Feb. 23, 1937. A. J. SCHULZ ET AL 2,071,660

DOOR CHECK

Filed Jan. 22, 1934

Fig. 1.

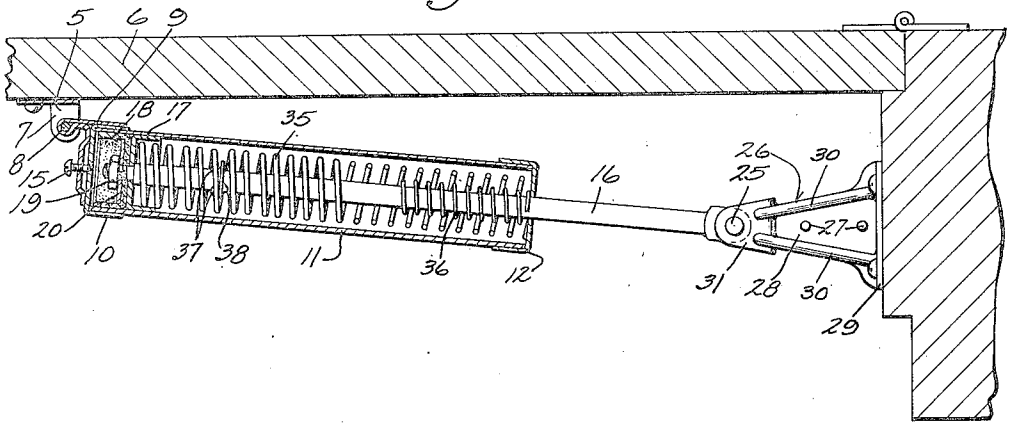


Fig. 2.

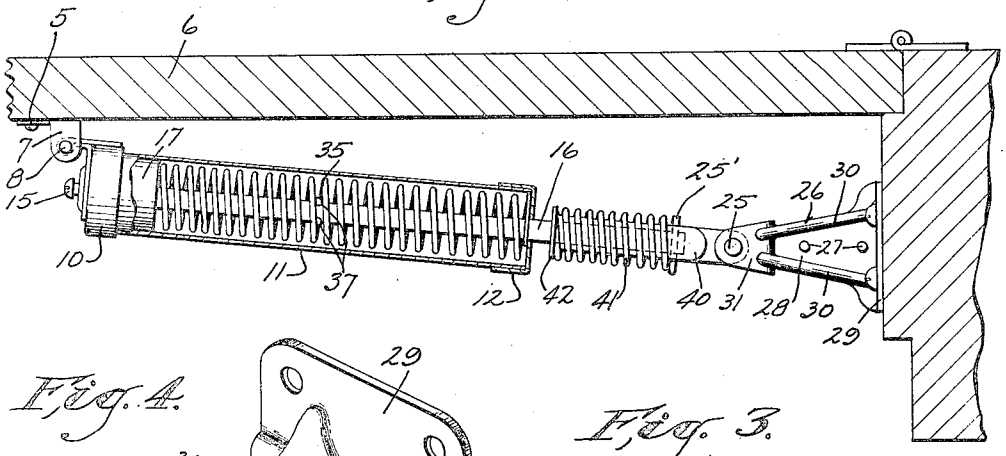


Fig. 4.

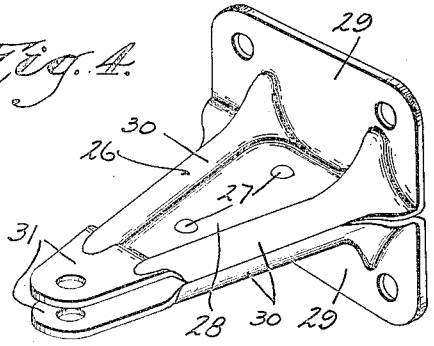
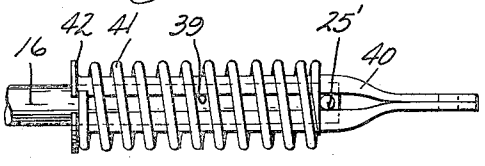


Fig. 3.



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DOOR CHECK

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4 Claims. (Cl. 16—66)

This invention relates to improvements in door checks of the type commonly used to effect a restrained closure of light doors such as screen and storm doors and the like.

It commonly occurs that outwardly opening doors such as screen or storm doors are caught by gusts of wind and blown open so violently that the door or its hinges are destroyed through contact of the door with adjacent portions of the casing. If such doors are equipped with pneumatic door checks having a piston and cylinder, it is common for such accidents to result in bending the piston rod or other parts of the apparatus.

It is the object of the present invention to prevent injury either to the door or the door check device by means of a novel and improved door check construction which positively limits the opening movement of the door to a predetermined range of movement sufficiently small to avoid injury and, moreover, provides an elastic shock absorbing means for offering a progressively increasing resistance to the final movement of the door in its opening direction. As a result of these improvements the door is prevented from opening sufficiently far to damage the door check, and the door, as well as the door check, are resiliently stopped in approaching their extreme position, so that the limiting function of the door check is performed without any violent shock upon the apparatus.

For the purposes of the invention the door check is secured with unusual rigidity both to the door and in the jamb, and a feature of the present invention consists of an improved bracket for making the necessary connection to the jamb.

In the drawing:

Figure 1 is a plan view of apparatus embodying the invention as applied to a door and door jamb.

Figure 2 is a corresponding view of modified apparatus embodying some of the features of the invention.

Figure 3 is a fragmentary detail in side elevation of the tension device shown in Figure 2.

Figure 4 is a fragmentary detail in perspective showing the bracket used in the Figure 1 and Figure 2 devices for application to the door jamb.

Like parts are identified by the same reference characters throughout the several views.

The mounting bracket 5 connected with door 6 may be conventional. It comprises a plate having marginal ears such as that shown at 7 supporting a pintle pin 8 which passes through a strap 9 connected with the head 10 of cylinder 11. Heads 10 and 12 of cylinder 11 are preferably fastened permanently thereto by soldering or otherwise. In accordance with conventional practice, the cylinder is vented and provided with an adjusting screw 15 to regulate the escape of air from the path of the advancing piston.

Reciprocable through the cylinder head 12 is the piston rod 16 shouldered near its end to engage the cup-shaped piston 17. The piston is preferably made of metal so that regardless of any deflection of the cup leather 18 the piston will serve as a cross head positively centering the rod 16 with reference to the cylinder. A nut 19 threaded to the end of the piston rod holds the cup leather washer 20 and the cup leather 18 to the face of the piston 17, the fit of the piston and the disposition of the cup leather being such that air will freely pass the assembly when the piston rod moves from left to right as viewed in Fig. 1 and Fig. 2, but will be trapped by the expansion of the cup leather under pressure during the movement of the cup leather from right to left.

Outside of the cylinder 11 the end of the piston rod 16 is fulcrumed by pivot pin 25 to a bracket 26 which is necessarily of unusual rigidity in order to withstand the strain of the new duty imposed upon it by the mechanism herein disclosed. It is preferred to make this bracket by welding together at 27 the corresponding arms of a pair of angle plates 28, said plates having their opposite arms extended in a common plane in opposite directions at 29 to comprise a base, suitably apertured for screws.

Each of the angle plates has ribs 30 buttressed upon its base and up its arms in registering relation and ultimately merging with the spaced terminal ears 31 through which pin 25 is received. The opposite and registering disposition of the ribs 30 and their relation to the two arms of the integrally joined angle plates is such as to provide an extremely strong rigid bracket.

In order that the door check may be effective for a door closer, it is preferably provided within cylinder 11 with the usual compression spring 35 which is confined between the cylinder head 12 and the piston 17 and serves to advance the piston to compress air within cylinder head 10 upon each occasion when the piston is retracted due to the opening of the door 6. The movement of the piston in response to the expansion of spring 35 has the effect of bringing bracket 5 closer to bracket 26, thereby closing the door at a rate controlled by the escape of air from cylinder head 10 under the regulation of screw 15.

In accordance with the present invention the

apparatus is so designed that the door is restricted to a predetermined range of angular movement. Ordinarily ninety degrees of movement of the door will afford full and unobstructed use of the doorway. Hence it is proposed to design the present mechanism in such a way as to limit the door to approximately ninety degrees of opening movement. Within this range of movement no harm can be done to the connecting rod 16 or the other parts of the mechanism.

However, inasmuch as the movement of the door may be made violent by a gust of wind, any apparatus employed to check that movement at a predetermined point must be cushioned or the screws holding the device to the door or to the door jamb will be stripped from the wood. In order to provide a cushion means for limiting the range of movement of the door, I mount an auxiliary relatively strong compression spring 36 loosely upon the piston rod 16. An intermediate portion of the rod is compressed at opposite sides to form lugs 37 which serve as a spring seat, preferably through an interposed washer at 38.

As the piston 17 is retracted by rod 16 during the opening of the door, the washer 38 will pick up the end of spring 36, regardless of the location of that spring on shaft 16, and will ultimately compress spring 36 against the head 12 of the cylinder. The resistance offered by spring 36 to the further retractive movement of rod 16 will increase in accordance with the distortion of the spring until finally the spring reaches its compression limit. The length of the parts is so determined that this will occur when the door has been opened approximately ninety degrees and thus a cushioned stop limiting the door to this degree of movement is provided.

If it be desired that the spring 36 be located on the outside of cylinder 11, the construction shown in Fig. 2 may be adopted. In this case the piston rod 16 carries a cross pin 25' working in a slot 39 of the piston rod extension 40. The rod 16 is telescopically receivable into the extension 40, and the extension is pivoted upon the pintle 25 of bracket 26. A compression spring 41 seats between the pin 25' and a flange 42 on the piston rod extension, thereby permitting the elongation of the overall dimensions of the piston rod and its extension against the compression of spring 41.

In this construction the lugs 37 on rod 16 are positioned to strike the cylinder head 12 as the door approaches a full open position. Since the rod 16 can no longer move outwardly with respect to the cylinder, the movement of the door can continue only through the elongation of the rod assembly, thereby compressing spring 41. When the spring 41 reaches its limit of compression the movement of the door will have been resiliently stopped without injury to the mechanism or the door.

It is particularly to be noted that I do not check the door movement in such a way as to involve the complete withdrawal of the rod from the cylinder. If the piston itself were to contact the end of the cylinder, the rod might be cramped with reference to the cylinder and would not function properly on the return stroke. By locating the stop lugs 37 at some distance from the piston I ensure that the rod will always have two relatively remote bearing points, one between the rod itself and the head 12, and the other between the piston and the cylinder. The fact that these bearing points are maintained in properly spaced relation at all times ensures against the cramping of the rod with respect to the cylinder.

The arrangement also protects the compression spring 35 which must function over a relatively long distance and which would take a set affecting its compression if it were unduly compressed during each operation of the device. The location of the stop lugs ensures against the complete compression of spring 35 at any time.

We claim:

1. In a door check device, the combination with a pair of brackets mounted for relative movement, of a cylinder member and a piston member in operative assembly, means limiting the outward movement of the piston member with respect to the cylinder member materially short of the end thereof, and means connecting the said members with respective brackets, the means connecting one of said members with its bracket being resiliently yieldable in substantially the direction of the piston movement, whereby to cushion the engagement of said limiting means.

2. In a door check device, the combination with a pair of brackets movable angularly with respect to each other, of a cylinder member and a piston member in operative connection, means pivotally connecting one of said members to a bracket, elastically yieldable means pivotally connecting the other of said members to the other of said brackets, and means positively limiting the outward movement of the piston member with respect to the cylinder member materially short of the end thereof.

3. In a door check device, the combination with a pair of angularly movable brackets, of a cylinder member provided with an apertured head, a piston member bearing interiorly upon said cylinder and comprising a rod portion bearing in the aperture of said head, means pivotally connecting one of said members to a bracket, means positively limiting the outward movement of said rod with respect to said head, and means elastically yieldable in the direction of the piston movement pivotally connecting the other of said members with the other of said brackets, said yieldable means being adapted to cushion the operation of said limiting means, said limiting means being effective while said piston member is provided with bearing guidance from said cylinder member at points relatively widely spaced therein to assure the maintenance of alignment between said piston member and cylinder member.

4. In a door check device, the combination with a pair of brackets mounted for relative swinging movement, of a cylinder member and a piston member in operative assembly, means limiting the outward movement of the piston member with respect to the cylinder member at a point to limit the relative swinging movement of the brackets to approximately 90 degrees, and means connecting the said members with the respective brackets, the means connecting one of said members with its bracket being resiliently yieldable in substantially the direction of piston movement, whereby to cushion the engagement of said limiting means and to prevent the destruction of the door check device and a door to which such device may be applied.

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