Aug. 30, 1955 R. H. WISE 2,716,256

COUNTERBALANCED DOOR CHECK

Filed June 16, 1951 2 Sheets-Sheet 1

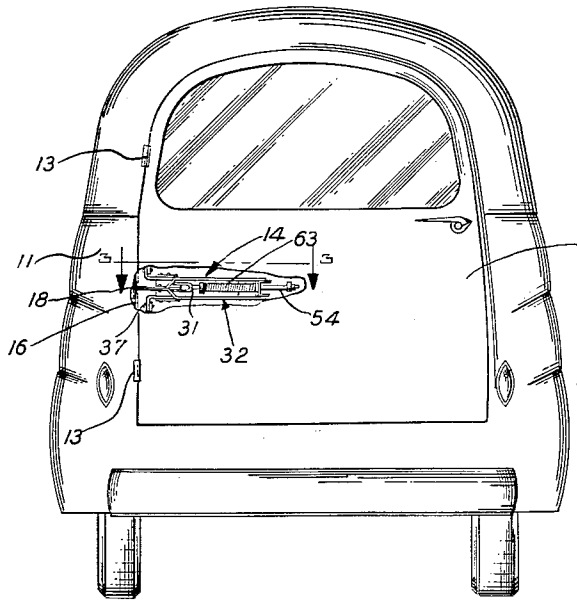


FIG. 1

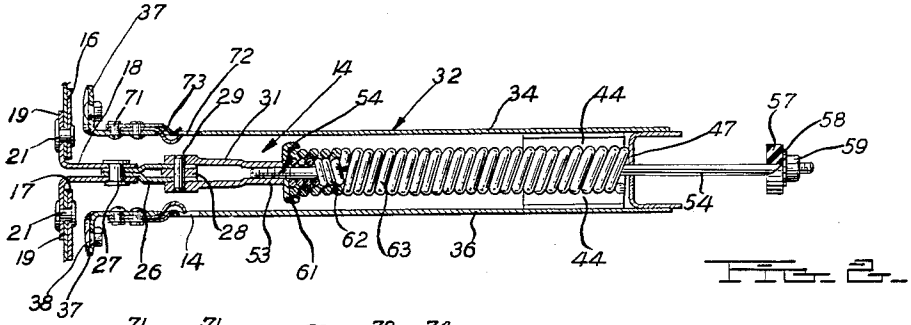


FIG. 2

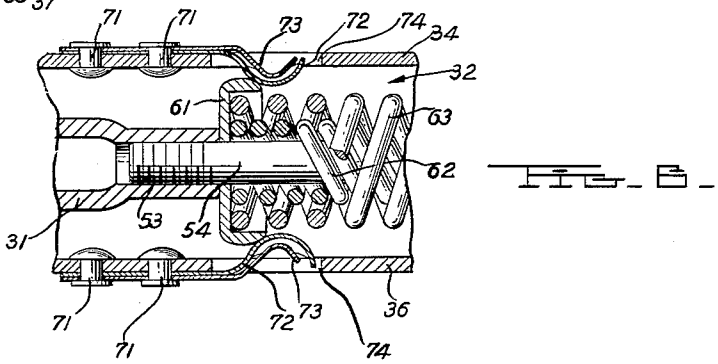


FIG. 3

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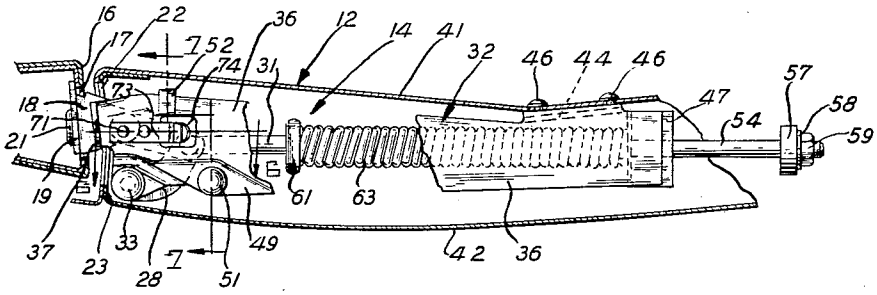


FIG. 3

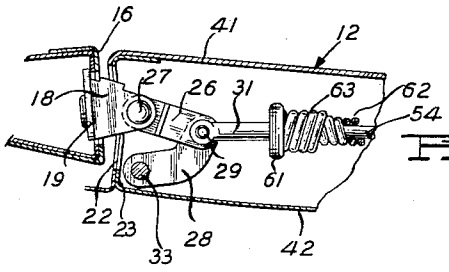


FIG. 4

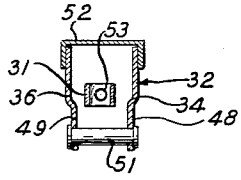


FIG. 7

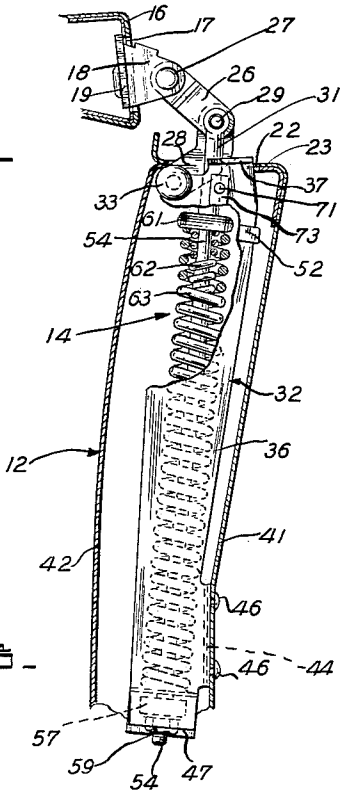


FIG. 5

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COUNTERBALANCED DOOR CHECK

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1 Claim. (Cl. 16—86)

This invention relates generally to door checking and holding devices for motor vehicle doors and has particular reference to a door check of the counterbalancing type.

An object of this invention is to provide a door checking and holding device particularly adapted for relatively heavy motor vehicle doors of the type mounted upon an inclined hinge axis and consequently requiring considerable counterbalancing to facilitate the opening of the door. The construction comprises a pair of interconnected toggle links, one connected to the door and the other connected to the door supporting structure, with the pivotal connection between the two toggle links being acted upon by a strong spring force in such manner as to partially or completely counterbalance the tendency of the door to swing to a closed position. It is an object of the invention to provide such a construction enabling the initial opening of the door to be effected automatically when the door latch is released and to counterbalance the door during the intermediate portion of its opening movement to enable it to be easily controlled, together with means positively but releasably holding the door in its fully open position. It is a further object to provide such a construction which is compact and capable of being arranged in a relatively narrow door and is of sturdy construction yet economical to manufacture.

Other objects and advantages of this invention will be made more apparent as this description proceeds, particularly when considered in connection with the accompanying drawings, wherein:

Figure 1 is a rear elevational view of a motor vehicle incorporating the door check of the present invention.

Figure 2 is an enlarged vertical cross-sectional view of the door check shown in Figure 1.

Figure 3 is an enlarged horizontal cross-sectional view taken on the line 3—3 of Figure 1 showing the door check in plan view.

Figure 4 is a view similar to a portion of Figure 3 but with the door check housing omitted to show the toggle linkage.

Figure 5 is a horizontal cross-sectional view similar to Figure 3 but showing the door check and the door in fully open position.

Figure 6 is a fragmentary cross-sectional view taken on the line 6—6 of Figure 3 showing the spring clips holding the door check mechanism in the fully open position.

Figure 7 is a cross-sectional view taken on the line 7—7 of Figure 3.

Referring now to the drawings, the door check of the present invention is shown in connection with the rear access door of a parcel delivery type of motor vehicle. Such doors are relatively large and heavy, and since they are usually pivoted about a hinge axis inclined from the vertical they are extremely heavy and difficult to open and to maintain in open position. The door check shown herein is particularly designed for such a door although it may of course be used in connection with other type vehicle doors as well.

Referring to the drawings, the reference character **11** indicates the rear body panel of a parcel delivery truck, the reference character **12** the rear door therefor, **13** the hinges pivotally connecting the door **12** to the body, and **14** the door checking and holding mechanism.

The rear body panel **11** is formed with an inwardly extending flange **16** defining the door opening and provided with an enlarged aperture **17** therethrough. A bracket **18** extends through the aperture **17** and is formed with flanges **19** suitably secured to the flange **16** of the body panel by means of fastening elements **21**.

The bracket **18** extends through an opening **22** provided in the jamb face **23** of the door **12**. Pivotally connected to the end of the bracket **18** is a toggle link **26**. The toggle link **26** is formed of two separate stampings spaced from each other adjacent their outer ends but bent into juxtaposition at their inner ends to be received between the two side flanges of the bracket **18** for pivotal connection thereto by means of a pivot pin **27**. A second one-piece toggle link **28** is provided, one end thereof being received between the two side flanges of the toggle link **26** and pivotally connected thereto by means of a pivot pin **29**. Also pivotally mounted upon the pivot pin **29** is a clevis **31**.

The opposite end of the toggle link **28** is received between the side flanges of the door check housing **32** and is pivotally connected thereto by means of a pivot pin **33**. The housing **32** is formed of a pair of side flanges **34** and **36** each having an end flange **37** secured to the jamb face **23** of the door by means of fastening elements **38**. The housing extends between the inner and outer panels **41** and **42** of the door **12**. The opposite ends of the side flanges **34** and **36** of the door check housing are provided with vertically extending flanges **44** secured to the inner door panel **41** by means of fastening elements **46**. The extreme ends of the flanges **34** and **36** of the door check housing **32** are secured to the side flanges of a U-shaped reinforcing end member **47**, preferably by welding.

As best seen in Figure 7, the side flanges **34** and **36** of the housing **32** are depressed at **48** and **49** respectively and are secured together by a shouldered stud **51**. The depressed portion enables the heads of the shoulder stud **51** to be beneath the adjacent surfaces of the housing flanges to enable the assembly to be inserted through the opening provided in the jamb face **23** of the door. The shouldered stud **51** maintains the flanges of the housing properly spaced and supported. A U-shaped metal clip **52** embraces the opposite sides of the flanges **34** and **36** of the door check housing **32**, being welded thereto, and prevents the flanges from being spread apart during the operation of the door check mechanism.

As best seen in Figure 3, the side flanges **34** and **36** of the door check housing **32** are further depressed adjacent the pivotal connection **33** of the toggle link **28** to the housing to provide lateral support for the link.

Referring now to Figure 2, it will be seen that the clevis **31** is provided with a threaded opening **53** for receiving the threaded end of the door check rod **54**. The opposite end of the rod extends through an opening formed in the U-shaped end reinforcing member **47** and terminates in a threaded portion receiving a rubber bumper **57**, a metal back-up washer **58** and a nut **59** which may be adjusted along the rod to vary the position of the rubber bumper. In the opening movement of the door the rubber bumper **57** is arranged to engage the U-shaped end member **47** of the housing to form a stop and limit further opening movement of the door.

A cup-shaped retainer **61** is mounted upon the door

check rod **54** and held against the adjacent end of the clevis **31** by means of a pair of coil springs extending between the retainer and the U-shaped end member **47** of the housing. Inner and outer springs **62** and **63** are provided to furnish the necessary spring action to properly counterbalance the heavy door.

Figures 3 and 4 illustrate the door check mechanism in the closed position of the door. It will be noted that the inner and outer springs **62** and **63** are compressed and that the toggle formed of the toggle links **26** and **28** is in a closed position. Upon unlatching the door, the coil springs apply a relatively large force through the retainer **61** and the clevis **31** to the pivot pin **29** interconnecting the toggle links **26** and **28**. This force tends to open the toggle and consequently automatically opens the door. As the door opens the toggle links move from the position shown in Figures 3 and 4 to the position shown in Figure 5 and it will be apparent that the direction of application of the spring force as applied through the clevis **31** to the pivot pin **29** connecting the toggle links also varies. The arrangement is such that the door is automatically moved by the mechanism through the initial portion of its opening range and then is substantially counterbalanced during the intermediate portion of its range so as to facilitate its control by the operator and make opening or closing movement of the door during this range relatively effortless.

Means are provided for holding the door in the fully open position shown in Figure 5. Secured to each flange **34** and **36** of the door check housing **32** by means of rivets **71** is a primary spring clip **72** and a secondary spring clip **73**, Figure 6. The inner ends of the primary clips **72** are bent in arcuate fashion and extend through openings **74** formed in the housing side flanges (Figure 3) into the path of the cup-shaped retainer **61** held against the end of clevis **31** by the coil springs **62** and **63**. The inner ends of the secondary spring clips **73** likewise project into the openings **74** in the housing side flanges, being generally V-shaped and spaced from the arcuate end portions of the primary clips **72**. The arrangement is such that when the door **12** is moved to its fully open position the retainer **61** engages the arcuate end portions of the primary clips **72** which snap over the retainer to hold the door open. The secondary clips **73** serve as back-up clips, being engageable by the end portions of the primary clips during spreading movement of the latter by the retainer **61**. The engagement

of the retainer **61** by the spring clips is best shown in Figure 6, and it will be apparent that the door is thus held in its fully open position. It can be readily released by pressure against the door to force the retainer **61** past the spring clips.

It will be understood that the invention is not to be limited to the exact construction shown and described, but that various changes and modifications may be made without departing from the spirit and scope of the invention, as defined in the appended claims.

What is claimed is:

In a motor vehicle body having a door and a body member having a door opening therein, a bracket secured to the body member adjacent the door opening and extending into said door through an opening in the latter, an elongated generally horizontal supporting bracket mounted within said door, a toggle link pivotally connected to the bracket carried by the body member, a second toggle link pivotally connected to the supporting bracket carried by the door, means pivotally connecting the opposite ends of said two toggle links together, a generally horizontal arm pivotally connected to said pivotal means, a member on said supporting bracket having an opening through which said arm extends, a cup-shaped retaining member carried by said arm and retaining means carried by said supporting bracket for cooperation with said cup-shaped retaining member, said retaining means comprising a plurality of spring fingers arranged in pairs with each pair of spring fingers comprising a primary spring finger secured to the supporting bracket and having a bent end portion projecting into the path of the cup-shaped retaining member and a secondary spring finger also secured to said supporting bracket and having a yieldable bent end portion in alignment with the bent end portion of said primary spring finger but spaced therefrom to back up the latter and increase the resistance of the latter to movement by said cup-shaped retaining member.

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