DOOR CLOSING SPRINGS AND CHECKS

John Wharton, Wolverhampton, England, assignor to James Gibbons Limited, Wolverhampton, Staffordshire, England, a British company

Filed Dec. 2, 1968, Ser. No. 702,738

Claims priority, application Great Britain, Apr. 12, 1967, 16,865/67

U.S. Cl. 16—55

3 Claims

ABSTRACT OF THE DISCLOSURE

A door closing spring and check mechanism comprises a box capable of being mounted in a door transom or lintel and containing a rectangular bridle encircling and engaging a double-acting cam to slide in the box on rotation of the cam on opening and closing a door attached to the cam spindle, a sealed hydraulic check, which opposes sliding of the bridle as the door closes, and a pair of springs arranged in parallel on each side of the check and urging the bridle to cause closing rotation of the cam.

This invention relates to door closing springs and checks and provides a compact mechanism which is particularly, but not exclusively, suitable for mounting above a door, in the transom or lintel, instead of in the floor as is more usual.

The invention may however be applied to floor springs.

According to the invention, a door closing spring and check mechanism comprises a box in which is journaled a pintle, to engage and turn with a door, a cam on the pintle and a follower which is mounted to slide in the box under the turning action of the cam, when the door is opened, in opposition to at least one door-closing compression spring thrusting on the follower and restrained, in return movement as the door closes, by a fluid check opposing the spring closing action.

In a preferred construction, the mechanism is double-acting, that is the mechanism is operative for either direction of door opening, by the cam having a form to move the follower against the thrust of the door-closing spring on rotation of the cam in either direction from a mid-position. The preferred construction also has a pair of door-closing compression springs in parallel on either side of a sealed hydraulic check cylinder and extending longitudinally in the box to bear directly against the end of a rectangular bridle, which forms the follower, surrounding a heart-shaped cam. The bridle is guided to slide longitudinally on the base of the box by a pair of fillets on the bridle bearing on either side of a rectangular guide plate mounted on the base of the box.

This guide construction for the bridle, forming as it were a fabricated mortice and tenon sliding joint, is an important constructional feature which saves the expensive machining of the sides of a box to form guide-ways which has been usual practice in floor springs.

Further features of the invention are included in the following description with reference to the accompanying drawings in which:

FIG. 1 shows, by way of example, a double-acting transom spring and check mechanism in plan with a top cover plate and top bearing plate omitted, and

FIG. 2 is a section on the line II—II of FIG. 1.

The mechanism illustrated is contained in a rectangular box designed to be mounted in a door transom or lintel with the base of the box flush with the soffit.

In the box there is journaled a pintle having a square end projecting below the box to engage in a socket in a shoe sunk in the top edge or rail of the door so that the pintle 2 turns with the door.

In the base of the box 1 and in a top bearing plate (not shown) amble bearings, preferably needle roller bearings, are provided for the pintle 2 so that it serves as a top centre for hinging of the door which is hung at or near the bottom on a center type hinge, preferably a centre-centre hinge which enables the door threshold to be completely clear of door hinging or closing mechanism.

Fast with the pintle 2, and preferably made integrally therewith, is a heart-shaped cam 4 which has a pair of checks 5 to thrust respectively against one of a pair of anti-friction rollers 6 mounted in a follower consisting of a rectangular bridle 7 surrounding the cam 4, two notches 2a are provided in the cam 4 to engage respectively with the anti-friction rollers 6 and hold the door when it is fully opened in either direction. A steady anti-friction roller 6a is also provided for the point of the cam 4.

On its underside, the bridle 7 has a pair of parallel guide fillets 8, secured by screws 9, on either side of a rectangular guide plate 10 mounted on the base of the box 1. The bridle 7 is thus guided for longitudinal sliding in the box and moves toward the further end of the box under the thrust of one or the other of the cam checks 5 when the door is opened in either direction.

This sliding movement of the bridle 7 is opposed by a parallel pair of strong helical compression springs 11 each held in adjusted pre-loaded compression between a bridge 12, across the further end of the box 1, and a nut 13 on a screw-threaded part of a thrust rod 14 which bears, through an adjustable pad nut 15, against the end of the bridge 7. The thrust rods 14 have reduced spligot ends 16 which engage in sockets in the bridle 7 and their other ends can slide through holes in the bridge 12 so that the springs 11 are firmly guided for truly axial compression and recovery. Openings 17 in the base of the box 1 provide access for a tammy bar key to the nuts 13 for final adjustment of the springs after installation, the openings 17 then being concealed by a bottom cover plate (not shown). Flat 14a on the thrust rods 14 are lightly engaged by grub screws 12a in the bridge 12 to prevent turning of the rods when the nuts 13 are adjusted.

The springs 11 are adjusted so that, after compression by opening of the door, they recover to close the door by their thrust on the bridle 7 acting on the checks 5 of the cam 4 to return the pintle 2 to its central, door-closed, position.

To prevent the door slamming under the closing action of the springs 11, the return movement of the bridle 7 is restrained by a sealed hydraulic check 18, of a known piston and cylinder type, mounted between a stub 19, fast on the bridge 7, and an anchorage yoke 20 on the bridge 12. The check 18 is secured to the stub 19 by a screw 21 and adjustable held in the yoke 20 by a pair of nuts 22 on a screw-threaded stem 23 of the check 18.

The check 18 contains hydraulic fluid, sealed against leakage, and has an internal valve system which permits the check easily to shorten telescopically, under thrust from the bridle 7 when the door is opened, but limits the rate of telescopic extension of the check under the thrust of the springs 11.

Apart from the sealed check 18, the mechanism requires only anti-friction grease lubrication of the moving parts so that the well-known leakage problems of oil-filled spring boxes are avoided and the mechanism can safely be mounted in a transom. Moreover, the box 1 encloses the whole mechanism and can itself be designed to be sealed to retain the small amount of hydraulic fluid which might escape from the check 18 should this have a seal failure.
I claim:
1. A door closing spring and check mechanism comprising
   (a) a box,
   (b) a pintle rotatably journalled in said box and adapted to engage and turn with a door,
   (c) a heart-shaped cam mounted on said pintle to rotate therewith,
   (d) a follower in the form of a rectangular bridle cooperating with said cam on rotation of the cam in either direction from a mid-position thereof,
   (e) a longitudinally-extending guide plate mounted on the base of said box below said bridle,
   (f) guide means on said bridle cooperating with said guide plate and constraining said bridle for longitudinal sliding movement in said box on said rotation of the cam,
   (g) a pair of door-closing compression springs housed in parallel in said box and thrusting on said bridle in the direction of said longitudinal movement, and
   (h) a sealed fluid check cylinder mounted in said box between and parallel with said springs, said check cylinder being connected to said bridle to be shortened on compression of said springs and extended on expansion of said springs,
   the springs being compressed by the longitudinal movement of the bridle occurring on rotation of the cam from the mid-portion thereof and the check cylinder acting to restrain movement of the bridle during the subsequent expansion of the springs to rotate the cam back to the mid-position thereof.
2. A door closing spring and check mechanism as claimed in claim 1, said guide means comprising a pair of fillets carried by said bridle and bearing on either side of said guide plate.
3. A door closing spring and check mechanism as claimed in claim 1, wherein such check cylinder is a hydraulic check cylinder.

References Cited

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Patent Number</th>
<th>Date</th>
<th>Inventor</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,079,763</td>
<td>11/1913</td>
<td>Henry</td>
<td>16—55</td>
</tr>
<tr>
<td>2,603,818</td>
<td>7/1952</td>
<td>Carlson</td>
<td>16—55</td>
</tr>
<tr>
<td>3,137,888</td>
<td>6/1964</td>
<td>Blom</td>
<td>16—55 XR</td>
</tr>
</tbody>
</table>

FOREIGN PATENTS

<table>
<thead>
<tr>
<th>Patent Number</th>
<th>Date</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>522,775</td>
<td>6/1940</td>
<td>Great Britain</td>
</tr>
<tr>
<td>997,269</td>
<td>7/1965</td>
<td>Great Britain</td>
</tr>
<tr>
<td>1,003,272</td>
<td>9/1965</td>
<td>Great Britain</td>
</tr>
<tr>
<td>1,470,529</td>
<td>1/1967</td>
<td>France</td>
</tr>
</tbody>
</table>

Bobby R. Gay, Primary Examiner
D. L. Troutman, Assistant Examiner