

[54] SWITCH ACTUATING MECHANISM
RESPONSIVE TO OPENING AND CLOSING
OF A DOOR

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[22] Filed: Mar. 22, 1972

[21] Appl. No.: 236,923

[30] Foreign Application Priority Data

Oct. 26, 1971 Japan..... 46/99345

[52] U.S. Cl. 200/61.64, 200/153 LA, 340/274,
292/201, 297/385

[51] Int. Cl. H01h 27/00

[58] Field of Search 292/144, 201;
340/274; 297/385; 24/230; 200/47, 61.88 B,
61.64, 61.67, 61.68, 153 LA

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[57] ABSTRACT

A switch actuating device responsive to the opening and closing of the door of a motor vehicle or the like.

The device comprises a striker of a door lock mechanism, a contact disposed in a striker receiving gap of the door lock mechanism and slidable in a full latch stroke section of the striker, the contact being normally urged to move toward an opening of the gap by the biasing force of a spring, and an actuator of a limit switch disposed in the path of rearward movement of the contact.

3 Claims, 8 Drawing Figures

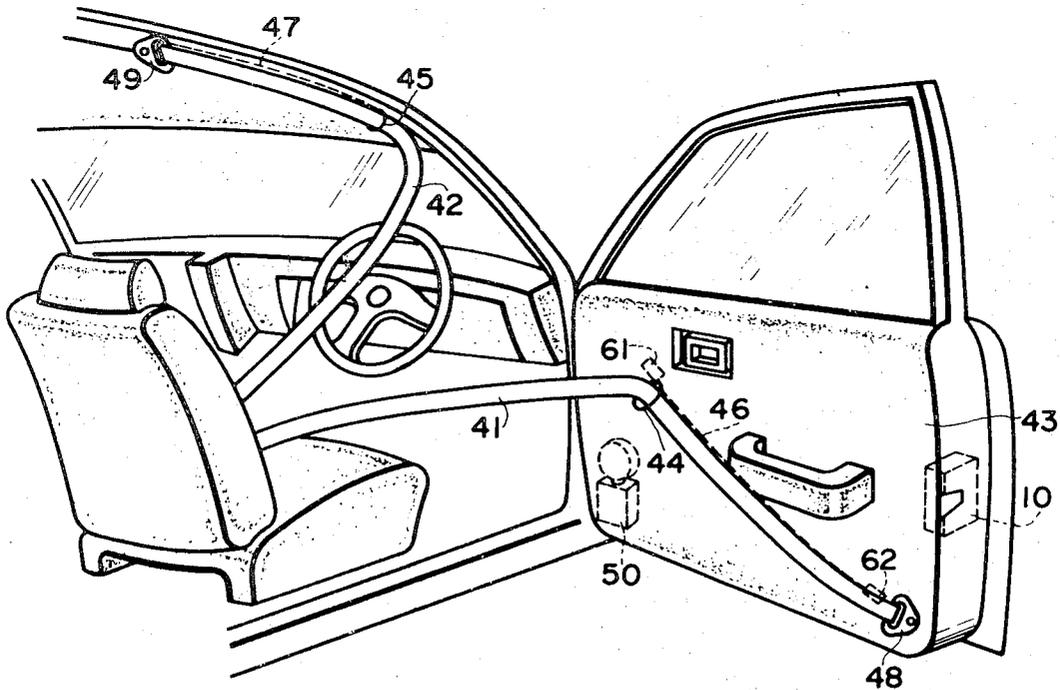


FIG. 1

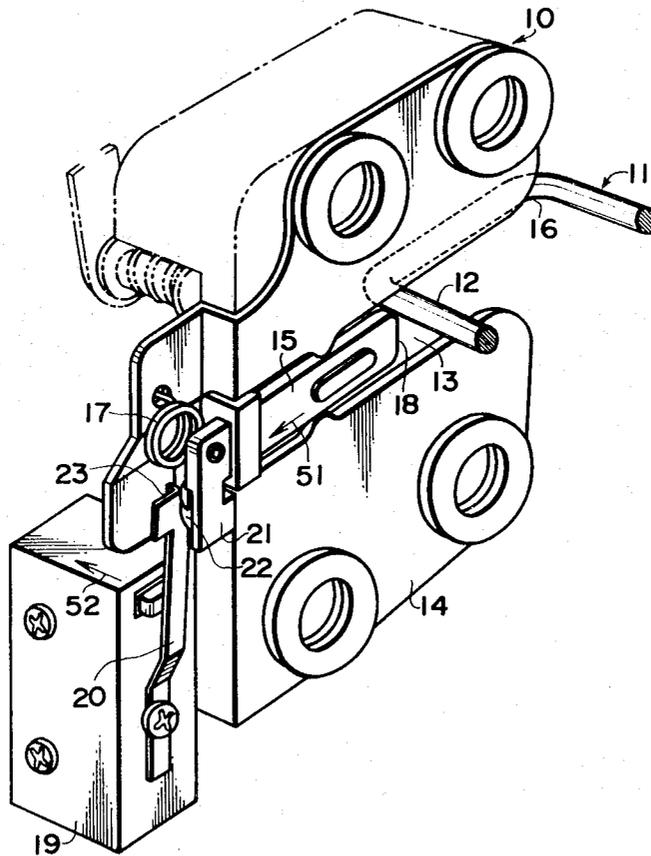


FIG. 2

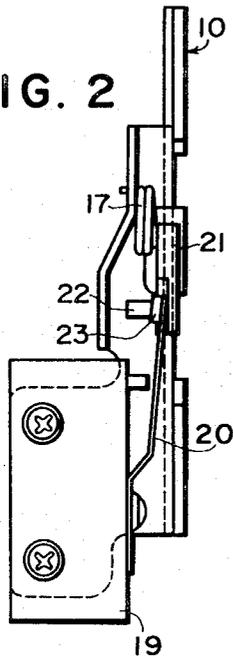


FIG. 3

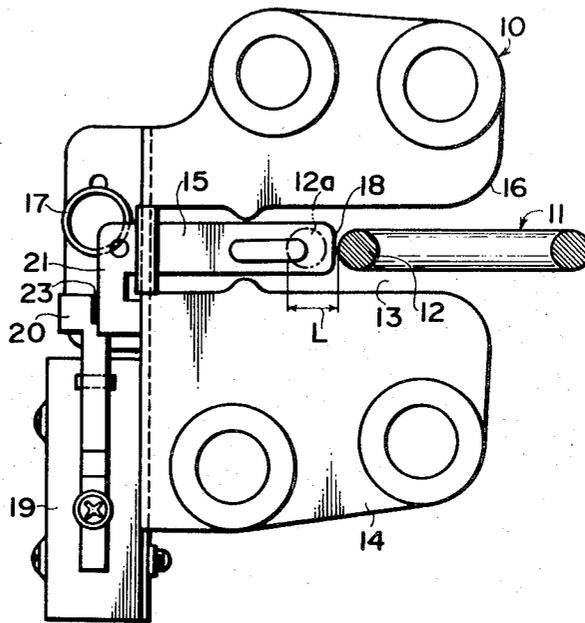


FIG. 4

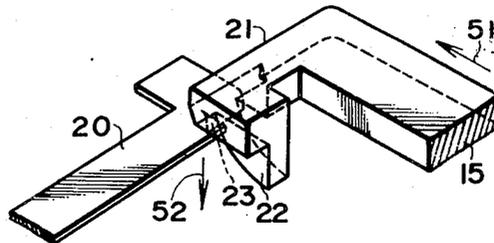


FIG. 5

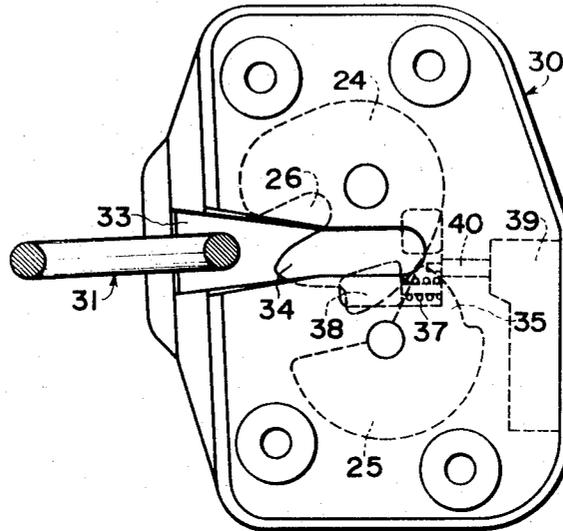


FIG. 6

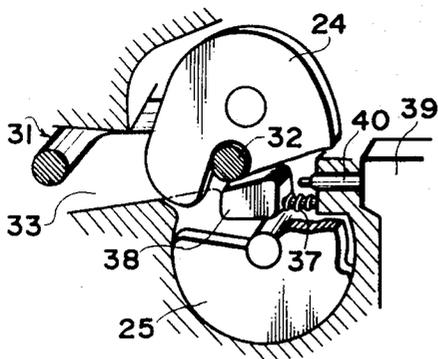


FIG. 7

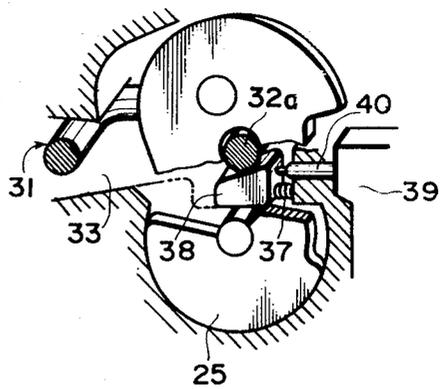
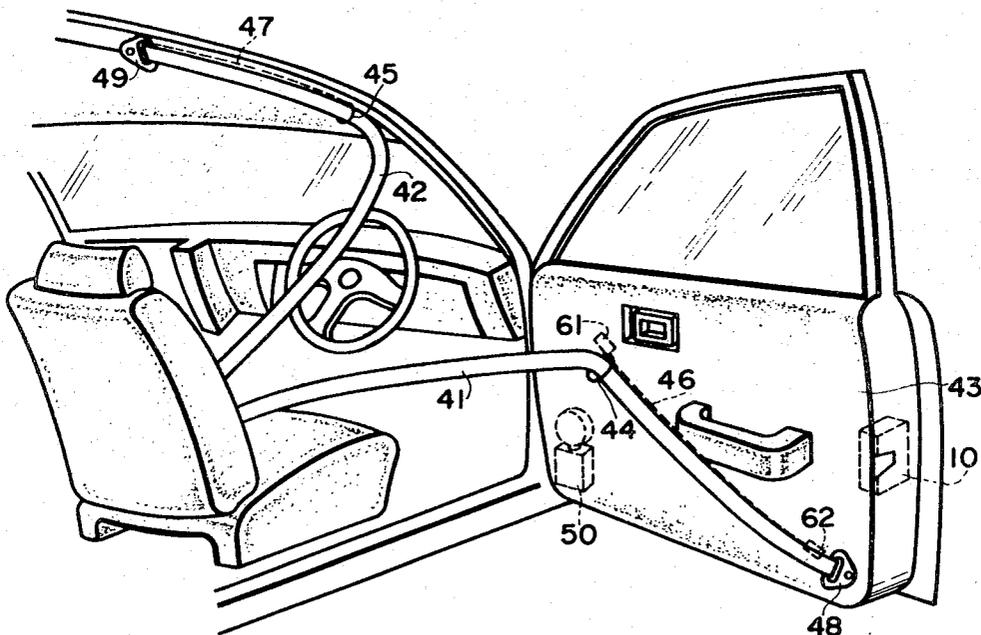


FIG. 8



SWITCH ACTUATING MECHANISM RESPONSIVE TO OPENING AND CLOSING OF A DOOR

This invention relates to a switch actuating mechanism which is responsive to the opening and closing of a door of a motor vehicle or the like.

Switch actuating mechanisms of various types have been proposed which are responsive to the opening and closing of a door of a motor vehicle. Switch actuating mechanisms of the prior art have, however, the disadvantage of responding to the opening and closing of the door even if the door is half-open or the door lock is half-latched, as if the door were fully closed. This makes it necessary to provide an additional detection means to detect when the door is half-open, resulting in increased complexity of the mechanism and increased cost.

The present invention obviates the aforementioned disadvantage of the prior art. Accordingly, an object of this invention is to provide a switch actuating mechanism responsive to the opening and closing of the door, simple in construction, which does not respond to the opening and closing of the door when the door is half-open, and which permits the driver to discover when the door is half-open.

Another object of this invention is to provide a switch actuating mechanism that responds to the opening and closing of the door, which is compact in size and capable of being readily incorporated in a door locking mechanism, in which the position of the striker in the lock means determines whether or not a limit switch is actuated. The limit switch is not actuated when the door is half-open, so that the driver can find out that the door is half-open.

Other objects are those inherent in the invention shown, described and claimed herein and will become evident as the description proceeds.

In the drawings:

FIG. 1 is a perspective view of the switch actuating device comprising one embodiment of this invention;

FIG. 2 is a front view of FIG. 1;

FIG. 3 is a side view of FIG. 1;

FIG. 4 is a perspective view, on an enlarged scale, of essential portions of the switch actuating device of FIG. 1;

FIG. 5 is a side view of another embodiment of this invention;

FIG. 6 is a perspective view, on an enlarged scale, of essential portions of the embodiment of FIG. 5, with certain parts being cut out and the device being shown in a half latched position;

FIG. 7 is a perspective view, on an enlarged scale, of essential portions of the embodiment of FIG. 5, with certain parts being cut out and the device being shown in a fully latched position; and

FIG. 8 is a schematic perspective view of a driver's seat of a motor vehicle provided with a seat belt guide device utilizing the switch actuating mechanism according to this invention.

FIG. 1 to FIG. 4 show a first embodiment of this invention in which a striker 11 is secured to a mounting frame of a vehicle body, and lock means 10 is provided in a door.

Lock means 10 is formed with a striker receiving gap 13. When inserted in striker receiving gap 13, striker 11 is locked by a locking device (not shown) after it has

moved in gap 13 a distance corresponding to a full latch stroke section L.

Disposed in full latch stroke section L in striker receiving gap 13 is a contact 15, slidably supported by a base plate 14 of lock means 10, which is normally urged by the biasing force of a spring 17 to move toward an opening 16 of gap 13 so that a front end 18 of contact 15 may be disposed within full latch stroke section L.

Accordingly, when striker 11 is inserted in gap 13 and reaches full latch stroke section L after the door is closed, the front end 18 of contact 15 is pressed by a leg 12 of striker 11, so that contact 15 is moved rearwardly against the biasing force of spring 17.

Disposed in the path of rearward movement of contact 15 is an actuator 20 of a limit switch 19 which is pressed by the rearwardly moving contact 15, thereby turning limit switch 19 on or off as the case may be.

In the embodiment shown and described above, a cam 22 having a bevelled surface is formed on a back of an arm 21 contiguous with and projecting from a rear end of contact 15 as shown in FIG. 4. When bevelled surface of cam 22 is brought into contact with a side edge 23 of actuator 20 and contact 15 moves rearwardly in the direction of an arrow 51, cam 22 causes actuator 20 to move in the direction of an arrow 52, thereby turning limit switch 19 on or off as the case may be.

In FIG. 3, one leg 12 of striker 11 is shown as being in a half latched position, and hence leg 12 in this position indicates that the door is half-open. 12a shows the position which leg 12 occupies when it is in a full latch position and hence the door is fully closed.

FIG. 5 to FIG. 7 show a second embodiment of this invention in which a leg 32 of an annular striker 31 is inserted in a gap 33 formed between opposing surfaces of rotary latches 24 and 25 which are rotated by the leg received in the gap, so that leg 32 received in a recess 26 of rotary latch 24 as teeth 34 and 35 are brought into engagement with each other is locked. In this locking device, a slide block 38 slidably supported by a door lock proper 30 and disposed in an inner part of gap 33 functions as a contact. Slide block 38 is pressed and moved rearwardly by leg 32 of annular striker 31 when leg 32 is introduced into the full latch stroke section shown in FIG. 7 from its half-latched position shown in FIG. 6. An actuator 40 of a limit switch 39 is disposed in the path of rearward movement of slide block 38. When striker 31 moves forwardly, rotary latches 24 and 25 are returned to their positions shown in FIG. 5 by the biasing force of a coil spring 37. 32a in FIG. 7 shows the position which leg 32 of striker 31 occupies when it is latched.

In the embodiments as shown and described above, the actuator 20 or 40 of limit switch 19 or 39 remains inoperative when striker 11 or 31 is in a half-latched position in the locking device. It is only after striker 11 or 31 has entered the full latch stroke section that actuator 20 or 40 is rendered operative.

FIG. 8 shows an application of the switch actuating device according to this invention in a seat belt guide device so as to guide a lap belt 41 and a shoulder belt 42 between occupant restraining positions and belt release positions. When a door 43 is opened as shown, limit switches are actuated and a motor 50 built in the door is operated, so that annular members 44 and 45 fitted over lap belt 41 and shoulder belt 42 respectively

are moved to belt release positions along guides 46 and 47. When the door is closed, limit switches are actuated to move annular members 44 and 45 to anchors 48 and 49 of the lap belt and shoulder belt respectively, so as to bring the belts to occupant restraining positions.

In this example, the switch actuating device according to this invention responds to the opening of the door from a fully closed position to a half-open position in which the door is slightly open or the striker is in a half-latched position, so that the belts are brought to respective belt release positions. Consequently the occupant is released from restraint in his seat as soon as the door is opened. Conversely, when the occupant closes the door, the switch actuating device according to this invention does not respond to the closing of the door when it is not fully closed and the striker is in the half-latched position. Consequently, the limit switches are not actuated and belts are not moved to occupant restraining positions, thereby indicating that vehicle is not ready for running. It is only after the door is fully closed that belts are brought to the occupant restraining positions.

61 and 62 are limit switches for opening an operation circuit for motor 50 at opposite ends of a stroke of annular member 44.

The example shown and described above is but one of the many cases of the use of the switch actuating device according to this invention. It will be readily understood that the device can be utilized, for example, in turning on and off room lights in the vehicle in response to the opening and closing of the door and at the same time in finding out that door is not in a half-open position.

What is claimed is:

1. A switch actuating device responsive to the opening and closing of the door of a motor vehicle, comprising:

- a. a door lock mechanism including a striker and a gap into which said striker is received, said striker being received within a section of said gap a full latch stroke;
- b. a slidable contact, connected to said door lock mechanism and partially extending within said striker receiving gap, said contact having a front end that is slidable within said section of said gap a full latch stroke and a rear end spaced outside said gap, said rear end including an arm extending therefrom, said arm having a cam including a bevelled surface;
- c. a spring biasing said contact towards an opening of said gap through which said striker is received to a position within said section of said gap, said striker being of U-shape form wherein the leg first entering said section removably engages said front end of said contact; and
- d. a limit switch including an actuator extending within the path of said contact, said cam removably engaging said actuator wherein forward movement of said striker within said section of gap forces said contact rearwardly to position said bevelled surface over said actuator for pressing and moving

said actuator downwardly.

2. A switch actuating device responsive to the opening and closing of the door of a motor vehicle, comprising:

- a. a door lock mechanism including a striker, and two rotary latches disposed in a face-to-face relationship and forming between them a gap into which said striker is received, said striker being received within a section of said gap a full latch stroke;
- b. a slidable contact block supported by said lock mechanism and slidable within said striker receiving gap, said contact block having a front end that is slidable within said section of said gap a full latch stroke and a rear end;
- c. a spring biasing said block towards an opening of said gap through which said striker is received to a position within said section of gap, said striker being of U-shape form wherein the leg first entering said section removably engages said front end of said block; and
- d. a limit switch including an actuator extending within the path of said block, said rear end of said block removably engaging said actuator wherein forward movement of said striker within said section of said gap forces said block rearwardly to engage said actuator.

3. Apparatus responsive to the opening and closing of the door of a motor vehicle, comprising:

- a. a door lock mechanism including a striker and a gap into which said striker is received, said striker being received within a section of said gap a full latch stroke when the door is closed;
- b. a contact, connected to said door lock mechanism and partially extending within said striker receiving gap, said contact having a front end that is slidable within said section of said gap a full latch stroke and a rear end having an arm extending therefrom;
- c. a spring biasing said contact towards an opening of said gap through which said striker is received to a position within said section of gap, said striker being of U-shape form wherein the leg first entering said section removably engages said front end of said contact;
- d. a limit switch including an actuator extending within the path of said contact, said arm removably engaging said actuator; and
- e. means coupled to said limit switch for transferring seat and shoulder belts between occupant restraining and belt releasing positions comprising a lap belt, a shoulder belt, annular members slidably fitted over said lap belt and said shoulder belt respectively and movable along respective guides from a belt restraining position to a belt release position, an annular member drive means connected to the door of the vehicle and responsive to the actuation of said limit switch for moving said annular members to the release position when the door is open and for moving said annular members to the occupant restraining position when the door is closed.

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