Nov. 19, 1946. M. TYKESON 2,411,481

DOOR CHECK

Filed Jan. 18, 1945

Fig. 1.

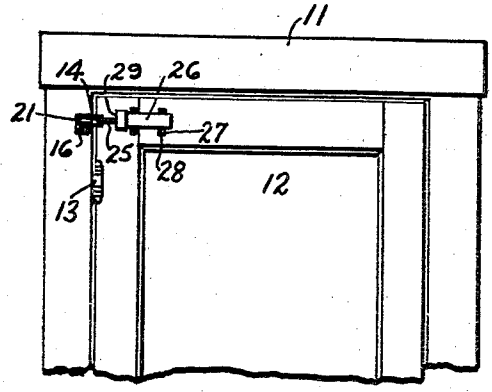


Fig. 4.

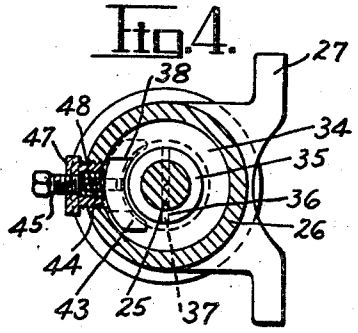


Fig. 5.

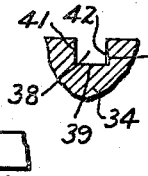


Fig. 6.

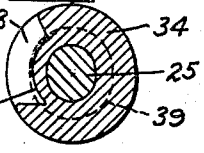


Fig. 2.

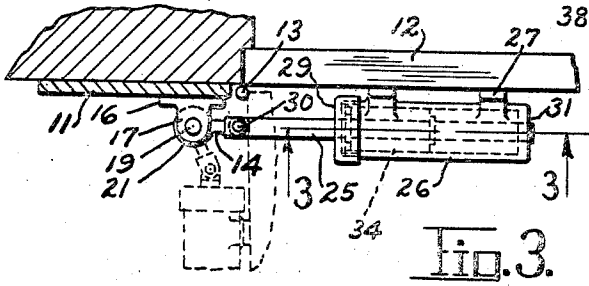


Fig. 9.

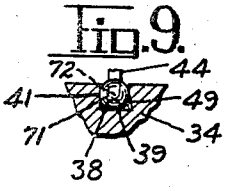


Fig. 3.

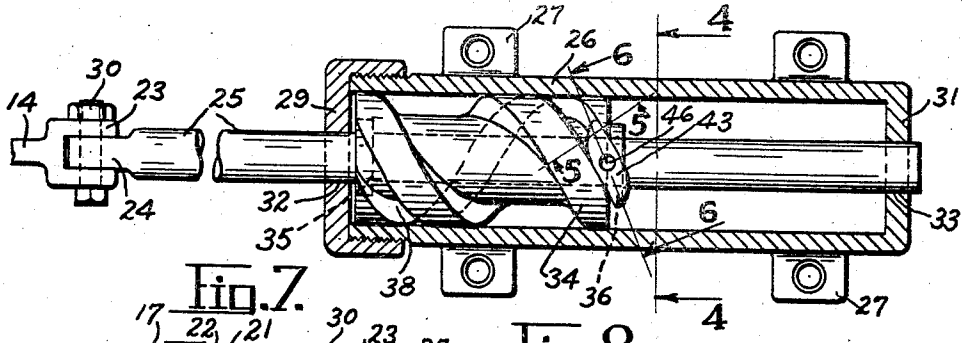


Fig. 7.

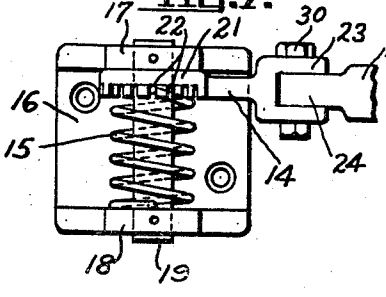
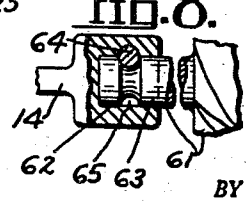


Fig. 8.



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DOOR CHECK

Martin Tykeson, Hamden, Conn.

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11 Claims. (Cl. 16—49)

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This invention relates to door checks and more particularly to the class of door checks which are employed to prevent sudden and forceful closing of doors and the like.

One object of this invention is to provide an improved form of door check wherein the door movement retarding effect is practically and efficiently obtained without the use of the substantially complicated combination of springs, pistons and cylinders, and oil, generally required in the usual forms of pneumatic door checks.

Another object of this invention is to provide a door check which will be relatively inexpensive to manufacture, simple in construction, of few parts, pleasing in appearance, compact, and very efficient and durable in use.

With the above and other objects in view, which will appear as the description proceeds, there has been illustrated in the accompanying drawing a form in which the features and principles of this inventon may be conveniently and practically embodied.

In the drawing:

Figure 1 is a face view of the upper portion of a door frame and door with the improved door check of this invention operatively applied thereto;

Figure 2 is an enlarged top view of the frame and door and door check shown in Figure 1;

Figure 3 is a longitudinal sectional view taken on the line 3—3 of Figure 2;

Figure 4 is a cross-sectional view taken on the line 4—4 of Figure 3;

Figure 5 is a broken sectional view taken on the line 5—5 of Figure 3;

Figure 6 is a broken sectional view taken on the line 6—6 of Figure 3;

Figure 7 is a front face view of a form of door closing spring device suitable for use with the door check of this invention;

Figure 8 is a detail view of a somewhat different form of connection between the door check and the spring device; and

Figure 9 is a detail view of a somewhat different form of friction shoe adapted for use in the door check of this invention.

Referring now to the drawing wherein like reference numerals designate like parts throughout the several views, the reference numeral 11 denotes a door frame in which a door 12 is adapted to swing by being secured thereto on hinges 13 in the usual and ordinary manner. The door check of this invention is adapted for use with a door 12 to prevent it being suddenly, or forcibly, closed either manually or by means

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of any one of the usual door closing spring devices, an example of which is shown in Figure 7.

By the use of a desired door closing spring device wherein an arm 14 is acted upon by a coiled spring 15 to be forcibly swung thereby in combination with the door check of this invention an efficient and automatic door closing and check mechanism is obtained. The door closing spring device shown comprises a base 16 having upstanding lugs 17 and 18, a shaft 19 extending between and secured in the lugs 17 and 18, and the spring 15, one end of which is secured to the shaft 19 and the other end of which is secured to a plate 21 in a selected groove of a plurality of grooves 22 formed therein for this purpose, the plate 21 being freely rotatable on the shaft 19 and secured to, or formed integral with, the arm 14. Swinging movement of the arm 14 in one direction winds up the spring 15 to increase the tension thereof sufficiently to suddenly close a door 12, to which the arm 14 is connected, the base 16 being, as usual, attached to the frame 11. The arm 14, in this instance, is bifurcated at its outer end 23 for ready attachment to the outer flattened end 24 of an operating rod 25, forming a part of the door check of this invention, by means of a bolt 30.

The door check illustrated, and embodying the features and principles of this invention, comprises a casing 26 having means in the form of ears 27 through which screws 28 may pass to fasten the casing 26 to the door 12. The casing, in this instance, is tubular and is provided with end walls 29 and 31, the end wall 29 being shown in the form of a cap adapted to be screw-threaded onto the open end of the casing 26. The rod 25 is extended into the casing 26 through a bearing 32 provided in the end wall, or cap, 29. In the embodiment illustrated, the rod 25 extends axially through the casing 26 and through a bearing 33 provided in the end wall 31, although it will be obvious from the following description that such extension of the rod 25 is not necessarily required.

A rotor 34, which is rotatable and slidable in the casing 26 is mounted for free rotation upon the rod 25 and is disposed within the casing 26. The rotor 34 is prevented from axial movement on the rod 25 at one end by a collar 35 formed integral with the rod 25 and at the other end by a collar 36 secured to the rod 25 by a pin 37. The rotor 34 has a spiral groove 38 formed in the periphery thereof. The groove 38 (see Figure 5) is U-shaped in cross-section having a flat bottom 39, and straight sides 41 and 42 at right

angles to the bottom 39 the greater part of its length. The spiral 38 is of equal depth the greater part of its length from end to end of the rotor 34.

A shoe 43 (see Figures 3 and 4), which is substantially the same in width as the spiral groove 38, and which is arcuate and spiral in form to slide fit in the said spiral groove 38, is provided to form the friction applying means for the door check. The shoe 43 is held against movement relatively to the rotor 34 by having a stem 44, of a screw 45, inserted into a hole 46 provided in the shoe 43 to receive the same. The screw 45 is screw-threaded through a spring retainer 47 which, in turn, is screw-threaded into the side wall of the casing 26. A coiled spring 48 encircles the stem 44 and reacts between the end wall of the retainer 47 and the shoe 43. Adjustment of the spring retainer 47 in the casing 26 will vary the spring tension of the spring 48 on the shoe 43 and the pressure of the latter upon the bottom surface 39 of the groove 38 to cause the desired friction. The groove 38 at the rear end of the rotor 34, the end adjacent the collar 36 on the rod 25, is slightly undercut as at 49 (see Figure 5) on its side wall 42 and the bottom surface 39 of the groove 38 is tapered inwardly toward its axis adjacent their rear end of the rotor 34 as at 51 (see Figure 6). The undercut 49 and the tapered groove portion 51 is provided for the purpose of relieving the groove 38 at this end portion so as to relieve the pressure of the shoe 43 on the rotor 34 in the groove 38.

It will be understood that the rotor 34 and the rod 25 can be integral, as indicated in Figure 8, in which instance the entire integral structure 61 will be rotatable in respect to the door spring arm 14. The arm 14, in this instance, is provided with a socket 62 to receive the reduced-in-diameter end 63 which is rotatably held in place in the socket 62 by a pin 64 passed through the socket 62 and which rides in an annular groove 65 formed in the end 63. In some instances the shoe 43 may be in the form of a ball 71 (see Figure 9), the stem 44 extending into a hole 72 provided in the ball 71 to receive the same.

Operation

As illustrated in Figure 2 the door closing spring device (Figure 7) is suitably secured to a side member of the door frame 11 in a position for its arm 14 to be attached to the end 24 of the rod 25 when the casing 26 of the door check of this invention is secured upon the upper portion of the door 12 by screws 28. The door check casing 26 is positioned on the door 12 with the rod 25 protruding therefrom to approximately its full extent when it is connected to the arm 14 and when the door is closed. This position of the casing 26 insures that the rotor 34 will be at substantially the extreme rear end of the casing 26 as shown in Figures 2 and 3.

When the device is in the position shown in Figures 2 and 3, with the door 12 closed, the shoe 43 is at the extreme forward end of the groove 38 and the pressure of the spring 48 thereon is at minimum due to the shoe 43 being disposed at the relieved portions 49 and 51 of the groove 38 and thus the friction between the shoe 43 and the sides 41 and 42 and the groove bottom 39 is also at minimum when the parts are in such position. Upon opening the door 12 the action of its swinging upon its hinges 13 causes the arm 14 of the spring device (Figure 7) to rotate about the shaft 19 and wind up the spring 15 increasing its tension. The rod 25 is also moved axially into the casing 26 carrying rotor 34 with it. During such axial movement the rotor 34 rotates upon the rod 25 due to the action of the shoe 43 in the spiral groove 38. When the door is fully open, as indicated in dotted lines in Figure 2, the rotor 34 is at substantially the extreme forward end of the casing 26 and the spring 15 is tensioned sufficiently to close the door when the latter is released.

When the door 12, after being opened, is released, the spring 15, acting through the arm 14, the rod 25, and the casing 26, upon the door 12, urges the door rapidly into shut position. This action is resisted by the friction of the shoe 43 upon the rotor 34 within the groove 38, as the rod 25 is pulled from the casing 26 causing the rotor to move with it under the rotating action of the shoe 43. It will be noted that while the spring 15 is at its maximum tension the friction between the shoe 43 and the rotor 34 is at its maximum and that, as the tension on the door closing spring 15 decreases to minimum as the door closes, the friction of the shoe 43 on the rotor 34 approaches minimum and the door is gently but firmly closed.

Obviously the door check of this invention may be used with doors having spring hinges or other means for closing the door in place of the spring 15. In such instances, the rod 25 will be connected to the door frame 11 through an arm 14 which is pivoted to a base 16 whereby the above described action of the door check of this invention will take place to insure quiet closing of the door. The door check of this invention is also useful on doors not having spring closing means to prevent manual slamming of the doors, only a connection of the rod 25 with a pivoted arm secured to the door frame 11 being required.

While there has been shown and described herein one form in which the features and principles of this invention may be embodied it is to be understood that the same may be embodied in other specific forms without departing from the spirit and essential attributes thereof, and it is therefore desired that the present embodiment be considered in all respects as illustrative and not restrictive, reference being had to the claims rather than to the foregoing description to indicate the scope of the invention.

Having thus fully disclosed the invention, what is claimed as new and for which it is desired to secure Letters Patent is:

1. A door check for a door swingable in a door frame, comprising a hollow casing, a rod axially movable in the casing, a rotor in the casing and carried by the rod in its axial movements and being rotatable on said rod, means to connect said rod to the door frame, means to secure said casing to the door, said rotor having a spiral groove in its peripheral surface, and a shoe secured to the casing and extending into frictional engagement with said rotor in the spiral groove therein.

2. A door check for a door swingable in a door frame, comprising a hollow casing, means to secure the casing to the door, a rotor slidably mounted in the casing, means to secure the rotor to the door frame to be moved axially in the casing when the door is swung, a member attached to the casing and in frictional engagement with the rotor, and cooperating means between the member and the rotor to rotate the latter as it

moves axially in the casing to retard swinging movement of the door.

3. A door check for a door swingable in a door frame, comprising a hollow casing, means to secure the casing to the door, a rotor slidably mounted in the casing, means to secure the rotor to the door frame to be moved axially in the casing when the door is swung, a member attached to the casing and in frictional engagement with the rotor, cooperating means between the member and the rotor to rotate the latter as it moves axially in the casing to retard swinging movement of the door, a part of said cooperating means between the member and the rotor being adapted to relieve the frictional engagement therebetween when the door is in closed position in respect to the door frame.

4. A door check for a door swingable in a door frame, comprising a hollow casing, means to secure the casing to the door, a rotor slidably mounted in the casing, means to secure the rotor to the door frame to be moved axially in the casing when the door is swung, a member attached to the casing and in frictional engagement with the rotor, cooperating means between the member and the rotor to rotate the latter as it moves axially in the casing to retard swinging movement of the door, a part of said cooperating means between the member and the rotor being adapted to relieve the frictional engagement therebetween when the door is in closed position in respect to the door frame, and means to vary the frictional engagement between the rotor and said member.

5. In combination, a door check for a door swingable in a door frame, said door check comprising a hollow casing, means to secure said casing to the door, a rotor slidably and rotatably mounted in the casing, spring means to secure the rotor to the door frame to be moved axially in the casing when the door is swung, said spring means being adapted to act through said rotor and said casing to urge the door into closed position in respect to the door frame, a member attached to the casing and in frictional engagement with the rotor, and cooperating means between the rotor and the member to rotate the rotor as it moves axially in the casing to retard the swinging movement of the door into closed position.

6. In a door check for a door adapted to swing in a door frame, a hollow casing adapted to be attached to the door, a rotor rotatable in said casing and adapted to be attached to the door frame and to slide in said casing when the door is swung, and cooperating means between said casing and said rotor to rotate it as it slides axially in the casing when the door is swung.

7. In a door check for a door adapted to swing in a door frame, a hollow casing adapted to be attached to the door, a rotor rotatable in said casing and adapted to be attached to the door frame and to slide in said casing when the door is swung, cooperating means between said casing and said rotor including a shoe secured to one and a spiral groove having side walls and a bottom wall in

the other to frictionally receive said shoe, a spring pressing said shoe into said groove against a wall thereof and means to vary the spring tension of said spring on said shoe to vary the friction between said shoe and a wall of the spiral groove.

8. In a door check for a door adapted to swing in a door frame, a hollow casing adapted to be attached to the door, a rotor rotatable in said casing and adapted to be attached to the door frame and to slide in said casing when the door is swung, cooperating means between said casing and said rotor including a spring pressed shoe secured to one and a spiral groove having side walls and a bottom wall in the other to frictionally receive said shoe, and means to vary the friction between said shoe and a wall of the spiral groove, a determined portion of a wall of the said groove being relieved to decrease friction of the shoe thereon at this portion of the wall of said groove.

9. In a door check for a door adapted to swing in a door frame, a hollow casing adapted to be attached to the door, a rotor rotatable in said casing and adapted to be attached to the door frame and to slide in said casing when the door is swung, cooperating means between said casing and said rotor including a spring pressed shoe secured to the casing and a spiral groove having side walls and a bottom wall in said rotor to receive said shoe in frictional engagement with a wall thereof, and means to vary the spring tension on said shoe to vary the frictional engagement thereof on the wall of said groove, a portion of the groove in said rotor having its side walls widened and its bottom wall deepened to relieve the frictional engagement of the shoe thereon at this portion.

10. A movement retarding device for a first member swingable in a frame member, comprising a casing adapted to be secured to one of the members, a rotor slidably mounted in the casing and adapted to be secured to the other of the members to be moved axially in the casing when the first member is swung in the frame member, said rotor having a spiral groove formed therein, and a shoe attached to the casing and extending into the groove in said rotor to rotate the latter as it moves axially in the casing to retard swinging movement of the first member.

11. A movement retarding device for a first member movable in respect to a second member, comprising a cylindrical casing adapted to be secured to the first members, a rotor, slidably mounted in the casing and being freely rotatable therein and adapted to be secured to the second member to be moved axially in the casing when the first member is moved relatively to the second member, said rotor having a spiral groove formed upon its periphery, and a shoe attached to the casing and extending into the spiral groove in the rotor to rotate the latter as it moves axially in the casing, to retard relative movement of the first member in respect to the second member.

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