June 20, 1961 R. M. FOX 2,989,333

ADJUSTABLE MEANS FOR A DOOR LATCH OPERATOR

Filed Sept. 23, 1957 2 Sheets-Sheet 1

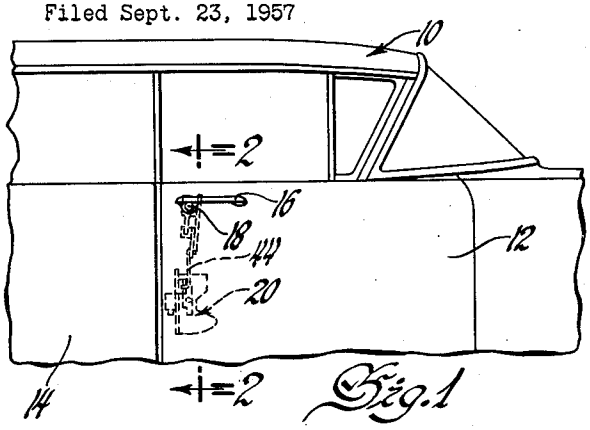


Fig. 1

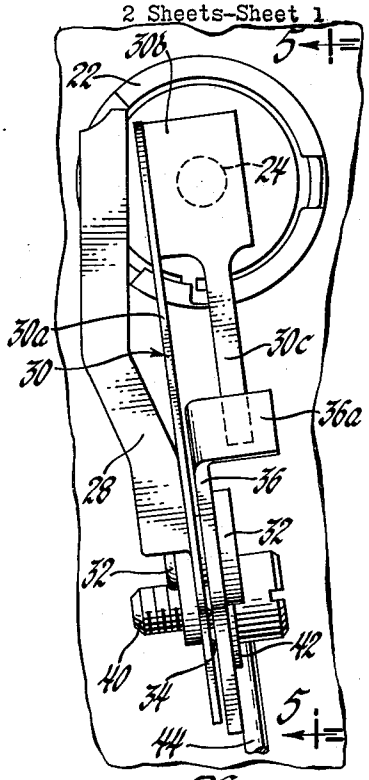


Fig. 3

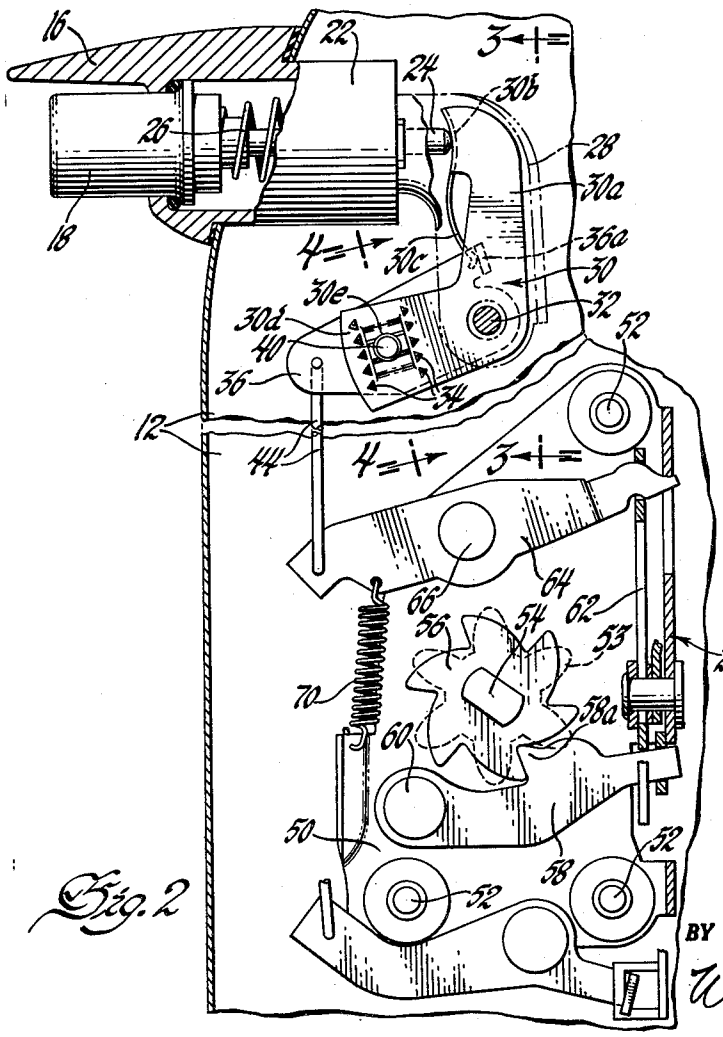


Fig. 2

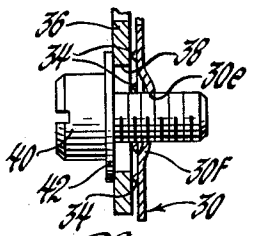


Fig. 4

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ADJUSTABLE MEANS FOR A DOOR LATCH OPERATOR

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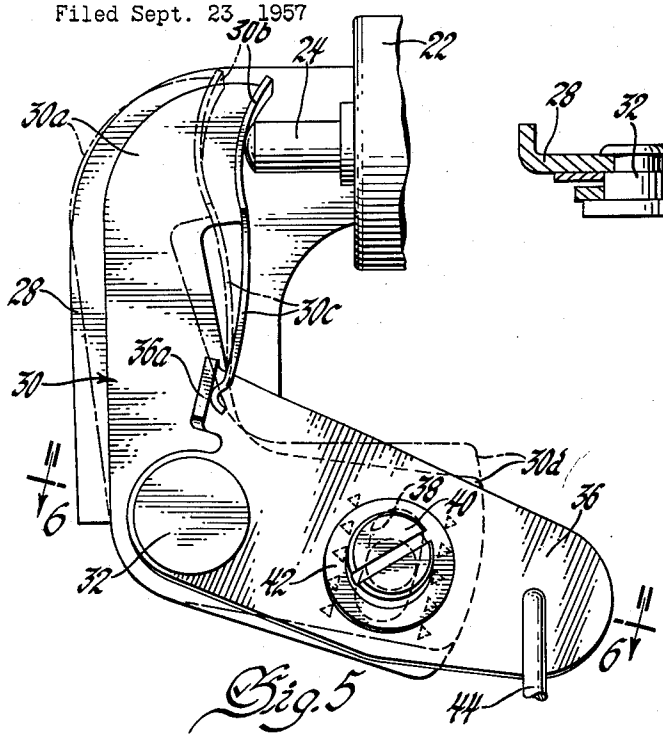


Fig. 5

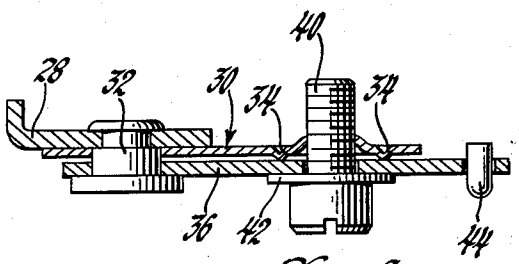


Fig. 6

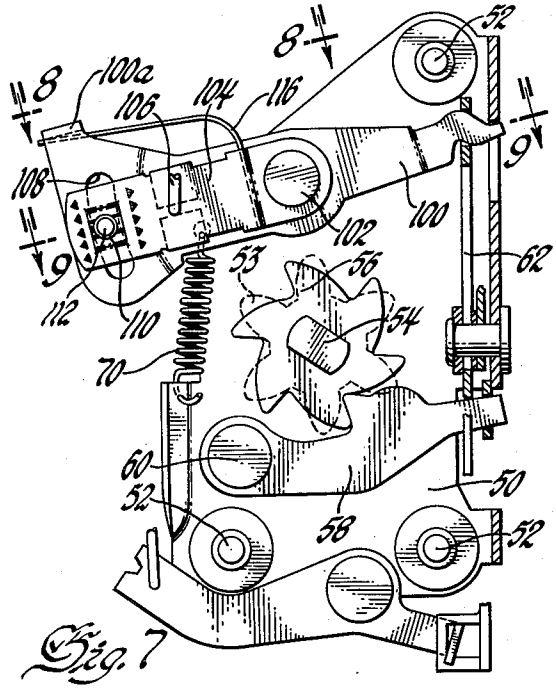


Fig. 7

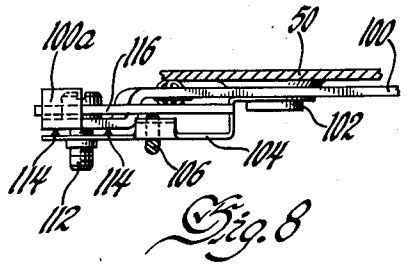


Fig. 8

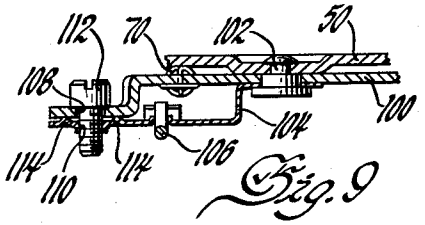


Fig. 9

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ADJUSTABLE MEANS FOR A DOOR LATCH OPERATOR

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Filed Sept. 23, 1957, Ser. No. 685,494
2 Claims. (Cl. 292—280)

This invention relates to adjustment means for a door latch operator, and more particularly to adjustment means for taking up play between the outside push button operating structure and the means which connect the push button to the door latch in an automobile door.

One feature of the invention is that it provides improved adjustment means for a door latch operator; another feature of the invention is that it provides a novel and improved means for taking up play between a door latch push button operator and the means which connect this operator to the latch; a further feature of the invention is that it provides a first lever for operation by the push button, a second lever connected to a door latch, and releasable holding means for selectively fixing the angular relationship between the levers to compensate for variations in the location of the push rod or other door latch actuator relative to the first lever; still a further feature of the invention is that the levers are coaxially mounted and have overlapping portions which mount the releasable holding means; yet a further feature of the invention is that the holding means may comprise a clamping stud threaded into one of said levers and extending through an elongated slot in the other of said levers; still another feature of the invention is that it provides a spring extending from one lever into biasing engagement with the other lever to swing one lever relative to the other when the holding means are released; and yet a further feature of the invention is that the releasable holding means is so arranged that the clamping stud may be tightened by turning it in a direction tending to take up play in the parts.

Other features and advantages of the invention will be apparent from the following description and from the drawings, in which:

FIG. 1 is a fragmentary side elevation of an automobile incorporating the improved adjustment means for the front door latch operator;

FIG. 2 is an enlarged vertical transverse section through a portion of the front door taken along the line 2—2 of FIG. 1, a portion of the door and connecting rod being broken away;

FIG. 3 is a vertical section taken along the line 3—3 of FIG. 2;

FIG. 4 is a detail section through the clamping means taken along the line 4—4 of FIG. 2;

FIG. 5 is a section taken along the line 5—5 of FIG. 3 showing the parts in one position in solid lines and in another position in broken lines;

FIG. 6 is a detail section taken along the line 6—6 of FIG. 5;

FIG. 7 is a section similar to a portion of FIG. 2 but showing a modified form of the invention;

FIG. 8 is a section taken along the line 8—8 of FIG. 7; and

FIG. 9 is a section taken along the line 9—9 of FIG. 7.

In many automobiles the door latches are operated from the outside by a push button assembly including a push rod which abuts one arm of a bell crank lever mounted in the door and having its other arm connected to the door latch. Operation of the push button swings the bell crank to release the bolt in the door latch.

It often happens that the parts are so located that there is play between the end of the push rod and the bell crank lever which it operates in the door. This may be due to several factors. In the first place, because of normal production tolerances in the mass production manufacture of these parts, it is not feasible to eliminate the possibility of play by making the push rod excessively long since if the push rod exceeds the normal length, the parts could not properly be mounted. However, if the push rod is shorter than normal or if the lever varies in size or in its position of mounting in the door, there may be an amount of play which is undesirable because the finger operated push button moves only a fraction of an inch upon actuation and a relatively small amount of play is definitely noticeable in the push button operation. Further, the handle assembly or door bracket upon which the push rod operated lever is mounted may vary in size and location due to normal production tolerances.

This invention provides a novel means wherein, after the parts are assembled during manufacture, a simple clamping device may be loosened and a spring will operate to take up any play between the push rod and the lever upon which it operates. The clamping means may then be tightened to hold the parts in the desired position. As a further feature of the invention, the parts are so arranged that tightening the clamping means tends further to eliminate play in the parts.

Referring now more particularly to the drawings, an automobile designated generally as **10** in FIG. 1 has a front door **12** and a rear door **14**. The front door is provided with an outside gripping handle **16** fixedly mounted on the door and carrying an actuating assembly including a finger operated push button **18** which is connected inside the door to the door latch designated generally as **20**. The front door may have an inside actuator and locking means and the rear door may have a similar latch and operating means which are not illustrated.

As shown in FIGS. 2 and 3, the handle **16** is formed with a chamber **22** which houses the push button assembly including, in addition to the push button **18**, a push rod **24** and a button return spring **26**. A support **28** is formed as an integral part of the handle assembly in the construction illustrated, although if desired, this support may be separate from the handle assembly and may be secured on the inside of the door.

A first lever designated generally as **30** is pivotally mounted on the support **28** by means of a headed stud **32** which is threaded into the support **28**. The lever **30** is formed as a bell crank having an upstanding arm **30***a* terminating at its upper end adjacent the end of the push rod **24** in a turned flange **30***b* for engagement by the push rod **24**. An integral leaf spring **30***c* depends from the flange **30***b*. The other arm of the bell crank **30** extends generally horizontally and is designated as **30***d*. This arm has an opening **30***e* adjacent its free end formed with thread engaging tabs **30***f* as shown in FIG. 4. A plurality of barbs or serrations **34** are punched into the arm **30***d*.

A second lever **36** is mounted on the stud **32** coaxially with the first lever **30** for swinging movement independent of the lever **30**, and a bent tab **36***a* on this lever seats the free end of the spring **30***c*, the spring being flexed from its free position into seating engagement with the flange **36***a*. The second lever **36** is formed with an elongated slot **38** which overlies the opening **30***e* in the first lever and which is formed on an arc drawn about the axis of the stud **32**. A headed stud **40** extends through the slot **38** and is threaded into the opening **30***e* which, as pointed out earlier, is formed with the thread locking tabs **30***f*. A washer **42** on the shank of the bolt **40** prevents the bolt head from entering the slot **38** in the second lever. By means of the bolt **40** the first and second levers may be clamped together through the overlapping portions of the

levers to selectively fix the angular relationship between the levers and thus compensate for variations in the location of the end of the push rod **24** with reference to the flange **30***b* as will later be described.

At its free end, the lever **36** is connected by a rod **44** to the door latch **20**. Only a portion of the latch is shown since latches of this type are well understood in the art. The latch is somewhat similar to the latch shown and described in United States Patent No. 2,796,276, granted on June 18, 1957, to James D. Leslie. While the particular latch illustrated is not identical with the latch shown in the Leslie patent, its principle of construction and operation are the same. The latch has a frame **50** which is secured by bolts **52** to the jamb face of the front door **12**. A rotary gear type bolt **53** similar to that shown in the Leslie patent is rotably mounted on the frame on a stud **54** upon which a ratchet **56** is also secured for rotation with the bolt. A detent **58** is pivoted on the frame at **60** and has a tooth **58***a* engageable with a selected tooth of the ratchet **56** to hold the bolt and ratchet against rotation in one direction. Engagement of the detent tooth with the ratchet holds the door latched and prevents it from being pulled open, since the bolt engages a striker on the automobile body as shown in the Leslie patent. When the detent is swung out of engagement with the ratchet tooth, the bolt and the ratchet **56** are freely rotatale and the door may be opened. The detent is controlled from the outside through an intermittent link **62** which is connected to one end of a latch operating lever **64** pivoted intermediate its ends at **66** on the latch frame. The other end of the lever **64** is connected to the lever **36** through the rod **44**. When the lever **36** is swung in a clockwise direction as the parts appear in FIG. 2, the latch operating lever **64** is swung in a clockwise direction to depress the intermittent link **62** and swing the detent clockwise out of engagement with the ratchet. It may also be seen that the connection between the lever **36** and the latch operating lever **64** determines the correct angular position of the lever **36**.

After assembly, the parts may be so located that there is space or play between the flange **30***b* of the lever **30** and the end of the push rod **24** as is illustrated in broken lines in FIG. 5. Under these circumstances the clamping bolt **40** may be loosened by means of a screw driver which may be inserted through an access opening provided in the inner panel of the door. When the bolt is loosened, the leaf spring **30***c* will react against the flange **36***a* which is formed on the lever **36**. The lever **36** is held by its connection with the operating lever **64** which is turn is yieldably held in the position illustrated by a relatively strong compression spring **70** which exerts more force than does the leaf spring **30***c*. Consequently, the first lever **30** will rotate in a clockwise direction (FIG. 5) under the force of the spring **30***c* until further rotation is stopped by engagement of the flange **30***b* with the end of the push rod **24**. When the parts are in this position, as is illustrated in solid lines in FIG. 5, all undesirable play has been removed from the latch actuator. With particular reference to FIG. 5, in order to tighten the bolt, it is turned in a clockwise direction so that the tightening action itself tends to remove any additional play in the parts; that is, play between the rod **24** and the flange **30***b* is removed by swinging the lever **30** in a clockwise direction and the bolt is tightened by turning it in a clockwise direction. As soon as the clamping action starts by virtue of the barbs or serrations **34**, the clamping force will tend to rotate the flange **30***b* clockwise into closer engagement with the push rod **24** rather than to rotate it away from the push rod.

FIGS. 7, 8 and 9 show a modified form of the invention in which the adjustment means is mounted directly on the latch. In this species, the latch itself is the same as the latch illustrated in FIG. 2 except for a modification in the shape of the operating lever. In FIGS. 7, 8 and 9, the operating lever is designated as **100** and is mounted on a stud **102** on the latch frame **50**. As in FIG. 2, one end of the lever is connected to the intermittent link **62**. In this embodiment of the invention, the operating lever **100** corresponds in function to the second lever **36** of the first embodiment of the invention in that the levers **36** and **100** each are connected to the door latch. Referring again to FIG. 7, a lever **104** is pivotally mounted on the stud **102** coaxially with the lever **100** and is connected by a rod **106** to a door latch actuator. The lever **100** is formed with an arcuate slot **108** and the lever **104** has an opening **110** overlying the slot **108** and adapted threadably to receive a clamping bolt **112**. Serrations or barbs **114** are punched into the lever **104** to insure clamping engagement with the lever **100**. A spring **116** is connected between a shoulder on the lever **104** and a flange **100***a* which is bent from the lever **100** so that when the bolt **112** is loosened, the spring reacts against the flange **100***a*. Since the position of the lever **100** is fixed by virtue of its engagement with the intermittent link **62** while (when the bolt **112** is loose) the lever **104** is freely rotatable, this lever will rotate in a counterclockwise direction as the parts appear in FIG. 7 to pull down on the rod **106** to remove any play from the latch operator part.

While I have shown and described certain embodiments of my invention, it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

I claim:

1. A adjustment means for a door latch operator comprising a door handle and push button assembly having a support portion, a first lever pivotally mounted on said support portion, a push rod in said assembly for engaging and swinging said first lever when actuated, a second lever pivotally mounted on said support portion coaxially with said first lever, substantial surface portions of said levers overlapping, said first lever having a curved slot formed on an arc concentric with the pivotal axis of said levers, means connecting said second lever to a door latch, a first spring associated with said means for urging said levers in one rotative direction to cause said first lever to abut said push rod, releasable clamping means mounted on said overlapping surface portions to selectively fix the angular relationship between said levers to compensate for variations in the length of said push rod, comprising a stud extending through the slot in the first lever and threaded into the second lever, a second spring formed with said first lever engaging a portion on the second lever and urging said first lever toward said push rod, said first and second springs adapted to compensate for variations in the push rod length by automatically swinging one of said levers relative to the other lever when said clamping means is released.

2. The apparatus as set forth in claim 1, wherein serrations are formed on one of said levers for engagement with the surface of the other of said levers to positively lock said levers from independent swinging movement upon tightening of said clamping means.

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