United States Patent [19]

Schroeder

[11] **3,791,687**

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[54] **POP UP MAGNETIC DOOR STOP AND HOLDER**

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[52] **U.S. Cl.** **292/251.5,** 292/DIG. 15

[51] **Int. Cl.** **E05c 19/16**

[58] **Field of Search** ..... 292/144, 251.5, DIG. 15

[56] **References Cited**

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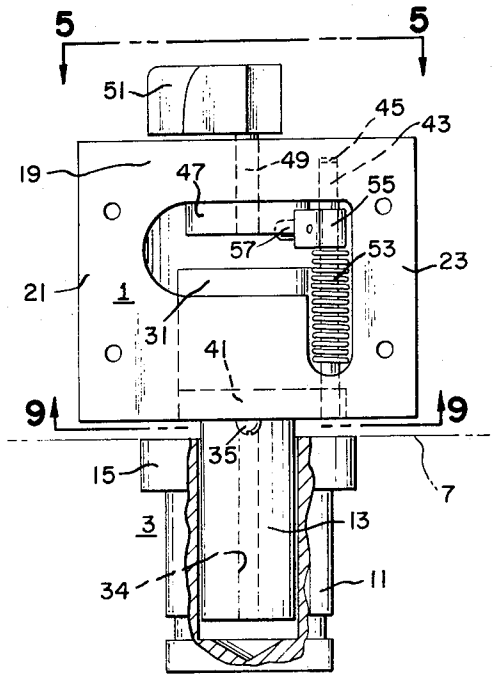
Primary Examiner—Richard E. Moore

Attorney, Agent, or Firm—Edward Brosler

[57] **ABSTRACT**

A cylindrical bar of magnetic material pops up from its installed position in a floor when a magnet, carried by a housing affixed to a door, reaches the position of installation of the bar, as the door is opened, such attraction of the bar to the magnet serving to stop and hold the door in its open position. A manually operable push member is capable of separating the cylindrical bar of magnetic material from the magnet, to weaken the holding power of the magnet, whereby the door may be closed when desired. A pair of small protuberances extending downwardly from the proximate end face of the magnet housing and forming a part thereof, enables this end of the housing to span the cylindrical bar when attracted to the magnet, whereby displacement of the door from its position is precluded until the cylindrical bar is pushed from its engagement with the magnet. One of the protuberances may extend lower than the push member when in down position, to always function as a stop to limit maximum opening of a door.

7 Claims, 9 Drawing Figures



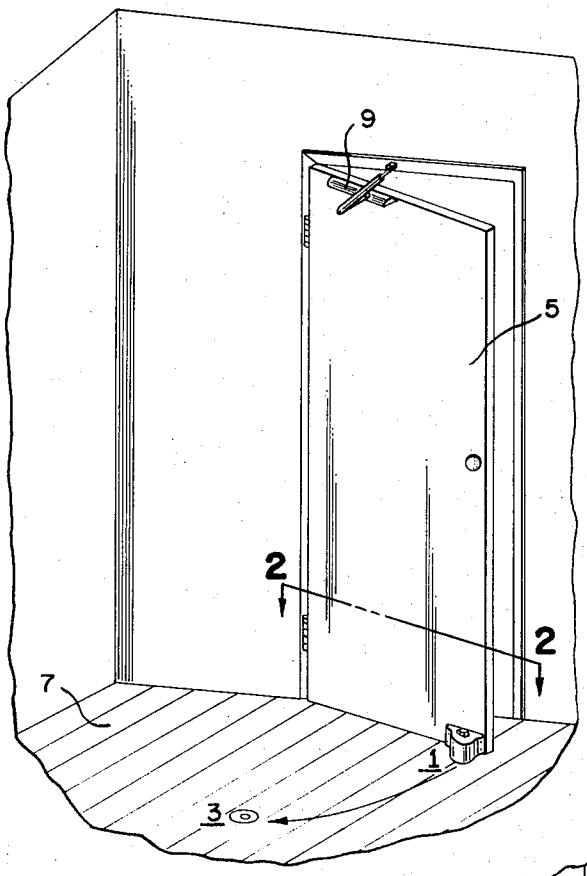


FIG. 1

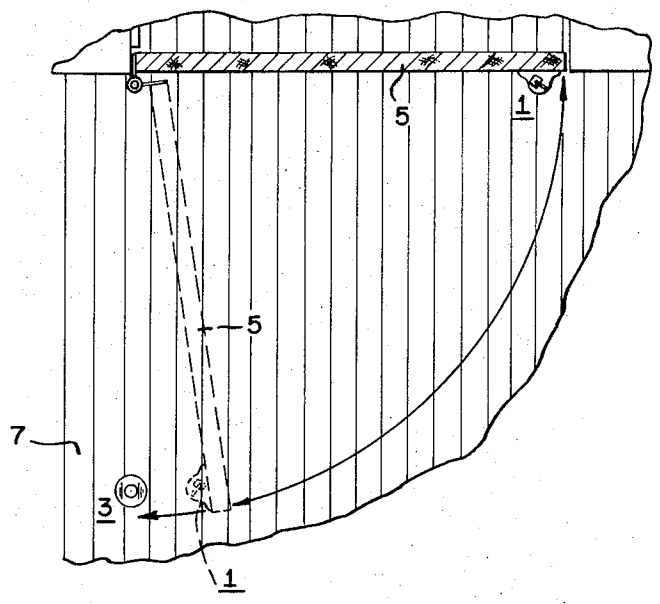


FIG. 2

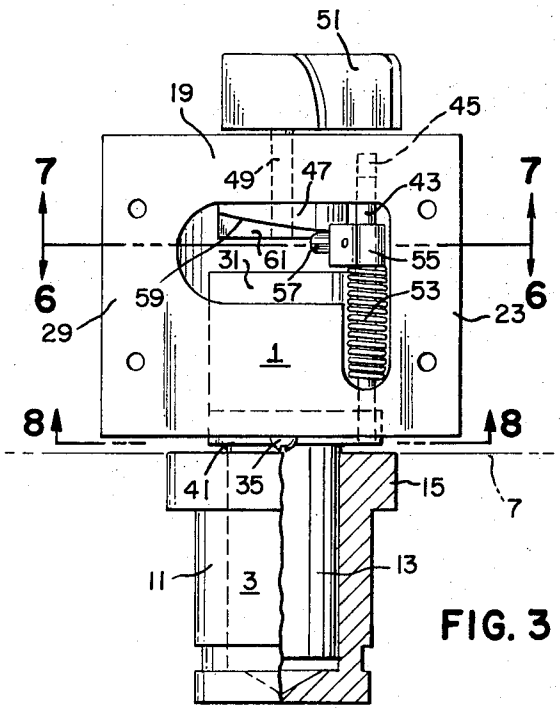


FIG. 3

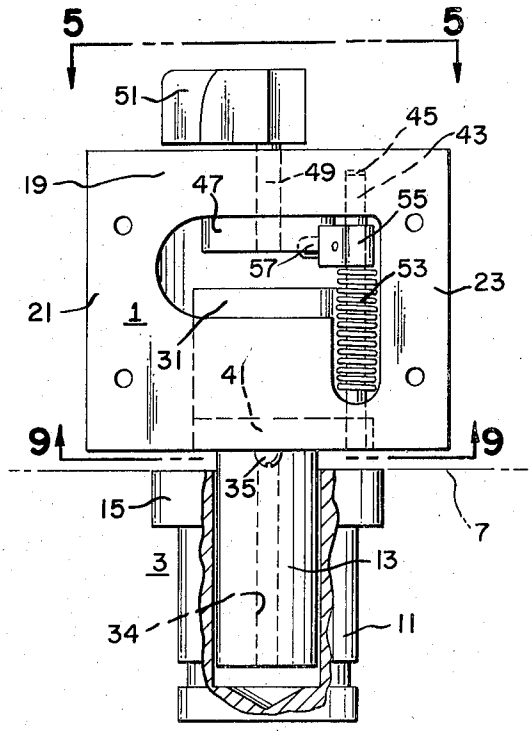


FIG. 4

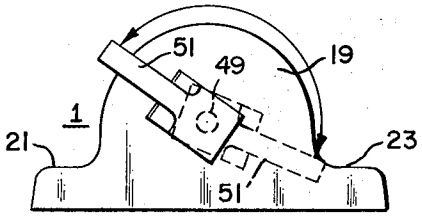


FIG. 5

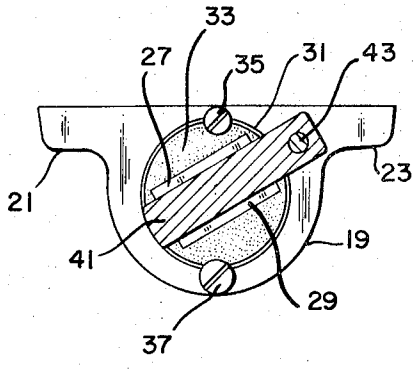


FIG. 8

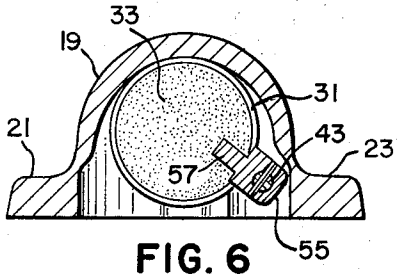


FIG. 6

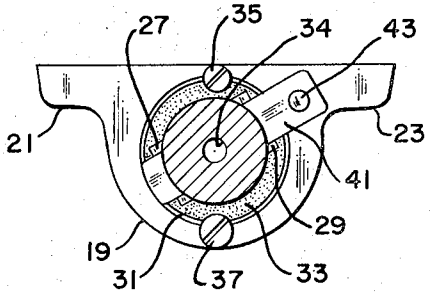


FIG. 9

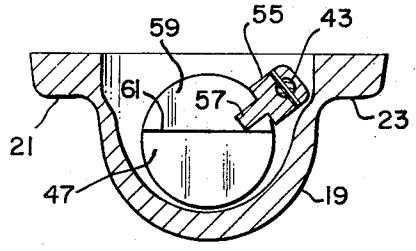


FIG. 7

POP UP MAGNETIC DOOR STOP AND HOLDER

My invention relates to door stops and holders, for stopping and/or holding a door in open position.

Many doors are provided with door closers or spring hinges, which cause an open door to move toward its closing position, unless otherwise restrained. To hold such door open, door holders are sometimes provided.

One such device is mounted on the trailing side of a door and involves a short rod hinged at one end to the lower portion of a door, and terminating at its free end, in a rubber plug or cap adapted to engage the floor, when the short hinged rod is permitted to drop to the floor. In such lowered position, the rubber plug or cap will engage the floor and frictionally impede the return of a door to its previous unopened position.

Another device for such purpose, involves a foot depressible rubber or like plug adapted to be pressured into engagement with the floor following the opening of a door, to retain the door in its open condition. Such device is usually provided with a foot releasable latch to permit spring return of the plug from its engagement with the floor to free the door for closing.

In neither case, does the device determine the open position of the door, which is left to the individual to determine. In both cases, the device functions as a stop by frictionally engaging the floor. Should the force exerted by the door closer overcome the frictional resistance of the holder, the holder will scrape along the surface of the floor, producing wear and unwanted markings.

Among the objects of my invention are;

1. to provide a novel and improved door holder which will additionally function as a door stop;
2. to provide a novel and improved door holder which cannot mar or damage floor surface;
3. to provide a novel and improved door holder which is simple and effective in its operation.

Additional objects of my invention will be brought out in the following description of a preferred embodiment of the same, taken in conjunction with the accompanying drawings wherein,

FIG. 1, is a three dimensional view depicting an installation of the present invention and showing the door in a partially open condition;

FIG. 2, is a view in section, taken in the plane 2—2 of FIG. 1, showing the door in its closed position, and in phantom, depicting the door approaching its desired open or stop position;

FIG. 3, is a view in elevation, and partly in section, illustrating the door stop and holder assembly of the present invention, and depicting the same in its nonfunctioning condition;

FIG. 4, is a corresponding view depicting the assembly of FIG. 3 in its energized functioning condition;

FIG. 5, is a plan view of the assembly of FIG. 3 to depict a manual control for adjusting the device between its functioning and nonfunctioning condition;

FIG. 6, is a view in section, taken in the plane 6—6 of FIG. 3;

FIG. 7, is a view in section, taken in the plane 7—7 of FIG. 3;

FIG. 8 is a view taken in the plane 8—8 of FIG. 3;

FIG. 9, is a view taken in the plane 9—9 of FIG. 4.

Referring to the drawings for details of my invention in its preferred form, the assembly may be considered as involving a pair of sub-assemblies 1 and 3, the one sub-assembly 1 for mounting adjacent the lower edge of a door 5 on either side thereof, and the other subassembly 3 to be installed in a floor 7 at a point on the arc traversed by the first subassembly upon opening of a door, such point determining the desired open position of the door, or the stop position thereof.

The invention is preferably for use with, though not necessarily limited to, a door provided with a door closer 9 as illustrated, or with spring hinges (not specifically illustrated), or with any other self closing mechanisms.

The sub-assembly for installation in the floor, comprises a cylindrical housing 11 of non-magnetic material such as aluminum, into which is slidably receivable, a cylindrical bar 13 which may be made wholly of magnetic material such as iron, or of aluminum and capped at its exposed end with a disc of magnetic material, whereby the overall weight may be considerably reduced, and, to further reduce the weight of this component, the bar may be recessed from its other end to form the equivalent of an aluminum tube.

The housing 11 is imbedded in the floor at the proper location, flush with the floor surface so as to offer no obstruction, either to the free swinging movement of the door, or to traffic by individuals. Preferably, the housing is provided with a heavy flange 15 to be recessed into the floor surface when the housing is installed.

The sub-assembly 1 for attachment to the door, involves a semi-cylindrical housing 19 provided with side flanges 21, 23 for affixing the same to the door.

Within the housing is a magnet which in the preferred embodiment illustrated, involves a pair of parallel spaced flat magnetic pieces 27, 29 supported within a cylinder 31 of nonmagnetic material such as aluminum, by a mastic or comparable material 33 having no magnetic properties. The spaced magnetic pieces are installed with an end of each exposed, and the cylinder containing the magnetic pieces is inserted through the bottom end of the housing into a cylinder chamber, where it is retained by a pair of diametrically located machine screws 35, 37 threaded into the bottom of the housing with their heads overlapping the edge of the cylinder containing the magnetic pieces. The screw 35 preferably extends lower than the other for reasons to be discussed.

As the door is swung open and the magnet arrives over the location of the sub-assembly in the floor, the magnetic bar will be instantly attracted into engagement with the magnet to impede further movement of the door and hold the same in position against the restoring action of the door closure.

In this situation, the end of the bar engaging the magnet will lie between the heads of the machine screws which hold the cylinder in place, and if such machine screws are both located on the arc defined by the travel of the magnet during opening of the door, such protuberances will trap the upper sub-assembly and function as mechanical stops against forcibly shifting the door from its desired position over the floor sub-assembly.

A close sliding fit of the bar 13 in its housing 11 is preferred. To assure against development of a vacuum on the up-stroke with such close fit, which could preclude pop-up action of the bar, and to avoid a slow re-

turn of the bar to its below floor level position, the bar is provided with a longitudinal vent passageway **34.**

To effect a release of the door from such a situation, I provide means for forcibly separating the bar **13** from its engagement with the magnet, and sufficiently to clear the obstruction offered by the protuberance **37,** but not the protuberance **35.** Thus, not only is the way cleared for closing movement of the door from its previously held position, but such breaking of engagement of the bar with the magnet reduces the magnetic force attracting the bar, whereby separation of the two subassemblies is thereby facilitated. Under these conditions, the door closer can then take over and effect an automatic closing of the door.

To effect such separation of the bar **13** from its engagement with the magnet, I provide a push element **41** located between the exposed ends of the spaced magnetic pieces **27** and **29,** and manually actuable means for exerting a force on said push element in the direction of the bar.

Toward this end, the push element is affixed to the lower end of a vertical rod **43** extending up into the housing **19,** where its upper end is slidably anchored in a recess **45** in the upper end of the housing.

A cam **47** located adjacent the roof of the housing **1** has a shaft **49** extending up through the upper end of the housing, to the end of which shaft is affixed a control knob **51.** A compression spring **53** installed on the rod, bears at its lower end against the floor of the housing, and at its upper end against a mounting **55** fixedly installed on the rod and from which extends a cam follower in the form of a pin **57** bearing against the cam under the action of the compression spring against the mounting.

The cam is of disc shape with a cam surface **59** occupying one half of the disc and constituting a planer surface sloping upwardly from a point slightly above the lower end plane of the disc. This forms a diametrical wall **61** limiting rotational movement of the cam to approximately 180°.

Within such 180° of movement, the cam follower will travel a vertical distance depending on the vertical rise of the cam surface and, being affixed to the push member **41,** the push member will move accordingly. The extent of such movement need only be such as to break physical contact between the magnet and the bar and cause the bar to clear the protuberance or such screw head **37,** to facilitate separation of the two subassemblies as previously described.

With an arrangement as described, it will be appreciated that upon opening of a door to its desired position, with the push member in its up non-functioning position, the magnet will promptly cause the bar **13** to pop-up into engagement therewith and hold the door in such position.

Under these conditions, the engaging end of the bar will lie between the screw head protuberances which function as stops to block any forcible attempt to move the door in either direction, the door being essentially locked in its open position.

To free the door for closing, the cam is rotated to cause a forcible separation of the bar from the magnet, and sufficiently to clear the protuberance **37.** The door closer can then take over the closing of the door, or in the absence of a door closer, the door may be closed manually.

On the other hand, should one not desire to so lock the door in its open position, the cam control knob **51** is rotated to effect a lowering of the push member **41.** When so adjusted, the bar **13,** upon the door reaching its location in the floor, will pop-up into engagement with the push member, but holding power will be sufficiently lower to permit closing under the action of a door closer, and in the absence of precautionary measures, the door could under these conditions be swung open beyond the floor installed sub-assembly and possibly do some damage.

However, by extending the protuberance or screw **35** to a point below the plane of the push member when in its low position, it functions as a limiting stop to opening of the door beyond this point.

From the foregoing description of my invention in its preferred form, it will be appreciated that the same is subject to alteration and modification without departing from the underlying principles involved, and I do not desire to be limited in my protection to the specific details so illustrated and described, except as may be necessitated by the appended claims.

I claim:

1. A pop-up magnetic door stop and holder assembly comprising a pair of sub-assemblies, one sub-assembly including a magnet, the other subassembly including magnetic material, means for affixing one of said subassemblies to a door, means for anchoring the other of said sub-assemblies to the floor at a location where it is desired to stop and hold a door in an open position, said magnet and magnetic material, when aligned in an installation, being sufficiently close to cause said magnet to attract said magnetic material to hold said door, and means for weakening the magnetic attraction of said magnet for said magnetic material in the absence of door movement and while said magnet and said magnetic material are still in such alignment, to facilitate a separation of said sub-assemblies.

2. A pop-up magnetic door holder in accordance with claim **1,** characterized by a physical stop depending from a location on the door sub-assembly such as to traverse the location of a floor sub-assembly before magnetic attraction between said magnet and magnetic material can occur, whereby upon such occurrence, said magnet and magnetic material, in the absence of said weakening of said attraction between said magnet and magnetic material, function to physically block return movement of said stop.

3. A pop-up magnet door stop holder in accordance with claim **1,** characterized by said means for weakening the magnetic attraction of said magnet for said magnetic material while still in such alignment, including manually operable means independent of door movement, for forcibly separating said magnetic material from said magnet.

4. A pop-up magnetic door stop and holder assembly in accordance with claim **3,** characterized by a door having one of said sub-assemblies affixed thereto, a floor having the remaining sub-assembly installed on an arc defined by said door during opening, a door closer on said door and exerting a closing force on said door when said door is in open position, said closing force being less than maximum magnetic holding force of said door stop and holder assembly but greater than the holding force of said weakened magnetic attraction due to said aligned separation of said magnet and magnetic material, whereby said door can be maintained in open

position but will automatically close upon such aligned separation between said magnet and said magnetic material.

5. A pop up magnetic door stop and holder in accordance with claim **3,** characterized by said separation means including a push member adapted to engage said magnetic material, and manually controllable cam means for urging said push member against said magnetic material.

6. A pop up magnetic door stop and holder in accordance with claim **5,** characterized by means for limiting the extent of movement of a door in the opening direction, to a position in line with said magnetic material, when said push member is in its functional position of separating said magnetic material from engagement against said magnet.

7. A pop up magnetic door stop and holder in accordance with claim **6,** characterized by said means for limiting the extent of movement of said door in the opening direction, including a protuberance extending from said first sub-assembly on the arc of movement of said sub-assembly when opening said door and terminating beyond the plane of said push member when in its functioning position.

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