May 2, 1950 F. L. THARP 2,506,284

DOOR CHECK

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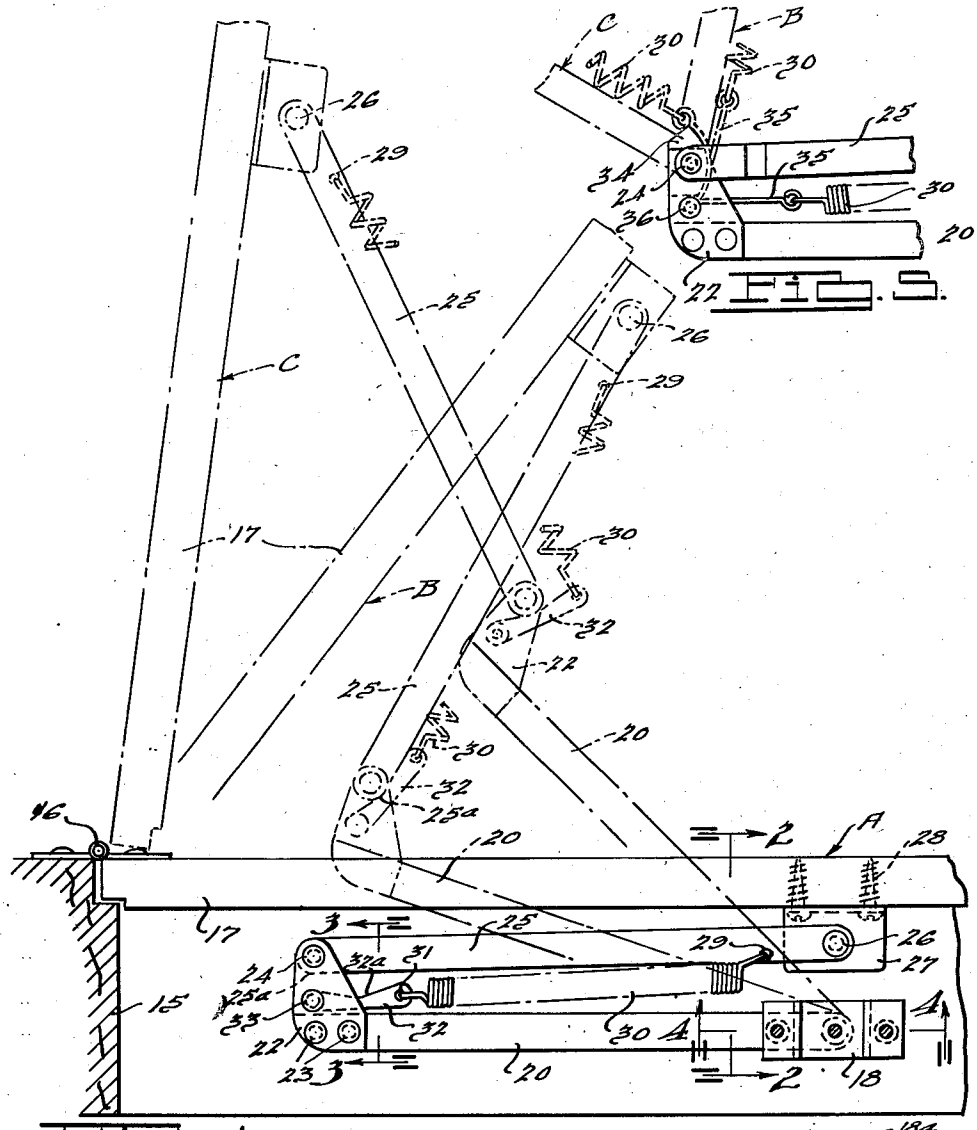


FIG. 1.

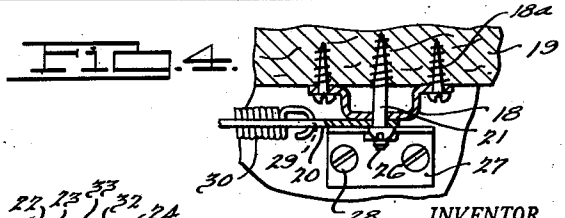


FIG. 4.

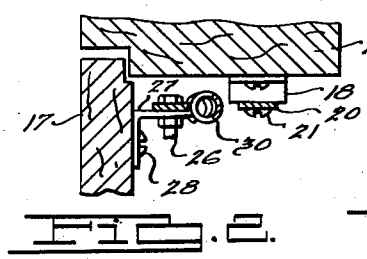


FIG. 2.

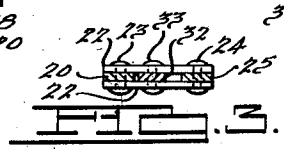


FIG. 3.

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DOOR CHECK

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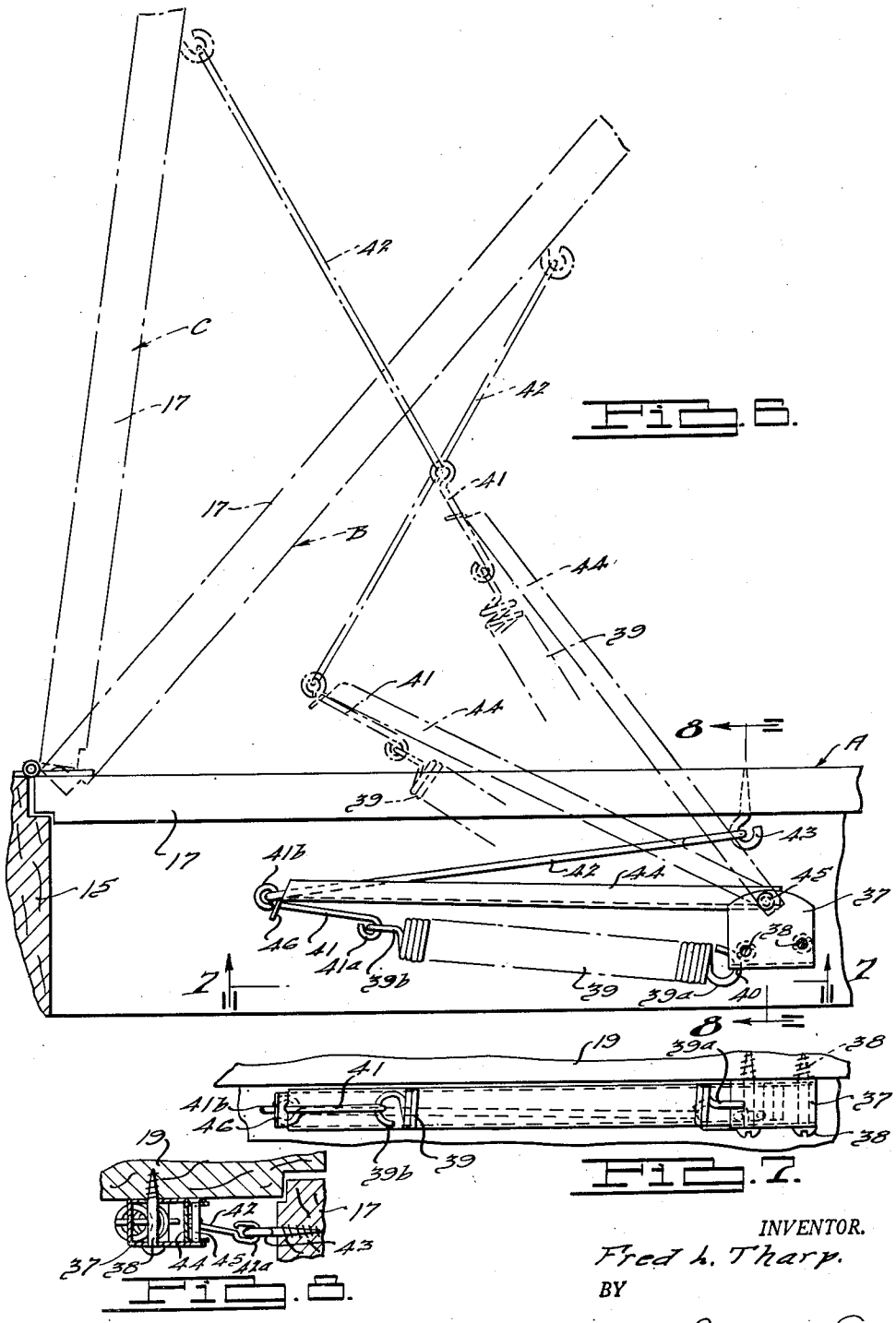


Fig. 6.

Fig. 7.

Fig. 1.

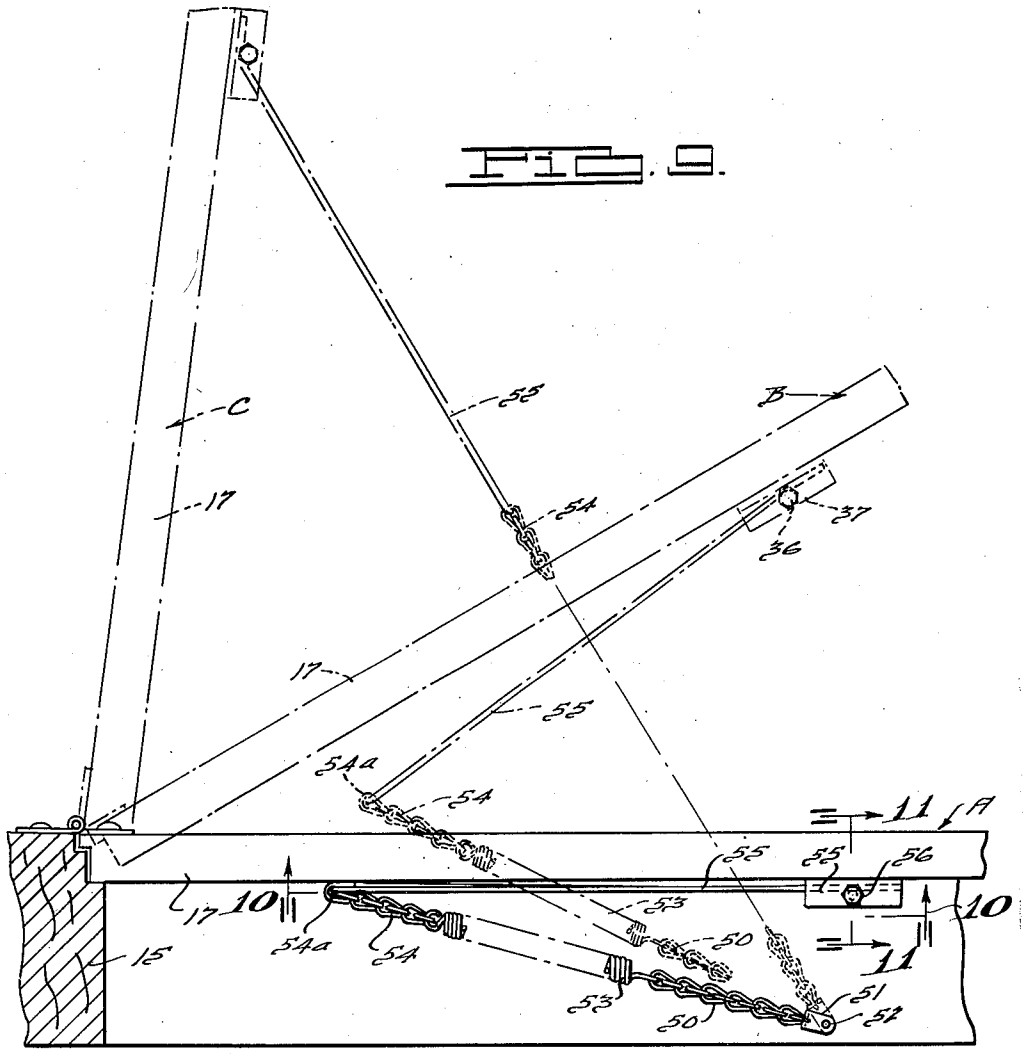
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DOOR CHECK

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Fig. 9.



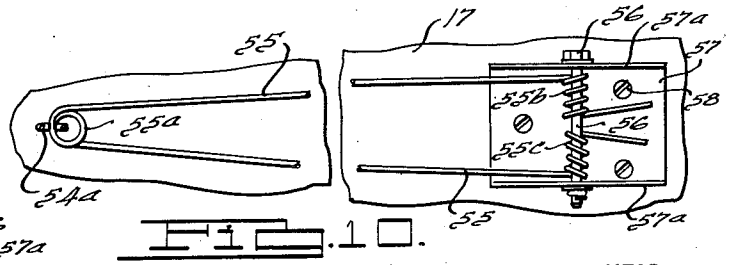


Fig. 10.

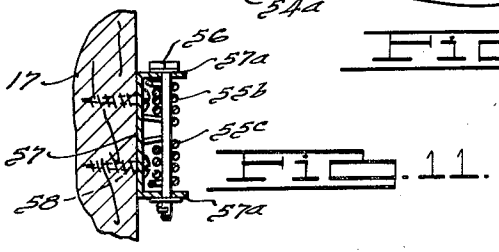


Fig. 11.

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DOOR CHECK

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Application June 14, 1946, Serial No. 676,656

4 Claims. (Cl. 16—63)

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This invention relates to door checks and especially to a device of this character adapted to be installed on a door frame in connection with an outside door, such as a storm door, and adapted to cushion and check the abrupt or violent opening of the door so as to prevent damage when the door is caught by a strong wind.

An object of the invention is to provide a door check so constructed as to offer in improved manner a plurality of stages of cushioning resistance to the opening movement of the door, the improved construction and operation of the device being such as to provide relatively light yielding resistance to normal opening movement of the door and thereafter a progressively increasing yielding resistance of such magnitude as to prevent the door being swung open beyond predetermined limits thereby precluding any possibility of the door crashing against the building wall.

A further object of the invention is to provide an improved door check device having a single coil spring adapted to be progressively deflected or stretched during normal opening movement of the door so as not to offer undue resistance to this movement, the device however being so constructed as to resist or check excessive opening movement of the door.

In accordance with one embodiment of the invention the check device comprises two non-extensible members pivoted together and movable from an angular relation to a parallel relation substantially end to end, a coil spring being interposed between the members and subject to deflection during relative angular movement of the members.

In accordance with another embodiment of the invention the check device comprises an inextensible member and a coil spring movable into alignment in an extreme open position of the door, means being provided for deflecting the spring a relatively small amount during normal opening movement of the door. In accordance with a third embodiment of the invention the check device comprises an inextensible but bendable member connected to the coil spring for offering relatively light yielding resistance to normal opening movement of the door, the coil spring coming into play to offer stiff yielding resistance at an extreme open position of the door when the members move into alignment.

Other objects of this invention will appear in the following description and appended claims, reference being had to the accompanying drawings forming a part of this specification wherein

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like reference characters designate corresponding parts in the several views.

Fig. 1 is a plan view, partly in section, illustrating a door check device constructed in accordance with one embodiment of the invention and mounted in operative relation to a door frame and door.

Fig. 2 is a fragmentary section taken substantially through lines 2—2 of Fig. 1 looking in the direction of the arrows.

Fig. 3 is a section taken substantially through lines 3—3 of Fig. 1 looking in the direction of the arrows.

Fig. 4 is a fragmentary section taken substantially through lines 4—4 of Fig. 1 looking in the direction of the arrows.

Fig. 5 is a fragmentary view, in part similar to Fig. 1, but illustrating a modified construction.

Fig. 6 is a view similar to Fig. 1 illustrating a second embodiment of the invention.

Fig. 7 is a fragmentary view in elevation taken substantially from lines 7—7 of Fig. 6 looking in the direction of the arrows.

Fig. 8 is a fragmentary section taken substantially through lines 8—8 of Fig. 6 looking in the direction of the arrows.

Fig. 9 is a view similar to Fig. 1 illustrating a third embodiment.

Fig. 10 is a view in elevation and partly in section taken substantially from lines 10—10 of Fig. 9 looking in the direction of the arrows.

Fig. 11 is a fragmentary section taken substantially through lines 11—11 of Fig. 9 looking in the direction of the arrows.

Before explaining in detail the present invention it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

In the drawings there are illustrated, by way of example, certain embodiments of the invention wherein there is shown at 15 a door frame to which is hinged at 16 an outer door 17, such as a storm door.

With reference to the check device illustrated in the embodiment of Figs. 1 to 4 inclusive, a channel shaped bracket 18 is secured by means of screws 18a to the bottom face of the upper jamb rail or header 19 of the door frame. A link

20 in the form of a flat bar or strip of metal is pivoted at its inner end to a screw 21 extending through a central hole in the bracket 18 and screwed into the header 19, the end of the link being held between the bottom face of the bracket and the head of the screw 21. The outer end of the link 20 extends between a pair of spaced plates 22 and is riveted thereto at 23. The plates 22 extend outwardly from the outer end of the link 20 substantially at right angles thereto and form in effect a lever or crank arm. Pivoted at 24, as by means of a pin or rivet extending through the outer ends of the plates 22, is a link 25 in the form of a flat metal strip or bar. This link is substantially the same length as the link 20 and is pivoted at its inner end by means of a vertical bolt 26 to the upper inwardly extending flange of an angle bracket 27 secured to the upper inner face of the storm door 17 by means of screws 28.

The link 25 is drilled to provide a hole 29 at a point spaced outwardly from the pivot 26 and the inner end of a tension spring 30 is hooked into this hole. The coil spring 30 in the closed position of the door 17 is under but slight tension and lies in a position substantially between the links 20 and 25 which extend substantially in parallel relation in the closed position of the door. The outer end of the coil spring 30 is hooked into a hole 31 in a cam lever 32, the outer end of this lever extending between the plates 22 and pivoted thereto, as by means of a pin or rivet 33, at a point intermediate the outer ends of the links 20 and 25. The cam lever 32 is contoured to provide an inclined cam edge 32*a* positioned for engagement with the rounded outer end 25*a* of the link 25 when the door is moved to predetermined open position.

In Fig. 1 three positions of the door 17 are shown in full lines and in dot and dash lines, the closed position of the door being indicated at A, a partial open position at B, and a full open position at C. As will be seen from an examination of Fig. 1, as the storm door commences its opening movement the links 20 and 25 will swing outwardly and the link 25 will move angularly relatively to the link 20. Due to the position of the connecting point 29 of the coil spring 30 the angular motion of the link 25 relatively to the lever arm 22 will result in progressively stretching or elongating the tension spring 30. This action will also result in swinging the cam lever 32 about its pivot 33, causing the cam lever to approach the pivot 24 of the outer end of the link 25. When the door 17 reaches the position shown at B, the cam lever 32 will engage the rounded end 25*a* of the link 25 as illustrated in Fig. 1. As the door swings open a further distance, as for example from the position B toward the position C, the rounded end 25*a* of the link 25 will exert a force on the cam lever 32 resulting in swinging the cam lever inwardly thereby progressively stretching the spring 30.

During normal use of the outer door 17 to permit ingress and egress, such as when the door is swung to the position B, the spring 30 will be stretched progressively but will not offer objectionably strong resistance to the opening of the door. However, when the door swings outwardly beyond position B, such as by the action of a strong wind, the force exerted by the end of the link 25 against the cam lever 32, causing the outer end of this lever to be swung inwardly away from the point of connection 29 of the inner end of the spring, will result in a material increase in the elongation of the spring which will, therefore, greatly increase its resistance to extreme opening movement of the door beyond the position B. The strength of the spring is selected so that it will offer sufficient resistance to extreme opening movement of the door so as to prevent any danger of the door contacting the wall of the building. Hence, any violent opening of the door by the force of a wind is fully cushioned and the danger of any damage on account of violent opening of the door is prevented.

The operation of the check device as modified in accordance with Fig. 5 is substantially the same as that above described. In this embodiment the outer end of the coil spring 30 is connected to an eye at one end of a link 35 which may be in the form of a flat metal strip. The opposite end of the link 35 is coiled about a stud 36 riveted to the plates 22 between which the link is interposed. The outer end of the link or arm 25 is in this embodiment pivoted at 24 to the upper face of the top plate 22 and rigidly secured between these plates is a cam 34 adapted to be engaged by the link 35 when the door reaches position B. As the door swings beyond this position toward position C, the link 35 is progressively wrapped around the curved surface of the cam 34 thus resulting in progressively stretching the spring 30. The stretching action produced by the wrapping engagement of the link 35 with the cam 34 is the same as the camming action produced by the engagement of the end of the link or arm 25 with the cam lever 32 in the embodiment of Fig. 1.

Referring to the embodiment illustrated in Figs. 6 to 8 inclusive, a channel shaped bracket 37 is secured to the header 19 by means of screws 38. The hooked end 39*a* of a coil spring 39 is connected to the side wall of the bracket 37 through the medium of a hole therein located at point 40. The outer hooked end 39*b* of the coil spring is connected to an eye 41*a* at one end of a link 41 which may be formed from a heavy piece of wire. The opposite end of the link terminates in an eye 41*b* to which is pivotally connected the outer end of a link 42 which may be formed of heavy gauge wire. The opposite hooked end of the link 42 is pivotally connected to a hook 43 having a threaded shank screwed into the storm door 17. A spring tensioning bar 44, which may be in the form of a channel having its inner end interposed between the flanges of the channel bracket 37, is pivoted to the latter by means of a rivet 45 extending through the flanges of the bracket 37 and riveted thereto. The outer end of the bar 44 is formed with an integral laterally extending lip 46 pierced to receive the link 41 and slidable thereon.

During normal use of the storm door 17 to permit ingress and egress, such as when the door is swung to the position B, the tension spring 39 will be stretched progressively by means of the tensioning bar 44 but will not offer undue resistance to the opening of the door. Due to the position of the point of connection 40 of the spring 39 to the bracket 37 with relation to the pivotal point of connection 45 of the bar 44 to the bracket, it will be seen that the bar 44 will stretch or elongate the spring 39 as the door moves open to the position B. During this time the lip 46 on the bar 44 will abut against the eye 41*b* on the link 41 and will exert an outward force causing the spring to be stretched as the door is swung to position B. When the door swings outwardly beyond position B the link 42 will stretch the spring an increasingly greater amount, and due

to this increased elongation of the spring the lip 46 will slide upon the link 41 as illustrated in Fig. 6. Thus, as the door is swung outwardly to an extreme position, such as by the force of a wind, the spring 39 and link 42 will assume a position in which they extend in alignment and, hence, very strong resistance will be exerted against violent opening of the door beyond position C.

In the embodiment illustrated in Figs. 9 to 11 inclusive, a length of chain 50 terminating in a connector 51 is secured at point 52 to the underside of the header of the door frame 15. The outer end of the chain 50 has an articulated connection with one end of a coil tension spring 53, and the outer end of this spring has an articulated connection with a second short length of chain 54. The outer end of the chain 54 is pivotally connected at 54a to a spring link 55. This link may be formed of suitable gauge spring wire bent into generally V-shape and provided with one or more coils 55a at the apex of the sides of the member 55. The terminal ends of the sides of this member are formed into a number of spring coils 55b and 55c which embrace a bolt 56 extending vertically through the spaced flanges 57a of a channel bracket 57. This bracket is secured by means of screws 58 to the inner side of the door 17 near the uper end thereof.

In the operation of the check device shown in Figs. 9 to 11 inclusive it will be readily seen that opening movement of the door 17, as from the closed position A to the partially open position B, will result in drawing the end 54a of the spring link 55 inwardly away from the face of the door, this link normally extending along the upper face of the door when the latter is in closed position. This action on the tension spring link 55, exerted by the chain and coil spring connection 50, 53 and 54, will result in progressively tensioning the spring link 55 and, hence, a moderate progresively increasing resistance will be exerted by the spring link 55 as the door moves open toward position B. This resistance offered by the spring link 55 will not be objectionably strong during normal opening of the door 17 to permit ingress and egress. However, in the event the door is swung open violently, as by the force of a wind, the spring 55 will be increasingly deflected, as shown in Fig. 9, and hence this spring will offer progressively increasing resistance to the opening movement of the door toward position C. When the door reaches this position the spring link 55 will be in alignment with the tension spring 53 and the chain connectors 50, 54. Further tendency of the door to open beyond position C will be resisted by spring 53 since the link 55 will then exert a direct pull on the tension spring 53 axially thereof. From the foregoing it will, therefore, be seen that in the embodiment of Figs. 9 to 11 inclusive the opening of the door from position A to position C will be resisted by the progressive deflection of the tension spring 55. Beyond position C the resistance to the opening of the door will be accomplished mainly by the stretching or elongation of tension spring 53 which will offer greater resistance to deflection than the tension spring 55.

I claim:

1. A door check for use with a door hinged at one edge to a fixed structure, comprising a pair of elongated members having an articulated connection at adjacent ends thereof and adapted to be connected at their opposite ends to the door and said structure respectively at points more remote from said hinged edge of the door than said articulated connection when the door is in closed position, said members being relatively movable angularly into substantial alignment when the door is swung to predetermined open position, one member being longitudinally stretchable when the members are disposed in substantial alignment and the other member extending its full length alongside and approximately parallel to the door when the door is closed and being bendable away from the door and thereby tensioned during predetermined initial opening movement of the door.

2. A door check for use with a door hinged at one edge to a fixed structure, comprising a pair of elongated members having an articulated connection at adjacent ends thereof and adapted to be connected at their opposite ends to the door and said structure respectively, said members being relatively movable angularly into end to end relation when the door is swung to predetermined open position, one member including a stretchable coil spring and the other member including a bendable spring adapted to be bent under tension during relative angular movement of the members prior to the disposition of the members in end to end relation, said bendable spring extending its full length alongside and approximately parallel to the door when the door is in closed position and said members extending from their end connections with said door and structure toward the hinged edge of the door when the door is in closed position whereby the articulated connection between adjacent ends of the members is disposed nearer the hinged edge of the door than said opposite ends of the members.

3. A door check for use with a door hinged at one edge to a fixed structure, comprising a pair of elongated members having an articulated connection at adjacent ends thereof and adapted to be connected at their opposite ends to the door and said structure respectively at points more remote from said hinged edge of the door than said articulated connection when the door is in closed position, said members being relatively movable angularly into substantial alignment when the door is swung to predetermined open position, one member being longitudinally stretchable when the members are disposed in substantial alignment and the other member extending its full length alongside and approximately parallel to the door when the door is closed and being bendable away from the door and thereby tensioned during predetermined initial opening movement of the door, means for connecting said one member to said structure, and means for connecting said other member to the door.

4. A door check for use with a door hinged at one edge to a fixed structure, comprising a pair of elongated members having an articulated connection at adjacent ends thereof and adapted to be connected at their opposite ends to the door and said structure respectively, said members being relatively movable angularly into end to end relation when the door is swung to predetermined open position, one member including a stretchable coil spring and the other member including a bendable spring adapted to be bent under tension during relative angular movement of the members prior to the disposition of the members in end to end relation, said bendable spring extending its full length alongside and approxi-

mately parallel to the door when the door is in closed position and said members extending from their end connections with said door and structure toward the hinged edge of the door when the door is in closed position whereby the articulated connection between adjacent ends of the members is disposed nearer the hinged edge of the door than said opposite ends of the members, means for connecting said one member to said structure, and means for connecting said other member to the door.

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REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
675,286	McCurry	May 28, 1901
796,420	Hall	Aug. 8, 1905
832,603	Fritts	Oct. 9, 1906
1,608,402	Larkin	Nov. 23, 1926
1,691,754	Busaker	Nov. 13, 1928
2,311,790	Tharp	Feb. 23, 1943