April 19, 1949. S. A. ROLLASON 2,467,597

FLUID CHECK DEVICE FOR DOORS

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Fig. 1.

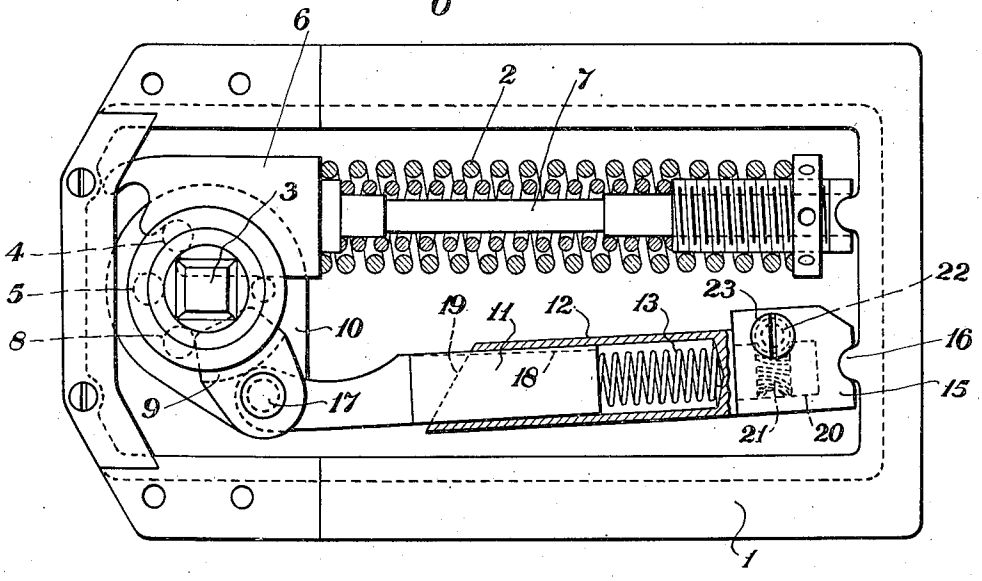


Fig. 2.

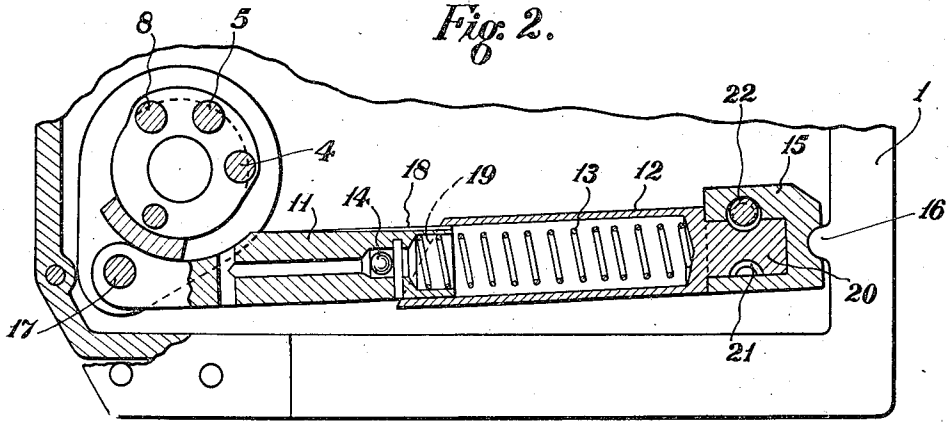
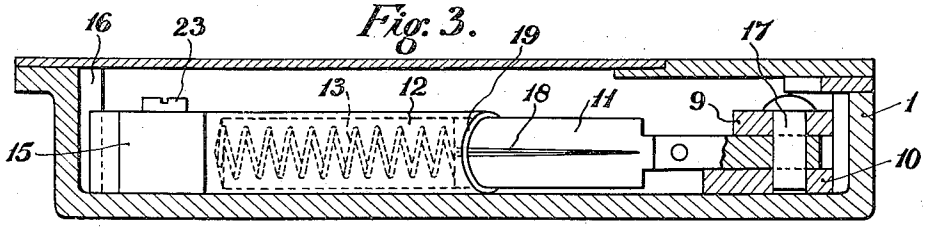


Fig. 3.



INVENTOR
Stewart Adolphus Rollason
BY Joseph J. Julian
ATTORNEY

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Fig. 4.

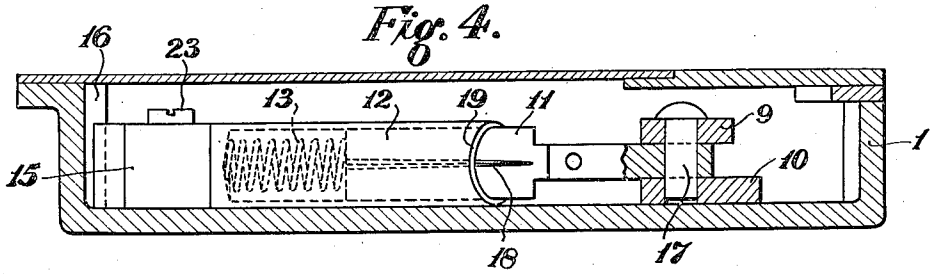


Fig. 5.

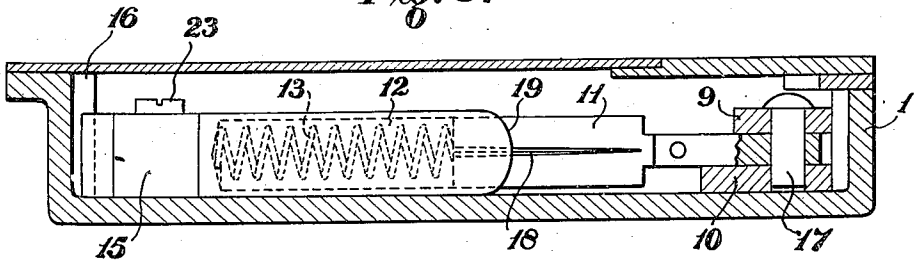


Fig. 6.

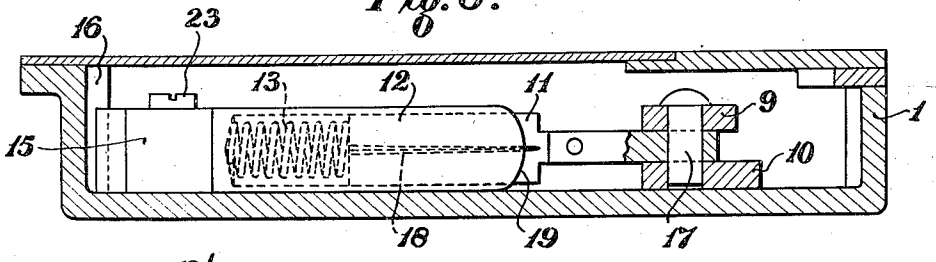
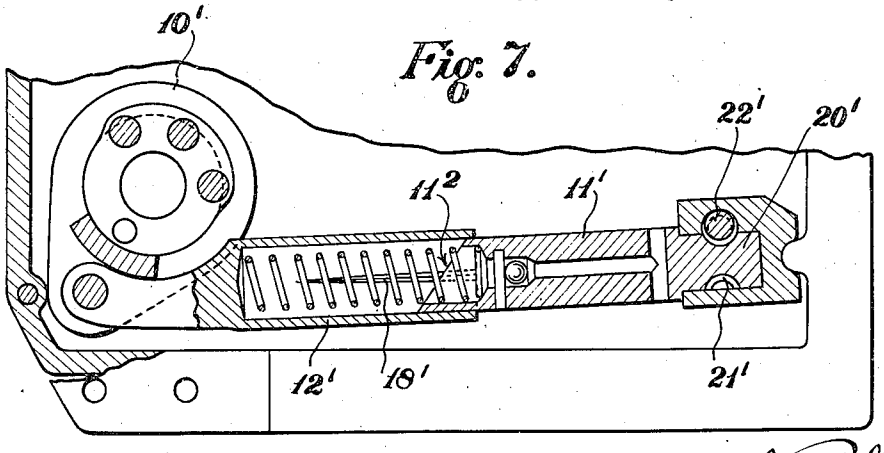


Fig. 7.



Stewart Adolphus Rollason
INVENTOR

BY Joseph J. Jackson
his ATTORNEY

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FLUID CHECK DEVICE FOR DOORS

Stewart Adolphus Rollason, Birmingham, England, assignor to William Newman and Sons Limited, Birmingham, England, a British company

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8 Claims. (Cl. 16—55)

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This invention relates to fluid check devices for doors which are adapted to be closed, when released, by means of a spring or springs, such check devices being of that kind comprising a piston movable within a cylinder against the action of oil or other fluid, so as to retard the closing movement of the door, the oil or fluid being forced, during the closing of the door, through a relatively small or restricted passage.

It is desirable not only to retard the closing movement of the door, under the spring action, progressively or in a variable manner, preferably so that the closing speed becomes less as the door approaches its fully closed position, to permit of the door closing without noise; but it is generally desirable, in addition, to provide means for adjusting the setting to vary the degree of retardation, according to requirements. Hitherto, in fluid check devices for doors, where a variation in the retardation of the closing movement of the door has been effected by a tapering pin or rod which gradually decreases the effective size of an outlet passage or opening through which the oil or fluid has to be forced, means have been provided for adjusting the setting of the pin or rod in relation to the part by which it has been carried to vary the degree of retardation.

The object of the present invention is to provide a fluid check device of the kind referred to with improved and efficient means for enabling the degree of retardation, or the time of greatest retardation, to be readily adjusted according to requirements, the arrangement, which dispenses with the use of a tapering pin or rod, being such that there is nothing to get out of order, or which is liable to become clogged, as sometimes happens where a tapering control pin or rod is employed, owing to dirt collecting between the pin or rod and the wall of the outlet passage.

According to the invention, in a fluid check device of the kind referred to, the groove of varying width through which the fluid is forced is formed either in the wall of the piston or in the wall of the cylinder, so that an edge of the cylinder or of the piston moves over the groove which is thereby more or less uncovered during the operation of the check device, and the closing of the door retarded in a progressive or variable manner, the piston and cylinder being relatively rotatable about a longitudinal axis, and the said

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edge of the cylinder or piston being so shaped that the extent to which the groove is uncovered and the retardation of the closing movement of the door, at any given point in the stroke of the piston, may be varied by turning the piston and cylinder relatively to one another.

The one part, either the piston or the cylinder, is preferably formed with an inclined or curved edge adapted to extend across the groove, the piston and cylinder being relatively rotatable by means of worm gearing. For example, a tapering groove may be formed in the piston, and the outer end edge of the cylinder may be inclined, by cutting the cylinder obliquely, the said cylinder having a short spindle fitting into a socket in a fixed anchoring part and the latter housing a worm adapted to engage worm teeth on the spindle, so that the cylinder may be turned about the axis of the piston by means of the worm, to vary the extent which the groove is uncovered, and the degree of retardation at any given point in the stroke of the piston.

Figure 1 of the accompanying drawings represents a sectional plan view of a combined floor spring and fluid check device in which the check device is constructed in accordance with this invention, the groove for the outlet of the fluid being formed in the side of the piston, which is shown at the inner end of its stroke, the cylinder being in section.

Figure 2 is a sectional plan of the fluid check portion of the device, with the piston at the outer end of its stroke, as when the door has been opened.

Figure 3 is a side view of the check device with the piston extended and with a setting for minimum retardation.

Figure 4 is a similar side view, with the same setting, but showing the piston at the inner end of its stroke.

Figure 5 is a similar view to Figure 3 but shows a setting for maximum retardation.

Figure 6 also shows the setting for maximum retardation, but with the piston at the inner end of its stroke.

Figure 7 is a sectional view of an alternative arrangement.

Referring to Figures 1 to 6 of the drawings, which show the application of the invention to a floor spring, the apparatus comprises the usual

shallow box-like casing 1 adapted to contain oil and housing a spring or springs 2, as well as a fluid check, the door being adapted to operate, in known manner, a square-sectioned or other pin 3 projecting up from the casing and carrying a part for compressing the spring or springs during the opening of the door, such as the pins 4, 5, co-operating with a head 6 on the rod 7, and also a part operatively connected to the fluid check, such as the pin 8 co-operating with an abutment 9 on a rotatable ring 10 connected to the check. The check serves to retard the closing of the door under the action of the spring or springs. This fluid check consists of a piston or plunger 11 housed within a cylinder 12 and adapted to be moved more or less out of the latter during the opening of the door, by means of a spring 13 so that oil is then drawn into the cylinder past a non-return valve 14, the movement of the piston in the reverse direction, which takes place during the closing of the door, causing the oil to be forced out of the cylinder through a restricted passage hereinafter described, so that a retarding action is exerted on the closing of the door under the influence of the spring 2. The cylinder 12 is provided at its inner end with an anchoring or locating part 15 which is grooved to engage a vertical rib 16 on the end wall of the casing of the device, the rib forming a fulcrum about which the cylinder may turn. The outer end of the piston 11, on the other hand, is pivotally connected to the operating ring 10 by means of a pin 17, and the arrangement is such that a reciprocating movement is imparted to the piston during the opening and closing of the door. In order to provide for the gradual release of the oil as the piston is forced into the cylinder, during the closing of the door, the said piston 11 is formed in its peripheral wall with a longitudinally-disposed tapering groove 18 which extends from the inner end of the piston to its outer end. The wider end of this tapering groove is located at the said inner end of the piston, and is left open, the opposite end of the said groove terminating in a point, and the arrangement is such that when the piston is at the outer end of its stroke as in Figures 2, 3 and 5, a comparatively large opening, formed by the wider portion of the groove, is left for the release of the oil from the cylinder, whilst as the piston moves into the cylinder the wall of the cylinder moves over the narrower portion of the groove, so that the effective outlet for the oil becomes progressively smaller. The result is that the retarding action to the closing of the door, caused by the oil having to be forced through this progressively decreasing aperture, is gradually increased, the retardation being greatest when the door has nearly completed its closing movement, that is, when the wall of the cylinder has moved, as far as possible, over the narrower end of the tapering groove, as in Figures 4 and 6. Means are provided for varying the degree of retardation, or the speed of closing the door, by arranging the cylinder wall to cover a greater or a lesser part of the groove when the piston is at the inner end of its stroke. Thus, by arranging the cylinder so that more of the groove is then left uncovered, a quicker closing movement results, since a larger outlet is provided for the oil for any given position of the door, during the closing of the latter, the groove tapering in a uniform manner. On the other hand, by arranging more of the groove to be covered by the

cylinder, when the piston is at the inner end of its stroke, the retardation which results throughout the closing movement of the door is increased. In order to enable the groove in the piston to be covered to a greater or lesser extent to vary the speed of closing of the door, according to requirements, the cylinder 12 is made rotatable and its outer end is cut obliquely at 19 so that it is left with an inclined edge, the arrangement being such that on turning the cylinder about its longitudinal axis the said edge, owing to its inclination, is caused to cover more or less of the groove 18 for any point in the stroke of the piston. The setting for minimum retardation is shown in Figures 3 and 4, and for maximum retardation in Figures 5 and 6, the cylinder having been turned through 180° in the latter case.

To enable the cylinder to be rotated to give the above adjustment it is made separate from the anchoring or locating part 15 which engages the rib on the end wall of the casing, and the inner end of the cylinder terminates in a short central trunnion or spindle 20 formed at about the middle with a ring of worm teeth 21 which are cut around the periphery of the said shaft or spindle. The latter, thus formed, is integral with or fixed to the cylinder end and is arranged to fit closely into, and is rotatable within, a socket or hole in the anchoring or locating part 15 whilst passing through the said anchoring or locating part, so as to mesh with the worm-teeth, is a worm 22 provided with an enlarged head-end 23 which is exposed and formed with a screwdriver-slot, so that the worm may be readily rotated. The worm 22 is prevented from axial movement, and the arrangement is such that when the worm is rotated the trunnion or spindle 20 is turned, thereby turning the cylinder, the latter being self-retaining in its adjusted position. Different portions of the inclined outer edge 19 of the cylinder may thus be brought to lie over the tapering oil-release groove 18 in the piston, so that the extent to which the groove is covered for any given position of the piston may be varied, consequently varying the effective size of the release opening for any point in the closing movement of the door. The degree of retardation which results during the closing movement may thus be altered to suit requirements.

By forming the oil release groove 18 in the piston, in the above manner, and dispensing with an engaging control pin or rod, the groove is not liable to become choked with dirt, since the turbulence created by the movement of the piston into, or out of, the cylinder serves to keep the groove clear of foreign matter.

In the arrangement shown in Figure 7, instead of an oil release groove being formed in the piston, as above described, a tapering groove 18^1 for the release of the oil is formed in the inner face of the wall of the cylinder 12^1, so as to extend longitudinally into the cylinder, with the wider end of the groove left open and disposed at the mouth or outer end of the cylinder. In this modified arrangement, the outer end of the piston 11^1 is cut or shaped obliquely to leave an inclined edge 11^2 which is adapted to extend across the oil-release groove 18^1, and either the piston 11^1 or the cylinder 12^1 may be made rotatable. In the arrangement shown the piston 11^1 is rotatable by a worm 22^1 engaging worm teeth 21 on a trunnion or shaft 20^1 at the end of the piston, whilst the cylinder is arranged to move over the latter, being, for example, connected to, and operated

by, the ring 10^1 controlled by the movement of the door.

Whether the groove is in the piston or in the cylinder, either the piston or the cylinder may be reciprocated, the other part being adapted to be turned to cause a different portion of an inclined edge of the one part to move over the groove.

Any other suitable means instead of worm gearing, may be provided for turning the piston or the cylinder, to give the required adjustment.

Although the invention has been particularly described in connection with a floor spring, it may be applied to arrangements where the spring and check are housed in a shoe fitted to a corner of the door; or it may be applied to other forms of combined spring and check devices for doors.

Also, it may be applied either to single acting or to double acting door springs and checks, as desired.

The end of the cylinder or piston may be obliquely curved instead of being cut obliquely in a straight line.

I claim:

1. A door check device comprising two parts slidable relatively one within the other against the retarding action of a fluid contained in one of the parts, a groove of a varying cross-sectional area in a wall of one of the parts for the release of the fluid during the closing of the door, the other part more or less covering the said groove, and having an edge movable over the same, during the relative sliding movement of the parts, and means for imparting a relative turning movement to the parts to bring a different portion of the said edge over the groove, the edge being so shaped that the amount of the groove which is covered at a given point in the sliding movement, and the resistance to the closing of the door, is then altered.

2. A door check comprising two parts slidable relatively one within the other against the retarding action of a fluid contained in one of the parts, a groove of a varying cross-sectional area in a wall of one of the parts for the release of the fluid during the closing of the door, the other part more or less covering the said groove, and having an oblique edge movable over the same, during the relative sliding movement of the parts, and means for turning one of the parts to bring a different portion of the oblique edge over the groove, so that the extent which the latter is uncovered at a given point in the sliding movement, and the resistance to the closing of the door, is then altered.

3. A fluid check device for doors, comprising a piston and cylinder slidable relatively one within the other against the retarding action of fluid in the cylinder, a groove of a varying cross-sectional area formed in the wall of the piston for the release of the fluid from the cylinder during the closing of the door, the cylinder more or less covering the groove and having an oblique edge movable over the latter, and means for turning the piston and cylinder relatively to bring a different part of the oblique edge over the groove, so that the extent to which the latter is uncovered, and the resistance to the closing of the door, at a given point in the relative sliding movement of the piston and cylinder, is then altered.

4. A fluid check device for doors, comprising a piston, an oil-containing cylinder engaging the piston and having an inclined end-edge, means, operated by the closing of the door, for moving

the piston into the cylinder against the retarding action of the oil, a longitudinal tapering groove, open at its wider end, in the wall of the piston for the escape of the oil during the closing of the door, the inclined edge of the cylinder extending across the groove, and means for turning the cylinder about the axis of the piston to bring a different part of its inclined end-edge over the groove, so that the extent which the latter is uncovered, and the resistance to the closing of the door, for a given point in the stroke of the piston is altered.

5. A fluid check device for doors, comprising a piston with an inclined end-edge, an oil containing cylinder engaging the piston, means operated by the closing of the door for moving the cylinder over the piston against the retarding action of the oil, a longitudinal tapering groove, open at its wider end, in the inside face of the wall of the cylinder for the escape of the oil during the closing of the door, the inclined edge of the piston extending across the groove, and means for turning the piston about its axis to bring a different part of its inclined end-edge over the groove, so that the extent which the latter is uncovered, and the resistance to the closing of the door, for a given point in the stroke of the cylinder, is altered.

6. A fluid check device for doors, comprising a piston with an oblique edge, an oil containing cylinder engaging the piston, means operated by the closing of the door for moving the cylinder over the piston against the retarding action of the oil, a longitudinal tapering groove, open at its wider end, in the inside face of the wall of the cylinder for the escape of the oil during the closing of the door, the oblique edge of the piston extending across the groove, and worm means for turning the piston about its axis to bring a different part of its oblique edge over the groove, so that the extent which the latter is uncovered, and the resistance to the closing of the door, for a given point in the stroke of the cylinder, is altered.

7. A fluid check device for doors, comprising a piston, an oil-containing cylinder engaging the piston and having an oblique edge, means, operated by the closing of the door, for moving the piston into the cylinder against the retarding action of the oil, a longitudinal tapering groove, open at its wider end, in the wall of the piston for the escape of the oil during the closing of the door, the oblique edge of the cylinder extending across the groove, a trunnion on the cylinder formed with worm teeth, an anchoring part having a socket engaged by the trunnion, and a worm on the anchoring part meshing with the worm teeth, so that by turning the worm the cylinder may be turned about its axis to bring a different part of its oblique edge over the groove, so that the extent which the latter is uncovered, and the resistance to the closing of the door, for a given point in the stroke of the piston, is altered.

8. A door control device consisting of a door-closing spring, a fluid check for retarding the closing movement of the door, a casing housing the door-closing spring and the fluid check, a door-operated part at one end of the casing connected to the spring and to the fluid check, the said fluid check comprising two parts slidable relatively one within the other against the retarding action of a fluid contained in one of the parts, a groove of a varying cross-sectional area in a wall of one of the the parts for the release of the fluid during the closing of the door, the

other part more or less covering the said groove, and having an oblique edge movable over the same, during the relative sliding movement of the parts, and means for turning one of the parts to bring a different portion of the oblique edge over the groove, so that the extent which the latter is uncovered at a given point in the sliding movement, and the resistance to the closing of the door, is then altered.

STEWART A. ROLLASON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
354,551	House et al.	Dec. 21, 1886

FOREIGN PATENTS

Number	Country	Date
538,942	Great Britain	Aug. 22, 1941