shape respectively adjacent its opposite ends for respectively receiving a pair of threaded fasteners that cooperate with each other to secure the vehicle closure hardware component, and the pair of the deformable connection portions having shapes that project toward each other between the adjacent end of the nut portion and the adjacent connection tab.

11. A vehicle closure hardware nut connector as in claim **8** wherein the generally flat nut portion includes a pair of stamped nuts projecting from its flat shape respectively adjacent its opposite ends for respectively receiving a pair of threaded fasteners that cooperate with each other to secure the vehicle closure hardware component, the opposite ends of the nut portion having rounded shapes that respectively project toward the adjacent connection tabs, the pair of connection tabs having rounded portions that respectively project toward the rounded opposite ends of the nut portion, and the pair of the deformable connection portions having shapes that project toward each other between the adjacent rounded end of the nut portion and the rounded portion of the adjacent connection tab and cooperating therewith to provide a generally X-shaped opening.

12. A vehicle closure hardware nut connector as in claim **11** wherein the projecting shapes of the deformable connection portions of each pair of rounded V shapes that project toward each other.

13. A vehicle closure hardware nut connector as in claim **12** wherein the rounded V shapes of the deformable connection portions each includes a notch that affects its deformation upon adjustment of the position of the hardware component on the vehicle body portion.

14. A vehicle closure hardware connector as in claim **1** which includes a single connection tab.

15. A vehicle closure hardware nut connector as in claim **14** wherein the generally flat nut portion includes a pair of stamped nuts spaced from each other projecting from its flat shape to receive a pair of threaded fasteners that cooperate

with each other to secure the vehicle closure hardware component, a pair of the deformable connection portions connecting the nut portion and the single connection tab in a coplanar relationship therewith, the deformable connection portions of each pair having shapes that project toward each other between the nut portion and the adjacent connection tab, and the nut connector having a four lobed opening between the flat nut portion and the connection tab.

16. A vehicle closure hardware nut connector as in claim **15** wherein the projecting deformable connection portions have rounded V shapes that project toward each other.

17. A vehicle closure hardware nut connector as in claim **16** wherein the rounded V shapes of the deformable connection portions each includes a notch that affects its deformation upon adjustment of the position of the hardware component on the vehicle body portion.

18. A vehicle closure hardware nut connector as in claim **15** wherein the connection tab is spaced from nut portion in a direction perpendicular to an axis extending between the spaced nuts.

19. A vehicle closure hardware nut connector comprising:

a unitary, one-piece stamping made from sheet metal and including:

a generally flat nut portion having a pair of opposite rounded ends and a pair of stamped nuts projecting from its flat shape respective adjacent its rounded opposite ends, and each nut having an interior for receiving an associated threaded fastener;

a pair of flat connection tabs respectively located adjacent the opposite rounded ends of the nut portion coplanar with its generally flat shape and adaptable to provide initial attachment of the nut connector to one surface of an associated vehicle body portion that has an oppositely facing surface against which a vehicle closure hardware component is contacted and secured by the threaded fasteners upon respective threading into the stamped nuts with the vehicle body portion clamped between the nut connector and the vehicle closure hardware component, and each connection tab including a rounded portion that projects toward the adjacent rounded end of the nut portion; and

a pair of deformable connection portions that extend between each opposite end of the flat nut portion and the adjacent connection tab coplanar with both, the deformable connection portions of each pair projecting toward each other and cooperating with the adjacent rounded end of the nut portion and the rounded portion of the adjacent connection tab to define a generally X-shaped opening, and the deforming connection portions being deformed while remaining coplanar with both the nut portion and the connection tabs to provide adjustment of the positioning of the hardware component on the vehicle body portion.

20. A vehicle closure hardware nut connector comprising:

a unitary, one-piece stamping made from sheet metal and including:

a generally flat nut portion having a pair of stamped nuts spaced from each other and projecting from the flat shape of the nut portion to receive threaded fasteners;

a single connection tab spaced from the nut portion in a direction perpendicular to an axis extending between the spaced nuts, the connection tab being coplanar with the generally flat shape of the nut portion and adaptable to provide initial attachment of the nut connector to one surface of an associated vehicle body portion that has an oppositely facing surface against which a vehicle closure hardware component is contacted and secured by threaded fasteners upon threading into the stamped nuts with the vehicle body portion clamped between the nut connector and the vehicle closure hardware component; and

a pair of deformable connection portions that extend between the flat nut portion and the connection tab coplanar with both and being deformed while remaining coplanar therewith to provide adjustment of the positioning of the hardware component on the vehicle body portion, the deformable connection portions having shapes that project toward each other, and the nut connector having a four lobed opening between the flat nut portion and the connection tab.

* * * * *