Feb. 15, 1938. W. H. PUGSLEY 2,108,511

DOOR CHECK

Filed Jan. 4, 1936 2 Sheets-Sheet 1

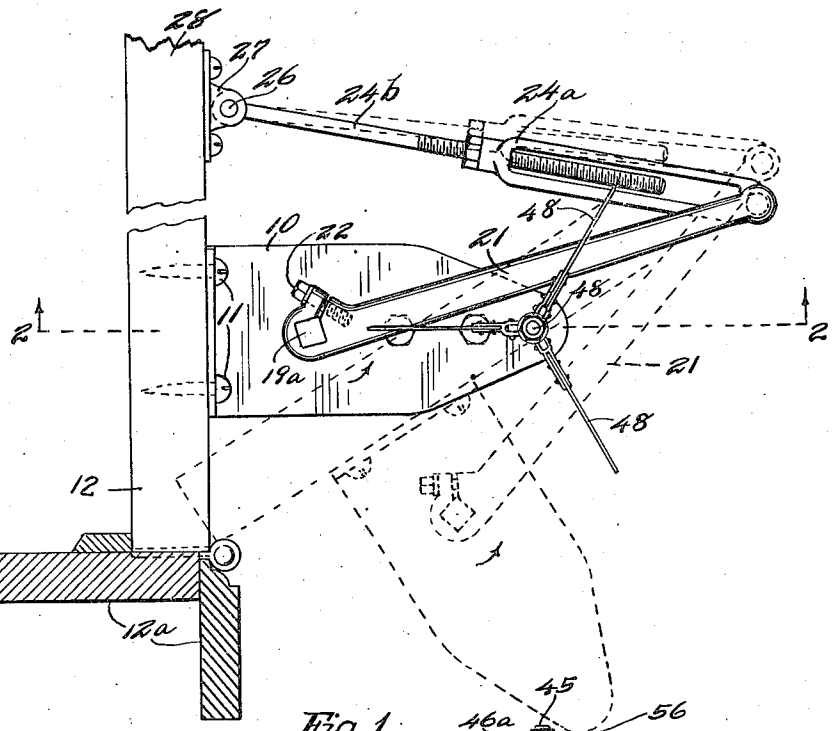


Fig. 1.

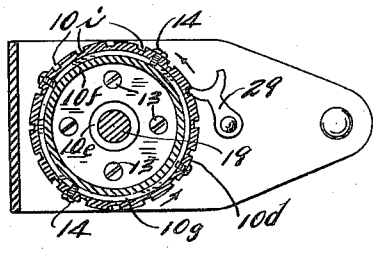


Fig. 3.

Fig. 2.

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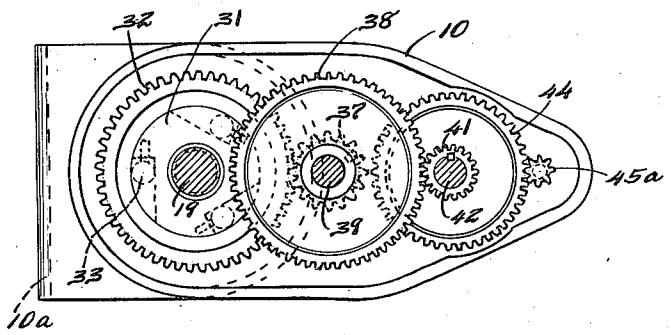


Fig. 4.

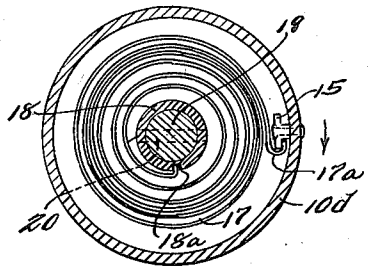


Fig. 5.

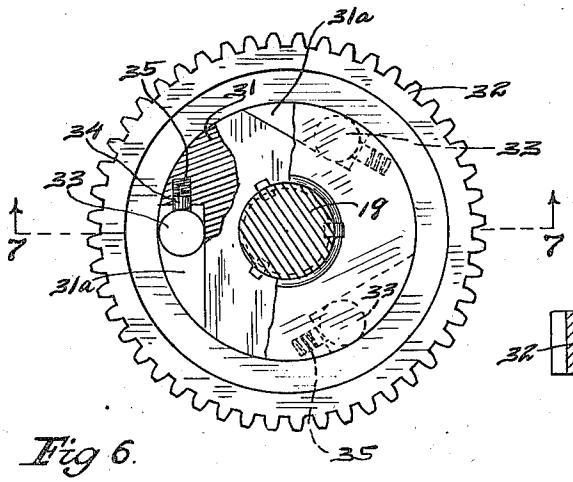


Fig 6.

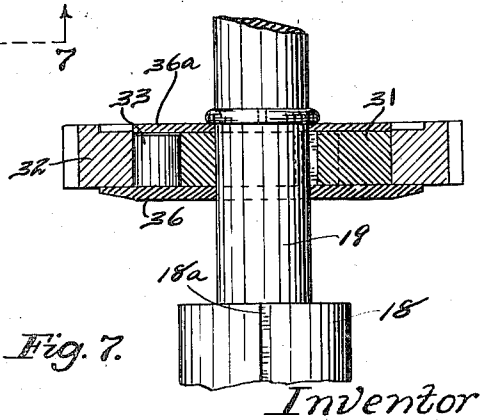


Fig. 7.

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DOOR CHECK

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Application January 4, 1936, Serial No. 57,538

6 Claims. (Cl. 16—49)

This invention relates to a door check, and particularly to the type of door check which is secured to a swinging door and acts to close the door with a slow movement after the door has been opened.

It is an object of this invention to provide a door check structure of simple and compact form and one which will operate equally well at all temperatures.

It is a further object of the invention to provide a door check of simple and efficient construction, which offers substantially no resistance to the opening movement of the door but which embodies a resistance to the closing movement of the door.

It is another object of the invention to provide a door check comprising a spring or similar motor which acts to close the door and which also acts to revolve a rotatable pneumatic resistance element, such as a fan, which fan may be constructed and arranged to increase its resistance as its speed of rotation is increased.

It is more specifically an object of the invention to provide a door check comprising a casing adapted to be secured to a door, a spring in said casing secured thereto, a shaft secured to said spring, a second shaft journaled in said casing with gearing for driving said second shaft at increased speed from said first mentioned shaft, a fan carried by said second shaft together with means for turning said first mentioned shaft when said door is swung open, a further means being provided for turning said second shaft when said door is closed but not turning the same when said door is swung open.

These and other objects and advantages of the invention will be fully set forth in the following description made in connection with the accompanying drawings, in which like reference characters refer to similar parts throughout the several views and in which:—

Fig. 1 is a top plan view of the door check showing a portion of the door and door jamb with certain parts shown in different positions in dotted lines;

Fig. 2 is a vertical section taken on line 2—2 of Fig. 1 as indicated by the arrows;

Fig. 3 is a horizontal section taken on line 3—3 of Fig. 2 as indicated by the arrows;

Fig. 4 is a horizontal section taken on line 4—4 of Fig. 2 as indicated by the arrows;

Fig. 5 is a horizontal section taken on line 5—5 of Fig. 2 as indicated by the arrows;

Fig. 6 is a partial horizontal section taken on line 6—6 of Fig. 2 as indicated by the arrow; and

Fig. 7 is a vertical section taken on line 7—7 of Fig. 6 as indicated by the arrows.

Referring to the drawings, a casing 10 is shown of rather elongated form, the same having sides which are parallel for the greater portion of its length and which then converge to a semi-cylindrical end portion, said casing is provided with vertical flanges 10*a* at one end apertured to receive screws 11 by which said casing may be secured to a door 12, a portion of which is shown, a part of the vertical door frame or casing is also shown as 12*a*. Said casing has an intermediate portion 10*b*, a cover plate 10*c* and a lower cylindrical portion 10*d*. The intermediate portion 10*b* has a hub 10*e* and a cylindrical member 10*f* surrounds this hub below the bottom of the casing and engages the bottom of the casing to which it is secured by spaced screws 13, shown as having their heads countersunk in member 10*f*. Member 10*f* fits within the top of the cylindrical portion 10*d* of the casing and the same has a circumferential slot 10*g* in its periphery. A plurality of circumferentially spaced screws 14 extend through the wall of casing portion 10*d* into the slot 10*g* and thus support said portion. The portion 10*d* has a block 15 secured to its inner wall by the spaced rivets 16, said block having oppositely directed flanges. A spiral plate spring 17 is provided having one end 17*a* bent to form a hook which engages one of the flanges on block 15. The inner end of spring 17 is bent substantially at a right angle and disposed in a vertical slot 18*a* formed in a bushing 18 secured to a shaft 19, as by the pin 20. Shaft 19 is journaled in hub 10*e* and also in a hub 10*h* formed at the top of the cover plate 10*c*. Shaft 19 has an angularly shaped portion 19*a* at its top shown as square in plane to which is secured one end of a lever 21. Lever 21 is shown as having a split hub fitting over portion 19*a*, which hub has therein a stud 22 by which it may be tightened. Lever 21 has a hub at its outer end recessed to receive a ball 23*a* on the end of a stud 23 which extends vertically through the end of another lever 24, said stud having a nut 25 threaded thereon engaging the bottom of lever 24. Lever 24 has a section 24*a* having an elongated slot therein and a hub at one end in which hub is threaded the other portion 24*b* of said lever, said latter portion being apertured at its end to receive a pivot pin 26 also passing through a small bracket 27 secured to the door frame 28 above the door 12.

With the described construction of the levers

21 and 24 it will be seen that shaft 19 will be turned when the door 12 is swung.

The upper portion of casing portion 10*d* has formed therein at its exterior a plurality of circumferentially spaced slots 10*i*. These slots are adapted to be engaged by a pawl 29 pivoted by the rivet 30 to the bottom of casing portion 10*b*. It will be noted that pawl 29 has two arms and thus can be swung so that either arm will engage with slots 10*i*. It will also be noted that spring 17 can be inverted and reversed and its hook portion 17*a* engaged over the other flange of block 15. These parts are thus reversible to suit doors swinging in different directions.

The shaft 19 has secured thereto the inner member 31 of an overrunning clutch the outer member of which constitutes a gear 32. Member 31 has a plurality of recesses 31*a* formed therein shown as three in number and in which are disposed, respectively, rollers 33. Each of these rollers is engaged by a small plunger 34 disposed in a hole formed in the end wall of each recess 31*a*, which plunger is urged outwardly by a small coiled compression spring 35 disposed in said hole. Rollers 33 are supported on a plate 36 surrounding shaft 19 and resting on the top of hub 10*e*. A plate 36*a* overlies rollers 33, said plate being disposed on top of member 31 and held down by a collar 19*b* on shaft 19. With the described structure it will be seen that when shaft 19 is turned in one direction gear 32 will be driven or turned with said shaft, but when shaft 19 is turned in the opposite direction said gear 32 will not be driven. Gear 32 meshes with a pinion 37, which is shown as formed integrally with a gear 38 disposed above pinion 37. Pinion 37 and gear 38 are journaled on a stud 39 having a reduced portion disposed in a hub projecting upwardly from the bottom of casing portion 10*b* and having another reduced portion in cover plate 10*c*, which latter portion is threaded to receive a nut 40. The lower end portion of stud 39 is formed as a flaring countersunk head substantially flush with the bottom of casing portion 10*b*. Gear 38 meshes with a pinion 41 secured to a stud 42 having a reduced headed portion disposed in the bottom of casing portion 10*b* and extending through a hub projecting from said bottom, the same also having a reduced threaded portion extending through cover plate 10*c*, which portion is adapted to receive a nut 43. The nuts 40 and 43 form the securing means for holding cover plate 10*c* in position. The stud 42 has secured thereto a gear 44 and this gear meshes with a pinion 45*a* secured to a shaft 45 and forming a part thereof, said shaft having a lower reduced portion journaled in a hub at the bottom of casing portion 10*b* and also being journaled in a hub projecting upwardly from cover plate 10*c*. It will be noted that members 37, 38 and gear 44 rest on the hubs in the bottom of casing portion 10*b*.

The shaft 45 has its upper end threaded and has secured to said end a block 46 having outwardly projecting lugs 46*a* which are circumferentially spaced and to which are pivoted transverse pivot arms 47. Arms 47 have secured thereto fan blades 48, shown as having lower flaring and rounded ends. Each blade has secured to it at its inner side a small clip bracket 49 to which is pivoted about a transverse pivot a rod 50. Rods 50 have eyelets or loops at their lower ends passing through holes in the cylindrical flange 51*a* of a cup-like member 51 having a depending hub slidable on shaft 45. Rods 50 are thus pivotally connected to member 51. A compression coil spring 52 surrounds shaft 45 bearing at its lower end on member 51 and engaging at its upper end a nut 53 threaded on shaft 45 and engaged by a similar jamb nut 54, nuts 53 and 54 having knurled cylindrical peripheries. Nuts 55 and 56 are also threaded on shaft 45 engaging respectively the bottom and top of block 46.

In operation, when the door 12 is in closed position, the parts occupy the positions shown in Fig. 1 in full lines. When the door is swung open the parts move to the positions indicated by the dotted lines in Fig. 1. It will be seen that in this movement lever arm 21 moves relatively to casing 10 and shaft 19 is rotated. This rotation is in a counter-clockwise direction and thus clutch member 31 does not drive gear 32 through the rollers 33 and member 31 thus rotates idly in gear 32. Sleeve 18, however, is turned with shaft 19 and spring 17 is flexed or wound up. Since clutch 31 does not operate to drive gear 32, shaft 45 is not driven and fan 48 is not driven. When door 12 has been swung to its maximum or desired open position and is released by the party opening it, spring 17 tends to unwind and exert force on shaft 19 to rotate the same. Shaft 19 is thus rotated in a clockwise direction and member 31 is turned with it and said member is clutched to the gear 32 by the rollers 33. Gear 32 is thus rotated and shaft 45 is rotated through the train of gears 37, 38, 41, 44, and 45*a*. Shaft 45 is rotated at high speed and fan blades 48 are thus rotated. As these blades are rotated they are thrown outwardly by centrifugal force and the diameter of the fan formed by said blades is thus increased. The blades 48 offer quite a resistance to the turning of shaft 45 and this resistance increases with the speed of shaft 45. Spring 17 continues to exert force on shaft 19 to turn the same and the parts are thus brought slowly back to the position shown in full lines in Fig. 1, the speed of this movement being retarded and kept small by rotation of fan blades 48. Spring 17, however, is of sufficient strength to continue to act until door 12 is entirely closed and latched, if there is a latch thereon. It will be seen that members 24*a* and 24*b* can be longitudinally adjusted to suit the particular installation or to produce the desired turning movement on lever 21. The tension of spring 17 can be adjusted by turning casing portion 10*d*, said casing portion is held in position with the desired tension on spring 17 by engaging of pawl 29 with one of the slots 10*i*. The tension of spring 52 can be regulated by adjustment of nuts 53 and 54 on rod 45.

From the above description it is seen that applicant has provided a simple and efficient structure of door check. When the door is opened no resistance is offered to the opening movement except for winding spring 17. When the door is allowed to close it is closed by spring 17 and the fan is driven to retard the closing movement and insure that the door will be brought gently to closed position. The structure works equally well whether the temperature be quite low or quite high. There is no fluid which must pass through any small opening and temperature changes thus do not affect the operation of the device. There are no parts to get out of adjustment and the device does not depend upon any delicate parts for its operation. The action is positive and no tension is needed for maintaining the device in operation. Casing 10 can contain oil or grease so that the parts are thoroughly lubricated. The device has been amply demon-

strated in actual practice and was found to be very successful and efficient.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts, without departing from the scope of applicant's invention, which generally stated, consists in a device capable of carrying out the objects above set forth in the parts and combinations of parts disclosed and defined in the appended claims.

What is claimed is:—

1. A door check and closer structure having in combination, a casing adapted to be secured to a door, a shaft journaled in said casing, a second casing below said first mentioned casing into which said shaft extends, a spring in said second casing and secured thereto and to said shaft, a second shaft journaled in said first mentioned casing and extending thereabove, a train of gears in said first mentioned casing for driving said second shaft from said first mentioned shaft and at greatly increased speed, a fan secured to said second shaft above said first mentioned casing and affording resistance against the air when said door is swung and said first mentioned shaft rotated, the air resistance to said fan acting as a brake on said spring in the closing movement of said door.

2. A door check and closer structure having in combination, a casing, a shaft journaled in said casing and projecting vertically therefrom, a fan outside of said casing carried by said shaft and means for turning said shaft at high speed when said door swings so that said fan is revolved at high speed and produces resistance against the air to have a braking effect on said means to retard movement of said door.

3. A door check and closer structure having in combination, a casing adapted to be secured to a door, a shaft journaled in said casing, means in said casing actuated by movement of said door for rotating said shaft, a second shaft journaled in said casing and extending vertically therefrom, means for driving said second shaft from said first shaft at greatly increased speed, a revoluble device having means acting against the air to create resistance and causing a braking effect on said first mentioned means.

4. A door check and closer structure having in combination, a casing adapted to be secured to a door, a spring in said casing and secured thereto, a shaft secured to said spring, a second shaft journaled in said casing driven at increased speed from said first mentioned shaft, said second shaft extending vertically from said casing, a plurality of fan blades secured to said second shaft outside of said casing, said blades being disposed in vertical planes extending radially to said second shaft and pivoted for outwardly swinging movement in said planes when said second shaft is rotated and means for turning said first mentioned shaft and placing said spring under tension when said door is swung open, said blades having air resistance acting as a brake on said spring in the closing movements of said door.

5. A door check and closer structure having in combination, a casing adapted to be secured to a door, a shaft journaled in said casing and projecting vertically thereabove, a plurality of fan blades secured to said shaft outside of said casing and disposed in vertical planes extending radially to the axis of said shaft, said blades being pivoted at their upper ends for outwardly swinging movement, resilient means resisting the outwardly swinging movement of said blades and means actuated by movement of said door for rotating said shaft at high speed so that said blades form a pneumatic resistance and act as a brake on said means.

6. A door check and closer structure having in combination, a casing adapted to be secured to a door, a shaft journaled in said casing and projecting vertically thereabove, a plurality of fan blades secured to said shaft, means actuated by movement of said door for rotating said shaft at high speed, said blades developing air resistance in their revolution and acting as a brake on said means.

WILLIAM H. PUGSLEY.