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HIDE-A-WAY DOOR STOP

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This invention relates to retractable door stops which are extendible from and retractible into a closure panel, where the extension and retraction of the door stop is effected by movement of the panel relative to the framing defining the aperture which the panel is intended to close.

A rubber-tipped door stop extending from the base of a door in the direction in which the door is swung open is often desired to prevent the door panel itself, or its handle, from striking an adjacent wall disposed in the path in which the door swings.

However, an un-retractable door stop constitutes an obstruction to cleaning, when the door is closed and may detract from the appearance of the door panel. Also, such a door stop may inadvertently be struck by the foot of an occupant of the room to cause a painful injury.

While door stops have been heretofore provided which have been hinged so that they may be turned against, or into the door panel, it has been necessary manually to pull them out into extended position, or to push them back against or into the door, as desired. If one forgets to set a door stop of this character in its required position, it is subject to the same disadvantages of a fixed stop member, or of not having any stop at all.

The present invention, in its application to a retractable door stop, serves to provide a rigid stop element which automatically retracts itself into the plane of the door panel when the door is closed, and, conversely, extends itself when the door is opened and the rigid door stop is needed.

By these automatic operations, the stop is drawn out of sight and eliminated as an obstruction or hazard when the door is closed, but is immediately extended to serve as a needed door stop whenever the door is opened.

This automatic extension and retraction is accomplished by providing a door stop which is pivotable about an axis substantially parallel to the door, and by arranging a gear type mechanism in the edge of the door panel to effect the desired door stop positioning, said gear mechanism being actuated by a matingly orificed striker plate which the gear contacts with the closing of the door.

The engagement of the gear mechanism with the striker plate further serves, incidentally, to prevent the door from rattling when subjected to wind or drafts.

The provision of a mating friction clamp element in the baseboard of the wall toward which the door swings will enable the door to be held in open position against the wall.

The preferred and other embodiments of the invention are illustrated in the accompanying drawings in which:

Fig. 1 is a perspective view showing the manner in which a door stop, constructed in accordance with the invention, is disposed and employed;

Fig. 2 is an enlarged fragmentary perspective detail showing a door stop mounting corner approaching the gear-actuating striker plate;

Fig. 3 is a horizontal section through a door panel equipped with the invention, the door being closed against the door jamb so that the gear mechanism is engaged with the cooperating striker plate to retract the door stop member;

Fig. 4 is a similar partial view, partly broken away showing the extension of the door stop member when the door is opened away from the door jamb;

Fig. 5 is a side elevation taken on the line 5-5 of Fig. 3;

Fig. 6 is a perspective view of a wall clamp member which may be employed to grip the door stop when it hits the wall toward which the door is swinging;

Fig. 7 is a perspective view taken from the underside of the door showing the manner of mounting another and preferred embodiment of the invention, the same being shown in full lines in closed position;

Fig. 8 is a partial side elevation showing the embodiment of Fig. 7 mounted below the lower edge of the door;

Fig. 9 is a similar partial side elevation showing the Fig. 7 embodiment mounted flush within the lower edge of the door;

Fig. 10 is a perspective view of a still further embodiment taken from above the level of the mounting plate;

Fig. 11 is a side elevation of the Fig. 10 embodiment taken in the direction of the arrow 11 on Fig. 10.

It will be seen from Fig. 1 that a retractable door stop constructed in accordance with the invention is comprised of one portion mounted on the lower corner 22 of the door panel 24, and a cooperating striker plate portion 26 which is set flushly in the lowered inner face 28 of the door jamb 30 in a line tangential to the arc circumscribed by the door corner 22 when the door is opened from, or closed against the jamb 30.

The portion 29 includes a four-sided corner mounting piece 21 and an elongate element 32 which, when pivoted to its extended position, serves as the actual stop member. The piece 21 is screwed onto the door corner 22 and serves pivotally to mount the element 32 on the underside of the lower edge 34 of the door panel 24, to pivot about a vertical axis 36, by means of an integral footplate 38 which is orificed centrally to receive a stud 40. The plate 30 is provided peripherally with a plurality of teeth 41, 42 disposed in an arc about the pivot axis. These teeth 41, 42 serve to engage, when the door panel 24 is closed against the jamb 30, a series of registering orifices 43, 44 in the striker plate portion 26 which is provided at the base of the door jamb 30 in a line tangential to the arc circumscribed by the corner 22 as the door is swung in against the jamb 30. As soon as the lead tooth 41 engages the first orifice 43, it is held in such orifice so that the door is permitted to close further only by pivoting the plate 30 and the integrally connected elongate element 32 about the vertical axis 36. As such pivoting continues the remaining teeth 42 engage the succeeding holes 44 until the elongate element 32 has swung 90° to retract itself wholly within the plane of the inner face of the door panel 24.

Conversely, as the door is opened the toothed footplate 38 and integral element 32 are pivoted about a reverse arc of 90° until the tooth 41 is freed from its receiving orifice 45 at which point the elongate element will have been swung outward of the plane of inner face 48 of door panel 48 until it assumes a position substantially perpendicular thereto.

Yieldable means must be provided, however, to retain the element 32 in such perpendicular disposition whenever the door is open, for two reasons: In the first place, the element 32 will be ineffective as a door stop in any other than such a perpendicular position since the force of wall striking the end 50 of the element 32 at any other angle than one of 90°, will cause the element to
pivot about its axis 36 until it moves back within the plane of the door face 48. In the second place, unless the element 32 is held normal to the door face 46, the teeth 41, 42 will not be properly aligned so that either the door 24 cannot close fully if the swing of the element 32 is restricted; or if it is not so restricted, then the element 32 may be undesirably pivoted to a disposition beyond the opposite outer face 42 of the door panel 24.

Such yieldable means thus required may comprise a wire spring 54, one end 56 of which is bent and inserted in a hole 58 in the element 32. The spring 54 is wrapped around the shank 60 of the stud 40 for at least one turn, and its opposite end 62 is brought to bear against a fixed short stud or projecting member 64. With this wire spring arrangement, it will be seen that the element 32 is continuously urged toward its fully extended position perpendicular to the door panel 24.

To prevent injury to the wall baseboard 66, the end 59 of the element 32 is capped with a sheath 68 of resilient material, such as rubber, and the baseboard itself may be provided with a female spring clip 70 to receive the thus-capped end 50 of the element 32.

The Fig. 7 embodiment of the invention substitutes for the corner mounting piece 21 of the Figs. 1–5 embodiment, a simple mounting plate 72 which is screwed onto the underside of the bottom edge 34 of the door panel 24. Plate 72 is orificed at 74 to permit a headed stud 40a to be passed therethrough and secured perpendicularly to the plate to provide means for pivotally mounting an elongate element 32a.

In this Fig. 7 embodiment, one side 76 of the element 32a is stepped at 78 and provided with a bore 80 normal to and into the step 76 slidably to receive one end 79 and a substantial portion of the length of a wire spring 82. The other extremity 84 of the spring 82 is passed through and held by a bored lug 86.

The orificed extremity 88 of the elongate element 32a is provided with a sufficient number of teeth 90 to engage the striker plate orifices 44 in the same manner as the teeth 41, 42 on the footing plate 38 of the Figs. 1–5 embodiment.

The Fig. 7 embodiment operates in substantially the same manner as the embodiment of Figs. 1–5. The element 32a is urged by the wire spring 82 into an extended position shown on dotted lines in Fig. 7 perpendicular to the door panel 24. However, when the teeth 90 are engaged in the striker plate orifices 44 (see Figs. 2, 3 and 5), the element 32a is caused to pivot in the direction of the arrow 92 about the axis of the stud 46a and in opposition to the bias of the wire spring 82 until the element 32a is disposed in the full line position shown in Fig. 7. During this pivoting of the element 32, the end 79 of the wire spring 82 slides axially and inwardly of the bore 80 to the dotted line position there shown. Conversely, when the teeth 90 are disengaged from the gear-like orifices 44 and the element 32a is pivoted back to decrease the angle at which the element 32 is disposed relative to the door panel 24, the spring 82 then takes over the positioning of the element 32 and causes it to be further pivoted until the element 32 is retracted under the lower edge 34 of the door panel 24.

In this process, the wire spring end 79 slides axially and outwardly of the bore 80 until it is disposed approximately at the point 81.

The Fig. 10 embodiment differs from that of Fig. 7 only in the type of biasing spring means which is employed with the element 32a. A helical spring 94 is disposed coaxially about a collar 96 through which the headed stud 40b is passed. The outer extremity 98 of the spring 94 is inserted in a slotted lug 100 where it is held against circumferential movement about the axis of the headed stud 40b. The inner end 102 of the spring 94 is secured to the collar 96, which, in turn, is locked against rotation relative to the stud 40b by the pin 104. A friction washer 106 is interposed between the collar 96 and the upper face of the element 32a to facilitate relative rotational movement of these two members. The protruding end 108 of the stud 40b may be peened over to prevent the element 32a from slipping off after mounting.

It may be seen that the Fig. 10 embodiment operates in the same manner as the Fig. 7 embodiment, the helical spring 94 simply providing the desired bias to pivot the element 32a into extended position when its teeth 90 are not engaged by the orifices 44 in the striker plate 26.

Other types of spring arrangements will doubtless occur to those skilled in the art, but all these are intended to be comprehended within the scope of the present invention.

It may be seen further from Figs. 8 and 9 that the embodiments of Figs. 7 and 10 may be mounted either below the lower edge 34 of the door panel 24, as in Fig. 8, or in a recess 110, as shown in Fig. 9.

The invention will be seen to provide a practical retractable door stop which may be fabricated inexpensively and mounted easily on the underside of a door panel.

The tooth-gear arrangement in cooperation with the spring bias exerted upon the pivotally retractable elongate door stop element provides a positive positioning action which appropriately disposes the door stop element in either extended position, when the door is opened away from the orificed striker plate, or retracted under, and in alignment with the plane of, the door panel, when the latter is closed.

I claim:

In a door hingedly mounted to open and close an aperture in a wall, an automatically retractable and extendible door stop comprising: an elongate flat element, said element being pivotably mounted adjacent one of its extremities on a horizontal edge of the door to pivot about a vertical axis from a retracted position within the planes of the faces of the door, to an extended position substantially perpendicular to the door; spring means urging said element to its extended position; said element including an outwardly facing arcuate toothed segment disposed fixedly in relation to, and at, the extremity of said element most proximate to the point of pivotal mounting; and cooperating means fixedly disposed in the portion of the wall defining said aperture, the last said means being further provided with orifices disposed to engage said arcuate toothed segment when the door is closed into the said aperture, thereby to cause said element to pivot about its axis in opposition to the urging of said spring means to its retracted position.

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