March 11, 1969 S. M. FREY 3,431,589

INTEGRATED HINGE AND DOOR CHECK ASSEMBLY

Filed April 5, 1967 Sheet 1 of 2

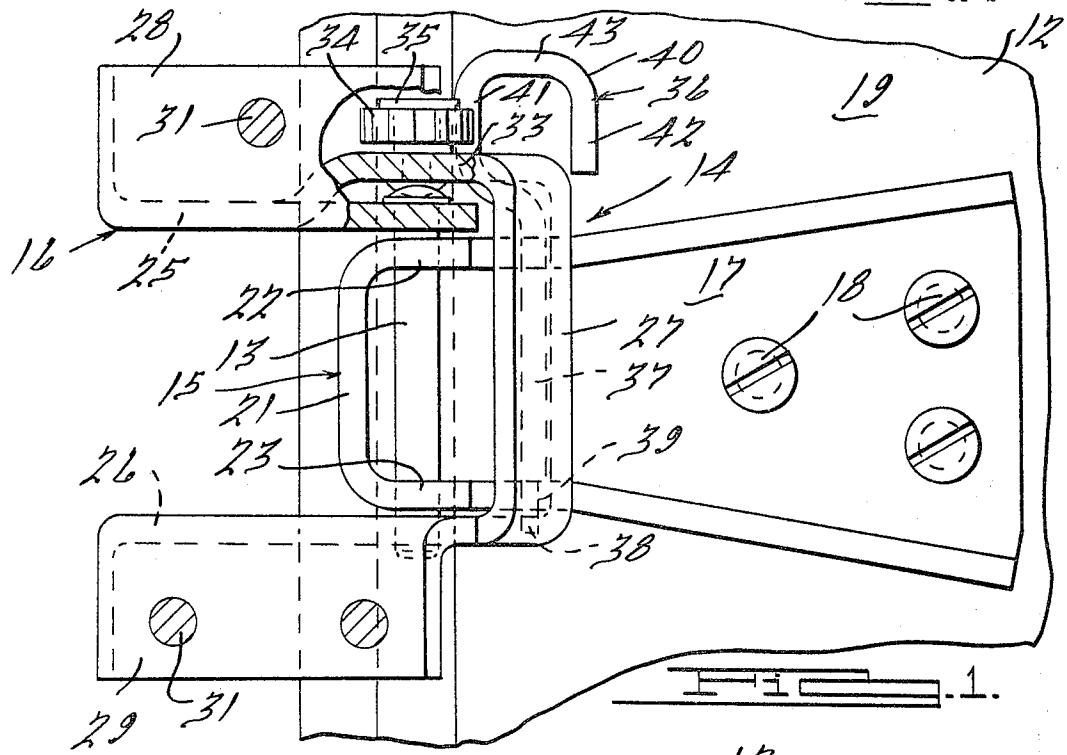


FIG. 1.

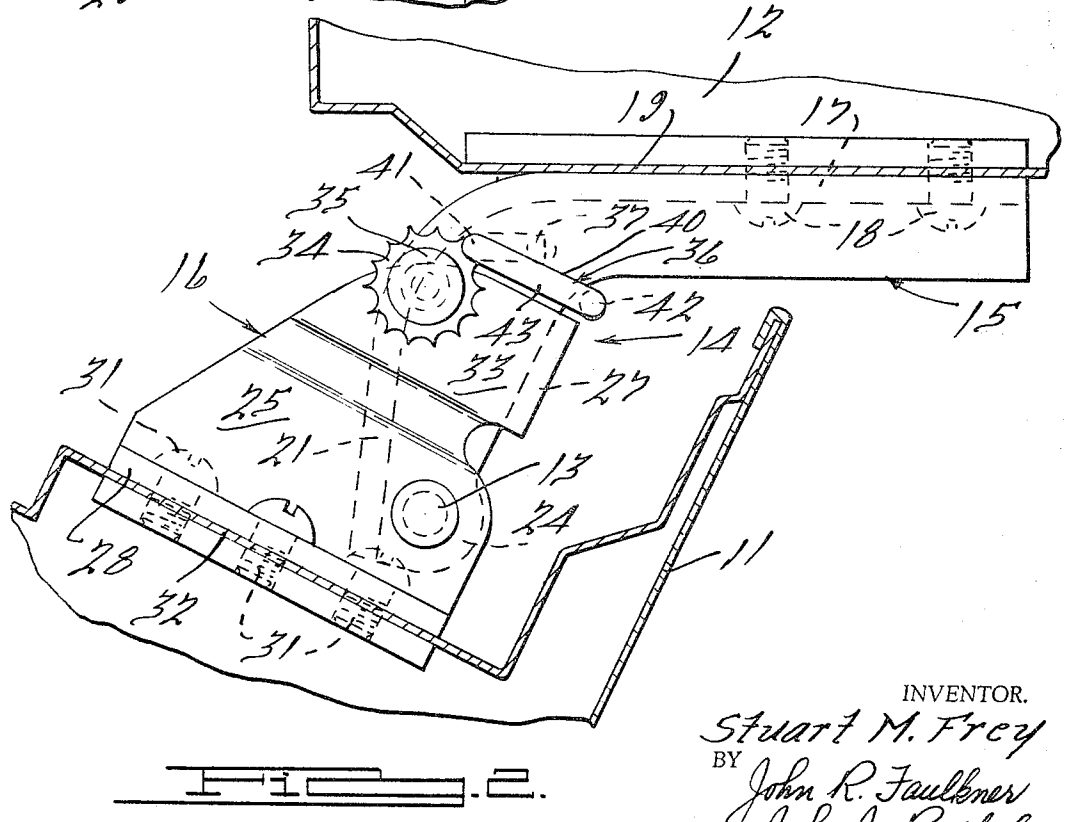


FIG. 2.

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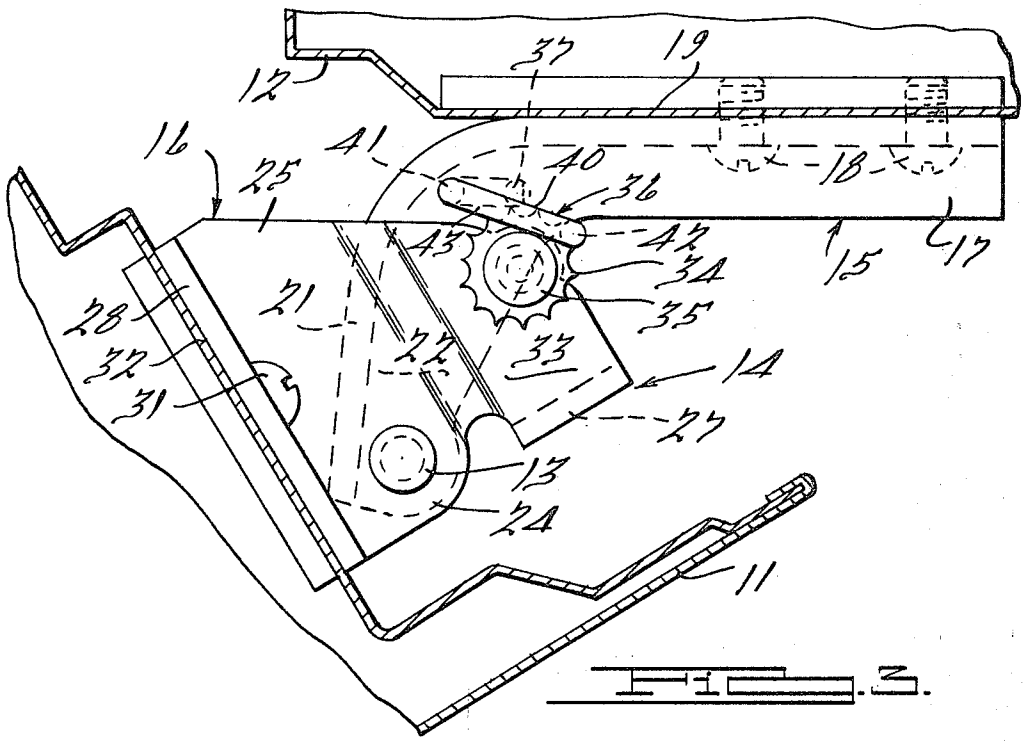


FIG. 3.

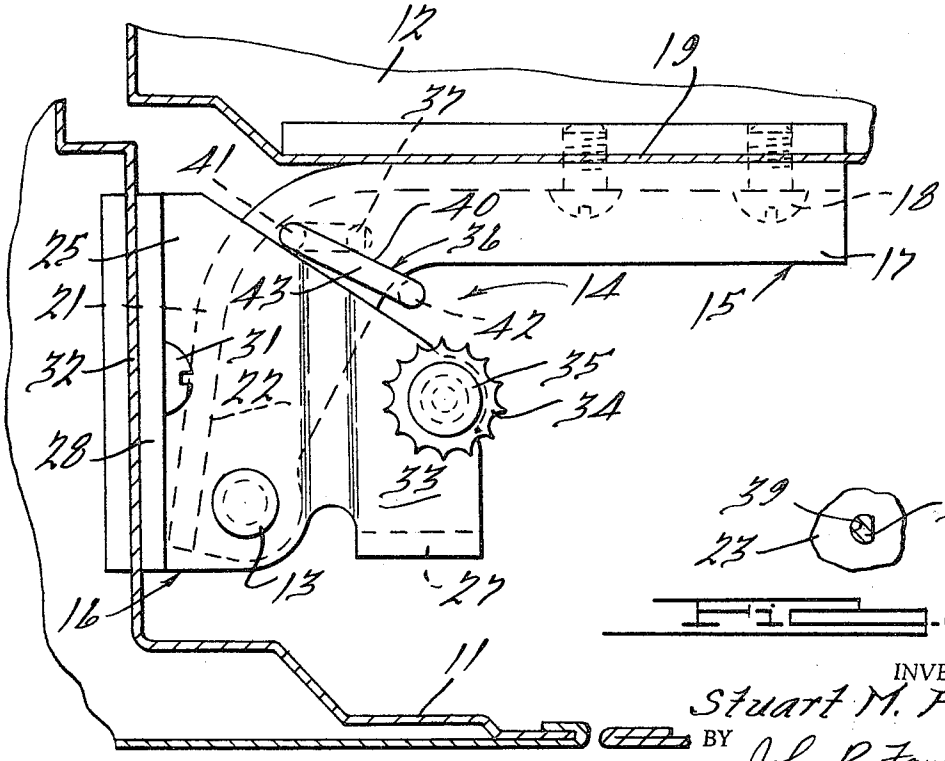


FIG. 5.

FIG. 4.

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INTEGRATED HINGE AND DOOR CHECK ASSEMBLY

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Int. Cl. E05d 11/54

ABSTRACT OF THE DISCLOSURE

An integrated hinge and door check assembly for a vehicle door in which the door checking and hold open feature is obtained through the interference of a torsion member with a roller element movable in a predetermined path, the torsion member and roller element being movable relative to one another as the door is swung to opened and closed positions. Upon sufficient force being exerted on the door to swing the latter in an opening or closing direction, the torsion member when engaged by the roller is deflected and overriden by the latter.

Background of the invention

The primary function of any door check mechanism for a vehicle door structure is to maintain the vehicle door in a predetermined opened position until the vehicle occupant overrides the hold open mechanism by exerting a closing force on the door. A secondary function of a door check mechanism is to slow down the swinging movement of the door as it is swung to an opened position, although modern vehicle doors are generally well cushioned against being slammed too hard into the body opening by the resilient weatherstrip material that forms the weather tight seal between the perimeter of the door and the adjacent body structure surfaces.

An integrated door hinging and checking mechanism absorbs quite a bit of abuse during the lifetime of the vehicle. The average vehicle door is a relatively heavy structure when loaded down with a window regulator mechanism, a latch mechanism and other accessories. As the door is swung to an open position there is a rather abrupt engagement of the door checking and holding elements. Accordingly, these elements must be durable, must be designed so as to provide a minimum of shock transmittal to the door and body structure upon engagement and must engage each other without an undesirable amount of noise being involved.

The present invention provides an integrated hinge and door check assembly having the desired operating characteristics.

Summary of the invention

The present invention embodies an integrated hinge and door check assembly for hinging a vehicle door structure on a vehicle body structure. The assembly comprises a first hinge member having two angularly related leg portions substantially L-shaped with one leg secured to one of the structures and the other leg projecting outwardly therefrom. Cooperating with the hinge member secured to the first of said structures, which may be the body structure, is a second hinge member secured to the other of the structures, which may be the vehicle door structure. The second hinge member has spaced substantially parallel portions straddling the outwardly projecting leg of the first hinge member. Hinge pin means pivotally connect the two hinge members for swinging movement relative to one another, the hinge pin means passing through the outwardly projecting leg of the first hinge member. The first hinge member has a torsion member projecting therefrom into the path of a roller element

journalled on the second hinge member. The roller element is positioned to deflect the torsion member and to override the latter as the vehicle door structure is swung from a closed to an opened position. The resistance of the torsion member to deflection and to being overriden in door structure closing direction is effective to hold the door structure in an opened position until sufficient manual force is exerted to overcome such resistance.

Brief description of the drawing

Other objects, advantages and features of the present invention will be made more apparent as this description proceeds, reference being had to the accompanying drawings, wherein:

FIG. 1 is a side elevational view of a preferred embodiment of the integrated hinge and door check mechanism according to the present invention;

FIG. 2 is a plan view of FIG. 1 having added thereto fragmentary portions of the vehicle body structure and vehicle door structure and showing the hinge and check assembly as it appears when the door structure is in a fully opened position relative to the body opening;

FIG. 3 is a view in part similar to FIG. 2 showing the relationship of the parts of the hinge and check assembly when the vehicle door is an intermediate opened position relative to the body structure; and

FIG. 4 is a view in part similar to FIG. 2 showing the parts of the hinge and check assembly when the vehicle door is in fully closed position relative to the vehicle body structure.

FIG. 5 is a view of the cross section of the end of the torsion bar.

Description of the preferred embodiment

Referring now to the drawings, the reference numeral **11** indicates a motor vehicle door structure hinged to an adjacent vehicle body structure or pillar **12** for pivotal movement about a hinge axis defined by a hinge pin **13**. The hinge pin **13** is a part of an integral hinge and door checking assembly, generally designated **14**, embodying the present invention.

The integral hinge and door checking assembly comprises two hinge members, a body side hinge member **15** and a door side hinge member **16** pivotally coupled by the hinge pin **13**. The body side hinge member **15** has two angularly related leg portions, i.e., it is substantially L-shaped as viewed in FIG. 2, with one leg **17** secured by bolts **18** to a wall **19** of the body pillar **12** and the other leg **21** projecting outwardly from the face of the wall **19** of the body pillar. In cross section the body side hinge member **15** is channel shaped, the side walls **22** and **23** of the outwardly projecting leg **21** being substantially parallel and apertured near the free end **24** of the latter to receive the hinge pin **13**.

The door side hinge member **16** has substantially parallel leg portions **25** and **26** joined by a laterally offset base portion **27**. Each leg terminates in a flange **28** and **29**, respectively, through which the body side hinge member is secured by bolts **31** to an end wall **32** of the door structure **11**.

The leg portion **25**, which is the upper leg portion as viewed in FIG. 1, has an upwardly offset section **33** which parallels the plane of the leg portion **25** and forms a platform on which an indented roller **34** is journalled on pivot stud **35**. The indented roller **34** projects over the edge of the platform **33** for engagement with a torsion member, generally designated **36**.

The torsion member **36** is formed of resilient rod stock and has an elongated cylindrical portion **37** which extends between the two parallel side walls **22** and **23** of the body side hinge member **15**. At its lower end the elongated portion **37** of the torsion member **36** is D-shaped, see FIG. 5.

This D-shaped end portion 38 projects through a complementary aperture 39 in the lower side wall 23 of the body side hinge member 15. The lower end of the rod 37 is thus anchored against rotation.

The upper end of the torsion member 36 above the body side hinge member 15 terminates in a loop 40 which has a substantially square shape in that it has substantially vertically extending parallel legs 41 and 42 connected by a horizontally extending upper portion 43. The vertical legs 41 and 42 are laterally offset from the axis of the elongated rod portion 37 of the torsion member 36 and thus are able to act as crank arms tending to twist the elongated rod portion 37 about its longitudinal axis. It is the resistance of the torsion member 36 to twisting about the longitudinal axis of its portion 37 which provides the door checking and holding feature of the present invention. The manner in which this occurs will be understood with reference to the following statement of the operation of the mechanism.

Operation

Referring now to FIG. 4, the parts of the integrated hinge and door check assembly embodying the present invention are shown in the position they would occupy when the vehicle door is in a closed position relative to the body opening in which it is received. The indented roller 34 is substantially displaced relative to the torsion member 36 and there are therefore no forces being exerted on any part of the mechanism other than the normal door support forces on the hinge pin 13.

When the vehicle door is swung about the hinge pin 13 in a counterclockwise direction as viewed in the drawings, the indented roller 34 engages the vertical leg 42 of the loop 40 of the torsion member 36. As the roller 34 rolls over the vertical leg portion 42 it causes the latter to be deflected in the direction of the door panel 19 supporting the body side hinge member 15. The deflection forces on the vertical leg 42 are transmitted through the connecting portion 43 to the leg 41 and down through the rod portion 37 of the torsion member 36 creating axial twisting of the portion 37. This continues until the roller reaches the position substantially as shown in FIG. 3, i.e., the position in which the door is partially opened. If desired, the opening movement of the door could be terminated here. The door would be held in the partially opened position since the vertical leg 42 of the torsion member 46 would have sprung back to its original position and would require the application of manual force on the door in order again to be deflected so the door could be swung back to a closed position.

If sufficient force is exerted on the door in its opening direction the roller 34 will continue to move past the vertical leg 42 into engagement with the vertical leg 41 of the torsion member 36. Again the roller would deflect the leg 41 setting up a torsional resistance in the torsion rod portion 37 of the torsion 36 and the roller would override the vertical leg 41 until the position shown in FIG. 2 was reached, i.e., a fully opened position of the door. The door would now be held in a fully opened position.

The laterally offset base portion 27 of the door side hinge member upon abutting the edges of the side walls 22 and 23 of the projecting leg 15 acts as a positive stop limiting the extent to which the door may be moved to a fully opened position. The door is thus held in its fully opened position through the action of the base wall 27 abutting the edges of the side walls 22 and 23 of the projecting leg 15 and through the relationship of the roller 34 with the leg 41 of the torsion member 36.

In order that the door may be swung from the fully opened position shown in FIG. 2 back to the fully closed position shown in FIG. 4, it is only necessary to exert sufficient manual force on the door to cause the roller 34 to deflect the leg 41 causing the torsional or axial deflection of the torsion rod portion 37 of the torsion member 36 and permitting the roller 34 to override the leg 41. The roller 34 will, of course, also abut the vertical leg 42 of the torsion member 36 and shove it aside as the roller overrides on its way to the inoperative position shown in FIG. 4.

It will be understood that this invention is not to be limited to the exact construction shown and described but that various changes and modifications may be made without departing from the spirit and scope of the invention.

I claim:

1. An integrated hinge and door check assembly for hinging a vehicle door structure on a vehicle body structure, comprising:

a first hinge member having two angularly related leg portions one leg of which is secured to one of said structures and the other leg of which projects outwardly from said one structure,

a second hinge member secured to the other of said structures having spaced substantially parallel portions straddling the outwardly projecting leg of the first hinge member,

hinge pin means pivotally connecting the parallel portions of the second hinge member to the outwardly projecting leg of the first hinge member,

an elongated torsion member projecting from said first hinge member and having a terminal loop portion at one side of the first hinge member,

a roller element journalled on said second hinge member,

said terminal loop portion having spaced substantially parallel roller element engageable sections positioned in offset relationship to the longitudinal axis of said torsion member,

said roller element being positioned to sequentially engage said torsion member roller element engageable sections to twist said torsion member about its longitudinal axis and to override said secitons as said vehicle door is swung from closed to opened position,

the resistance of said torsion rod to deflection being effective to hold said door structure in a partially opened or fully opened position depending on the respective section of the loop portion engaged by the roller element until sufficient manual force is exerted to overcome such resistance.

2. An integrated hinge and door check assembly according to claim 1 in which a vertical portion connects the parallel portions of the second hinge member and abuts the outwardly projecting leg of the first hinge member to provide a positive stop to limit movement of the door structure in opening direction.

References Cited

UNITED STATES PATENTS

3,370,317 2/1968 Marchione ---------- 16—139

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