Nov. 5, 1935. A. V. HENST 2,019,534

DOORLATCH

Filed Oct. 26, 1932

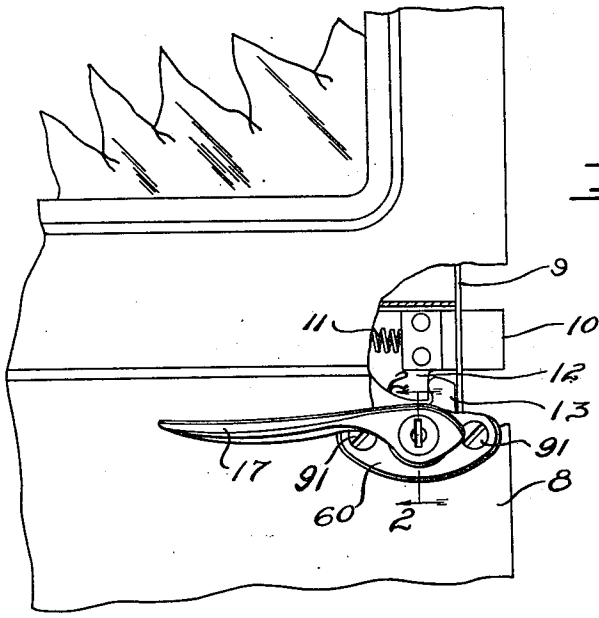


Fig. 1.

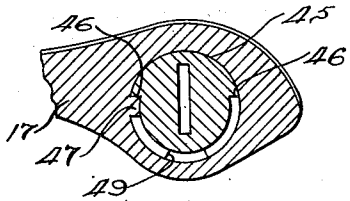


Fig. 2.

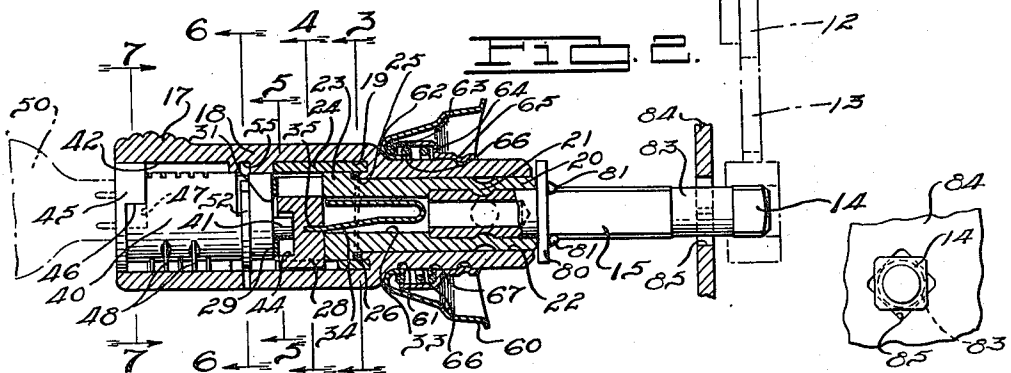


Fig. 3.

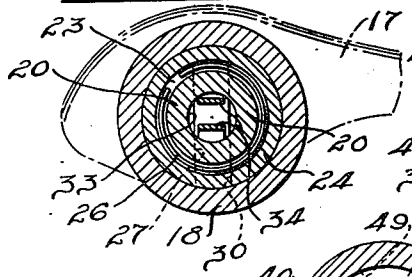


Fig. 4.

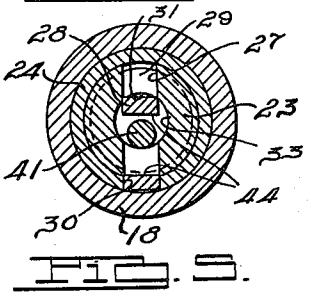


Fig. 5.

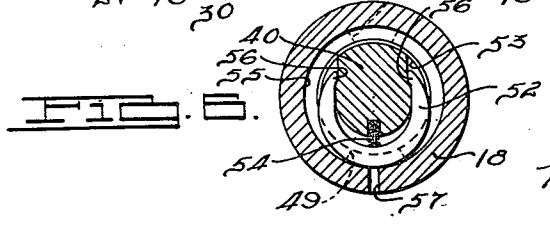


Fig. 6.

INVENTOR
Abraham Vander Henst.

BY
Harness, Dickey, Pierce & Hann.
ATTORNEYS.

Patented Nov. 5, 1935 2,019,534

UNITED STATES PATENT OFFICE

2,019,534

DOORLATCH

Abraham Vander Heust, Grand Rapids, Mich., assignor to W. B. Jarvis Company, a corporation of Michigan

Application October 26, 1932, Serial No. 639,

3 Claims. (Cl. 70—91)

My invention relates to improvements in door latches, particularly of the type which may be locked against withdrawal of the bolt, generally for use with automotive vehicles and the like.

This application is an improvement on my co-pending application, Serial No. 285,512, filed June 15, 1928, and patented February 28, 1933, as Patent No. 1,899,686 on "Door latches" and relates to the same general subject matter, that is, a door latch operating handle which is free to rotate without moving the latch bolt, when in "locked position". This type of door latch operating handle and locking means has numerous advantages as set forth in my co-pending application, one of the principal advantages is that the lock can not be forced or the handle broken off in attempts to move the latch bolt when it is locked, by applying excessive force to the handle.

It is an object of my present invention to provide an improved door latch operating means and improved means to lock the latch bolt against withdrawal.

Another object of my invention is to provide a door latch and operating handle therefor which is a compact structure, of simple and efficent design.

A further object of my invention is to provide a door latch lock and handle therefor which is economical to manufacture, has few parts and is easy to assemble and maintain.

Other objects and advantages of my invention will readily become apparent from a reading of the following detailed description and accompanying drawing, in which:

Figure 1 is a fragmentary side elevation of the door of an automotive vehicle illustrating an application of the improved door latch and operating means of my invention, parts being broken away to illustrate certain details more clearly;

Figure 2 is an enlarged cross-sectional view of the latch handle and lock of my invention taken on the line 2—2 of Figure 1;

Figure 3 is an enlarged detail cross-sectional view taken on the line 3—3 of Figure 2;

Figure 4 is an enlarged detail cross-sectional view taken on the line 4—4 of Figure 2.

Figure 5 is an enlarged detail cross-sectional view taken on the line 5—5 of Figure 2, and

Figure 6 is an enlarged detail cross-sectional view taken on the line 6—6 of Figure 2.

Figure 7 is an enlarged detail cross-sectional view taken on the line 7—7 of Figure 2.

Figure 8 is a fragmentary end view of the inner end of the device illustrated in Figure 2.

Referring now to the drawing in detail, in which like reference characters designate like parts throughout the several views, I have shown in Figure 1 a door panel 8, a door frame 9, a conventional door latch bolt 10 which is slidably mounted in a horizontal plane in the door frame in any suitable manner, and a compression spring 11 is provided backing the bolt 10 to urge it constantly outwardly. A lug 12 is formed on the bolt which is in alignment with and engageable by a roll back 13 which is mounted on the squared end 14 of a horizontally disposed rotatable handle shaft or chill 15.

A door handle 17 is preferably formed integral with a stem member 18 which extends in a horizontal plane at right angles to the path of movement of the bolt 10. The stem 18 is of general cylindrical shape and is centrally bored in a manner which will hereinafter be described and comprises the operating stem and housing of the lock and latch operating elements.

The end of the shaft 15 opposite the squared end which receives the roll back, is received within an elongated spindle 20 of round cross-section and fixed thereto by stake punching at four points such as indicated at 21. The spindle member 20 is adapted to rotatably fit within the central bore 22 of the inner end of the stem 18, as best shown in Figure 2. The outer end of the spindle 20 is provided with an enlarged or headed end as indicated at 23. An annular steel bushing 24 is fixed within the stem 18 by die casting the stem around the bushing which is arranged so that the enlarged head 23 of the spindle 20 will be disposed therein. The stem 18 is pressed tightly into engagement with the outer periphery 19 and the ends of the bushing 24 so as to maintain it rigidly in place. It will also be seen that the die casting of the stem 18 also forms a reduced end portion of the latter and provides an annular shoulder 25 at the juncture of the bore 22 of the reduced end portion of the stem and the bore of the bushing 24 against which shoulder the enlarged head 20 of the spindle abuts to prevent removal of the stem 18 outwardly from the spindle.

A split wire spring 26 is interposed between the head 23 of the spindle 20 and the annular shoulder 25 formed within the stem 18. This spring surrounds the spindle 20 and serves as an anti-rattle spring, preventing rattling of the parts when in assembled relation, see Figure 3.

The outer end of the spindle is slotted crosswise at 27 as best shown in Figures 4 and 5 and a locking bolt 28 is provided which is adapted to slidably fit within the slot 27, see Figures 2, 4,

and 5. An end washer 29 is fitted in the extreme outer end of the annular spindle head 23 by a drive fit or in some other suitable manner as best shown in Figures 2 and 5, and serves to retain the bolt 28 in the slot 27 and to insure its smooth sliding movement within the slot 27, acting as a bearing on the outer surface of the bolt 28 to keep it perfectly aligned within the slot 27.

The steel sleeve 24 is slotted at 30 directly below the axis of rotation of the spindle head 23 and is adapted to receive the bolt 28 when it is urged downwardly, thus locking the spindle 20 against rotation relative to the steel sleeve 24 and the stem 18 in which the sleeve is fixed. When the bolt 28 is raised in the slot 27 out of engagement with the slot 30 of the sleeve 24, the spindle 20 is free to rotate within the stem 18, and consequently the stem 18 and handle 17 is free to turn about the spindle 20 without rotating the shaft 15 and without actuating the roll back 13.

A central axial bore 33 is provided in the spindle 20 in which a hair pin type spring 34 is mounted. This is the bolt actuating spring and one end thereof extends forwardly and is adapted to be received within a cross slot 35 which is formed in the back of the bolt 28 (see Figs. 2 and 4). The spring 34 constantly urges the bolt 35 outwardly and downwardly when the parts are positioned as shown in the drawing, against the steel bushing 24 and into the slot 30 of the bushing 24 when the parts are in alignment as illustrated in Figures 2 and 4.

It is thus apparent that when the bolt 28 is in engagement with the slot 30 of the bushing 24 which is in turn fixed to the spindle 18, the spindle 20 will be locked against rotation within the stem 18 and a rotative movement of the handle 17 will rotate the shaft 15 and the roll back 13 to cause withdrawal of the latch bolt 10. When the bolt 28 is withdrawn from the slot 30 by reciprocating it within the slot 27 of the spindle head 23, the handle 17 and its outer stem 18 is free to rotate about the spindle 20 without rotating the shaft 15 and roll back 13.

Means is provided to lock the bolt 28 out of engagement with the slot 30 of the sleeve 24, which includes a key controlled lock barrel 40 which is of conventional cylindrical construction. The lock barrel 40 is provided on its inner end with a pin 41 which is offset from the axis of rotation of the lock barrel 40. The lock barrel 40 being cylindrical in form, is rotatably mounted within a bore 42 at the outer end of the stem 18. The projecting offset pin 41 is adapted to be received in a notch 44 provided in the outer surface of the lock bolt 28. The pin 41 also rotates within the central opening 31 of the washer 29 which retains the lock bolt in position (Figs. 2 and 5). When the lock barrel is in position with the offset pin 41 diametrically below the axis of rotation of the lock barrel, the lock bolt 28 will be in the position indicated in Figures 2, 4, and 5 in engagement with the slot 30 of the sleeve 24. Upon rotation of the lock barrel 40 one-half turn or 180 degrees, the pin 41 will rotate to a position diametrically above the axis of rotation of the lock barrel and, engaging the upper edge of the notch 44 of the lock bolt 28 in cam fashion, will raise the bolt 28 out of engagement with the slot 30 of the sleeve 24, thereby permitting the stem 18 to rotate freely about the spindle 20.

An enlarged radially extending flange 45 is formed on the outer end of the lock barrel and cut to form a pair of shoulders 46 on diametrically opposite sides thereof, which are adapted to engage a lug 47 projecting from the inner surface of the stem 18 within the bore 42. The lug 47 serves as a stop to restrict the rotation of the lock barrel 40 when rotated in either direction so that the lock elements 48 will come in proper registry with the conventional slots 49 which are provided therefor, when the key 50 has been removed. (Figs. 2 and 7).

Improved means is provided to facilitate the removal of the lock barrel 40 from the stem 18 of the handle when the lock barrel 40 is rotated in "unlocked" position as illustrated in the drawing, that is, with the lock bolt 28 in engagement with the sleeve 24 so that the handle 17 will actuate the latch bolt 10. This means is also designed to prevent removal of the lock barrel when it is rotated to "locked" position, that is, with the lock bolt 28 out of engagement with the sleeve 24, so that the handle 17 is inoperative to withdraw the latch bolt 10. This means comprises a radially projecting collar 52, which is slidably mounted in a groove 53 cut about the outer periphery of the lock barrel 40, and a spring 54 which is disposed between the lock barrel and the collar 52, tending to urge it outwardly into engagement with an annular slot 55 which is cut on the inner periphery of the stem 18. The collar 52 is U-shaped and has inturned ends 56 which engage raised portions in the slot 53 of the lock barrel to limit the outward movement of the collar 52. The collar 52 is spring pressed downwardly when the lock barrel is in the position shown in the drawing, that is, with the pin 41 below the axis of rotation and the lock bolt 28 engaging the slot 30 of the sleeve 24, the collar continuously engages the annular slot 55 throughout the entire rotative movement of the lock barrel. The engagement of the collar 52 with the slot 55 prevents the lock barrel from being removed from the stem 18. When the device is in "unlocked" position as illustrated in the drawing, the lock barrel may be removed from the stem by inserting a pin or other member into a bore 57 in the under side of the stem 18 which communicates with the annular slot 55, and by pushing the collar 52 inwardly, and compressing the spring 54, the collar will be moved out of engagement with the annular slot 55 to permit removal of the lock barrel. When the lock barrel 40 is rotated one-half turn in "locked position", the projecting end of the collar 52 will be disposed above the axis of rotation of the lock barrel, and out of alignment with the bore 57 and the lock barrel cannot be removed.

The escutcheon plate 60 is mounted on the door 8 by screws or bolts 61 and the central edge of the escutcheon plate is turned inwardly adjacent the central annular opening 91 formed therein to receive the stem 18. An annular shoulder 62 is formed about the outer periphery of the stem 18 by the reduced inner end of the stem 18, and the escutcheon plate surrounds the stem and abuts this shoulder. An annular groove 63 is formed on the inner surface of the escutcheon plate 60. A sleeve 64 is provided which surrounds the reduced inner end of the stem 18 and is fixed thereto by staking as at 65. The end of the sleeve 64 which opens toward the groove 63 in the escutcheon plate is flared outwardly to form a space for a compression spring 66 which surrounds the stem 18 and is disposed between the escutcheon plate and the sleeve 64 to insure a snug fit between the rotating parts

and to prevent rattling of the parts. The spring 66 is seated on one end in the annular groove 63 formed on the inner surface of the escutcheon plate and is seated at its other end on an annular shoulder 67, formed on the sleeve 64.

I have provided novel means to prevent the withdrawal of the latch operating mechanism from the door when the device is in locked or "free spinning" position. The improved means of accomplishing this purpose also facilitates the assembly of the device of my invention in a door, without the use of any bolts, screws or attaching device. As shown in Figure 2 I have for this purpose supplied a washer 80 of substantial thickness which surrounds the square shaft 15. The washer 80 abuts the end of the spindle 20 and is held in position by stake punching the shaft 15 at 81. It is to be noted at this point that considerable clearance is allowed between the inner end of the stem 18 and the washer to permit sliding movement of the spindle relative to the stem in response to the action of the spring 26 which is interposed between the head 23 of the stem and the shoulder 25 formed in the bore of the stem. The spring 26 urges the spindle head against the inner end of the lock barrel 40 and thus places all of the parts under spring pressure to prevent rattling.

The shaft 15 is rounded at 83 as shown in Figure 2 and a plate 84 of substantial thickness surrounds the shaft 15 at this rounded portion 83. The plate 84 is fixed in the door frame or latch by welding or in any other desirable suitable manner (not shown in the drawing). The opening 85 in the plate 84 through which the shaft 15 passes is a square opening, as clearly shown in the end view Figure 8. The squared opening 85 remains in the fixed position illustrated in Figure 8 in which position the four corners of the square are rotated forty-five degrees from the four corners of the squared shaft 15 in the position the shaft assumes with the parts as shown in Figure 2, that is, with the handle 17 in horizontal position.

It is aparent that the squared end 14 of the shaft 15 cannot be withdrawn through the square opening 85 in the plate 84 without aligning the four corners of the squared end 14 with the four corners of the opening 85, the opening being of a size to permit passage of the squared end 14 only when the four corners of the end and opening are aligned. When the bolt 28 is raised out of engagement with the slot 30 and the handle is free to rotate without rotating the shaft 15, that is, in free spinning locked position, the squared end 14 cannot be withdrawn through the opening 85 in the plate 84 and since the shaft 15 is not accessible from the outer side of the mechanism, the device will be securely locked against removal from the door.

By turning the key 50 and rotating the lock barrel 40 to cause the bolt 28 to engage the sides of the slot 30 as hereinbefore described, the handle 17 will be locked for rotation with the shaft 15 and by rotating the shaft 15 one-eighth of a turn or through an arc of 45 degrees, the shaft 15 will be rotated to a position where the four corners of the squared end 14 will be in alignment with the four corners of the opening 85 in the plate 84 and the entire device, together with the shaft 15 may be withdrawn from the door, the squared end 14 being removed from the roll back 13 and passing through the opening 85 in the plate 84. It is understood that the screws 61, which retain the escutcheon plate in position, must be removed to permit removal of the door handle and operating mechanism. When installing or removing the device of my invention, the latch bolt 10 should be pressed inwardly compressing the spring 11, thus facilitating the rotation of the shaft 15 through the required angle of 45 degrees, to permit movement of the squared end 14 of the shaft 15 in either direction through the opening 85 of the plate 84. It is apparent therefore that the device of my invention is securely fixed against removal when the device is in locked or "free spinning" position.

It is to be noted that the door latch operating handle and lock of my invention is of simple construction, of few parts and of unusually compact arrangement, permitting neat, symmetrical external lines and avoiding any unnecessary bulk in the exterior dimensions of the device, while at the same time providing the necessary strength to the unit. The single stem 18 which is cast integral with the handle 17 serves as a housing for the necessary spindle lock bolt and lock. The spindle serves as the roll back operating shaft and houses the lock bolt and its operating spring which is disposed in a central bore within the spindle further simplifying construction and reducing the cost of production. The device is entirely rattle-proof, due to the use of compression springs between the escutcheon plate and stem surrounding sleeve 64, to the use of the spring 26 between the spindle head and the stem and to the use of the washer 29 which retains the lock bolt in sliding position. These features combined with the simplified method of removing the lock barrel when the device is in unlocked position provide a unit of high efficiency and simple structural design.

Formal changes may be made in the specific embodiment of the invention described without departing from the spirit and substance of the broad invention, the scope of which is commensurate with the appended claims.

I claim:

1. In combination, a door handle provided with a hollow stem reduced near one end to form an annular shoulder on the inner periphery of the stem, a spindle having a smaller end rotatably mounted in the reduced inner end of the stem and an enlarged head formed on one end thereof rotatable in the hollow stem, an annular shoulder formed between said head and the smaller end of the spindle and adapted to abut the shoulder of the inner periphery of the stem, a spring disposed between the shoulder of the spindle head and the shoulder of the stem to prevent rattling of the parts, a bolt slidably mounted in a transverse slot formed in the end of the spindle head, a bushing fixed in the hollow stem surrounding the head of the spindle, a slot formed in said bushing adapted to receive the bolt whereby to connect the stem and spindle against relative rotation, and a washer fixed in the end of the spindle head to retain the bolt in sliding position in the slotted end of the spindle.

2. In combination, a door handle provided with a hollow stem reduced near one end to form an annular shoulder on the inner periphery of the stem, a spindle having a smaller end rotatably mounted in the reduced inner end of the stem and an enlarged head formed on one end thereof rotatable in the hollow stem, an annular shoulder formed between said head and the smaller end of the spindle and adapted to abut the shoulder of the inner periphery of the stem, a

spring disposed between the shoulder of the spindle head and the shoulder of the stem to prevent rattling of the parts, a bolt slidably mounted in a transverse slot formed in the end of the spindle head, a bushing fixed in the inner periphery of the stem surrounding the enlarged rotatable head of the spindle, a slot in said bushing adapted to receive the slidable bolt of the spindle head to connect the stem and spindle against relative rotation, and a washer fixed in the end of the enlarged head of the spindle bearing against the outer surface of the slidable bolt to retain said bolt in sliding position in the slotted end of the spindle head.

3. In combination, a door handle provided with a hollow stem reduced near one end to form an annular shoulder on the inner periphery of the stem, a spindle having a smaller end rotatably mounted in the reduced inner end of the stem and an enlarged head formed on one end thereof rotatable in the hollow stem, said spindle having a central axial bore therein, an annular shoulder formed between said head and the smaller end of the spindle and adapted to abut the shoulder of the inner periphery of the stem, a spring disposed between the shoulder of the spindle head and the shoulder of the stem to prevent rattling of the parts, a bolt slidably mounted in a transverse slot formed in the end of the spindle head, a bushing fixed in the inner periphery of the stem surrounding the enlarged rotatable head of the spindle, a slot in said bushing adapted to receive the slidable bolt of the spindle head to connect the stem and spindle against relative rotation, a washer fixed in the end of the enlarged head of the spindle bearing against the outer surface of the slidable bolt to retain said bolt in sliding position in the slotted end of the spindle head, and a bolt actuating spring mounted within the central axial bore of the spindle engaging the bolt and adapted to urge it into the slot of the bushing.

ABRAHAM VANDER HENST.