July 10, 1962 E. T. STROM 3,042,959

DOOR STOP

Filed March 21, 1958

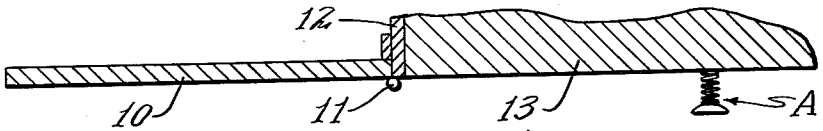


FIG. 1

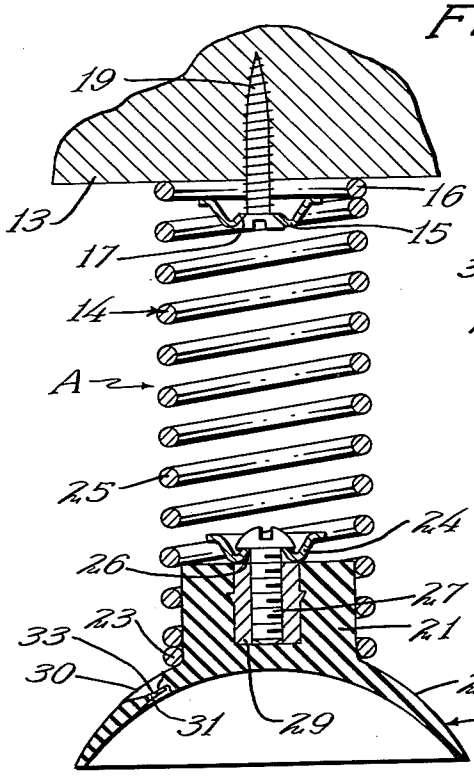


FIG. 2

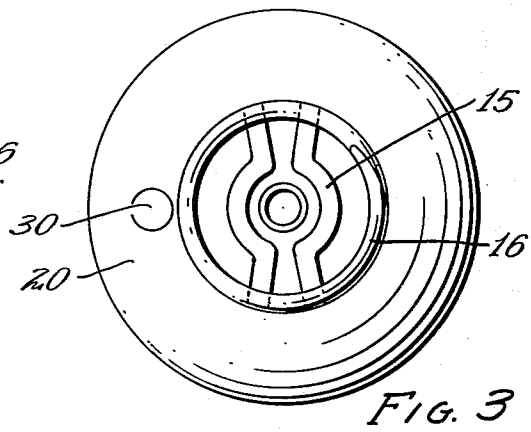


FIG. 3

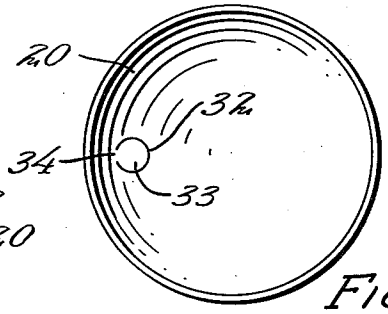


FIG. 6

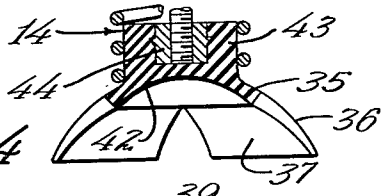


FIG. 4

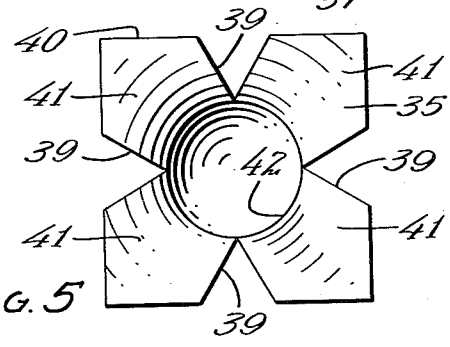


FIG. 5

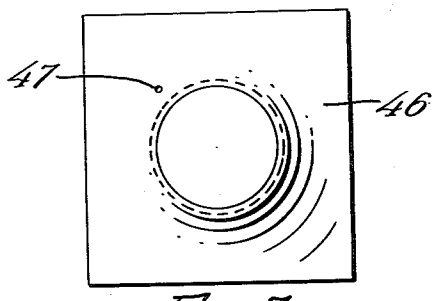


FIG. 7

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DOOR STOP

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4 Claims. (Cl. 16—86)

This invention relates to an improvement in door stops and deals particularly with a resilient cushioning member designed to engage against the door as it swings toward one extreme position in order to prevent the door from slamming against a wall or the like.

An object of the present invention resides in the provision of a suction cup device which is mounted upon the end of a spring which in turn is mounted upon a wall to project in a desired direction therefrom. This device is mounted in the path of movement of a door as it swings toward one extreme position which would normally be fully open position. As the door swings forcefully toward the wall, the surface of the door engages the suction cup which cushions the movement of the door and tends to stop its movement. If the door is swinging with sufficient force, this force will cause the supporting spring to contract thus further cushioning the movement of the door. As a result, the door will be limited in its movement and will stop movement gradually thereby preventing injury to the door or its supporting hinges.

A feature of the present invention resides in the provision of a device for checking the movement of a door as it swings toward an extreme position and which may be used in combination with a glass door or with a door having a glass window therein. The device acts to cushion the movement of the door and to bring it to a gradual stop without injury to the door.

A further feature of the present invention resides in the provision of a device of the type described incorporating a valve means for permitting air to enter the suction cup as the door moves away from the same. This may comprise a bleed valve but in preferred form comprises an integral flap valve which swings open as the door moves away from the suction cup to prevent the door from being held to the cup.

A further feature of the present invention resides in the provision of a device of the type described which may incorporate a series of resilient fingers which engage the surface of the door prior to the engagement of the door against the suction cup. These fingers gradually reduce the speed of movement of the door by flexing rearwardly upon engagement with the door but permit the door to engage the suction cup when the fingers are sufficiently flexed.

These and other objects and novel features of the present invention will be more clearly and fully set forth in the following specification and claims.

In the drawing forming a part of the specification:

FIGURE 1 is a diagrammatic sectional view through a door and frame and adjoining portion of the wall, showing a typical manner of mounting the door check.

FIGURE 2 is a sectional view through the device showing the construction thereof.

FIGURE 3 is an end view of the door check.

FIGURE 4 is a sectional view through a modified form of construction of cushioning means.

FIGURE 5 is an end view of the cushioning means illustrated in FIGURE 4.

FIGURE 6 is an end view of the door check shown in FIGURES 1 through 3, showing the end opposite that shown in FIGURE 3.

FIGURE 7 is an end elevational view of a modified form of suction cup.

FIGURE 1 of the drawing diagrammatically illustrates a door 10 which is hingedly secured by a hinge 11 to a door frame 12. The door frame 12 is mounted in a wall 13.

The door check A is mounted upon the wall 13 to extend in a direction substantially normal to the surface of the door 10 when it swings into engagement with the check.

As illustrated in FIGURE 2 of the drawing, the door check A includes an elongated spring 14 having an anchoring strip or plate 15 of sufficient length so as to bridge the end convolution 16 thereof engaging said convolution and secured inwardly of this end spring convolution 16. The anchoring strip 15 is dished or recessed and is provided with a central aperture 17 designed to accommodate a screw 19 or similar device which may be used to attach the spring in a desired position upon the wall 13.

A suction cup 20 is provided with a central projection 21 on its convex surface 22 to project axially from the cup. The cup 21 is of proper size to snugly fit within the end 23 of the spring 14. An anchoring strip 24, similar to the strip 15, bridges the sides of the spring 14 and is secured to one of the convolutions 25 thereof. This anchoring strip 24 is provided with a central aperture 26 designed to accommodate an anchoring bolt or screw 27.

The projection 21 accommodates an internally threaded nut or sleeve 29 which is embedded in the axis of the projection. The mounting screw 27 is threaded into the sleeve 29 to securely anchor the spring to the suction cup.

The outer surface 22 of the suction cup 20 is provided with a circular indentation 30 which extends most of the way through the body of the suction cup leaving a thin web 31 at the base of the indentation. This web 31 is cut along an arcuate line 32 defining a generally circular tab 33 which remains connected to the body of the suction cup 20 along an area of connection 34. The tab 33 provides a flap which may flex inwardly but which is prevented from flexing outwardly by means of an obstructing lip 28 integral with the cup 20. Thus, as the suction cup engages the surface of the door, there is tendency to compress air within the suction cup and to force the air outwardly between the periphery of the cup and the door surface. However, the flap 33 may flex inwardly if the interior of the cup is subjected to partial vacuum as the door 10 is moved away from the surface of the cup.

In FIGURES 4 and 5 of the drawings I disclose a modified form of construction which has certain advantages over the structure previously described. These figures show a suction cup structure 35 having a convex upper surface 36 and a concave under surface 37. As shown in FIGURE 5, the suction cup device 35 is generally square in outline and is provided with V-shaped notches 39 which extend from the periphery or outer edge 40 toward the center thereof. This divides the periphery of the suction cup device into a series of four radially extending resilient fingers 41 which are designed to engage against the surface of the door as the door swings toward the check and to check the movement of the door. The undersurface of the suction cup 37 is provided with a hollowed central portion 42 which acts to form the actual suction cup of the device. Thus, when the resilient fingers 41 flex to a sufficient extent so as to flatten against the surface of the door, the door engages the periphery of the suction cup 42. The apex of each notch 39 extends into close relationship with the periphery of this hollow center portion 42.

The suction cup device 35 is provided with a rearwardly projecting axial shank 43 in which is embedded an axial sleeve or nut 44 which is internally threaded to accommodate the fastening screw 27. The spring 14 and the remainder of the modified device is identical to that

previously described and illustrated in FIGURE 2 and accordingly is not shown in detail.

As will be seen, the supporting spring combines with the suction cup to gradually stop the movement of the door and to cushion this action to such an extent that the doors and door supporting means will be saved from injury even where the door swings against the check with a very considerable force. The check is extremely effective for use with glass doors and with doors containing glass windows and effectively prevents the breakage of the glass.

FIGURE 7 illustrates a modified form of suction cup of square outline, shown in general at 46. This shape of suction cup is advantageous in certain installations, such as where the suction cup engages a board which is relatively narrow. Due to the square shape, there is more actual cushioning area provided for a certain width of cup.

The cup 46 is shown as having a restricted opening 47 extending therethrough to break the vacuum within the cup. Thus, while the sudden slamming of the door against the cup will cause a partial vacuum tending to prevent rebound, the hole 47 will gradually admit air to permit the closing of the door without difficulty.

In accordance with the patent statutes, I have described the principles of construction and operation of my improvement in door stops, and while I have endeavored to set forth the best embodiment thereof, I desire to have it understood that changes may be made within the scope of the following claims without departing from the spirit of my invention.

I claim:

1. A door check including a coil spring having a plurality of spaced convolutions, means at one end of said spring for securing the spring to a wall, a suction cup device having an axial projecting shank engaged in the other end of said spring, sleeve means embedded in said axial shank, said suction cup being arranged with its periphery on a plane substantially normal to the axis of spring, said spring being simultaneously flexed laterally and compressed axially by the impact of a closing door to maintain said suction cup peripheral relation, and means attached to said sleeve securing said shank to said spring.

2. The construction described in claim 1 and in which the means at one end of the spring for attaching the spring to a wall includes a member bridging across a convolution of the spring.

3. A door check including a coil spring having a plurality of spaced convolutions, means at one end of said spring for securing the spring to a wall, a suction cup device having an axial projecting shank engaged in the other end of said spring, said suction cup being arranged with its periphery on a plane substantially normal to the axis of the spring, means securing said shank to said spring, and a flap valve forming a part of the body of the suction cup and being flexible inwardly into said cup.

4. A door check including a coil spring having a plurality of spaced convolutions, a first anchoring member near one end of said spring which extends between adjacent convolutions and engages one of said convolutions, said first anchoring member having a centrally located aperture, a first screw element projecting through said aperture in an axial direction from said spring and adapted to extend through said one spring end for engagement with a wall, the head of said screw element abutting said first anchoring member, a second anchoring member near the other end of said spring which extends between adjacent convolutions and engages one of said adjacent convolutions, said second anchoring member having a centrally located aperture, a second screw element projecting through the aperture of said second anchoring member, and a suction cup device having a shank and a sleeve imbedded in said shank, said sleeve being secured to said second screw element, said suction cup device being arranged with its periphery in a plane substantially normal to the axis of the spring, said spring being simultaneously flexed laterally as well as compressed axially by the impact of the closing door.

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