

[72]	Inventor	Lester M. Goeman Grosse Pointe Woods, Mich.
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[73]	Assignee	General Motors Corporation Detroit, Mich.

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Primary Examiner—Richard E. Moore
Attorneys—W. E. Finken and D. L. Ellis

[54] DOOR-LATCHING ARRANGEMENT
4 Claims, 9 Drawing Figs.

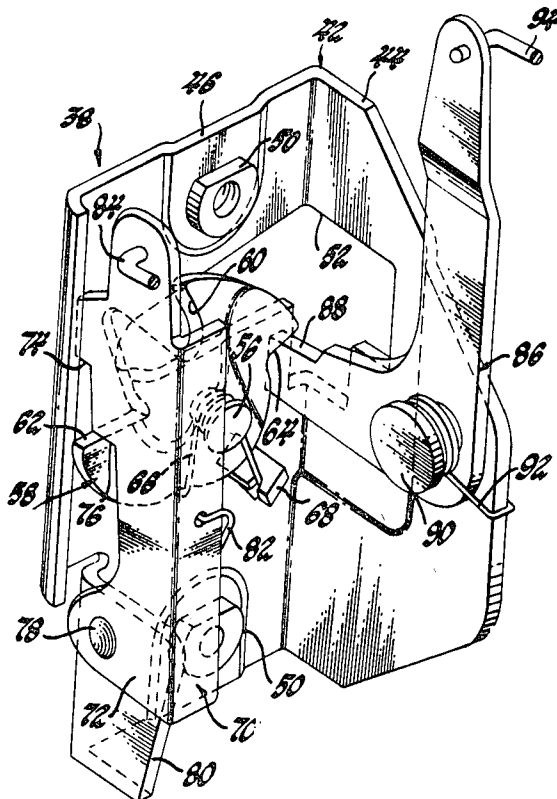
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[51]	Int. Cl.	E05c 3/26
[50]	Field of Search	292/216 Y, 241 J, 336.3, 229, 200, 196, 100, 129; 49/324, 209, 300, 255

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ABSTRACT: A vehicle door swingable about a vertical axis situated generally at one edge thereof has pivotally mounted therein a bifurcated latch bolt having detent and pull-in shoulders. A detent lever having a pair of detent shoulders thereon is pivotally mounted on the door and engages the detent shoulder of the latch bolt to maintain the latter in either an intermediate latched or a fully latched position. A fixed striker on the vehicle engages and rotates the latch bolt to the intermediate latched position during closing movement of the door and a pull-in lever pivotally mounted on the door is operable to engage the pull-in shoulder on the latch bolt to rotate the latch bolt from the intermediate latched to the fully latched position to thereby forcibly draw the door into the door opening.



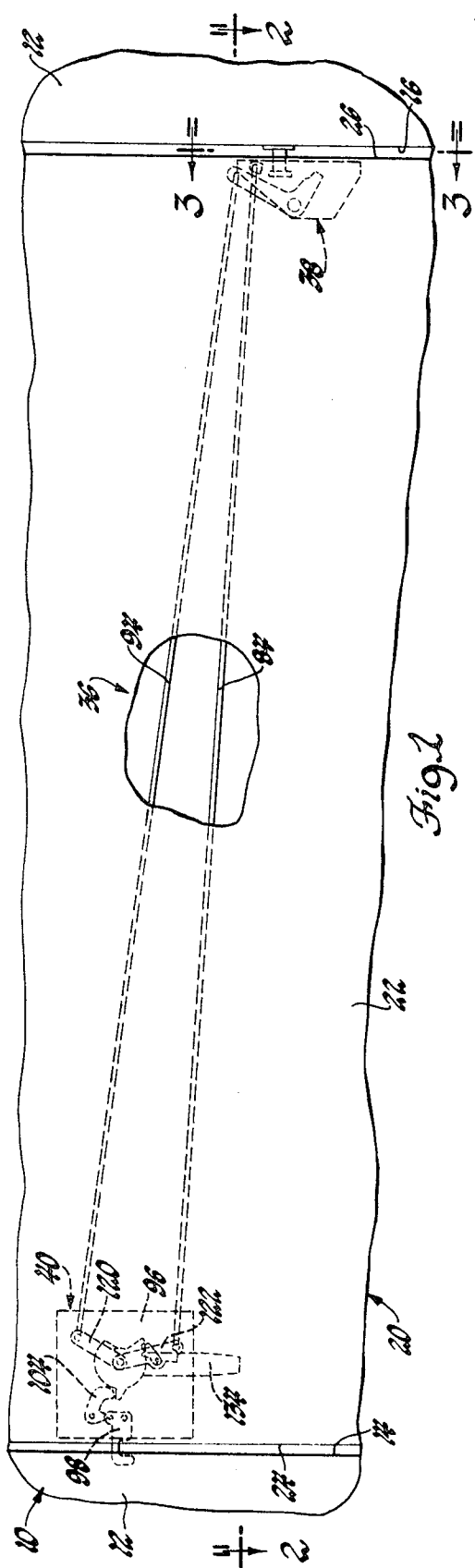


Fig. 1

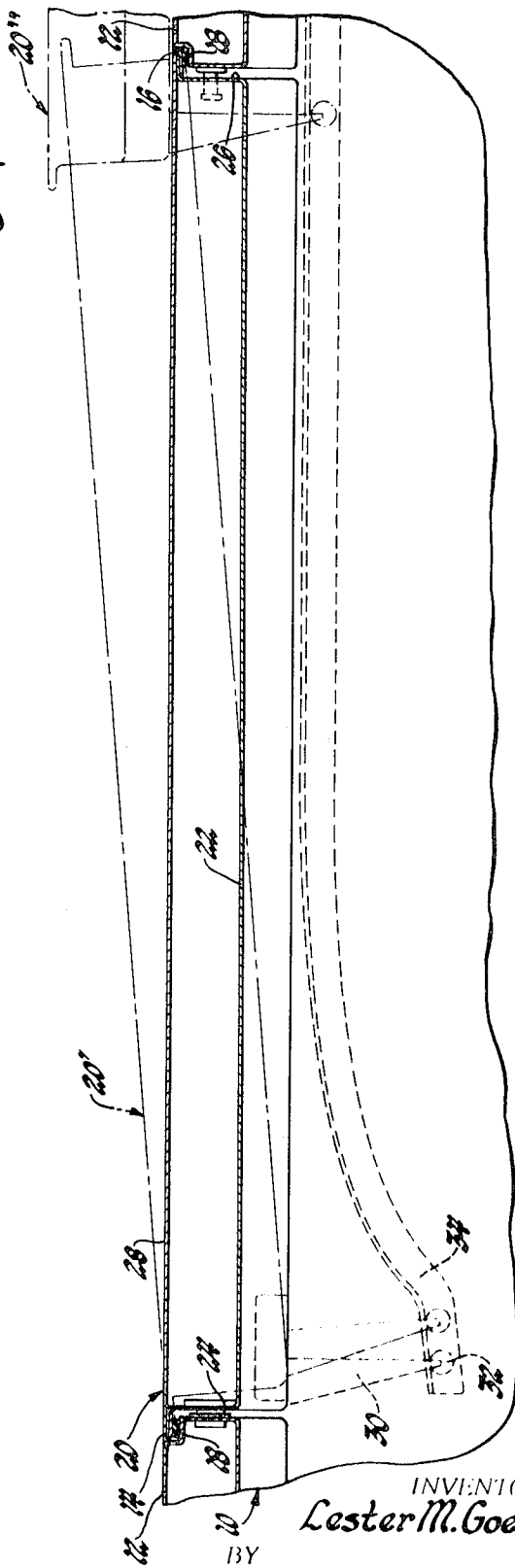
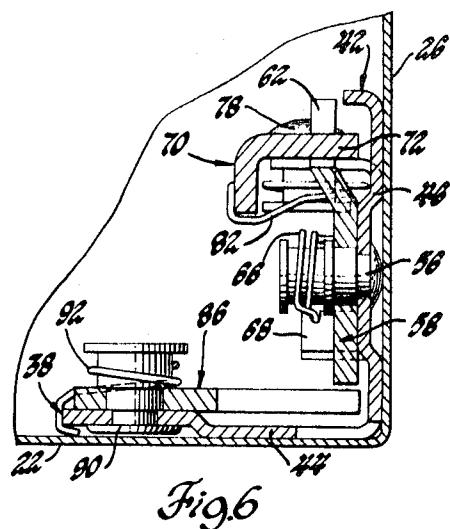
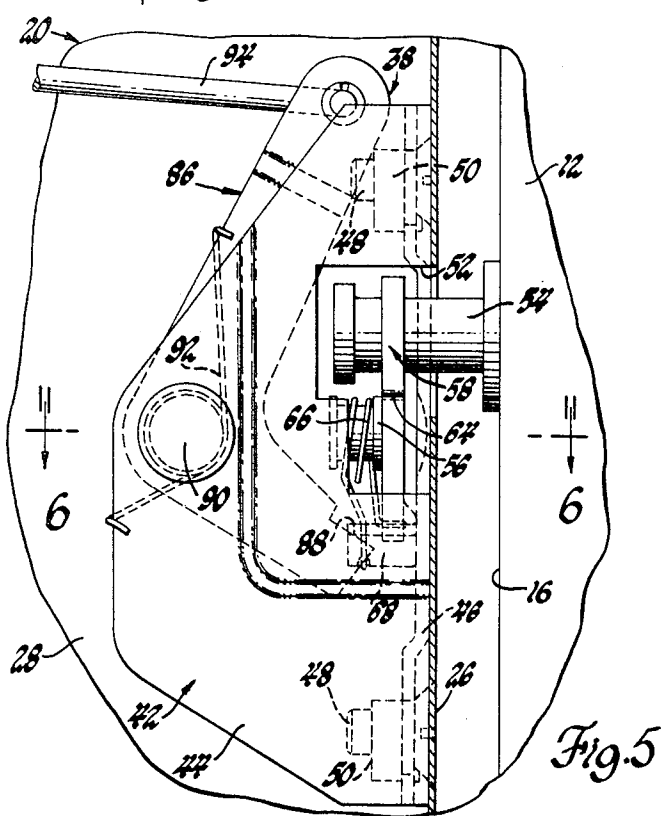
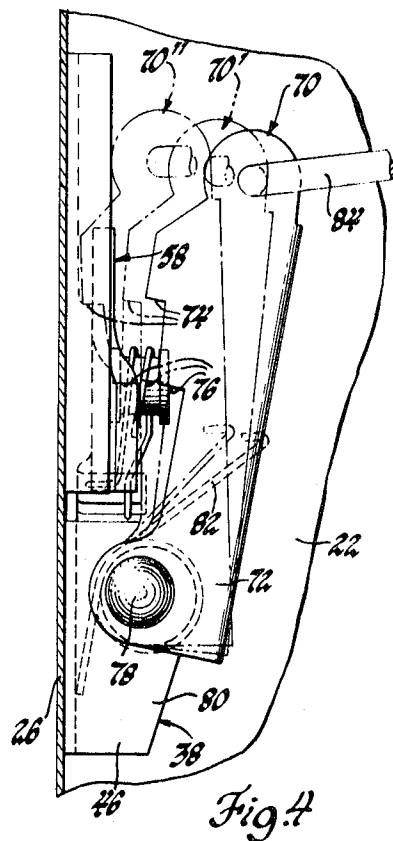
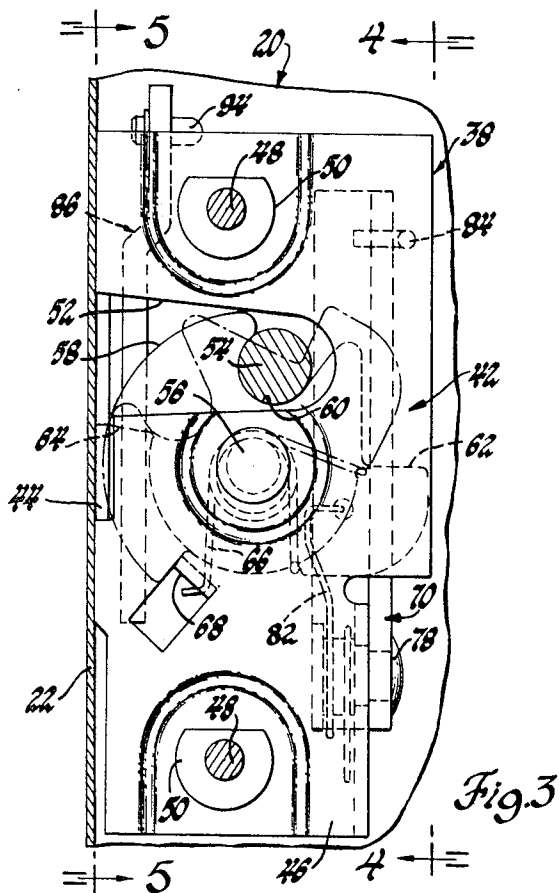


Fig. 2

INVENTOR.
Lester M. Goeman

BY
D. L. Ellis

ATTORNEY



INVENTOR
Lester M. Goeman

BY

D. L. Ellis

ATTORNEY

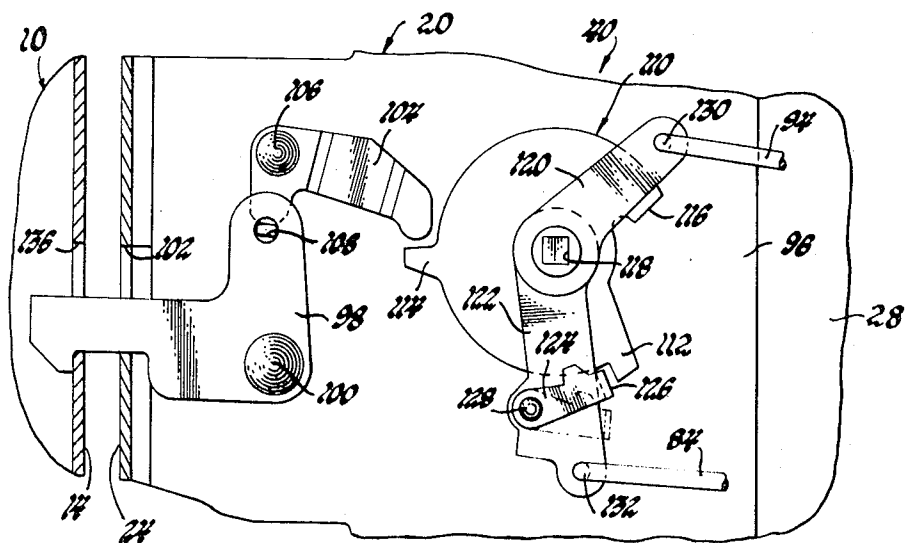


Fig. 7

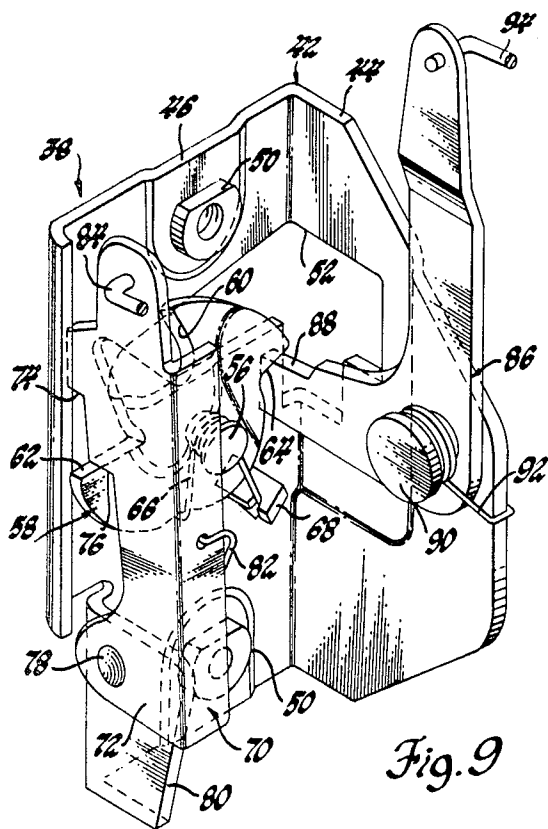
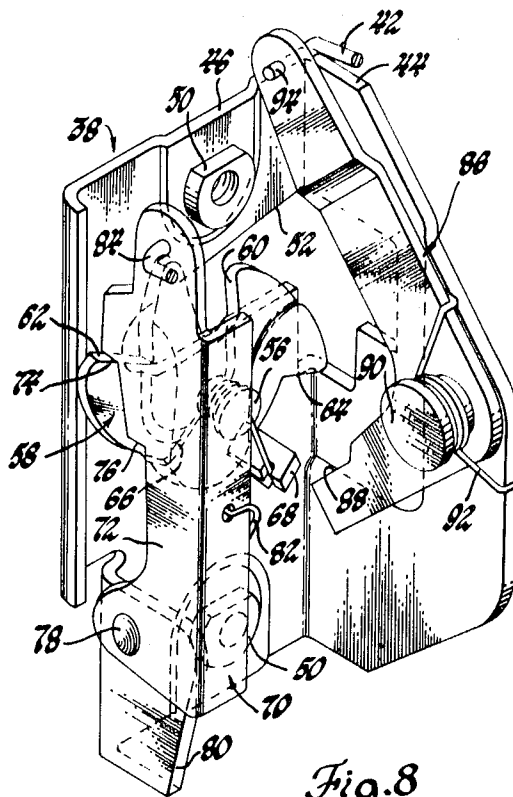


Fig. 9



DOOR-LATCHING ARRANGEMENT

This invention relates generally to vehicle door-latching arrangements and in particular to a latching arrangement operable to move the door from a semiclosed to a fully closed position.

Vehicle sliding doors of the flush type, wherein the door is pivoted out of a closed position in flush relationship with the vehicle body side panels to a partially opened position and is then bodily shifted longitudinally along the side of the vehicle to completely clear the door opening, significantly increase the utility of small van-type vehicles by permitting easy access to the vehicle cargo area even when the van occupies a relatively narrow space. A problem is encountered, however, in latching such doors closed because of the relatively short swing available between the partially opened position and the fully closed position in coplanar relationship with the vehicle body side panels. In conventional vehicle doors having a normal full swing, such as a typical automobile front door, the inertia generated by forcibly swinging the door closed is sufficient to overcome the latch-biasing springs and the seal pressure generated by the door seals as the door presses thereagainst. Without such a large swing, however, sufficient closing inertia will not be generated unless an abnormally large closing force is exerted on the door. It is, therefore, important to provide convenient means for moving the door from the partially opened to the fully closed position with relative ease. Typical prior art latching arrangements of this type require expensive and complicated linkage systems. A latching arrangement according to this invention, however, incorporates a pull-in mechanism characterized by only a single lever acting directly on the latch bolt which pull-in mechanism, consequently, is of simple design and is significantly easier to install and service than prior art arrangements.

The primary feature, then, of this invention is that it provides an improved door-latching arrangement including a latch assembly on the door in which assembly a detent means engages a rotatably mounted latch bolt to maintain the latter in either an intermediate latched or a fully latched position and in which assembly a movable pull-in lever is operable to directly engage and forcibly rotate the latch bolt from the intermediate latched to the fully latched position. Another feature of this invention resides in the provision in the latch assembly of pull-in lever-operating means which include a handle assembly and link means between the handle assembly and pull-in lever, the handle assembly being operable to shift the link means to operate the pull-in lever and forcibly rotate the latch bolt to the fully latched position. These and other features of this invention will be readily apparent from the following specification and from the drawings wherein:

FIG. 1 is a fragmentary partially broken away elevational view of the inside of a vehicle having a sliding door and a latch arrangement according to this invention;

FIG. 2 is a sectional view taken generally along the plane indicated by lines 2—2 in FIG. 1 and showing the door in a plurality of positions;

FIG. 3 is an enlarged sectional view taken generally along the plane indicated by lines 3—3 in FIG. 1;

FIG. 4 is a sectional view taken generally along the plane indicated by lines 4—4 in FIG. 3;

FIG. 5 is a sectional view taken generally along the plane indicated by lines 5—5 in FIG. 3;

FIG. 6 is a sectional view taken generally along the plane indicated by lines 6—6 in FIG. 5;

FIG. 7 is an enlarged view of a portion of FIG. 1 and showing the handle assembly portion of the door latching arrangement;

FIG. 8 is a perspective view of the latch assembly portion of the door-latching arrangement and showing the latch bolt in the intermediate latched position; and

FIG. 9 is similar to FIG. 8 but showing the latch bolt in the fully latched position. Referring now to FIGS. 1 and 2 of the drawings, the body of a van-type vehicle generally designated 10 has side panels 12 defining a door opening or frame having vertical sides 14 and 16. A typical rubber-type seal 18, FIG. 2,

extends around the door opening in a conventional manner. A door 20 including a flanged inner panel 22 having vertical flanges 24 and 26 and an outer panel 28 pinch welded to the inner panel around the periphery of the flange of the latter is mounted on the vehicle body 10 for openably closing the door opening and further includes a pair of rigid brackets located generally at the top and bottom of the forward edge of the door. The rigid brackets have respective ones of a pair of guide rollers rotatably mounted thereon, only the lower rigid bracket 30 with guide roller 32 thereon being shown in FIG. 2, and a curved lower guide track 34 and a similarly curved upper guide track, not shown, are provided on the vehicle body 10 generally below and above the door opening to guidingly engage respective ones of the guide rollers.

The rear edge of the door 20 is connected to the vehicle body by conventional means, not shown, for sequential movement in planes generally perpendicular to and parallel to the plane of the door opening. It will be obvious to those skilled in the art that such means could include a link having one end mounted on the door for pivotal movement about a vertical axis of the latter and the other end mounted on a carriage for pivotal movement about a generally vertical axis of the carriage which carriage, in turn, moves on a generally horizontal track fixed to the vehicle side panel rearwardly of the door opening. More particularly, from the fully closed position shown in solid lines in FIG. 2, the door 20 is first pivoted counterclockwise generally about a vertical axis at the forward outside corner thereof with the rear vertical flange 26 or free-swinging edge moving generally perpendicularly with respect to the plane of the door opening to a partially opened position 20', FIG. 2, wherefrom the door is bodily shiftable rightwardly or rearwardly. As the door is bodily shifted rearwardly, with the vertical flange 26 moving generally parallel to the plane of the door opening, the curvature of the upper and lower guide tracks guides the forward edge of the door out of the door opening to a position generally parallel to the side panels 12 so that the door may be further bodily shifted to a fully opened position 20'', FIG. 2, exposing substantially the entire door opening while occupying only a small area adjacent side panel 12 of the vehicle body rearwardly of the door opening. A door-latching arrangement according to this invention and generally designated 36, FIG. 1, is operable in a manner to be described to releasably maintain the door in the fully closed position.

As best seen in FIG. 1, the latching arrangement 36 includes a latch assembly 38 and a handle assembly 40. The latch assembly 38 includes a generally L-shaped support plate 42, FIGS. 6, 8 and 9, having legs 44 and 46. The support plate 42 is mounted on the rear vertical flange 26 of the door 20 by threaded fasteners 48 extending through the rear vertical flange 26 into tapped bosses 50 on the leg 46 of the support plate, FIGS. 3, 5, 8 and 9. A striker clearance aperture, not shown, on the inner panel 22 of the door 20 extends around to the rear vertical flange 26 and registers with a similarly shaped aperture 52 in the support plate, seen best in FIGS. 3, 5, 8 and 9, extending from leg 44 around to leg 46. In the fully closed position of the door a conventional headed striker 54, FIGS. 3 and 5, fixedly secured to vertical side 16 of the door opening or frame protrudes through the registered striker apertures into the interior of the door while the clearance between the striker apertures and the striker permits free and unobstructed movement of the rear vertical flange 26 of the door into and out of the door opening in a plane generally perpendicular thereto as the door is pivoted between the partially opened position 20' and the fully closed position shown in solid lines in FIG. 2.

Referring particularly now to FIGS. 3, 6, 8 and 9, a pivot stud 56 is fixedly secured to leg 46 of the support plate 42 and rotatably supports a latch bolt 58 having a bifurcation 60, a detent shoulder 62, and a pull-in shoulder 64. A coil torsion spring 66 is coiled about pivot stud 56 and bears at one end against an upturned tab 68 integral with leg 46 and at the other end against latch bolt 58 to thereby bias the latter in a

counterclockwise direction, FIG. 3, toward an unlatched or normal position, shown in broken lines in FIG. 3, wherein pull-in shoulder 64 abuts upturned tab 68. The latch bolt 58 is rotatable in a clockwise direction, FIG. 3, from the unlatched position to either an intermediate latched position, FIG. 8, or a fully latched position, shown in FIG. 9 and in solid lines in FIG. 3.

With reference now to FIGS. 4, 6, 8 and 9, detent means are provided for releasably maintaining the latch bolt 58 in either of the two latched positions and include a detent lever 70 having a flange 72 with a pair of detent shoulders 74 and 76 thereon. The detent lever 70 is rotatably supported on a stud 78 fixedly secured to an upturned tab 80 of leg 46 of the support plate 42. A coil torsion spring 82 is coiled about stud 78 and bears at one end against leg 46 of the support plate and at the other end against the detent lever 70 to thereby bias the latter counterclockwise, FIG. 4, from a releasing position, shown in solid lines in FIG. 4, toward either of two engaging positions 70' and 70'' wherein shoulders 74 and 76, respectively, engage the detent shoulder 62 on the latch bolt. One end of a draft link 84 is pivotally connected to the detent lever 70 generally at the upper end thereof so that rightward bodily shiftable movement of the draft link is operable to pivot the detent lever in a clockwise direction, FIG. 4, from either of the engaging positions to the releasing position wherein both shoulders 74 and 76 are removed from the plane of the latch bolt 58.

Referring now to FIGS. 5, 6, 8 and 9, a generally L-shaped pull-in lever 86 having a lifting surface 88 on one leg thereof is rotatably supported on a stud 90 fixedly secured to leg 44 of the support plate 42. A coil torsion spring 92 is coiled about stud 90 and bears at one end against leg 44 of the support plate and at the other end against pull-in lever 86 to thereby bias the latter in a clockwise direction, FIG. 5, toward a retracted position shown in solid lines in FIG. 5. A second draft link 94 is pivotally connected to the other leg of the pull-in lever generally at the distal end thereof and is operable upon leftward bodily shiftable movement to pivot the pull-in lever counterclockwise, FIG. 5, from the retracted position, FIGS. 5 and 8, to an extended position, not shown, during which rotation lifting surface 88 pierces the plane of latch bolt 58 and engages pull-in shoulder 64 on the latch bolt when the latter is in the intermediate latched position. Continued rotation of the pull-in lever 86 following engagement between the lifting surface 88 and pull-in shoulder 64 initiates rotation of the latch bolt 58 from the intermediate latched to the fully latched position, FIG. 9.

When reference now to FIGS. 1 and 7, handle assembly 40 includes a main support plate 96 fixed to the door 20 between the inner and outer panels thereof by conventional means, not shown. A generally hook-shaped latch bolt 98 is pivotally mounted on the main support plate 96 at 100 and protrudes through an access opening 102 in vertical flange 24 of the door. A transfer lever 104 is pivotally supported on the main support plate 96 at 106 and has one leg thereof pivotally connected to the latch bolt 98 at 108 and the other leg lying in the plane of a generally disk-shaped operating member 110 which operating member is rotatably mounted on the main support plate by conventional means, not shown. The operating member 110 includes a pair of projections 112 and 114 and an upturned tab 116 and has a square aperture 118 therethrough centered on the axis of rotation of the operating member. A first lever 120 overlies operating member 110 and is rotatably mounted on the main support plate coaxially with the operating member for independent rotation. A second lever 122 overlies both operating member 110 and first lever 120 and is rotatably mounted on the main support plate coaxially with the operating member and first lever for independent rotation. An intermediate lever 124 having a downturned tab 126 at one end overlies second lever 122 and is supported on the latter at 128 for pivotal movement between engaged and disengaged position, shown respectively in solid and broken lines in FIG. 7. Conventional means, not shown, such as a garnish

button arrangement on the door, are provided for selectively pivoting the intermediate lever 124 between the engaged and disengaged positions. The remaining end of second draft link 94 is pivotally connected to first lever 120 at 130 while the remaining end of first draft link 84 is pivotally connected to second lever 122 at 132. Conventional inside and outside handles are connected to the operating member 110 through square aperture 118 for unitary rotation therewith, only outside handle 134 shown in broken lines in FIG. 1.

A typical operational sequence of the latching arrangement according to this invention may normally begin with the door in the fully opened position 20'', FIG. 1, and the latch bolt 58 in the unlatched position, shown in broken lines in FIG. 3. To close the door opening, the door 20 is bodily shifted forwardly on the vehicle body, the upper and lower guide tracks guiding the forward edge of the door into the door opening until partially opened position 20' is achieved. Upon reaching the partially opened position the latch bolt 98 automatically hooks a keeper aperture 136, FIG. 7, in vertical side 14 of the door opening to prevent unintentional rearward bodily shiftable movement of the door. A relatively small motivating force is then applied to the rear or free-swinging edge of the door 20, pivoting the latter clockwise, FIG. 1, toward coplanar relationship with the vehicle body side panel 12 during which pivotal movement the striker 54 engages the latch bolt 58 in the bifurcation 60. The inertia of the door, while being relatively small, is sufficiently large to initiate rotation of the latch bolt 58 in a clockwise direction, FIG. 3, to the intermediate latched position wherein the detent lever 70 assumes engaging position 70', FIG. 4, with shoulder 74 overlying detent shoulder 62 on the latch bolt 58, FIG. 8. The detent lever thereby prevents the spring 66 from rotating the latch bolt 58 counterclockwise to release the striker 54 from the bifurcation and the door 20 is thus maintained in the semiclosed position in the door opening.

In the intermediate latched position of the latch bolt 58, FIG. 7, the pull-in shoulder 64 thereof assumes a generally horizontal orientation perpendicular to and lying across the arcuate path defined by lifting surface 88 on the pull-in lever 86 during pivotal movement of the latter about stud 90. When it is desired to bring the door 20 from the semiclosed to the fully closed position in the door opening, the outside handle 134 is grasped and rotated counterclockwise, FIG. 1, causing upturned tab 116 on the operating member to engage the side of first lever 120 and rotate the latter counterclockwise, FIG. 7. Counterclockwise rotation of the first lever initiates corresponding counterclockwise pivotal movement, FIG. 5, of pull-in lever 86 from the retracted position to the extended position causing the lifting surface 88 to engage the pull-in shoulder 64 and forcibly rotate the latch bolt 58 from the intermediate latched to the fully latched position during which movement the latch bolt reacts against the striker 54 to forcibly pull the door into the door opening against the seals 18. In the fully latched position of the latch bolt 58, detent lever 70 assumes engaging position 70'', FIG. 4, with shoulder 76 overlying detent shoulder 62 on the latch bolt 58 to prevent counterclockwise movement, FIG. 3, to the unlatched or intermediate latched positions. Release of the operating handle 134 permits rotation of the pull-in lever 86 and the outside operating handle back to their original positions by spring 92 in cooperation with spring means, not shown, in the handle assembly.

When it is desired to open the door, the outside handle 134 is grasped and rotated clockwise, FIG. 1, causing projection 114 on the operating member 110 to engage transfer lever 104 and rotate the latter counterclockwise, FIG. 7, to pivot the hooked latch bolt 98 out of engagement with keeper aperture 136. Simultaneously, in the engaged position of the intermediate lever 124, projection 112 on the operating member 110 engages downward tab 126 of the intermediate lever to thereby rotate second lever 122 clockwise, FIG. 7. Clockwise rotation of the second lever initiates corresponding rotation of the detent lever 70 from the engaging position 70'' to the

releasing position, shown in solid lines in FIG. 4, whereupon the combination of the door seal pressure and the bias of coil spring 66 pivots the door 20 from the fully closed to the partially opened position 20', from which position the door may be bodily shifted rearwardly to the fully opened position 20'' or any position between the partially and fully opened positions. After bodily shifting movement of the door has begun, release of the outside operating handle permits rotation of the detent lever back toward the engaging positions 70' and 70'' by spring 82. In the unlatched position of the latch bolt 58 an edge 138, FIG. 4, of the detent lever 70 rests against the side of latch bolt 58. The latch bolt, however, is so formed that upon reaching either the intermediate or the fully latched position support is removed from the edge 138 so that the detent shoulders can move into overlying relationship to detent shoulder 62 on the latch bolt.

With particular reference to FIG. 7, the door may be secured against unauthorized manipulation by pivotal movement of intermediate lever 124. More particularly, pivotal movement of the intermediate lever 124 from the engaged to the disengaged position by the aforementioned conventional means, not shown, moves the downturned tab 126 out of the arcuate path defined by projection 112 during pivotal movement of operating member 110. Thus removed, the projection 112 is permitted to freewheel past the downturned tab 126 without contacting either the second operating lever or the intermediate lever. Therefore, although the hooked latch bolt 98 is brought to a releasing position, the latch bolt 58 is continually maintained in the fully latched position preventing any free-swinging movement of the rear edge of the door and consequently any movement of the entire door. To again obtain normal operation of the door, the intermediate lever 124 is merely pivoted back from the disengaged to the engaged position.

Having thus described the invention what is claimed is:

1. In a vehicle body having a door opening, a striker fixedly secured thereto at one side of said door opening and a door swingable about a generally vertical axis at one edge between opened and closed positions relative to said door opening, a latching arrangement comprising in combination a latch bolt having a striker engaging means and at least one shoulder portion formed directly thereon, means mounting said latch bolt on said door for rotation between an unlatched position and either of two latched positions, said latch bolt being engageable with said striker in respective ones of said two latched positions to retain said door member in said door opening in a semiclosed and fully closed position, detent means engageable with said latch bolt to maintain the latter in either of said two latched positions a pull-in lever, means mounting said pull-in lever on said door for movement between retracted and extended positions, and means on said pull-in lever operable upon movement of the latter from said retracted to said extended position to engage said shoulder portion on said latch bolt and forcibly rotate the latter from one of said latched positions to the other.

2. In a vehicle body having a door opening, a striker fixedly secured thereto at one side of said door opening and a door swingable about a generally vertical axis at one edge between open and closed positions relative to said door opening, a latching arrangement comprising in combination, a latch bolt having striker-engaging means and a pair of shoulder portions formed directly thereon, means mounting said latch bolt on said door for rotation about a horizontal axis extending generally longitudinally of said door between an unlatched position and either of two latched positions, said latch bolt being engageable with said striker in respective ones of said two latched positions to retain said door in said door opening in a semiclosed and a fully closed position, a detent lever having a pair of detent shoulders thereon, means mounting said detent lever on said door for pivotal movement between either

of two engaging positions wherein respective ones of said detent shoulders engage one of said shoulder portions on said latch bolt to maintain the latter in corresponding ones of said two latched positions and a releasing position wherein said detent shoulders are disengaged from said one shoulder portion, a pull-in lever, means mounting said pull-in lever on said door for pivotal movement about a generally transverse axis of the latter between retracted and extended positions, means on said pull-in lever engageable with the other of said shoulder portions on said latch bolt upon pivotal movement of said pull-in lever from said retracted to said extended position to forcibly rotate said latch bolt from one of said latched position to the other, and means on said door selectively operable to rotate said pull-in lever from said retracted to said extended position and to pivot said detent lever from either of said engaging positions to said releasing position.

3. The latching arrangement as recited in claim 2 further including spring means biasing said latch bolt toward said unlatched position, spring means biasing said detent lever toward said engaging positions and spring means biasing said pull-in lever toward said retracted position.

4. In a vehicle body defining a door opening and having a door mounted thereon for rotation about a generally vertical axis at one edge between a fully closed position and a partially opened position and for longitudinal sliding movement relative to said door opening from said partially opened position to a fully opened position, an improved latch arrangement comprising in combination, a striker fixedly secured to said vehicle body in said door opening, a support plate fixedly secured to said door member, a bifurcated latch bolt having a detent shoulder and a pull-in shoulder thereon, means mounting said latch bolt on said support plate for rotation about a horizontal longitudinal axis of said door between an unlatched position and either one of an intermediate latched position and a fully latched position corresponding to a semiclosed and a fully closed position of said door, said striker upon pivotal movement of said door from said partially opened position toward said fully closed position being engageable with said latch bolt and operable to pivot said latch bolt from said unlatched to said intermediate latched position, first spring means biasing said latch bolt toward said unlatched position, a detent lever having a pair of detent shoulders thereon, means mounting said detent lever on said support plate for pivotal movement about a generally transverse axis of said door between a releasing position and a first engaging position wherein one of said detent shoulders engages said latch bolt detent shoulder to maintain said latch bolt in said intermediate latched position and a second engaging position wherein the other of said detent shoulders engages said latch bolt detent shoulder to maintain said latch bolt in said fully latched position, second spring means biasing said detent lever toward said engaging positions, a pull-in lever, means mounting said pull-in lever on said support plate for pivotal movement about a generally transverse axis of said door between a retracted and an extended position, means on said pull-in lever engageable with said pull-in shoulder of said latch bolt upon pivotal movement of said pull-in lever from said retracted to said extended position to forcibly rotate said latch bolt from said intermediate latched to said fully latched position, third spring means biasing said pull-in lever toward said retracted position, a pair of draft links each having one end respectively pivotally connected to said detent lever and to said pull-in lever, handle means rotatably mounted on said door, and means operably connecting the other end of each of said draft links to said handle means so that pivotal movement of said handle means in one direction bodily shifts one of said draft links to pivot said detent lever from either of said engaging positions to said releasing position and in the other direction bodily shifts the other of said draft links to pivot said pull-in lever from said retracted to said extended position.

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