

Feb. 28, 1939.

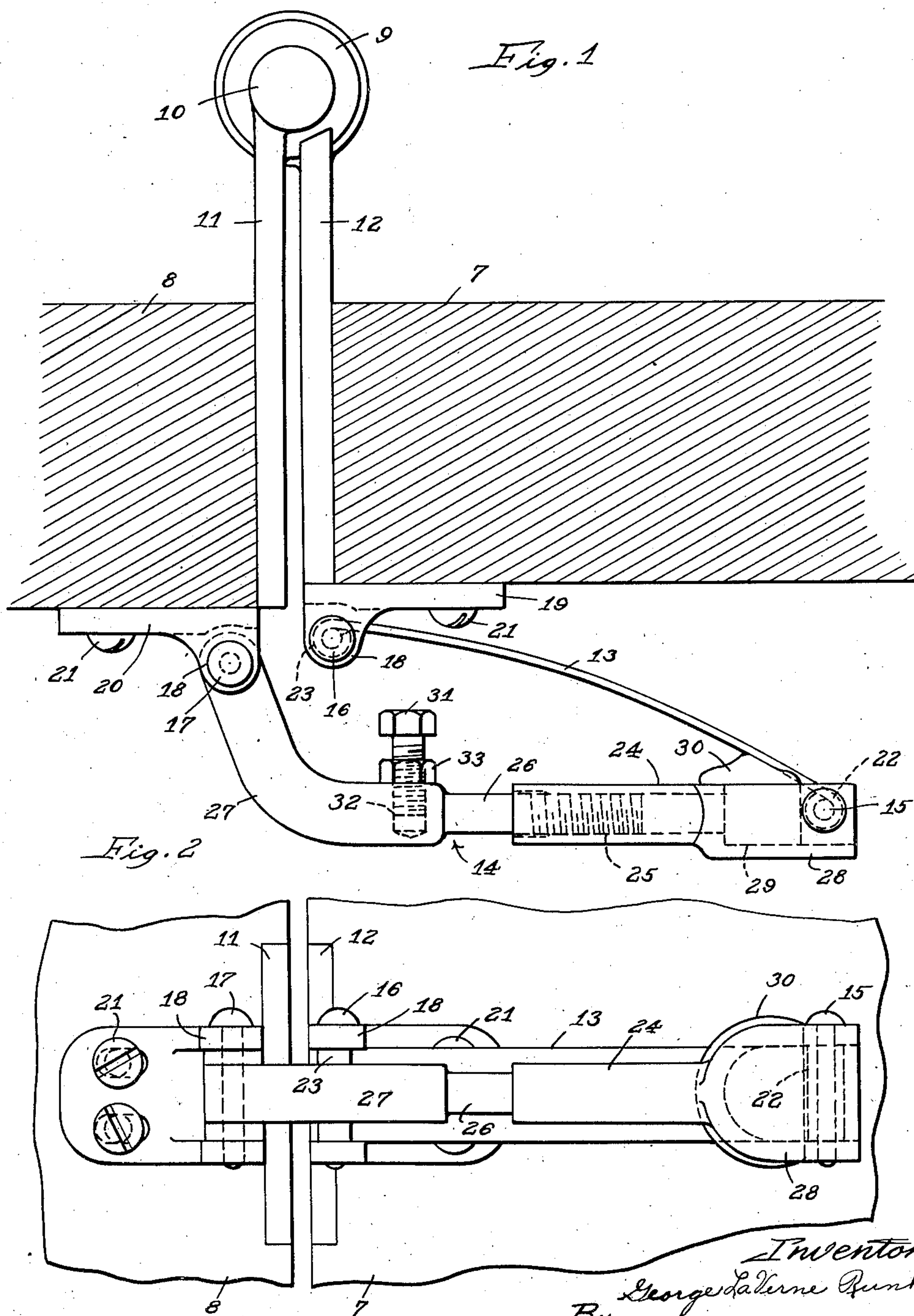
G. LA V. RUNKLE

2,149,074

DOOR CHECK

Filed Feb. 13, 1937

2 Sheets-Sheet 1



Inventor:  
George Laverne Runkle  
By  
Wilson, Lawell, Wilanna & Wintercorn  
Attys.

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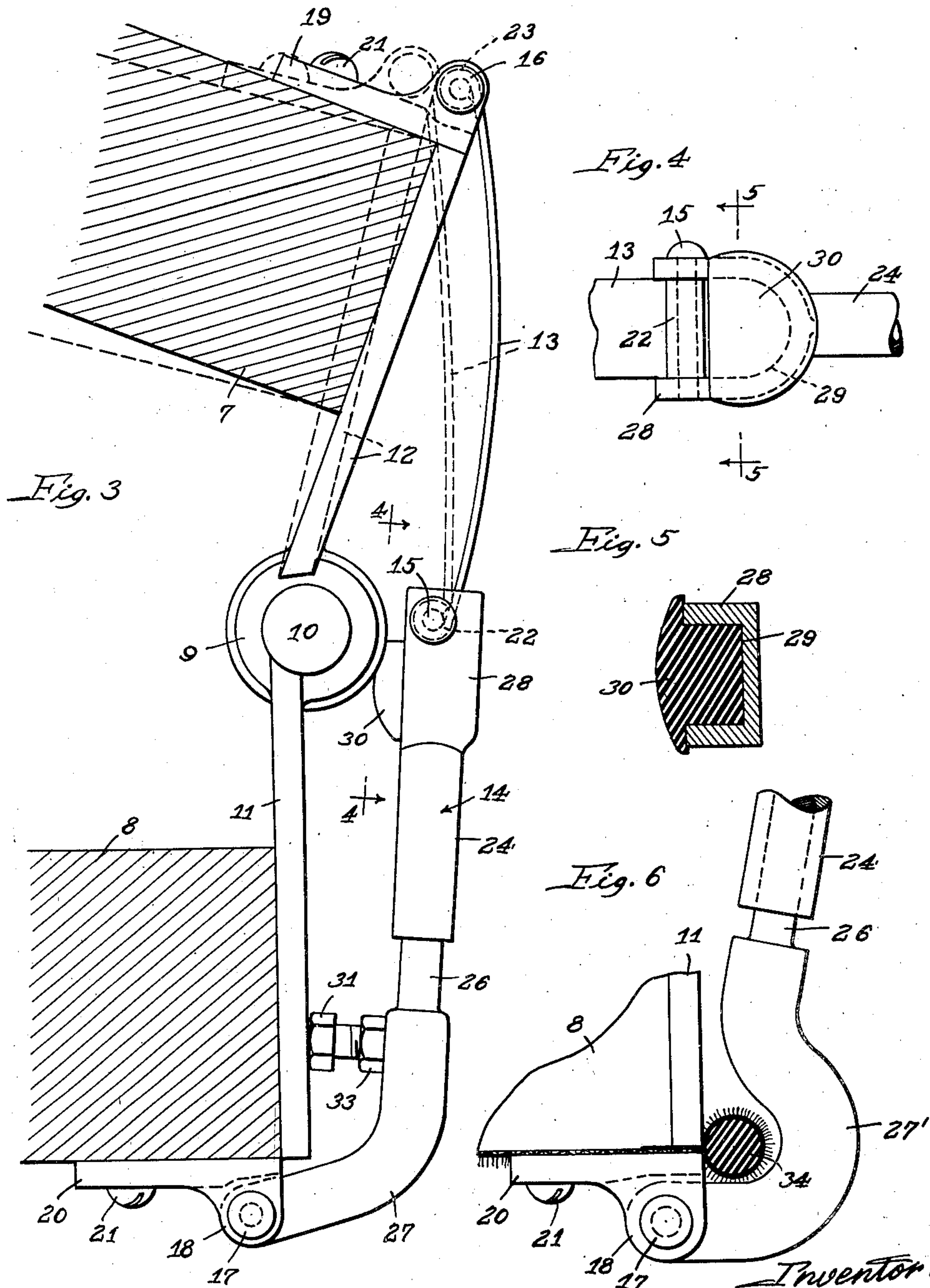
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2 Sheets-Sheet 2



Inventor:  
By George LaVerne Runkle  
Wilson, Lawell, Wilanna & Wintercorn  
Attys.



## UNITED STATES PATENT OFFICE

2,149,074

## DOOR CHECK

George La Verne Runkle, Freeport, Ill., assignor  
to Henney Motor Company, Freeport, Ill., a cor-  
poration of Delaware

Application February 13, 1937, Serial No. 125,595

20 Claims. (Cl. 16—85)

This invention relates to a new and improved door check.

The conventional door check provided on motor vehicles is designed for use with doors swingable only through approximately 90°, that amount of movement being sufficient for most practical purposes in the loading and unloading of passengers. However, on hearses and ambulances, and undertakers' service cars, as well as on other vehicles, such as delivery trucks, it is desired to have the back door swingable through much more than 90°, and it therefore becomes a problem to provide a practical form of check for such a door. It is the principal object of my invention to provide a door check specially designed to accommodate nearly 180° door movement and afford a stiff spring resistance to movement of the door when it reaches a point near the limit of its opening movement, whereby to relieve the hinges of sudden shocks and strains.

Another object is to provide a door check formed by two toggle links which, while they are arranged to unfold in the opening of the door to check its movement, are further proportioned and arranged so as to fold compactly in a plane approximately parallel to the inside of the door when the door is closed, whereby to avoid striking or interfering with objects inside the vehicle that may be placed rather close to the door, as for example, a casket in a hearse.

Still another object is to provide a rubber bumper on the door check so located with respect to the pivotal connection between the two links thereof and the door hinge that it serves by compression between the links in the closed position of the door as an anti-rattle, and serves by engagement with the hinge in the opening of the door to prevent metal-to-metal contact between the door check and hinge and thereby silence as well as further cushion the operation of the door check.

A further object is to provide a door check having a screw adjustment by means of which the device can be readily adjusted to suit the requirements of any given installation and operate most efficiently.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a horizontal section showing the hinged edge of a door and the adjacent pillar or post, looking down on the hinge therefor and the associated door check of my invention;

Fig. 2 is a face view of the door check as it appears in Fig. 1;

Fig. 3 is a view similar to Fig. 1, but showing

the door opened and illustrating by full and dotted line positions of certain parts, the mode of operation of the door check;

Fig. 4 is an elevational detail on the line 4—4 of Fig. 3;

Fig. 5 is a sectional detail on the line 5—5 of Fig. 4, and

Fig. 6 is a view corresponding to a portion of Fig. 3, but showing another construction of a part of the door check.

Similar reference numerals are applied to corresponding parts throughout the views.

Referring first to Figs. 1 to 5, the parts numbered 7 and 8 are respectively the door and pillar, but it will soon be apparent that so far as the operation of the door check of my invention is concerned, it is immaterial whether 7 is the door and 8 the pillar, or vice versa; the door check will operate the same either way. At 9 are indicated the knuckles of a conventional butt hinge, and 10 is the pintle thereof which provides the axis on which the hinge members 11 and 12 are relatively movable. The hinge shown may be the middle one of three hinges, the door check of my invention being preferably provided in connection with that hinge, for obvious reasons. The device, generally speaking, is made up of two toggle links 13 and 14 pivotally connected together at 15 and having pivotal connection with the door and pillar at 16 and 17, respectively. The pivots 16 and 17 are provided by pins entered through ears 18 in the attaching plates 19 and 20 suitably secured to the door and pillar, respectively, by screws 21. The link 13 is in the form of a bowed leaf-spring curled at the ends to provide knuckles 22 and 23 to receive the pivot pins 15 and 16, respectively. The link 14 is a rigid member made up of a tubular part 24, the bore 25 of which is threaded to receive the reduced threaded stem 26 on the gooseneck 27 forming the other part of the link 14. A shackle 28 is formed on the outer end of the part 24 to receive the end of the leaf-spring 13 and has the pivot pin 15 passed therethrough to pivotally connect the parts together. This shackle also provides a recess 29 for a rubber bumper block 30 in such close proximity to the pivot 15 that the bumper will be pinched between the parts when they fold in the closing of the door, as illustrated in Fig. 1. This same bumper will also come into engagement with the hinge knuckles when the door is opened, as illustrated in Fig. 3.

In operation, in the first instance (Fig. 1) the bumper 30 serves mainly to keep the parts of the



folded door check under tension so that they will not be loose and free to rattle when the hearse or other vehicle on which the device is mounted is in motion, and, of course, since the compression of the bumper block occurs in the closing of the door, a certain amount of cushioning action is also secured, partly by the compression of the bumper block itself and partly by the flexing of the leaf-spring 13 incident thereto.

When the door check is folded, as in Fig. 1, it takes up very little room inside the vehicle and isn't apt to engage or interfere with what may be placed in the vehicle near the door. In the other instance (Fig. 3) the bumper 30 in the opening of the door 7 and consequent unfolding of the door check serves mainly to silence the operation by preventing metal-to-metal contact between the hinge knuckles 9 and the shackle 28. Here again it is obvious that a cushioning action is also secured with the bumper, because when the door 7 is swung further beyond the point of engagement of the bumper 30 with the hinge knuckles 9, the bumper is compressed and accordingly offers yielding resistance to the movement of the door. The main cushioning effect, however, is that secured with the leaf-spring 13 which, as shown in Fig. 3, is subjected to a strong pull in the movement of the door from full line position to the dotted line position, tending to straighten out the spring. This action occurs near the limit of opening movement of the door when, as can be seen from Fig. 3, the door is in a position where it exerts considerable leverage, which, however, is adequately offset by the resistance of the bowed leaf-spring, which requires a heavy pull to straighten it. In passing, I would mention that the adjustable threaded connection between the parts 24 and 27 is of advantage in the application of the door check to the door, because it permits locating the bumper 30 at the proper point for engagement with the hinge knuckles and also locating the pivot 15 at the same time to obtain best operation of the device.

The gooseneck part 27 of the link 14 carries an adjustable set screw 31 threaded in a transverse hole 32 provided in the part 27 next to the inner end of the stem 26. A lock nut 33 threads on the screw 31 and jams against the part 27 when tightened to hold the screw in adjusted position.

When the door is opened, the screw 31 is so adjusted that the head thereof will come into engagement with the hinge member 11 on the pillar 8 after the bumper 30 has engaged the hinge knuckles and been subjected to a certain amount of compression as a result of the further opening movement of the door. In other words, the screw serves as a positive stop to limit the compression of the bumper 30 and prevent it from being squashed. Incidentally, the screw 31 will also insure keeping the pivot 15 from reaching a position too close to a line passing through the pivots 16 and 17, which would be objectionable for the reason that it might give rise to some difficulty in the closing of the door. Obviously if the pivot 15 were allowed to reach a dead-center relationship with the pivots 16 and 17, or any position too closely approximating such relationship, there would be difficulty in closing the door. It is clear from the showing in Fig. 3, wherein the pivot 15 is spaced amply from a line joining the pivots 16 and 17, that the door check will fold or jack-knife comparatively easily when the door is being closed. I have found that the addition of the screw 31 materially strengthens the door check and avoids danger of breakage

at the gooseneck 27 when the door is swung open violently, placing an unusually heavy load upon the door check parts.

Fig. 6 illustrates a construction in which a different form of gooseneck part 27' is provided having a U or V bend therein at the end extending to the pivot 17. This is of two-fold advantage; it avoids interference with the beading 34 around the inside of the door frame, and it locates the pivot 17 in closer relation to the axis of the stem 26, so that the pull exerted on the door check parts when the door is opened is borne more by the pin 17 and there is accordingly less danger of breakage of the gooseneck part. I have accordingly found it unnecessary with this construction to provide the set screw 31. However, I may nevertheless provide a screw like the screw 31 on the gooseneck part 27'.

It is believed the foregoing description conveys a good understanding of the objects and advantages of my invention. The appended claims have been drawn with a view to covering all legitimate modifications and adaptations.

I claim:

1. A door check comprising two link members pivotally connected together at one end and adapted to be pivotally connected at the other end to a door and door pillar, respectively, adjacent the hinged edge of the door, one of said link members being on one of said door and pillar elements and comprising a bowed leaf spring which in the extreme opening movement of the door is subjected to a pull tending to straighten the same, whereby to cushion the door at the limit of its movement, and the other link being on the other of said door and pillar elements and having an adjustable striker thereon to limit the door opening movement by abutment with a surface stationary with the associated one of the door and pillar elements.

2. A door check comprising two members pivotally connected together at one end and adapted to be pivotally connected at the other end to a door and door pillar, respectively, adjacent the hinged edge of the door, one of said members being on one of said door and pillar elements and being of gooseneck form to extend around the edge of one of the associated one of said door and pillar elements in the opening of the door, when the door check members move into end to end relationship from the edge of one of the door and pillar elements to the edge of the other element, the other door check member being a bowed leaf spring which in the extreme opening movement of the door is subjected to a pull tending to straighten the same, whereby to cushion the door at the limit of its movement, and an adjustable set screw on the gooseneck member arranged to engage a surface stationary with the associated one of the door and pillar elements at the limit of door opening movement.

3. A door check comprising two link members pivotally connected together at one end and adapted to be pivotally connected at the other end to a door and door pillar, respectively, adjacent the hinged edge of the door, one of said members being an elongated bowed leaf spring, and the other member having a gooseneck end remote from the end pivotally connected to the leaf spring.

4. In combination with a door, a door pillar, and a hinge comprising members secured to and projecting from the door and pillar and having pivotally connected knuckle portions on their outer ends, a door check comprising a link pivoted



tally connected to the inner side of one of said door and pillar elements adjacent the hinge, a second link pivotally connected adjacent the hinge to the inner side of the other of said door and pillar elements, said links being pivotally connected at their free ends and being long enough to allow opening of the door through nearly 180°, and a resilient bumper movable with said links into engagement with the knuckle portions of the hinge members when the door approaches the limit of opening movement, whereby to cushion the door at the limit of its movement.

5. In combination with a door, a door pillar, and a hinge comprising members secured to and projecting from the door and pillar and having pivotally connected knuckle portions on their outer ends, a door check comprising a link pivotally connected to the inner side of one of said door and pillar elements adjacent the hinge, a second link pivotally connected adjacent the hinge to the inner side of the other of said door and pillar elements, said links being pivotally connected at their free ends and being long enough to allow opening of the door through nearly 180°, a resilient bumper movable with said links into engagement with the knuckle portions of the hinge members when the door approaches the limit of opening movement, whereby to cushion the door at the limit of its movement, and an adjustable set screw mounted on one of said links and arranged to engage the adjacent hinge member in the opening of the door to the limit of its movement, whereby to positively limit compression of the resilient bumper.

6. In combination with a door, a door pillar, and a hinge comprising members secured to and projecting from the door and pillar and having pivotally connected knuckle portions on their outer ends, a door check comprising a link pivotally connected to the inner side of one of said door and pillar elements adjacent the hinge, a second link pivotally connected adjacent the hinge to the inner side of the other of said door and pillar elements, said links being pivotally connected at their free ends and being long enough to allow opening of the door through nearly 180°, and a resilient bumper on one of said links adjacent the free end thereof arranged to be compressed between the two links of the door check in the closing of the door and also arranged to engage and be compressed against the knuckle portions of the hinge members when the door is opened approximately to the limit of its movement.

7. In combination with a door, a door pillar, and a hinge comprising members secured to and projecting from the door and pillar and having pivotally connected knuckle portions on their outer ends, a door check comprising a link pivotally connected to the inner side of one of said door and pillar elements adjacent the hinge, a second link pivotally connected adjacent the hinge to the inner side of the other of said door and pillar elements, said links being pivotally connected at their free ends and being long enough in the aggregate to allow opening of the door through nearly 180°, one of said links being of two-piece construction and the pieces being adjustable relative to one another to vary the overall length of said link and of the combination of links, and a resilient bumper on the outer end of the adjustable one of said links, arranged to be compressed against the knuckle portions of the

hinge members when the door is opened to approximately its full extent.

8. A door check comprising two link members pivotally connected together at one end and adapted to be pivotally connected at the other end to a door and door pillar, respectively, adjacent the hinged edge of the door, one of said members being a bowed leaf spring, and a rubber bumper block mounted on the free end of the other member in a position to be compressed between the members in the folding thereof.

9. A door check comprising two link members pivotally connected together at one end and adapted to be pivotally connected at the other end to a door and door pillar, respectively, adjacent the hinged edge of the door, one of said members being a bowed leaf spring, the other member comprising two interthreaded sections adjustable relative to one another to vary the length of said member, and a rubber bumper block mounted on the free end of the last-mentioned member in a position to be compressed between the members in the folding thereof.

10. A door check comprising two link members pivotally connected together at one end and adapted to be pivotally connected at the other end to a door and door pillar, respectively, adjacent the hinged edge of the door, one of said link members being a bowed leaf-spring which in the extreme opening movement of the door is subjected to a pull tending to straighten the same, whereby to cushion the door at the limit of its movement, and a rubber bumper block carried on the free end of the other of said link members to limit swinging movement of said member by engagement with a surface stationary with the door pillar in the opening of the door.

11. A door check comprising two link members pivotally connected together at one end and adapted to be pivotally connected at the other end to a door and door pillar, respectively, one of said link members being a bowed leaf-spring which in the extreme opening movement of the door is subjected to a pull tending to straighten the same, whereby to cushion the door at the limit of its movement, the other member comprising two interthreaded sections adjustable relative to one another to vary the length of said member, and a rubber bumper block carried on the free end of the last named link member to limit swinging movement of said member by engagement with a surface stationary with the door pillar in the opening of the door.

12. A door check comprising two link members pivotally connected together at one end and adapted to be pivotally connected at the other end to a door and door pillar, respectively, adjacent the hinged edge of the door, one of said members being an elongated bowed leaf-spring, and the other member having a gooseneck end remote from the leaf-spring, and a rubber bumper block on the free end of the gooseneck member remote from the gooseneck end thereof and arranged to be compressed between the members in the folding thereof.

13. A door check comprising two link members pivotally connected together at one end and adapted to be pivotally connected at the other end to a door and door pillar, respectively, adjacent the hinged edge of the door, one of said members being on one of said door and pillar elements and being an elongated bowed leaf-spring which in the extreme opening movement of the door is subjected to a pull tending to straighten the same, whereby to cushion the door at the



limit of its movement, and the other member being on the other of said door and pillar elements and having a gooseneck end remote from the leaf-spring, and a rubber bumper block on a portion of the gooseneck member arranged to strike a surface stationary with the associated one of said door and pillar elements at the limit of door opening movement.

14. A door check comprising two link members pivotally connected together at one end and adapted to be pivotally connected at the other end to a door and door pillar, respectively, adjacent the hinged edge of the door, one of said members being an elongated bowed leaf-spring, and the other member having a gooseneck end remote from the leaf-spring, the gooseneck member having an adjustable pivot piece threaded thereon permitting variation in the overall length of said member, said pivot piece having pivotal connection with said leaf spring member, a rubber bumper block on the pivot piece arranged to be compressed between the members in the folding thereof, and an adjustable set screw on the gooseneck member adjacent the gooseneck end and on the same side of said member with the aforesaid bumper block arranged by engagement with a surface stationary with the door pillar to serve as a positive stop limiting swinging movement of the gooseneck member in the opening of the door.

15. A door check comprising two link members pivotally connected together at one end and adapted to be pivotally connected at the other end to a door and door pillar, respectively, adjacent the hinged edge of the door, one of said link members being on one of said door and pillar elements and being a bowed leaf-spring which in the extreme opening movement of the door is subjected to a pull tending to straighten the same, whereby to cushion the door at the limit of its movement, and the other link member being on the other of said door and pillar elements and being constructed so as to permit adjustment of the overall length thereof, whereby to vary the extent of door opening permitted, and a set screw on one of said link members arranged to engage a surface stationary with the associated one of said door and pillar elements at the limit of door opening movement.

16. In combination with a door, a door pillar, and a hinge comprising members secured to and projecting from the door and pillar and having pivotally connected knuckle portions on their outer ends, a door check comprising a link pivotally connected to the inner side of one of said door and pillar elements adjacent the hinge, a second link pivotally connected adjacent the hinge to the inner side of the other of said door and pillar elements, one of said links being of two-piece construction and the pieces being adjustable relative to one another to vary the overall length of said link and of the combination of links in end to end relation, and a resilient bumper carried on one of said links arranged to be compressed between the links in the folding thereof.

17. A door check comprising two link members pivotally connected together at one end and adapted to be pivotally connected at the other end to a door and door pillar, respectively, adjacent the hinged edge of the door, one of said members being on one of said door and pillar elements and being of gooseneck form to extend around the edge of one of the associated said

door and pillar elements in the opening of the door, when the door check members move into end to end relationship from the edge of one of the door and pillar elements to the edge of the other element, and a resilient bumper on the outer end of one of said links arranged to be compressed against a surface stationary with the associated one of said door and pillar elements at the limit of door opening movement.

18. A door check comprising two link members pivotally connected together at one end and adapted to be pivotally connected at the other end to a door and door pillar, respectively, adjacent the hinged edge of the door, one of said members being of gooseneck form to extend around the edge of one of said door and pillar elements in the opening of the door, when the door check members move into end to end relationship from the edge of one of the door and pillar elements to the edge of the other element, and a resilient bumper block carried on one of said members and arranged to be compressed between the members in the folding thereof.

19. A door check comprising two link members pivotally connected together at one end and adapted to be pivotally connected at the other end to a door and door pillar, respectively, adjacent the hinged edge of the door, one of said link members being a bowed leaf spring which in the extreme opening movement of the door is subjected to a pull tending to straighten the same, whereby to cushion the door at the limit of its movement, a resilient bumper movable with said links and adapted to engage a surface stationary with one of the door and door pillar elements whereby to further cushion the door at the limit of its movement, and the other link having an adjustable striker thereon adapted to engage a surface stationary with one of the door and door pillar elements in the opening of the door to the limit of its movement, whereby to positively limit compression of the resilient bumper.

20. A door check comprising two members pivotally connected together at one end and adapted to be pivotally connected at the other end to a door and door pillar, respectively, adjacent the hinged edge of the door, one of said members being on one of said door and pillar elements and being of gooseneck form to extend around the edge of one of the associated said door and pillar elements in the opening of the door, when the door check members move into end to end relationship from the edge of one of the door and pillar elements to the edge of the other element, the other door check member being on the other of said door and pillar elements and being a bowed leaf spring which in the extreme opening movement of the door is subjected to a pull tending to straighten the same, whereby to cushion the door at the limit of its movement, a resilient bumper movable with the door check members and adapted to engage a surface stationary with one of the door and pillar elements when the door approaches the limit of opening movement, whereby to cushion the door at the limit of its movement, and an adjustable striker on the gooseneck member adapted to engage a surface stationary with the associated one of the door and door pillar elements at the limit of opening movement of the door, whereby to positively limit compression of the resilient bumper.

GEORGE LA VERNE RUNKLE.



CERTIFICATE OF CORRECTION.

Patent No. 2,149,074.

February 28, 1939.

GEORGE LA VERNE RUNKLE.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, second column, line 15, claim 18, after "members" insert the words being on one of said door and pillar elements and; line 16, same claim, before the word "one" insert the associated; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 16th day of May, A. D. 1939.

Henry Van Arsdale

(Seal)

Acting Commissioner of Patents.