April 28, 1964 J. R. KIRK 3,130,997

SAFETY ROLLER DOOR LATCH MECHANISMS

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FIG. 1.

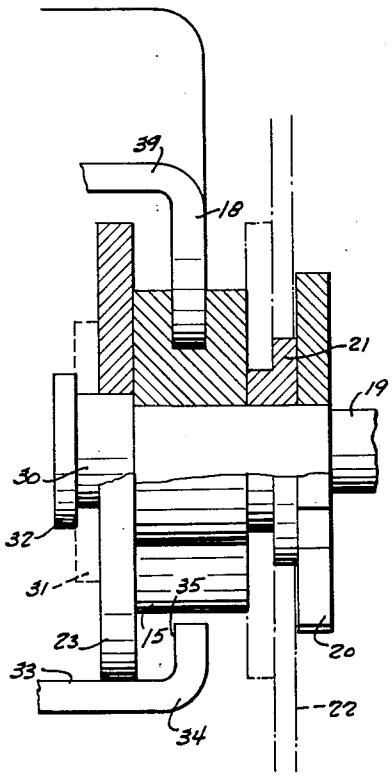


FIG. 3.

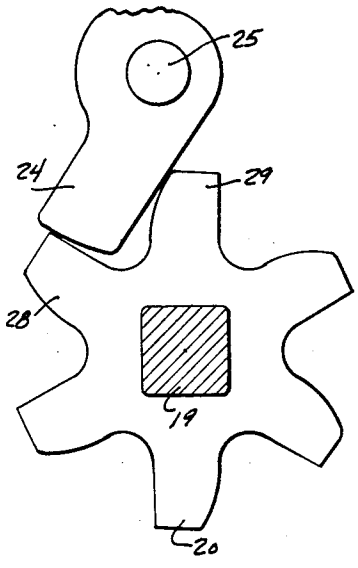
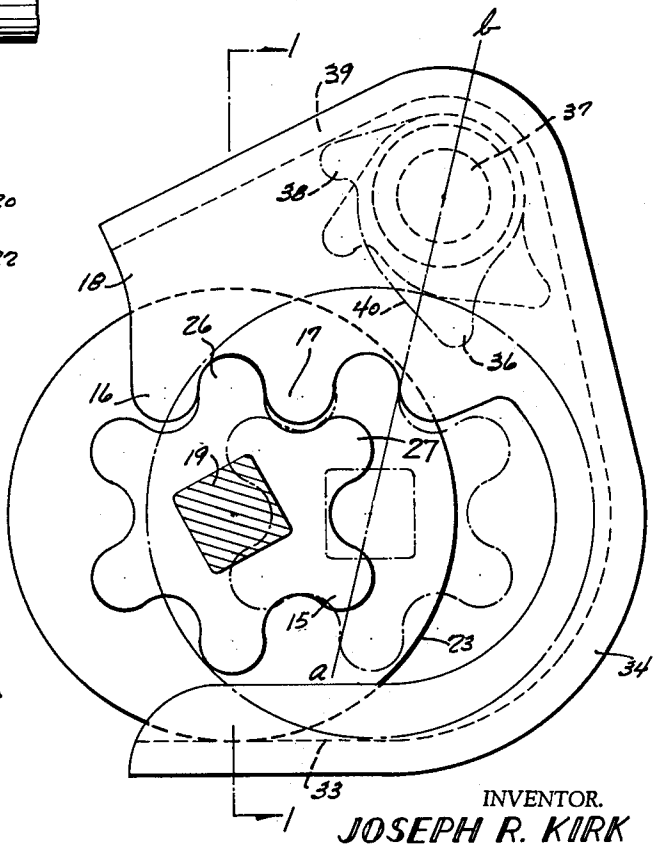


FIG. 2.



INVENTOR.
JOSEPH R. KIRK
BY
Andrew F. Wintercorn
ATTORNEY

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FIG. 4.

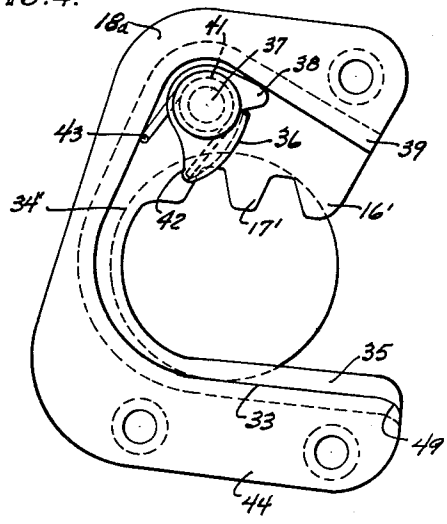


FIG. 5.

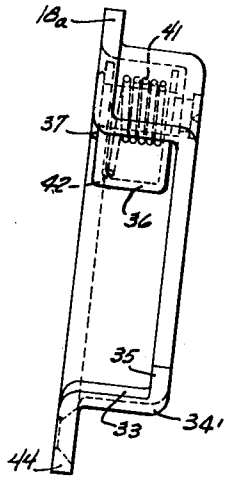


FIG. 6.

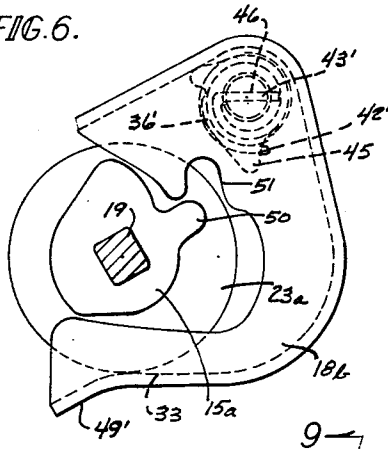


FIG. 7.

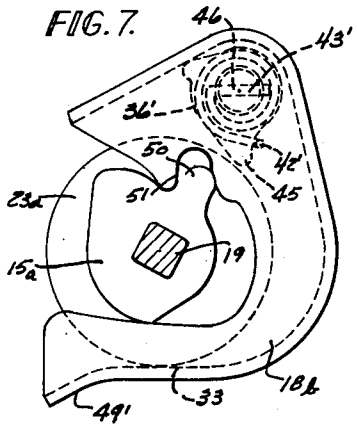
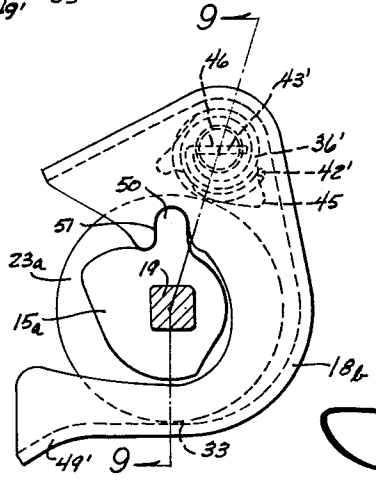


FIG. 8.



INVENTOR.
JOSEPH R. KIRK
BY
Andrew F. Wintercorn
ATTORNEY

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FIG. 9.

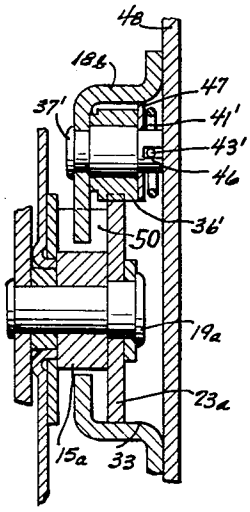


FIG. 10.

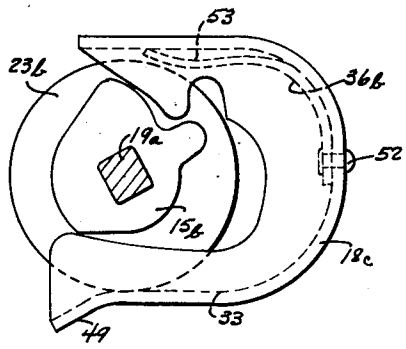


FIG. 11.

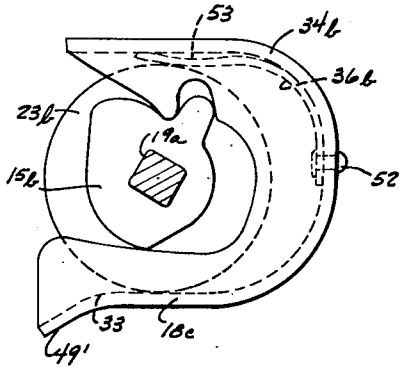
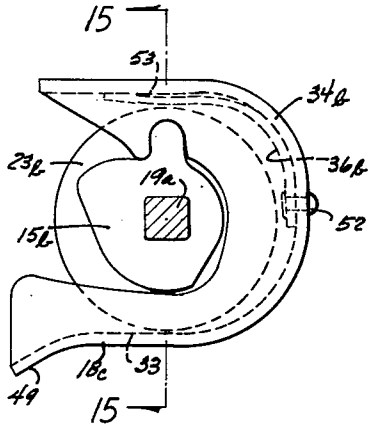


FIG. 12.



INVENTOR.
JOSEPH R. KIRK

BY

ATTORNEY

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FIG. 15.

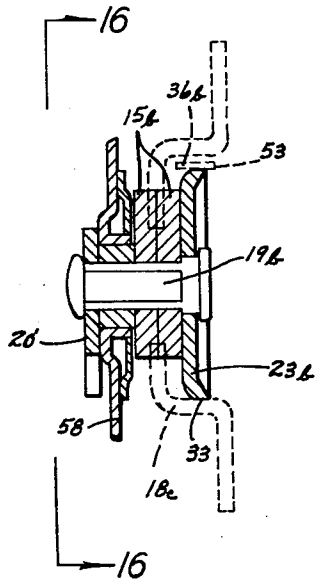


FIG. 16.

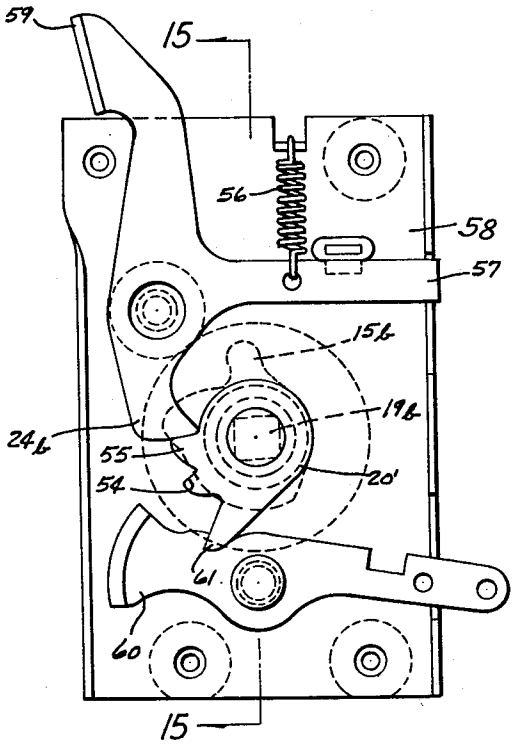


FIG. 13.

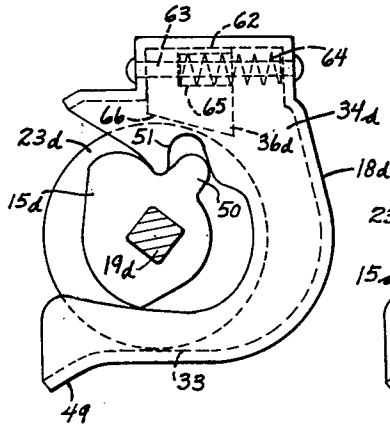
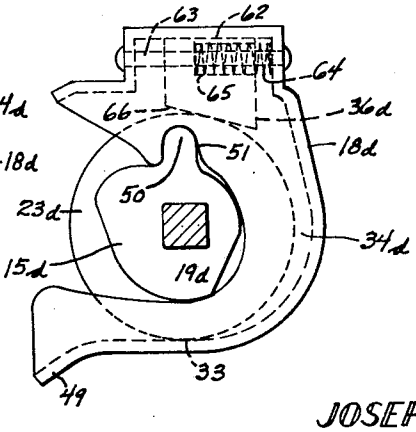


FIG. 14.



INVENTOR.
JOSEPH R. KIRK

BY Andrew F. Wintercorn

ATTORNEY

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3,130,997

SAFETY ROLLER DOOR LATCH MECHANISMS

Joseph R. Kirk, Rockford, Ill., assignor to Atwood Vacuum Machine Company, Rockford, Ill., a corporation of Illinois

Filed Nov. 26, 1958, Ser. No. 776,571
18 Claims. (Cl. 292—280)

This invention relates to new and improved safety roller door latch mechanisms designed for use primarily on the doors of motor vehicles but adapted for other uses wherever similar problems may be presented.

As pointed out in Atwood-owned Johnson Patent No. 2,795,448, it is important to keep the doors of motor vehicles closed in accidents because, generally speaking, persons are far safer inside the cars under such circumstances. The reason doors spring open is that the door and door post spread apart under impact or as a result of unusual twisting strains imposed on the body of the car, and the ordinary latch bolt slidably engaged with a striker was not designed to and could not prevent spreading apart of the door and door post. It is, therefore, the principal object of my invention to provide in conjunction with the keeper on the door post and the roll-in, roll-out latch cam or rotor on the door, a safety roller or disk disposed outwardly relative to the cam or rotor but concentric therewith and arranged in the closing of the door to roll inside the keeper, whereby not only to prevent the spreading apart of the door and door post under the conditions previously mentioned but make for a smoother and easier operating door latch mechanism and one in which the major portion of the loads are assumed by the roller or disk, thereby relieving the tooth or teeth on the cam or rotor and the interlocking tooth or teeth on the keeper from much of the wear to which these parts would otherwise be subjected.

The safety roller or disk, in accordance with my invention, is used to further advantage in combination with means provided inside the keeper to prevent rattle, or both to prevent rattle and assist in the ejection of the roller and accordingly make for easier opening of the door, without in any way sacrificing security in the latching of the door in closed position. The aforesaid means in one case is in the form of a leaf spring having a bowed portion which is flattened more or less by contact with the periphery of the roller as it rolls into place in the keeper, thereby giving an anti-rattle effect. In another case, said means is in the form of a pawl or cam pivotally mounted in the keeper in the path of the roller and spring-actuated to turn in one direction to a limit position but swung by contact with the periphery of the roller in the opposite direction to a holding position, in which the cam functions as an anti-rattle means, and then, when the door is unlatched, the cam under action of the spring imparts an outward push to the roller to assist in the opening of the door. In another case, said means is in the form of a spring-pressed reciprocable wedge-shaped cam that is engaged by the periphery of the roller as it rolls into place in the keeper, thereby forcing the cam inwardly against spring resistance to obtain an anti-rattle effect when the door is closed and also an assist action in the opening of the door.

The invention is illustrated in the accompanying drawings, in which—

FIGS. 1 and 2 are views in planes at right angles to one another (FIG. 1 being a section on the line **1—1** of FIG. 2) showing a door latch mechanism embodying the safety roller or disk of my invention, FIG. 2 showing the latch rotor and roller in full lines in the safety position and in dotted lines in the latched position, the spring-actuated pawl or cam cooperating with the roller for anti-rattle and roller ejection purposes being also indicated in two corresponding positions;

FIG. 3 shows the inner rotor and cooperating pawl;

FIGS. 4 and 5 are an inside view and end view, respectively, of a similar keeper plate better disclosing the spring-actuated cam which in this form is of stamped sheet metal construction;

FIGS. 6, 7 and 8 show a related form of keeper plate with a cooperating roll-in, roll-out latch cam, the parts being shown in open position in FIG. 6, safety position in FIG. 7, and latched position in FIG. 8;

FIG. 9 is a cross-section on the line **9—9** of FIG. 8;

FIGS. 10, 11 and 12 are views similar to FIGS. 6, 7 and 8, showing a leaf spring as a modified or alternative form of anti-rattle means;

FIGS. 13 and 14 are views similar to FIGS. 6 and 7 but showing the spring-pressed reciprocable wedge-shaped cam as a further modified or alternative form of anti-rattle and assist means;

FIG. 15 is a cross-section on the line **15—15** of FIG. 12, and

FIG. 16 is an inside view of the door latch housing on the edge of the door on line **16—16** of FIG. 15, showing the ratchet or inner rotor, similarly as in FIG. 3, but including the outside-operated spring-actuated pawl and the inside-operated remotely-controlled pawl, both of which cooperate with the inner rotor or ratchet.

Similar reference numerals are applied to corresponding parts throughout the views.

Referring first to FIGS. 1 to 3, the reference numeral **15** designates a rotary gear type latch or bolt carried on the door and having gear teeth for roll-in, roll-out meshing engagement with rack teeth **16** and **17** provided on the striker or keeper plate **18** that is carried on the door post. The rotor **15** is non-rotatably mounted on the polygonal-shaped portion of a stub-shaft **19** with the ratchet **20** to turn together, a bearing bushing **21** spacing the two parts and providing a rotatable mounting for the assembly in the lock plate **22** on the edge of the door in the usual manner, no invention being claimed in any of the details described so far, excepting only in so far as the same cooperate with the novel safety roller or disk **23** provided in connection therewith in accordance with my invention. The pawl **24** shown in FIG. 3 pivoted at **25** with respect to the lock plate **22** cooperates with the ratchet **20** in the usual way in the rolling in of the rotor **15** into the keeper **18** and therefore holds the door against opening even if only the one tooth **26** is in mesh between the rack teeth **16** and **17**, as shown in FIG. 2, this being the "safety" position of the rotor **15**. Of course, when the door is fully closed, the next tooth **27** is also in mesh behind the rack tooth **17**, and in that case the pawl **24** instead of being engaged behind the tooth **28** on the inner rotor **20** is now engaged behind the tooth **29**.

In accordance with my invention, the safety roller or disk **23**, which is mounted for rotation on the cylindrical outer end portion **30** of the shaft **19** alongside the rotor **15**, with or without a washer **31** between the roller and the headed outer end **32** of the shaft, is arranged to roll on a track **33** parallel to the rack **16—17** provided inside the embossed portion **34** of the keeper plate **18**. Thus, the safety roller or wheel **23** serves in the capacity of a dovetail in the door closing operation not only to raise the door, if it sags, thereby assuring the correct full meshing engagement of the gear teeth on the rotor with the rack teeth on the keeper, essential for its secure locking, but it also improves the operation by affording smooth anti-friction rolling action as the roller rolls in and rolls out in the closing and opening of the door. Furthermore, it serves by engagement with the inside of the keeper, as at **35**, positively to prevent accidental opening of the door by the spreading apart of the door and door post

under impact or as a result of unusual twisting strains imposed on the body of the car in an accident, and this, in many cases, makes the difference between life and death.

The safety roller or disk 23 also cooperates with a spring-actuated pawl or cam 36 that is pivoted at 37 inside the keeper and held under spring pressure normally in the position indicated in dot and dash lines in FIG. 2 with the stop projection 38 on the pawl engaging the top wall 39 of the embossed portion 34 of the keeper plate, so that the curved cam surface 40 on the pawl is engaged by the roller and the pawl is swung in a counterclockwise direction, against the resistance of its spring as the roller rolls in to the dotted line position shown in FIG. 2 until a nearly dead-center relationship is established between these two parts, as indicated by the line *ab* in FIG. 2, in which the spring pressure active on the pawl 36 causes the roller 23 to be pressed downwardly against the track 33 for an anti-rattle effect so long as the door remains closed. However, when the door is unlatched for opening it is obvious that the spring-loaded pawl 36 imparts an appreciable outward push on the roller 23 to assist in the opening of the door.

In FIGS. 4 and 5 the spring-actuated pawl or cam 36 is illustrated as a sheet metal stamping of generally U-shaped cross-section pivotally mounted on a post 37 which extends through registering holes provided in its opposed side walls and has a coiled torsion spring 41 mounted thereon between said walls with one end 42 abutting the back of the connecting web portion between said side walls and the other end 43 abutting the inside of the embossed portion 34′ of the keeper plate 18*a*. The stop projection 38 in this case is defined by an outwardly projecting lug formed as an extension on one or both of the side walls of the U-shaped body of the pawl. The perforated flange portion 44 of the keeper plate 18′ is, of course, adapted to be secured to the door post, and a similar flange (not shown) can be provided on the keeper plate 18 for the same purpose.

Referring next to FIGS. 6–9, the pivoted pawl or cam 36′ in this construction is of solid form, as best appears in FIG. 9, and the torsion spring 41′ used in connection with it is of spiral form and has the outer end portion 42′ bent at right angles to the plane of the spring for abutment behind the tail portion 45 of the pawl, while its inner end portion 43′ is anchored in a diametrically extending slot 46 provided in the inner end of the post 37′, the spring being held in spaced relation to the pawl 36′ by a washer 47, as clearly appears in FIG. 9, and being retained against displacement from the inner end of the post by staking or by the door post 48, against which the inner end of the post has abutment. The keeper plate 18*b* illustrated here is similar to the keeper plate 18 illustrated in FIGS. 1 and 2, and keeper plate 18*a* of FIGS. 4 and 5, but, whereas the plate 18*a* shows a short ramp 49 and no ramp is shown on keeper plate 18, keeper plate 18*b* has a longer ramp 49′ shown at its entrance, so that even if the door sags appreciably the safety roller or disk 23*a* can run up the ramp for easy entry of the roll-in, roll-out cam type latch 15*a*, shown in this form in lieu of the gear type latch 15 in FIGS. 1–2. This cam latch has a single tooth 50 arranged to engage in a notch 51 provided in the keeper plate, and, with this construction, despite the use of only a single tooth 50, it is possible to lock the door in the "safety" position, as indicated in FIG. 7. The latched position with the door fully closed is shown in FIG. 8, and the open position in FIG. 6. Here again, it is obvious that the safety roller or wheel 23*a*, which is mounted on the same stub-shaft 19*a* with the cam latch 15*a*, as best appears in FIG. 9, serves all of the same purposes as the safety roller or disk 23 in the constructions of FIGS. 1–3 and 4–5.

Referring next to FIGS. 10–12, and 15, the keeper plate 18*c* differs from the others previously described in having a slightly different form of embossed portion 34*b*, this being required to house a leaf-spring 36*b* that is riveted at its one end to the inside thereof, as shown at 52. This leaf spring has a normally bowed free outer end portion 53, which, in the rolling in of the safety roller or disk 23*b*, is engaged and flattened more or less between the periphery of the roller or disk and the inside of the adjacent wall of the embossed portion of the keeper plate, whereby to press the roller or disk against the opposite wall of the embossed portion of the keeper plate on which the track 33 is defined, and accordingly prevent rattle. The roll-in, roll-out cam type latch 15*b* is similar to the cam type latch 15*a* of FIGS. 6–9, but whereas latch 15*a* is formed in one piece, as shown in FIG. 9, the latch 15*b* is formed by two cam plates of identical contour mounted in face to face abutment on the post 19*b*. The operation of the present construction so far as the safety roller or disk 23*b* is concerned is, of course, the same as previously described except that the leaf spring 36*b* affords only an anti-rattle effect, and this effect is not as appreciable in the safety position of the roller or disk 23*b* shown in FIG. 11 as it is in the latched position shown in FIG. 12, because the bowed portion 53 is not flattened quite as much in the safety position as it is in the latched position.

Referring to FIGS. 13 and 14, the keeper plate 18*d* differs from the others previously described in having a slightly different form of embossed portion 34*d*, this being necessary to provide a guideway 62 for the reciprocable wedge-shaped shoe or cam 36*d* slidably mounted on the pin 63 entered in registering holes in the opposite ends of the rectangular guide portion 62 of the keeper plate. A coiled compression spring 64 which surrounds the pin and has abutment at one end in a recess 65 provided in the shoe 36*d* and at the other end on the adjacent end wall of the guide portion 62 of the keeper plate normally holds the shoe 36*d* in the forward position shown in FIG. 13 engaging the other end wall of the guide portion 62 of the keeper plate. The safety roller or disk 23*d* which cooperates with the roll-in, roll-out cam type latch 15*d*, similarly as the roller 23*b* cooperates with cam latch 15*b* in FIGS. 10–12, will not come into engagement with the shoe 36*d* in the "Safety" position shown in FIG. 13, but in the final roll-in movement of the roller 23*d* in the closing of the door the periphery of the roller engages the inclined bottom 66 of the shoe and the same is accordingly moved inwardly against the resistance of the spring 64 to the position shown in FIG. 14, in which the shoe functions as an anti-rattle means under the increased pressure of the spring 64, the roller 23*d* being thereby held resiliently in engagement with the track 33. While the main component of the spring pressure is in a downward direction toward the track 33, because of the wedge shape of the shoe 36*d*, the outward component is effective in the opening of the door to give an appreciable assist action comparable to that obtained with the pawl 36′ shown in FIGS. 6–9.

In FIG. 16 I have shown another form of ratchet 20′ the function of which is, of course, the same as that of the ratchet 20 shown in FIG. 3. The pawl 24*b* in this form engages tooth 54 in the "Safety" position of the latch 15*b* shown in FIG. 11, and engages tooth 55 in the fully latched position of the latch 15*b* shown in FIG. 12. Pawl 24*b* is normally urged toward locking engagement with the ratchet 20′ by means of a coiled tension spring 56, one end of which is connected to an arm 57 on the pawl and the other end to a lug on the housing plate 58 that is arranged to be fastened onto the edge portion of the door in the usual way. The other arm 59 of the pawl is arranged to be actuated by a push-button or handle element on the door so that the door may be opened when the pawl 24*b* is actuated by the push-button or handle, provided the inside operable pawl 60 which engages another tooth 61 on the ratchet has not been set in the locked position shown. This same

mechanism can, of course, be used with the structures of FIGS. 1–3, 4–5, 6–9, and 13–14.

It is believed the foregoing description conveys a good understanding of the objects and advantages of my invention. The appended claims have been drawn to cover all legitimate modifications and adaptations.

I claim:

1. In a door latch mechanism comprising a keeper fixed on a door post and having a latch receiving opening provided therein that is notched on one side to define a rack, a rotary toothed latch carried on the adjacent edge face of a door arranged to enter the opening in the keeper and have intermeshing engagement with the rack in the closing of the door as the latch rolls into place in the keeper, means for releasably locking said latch against turning to lock the door in closed position, and manually operable means for releasing said last mentioned means to permit opening of the door, the improvement which consists in the provision, in fixed spaced relation to the edge of the door, of an anti-friction roller for rolling engagement on a track provided behind the keeper in substantially parallel relation to said rack, said roller being disposed in concentric relation with said latch and being large in diameter in relation to the latch and the opening in the keeper and arranged in the closing of the door to run on said track into operative position behind said keeper whereby positively to limit the spreading apart of the door and door post.

2. A door latch mechanism as set forth in claim 1, including a ramp at the outer end of the track which the roller in going behind the keeper in the closing of the door is arranged to engage first to guide the latch into the opening in the keeper.

3. A door latch mechanism as set forth in claim 1 in which the keeper comprises a plate having an embossed portion in which the latch receiving opening is provided, the track being provided on the inside of one peripheral wall of said embossed portion, the roller being arranged to enter said embossed portion and run on said track in moving into operative position behind the latch receiving opening.

4. A door latch mechanism as set forth in claim 1 in which the keeper comprises a plate having an embossed portion in which the latch receiving opening is provided, the track being provided on the inside of one peripheral wall of said embossed portion, the roller being arranged to enter said embossed portion and run on said track in moving into operative position behind the latch receiving opening, there being a ramp on said embossed portion at the outer end of said track arranged to be engaged by the roller in entering said embossed portion to guide the latch into meshing engagement with the rack.

5. In a door latch mechanism comprising a keeper fixed on a door post and having a latch receiving opening provided therein that is notched on one side to define a rack, a rotary toothed latch carried on the adjacent edge face of a door arranged to enter the opening in the keeper and have intermeshing engagement with the rack in the closing of the door as the latch rolls into place in the keeper, means for releasably locking said latch against turning to lock the door in closed position, and manually operable means for releasing said last mentioned means to permit opening of the door, the improvement which consists in the provision, in fixed spaced relation to the edge of the door, of an anti-spread disk element in concentric relation to said latch that is large in diameter in relation to the latch and the opening in the keeper and arranged in the closing of the door to be moved into operative position behind said keeper positively to limit the spreading apart of the door and door post, and compressible resilient means behind the keeper arranged to be engaged and compressed by the anti-spread disk element in the closing of the door to prevent rattle and give an assist thrust to said disk element in the opening movement of the door to assist opening thereof.

6. In a door latch mechanism comprising a keeper fixed on a door post and having a latch receiving opening provided therein that is notched on one side to define a rack, a rotary toothed latch carried on the adjacent edge face of a door arranged to enter the opening in the keeper and have intermeshing engagement with the rack in the closing of the door as the latch rolls into place in the keeper, means for releasably locking said latch against turning to lock the door in closed position, and manually operable means for releasing said last mentioned means to permit opening of the door, the improvement which consists in the provision, in fixed spaced relation to the edge of the door, of an anti-friction roller for rolling engagement on a track provided behind the keeper in substantially parallel relation to said rack, said roller being disposed in concentric relation with said latch and being large in diameter in relation to the latch and the opening in the keeper and arranged in the closing of the door to run on said track into operative position behind said keeper whereby positively to limit the spreading apart of the door and door post, and means to prevent rattle by holding the roller resiliently in engagement with the track.

7. In a door latch mechanism comprising a keeper fixed on a door post and having a latch receiving opening provided therein that is notched on one side to define a rack, a rotary toothed latch carried on the adjacent edge face of a door arranged to enter the opening in the keeper and have intermeshing engagement with the rack in the closing of the door as the latch rolls into place in the keeper, means for releasably locking said latch against turning to lock the door in closed position, and manually operable means for releasing said last mentioned means to permit opening of the door, the improvement which consists in the provision, in fixed spaced relation to the edge of the door, of an anti-spread disk element in concentric relation to said latch that is large in diameter in relation to the latch and the opening in the keeper and arranged in the closing of the door to be moved into operative position behind said keeper positively to limit the spreading apart of the door and door post, and a pivoted spring-actuated pawl mounted behind the keeper and arranged to be engaged by the anti-spread disk element so as to prevent rattle in the closed position of the door, the pawl in the opening of the door giving an assist action by spring pressure through the pawl against the anti-spread element.

8. In a door latch mechanism comprising a keeper fixed on a door post and having a latch receiving opening provided therein that is notched on one side to define a rack, a rotary toothed latch carried on the adjacent edge face of a door arranged to enter the opening in the keeper and have inter-meshing engagement with the rack in the closing of the door as the latch rolls into place in the keeper, means for releasably locking said latch against turning to lock the door in closed position, and manually operable means for releasing said last mentioned means to permit opening of the door, the improvement which consists in the provision, in fixed spaced relation to the edge of the door, of an anti-friction roller for rolling engagement on a track provided behind the keeper in substantially parallel relation to said rack, said roller being disposed in concentric relation with said latch and being large in diameter in relation to the latch and the opening in the keeper and arranged in the closing of the door to run on said track into operative position behind said keeper whereby positively to limit the spreading apart of the door and door post, and a pivoted spring-actuated pawl mounted behind the keeper and arranged to be engaged by the anti-friction roller so as to prevent rattle in the closed position of the door, the pawl in the opening of the door giving an assist action by spring pressure through the pawl against the anti-friction roller.

9. A door latch mechanism as set forth in claim 8 in which the keeper comprises a plate having an embossed

portion in which the latch receiving opening is provided, the track being provided on the inside of one peripheral wall of said embossed portion, the roller being arranged to enter said embossed portion and run on said track in moving into operative position behind the latch receiving opening, said pawl being disposed in said embossed portion opposite the track and arranged to be swung by contact with the roller against the action of its spring means to a position in which the spring pressure is transmitted to said roller through the pawl mainly toward said track to prevent rattle, but said pawl being swingable in the opening of the door so as to exert an assist action on the roller.

10. In a door latch mechanism comprising a keeper fixed on a door post and having a latch receiving opening provided therein that is notched on one side to define a rack, a rotary toothed latch carried on the adjacent edge face of a door arranged to enter the opening in the keeper and have intermeshing engagement with the rack in the closing of the door as the latch rolls into place in the keeper, means for releasably locking said latch against turning to lock the door in closed position, and manually operable means for releasing said last mentioned means to permit opening of the door, the improvement which consists in the provision, in fixed spaced relation to the edge of the door, of an anti-friction roller for rolling engagement on a track provided behind the keeper in substantially parallel relation to said rack, said roller being disposed in concentric relation with said latch and being large in diameter in relation to the latch and the opening in the keeper and arranged in the closing of the door to run on said track into operative position behind said keeper whereby positively to limit the spreading apart of the door and door post, and an elongated bowed leaf spring secured in a fixed relation to the keeper and behind the same, the bowed portion of said spring being arranged to be flattened by engagement therewith of said anti-friction roller in the closing of the door, whereby to prevent rattle.

11. A door latch mechanism as set forth in claim 10 in which the keeper comprises a plate having an embossed portion in which the latch receiving opening is provided, the track being provided on the inside of one peripheral wall of said embossed portion, the roller being arranged to enter said embossed portion and run on said track in moving into operative position behind the latch receiving opening, said leaf spring being disposed in said embossed portion opposite the track so that the bowed portion of the spring is flattened between the peripheral wall of said embossed portion and the periphery of said roller, and the spring pressure active on said roller maintains it in close contact with the track.

12. In a door latch mechanism comprising a keeper fixed on a door post and having a latch receiving opening provided therein that is notched on one side to define a rack, a rotary toothed latch carried on the adjacent edge face of a door arranged to enter the opening in the keeper and have intermeshing engagement with the rack in the closing of the door as the latch rolls into place in the keeper, means for releasably locking said latch against turning to lock the door in closed position, and manually operable means for releasing said last mentioned means to permit opening of the door, the improvement which consists in the provision, in fixed spaced relation to the edge of the door, of an anti-friction roller for rolling engagement on a track provided behind the keeper in substantially parallel relation to said rack, said roller being disposed in concentric relation with said latch and being large in diameter in relation to the latch and the opening in the keeper and arranged in the closing of the door to run on said track into operative position behind said keeper whereby positively to limit the spreading apart of the door and door post, and a reciprocable spring-actuated shoe mounted behind the keeper and arranged to be engaged by the anti-friction roller in the closing of the door so as to prevent rattle in the closed position of the door.

13. A door latch mechanism as set forth in claim 12 in which the keeper comprises a plate having an embossed portion in which the latch receiving opening is provided, the track being provided on the inside of one peripheral wall of said embossed portion, the roller being arranged to enter said embossed portion and run on said track in moving into operative position behind the latch receiving opening, said shoe being disposed in said embossed portion opposite the track and having a surface on that side toward the track and inclined in outwardly diverging relationship thereto toward the entrance to said keeper, whereby said shoe is forced inwardly in the closing of the door wedgingly to engage said roller for an anti-rattle effect in the closed position of the door and to give an assist action in the opening of the door.

14. Vehicle door latching apparatus of the character described, including a shaft, a rotatable bolt carried by said shaft, said bolt having a plurality of radially projecting gear-like bolt teeth extending at least partially around its periphery, a bolt interlock member comprising a disk carried by said shaft immediately adjacent the outer face of said bolt, means for preventing axial separation of said disk from said bolt, said disk having a diameter at least as great as the addendum circle of said bolt, a striker having a body with a plurality of tooth-like projections extending therefrom for meshing engagement with the teeth of said bolt, and a striker interlock portion projecting from said body in the plane of said tooth-like projections formed to provide, in cooperation with said tooth-like projections, a C-shaped recess to receive said bolt, said tooth-like projections defining one boundary arm of said C-shaped recess, said disk overlapping said tooth-like projections and said striker interlock portion and being equally spaced from each to prevent separation of said bolt teeth from said tooth-like projections in a direction extending axially of said bolt, said disk having rolling engagement on a track provided in rigid relation to the striker behind and substantially parallel to the tooth-like projections.

15. A door latch mechanism as set forth in claim 14, including a ramp at the outer end of the track which the disk in going behind the tooth-like projections in the closing of the door is arranged to engage first to guide the bolt into the C-shaped recess in the striker.

16. A door latch mechanism as set forth in claim 14, in which the striker comprises a plate having an embossed portion in which the C-shaped recess is provided, the track being provided on the inside of one peripheral wall of said embossed portion, the disk being arranged to enter said embossed portion and run on said track in moving into operative position behind the tooth-like projections.

17. Vehicle door latching apparatus of the character described, including a shaft, a rotatable bolt carried by said shaft, said bolt having a plurality of radially projecting gearlike bolt teeth extending at least partially around its periphery, a bolt interlock member comprising a disk carried by said shaft immediately adjacent the outer face of said bolt, means for preventing axial separation of said disk from said bolt, said disk having a diameter at least as great as the addendum circle of said bolt, a striker having a body with a plurality of tooth-like projections extending therefrom for meshing engagement with the teeth of said bolt, and a striker interlock portion projecting from said body in the plane of said tooth-like projections formed to provide, in cooperation with said tooth-like projections, a C-shaped recess to receive said bolt, said tooth-like projections defining one boundary arm of said C-shaped recess, said disk overlapping said tooth-like projections and said striker interlock portion and being equally spaced from each to prevent separation of said bolt teeth from said tooth-like projections in a direction extending axially of said bolt, said disk having rolling engagement on a track provided in rigid relation to the striker behind and substantially parallel to the tooth-like projections, and means to prevent rattle by holding the

disk resiliently in engagement with the track on which it is rolled.

18. In a door latch mechanism comprising a keeper fixed on a door post and having a latch receiving opening provided therein that is notched on one side to define a rack, a rotary toothed latch carried on the adjacent edge face of a door arranged to enter the opening in the keeper and have intermeshing engagement with the rack in the closing of the door as the latch rolls into place in the keeper, means for releasably locking said latch against turning to lock the door in closed position, and manually operable means for releasing said last mentioned means to permit opening of the door, the improvement which consists in the provision, in fixed spaced relation to the edge of the door, of an anti-friction roller for rolling engagement on a track provided behind the keeper in substantially parallel relation to said rack, said roller being disposed in concentric relation with said latch and being large in diameter in relation to the latch and the opening

in the keeper and arranged in the closing of the door to run on said track into operative position behind said keeper whereby positively to limit the spreading apart of the door and door post, and combination anti-rattle and assist means engaging the roller peripherally so as to hold the roller resiliently in engagement with the track in the closed position of the door and also exert an outward thrust on the roller in door opening movement to assist in opening of the door.

References Cited in the file of this patent

UNITED STATES PATENTS

2,074,191	Roethel	Mar. 16, 1937
2,156,874	Schonitzer	May 2, 1939
2,814,193	Roethel	Nov. 26, 1957
2,828,996	De Angelo	Apr. 1, 1958
2,893,774	Carpenter	July 7, 1959
2,931,677	De Vito et al.	Apr. 5, 1960