Nov. 24, 1959 J. H. ROETHEL 2,914,353

DOOR LOCK MECHANISM

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FIG. 1.

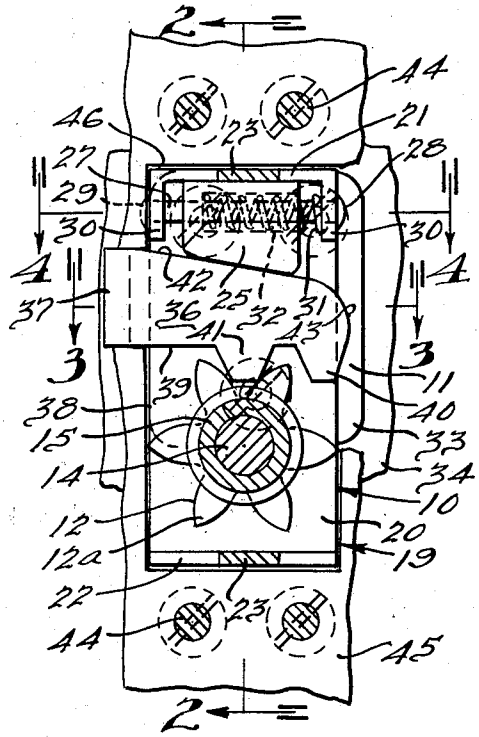
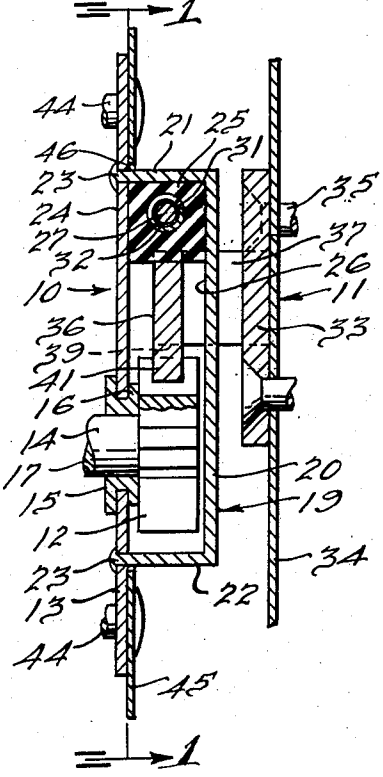


FIG. 2.



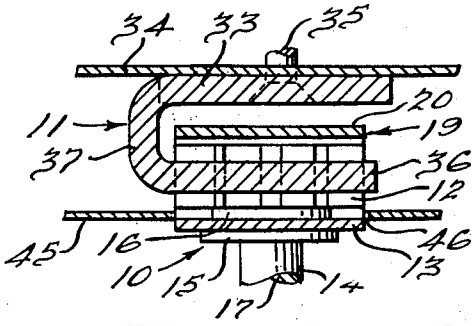


FIG. 3.

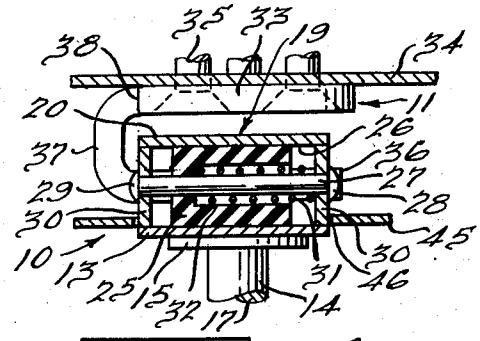


FIG. 4.

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DOOR LOCK MECHANISM

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5 Claims. (Cl. 292—280)

This invention relates to a latch device and keeper or striker device interlock construction and arrangement particularly adapted for use on vehicle bodies.

More particularly the present invention is concerned with the provision of an improved construction and arrangement of a cooperative latch device and keeper or striker device adapted to effectively maintain a vehicle door in latched condition relative to a vehicle body frame or pillar member. The structure embodying the present invention comprises a latch device pivotally mounted adjacent the outer face of a latch mechanism plate. The latch device shaft is journalled in suitable fixed bearing or bushing means rigidly secured to the plate. The latch device performs the usual function of maintaining the door in latch condition, that is, against swinging movement from a closed to an open position until the latch mechanism is released.

The embodiment of the invention herein illustrated provides against lateral disengagement of the latch device from the keeper or striker device. The conventional latch device coacting with a striker or keeper device is intended only to hold a vehicle door in closed or latched condition against swinging movement about the door hinges. However, such devices frequently fail to keep the vehicle door securely latched under abnormal conditions, such as when the vehicle is involved in a collision or is upset. The modern vehicle body is only a relatively rigid structure. Collision or upset impacts often cause body deformation and relative movement between the vehicle body components and more particularly between the doors and door framing members. Such body deformation and resultant relative movement of the vehicle door and framing member or body pillar may cause the latch device to be pulled away from the striker or keeper device in a direction longitudinally of the vehicle body permitting the vehicle door to fly open and the vehicle occupants to be thrown from the vehicle even though the latch mechanism itself remains in latched condition.

It is an object of the present invention to provide a simple and inexpensive improvement in a cooperating latch device and striker or keeper device which will effectively inhibit lateral movement, that is, movement in a direction longitudinally of a vehicle body, to a degree sufficient to prevent the latch device and keeper or striker device from becoming laterally disengaged. It will be understood that some degree of lateral movement must be permitted to occur since certain tolerances and clearances must be allowed in the fitting together of the vehicle body components to compensate for manufacturing inaccuracies. The present invention permits normal manufacturing tolerances and clearances to be maintained while at the same time making provision for limiting the permissible lateral movement of the latch device and keeper or striker device relative to one another so that the two cannot become abnormally disengaged.

Briefly, the object of the present invention is achieved by placing a vertically extending strap member on the front face of the latch mechanism plate. The strap member is open at the sides thereof. The striker or keeper device is in the form of a hook-like member, the latter being secured to a mounting plate at the rear edge thereof and projecting outwardly in such a manner as to be adapted to enter between the strap member and the latch plate from the leading side of the strap member as the door swings from an open to a closed position. The lower edge of the hook-like member is provided with tooth-like projections adapted to engage the latch device to retain the door in door latched condition. The upper edge of the striker or keeper hook-like member is inclined from front to rear, the angle of inclination being relatively small. The inclined upper surface of the hook-like member is adapted to cooperate with a wedge member slidably mounted within the strap member at the upper end thereof.

With the latch device in engagement with the tooth-like projections on the underside of the hook-like member and the wedge member in engagement with the inclined upper surface of the hook-like member, the free edge wall of the swinging door is held against vibratory movement in a vertical direction. At the same time, the hook-like member, having been interposed between the strap and the latch plate, is effective to prevent such relative movement of the latch device and keeper or striker device as could cause the two to become abnormally disengaged.

Further objects, advantages and features of the present invention will be apparent from the following description taken in conjunction with the accompanying drawing, wherein:

Fig. 1 is a view in part sectional taken substantially through line 1—1 of Fig. 2 looking in the direction of the arrows and illustrating the cooperative relationship between the latch device and striker or keeper device, as exemplified by the illustrated embodiment of the present invention, when the latch device is in door latched position;

Fig. 2 is a sectional view taken substantially through line 2—2 of Fig. 1 looking in the direction of the arrows;

Fig. 3 is a sectional view taken substantially through line 3—3 of Fig. 1 looking in the direction of the arrows; and

Fig. 4 is a sectional view taken substantially through line 4—4 of Fig. 1 looking in the direction of the arrows.

Before explaining in detail the present invention, it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawing, since the invention is capable of other embodiments and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

In the drawing there is illustrated, by way of example, a particular embodiment of the present invention as applied to the door and door frame structures of an automobile body. The embodiment of the invention as illustrated in Figs. 1 to 4, inclusive, comprises a latch device, generally designated **10**, and a striker or keeper device, generally designated **11**. The latch device **10** is exemplified as a gear type or rotary bolt **12** having a number of radially projecting tooth-like projections **12***a*, such as six, which are spaced equally around the periphery of the bolt. The latch bolt **12** is pivotally or rotatably mounted on a latch plate **13** by means of a pivot shaft **14** which is journalled in a suitable fixed bushing or bearing means **15**. Preferably, the bushing or bearing means is provided with a flange **16** adapted to act as a spacer between the latch plate **13** and the rotary bolt **12**.

It will be understood that the end portion **17** of the pivot shaft **14**, which is shown broken off, normally carries a ratchet member (not shown). The ratchet

member cooperates with the other elements of the latch mechanism whereby the latch bolt **12** may be held against rotation in door unlatching direction or may be released so as to be freely rotatable in door unlatching direction. The operative mechanism of the latch mechanism forms no particular part of the present invention and the foregoing brief statement is deemed sufficient for an understanding of the present invention.

Referring again to the drawing and more particularly to Fig. 2, it will be noted that the latch plate **13** has attached to its front face **18** a channel shaped member **19** hereinafter more particularly referred to as a strap. The strap **19** is provided with a vertically extending main plate portion **20** and upper and lower horizontally extending leg portions **21** and **22** respectively. The leg portions space the strap plate portion **20** outwardly of the outer face of the bolt **12**. Each leg portion is provided with a tab portion **23** which extends through a complementarily shaped slot in the plate **13**. The portion of each tab **23** projecting beyond the inner face **24** of the plate **13** is suitably riveted or staked over thereby securing the strap **19** on the latch plate **13**.

The underside of the upper horizontal leg **21** provides in part a slideway for a make-up wedge **25**. The wedge **25** may be made of pressed metal containing a suitable lubricant or may be made of a suitable plastic composition material. In preferred practice the plastic is nylon. The wedge **25** is slidably supported beneath the upper horizontal leg portion **21** and between the front face **18** of the latch plate **13** and inner face **26** of the strap plate portion **20** by a guide rod **27** which extends through the wedge **25**. The guide rod **27** has its ends **28** and **29** anchored in end wall sections **30** which may be formed by turning end extensions of the upper leg portion **21** downwardly at a right angle thereto. To resiliently urge the wedge **25** outwardly, or to the left as viewed in Fig. 1, along its guide rod, a coiled spring **31** is provided. The spring **31** surrounds the inner end of the guide rod **27**. One end of the spring **31** abuts the inner face of adjacent end wall **30** and the other end of the spring lies within a recess or counterbore **32** in the wedge **25**. The function of the wedge **25** will be hereinafter explained.

The striker or keeper device **11** embodying the present invention comprises a plate member **33** of substantially square shape adapted to be secured to a vehicle body pillar **34** by suitable bolts **35**. As best seen in Fig. 3, a sectional view of the striker or keeper device **11** taken substantially through the center thereof shows it to be U-shaped in appearance. This results from the fact that the striker or keeper device is provided with a horizontally extending hook-like or finger-like member **36** which is spaced from the main plate portion by a rib **37**, the hook-like member **36** being connected to the plate **33** by the rib **37** at the rear or inner edge **38** thereof.

The hook-like member is somewhat narrower vertically than the plate **33**. At its lower edge **39** the hook-like member is provided with a pair of downwardly depending tooth-like projections **40** and **41**. The tooth-like projections **40** and **41** are adapted to coact with the tooth-like projections **12***a* on the latch bolt **12**, as will be more fully explained. The upper surface **42** of the hook-like member is upwardly inclined from its rounded leading edge **43** toward the rear, as best seen in Fig. 1. Thus, the upper portion of the hook-like member is in effect a ramp which is adapted to slidably receive the wedge **25** as will be more fully explained.

It will be noted that the latch plate **13**, which may be of any suitable size or shape, is adapted to be secured by suitable bolts **44** to the edge wall **45** of a vehicle door. The edge wall **45** is provided with a suitable aperture **46** through which the strap covered latch bolt **12** is adapted to project, as best seen in Figs. 2 to 4, inclusive.

In operation, when the vehicle door is in an unlatched or open condition, the latch device **10** is in a position in which it is disassociated from the striker or keeper device **11**. As the door is swung to a closed position, the rotary bolt **12** first engages the striker or keeper tooth **40**. If, for any reason, the closing movement of the door is interrupted at this point, the door will be held by the tooth **40** against movement in an opening direction until the latching mechanism is released. The tooth **40** is known as the safety latching tooth. When the bolt **12** is in engagement with the safety latching tooth **40** the vehicle door is not held against vibratory movement in an up and down direction.

As the bolt **12** moves past the safety locking tooth **40**, the lower surface of the wedge **25** engages the ramp portion or upper surface **42** of the striker or keeper member **36**. The initial point of engagement may vary depending on the alignment of the latch device **10** with the keeper or striker **11**. As soon as a suitable locking position of the wedge **25** on the ramp surface **42** is reached, the wedge movement in a closing direction ceases although the vehicle door may continue to move in a closing direction for a slight distance further until the latch bolt **12** is in operative engagement with the striker or keeper tooth **41**, this tooth being known as the final latching tooth. The relative movement between the wedge **25** and the latch plate **13** results in the spring **31** being placed under compresison. The effect of the compressed spring **31** is to continually urge the wedge **25** up the ramp surface **42** thus ensuring that the striker or keeper member **36** is tightly engaged between the wedge **25** and the rotary bolt **12**. This tight engagement effectively diminishes any possibility of movement of the door in an up and down direction due to vibrations occurring while the vehicle is in motion.

In final locking position the hook-like member **36** of the striker or keeper **11** completely projects through the strap **19** from the edge **38** to the opposite edge thereof. Thus, the present invention provides a highly desirable safety interlock between the strap member **19** secured to the latch plate **13** and the striker or keeper device **11**. Any force tending to separate the door from the body pillar in a direction parallel to the axis of rotation of the latch bolt **12** will be resisted by the interengagement of the hook-like member **36** with the strap member **19**. Except for the limited lateral movement permitted by the lateral clearance between the striker or keeper device member **36** and the strap member **19**, the latch bolt **12** cannot move sufficiently sideways to permit it to become laterally disengaged from the striker or keeper device **11**. The only way the latch bolt **12** may be released from engagement with the striker or keeper device is by normal operation of the latch mechanism to permit free rotation of the bolt **12**.

I claim:

1. In combination, a rotatable latch device mounted on the free edge wall of a swinging door, said latch device having tooth-like projections thereon, a keeper device mounted on the jamb face of a door framing member, said keeper device being provided with a mounting plate portion and a spaced portion substantially paralleling said plate portion, said spaced portion being provided with depending tooth-like projections forming tooth spaces to receive said latch device tooth-like projections, a strap means, means mounting said strap means on said free edge wall of the door, said strap means having a plate portion, said strap means plate portion being adapted when said latch device tooth-like projections are received within said tooth spaces to be in interposed position between said keeper device plate portion and its said spaced portion, a wedge means, means slidably mounting said wedge means within said strap means, said wedge means being adapted to engage the upper surface of said spaced portion when the latter is in said interposed position, said spaced portion and

strap means plate portion coacting to prevent such lateral displacement of said projections relative to one another as would cause said projections to become disengaged, and said wedge means being effective to prevent up and down vibratory movement of said projections relative to one another.

2. In combination, a rotatable latch device mounted on the free edge wall of a swinging door, said latch device having tooth-like projections thereon, a keeper device mounted on the jamb face of a door framing member, said keeper device being provided with a mounting plate and a generally horizontally extending spaced portion secured to said mounting plate at one side thereof, said portion being provided with depending tooth-like projections forming tooth spaces to receive said latch-device tooth-like projections, a strap member having a vertically extending plate portion and upper and lower angularly related leg portions, means securing said leg portions to the free edge wall of the door, said plate portion being spaced outwardly of said latch device and said upper leg portion being spaced substantially thereabove, said strap member plate portion being adapted when said latch device tooth-like projections are received within said tooth spaces to be in an interposed position between said mounting plate and said spaced portion, a wedge means, means slidably mounting said wedge means within said strap member, said wedge means being adapted to engage the upper surface of said spaced portion when the latter is in said interposed position, said spaced portion and strap member plate portion coacting to prevent such lateral displacement of said projections relative to one another as would cause said projections to become disengaged, and said wedge means being effective to prevent up and down vibratory movement of said projections relative to one another.

3. In combination, a rotatable latch device mounted on the free edge wall of a swinging door, said latch device having tooth-like projections thereon, a keeper device mounted on the jamb face of a door framing member, said keeper device being provided with a mounting plate and a generally horizontally extending spaced portion secured to said mounting plate at one side thereof, said portion being provided with depending tooth-like projections forming tooth spaces to receive said latch-device tooth-like projections, a strap member having a vertically extending plate portion and upper and lower angularly related leg portions, means securing said leg portions to the free edge wall of the door, said plate portion being spaced outwardly of said latch device and said upper leg portion being spaced substantially thereabove, said strap member plate portion being adapted when said latch device tooth-like projections are received within said tooth spaces to be in an interposed position between said mounting plate and said spaced portion, a wedge means, means slidably mounting said wedge means within said strap member beneath said upper leg portion, said upper surface of said spaced portion being upwardly inclined to provide a ramp engageable by said wedge means as the vehicle door is moved from an open to a closed position, said spaced portion and strap member plate portion coacting in closed position of the door to prevent such lateral displacement of said projections relative to one another as would cause said projections to become disengaged, and said wedge means being effective to prevent up and down vibratory movement of said projections relative to one another.

4. In combination, a rotatable latch device mounted on the free edge wall of a swinging door, said latch device having tooth-like projections thereon, a keeper device mounted on the jamb face of a door framing member, said keeper device being provided with a mounting plate portion and a spaced portion substantially paralleling said mounting plate portion, said spaced portion being provided with depending tooth-like projections forming tooth spaces to receive said latch device tooth-like projections, a wedge means, a wedge means supporting member mounted on said free edge wall of the door, said wedge means supporting member having a leg portion in vertical spaced relationship to said latch device and having a depending plate portion substantially paralleling said free edge wall of the door and spaced outwardly therefrom, means mounting said wedge means in slidable relation to the latch device side of said leg portion, said wedge means supporting member plate portion being adapted when said latch device tooth-like projections are received within said tooth spaces to be in interposed position between said keeper device plate portion and its said spaced portion, said wedge means being adapted to engage the upper surface of said spaced portion when the latter is in said interposed position, said spaced portion and wedge means supporting member plate portion coacting to prevent such lateral displacement of said projections relative to one another as would cause said projections to become disengaged, and said wedge means being effective to prevent up and down vibratory movement of said projections relative to one another.

5. In combination, a rotatable latch device mounted on the free edge wall of a swinging door, said latch device having tooth-like projections thereon, a keeper device mounted on the jamb face of a door framing member, said keeper device being provided with a mounting plate portion and a spaced portion substantially paralleling said mounting plate portion, said spaced portion being provided with depending tooth-like projections forming tooth spaces to receive said latch device tooth-like projections, said spaced portion being provided with an upwardly inclined surface on the side opposite the depending tooth-like projections, a supporting member mounted on the free edge wall of the door, said supporting member having a leg portion in vertical spaced relationship to said latch device and having a depending plate portion substantially paralleling said free edge wall of the door and spaced outwardly therefrom, an inclined surface engaging member, and means movably mounting said inclined surface engaging member beneath the latch device side of said leg portion, said supporting member plate portion being adapted when said latch device tooth-like projections are received within said tooth spaces to be interposed between said keeper device mounting plate portion and its spaced portion, said inclined surface engaging member being in engagement with the inclined surface of said spaced portion when the latter is in said interposed relationship, the means mounting said inclined surface engaging member including a resilient member effective to urge said inclined surface engaging member into tight engagement with the inclined surface of said spaced portion thereby to resist up and down vibratory movement of said projections relative to one another, said spaced portion and supporting member plate portion coacting to prevent such lateral movement of said projections relative to one another as would cause said projections to become disengaged.

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