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MAGNETIC DOOR STOP

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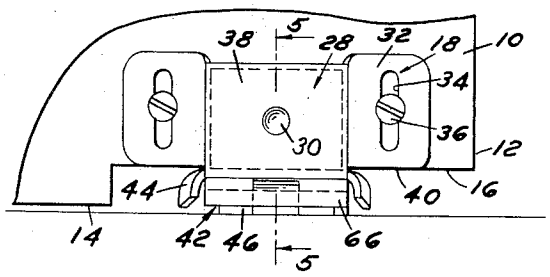

FIG. 1

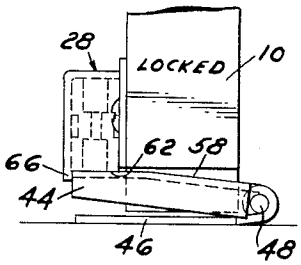

FIG. 2

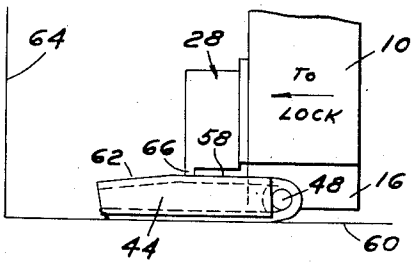

FIG. 3

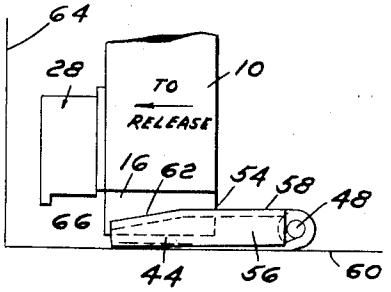

FIG. 4

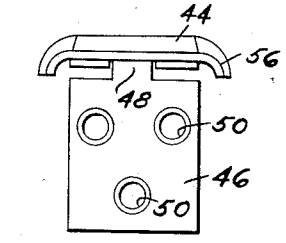

FIG. 7

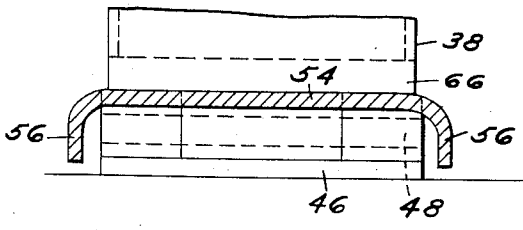

FIG. 8

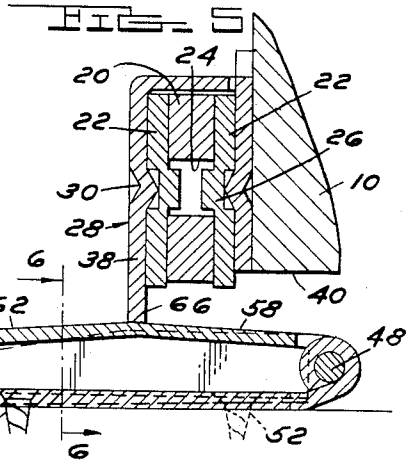

FIG. 5

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MAGNETIC DOOR STOP

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This invention relates to a door stop and more particularly to a door stop of the magnetic type.

It is an object of the present invention to provide a door stop which is designed to positively prevent movement of the door in one direction when engaged by the stop.

A further object of the invention is to provide a magnetic door stop which is arranged to positively prevent movement of the door in one direction when engaged with the stop and to permit ready disengagement of the magnetic stop with the door when the door is moved slightly in the opposite direction.

A further object of the invention resides in the provision of a magnetic door stop which is designed to be mounted on a floor and nevertheless avoid an unsightly appearance or a serious obstruction on the surface of the floor.

In the drawings:

Fig. 1 is a fragmentary elevational view of a door provided with the door stop of this invention.

Fig. 2 is a view similar to Fig. 1 viewing the arrangement from the free edge of the door.

Fig. 3 is a view similar to Fig. 2 and showing the door being shifted toward a position where it is positively engaged by the door stop, the door in the engaged position being shown in Fig. 2.

Fig. 4 is a view similar to Fig. 2 and showing the door being moved to a position releasing the door stop.

Fig. 5 is a sectional view taken generally along the lines 5—5 in Fig. 1 with the door and stop shown in the position illustrated in Fig. 3.

Fig. 6 is a sectional view along the lines 6—6 in Fig. 5.

Fig. 7 is a view of the strike plate forming part of the door stop of this invention.

Referring more particularly to the drawings, there is illustrated in Fig. 1 a door **10** which, in the arrangement shown, is hinged along one edge thereof, not shown, and has a free vertical edge at **12**. The lower edge of the door is designated **14**. In the arrangement shown, the lower outer corner of the door has a rectangular recess **16** formed therein; and directly above this recess **16**, a magnet assembly **18** is mounted. As is seen best in Figs. 1 and 5, magnet assembly **18** includes a magnet member **20**, preferably a ceramic magnet, provided with steel pole pieces **22** at the opposite faces thereof. Preferably, magnet **20** is fashioned with a central aperture **24** and pole pieces **22** are formed with dimples **26** which engage in aperture **24** to retain the pole pieces **22** in position at each side of magnet **20**. These members are encased within a housing **28** having dimples **30** thereon engaging the dimples **26** in the pole pieces **22** to hold the magnet and pole pieces in position within housing **28**. Housing **28** is fashioned with a pair of base flanges **32** for mounting the magnet assembly on the door. The flanges **32** are provided with elongated openings **34** through which mounting screws **36** may be driven to mount the magnet assembly on the door in a vertically adjustable position.

It will be noted that the pole pieces **22** project below the upper edge of recess **16** a slight distance and that the outer face **38** of housing **28** projects downwardly below the lower ends of pole pieces **22**. In a typical arrangement, the distance between the edge **40** of recess **16** and the lower edges of pole pieces **22** might be on the order of 1/16" and the distance between the lower edges of pole pieces **22** and the lower edge of face **38** of housing **28** might be on the order of 1/8".

The other component of the door stop of this invention comprises a strike plate **42**. Strike plate **42** comprises two plate members **44** and **46** hinged together as at **48**. The hinge plate **46** comprises a rectangular plate formed with openings **50** through which screws **52** may be driven to secure the strike plate **42** to the floor. Strike plate **42** is mounted on the floor in the path of movement of magnet assembly **18** preferably adjacent one of the limiting positions of the door; for example, adjacent the fully opened position of the door. Strike plate **42** is mounted on the floor so that the hinge axis **48** is disposed generally perpendicular to the path of movement of magnet assembly **18** and facing in a direction opposite the direction in which the door is moved to bring it into engagement with the door stop. For example, if the strike plate **42** is mounted so as to hold the door in opened position, it would be arranged on the floor so that the hinge pin **48** faces the direction in which the door is moved to the closed position.

Hinge plate **44** is generally U-shaped in cross section (see Fig. 6) and is fashioned with a top wall **54** and arcuate side walls **56**. To wall **54** has a portion **58** thereof adjacent hinge pin **48** generally parallel with the floor surface indicated generally at **60**. Top wall **54** has a second portion **62** which slopes downwardly from portion **58** in the direction of the free end of hinge plate **44**. By way of example, the portions **62** and **58** of top wall **54** may be inclined at an angle of about 10° relative to one another. Side walls **56**, as mentioned previously, are of arcuate configuration and also taper downwardly toward the free end of plate **44** (see Fig. 7). Thus, the hinge plate **44** in its normal position shown in Fig. 4 does not provide any substantial obstruction on the floor. This is especially true where the strike plate **42** is mounted on the floor so as to hold the door in the open position, in which case the strike plate would be mounted near the wall on which the door is hinged. This wall is generally designated **64** in Fig. 4. It will be observed that in the normal position, hinge plate **44** overlies and conceals hinge plate **46**.

To illustrate the operation of the magnetic door stop of this invention, refer first to Fig. 3 wherein the door **10** is shown as being swung towards the open position. As soon as the pole pieces **22** reach a position overlying the flat surface portion **58** of the top wall **54** of strike plate **44**, the magnetic attraction between hinge plate **24** and pole pieces **22** is sufficient to cause hinge plate **44** to swing upwardly into engagement with the abutment **66** provided by the lower edge portion of the face **38** of housing **28**. As the door continues to move further in the opening direction, abutment **66** remains engaged with the top face **54** and hinge plate **44** pivots upwardly still further as the abutment **66** rides over the inclined portion **62** of top face **54**.

As soon as the abutment **66** rides past the free end of hinge plate **44**, the hinge plate snaps upwardly into coplanar engagement with the lower edge of the pole pieces **22** and behind the abutment **66** (Fig. 2). The magnetic attraction between pole pieces **22** produces a braking effect on the swinging movement of the door and the door is thus held in the open position. In this position, engagement of abutment **66** with strike **42** positively prevents the door from being swung towards closed position. When it is desired to release the door from the strike, it is swung still further in the opening direction from the position

shown in Fig. 2 to the position shown in Fig. 4. As the pole pieces **22** ride past the end of the inclined portion **62** of the top wall **54** of hinge plate **44**, hinge plate **44** drops downwardly because of gravity to a position engaging the floor **60**. Thereafter, the door can be swung to the closed position.

In swinging to the closed position, when the lower edges of pole pieces **22** pass over the inclined portion **62** of top wall **54**, these surfaces are spaced apart such that the magnetic attraction between these members is insufficient to swing plate **44** upwardly. Thus, abutment **66** swings past the free edge of hinge plate **44**; and the hinge plate **44** is not pivoted upwardly by magnetic attraction until the pole pieces are substantially directly above the portion **58** of top wall **54**.

Thus, it will be seen that I have provided a magnetic door stop which is designed to positively prevent the door from being moved from one of its limiting positions when engaged by the door stop towards its other limiting position. At the same time, the magnetic door stop of this invention is fashioned such that the door may be released therefrom by simply moving it slightly in the opposite direction. It will be appreciated, of course, that the forming of the recess **16** at the lower outer corner of the door is not absolutely necessary. The door may be dimensioned in height so that there is sufficient clearance between its lower edge and the floor surface to accommodate the strike plate **42** as described.

We claim:

1. In combination, a door movable between open and closed positions, said door having a magnet assembly mounted thereon adjacent the lower edge thereof, said magnetic assembly having a downwardly facing magnetic face disposed at a level adjacent the adjacent lower edge portion of the door and having an abutment thereon projecting downwardly below said magnetic face, a strike plate mounted on the floor surface in the path of movement of said magnet assembly on the door, said strike plate being mounted adjacent one end of said path, said strike plate comprising first and second members hinged together, said first member being secured to the floor surface with the axis of the hinge disposed generally perpendicular to the path of movement of the magnet assembly whereby the second hinge member is free to swing from a position adjacent the floor upwardly to a position engaged by the magnet assembly when the magnet assembly swings to a position over said second hinge member, said second hinge member having a top face portion normally spaced below the path of travel of the magnet assembly a distance such that when the magnet assembly passes thereover, the second hinge member pivots upwardly towards said magnetic face in response to the magnetic attraction and having a second portion adjacent the first portion and disposed more remote from the axis of said hinge, said second portion being normally spaced below the path of movement of the magnet assembly a distance such that the magnetic attraction between the magnet assembly and the second hinge member is insufficient to pivot the second hinge member from said normal position upwardly into engagement with the magnet assembly when the magnet assembly is disposed directly above said second portion of said top face, said second portion of said second hinge member having an edge portion providing a shoulder movable upwardly into interengagement with said abutment in response to magnetic attraction between the second hinge member and the magnet assembly to prevent return movement of the door from said one end of said path.

2. The combination called for in claim 1 wherein said second portion of the top face of the second hinge member is inclined downwardly towards the floor surface in the direction of the free end of said second hinge member.

3. The combination called for in claim 1 wherein said magnet assembly includes a magnet and a housing enclosing said magnet, said abutment being fashioned as a lower edge portion of said housing and the lower end face of said magnet comprising said magnetic face.

4. The combination called for in claim 2 wherein the inclination of said second portion of said top face of the second hinge member is such that the second hinge member is adapted to swing upwardly under the influence of said magnet to a position wherein said second portion of said top surface is in substantially coplanar engagement with the lower end face of said magnet assembly.

5. The combination called for in claim 4 wherein said second hinge member overlies said first hinge member.

6. In combination, a door movable between open and closed positions, said door having a magnet assembly mounted thereon adjacent the lower edge thereof, said magnet assembly having a downwardly facing magnetic face disposed at a level adjacent the adjacent lower edge portion of the door and having an abutment thereon extending downwardly below said magnetic face, said abutment being disposed at the leading edge of said magnetic assembly in relation to the swinging movement of the door towards the open position, a strike plate mounted on the floor surface so as to be disposed directly below the magnet assembly when the door approaches said open position, said strike plate comprising a pair of members hinged together, one of said members being secured to the floor and the other being adapted to swing upwardly under the magnetic attraction of said magnet assembly, said other hinge member having a top face portion normally disposed below the path of said magnet assembly a distance such that when the magnet assembly passes thereover, the magnetic attraction is sufficient to pivot said other hinge member upwardly towards said magnetic face, said other hinge member also having a second top face portion contiguous to said first mentioned top face portion and extending therefrom in the direction of the opening movement of the door, said second top face portion extending to the free end of said other hinge member and being normally disposed below the path of travel of the magnet assembly a distance such that when the door is swung from open towards closed position, the magnetic attraction between said magnet assembly and said other hinge member is insufficient to pivot said other hinge member upwardly until said abutment travels past the free end of said other hinge member, said other hinge member being formed of magnetic material such that it remains in its upwardly pivoted position as the magnet assembly passes from over said first mentioned top face portion to the second mentioned top face portion whereby the door may be swung to a position wherein the free end of said other hinge member engages behind said abutment to prevent closing movement of the door.

7. The combination called for in claim 6 wherein said two top face portions of said other hinge member are contiguous and inclined relative to one another.

8. The combination called for in claim 6 wherein said strike plate is mounted on the floor with the axis of the hinge disposed generally perpendicular to the path of movement of the magnet assembly.

9. The combination called for in claim 6 wherein said magnet assembly includes a magnet and a housing surrounding said magnet, said housing having means thereon for adjusting the housing vertically on the door.

10. The combination called for in claim 7 wherein said magnet is provided with a pair of pole pieces having generally horizontally disposed lower faces forming said magnetic face, the inclination of said second mentioned top face portion of said other hinge member being such that when said other hinge member engages said magnet behind said abutment, said second mentioned top face portion is substantially in coplanar engagement with the lower end faces of said pole pieces.

11. The combination called for in claim 10 wherein

said abutment comprises a downward extension of one face of said housing.

12. The combination called for in claim 11 wherein said other hinge member comprises a top wall fashioned with said first and second mentioned top face portions and side wall portions.

13. The combination called for in claim 12 wherein said side wall portions are of arcuate cross section, the lower edges of said side wall portions in the normal position of said other hinge member engaging the floor surface and said side wall portions providing rounded surfaces extending from the floor surface to said top face portions of said other hinge member.

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