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54 **Lift-off Hinge Assembly.**

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## Description

The present invention relates to a lift-off hinge assembly, particularly for use in hingedly connecting a vehicle door to a vehicle body.

It is known from DE 3406984 to provide a lift-off hinge assembly including a first hinge leaf hingedly connected to a second hinge leaf by a hinge pin rotatably located in one hinge leaf, the hinge pin having a bearing portion upon which the other hinge leaf is seated and being connected to the other hinge leaf by a removable axially compressible collar. The collar is located in the hinge eye of the other hinge leaf and is compressed towards the bearing portion to place the collar under axial compression so that it rotatably locks the hinge pin and the other hinge leaf together.

According to the present invention as defined in independent Claim 1, there is provided a lift-off hinge assembly including a first hinge leaf hingedly connected to a second hinge leaf by a hinge pin rotatably located in one hinge leaf, the hinge pin having a bearing portion upon which the other hinged leaf is seated and being connected to the other hinge leaf by a removable axially compressible collar which is located at least in part within the hinge eye of said other hinge leaf and compression means arranged to urge the collar towards the bearing portion to place the collar under axial compression so that it rotatably locks the hinge pin and other hinge leaf together, characterised in that the collar is of frusto-conical shape and the hinge eye includes an inclined surface portion complementary to the inclined surface of the collar, the hinge pin having a head portion including a connection portion having a diameter less than the minimum diameter of the hinge eye, the collar having an internal axially extending bore in which the connection portion is received, the collar on axial compression being moved toward said bearing portion to cause the collar to wedgingly locate between the connection portion and inclined surface portion and thereby rotatably lock hinge leaf to the hinge pin.

Further preferred embodiments of the invention are defined in dependent Claims 2-7

Various aspects of the present invention are hereinafter described with reference to the accompanying drawings, in which:-

Figure 1 is a plan view of an embodiment according to the present invention shown with the locking means and collar removed;

Figure 2 is a sectional view taken along line II-II of Figure 1; and

Figure 3 is a plan view of an alternative hinge leaf for use in the construction illustrated in Figure 1.

The hinge assembly 10 includes a hinge leaf 12 which is hingedly connected to hinge leaf 14 by

means of a hinge pin 16. In the illustrated embodiment, leaf 12 is intended to be secured to a vehicle door 15 say by welding and leaf 14 is intended to be secured to the vehicle body 13 by means of bolts 17.

The hinge pin 16 has a constant diameter portion 18 which is rotatably received in a bush 20 located in a bore 22 formed in support arm 14a of leaf 14. The bush 20 is conveniently formed from a suitable plastics material such as polytetrafluoroethylene, which may be reinforced for instance with a metal mesh. The pin portion 18 forms the majority of the length of pin 16 and provides a large rotative surface area for rotatably supporting large loads.

The pin 16 is provided with a head portion of relatively short axial extent. The head portion includes a connection portion 26 and a bearing portion 27. The connection portion 26 is slidingly received in an aperture 26a formed in a support arm 28 which forms part of leaf 12.

In use, the support arm 28 bears upon the bearing portion 27 which in turn bears upon support arm 14a via an annular flange 30 of bush 20.

The upper portion of support arm 14a is provided with a projection 34 which is spaced from the upper edge 14b of the support arm 14a to form a groove 14c.

The support arm 28 has an arcuate portion 32 which is arranged to pass through the groove 14c during relative angular movement of the hinge leaves about their hinge axes.

Accordingly whilst the arcuate portion 32 is located within groove 14c, it co-operates with projection 34 to prevent support arm 28 from being axially withdrawn from the head portion 24 of the pin and thereby prevents separation of the hinge leaves 12, 14.

In Figure 1, the arcuate portion 32 terminates at a radially inwardly directed shoulder 36.

Accordingly, if the leaves 12, 14 are rotated about their hinge connection so that shoulder 36 passes beyond the projection 34 it will then be possible to withdraw support arm 28 from the head portion of the pin.

In the embodiment of Figure 3, the support arm 28 has an arcuate portion 32 which terminates at a radially outwardly located shoulder 42.

Accordingly relative angular movement of the leaves 12, 14 is limited during opening movement by virtue of the support arm 14a abutting against shoulder 42.

This is desirable in certain applications as it prevents the door supported on the hinge assembly from being opened to a position whereat it abuts against the surrounding vehicle body.

In order to enable separation of the hinge leaves 12, 14 the arcuate portion is provided with a

recess 46 of sufficient dimensions to enable the projection 34 to pass therethrough on withdrawal of support arm 28 from the head portion of the pin.

The position of the recess 46 along the length of arcuate portion 32 determines the relative angular position of leaves 12, 14 at which separation of the leaves can be effected. In use, this position is normally chosen to enable the door to be lifted at a position whereat it is less likely to interfere with the vehicle body whilst being lifted to separate the hinge leaves.

At least leaf 12, is conveniently made from metal sheeting by stamping and folding operations.

In use at least two hinge assemblies are used to support a vehicle door and the weight of the door applied to the hinges during opening and closing is carried by the relatively long pin portions 18. However to remove the door from the body when the door is in a predetermined position, it is only necessary to raise the door by a relatively small amount (dictated by the length of connection portion 26). In normal usage of the door, a door check is provided to prevent the door opening to a position whereat the hinge leaves may be separated by raising of the door.

As seen in Figure 2, the hinge pin 16 projects sufficiently far beneath the hinge leaf 14 to receive a circlip 50 which prevents the hinge pin 16 from being axially withdrawn from leaf 14. If desired other types of stop means providing a similar function as circlip 50 may be used to prevent axial withdrawal of the pin 16.

The aperture 26a formed in hinge leaf 12 is of circular cross-section and has a minimum diameter portion 26b which is greater than the diameter of head portion of the pin. The head portion of the pin is smooth walled and of cylindrical shape. Accordingly location of hinge leaf 12 onto the head portion 24 is facilitated during remounting due to the clearance between the aperture 26a and head portion of the pin.

In order to rotationally lock hinge leaf 12 to the head portion of the pin locking means are provided in the form of an axially compressible collar 60 which is generally frusto-conical in shape. The collar 60 has an axially extending bore 61 of slightly greater diameter than the head portion of the pin to facilitate insertion of the collar onto the head portion and also its removal from the head portion when in an axially relaxed condition.

A bolt 65 is provided which is screw threadedly received in a threaded bore 66 formed in the upper portion of the hinge pin 16. Tightening of the bolt 65 places the collar under axial compression which causes the collar to move into the aperture 26a. Initially, the inclined outer surface of the collar acts against the walls of the aperture 26a to cause the head portion of the pin to be axially aligned within

the aperture 26a and thereafter, further compression causes the collar to wedgingly locate between the head portion of the pin and the walls of the aperture 26a to thereby rotatably lock hinge leaf 12 to the pin 16. If necessary, the lower end of pin 16 may be provided with means for preventing rotation of pin 16 during tightening of the bolt 65, for instance such means may take the form of a socket for receiving an Allen key.

The collar 60 is preferably made from a resilient material which regains its original shape after axial compression. For instance the collar 60 may be in the form of a split ring which enables the bore of the collar to contract on axial compression of the collar to thereby positively grip the head portion of the pin. The split ring may be conveniently formed from a sintered metal.

Preferably, as shown, the aperture an inclined surface 67 complementary to the inclined surface of the collar. The provision of surface 67 facilitates centralisation of the collar during initial axial compression and also provides a large seat for the collar.

The minimum diameter portion 26c preferably has an axially extending face which serves as an abutment face during initial remounting of the hinge leaf 12 and thereby serves to resist demounting of the hinge leaf 12 from the head portion of the pin prior to insertion of the collar 60 and bolt 65.

The provision of the locking means described above enables the axial length of the connection portion 26 to be reduced to a minimum and thereby provide a lift-off hinge assembly which is capable of separation by lifting the hinge leaves axially apart by a small distance. In the illustrated embodiment it will be noted that the connection portion 26 is of shorter axial extent than the aperture 26a.

If desired, projection 34 may be omitted so that the hinge leaves are separable at any angular position.

Additionally locking means other than a bolt may be provided. For instance the connection portion 26 may be extended and provided with a peripheral groove for the reception of a resilient clip which is arranged to apply axial compression on the collar 60.

## Claims

1. A lift-off hinge assembly including a first hinge leaf (14) hingedly connected to a second hinge leaf (12) by a hinge pin (16) rotatably located in one hinge leaf, the hinge pin having a bearing portion (27) upon which the other hinged leaf is seated and being connected to the other hinge leaf (12) by a removable axially compressible collar (60) which is located at least in

part within the hinge eye (26a) of said other hinge leaf and compression means (65) arranged to urge the collar towards the bearing portion to place the collar under axial compression so that it rotatably locks the hinge pin and other hinge leaf together, characterised in that the collar (60) is of frusto-conical shape and the hinge eye (26a) includes an inclined surface portion (67) complementary to the inclined surface of the collar, the hinge pin having a head portion including a connection portion (26) having a diameter less than the minimum diameter of the hinge eye (26a), the collar (60) having an internal axially extending bore (61) in which the connection portion (26) is received, the collar on axial compression being moved toward said bearing portion (27) to cause the collar to wedgingly locate between the connection portion (26) and inclined surface portion (67) and thereby rotatably lock hinge leaf (12) to the hinge pin (16).

2. A lift-off hinge assembly according to Claim 1, wherein the collar extends axially for the majority of the axial extent of the hinge eye.
3. A hinge assembly according to Claim 1 or 2, wherein the connection portion (26) has an axial extent of the hinge eye (26a) formed in said other hinge leaf.
4. A hinge assembly according to Claim 1, 2 or 3, wherein at least said other hinge leaf is a metal pressing.
5. A hinge assembly according to Claim 1,2,3 or 4, wherein the collar (60) is formed from a resilient material.
6. A hinge assembly according to Claim 5, wherein the collar (60) is in the form of a split ring.
7. A hinge assembly according to Claim 6, wherein the collar (60) is formed from sintered metal.

#### Revendications

1. Un ensemble de charnière dégonflable comprenant une première paumelle (14) de charnière reliée à charnière à une deuxième paumelle (12) de charnière par une fiche de charnière (16) logée à rotation dans une paumelle de charnière, la fiche de paumelle comportant une partie de support (27) sur laquelle l'autre paumelle de charnière est montée et étant reliée à l'autre paumelle (12) de charnière par

un collier amovible (60) compressible axialement qui est situé au moins en partie à l'intérieur de l'oeillet (26a) de charnière de ladite autre paumelle de charnière et des moyens de compression (65) disposés de manière à solliciter le collier vers la partie de support pour placer le collier sous compression axiale de façon à ce qu'il verrouille à rotation la fiche de charnière et l'autre paumelle de charnière entre elles, caractérisé en ce que le collier (60) est de forme tronconique et en ce que l'oeillet (26a) de charnière comprend une partie (67) de surface inclinée complémentaire de la surface inclinée du collier, la fiche de charnière comportant une partie de tête comprenant une partie (26) de connexion d'un diamètre inférieur au diamètre minimal de l'oeillet (26a) de charnière, le collier (60) comportant un alésage interne (61) s'étendant axialement dans lequel la partie de connexion (26) est recue, le collier étant déplacé, par compression axiale, vers ladite partie (27) de support pour amener le collier à se situer en coincement entre la partie de connexion (26) et la partie (67) de surface inclinée et à verrouiller ainsi en rotation la paumelle (12) de charnière à la fiche (16) de charnière.

2. Un ensemble de charnière dégonflable selon la revendication 1, dans lequel le collier s'étend axialement sur la majeure partie de la dimension axiale de l'oeillet de charnière.
3. Un ensemble de charnière selon la revendication 1 ou 2, dans lequel la partie (26) de connexion comporte une dimension axiale de l'oeillet (26a) de charnière formée dans ladite autre paumelle de charnière.
4. Un ensemble de charnière selon la revendication 1, 2 ou 3, dans lequel au moins ladite autre paumelle de charnière est un élément métallique fabriqué à la presse.
5. Un ensemble de charnière selon la revendication 1, 2, 3 ou 4, dans lequel le collier (60) est en une matière élastique.
6. Un ensemble de charnière selon la revendication 5, dans lequel le collier (60) est en forme d'anneau fendu.
7. Un ensemble de charnière selon la revendication 6, dans lequel le collier (60) est en métal fritté.

#### Patentansprüche

1. Hebescharnieranordnung mit einem ersten Scharnierblatt (14), das über einen drehbar im einen Scharnierblatt angeordneten Scharnierbolzen (16) schwenkbar mit einem zweiten Scharnierblatt (12) verbunden ist, wobei der Scharnierbolzen einen Lager- oder Auflageabschnitt (27), auf dem das andere (angelenkte) Scharnierblatt aufsitzt, aufweist und mit dem anderen Scharnierblatt (12) über eine ausbaubare, axial zusammendrückbare Manschette (60) verbunden ist, die sich zumindest teilweise im Scharnierauge (26a) des anderen Scharnierblatts befindet, und einem Zusammenrückmittel (65), das angeordnet ist, um die Manschette gegen den Auflageabschnitt zu drängen und die Manschette unter axiale Kompression zu setzen, so daß sie den Scharnierbolzen und das andere Scharnierblatt drehbar miteinander verriegelt, dadurch gekennzeichnet, daß die Manschette (60) kegelstumpfförmig ausgebildet ist und das Scharnierauge (26a) einen zur Schrägfläche der Manschette komplementären Schrägflächenabschnitt (67) aufweist, der Scharnierbolzen einen Kopfabschnitt mit einem Verbindungsabschnitt (26) eines Durchmessers, der kleiner ist als der kleinste Durchmesser des Scharnierauges (26a), aufweist, die Manschette (60) eine innere, axial verlaufende Bohrung (61), in welcher der Verbindungsabschnitt (26) aufgenommen ist, aufweist, die Manschette bei axialer Zusammendrückung gegen den Auflageabschnitt (27) bewegbar ist, um die Manschette zwischen dem Verbindungsabschnitt (26) und dem Schrägflächenabschnitt (67) zu verkeilen und damit das Scharnierblatt (12) drehbar gegen den Scharnierbolzen (16) zu arretieren.
2. Hebescharnieranordnung nach Anspruch 1, dadurch gekennzeichnet, daß sich die Manschette über den größten Teil der Axialerstreckung des Scharnierauges axial erstreckt.
3. Hebescharnieranordnung nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß der Verbindungsabschnitt (26) eine Axialerstreckung (gleich der) des im anderen Scharnierblatt ausgebildeten Scharnierauges (26a) aufweist.
4. Hebescharnieranordnung nach Anspruch 1, 2 oder 3, dadurch gekennzeichnet, daß zumindest das andere Scharnierblatt ein Metallpreß-(form)teil ist.
5. Hebescharnieranordnung nach Anspruch 1, 2, 3 oder 4, dadurch gekennzeichnet, daß die Manschette (60) aus einem elastischen Material geformt ist.
6. Hebescharnieranordnung nach Anspruch 5, dadurch gekennzeichnet, daß die Manschette (60) in Form eines Schlitzrings vorliegt.
7. Hebescharnieranordnung nach Anspruch 6, dadurch gekennzeichnet, daß die Manschette (60) aus Sintermetall geformt ist.



