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COMBINED DOOR STOP AND HOLDER

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This invention relates to new and useful improvements in door stops, and has as its principal object the provision of a door stop which performs not only the usual functions of a door stop in arresting the opening movement of a door to prevent damaging contact thereof, or of its door knob, with adjacent walls or other building structures, but also engages and holds the door releasably in its open position, whereby to prevent it from swinging shut by accident, either by rebounding from the stop, or as a result of winds or drafts.

Another object is the provision of a combined door stop and holder of the character described in which the holding function is performed by a magnet. This eliminates most of the mechanical moving parts herefore required in latch-type or other mechanical door holders, and thus provides longer, more trouble-free life, as well as eliminating the distinct manual operations usually required to release such mechanical holders. In the present case the door is released from the magnet by pulling thereon with a force greater than could normally be exerted thereon by wind or the like.

A further object is the provision of a combined door stop and holder of the character described wherein the magnetic holder is normally disposed ahead of the stop, so as to be engaged by the door before the door engages the stop, but wherein the magnetic holder is yieldably supported in relation to the stop so as to be movable to a position rearward of the stop face. Thus the magnetic holder need never absorb the full impact or momentum of the door. The hammering effect of this impact could cause eventual misalignment of rigidly mounted parts, and breakage of magnets, which are inherently brittle.

A still further object is the provision of a combined door stop and holder of the character described wherein the magnetic holder comprises a magnet disposed in a carrier and having limited free movement relative to the carrier, whereby to allow accurate alignment and engagement of the magnet with a steel plate secured to the door, despite the fact that the carrier, being movable relative to the stop, may also move relative to the door, and despite the varying angularity of the door resulting from its hinged mounting.

Other objects are simplicity and economy of construction and efficiency and dependability of operation.

With these objects in view, as well as other objects which will appear in the course of the specification, reference will be had to the drawing, wherein:

FIG. 1 is a side elevational view of a combined door stop and holder embodying the present invention, mounted in a double door with parts shown in section, and FIGS. 2, 3 and 4 are fragmentary sectional views taken respectively on lines II—II, III—III and IV—IV of FIG. 1.

Like reference numerals apply to similar parts throughout the several views, and the numerals 2 and 4 apply respectively to the wall and floor of a building structure, the wall being equipped with the usual baseboard 6, while the numeral 8 applies to a door, it being understood that the door is hinged on a vertical axis, and that as said door approaches a fully open position, it is disposed adjacent wall 2.

The combined door stop and holder forming the subject matter of the present invention includes a shank portion 10 provided at one end with a flange 12 and a screw-threaded section 14, whereby the shank may be mounted in wall 2 as shown by screwing section 14 into baseboard 6, with flange 12 disposed flush against the baseboard. It will be clear that if the door is not adjacent to a wall when in its desired maximum open position, shank 10 could be angled downwardly and screwed into floor 4.

The opposite or outer end portion of shank 10 is disposed horizontally and generally at right angles to the plane of the door as said door approaches its fully open position. The extreme outer end portion 16 of the shank is reduced in diameter, and has a stop holder 18 secured thereon by a set screw 20. Said stop holder is cup-shaped, the recess 22 therein opening outwardly axially of the shank, and the actual stop consists of a bumper 24 of rubber or the like secured in said recess and extending outwardly therefrom. Said bumper is of course disposed in the path of door 8, so as to engage and arrest the opening movement thereof.

A forcibly facing shoulder 26 is formed integrally on shank 10 in spaced apart relation from stop holder 18, both the shoulder and the stop holder having a larger diameter than the shank. Mounted loosely on the shank between said shoulder and stop holder is an L-shaped sheet metal bracket 28, said shank passing through a loosely fitting hole 30 formed in the vertical leg of said bracket, while the horizontal leg of the bracket is spaced below stop holder 18. The vertical leg of said bracket is biased forwardly toward engagement with stop holder 18, as shown in FIG. 1, by a tube 32 of soft rubber or the like, disposed about shank 10, said rubber tube acting as a compression spring bearing at one end against shoulder 26 and at its opposite end against bracket 28. Secured to the horizontal leg of bracket 28, as by screws 34, is a magnet holder 36 consisting of a box formed of non-magnetic material and including a cover 38, also of non-magnetic material, secured thereon by screws 34. Formed within the box is a cavity 40 in which is loosely carried a permanent bar magnet 42 provided at its respective ends with pole pieces 44 and 46 which extend forwardly through slots 48 and 50 formed in the forward wall of the holder box. The size and configuration of cavity 40 is such that the magnet has free but limited movement with respect to the box in all directions, and may turn universally about the axis of the magnet, or about horizontal or vertical axes at right angles to the magnet. Nevertheless, the pole pieces 44 and 46 always extend forwardly through slots 48 and 50. Also, it will be seen that as long as rubber tube 32 holds bracket 28 firmly against stop holder 18, pole pieces 44 and 46 extend forwardly from the outer face of bumper or stop 24 so as to be engaged by the door before the door engages the bumper. The pole pieces of the magnet cooperate with a steel plate 52 secured to door 8 by screw 54.

In operation, it will be seen that as door 8 approaches its fully open position, steel plate 52 first engages and is magnetically secured to magnet pole pieces 44 and 46. Then, if the door is being opened with sufficient momentum to overcome the resilient resistance of rubber tube 32, said tube will be compressed by bracket 28, and magnet 42 will be moved in a direction parallel to the shank, until the door engages bumper 24, which arrests its movement. Rubber tube 32 will then force bracket 28 forwardly against stop holder 18, moving the door slightly apart from bumper 24. The magnet then retains the door open against accidental closure by winds, drafts, vibration, improper hinge mounting, and the like. However, the door may be freed from the magnet and closed whenever desired by application of considerable manual force thereto.

It is believed clear that a combined door stop and holder having several advantages has been produced. The magnet, by reason of the yieldable support of its holder,
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is relieved of the full hammering impact blows to which it would be subjected if it were rigidly mounted, and which could cause breakage of magnets, which are customarily brittle. Instead, the major portion of the impact is absorbed by bumper 24. The loose and free mounting of the magnet in its holder permits full and effective engagement between the pole pieces and door plate 52, despite the fact that inaccurate mounting of the door and stop elements might otherwise prevent such full engagement, as for example if the operative faces of pole pieces 44 and 46 were not exactly parallel to plate 52. Such inaccuracies or misalignments also result from the angular pivotal movement of the door, and from the fact that bracket 28 has a pivotal movement on shank 10, and also could be aggravated by gradual misalignment of the parts during usage, but are all compensated by the loose mounting of the magnet. Also this loose mounting, together with the fact that the magnet is normally disposed outwardly from bumper 24, permits full engagement of plate 52 with the magnet before impact with the bumper occurs. This renders any possibility that the shock and vibration accompanying the impact with the bumper will disengage the magnet much less likely. Such disengagement is rendered still less likely by the fact that the magnet and holder are resiliently supported by rubber tube 32 at the instant the door engages the bumper. Also, rubber tube 32 absorbs a substantial portion of the momentum of the door before the door engages the bumper, so that the door rebounds from the bumper with less force and is less likely to be disengaged from the magnet.

While I have shown and described a specific embodiment of my invention, it will be readily apparent that many minor changes of structure and operation could be made without departing from the spirit of the invention as defined by the scope of the appended claims.

What I claim as new and desire to protect by Letters Patent is:

1. A combined door stop and holder comprising:
   (a) a shank adapted to be affixed to a building structure adjacent a door,
   (b) a bumper affixed to the outer end of said shank so as to be engaged by said door as said door reaches its open position,
   (c) a magnet carrier mounted on said shank for movement longitudinally with respect thereto,
   (d) a magnet mounted in said carrier and adapted by said movement of said carrier to be moved from a normal position disposed outwardly from said bumper so as to be engaged by said door before said door engages said bumper to a retracted position disposed inwardly from said bumper, and
   (e) a ferrous metal plate adapted to be affixed to said door to engage said magnet.

2. A combined door stop and holder as recited in claim 1 with the addition of:
   (a) resilient means biasing said magnet holder outwardly to retain said magnet yieldably in its normal position.

3. A combined door stop and holder as recited in claim 1 wherein said magnet holder is slidably mounted on said shank between a pair of stops rigidly associated with said shank, said magnet holder being disposed against the first of said stops when said magnet is in its normal position, and with the addition of:
   (a) a resilient rubber tube disposed about said shank and compressed between said magnet holder and the second of said stops.

4. A combined door stop and holder as recited in claim 1 wherein said magnet is mounted in said holder for free but limited universal movement with respect thereto.

5. A combined door stop and holder as recited in claim 1 with the addition of:
   (a) resilient means biasing said magnet holder outwardly to retain said magnet yieldably in its normal position, and
   (b) wherein said magnet has limited free universal movement with respect to said magnet holder.

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