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(54) Title: ANTI-CHUCK FEATURE IN LATCH

(57) Abstract: A latch assembly is provided for selectively engaging a striker to releasably secure a door to a motor vehicle body. The latch assembly includes a housing and a ratchet rotatably mounted to the housing for movement between an unlatched position and a latched position retaining the striker. The latch assembly also includes a striker bumper mounted to the housing. The striker bumper includes a bulbous end having an internal cavity for absorbing a striker impact and biasing the striker against the ratchet when the ratchet is in the latched position thereby preventing rattling of the striker against the ratchet.
ANTI-CHUCK FEATURE IN LATCH

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The invention relates to a latch assembly for releasably securing a motor vehicle door in a closed position. More particularly, the invention is related to a latch assembly having an anti-chuck feature for preventing door chuck while maintaining low door opening and closing efforts.

2. Description of Related Art

[0002] Motor vehicles include hinged doors for selectively providing access to an interior passenger compartment or cargo compartment. Typically, a latch assembly is coupled between one of the doors and a motor vehicle body for releasably securing the door in a closed position. More specifically, the latch assembly selectively engages a striker fixedly secured to the motor vehicle body. The latch assembly includes a ratchet and a pawl. The ratchet is movable between a latched position, in which the ratchet retains the striker, and an unlatched position, in which the ratchet releases the striker. The pawl is movable between a ratchet engaged position, in which the pawl is engaged with the ratchet and holds it in the latched position, and a ratchet released position, in which the pawl is disengaged from the ratchet and the ratchet moves to the unlatched position and releases the striker.

[0003] Typically, the latch assembly also includes a striker bumper to receive and absorb an impact from the striker when the door is closed, thus reducing stresses on the latch assembly and closing noise. When the motor vehicle is driven over rough roads or speed bumps, the door tends to rattle causing noise or door chuck, which is considered highly undesirable based on vehicle noise, vibration, and harshness standards. Door chuck is defined as back and forth movement of the strike: within the latch assembly.

[0004] An easy way to avoid door chuck is to increase interference between the striker bumper and the striker. The increased interference, however, increases
opening and closing efforts of the door. Other current approaches to prevent or minimize door chuck include using wedges and striker bolt catches. A
example of a latch assembly using wedges is disclosed in U.S. Pat. No. 4,756,563 to Garwood et al. The relative cost of the wedges and bolt catches is high and as seals on the door age, the noise or door chuck returns.

**SUMMARY OF THE INVENTION**

[0005] According to one aspect of the invention, a latch assembly is provided for selectively engaging a striker to latch a door to a motor vehicle body. The latch assembly includes a housing having an aperture extending between an open end for receiving the striker and an opposing closed end. A ratchet is rotatably mounted to the housing for movement between an unlatched position and a latched position engaging the striker. A pawl is pivotally mounted to the housing and engages the ratchet to retain the ratchet in the latched position. A striker bumper is mounted at the opposing closed end of the aperture and includes a bulb-shaped end for absorbing a striker impact. The bulb-shaped end of the striker bumper includes an internal cavity extending therethrough. A pillow bumper is mounted to the ratchet and compressingly engages the housing when the ratchet rotates past the latched position to an over-travel position. The pillow bumper prevents further movement of the striker within the latch assembly thereby absorbing the energy and sound of the striker against the latch assembly.

**BRIEF DESCRIPTION OF THE DRAWINGS**

[0006] The present invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

[0007] Figure 1 is a fragmentary, perspective view of a motor vehicle including a latch assembly fixedly mounted along a door according to the invention;

[0008] Figure 2 is a perspective view of the latch assembly including a ratchet in an unlatched position;
Figure 3 is a perspective view of the latch assembly including the ratchet in an intermediate latched position retaining the striker;

Figure 4 is a perspective view of the latch assembly including the ratchet in a latched position retaining the striker;

Figure 5 is a perspective view of the latch assembly with the ratchet removed to show a striker bumper;

Figure 6 is a perspective view of the latch assembly with the ratchet removed to show the striker compressing the striker bumper; and

Figure 7 is a perspective view of the latch assembly with the ratchet in an over-travel position compressing a pillow bumper.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to Figure 1, a motor vehicle, generally shown at 10, includes a body portion 12 and a door 14 pivotally hinged to the body portion 12 for movement between an open position and a closed position. In Figure 1, the door 14 is shown in the open position. A latch assembly, generally shown at 16, is fixedly mounted to the door 14 for selectively engaging a striker 18 mounted along the body portion 12 of the motor vehicle 10. The latch assembly 16 engages the striker 18 when the door 14 is closed.

Referring to Figures 2 through 7, the latch assembly 16 is shown with a front faceplate (not shown) removed for illustration. The latch assembly 16 includes a housing 20 having a first side 22, and an opposing second side 24 mounted against the door 14. The housing 20 includes relatively thin peripheral walls 26a, 26b that extend along the first side 22 of the housing 20 and protrude perpendicularly therefrom to define a cavity 28 having a first shelf portion 30 and a second shelf portion 32. A ratchet 34 and pawl 36 are disposed within the cavity 28.

Referring to Figure 5, the ratchet 34 is removed for illustration. A frusto-trapezoidal aperture, generally shown at 38, often referred to as a "fishmouth,"
bisects the first side 22 of the housing 20. The aperture 38 is designed to receive the striker 18 therein. A seal 40, preferably formed from a flexible rubber material, is mounted or otherwise integrally formed with the housing 20 at an open end 42 of the aperture 38. An elastomeric or rubber striker bumper 44 is fixedly mounted at an opposing closed end 46 of the aperture 38 for receiving and absorbing an impact from the striker 18 when the door 14 is closed, thereby reducing stresses on the latch assembly 16 and reducing noise. The striker bumper 44 is preferably made from a thermoplastic elastomer such as that sold under the trademark SANTOPRENE 65 and is a bulb-type design that provides interference with the striker 18 while at the same time maintaining low opening and closing efforts of the door 14. More specifically, the striker bumper 44 includes a bulbous end 48 having an internal generally cylindrical cavity or slot 50 extending therethrough. The slot 50 extends generally perpendicular to the direction of travel of the striker 18. A protrusion 52 formed along an inner wall of the slot 50 extends axially therethrough. The protrusion 52 is disposed along the inner wall of the slot 50 on a side toward the closed end 46 of the aperture 38.

[0017] The ratchet 34 and pawl 36 are preferably constructed from metal and partially covered with a plastic material in order to reduce noise during latch operation. Certain portions that are subject to wear, such as a ratchet tooth 54 and a pawl tooth 56, shown in Figures 2-4 and 7, are not covered in plastic. In the embodiment shown, the pawl 36 includes a pawl tail 58 for optimizing its center of gravity.

[0018] The ratchet 34 is rotatably mounted to the first side 22 of the housing 20 via a pin 60 for movement between an unlatched position, shown in Figure 2, an intermediate latched position, shown in Figure 3, a latched position, shown in Figure 4, and an over-travel position, shown in Figure 7. A groove 62 in the first shelf portion 30 houses a first coil compression spring 64. A tab 66, illustrated with hidden lines, protrudes from an underside of the ratchet 34 and engages one end of the first spring 64. Another end of the first spring 64 engages an end wall 68 of the groove 62.

When the pawl 36 is disengaged, the first spring 64 biases the ratchet 34 in a counterclockwise direction from the latched position, through the intermediate latched
position, to the unlatched position. The ratchet tooth 54 engages a shoulder 70 of the housing 20 to stop the ratchet 34 in the unlatched position. The shoulder 70 is located adjacent the open end 42 of the aperture 38.

[0019] When the door 14 is closed the striker 18 enters a mountr 71 of the ratchet 34 and rotates the ratchet 34 into the intermediate latched position, wherein the pawl tooth 56 engages a hook portion 72 of the ratchet 34, as shown in Figure 3. In the intermediate latched position the ratchet 34 retains the striker 18 loosely. As the door 14 continues to close, the striker 18 rotates the ratchet 34 into the latched position, wherein the pawl tooth 56 engages the ratchet tooth 54, as shown in Figure 4. In the latched position the striker 18 abuts and partially compresses the bulbous end 48 of the striker bumper 44.

[0020] During door slam or vibration conditions, the striker 18 can compress the striker bumper 44 approximately one millimeter further, thereby causing the ratchet 34 to rotate past the latched position until a pillow bumper 74 mounted on or otherwise integrally formed along a peripheral edge 75 of the ratchet 34 compressingly engages the peripheral wall 26a of the housing 20 and becomes a hard stop to prevent further movement of the striker 18. When the ratchet 34 is rotated past the latched position the ratchet 34 is in the over-travel position, as shown in Figure 7. The pillow bumper 74 is preferably made from a polyester elasomer such as that sold under the trademark HYTREL, which has a different "k" value or spring constant than the striker bumper 44. The pillow bumper 74 includes an internal cavity or slot 76 extending therethrough.

[0021] The pawl 36 is pivotally mounted to the first side 22 of the lousing 20 via a pin 78 for movement between a ratchet released position and a ratchet engaged position. A groove 80 in the second shelf portion 32 houses a second coil compression spring 82. A shoulder 84 of the pawl 36 engages one end of the second spring 82. Another end of the second spring 82 engages an end wall 86 of the groove 80, so that the second spring 82 biases the pawl 36 in the counterclockwise direction toward the ratchet engaged position. When the pawl 36 is pivoted in the clockwise
direction to the ratchet released position, the ratchet 34 is free to rotate from the latched position to the unlatched position.

[0022] In operation, as the door 14 is being closed, the striker 18 enters the open end 42 of the aperture 38. The striker 18 then enters the mouth 71 of the ratchet 34, engages the hook portion 72, and rotates the ratchet 34 against the bias of the first spring 64 in a clockwise direction (when viewed from Figure 2) from the unlatched position, through the intermediate latched position, and finally into the latched position. As the ratchet 34 rotates toward the latched position, the striker 18 abuts the bulbous end 48 of the striker bumper 44, which deflects inward due to the slot 50 formed therein. The striker bumper 44 absorbs the energy and sound of the striker 18 engaging the latch assembly 10.

[0023] During this latching movement, the pawl 36 pivots in the clockwise direction (when viewed from Figure 2) and the pawl tooth 56 rides along the peripheral edge 75 of the hook portion 72 of the ratchet 34. The pawl tooth 56 engages the hook portion 72 when the ratchet 34 is in the intermediate latched position, as shown in Figure 3. As the ratchet 34 continues to rotate in the clockwise direction, the pawl tooth 56 rides along the peripheral edge 75 of the ratchet tooth 54 until the pawl tooth 56 engages the ratchet tooth 54 under the bias of the second spring 82, thereby maintaining the ratchet 34 in the latched position, as shown in Figure 4.

[0024] When captured in the mouth 71 of the ratchet 34, the striker 18 is biased against the ratchet 34 by the striker bumper 44. During door slam or vibration conditions, the striker 18 can compress the striker bumper 44 approximately one millimeter farther than when the ratchet 34 is in the latched position. Thus, causing the ratchet 34 to rotate in the clockwise direction (when viewed from Figure 4) to the over-travel position, shown in Figure 7, wherein the pillow bumper 74 compressingly engages the peripheral wall 26a to prevent further movement of the striker 18. Therefore, the latch assembly 10 absorbs the energy and sound of the striker 18 when the door is closed, and during door slam and vibration conditions.
The invention has been described in an illustrative manner, and it is to be understood that the terminology, which has been used, is intended to be in the nature of words of description rather than of limitation. Many modifications and variations of the present invention are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims, the invention may be practiced other than as specifically described.
What is claimed:

1. A latch assembly selectively engaging a striker for releasably securing a door to a motor vehicle body, said latch assembly comprising:

   a housing;

   a ratchet rotatably mounted to said housing for movement between an unlatched position and a latched position retaining the striker; and

   a striker bumper mounted to said housing and including a bulbous end having an internal cavity for absorbing a striker impact and biasing the striker against said ratchet when said ratchet is in said latched position thereby preventing rattling of the striker against said ratchet.

2. A latch assembly as set forth in claim 1 including a pawl pivotally mounted to said housing and engageable with said ratchet to retain said ratchet in said latched position.

3. A latch assembly as set forth in claim 2 wherein said cavity is generally cylindrical, extending axially therethrough in a direction perpendicular to the direction of travel of the striker.

4. A latch assembly as set forth in claim 3 wherein said striker bumper includes a protrusion formed within said internal cavity and extending axially therethrough.

5. A latch assembly as set forth in claim 4 wherein said housing includes an aperture, said aperture extending between an open end for receiving the striker therein and an opposing closed end.

6. A latch assembly as set forth in claim 5 wherein said striker bumper is mounted at said opposing closed end of said aperture.

7. A latch assembly as set forth in claim 6 including a pillow bumper mounted on said ratchet, said pillow bumper compressingly engaging said housing
when said ratchet is in an over-travel position thereby preventing further movement of said striker.

8. A latch assembly as set forth in claim 7 wherein said over-travel position is defined by said ratchet rotating past said latched position.

9. A latch assembly as set forth in claim 8 wherein said pillow bumper includes an internal cavity.

10. A latch assembly as set forth in claim 9 wherein said pillow bumper is integrally formed along a peripheral edge of said ratchet.

11. A latch assembly selectively engaging a striker for releasably securing a door to a motor vehicle body, said latch assembly comprising:

   a housing;

   a ratchet rotatably mounted to said housing for movement between an unlatched position, a latched position retaining the striker, and an over-travel position, wherein said over-travel position is defined by said ratchet rotating past said latched position;

   a striker bumper mounted to said housing and including a bulbous and having an internal cavity for absorbing a striker impact and biasing the striker against said ratchet when said ratchet is in said latched position thereby preventing ratiling of the striker against said ratchet; and

   a pillow bumper mounted on said ratchet, said pillow bumper compressingly engaging said housing when said ratchet is in said over-travel position thereby preventing further movement of the striker.

12. A latch assembly as set forth in claim 11 wherein said pillow bumper includes an internal cavity.

13. A latch assembly as set forth in claim 12 wherein said pillow bumper is integrally formed along a peripheral edge of said ratchet.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC ... Quebec KlA 0C9

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPCs E05B 65/20, 63/00, E05C 3/12, 3/26

USPC 292/341 12, 292/DIG56, 292/DIG40, 16/86

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)

DELPHION, ESP@CENET, CANADIAN PATENT DATABASE

KEYWORDS striker, strike, chuck, bumper, buffer, latch, ratchet, door

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>Y</td>
<td>US 4165112 A (KLEEFELDT, F) 21 August 1979 (21-08-1979) * Col 2, line 54 - Col 3, line 44, Figs 1-3 *</td>
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<td>US 3876238 A (WATERMANN, H) 08 April 1975 (08-04-1975) * Col 2, line 58 - Col 3, line 09, Figs 3 &amp; 7 *</td>
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[X] Further documents are listed in the continuation of Box C

[X] See patent family annex

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents such combination being obvious to a person skilled in the art

& document member of the same patent family

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Name and mailing address of the ISA/CA

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