Sept. 30, 1952 E. W. CARLSON 2,611,919

CHECKING MECHANISM FOR DOORS

Filed Dec. 1, 1950 2 SHEETS—SHEET 1

Fig. 1

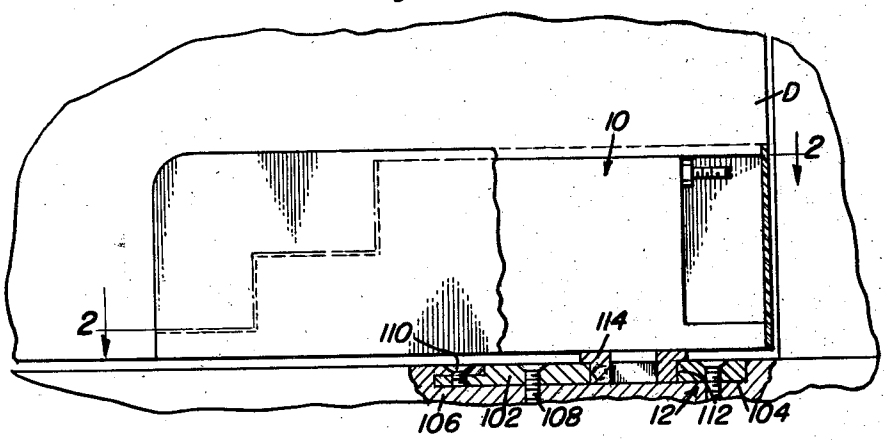


Fig. 2

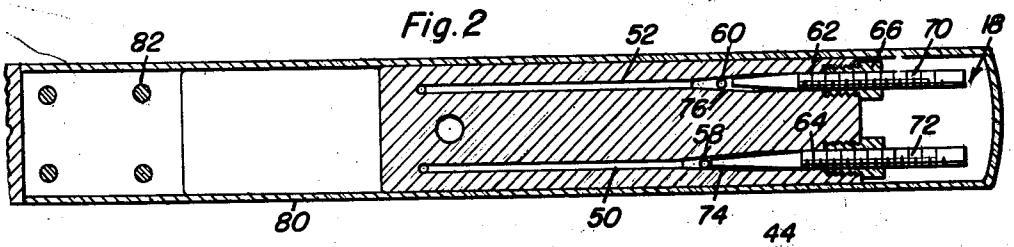


Fig. 8

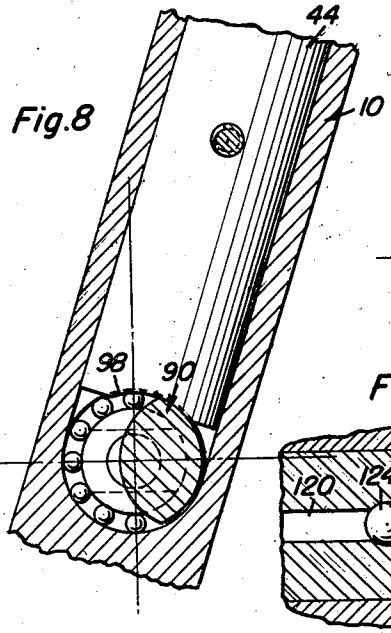


Fig. 9

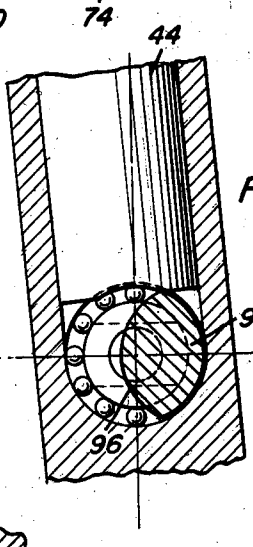
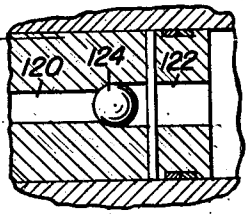


Fig. 7



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CHECKING MECHANISM FOR DOORS

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Fig.3

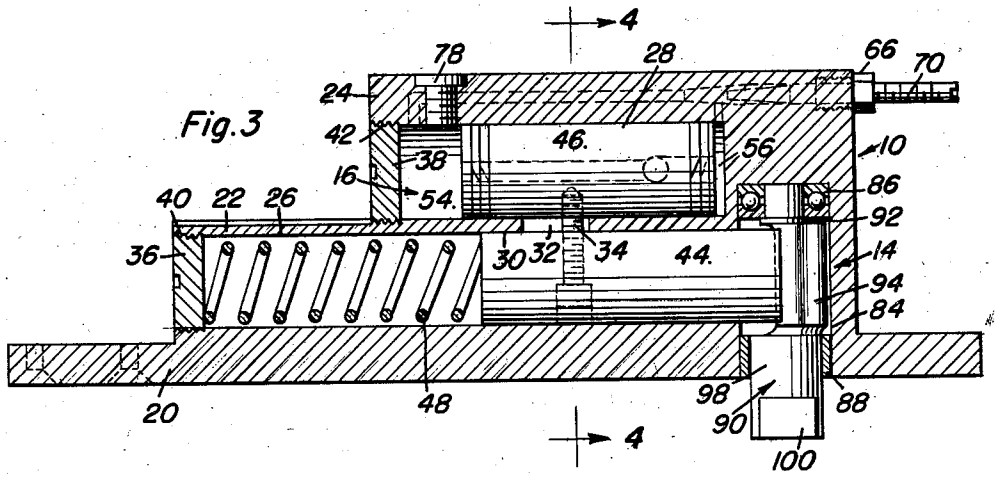


Fig.4

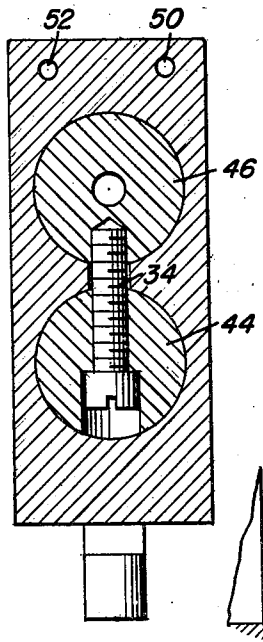


Fig.5

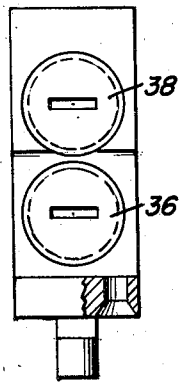


Fig.6

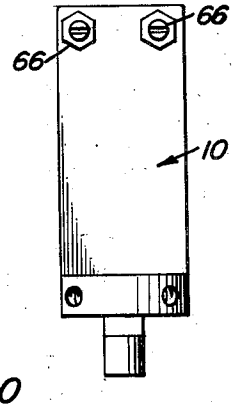
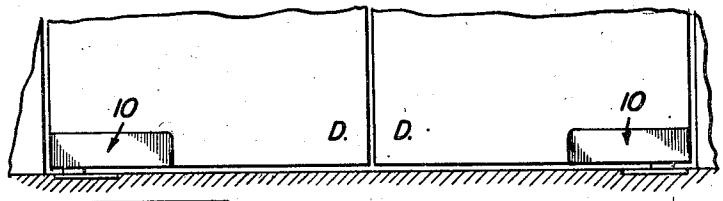


Fig.10



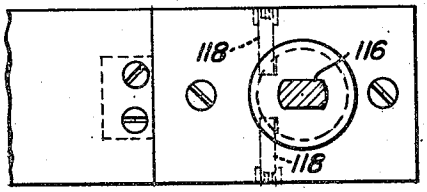


Fig.11

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CHECKING MECHANISM FOR DOORS

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Application December 1, 1950, Serial No. 198,643

2 Claims. (Cl. 16—55)

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The present invention relates to improvements in checking mechanisms for doors and more particularly to a checking mechanism which is adapted to control the swinging movement of a swinging door whereby the swinging door may be held in its open position after the door has been swung through at least 85° and wherein means are provided for controlling the closing movement of the door, initial movement of the door being restricted by a pair of fluid flow passages having adjustable valve means, and the final stages of movement of the door being substantially slowed by the restricted flow of fluid through one of the fluid flow passages.

An object of the present invention is to provide an improved checking mechanism for doors which may be manufactured as a single unit to be inserted into a door for rotatably supporting the door on a cam surfaced rod.

A further object of the invention is to provide a checking mechanism having a housing and a pair of reciprocable pistons mounted therein and interconnected for simultaneous movement and wherein a first piston is axially moved upon pivoting of the door and engagement with the cam surfaced rod while the return movement of the piston is controlled by fluid flow around the second piston.

A still further object of the present invention is to provide a pair of fluid flow passages past the second piston in the second bore with adjustable valves for controlling the flow through the passages and wherein a first passage opens communication with an intermediate end portion of the second wall while the second passage opens communication with an end portion of the second bore whereby movement of the second piston will first close the first passage and then close the second passage, thereby substantially controlling the fluid flow around the piston and the pivoting movement of the door.

Still another object of the present invention is to provide a novel cam surfaced rod for engagement with the first piston whereby when the door has been moved through at least 85°, the cam surface in engagement with the end portion of the first piston will maintain the door in its open position.

Various other objects and advantages will become apparent from the detailed descriptions to follow. The best form in which I have contemplated applying my invention is clearly illustrated in the accompanying drawings, wherein:

Figure 1 is a side elevational view showing the checking mechanism of the present invention mounted in a door with parts in section;

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Figure 2 is a horizontal longitudinal sectional view taken substantially along the plane of line 2—2 of Figure 1;

Figure 3 is a vertical longitudinal sectional view of the checking mechanism of Figure 1;

Figure 4 is a vertical transverse sectional view taken substantially along the plane of line 4—4 of Figure 3;

Figure 5 is an inner end elevational view of the checking mechanism;

Figure 6 is an outer end elevational view of the checking mechanism;

Figure 7 is an enlarged detailed sectional view through the second piston showing the ball check valve therein;

Figure 8 is a detailed sectional view showing a portion of the checking mechanism in an open position after the door has been moved over 90°;

Figure 9 is a view similar to Figure 8 but wherein the door has been moved a minimum of 85°;

Figure 10 is a detailed elevational view showing a pair of swinging doors each being provided with a checking mechanism of the present invention; and

Figure 11 is a top plan view looking down on the means for non-rotatably supporting the cam surfaced rod.

Referring more particularly to the drawings, wherein like numerals designate like parts throughout, the numeral 10 designates generally the housing for the door checking mechanism, the numeral 12 designates generally the means for non-rotatably supporting the cam surfaced rod while the numeral 14 designates generally the cam surfaced rod or shaft which rotatably supports the checking mechanism housing. The numeral 16 designates generally the piston means for controlling the movement of the checking mechanism while the numeral 18 designates generally the fluid control means for the piston means 16.

The housing 10 is of stepped construction having a first portion 20, a second portion 22 and a third portion 24. The second portion 22 and third portion 24 are longitudinally bored at 26 and 28 to provide a pair of parallel first and second bores in the housing 10. The wall 30 between the pair of bores 26 and 28 is formed with a slot 32 through which a screw 34 may be extended for movement in said slot for a purpose presently seen. The bores 26 and 28 are closed at their inner ends and have their open outer ends removably closed by the closure plugs 36 and 38 which are threadedly engaged in the threaded portions 40 and 42 of said bores.

A first piston 44 is reciprocably disposed in

the first bore 26 while a second piston 46 is reciprocably disposed in the second bore 28 with the screw 34 interconnecting the first and second pistons for simultaneous movement. A resilient means comprising a spring 48 is positioned in the first bore 26 for normally urging the first piston 44 to the position shown in Figure 3 while the longitudinal movement of the second piston 46 is controlled by fluid flow means 18.

The fluid flow means 18 comprises a pair of passages 50 and 52 which are longitudinally situated in the housing 10 and provide communication between the chamber 54 and chamber 56 at opposite ends of the piston 46. The first passage 50 has a downwardly extending passage 58 which communicates with an intermediate portion of the chamber 56 while the passage 52 has a downwardly extending passage 60 in communication with the outer end portion of the chamber 56 whereby longitudinal movement of the piston 46 will first close communication through the passage 58 and then through the passage 60 for a purpose to be hereinafter described.

The housing 10 is also provided with a pair of longitudinal bores 62 and 64 which are in axial alignment with the bores 52 and 50. Interiorly and exteriorly threaded bushings 66 are engaged in the bores 62 and 64 for adjustably supporting the pair of control valves 70 and 72, the valves 70 and 72 being adapted to cooperate with the tapered valve seats 74 and 76 for controlling the flow through the passages 50 and 52.

The housing 10 is provided with an access opening closed by the closure plug 78, the opening being provided for filling the fluid system of the checking mechanism.

The entire housing 10 is encased in metallic sheathing 80 and secured within a recess formed in the door D by means of screws inserted through the openings 82 in the first portion 20 of the housing.

A perpendicularly extending bore 84 is in communication with the bore 26 at one end thereof and has a roller truck bearing 86 disposed in the upper end thereof. The bearing sleeve 88 is fixed within the bore 84 adjacent the lower end thereof and a cam surfaced rod 90 is disposed within the bore 84 for rotatably supporting the housing 10 and door D. The cam surfaced rod 90 is formed with an annular flange at 92 for engagement with the truck bearing 86 and has a concentric portion 94 formed with a cam surface 96 for engagement with the recessed portion 98 of the first piston 44. The lower end of the rod 90 is formed with a reduced bearing portion for rotatably engaging the bearing sleeve 88. The lowermost end portion of the rod 90 is formed with flattened lateral faces 100 for a purpose to be hereinafter described.

The cam surfaced rod 90, looking at Figures 8 and 9, is formed with the cam surface 96 which has a radius of curvature substantially equal to the radius of curvature of the cam surfaced portion 94 and the cross sectional area of the cam surfaced portion 94 is equal to less than one-half of the area of the cam surfaced portion 94 had it been completely circular and not of reduced cross section.

The means 12 for non-rotatably supporting the cam surfaced rod 90 includes a plate 102 which is secured within the recess 104 formed within the threshold element 106 of the frame of the doorway. Of course, screws 108 and 110 may be employed for securing the plate 102 within the recess. The plate 102 is formed with an opening 112 for receiving the bearing bushing 114 having

a non-circular opening 116 therein for receiving the lowermost end portion of the cam surfaced rod 90 therein. A transversely extending pair of screws 118 are engaged with the bearing bushing 114 for non-rotatably securing the same to the plate 102.

Looking now at Figure 7, it will be seen that the second piston 46 is provided with a longitudinally extending bore 120 having an enlarged bore portion 122 in communication with the chamber 56. A ball check valve 124 permits fluid flow in one direction through the second piston 46 during reciprocation thereof.

In view of the foregoing description, taken in conjunction with the drawings, it is believed that a device has been provided which will accomplish all of the objects hereinabove set forth. From a consideration of Figures 2 and 3, it will be seen that pivoting movement of the door will effect fluid flow through the longitudinal bore in the second piston 46 past the check valve 124 until the door reaches its open position, due to the camming action of the cam rod 90 against the first piston 44. As soon as the door passes approximately 85° of movement, engagement between the piston 44 and the cam surfaced portion 94 of the cam rod 90 will maintain the door in its open position. The closing movement of the door is limited by the flow of fluid through the passages 50 and 52. When the piston 46 reaches the position shown in Figure 3, the flow through the first passage 50 will be stopped thereby slowing the closing movement of the door during the latter stages of movement. The valves 70 and 72 may be threadedly adjusted for further controlling the initial and final closing action of the door.

Having described the invention, what is claimed as new is:

1. A door check comprising a housing disposed in a door and having a pair of substantially parallel first and second bores therein, first and second pistons reciprocably disposed in said first and second bores, respectively, the wall between said bores being provided with a slot and means extending through said slot and connecting said pistons for simultaneous movement, resilient means in said first bore and normally urging said first piston to a first position, a cam surfaced rod perpendicularly disposed relative to said first piston and rotatably supporting said housing, the cam surface of said rod being engaged with the adjacent end of said first piston, and fluid control means for said second piston controlling fluid flow past said second piston whereby when the door is opened the pistons will move to a second position and when the door is released the fluid control means will control the movement of said pistons back to the first position and thereby effect controlled movement of said door, said fluid control means including a pair of passages in said housing connecting the chambers at opposite ends of said second piston, and valve means for adjustably controlling the flow through said passages, one of said passages communicating with said second bore at an intermediate portion thereof, and a second passage communicating with an end portion of said second bore whereby movement of said second piston toward said end portion will first close communication through said one passage thereby effecting a slowed passage of fluid from one end of said second bore to the other end thereof whereby the closing movement of the door will be slowed during the latter stages thereof.

2. A door check comprising a housing disposed

in a door and having a pair of substantially parallel first and second bores therein, first and second pistons reciprocably disposed in said first and second bores, respectively, the wall between said bores being provided with a slot and means extending through said slot and connecting said pistons for simultaneous movement, resilient means in said first bore and normally urging said first piston to a first position, a cam surfaced rod perpendicularly disposed relative to said first piston and rotatably supporting said housing, the cam surface of said rod being engaged with the adjacent end of said first piston, and fluid control means for said second piston controlling fluid flow past said second piston whereby when the door is opened the pistons will move to a second position and when the door is released the fluid control means will control the movement of said pistons back to the first position and thereby effect controlled movement of said door, said fluid control means including a pair of passages in said housing connecting the chambers at opposite ends of said second piston, and valve means for adjustably controlling the flow through said passages, one of said passages communicating with said second bore at an intermediate portion

thereof, and a second passage communicating with an end portion of said second bore whereby movement of said second piston toward said end portion will first close communication through said one passage thereby effecting a slowed passage of fluid from one end of said second bore to the other end thereof whereby the closing movement of the door will be slowed during the later stages thereof, said second piston being formed with a longitudinal passage interconnecting the chambers at opposite ends of said second bore, and a ball check valve in said last recited passage for controlling the fluid flow for flow through said second piston only during opening movement of the door.

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