

[54] MOTOR VEHICLE DOOR LATCH

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[58] Field of Search 292/216, 280, 346, 341.12, 292/341.13, DIG. 41

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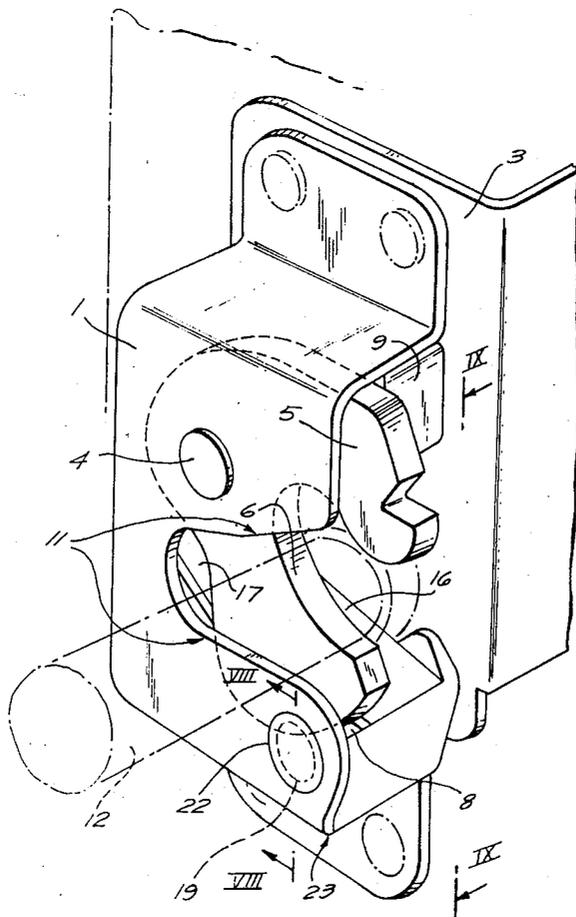
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[57] ABSTRACT

A motor-vehicle latch has a U-shaped housing whose legs are secured to a cover plate bridging the legs, e.g. on a door edge, and whose web is formed with a laterally open notch which receives a bolt extending from a doorpost when the door is closed. A bifurcate lock pawl is pivoted in the housing and has a pair of arms which straddle the bolt in the closed position of the door. A keeper engages one of the arms of the pawl to hold the door closed. A pair of ramps which converge, in the direction of door closure toward a plane including the bolt axis as the door is closed receive the bolt head as soon as it enters the notch and guide this bolt continuously back into the throat of the latch. The bolt only strikes one of the arms and is straddled by the arms without engagement of the bolt in the bight of the pawl. The ramps can be supported against the legs of the housing on elastomeric cushions and are formed of a synthetic resin.

11 Claims, 9 Drawing Figures



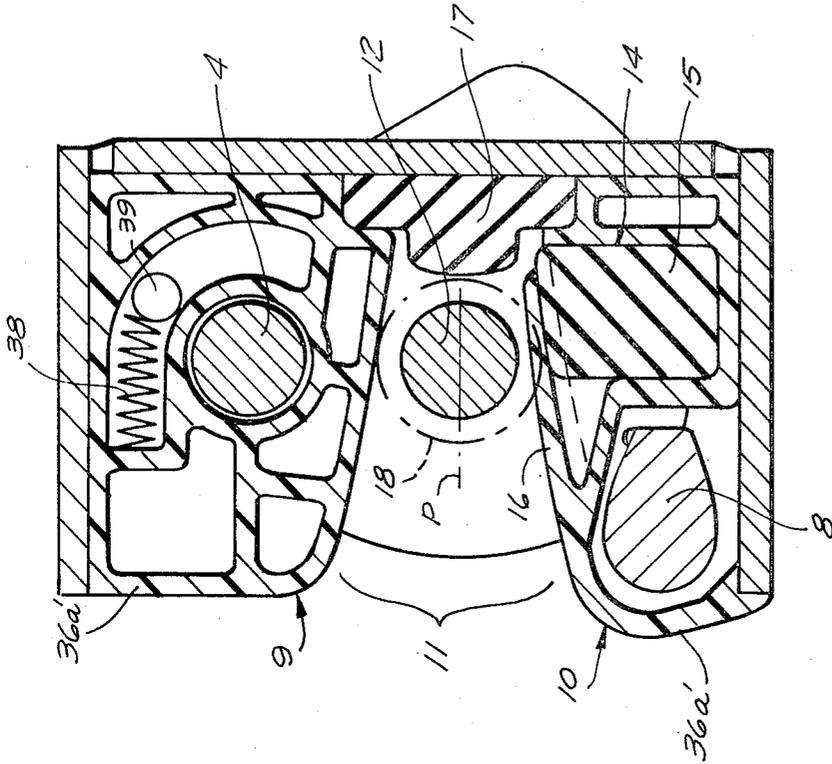


FIG. 4

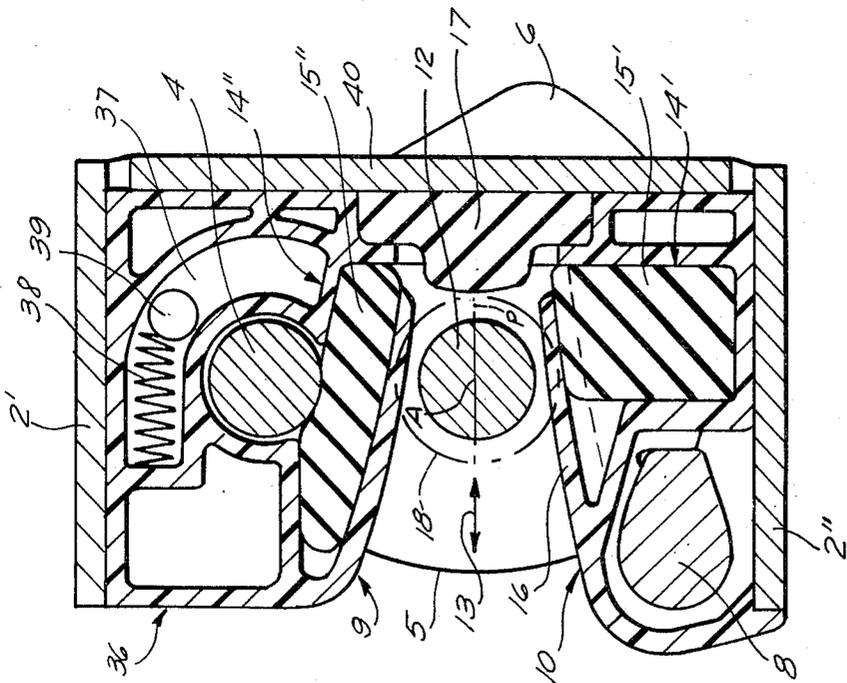


FIG. 3

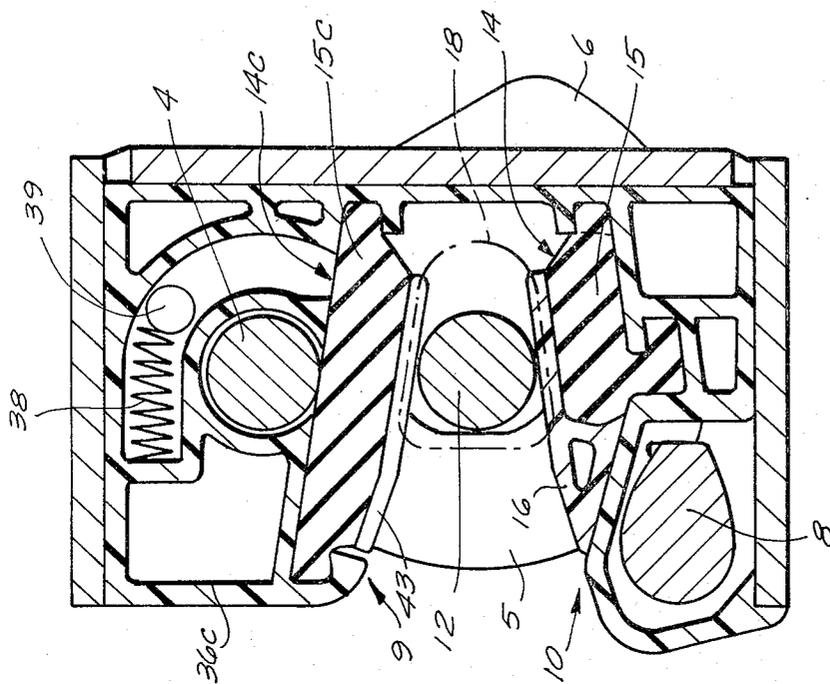


FIG. 6

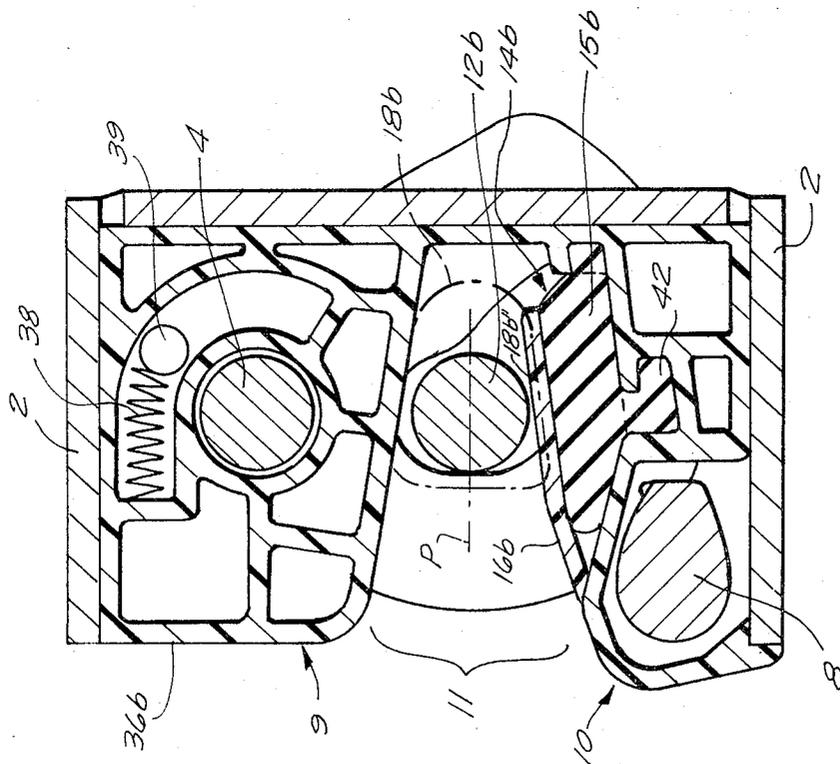
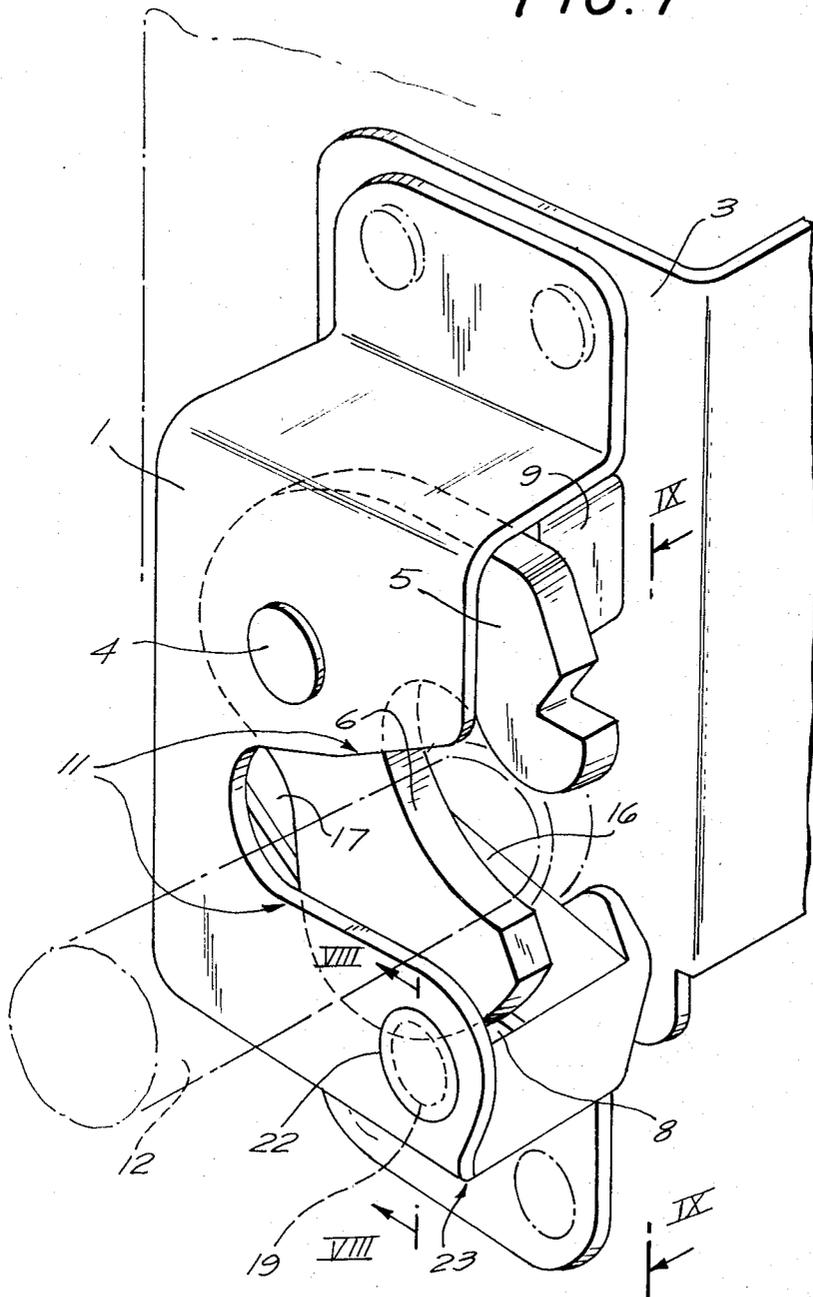


FIG. 5

FIG. 7



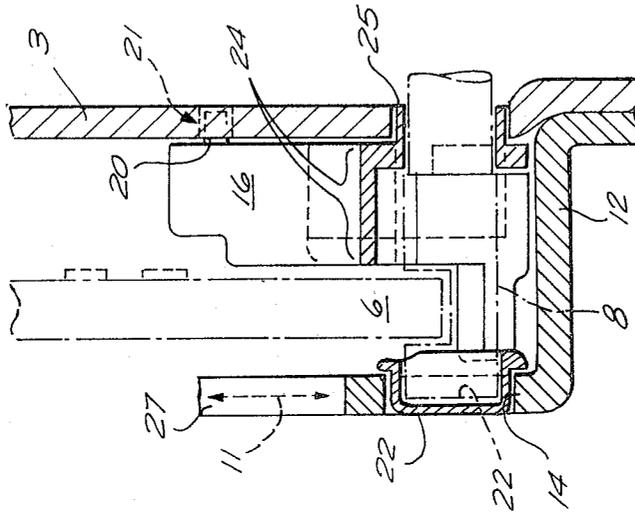


FIG. 8

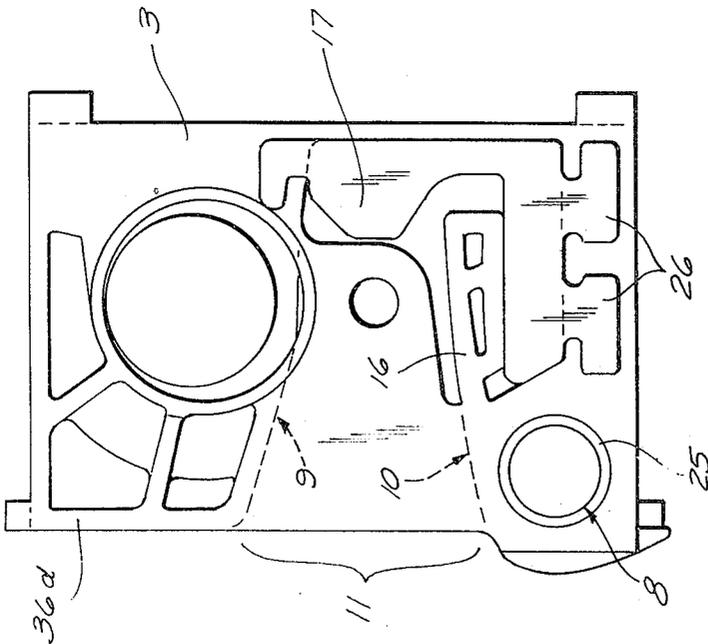


FIG. 9

MOTOR VEHICLE DOOR LATCH**CROSS REFERENCE TO COPENDING APPLICATION**

The application is related to the commonly owned copending application Ser. No. 220,037 filed Jan. 24, 1972, now U.S. Pat. No. 3,781,045 issued Dec. 25, 1973.

FIELD OF THE INVENTION

The present invention relates to a latch and more particularly, to a door latch for use on a motor vehicle.

BACKGROUND OF THE INVENTION

A common type of motor-vehicle door latch has a U-shaped housing whose legs are attached to a door edge. The web of this housing is formed with a notch into which a bolt extending from the vehicle doorpost is received when the door is closed. Between the housing web and the door edge there is a disposed bifurcate locking pawl which is carried on a pin pivoted in the web and in the cover plate. A keeper is pivotal to engage an arm of the pawl so as to retain the bolt in the notch. Mechanism is provided to operate the keeper by pivoting it to release the pawl and allow the door to be opened.

As a general rule the bolt strikes against the throat of the pivotal pawl and then pivots this pawl back past the keeper. As the pawl is pivoted the door is cammed either upwardly or downwardly, depending on whether the pawl pivot is above or below its throat. This deflection inevitably increases the requisite closing force of the door. Due to the extra force required and to the impact of the bolt on the pawl's throat, the closing of the door is attended by a considerable amount of noise.

Another disadvantage of such doors is that the door hinges are constantly taxed by the deflection of the door as it closes, so that these hinges may become loose. Also the door deflection applies unnecessary strain upon the latch. In addition it is relatively simple for car thief to open such a door by inserting a flat hook to depress the keeper and free the pawl.

OBJECTS OF THE INVENTION

It is therefore an object of the present invention to provide an improved motor-vehicle door latch.

Another object is to provide such a latch which closes easily and quietly.

Yet another object is the provision of such a latch which has a long service life and is inexpensive to manufacture.

A further object is to provide a latch which cannot be forced open as easily as the above-described prior-art latches.

SUMMARY OF THE INVENTION

I attain these objects according to the present invention in a latch of the above-described general type wherein the bolt is guided into the notch between two resiliently deflectable and outwardly diverging inwardly converging ramps. The bolt as it pivots the pawl back does not ever engage the bight of the pawl, but merely pushes against the central region of one of these arms and is straddled thereby. At least one of the ramps provides resilient support for the bolt from the point at

which it enters the latch until its final position in which it is straddled by the arms of the pawl and the latter is secured by the keeper.

Such a lock is quiet and operates extremely easily. Since it does not strike the bight of the pawl to pivot it around, the door is not cammed up or down and less force is needed to close it. In addition, due to the straight-line path followed by the bolt, the latch can be relatively lightly constructed and still have a long service life.

According to another feature of this invention the ramp over the guide adjacent the keeper has a skirt which completely covers this keeper, preventing entry of a tool for opening the door without the key. Thus such a latch is extremely difficult to force.

In accordance with the invention the locking bolt engages the two ramps as soon as it enters the notch in the housing's web. These ramps guide the bolt back past the pawl into the base of the notch. At no time does the bolt engage the web of the housing, since the notch is made larger than the outwardly flaring opening formed by the ramps so that the door closes extremely quietly, the only contact being that of the bolt against the arm of the pawl with the keeper latching into place behind the pawl to lock it.

DESCRIPTION OF THE DRAWING

The above and other objects, features, and advantages will become more readily apparent from the following description, reference being made to the accompanying drawing in which:

FIG. 1 is a vertical axial section through a first embodiment of the latch according to the present invention;

FIGS. 2 and 3 are sections taken along lines II — II and III — III of FIG. 1, respectively;

FIGS. 4-6 are views similar to FIG. 3 showing three other embodiments of the present invention;

FIG. 7 is a perspective view of yet another embodiment of this invention; and

FIGS. 8 and 9 are sections taken along lines VIII — VIII and IX — IX of FIG. 7, respectively.

SPECIFIC DESCRIPTION

As seen in FIGS. 1-3 a motor-vehicle latch has a housing 1 formed of a web 27 from which extend two planar and flat legs 2' and 2''. A cover plate 3 bridges flanges 28 extending outwardly from the legs 2' and 2'' and is adapted to be secured to the edge of a motor-vehicle door 29. The web 27 is formed with a laterally open notch 11 whose inside edges diverge outwardly and converge inwardly. A bolt 12 secured to a motor-vehicle doorpost 30 is adapted to enter the notch 11 with clearance in the direction of convergence of the edge thereof.

A stepped steel pin 4 extends axially between the plate 3 and the web 27. Pivotal on this pin between a shoulder 31 thereon and the web 27 is a bifurcate pawl 32 having a pair of arms 5 and 6 defining a throat 7. The leg 5 is formed with a notch 33 into which a projection 34 of a keeper 8 is engageable, as described in the aforementioned copending application Ser. No. 220,037 filed Jan. 24, 1972. Means 35 is provided as described in that application for rotating this keeper 8 to free the pawl 32 and allow the latch to open.

A unitarily injection molded inherently resilient body 36 is received between the web 27 and cover plate 3

and formed with a pair of ramps 9 and 10 which guide the bolt 12 along the straight path shown by arrow 13. These ramps 9 and 10 are symmetrical about a plane P lying along the direction 13 and the center axis A of the bolt in the closed position shown in FIG. 3. In this manner as the bolt enters the housing 1 in direction 13 it is received in a mouth formed by the ramps 9 and 10 and guided into the latch without deflection either up or down. This insures a quiet and smooth latching of the door.

The synthetic-resin body 36 need not be a solid block, but can be largely hollow. It is formed by injection molding with a chamber 37 in which a spring 38 bears on a pin 39 extending axially from the pawl 32 so as to bias this pawl in the clockwise direction, into the "open" position, shown in FIG. 2 in broken lines. In addition the body is formed below the lower ramp 10 with a chamber 14' and above the upper ramp 9 with a chamber 14'' into which rubber or other molded elastomeric bodies 15' and 15'', respectively, are fitted. The bolt 12 has an enlarged head 18 which engages these surfaces 9 and 10 and deflects them outwardly from the plane P against their cushions 15 and 15', respectively, as this bolt 12 moves along plane P from the broken-line position of FIG. 2 to the solid-line position. The housing 1 is formed with a bent-over back wall 40 formed with an opening 41 which accommodates the leg 6 of the pawl 32 in its closed position. This back wall 40 supports the body 36 so that it is not pushed out of the housing 1 as the door is closed. In addition a third elastomeric cushion 17 is provided at the base of the throat of the latch so that the latch comes to rest with the bolt head 18 resting against it. The lower ramp 10 acts as a shield 16 for the keeper 8 so that this element is only exposed at the place where it meets the pawl 32 in order that unauthorized opening of the latch by operation of the keeper from without is almost impossible. Even if only one of the ramps 9, 10 is provided, it can be arranged to give the necessary theft protection.

Instead of forming the body 36 as a single integral piece as in FIGS. 1-3 it is possible as shown in FIG. 4 to form it of two separate pieces 36a' and 36a''. In this embodiment also the piece 36a' above the plane P is not provided with a cushion, but relies on its own inherent elasticity to cushion the head 18 of the bolt 12.

The embodiment of FIG. 5 is identical to that of FIGS. 1-3 except that here the body 36b is formed with a nonintegral shield 16b forming the lower ramp 10. A cushion 15b in a chamber 14b under this shield 16b is keyed into the lower half of the body 36b at 42. In addition the bolt 12b here has a head 18b formed with a pair of converging flanks 18b' and 18b'' having the same inclination relative to the plane P as the ramps 9 and 10. In this manner the ramps 9 and 10 wear more evenly and an extremely solid seating of the head 18b between them is insured.

In FIG. 6 the same system as that of FIG. 5 is used, except that the upper ramp is formed of an independent ramp member 43 under which a cushion 15c in a space 14c is provided. This cushion 15c is keyed into the body 36c.

In all of the above embodiments the bolt 12 never comes to rest in the throat or crotch 7 between the two arms 5 and 6. In this manner the bolt strikes the inside of the arm 6 adjacent its end and pivots the pawl 32 around, at the same time riding up the arm toward the

crotch 7. When the bolt finally comes to rest, in the FIG. 2 solid-line position, it is still spaced away from the base 7 of the gap between the legs 5 and 6, and is wedged between the ramps 9 and 10, the leg 5, and the rear cushion 17. It is in contact with only one of the legs 5 for tightest fit. Thus there is no harsh click as the bolt strikes the pawl at the crotch between the two arms as is the case in prior-art latches of this general type.

The embodiment of FIGS. 7-9 shows an arrangement wherein the lower ramp 10 is extended as a shield 16 which is provided with axially extending lugs 20 received in bores 21 in the cover plate 3. In addition a back cushion 17d is provided which is keyed into the body 36d at 26.

The shield 16 covers the pivot pin 19 of the keeper 8 which has its one end received in a sleeve or cup 22 in turn received in a bore 44 formed in the web 27. The shield is formed at 25 with a sleeve-like projection which guides the keeper 8 in the cover plate 3 so that noise is reduced to a minimum and wear is decreased. The shield 16 extends over the end of the housing 1 below the keeper 8 with an extension 23 forming an integral part of the portion 24 constituting the ramp 10. Again the body 36d is made of a tough synthetic resin such as Nylon, a polyamide, and is formed by injection molding.

I claim:

1. A latch for a door engageable with a doorpost, said latch comprising:
 - a bolt extending from said doorpost and having an axis;
 - a U-shaped housing on said door having a flat central web formed with a laterally open notch and two flat legs extending from said web toward said door;
 - a cover plate bridging said legs of said housing;
 - a pivot pin extending axially between said web and said plate;
 - a pivotal flat locking pawl on said pin having a pair of arms separated by a bight, said bolt being engageable with one of said arms adjacent said bight to pivot said pawl;
 - a keeper pivoted between said web and said plate and engageable with at least one of said arms to prevent pivoting of said pawl in one direction to retain said bolt behind said pawl in said notch; and
 - a pair of outwardly resiliently deflectable ramps between said plate and said web and next to said pawl, said ramps converging toward a plane described by the axis of said bolt in the direction of insertion thereof, said bolt being engageable with both of said ramps on entrance along said plane into said notch, said ramps being in continuous engagement with said bolt throughout the movement thereof in said housing and said pawl being dimensioned to prevent engagement of said bight with said bolt.
2. The latch defined in claim 1 wherein said ramps are provided directly against said plate.
3. A latch for a door engageable with a doorpost, said latch comprising:
 - a bolt extending from said doorpost and having an axis;
 - a U-shaped housing on said door having a flat central web formed with a laterally open notch and two flat legs extending from said web toward said door;
 - a cover plate bridging said legs of said housing;

a pivot pin extending axially between said web and said plate;

a pivotal flat locking pawl on said pin having a pair of arms separated by a bight, said bolt being engageable with one of said arms adjacent said bight to pivot said pawl;

a keeper pivoted between said web and said plate and engageable with at least one of said arms to prevent pivoting of said pawl in one direction to retain said bolt behind said pawl in said notch; and

a pair of outwardly resiliently deflectable ramps between said plate and said web and next to said pawl, said ramps converging toward a plane described by the axis of said bolt in the direction of insertion thereof, said bolt being engageable with both of said ramps on entrance along said plane into said notch, said bolt being formed with an enlarged head, said head being engageable with said ramps, said head being formed with a pair of flanks converging in said direction and flatly engageable with said ramps.

4. A latch for a door engageable with a doorpost, said latch comprising:

a bolt extending from said doorpost and having an axis;

a U-shaped housing on said door having a flat central web formed with a laterally open notch and two flat legs extending from said web toward said door;

a cover plate bridging said legs of said housing;

a pivot pin extending axially between said web and said plate;

a pivotal flat locking pawl on said pin having a pair of arms separated by a bight, said bolt being engageable with one of said arms adjacent said bight to pivot said pawl;

a keeper pivoted between said web and said plate and engageable with at least one of said arms to prevent pivoting of said pawl in one direction to retain said bolt behind said pawl in said notch; and

a pair of outwardly resiliently deflectable ramps between said plate and said web and next to said pawl, said ramps converging toward a plane described by the axis of said bolt in the direction of insertion thereof, said bolt being engageable with both of said ramps on entrance along said plane into said notch, said latch further comprising a shield extending over said keeper and laterally covering same, said shield being at least partially formed as a sleeve, said keeper being pivotal in said sleeve.

5. A latch for a door engageable with a doorpost, said latch comprising:

a bolt extending from said doorpost and having an axis;

a U-shaped housing on said door having a flat central web formed with a laterally open notch and two flat legs extending from said web toward said door;

a cover plate bridging said legs of said housing;

a pivot pin extending axially between said web and said plate;

a pivotal flat locking pawl on said pin having a pair of arms separated by a bight, said bolt being engageable with one of said arms adjacent said bight to pivot said pawl;

a keeper pivoted between said web and said plate and engageable with at least one of said arms to prevent

pivoting of said pawl in one direction to retain said bolt behind said pawl in said notch; and

a pair of outwardly resiliently deflectable ramps between said plate and said web and next to said pawl, said ramps converging toward a plane described by the axis of said bolt in the direction of insertion thereof, said bolt being engageable with both of said ramps on entrance along said plane into said notch, said latch further comprising a shield extending over said keeper and laterally covering same, said shield being formed unitarily with one of said ramps and extending over said keeper to one of said legs of said housing.

6. A latch for a door engageable with a doorpost, said latch comprising:

a bolt extending from said doorpost and having an axis;

a U-shaped housing on said door having a flat central web formed with a laterally open notch and two flat legs extending from said web toward said door;

a cover plate bridging said legs of said housing;

a pivot pin extending axially between said web and said plate;

a pivotal flat locking pawl on said pin having a pair of arms separated by a bight, said bolt being engageable with one of said arms adjacent said bight to pivot said pawl;

a keeper pivoted between said web and said plate and engageable with at least one of said arms to prevent pivoting of said pawl in one direction to retain said bolt behind said pawl in said notch; and

a pair of outwardly resiliently deflectable ramps between said plate and said web and next to said pawl, said ramps converging toward a plane described by the axis of said bolt in the direction of insertion thereof, said bolt being engageable with both of said ramps on entrance along said plane into said notch, said latch further comprising at least one elastomeric cushion received between at least one of said ramps and the respective leg of said housing.

7. The latch defined in claim 6, further comprising at least one elastomeric cushion fixed in said housing at the base of said notch.

8. The latch defined in claim 6 wherein said notch is slightly wider than and overlies the mouth formed by said ramps.

9. A motor-vehicle door latch comprising:

a housing of U-configuration comprising a vertical web, a pair of horizontal legs formed unitarily with said web, and a plate bridging said web legs, said web being formed with a slot opening along an edge of the web in the direction of a bolt receivable in said latch;

a bifurcated pawl pivotally mounted in said housing about an axis perpendicular to said web and at a location offset from the bight of said pawl, the arms of said pawl being constructed and arranged to straddle said bolt upon insertion thereof in said housing to an end position;

at least one resiliently deflectable guide ramp in said housing for intercepting said bolt substantially immediately upon such insertion and supporting same to and in said end position, the pawl being constructed and arranged to engage said bolt only along inner flanks of the arms thereof at locations spaced from said bight; and

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a keeper engageable with said pawl for retaining same upon entrainment of said pawl by said bolt into said end position, said keeper being provided along the lower leg at the front of said housing, said ramp being formed with an apron overlying said keeper and extending to said lower leg for preventing entry of a tool between said ramp and said keeper to trip the latter.

10. The latch defined in claim 9 wherein said pawl is

flat and is disposed directly adjacent said web, said ramp being disposed between said pawl and said plate and lying directly adjacent the latter.

11. The latch defined in claim 10 wherein said bolt is provided with a shank and a head larger than said shank and adapted to ride upon said ramp whereby said shank engages only said arms of said pawl as said bolt moves through said housing into said end position.

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