Jan. 4, 1938. A. H. HABERSTUMP 2,104,124

DOOR STOP AND CHECK

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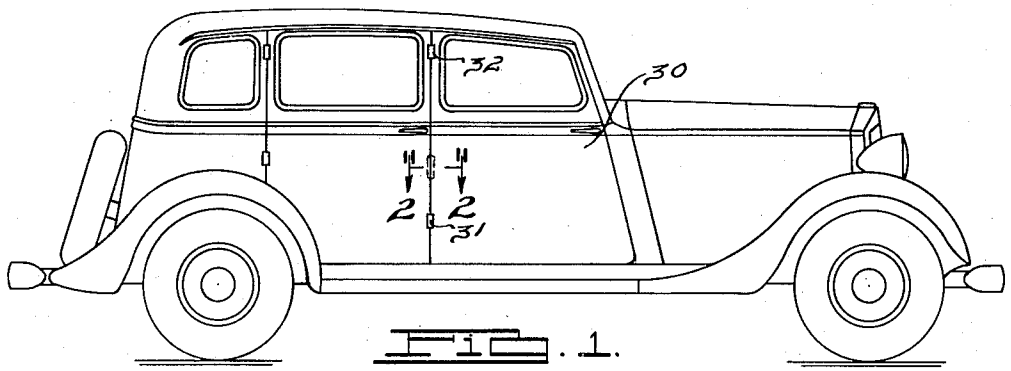


Fig. 1.

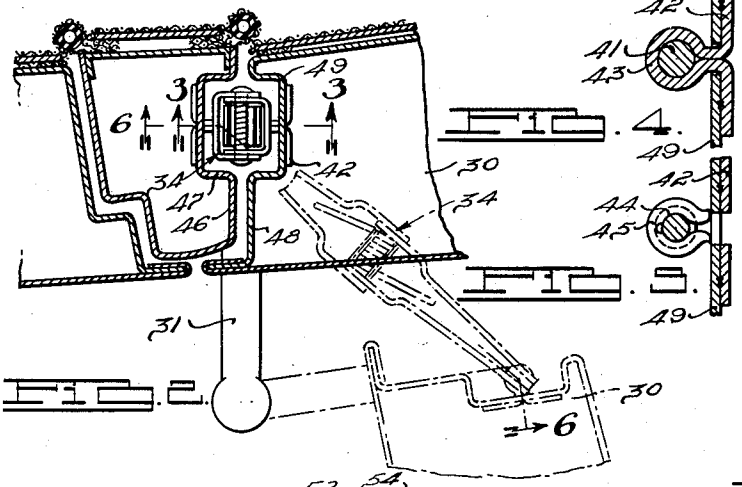


Fig. 2.

Fig. 3.

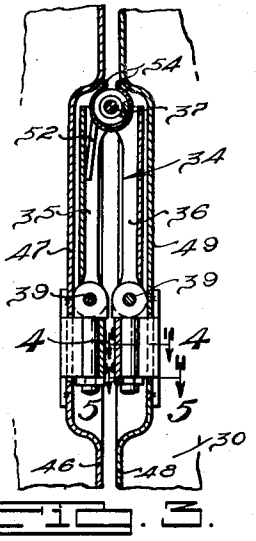


Fig. 4.

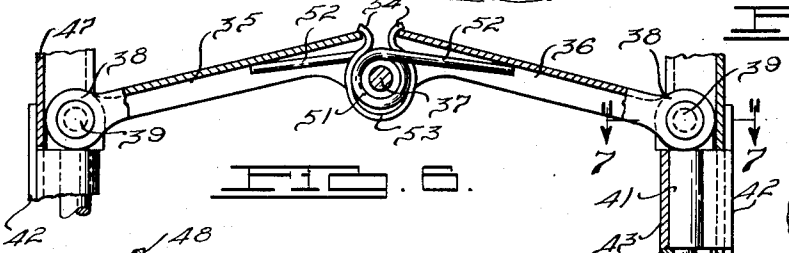


Fig. 5.

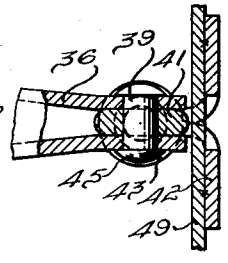


Fig. 7.

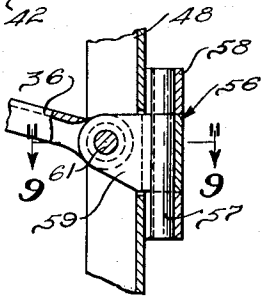


Fig. 8.

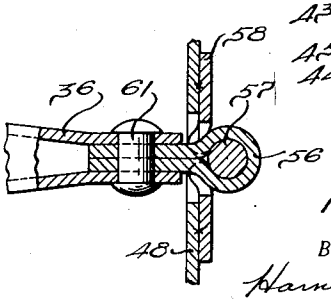


Fig. 9.

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DOOR STOP AND CHECK

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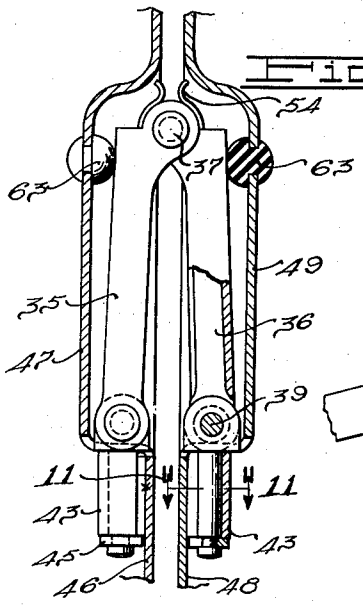


Fig. 10.

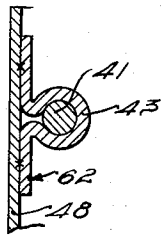


Fig. 11.

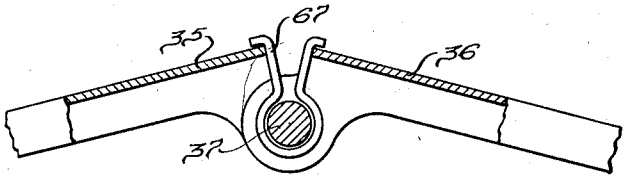


Fig. 14.

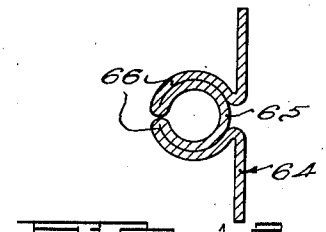


Fig. 12.

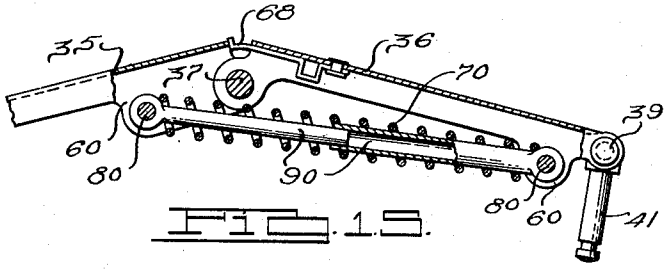


Fig. 13.

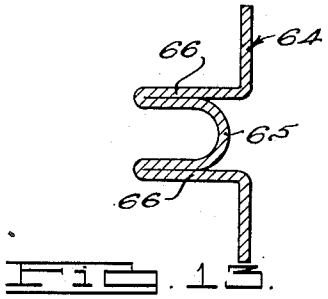


Fig. 15.

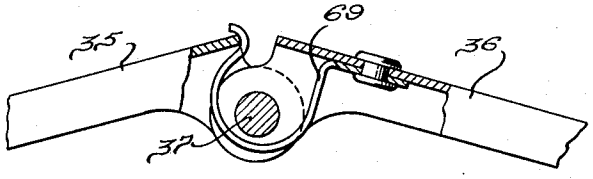


Fig. 16.

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DOOR STOP AND CHECK

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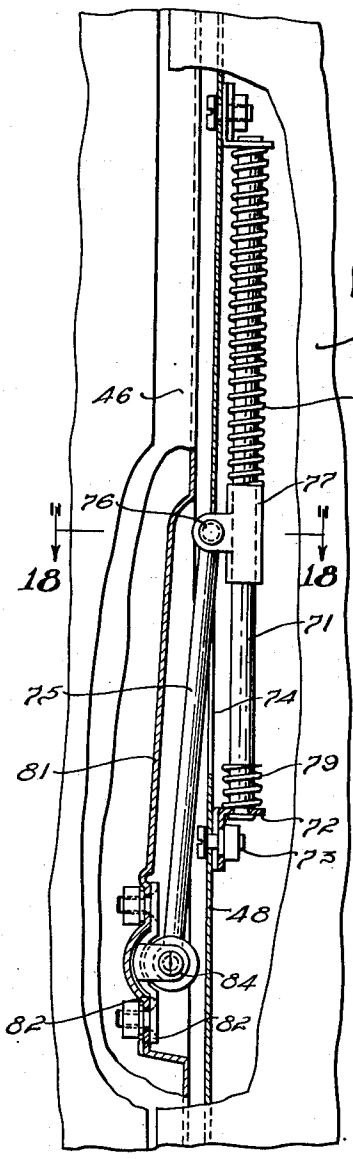


Fig. 17.

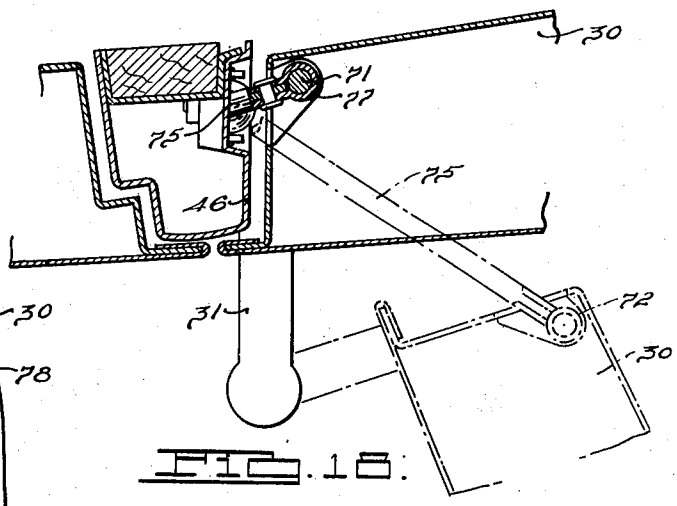


Fig. 18.

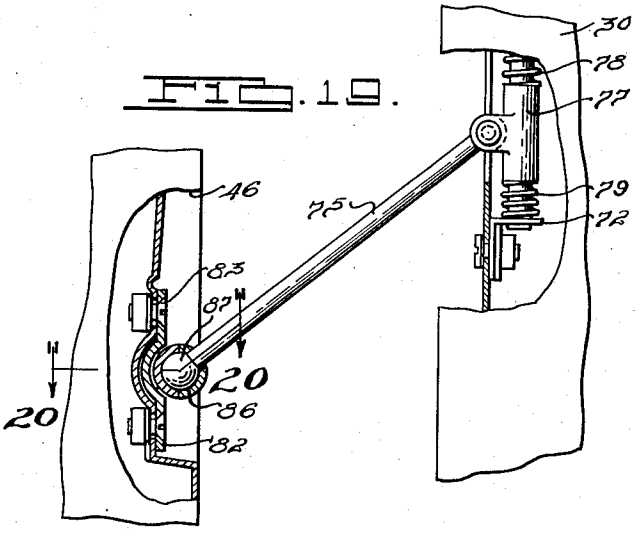


Fig. 19.

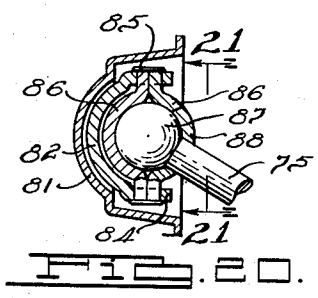


Fig. 20.

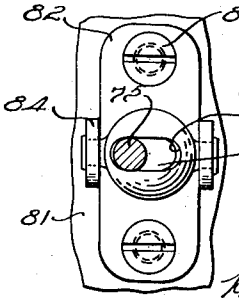


Fig. 21.

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DOOR STOP AND CHECK

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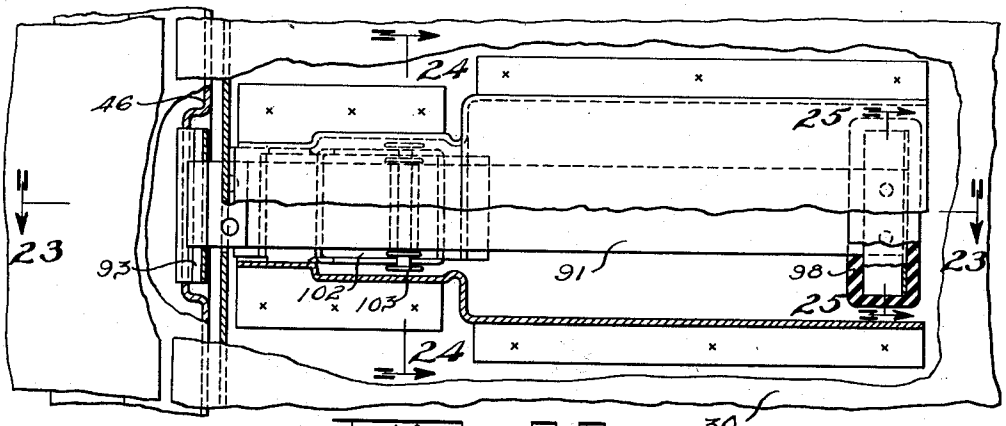


Fig. 22.

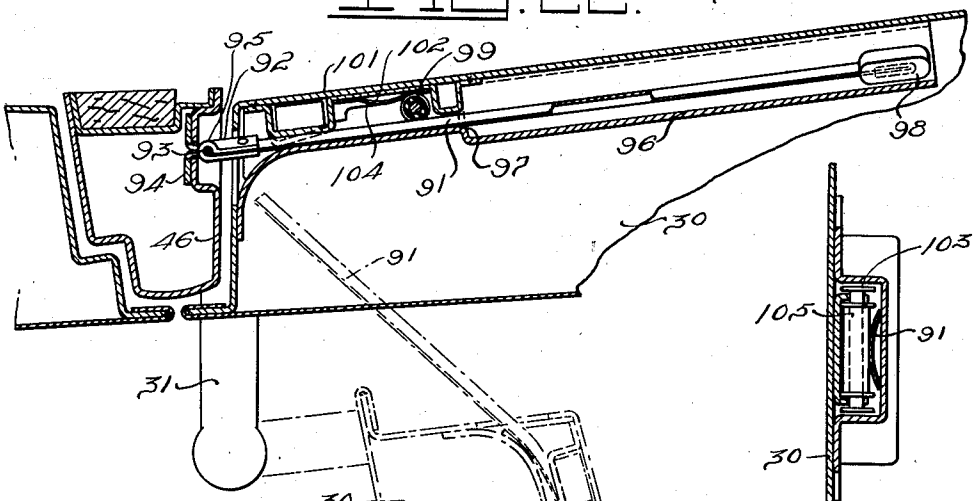


Fig. 23.

Fig. 24

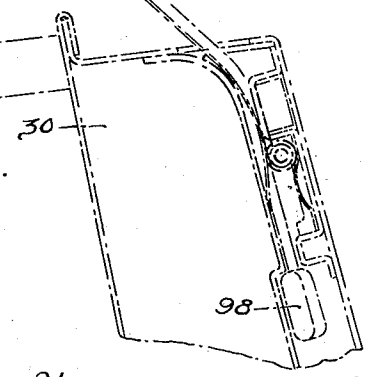
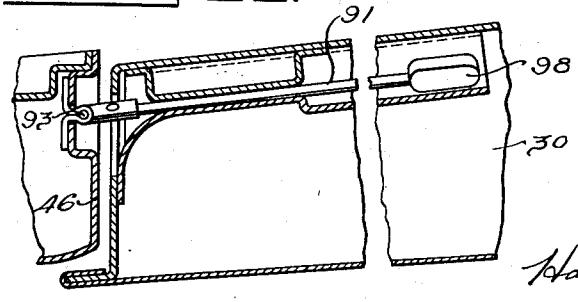


Fig. 26.



Fig. 25.



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Patented Jan. 4, 1938 2,104,124

UNITED STATES PATENT OFFICE

2,104,124

DOOR STOP AND CHECK

Alfred H. Haberstump, Detroit, Mich., assignor to The Murray Corporation of America, a corporation of Delaware

Application August 11, 1934, Serial No. 739,395

6 Claims. (Cl. 16—85)

My invention relates to automotive vehicle doors and particularly to a double acting checking device which limits the opening movement of the door and retains the door in any open position against a closing movement.

Door checks have been provided heretofore which limit the opening movement of the door and which may be employed to retain the door in complete open position. However, door checks are not employed for limiting the opening movement of the door and for retaining the door open in any of its positions. Up to the present time the single acting door check was satisfactory and it was not until the advent of the present day automobile that the inadequacy of such stops was apparent.

The present automobile body has curved sides which causes the hinge alignment to slope relative to the vertical and which causes the door to swing shut by gravity. The same effect has been caused by the swinging of doors on slanting pillars and in either instance the tendency of the door to close was found to be objectionable. This was caused by the door striking the person entering the vehicle or catching the heel as the foot is placed on the running board to cause embarrassment when entering the vehicle. To overcome this difficulty and to have the door under complete control by limiting its opening movement and retaining it open at any of its open positions, the present double acting door check was invented. Several forms which the door check may assume are illustrated, all of which produce the same novel result of limiting the outward movement of the door and retaining the door in any open position against the tendency to move to closed position by gravity. The double acting checking device is so constructed as to permit the ready closing of the door by requiring substantially no more force than if the check was not present.

Owing to the shape of the doors at the top and sides, it is necessary to mount the checking device between the pillar and the door, preferably near the belt line. In view of the narrow pillar and the movement of the glass in the door, very little room is provided for the double acting check at this point. For this reason the check must be compact so as to occupy a minimum amount of space.

Accordingly, the main objects of my invention are: to provide a double acting check for a door of a vehicle which limits the outward movement of the door and prevents the door from swinging closed from any of its open positions; to provide a double acting check which is mountable between the pillar and door near the belt line out of interference with the movement of the glass in the door; to provide a double acting door check with spring means which operate in connection with an arm to have its moment so change as to be more effective the greater the opening movement of the door; and, in general, to provide a door check which is simple in construction, positive in operation and economical of manufacture.

Other objects and features of novelty of my invention will be either specifically pointed out or will become apparent when referring, for a better understanding of my invention, to the following description taken in conjunction with the accompanying drawings, wherein:

Figure 1 is a side view in elevation of an automotive vehicle provided with a door check embodying features of my invention,

Fig. 2 is an enlarged sectional view of the structure illustrated in Fig. 1, taken on the line 2—2 thereof,

Fig. 3 is a sectional view of the structure illustrated in Fig. 2, taken on the line 3—3 thereof,

Fig. 4 is an enlarged sectional view of the structure illustrated in Fig. 3, taken on the line 4—4 thereof,

Fig. 5 is an enlarged sectional view of the structure illustrated in Fig. 3, taken on the line 5—5 thereof,

Fig. 6 is an enlarged sectional view of the structure illustrated in Fig. 2, taken on the line 6—6 thereof,

Fig. 7 is an enlarged sectional view of the structure illustrated in Fig. 6, taken on the line 7—7 thereof,

Fig. 8 is a view of structure, similar to that illustrated in Fig. 6, showing a modified form thereof,

Fig. 9 is an enlarged sectional view of the structure illustrated in Fig. 8, taken on the line 9—9 thereof,

Fig. 10 is a view of structure, similar to that illustrated in Fig. 3, showing a modified form thereof,

Fig. 11 is an enlarged sectional view of the structure illustrated in Fig. 10, taken on the line 11—11 thereof,

Fig. 12 is an enlarged sectional view of structure, similar to that illustrated in Fig. 4, showing a modified form thereof,

Fig. 13 is a view of structure, similar to that

in Fig. 12, before the final bending operation thereon,

Fig. 14 is a view of structure, similar to that illustrated in Fig. 6, showing a modified form thereof,

Fig. 15 is a view of structure, similar to that illustrated in Fig. 14, showing a modified form thereof,

Fig. 16 is a view of structure, similar to that illustrated in Fig. 14, showing a further modified form thereof,

Fig. 17 is a broken view of an automobile door and pillar, partly in section, showing another form of double acting door check,

Fig. 18 is a sectional view of structure illustrated in Fig. 17, taken on the line 18—18 thereof,

Fig. 19 is a view of structure, similar to that illustrated in Fig. 17, with the door in open position,

Fig. 20 is an enlarged broken sectional view of the structure illustrated in Fig. 19, taken on the line 20—20 thereof,

Fig. 21 is a sectional view of the structure illustrated in Fig. 20, taken on the line 21—21 thereof,

Fig. 22 is a broken view of an automobile door and pillar, partly in section, showing a further form of double acting door check,

Fig. 23 is a sectional view of the structure illustrated in Fig. 22, taken on the line 23—23 thereof,

Fig. 24 is a sectional view of the structure illustrated in Fig. 22, taken on the line 24—24 thereof,

Fig. 25 is an enlarged sectional view of the structure illustrated in Fig. 22, taken on the line 25—25 thereof, and

Fig. 26 is a broken view of structure similar to that illustrated in Fig. 23, showing a further form thereof.

Fig. 1 discloses a modern automobile having a front door, the front edge of which slopes from the bottom rearwardly at the top, and sides which are curved to have the lower hinge 31 extend outwardly a greater amount than the upper hinge 32 to have the axial line of the hinges disposed at an angle to the vertical. In view of the lower extension of the door and the sloping axes of the hinges, gravity will tend to swing the door closed which, as pointed out hereinabove, would strike a passenger entering the vehicle and often times catch the heel when the foot is disposed on the running board.

The present invention embodies the provision of a double acting check for the door which limits the opening movement and also prevents the closing of the door in any of its open positions.

In Figs. 2 to 16, I have illustrated one form of double acting check 34 comprising a pair of pivoted arms 35 and 36 pivoted together by the pin 37, the arms being of channel section, as illustrated in Fig. 2. The channels are herein illustrated as being nested one within the other but it is to be understood that other forms might be employed. The ends of each of the arms 35 and 36 are provided with an apertured boss 38 which is connected by a pivot 39 to a pin 41. Brackets 42 are welded or otherwise secured to the pillar and to the rail portion of the door, being preformed to provide a cylindrical portion 43 in which the pin 41 is disposed for pivotal movement. The end of the pin is slotted at 44 to receive a split spring washer 45 for locking the pin 41 within the cylinder portion 43.

The one side 46 of the pillar is recessed at 47 for receiving one-half of the double acting check 34 while the rail 48 of the door is likewise recessed at 49 for receiving the other half of the check 34. The recessed portions 47 and 49 are oppositely disposed to each other, as clearly illustrated in Fig. 2. The bracket 42 has the cylinder portion 43 thereof extending through an aperture in the web portion of the recessed portions 47 and 49 with the laterally extending portions welded to the inside of the rail and the pillar elements 48 and 46, respectively.

A coil spring 51 is disposed about the pivot 37 having arms 52 thereon which bear against the web of the channel arms 35 and 36 of the check. A circular spring 53, made of flat clock spring material, encompasses the coil spring 51 with its hooked ends 54 engaging the abutted ends of the webs of the channel elements 35 and 36. The spring 53 cushions the final opening movement of the door and prevents the arms from remaining in prolongation of each other, which otherwise would lock the door in open position.

When the door is closed the greatest tension is provided on the spring 51, but in this position the arms 35 and 36 are in parallel relation and exert a minimum amount of force in retaining the door against a closing movement. As the door is progressively opened the arms 35 and 36 become disposed at a greater angle to each other and thereby exert an increased force on the door, even though the spring 51 has decreased somewhat in tension. The double acting door check provides a greater force the greater the distance the door is opened, to counteract the greater tendency of the door to swing toward closed position. The spring is such that only a light effort is required to close the door. The arms fold together and pivot on the pivot 39 during the time the pins 41 are turning in their cylindrical supports 43. This is necessary to have the double door check follow the swinging movement of the door from the dotted line position in Fig. 2 to the folded position which it will assume when the door is closed.

In Figs. 8 and 9, I have shown a modified form of support for the ends of the arms 35 and 36 wherein a hinged cylindrical element 56 is supported by a pin 57 retained in the fixed hinge bracket 58 which is secured to the web of the door rail 48. The hinge bracket 57 extends forwardly at 59 to be secured by a rivet 61 to the end of the arm 36. The hinge bracket 56 is swingable about the pivot 57 in a somewhat similar manner to the pin 41 to permit the arms 35 and 36 to follow the movement of the door, as illustrated in dotted line in Fig. 2.

In Fig. 10, I have shown a further modified form of construction wherein cylindrical brackets 62 are disposed inwardly of the door rail and pillar elements 48 and 46, respectively, the recessed portions 47 and 49 extending sufficiently to clear the pivot 39. The brackets 62 are illustrated in Fig. 11 as being preformed to provide the cylindrical portion 43 and sidewardly extending flanges which are welded directly to the inner surface of the pillar and rail. The pins 41 are secured in a manner similar to that shown in Fig. 3, but are not visible when the door is in open position. Otherwise the structure is the same as illustrated in Figs. 1 to 7, inclusive.

To prevent the double door check from rattling when the door is in closed position, I have provided resilient stops 63 which are secured in the web of the recessed portions 47 and 49 in position to be engaged by the upper free end of the

arms 35 and 36 to prevent them from striking the metal at that point.

In Figs. 12 and 13, I have shown another form of bracket 64, similar to bracket 62 of Fig. 11, constructed by having the metal bent in reverse channel shape at 65. This only requires the ends 66 to be rolled on a mandrel to produce the bracket 64, as illustrated in Fig. 12. Material strength is provided in such a bracket which is simple in construction and economical of manufacture.

In Fig. 14, I have illustrated a spring 67 disposed directly adjacent to the pin 37 for engaging the arms 35 and 36. The spring 67 engages the ends of the webs of the arms for cushioning the door opening movement and preventing the arms from remaining in longitudinal extension of each other. The spring 67 may be employed when the door check is to be used only as a stop element for limiting the opening movement and not for restraining the door against a closing movement.

In Fig. 15, I have shown a form of spring 68 riveted to the arm 36 which may be employed for cushioning the closing movement, for preventing the arms 35 and 36 from remaining in elongated relation and for preventing any rattling of the spring, as might occur with the spring 53 when the helical spring 51 is wound tightly about the pivot. The spring 68 is further useful in providing clearance for the spring 53.

The use of the spring 68 also provides clearance for the employment of a helical compression spring 70 for retaining the door against a closing movement. Bosses 60 are provided on opposite ends of the arms 35 and 36, respectively, through which pins 80 extend for taking the thrust of the spring 70 and for supporting the telescopable pin and cylinder 99 which supports and positions the spring. The spring becomes more effective as it expands in view of the action of its end on the arm 35 for retaining the door against a closing movement. The spring is slightly less effective in the full open position of the door in view of the less favorable action of the spring 70 on the arm.

A spring 69 illustrated in Fig. 16, is similar to spring 68 being riveted to the arm 36 and not only prevents rattling but also provides a greater area about the pivot 37.

Referring to Figs. 17 to 21, I have shown a further form of double door check which my invention may assume. In this construction a rod 71 is supported at each end on a bracket 72 secured to the inner surface of a door rail 48 by suitable means, herein shown as bolts 73. A slot 74 is provided in the rail through which an arm 75 extends to be pivotally engaged at 76 to a sliding collar 77 which encompasses the rod 71 and slides upwardly and downwardly thereon. An helical compression spring 78 is provided on the upper end of the collar capable of expanding throughout the downward movement of the collar 77. A short spring 79 is provided on the lower end of the rod 71 for absorbing the final movement of the collar to cushion the checking of the door. The pillar rail 46 is recessed at 81 for receiving the arm 75 when the door is in closed position. The arm 75 is provided at its lower end with a bracket 82 secured to the pillar 46 by suitable bolts 83. Two upstanding tongues 84 on the bracket 82 receive trunnions 85 of semi-spherical elements 86 which surround a ball 87 on the end of the rod 75. A slot 88 is provided in the outer element 86 through which the rod 75 extends to permit a limited universal movement of the rod.

When the door is in closed position, as illustrated in Fig. 17, the arm 75 has a minimum moment and even though the maximum compression of the spring 78 is available to act on the collar 77, a minimum force will result to prevent the closing of the door. As the door is opened the spring 78 expands but a greater force is available to prevent the closing movement of the door since the arm 75 is in a more favorable position to retain the door open. The spring continues to expand as the door is opened further and a more favorable position of the arm 75 holds the door open with a greater force so that in any position of the door the arm is available to prevent the door from closing. A further advantage in this construction resides in the action of the spring to cause the door to move from initial closed position as soon as the door latch is released. This construction is further useful in preventing the rattling of the door when closed.

When the door is opened, the opening movement is limited by the striking of the collar 77 on the spring 78 which dampens the movement and limits the opening movement of the door. Both ends of the arm may swing to various positions, as illustrated in Figs. 18 and 19, to follow the movement of the door. The double acting check formed in this manner is rugged and positive in operation and available to limit the opening movement of the door, to resist a closing movement by gravity and to initially move the door from latched position when released.

In Figs. 22 to 25, I have shown a further form of double door check for limiting the outward movement of the door and preventing the closure of the door in any open position. The check comprises a flexible strap 91 which is of arcuate lateral shape to provide rigidity against bending when loaded longitudinally. One end of the strap is provided with a clip 92 which is secured by a pivot 93 to a hinge bracket 94 which is welded to the inner surface of the pillar 46 within the indented portion 95. The strap extends in a cover 96 secured to the panel of the door having a shoulder portion 97 thereon against which the enlarged head 98 on the free end of the strap abuts, to limit the outward movement of the door. For restraining the movement of the door against either an opening or closing movement, a roller 99 is provided within a runway 101 having a spring 102 therein which resists the movement of the roller and, therefore, of the strap. When a positive force, however, is exerted on the door to open or close the door the roller is forced over the spring 102 to the opposite end of the runway 101 and the roller is no longer effective to resist the door movement.

The roller is provided with extending shoulder portions 103 which project over the slot 104 in the runway portion 101 to guide the roller and retain it in position. The roller has its central portion 105 preferably made of rubber to engage and prevent a sliding movement of the strap 91 thereacross when the roller engages the spring 101.

The head 98 is formed by metal straps 106 riveted or otherwise secured on opposite sides to the end of the strap 91. The straps 106 are covered by a resilient material 107 to provide a resilient stop to cushion the final opening movement of the door, as shown in dot-and-dash line in Fig. 23. The door is retained in any open

position and is readily closed when a positive force on the door moves the roller over the spring 101 to the opposite end of the retainer where it is no longer effective. The initial opening movement of the door causes the movement of the roller to the opposite end of the retainer.

In Fig. 26 I have illustrated the strap 91 as being employed merely to limit the outward opening movement of the door by having the roller and retainer portion thereof omitted. A flexible door stop is provided which positively limits the opening of the door. The strap moves along the panel of the door as the door is closed, and remains out of contact with the glass guide run and the window operating mechanism. This particular check is unique in that it occupies very little space and can be fitted in the door between the window mechanism and the panel.

It will thus be seen that all of the double acting door checks which have been described and illustrated, provide a positive stop at any open position of the door against a closing movement. The checks are simple in construction and positive in operation and function not only to prevent the closing of the door but are also available to limit the outward movement of the door to effectively check the movement of the door in either direction. This is further desirable to prevent the warping of the door which would occur if checked on one edge only.

While I have described and illustrated several embodiments of my invention, it will be apparent to those skilled in the art that various changes, omissions, additions and substitutions may be made therein without departing from the spirit and scope of my invention, as set forth in the accompanying claims.

I claim as my invention:

1. The combination in a double acting door check, of an arm movable with said door into a more effective position to act when spring pressed to resist the closing of the door, spring means acting on said arm under its greatest stress when the arm is in its least effective position, the arm and spring providing a variable resultant force balancing the closing moment of the door in any of its open positions.

2. A double acting check disposed between a door and pillar including, in combination, a pair of arms pivoted together, securing means for each end of the arms attached to the door and pillar, respectively, and constructed to provide universal movement thereto, and spring means acting on said arms for providing a variable force opposing the closing movement of the door in all of its open positions.

3. A double acting check disposed between a door and pillar including, in combination, a checking element, securing means for each end of said element attached to the door and pillar, respectively, and constructed to provide universal movement thereto, and spring means acting on said element for opposing the closing movement of the door in all of its open positions, the moment of the element and the stress of the spring being so balanced as to exert an increasing force against the closing of the door corresponding to the greater closing urge of the door in its further open positions.

4. A double acting check disposed between a door and a pillar including, in combination, a checking element, securing means for each end of said element attached to the door and pillar, respectively, to provide universal movement thereto, spring means acting on said element for opposing the closing movement of the door in all of its open positions, the moment of the element and the stress of the spring being so balanced as to exert an increasing force against the closing of the door corresponding to the greater closing urge of the door in its further open positions, and said element being effective to limit the opening movement of the door.

5. A double acting check disposed between a door and a pillar including, in combination, a checking element, securing means for each end of said element attached to the door and pillar, respectively, to provide universal movement thereto, spring means acting on said element for opposing the closing movement of the door in all of its open positions, the moment of the element and the stress of the spring being so balanced as to exert an increasing force against the closing of the door corresponding to the greater closing urge of the door in its further open positions, said element being effective to limit the opening movement of the door, and means for cushioning the final opening movement of the door.

6. Door check mechanism for a vehicle door including a pair of pivotally connected members serving to limit the opening movement of said door, spring means associated with said members serving to cushion the opening movement of said door and serving to resiliently restrain said door against closing movements.

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