March 30, 1954 H. L. ASP 2,673,755

MAGNETIC DOOR CATCH

Filed April 1, 1950 2 Sheets-Sheet 1

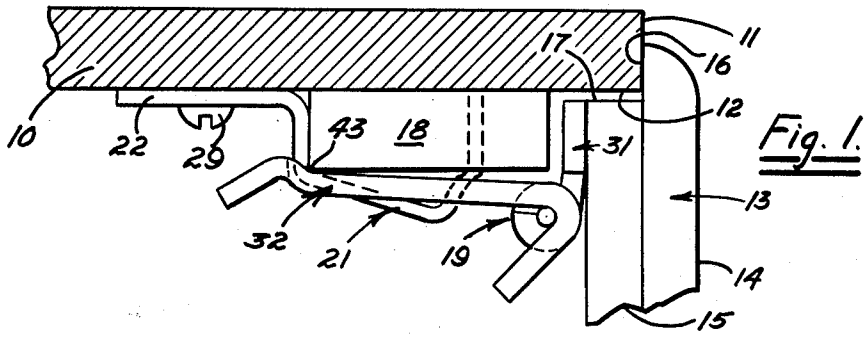


Fig. 1.

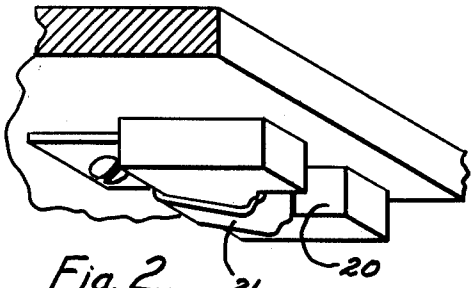


Fig. 2.

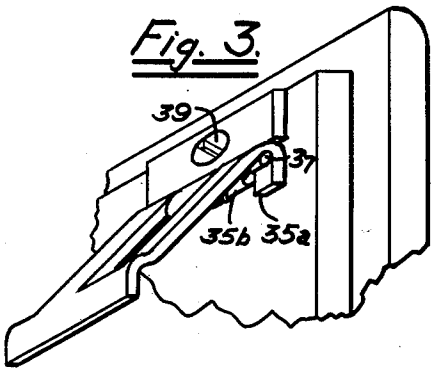


Fig. 3.

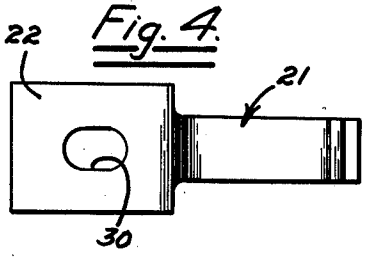


Fig. 4.

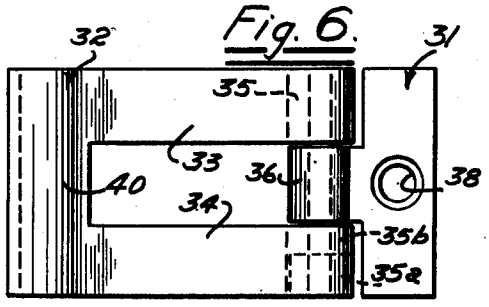


Fig. 6.

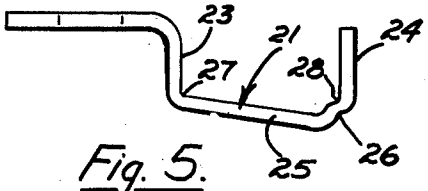


Fig. 5.

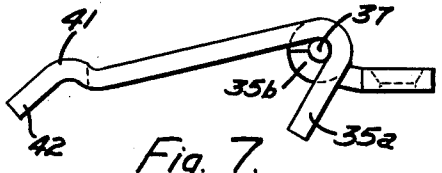


Fig. 7.

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March 30, 1954 H. L. ASP 2,673,755

MAGNETIC DOOR CATCH

Filed April 1, 1950 2 Sheets-Sheet 2

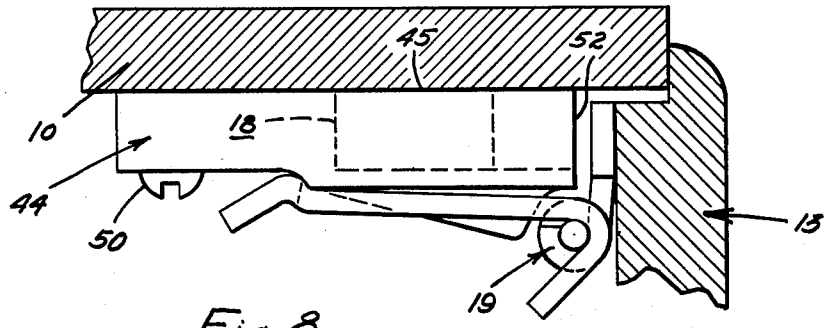


Fig. 8.

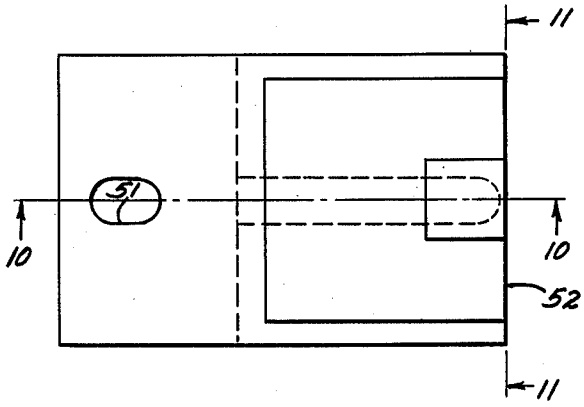


Fig. 9.

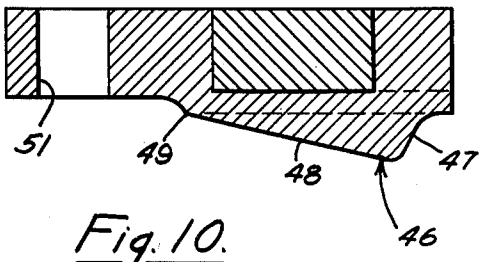


Fig. 10.

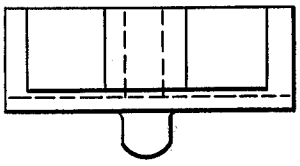


Fig. 11.

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MAGNETIC DOOR CATCH

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Application April 1, 1950, Serial No. 153,469

5 Claims. (Cl. 292—78)

1

This invention relates to door catches and particularly to such catches which utilize magnetic force as the principal holding force.

There has been proposed a magnetic door catch which is comprised of a magnet resiliently supported on the door frame, and an armature mounted on the door and adapted to be drawn to the magnet. The magnet and armature are aligned so that when the door is closed, the armature will strike the magnet and will be held by the magnet until released by the opening of the door. The resilient mounting of the magnet is relied upon to absorb the shocks of the closing of the door, but it is obvious that all of the shock cannot be eliminated and hence the magnet gradually deteriorates and may in time shatter. This is particularly true if the magnet is made of an alloy sold commercially under the trade name of "Alnico," which is quite brittle.

The principal object of this invention is to provide an improved door catch of the magnetic type in which the armature does not strike the magnet with the full momentum of the swinging door, but is nevertheless held firmly by the magnet.

Another object of this invention is to provide a door catch which utilizes both magnetic and mechanical forces for holding two separable members of a catch together.

It has also been found that where a magnetic door catch is so hinged that the armature strikes the magnet with the full momentum of the door, the armature may bounce away from the magnet when the blow is sufficiently severe. This necessitates using caution in the operation of the door and detracts from the general utility of the catch.

Another object of this invention is to provide a door catch of the magnetic type in which recoil upon a sudden closing of the door is reduced to a minimum.

A more specific object of this invention is to provide a door catch utilizing a magnet and armature in which the armature is in the form of a pivoted latch which is magnetically attracted and mechanically latched to the magnet.

Another specific object of this invention is to provide a means for controlling the rate of movement of an armature of a magnetic door catch toward and away from the magnet of the catch.

These and other objects of this invention will become apparent from the following description when taken together with the accompanying drawings in which

2

Fig. 1 is a side elevation of the catch of this invention with fragments of the door and cabinet to which the catch is attached;

Fig. 2 is an isometric view of the magnet used in the catch of this invention and of the means used to mount the magnet on the cabinet;

Fig. 3 is an isometric view of the armature used in the catch of this invention;

Figs. 4 and 5 are plan and side views, respectively, of the means for mounting the magnet of this invention in the cabinet;

Figs. 6 and 7 are plan and side views, respecsively, of the armature used in the magnetic catch of this invention;

Fig. 8 is a side elevation of a modification of the catch of Fig. 1;

Fig. 9 is a top or plan view of the catch of Fig. 8;

Fig. 10 is a section taken through the catch taken along line 10—10 of Fig. 9; and

Fig. 11 is an end elevation of the catch taken in the direction of arrows 11—11 of Fig. 9.

Referring now to the drawings for a detailed description of this invention and particularly to Fig. 1, there is shown a fragment 10 of the top of a cabinet having a front edge 11 and a bottom or inner surface 12. A fragment of a door 13, which may be hinged to the cabinet by any suitable means (not shown), is adapted to move to and from edge 11 substantially in the plane of the said top of the cabinet. Said door 13 in the form illustrated is formed from two pieces 14, 15, the latter piece 15 being shorter than the former so that a portion 16 of piece 14 overlaps piece 15 and constitutes a stop for the door. The top edge 17 of piece 15 clears surface 12 to avoid the possibility of binding.

The catch by which door 13 is held against the cabinet top 10 is comprised of a permanent magnet 18 and an armature 19. Any magnetic material capable of retaining its magnetism for substantially indefinite lengths of time may be used, but the material sold under the trade name of "Alnico" has been found to be best suitable for this purpose because of its high flux density and long retentivity. This material, however, is very brittle and hence care must be taken to protect it from shocks or jars. It is a feature of this invention that the armature of the catch does not strike the magnet with the full momentum of the door on which it is mounted. As will be described hereinafter, no springs are used to protect the magnet.

Magnet 18 is substantially U-shaped, leaving a recess 20. Said magnet 18 is held in place against surface 12 by a clip 21 which may be of

nonmagnetic material such as brass, having a substantially rectangular portion 22, a pair of parallel sections 23, 24, the latter sections being connected by an angularly disposed section 25 and a short curved section 26. Two corners 27 and 28 are formed where sections 23 and 25 join and where sections 24 and 26 join, respectively. Said corners 27, 28 are relied upon to contact magnet 18 so that when rectangular section 22 is flush with surface 12, said magnet 18 will be likewise held against surface 12, section 24 being received in recess 20 so as not to interfere with the operation of magnet 18.

Clip 21 is secured to top 10 by a screw 29 passing through an opening 30 which is elongated as shown to permit clip 21 to be adjusted toward or away from door 13 as desired.

The armature 19 is comprised of two parts 31 and 32 made of magnetic material. Part 32 is U-shaped, the sides 33 and 34 of which are spaced apart a distance greater than the width of sections 25 and 26 of clip 21 so that sections 25 and 26 may pass through the space defined by said sides. The ends 35 and 35*b* are bent into substantially closed loops. The part 35*a* of the side 34 is bent back approximately 135 degrees, the purpose of which is to provide a stop for armature part 32 to hold said part 32 at an angle of approximately 45 degrees from the back of door 13 and hence in closer relation to magnet 18.

Armature part 31 has a tongue 36 extending between sides 33, 34, said tongue being bent back upon itself and around a hinge pin 37, the latter also being received in the closed loops formed in ends 35 and 35*b*, thereby effectively providing a pivoted support for part 32 with respect to part 31. Said part 31 is formed with an opening 38 which, as shown in Fig. 3, serves to receive a screw 39 by which part 31 is secured to door 13.

The cross member 40 of armature part 32 is formed with a ridge 41 as seen in profile in Figs. 1, 3 and 7, with the end 42 bent at an angle with respect to the plane of sides 33 and 34.

The parts of the catch are mounted on the door and cabinet as shown in Fig. 1. It will be observed that part 31 is sufficiently close to magnet 18 to be attracted thereto, but is not physically in contact therewith. In this position, door 13 is in contact with front edge 11 of the cabinet and hence contact between armature part 31 and magnet 18 is thus impossible. It will also be observed that ridge 41 is hooked over the corner 43 of magnet 18 so as to impose some mechanical resistance to movement of part 32 to the right as viewed in Fig. 1. Because of the general proximity of part 32 to magnet 18 and the actual contact therewith at corner 43 the former will be held firmly in the position shown in Fig. 1 by magnet 18. In addition to the mechanical resistance and the resistance to sliding over the surface of magnet 18 and said part 32, it will be noted that part 32 must be rotated about its hinge pin 37 in a direction substantially directly opposing the force of attraction of magnet 18, this rotation being compelled first, by corner 43 and ridge 41, and, second, by the inclination of section 25 of clip 21 with respect to magnet 18. Cross member 40 must ride over said section 25, and in so doing it will be drawn farther and farther from magnet 18. If the movement of door 13 is sudden enough, part 32 will be rotated out of the sphere of influence of magnet 18, and part 31 being likewise too distant from magnet 18 to exercise any appreciable effect on the door, the latter will swing free.

When door 13 is open, the parts of armature 19 first assume the position shown in Fig. 3. If the said door is closed slowly, parts 31 and 32 will not be attracted appreciably until the door is almost completely closed. The magnet 18 will be nearest the portion of part 32 which is adjacent hinge pin 37 and will then draw the entire part toward itself. This causes part 32 to swing upward as viewed in Fig. 1, with cross member 40 striking section 25 of clip 21 and then sliding along said section 25 until ridge 41 is latched over corner 43. While cross member 40 is sliding along section 25, the force of attraction is increasing inversely as the square of the distance between the magnet 18 and armature parts 31 and 32. The actual shock of the closing of the door is not taken by the magnet, but by the cabinet itself.

Should door 13 be slammed shut with average force, that is, with the force normally used to operate a spring detent type of catch, the latching of armature part 32 over magnet 18 will prevent door 13 from bouncing open. Furthermore, it will be observed that for each increment of opening of door 13, there is not an equivalent separation of armature part 32 and magnet 18. Thus the rate of separation of armature part 32 is slower than the rate of opening of door 13 and hence the force of magnetic attraction is felt for a larger opening of door 13 than is the case with prior magnetic catches. This difference in rates of separation accounts for the lack of "bounce" in the present catch. This absence of "bounce" enables the present catch to hold the door shut against the air pressure that develops in multi-door cabinets when any one door is slammed.

The modification shown in Figs. 8 to 11 differs from the form just described in that clip 21 is eliminated and its function is performed instead by a molded plastic body which surrounds magnet 18 on two sides and serves to support the magnet from the cabinet. The armature used with the Fig. 8 form is identical with the one shown at 19 in Fig. 1 and hence will not be described again.

Referring now to Figs. 8 and 11, magnet 18 is embedded in a body 44 of one of the commercially available resins suitable for use as cabinets, receptacles, knobs, etc. where resistance to shock and abrasion is a prime requisite. Some of the melamine resins, particularly those which can be colored to match the colors of kitchen cabinets, would be suitable as well as the vinyl resins frequently used for brushes, combs and other toilet articles. The magnet is most simply embedded in the body 44 by molding the plastic around the magnet. The mold is so shaped as to cover all but one side 45 and the pole ends of the magnet 18. A rib 46 is formed centrally of the body 44, said rib being narrow enough to be received between the sides 33 and 34 of armature part 32. It is provided with a substantially curved surface 47, an inclined surface 48 and a corner 49. These are the counterparts of curved section 26 and inclined section 25 of Fig. 1 and corner 43 of magnet 18 and perform the same function. The body 44 is held against cabinet top 10 by a screw 50 which passes through an opening 51 which is elongated to permit slight adjustment of the magnet 18 toward or away from the door 13. The end 52 of magnet 18 is left uncovered by the body 44 so that armature 19 can still be brought in close proximity to magnet 18 without actually contacting it.

The catches described above are thus both magnetically and mechanically operated, the mechanical part serving to protect the magnetic part from shock and also adding a mechanical resistance to the existing magnetic resistance operating to hold the parts of the catch together. The catches may be used to hold any separable parts together, such as doors, drawers, covers, clasps, etc. which move in a predetermined path.

It is understood that the foregoing description is merely illustrative of preferred embodiments of this invention and that the scope of the invention therefore is not to be limited thereto, but is to be determined by the following claims.

What is claimed is:

1. A catch for separable devices, said catch comprising a U-shaped magnetic member, a support for the magnetic member adapted to be mounted on one of the separable devices and comprising a body of moldable material covering all but the ends of the U and one side, an armature adapted to be pivotally mounted on the other of the separable devices and adapted to move into proximity to the magnetic member so as to be attracted thereby and rotated about its pivotal mounting toward the said magnetic member, said body having formed thereon an inclined surface and a corner, whereby the pivotally mounted armature slides along the inclined surface into proximity to the magnetic member and becomes latched over said corner, said pivotally mounted armature having a curved surface to effect the latching of the armature as aforesaid.

2. A catch for separable devices, said catch comprising a magnetic member adapted to be mounted on one of the separable devices, an armature adapted to be pivotally mounted on the other of the separable devices and adapted to move into proximity to the magentic member so as to be attracted thereby and rotated about its pivotal mounting toward the said magnetic member, and means interposed between the armature and magnetic member for guiding the movement of the armature toward the magentic member, a second armature adapted to be fixed to the said other of the separable devices and adapted to be brought into proximity to the said magnetic member when the separable devices are brought together, said pivoted armature being in the form of a U, a pivot pin supported by the second armature, a portion of one side of the U being bent around the pin to form an acute angle with respect to the main plane of the U so as to contact the said other of the separable devices when the armature is separated from the magnetic member and prevent the pivoted armature from swinging beyond the effective field of attraction of the magnetic member.

3. A catch for separable devices, said catch comprising a U-shaped magnetic member, a support for the magnetic member adapted to be mounted on one of the separable devices and

comprising a body of moldable material covering all but the ends of the U and one side, an armature adapted to be pivotally mounted on the other of the separable devices and adapted to move into proximity to the magnetic member so as to be attracted thereby and rotated about its pivotal mounting toward the said magnetic member, another armature adapted to be fixed to the other of the separable devices and adapted to be brought into proximity to the ends of the U when the said devices are together to hold said devices together, said body having formed thereon an inclined surface and a corner, whereby the pivotally mounted armature slides along the inclined surface into proximity to the magnetic member and becomes latched over said corner, said pivotally mounted armature having a curved surface to effect the latching of the armature as aforesaid.

4. A catch for a swinging door or the like hinged in a vertical plane to a cabinet having a top against which the door is adapted to abut, said catch comprising a magnetic member adapted to be mounted on the inside of the top adjacent the door, an armature adapted to be pivotally mounted on a substantially horizontal pivot on the door and adapted to be swung into proximity to the magnetic member as the door is closed and made to abut on the said cabinet top so as to be attracted thereby, said armature tending to fall away from the magnet by gravity, a stop on the pivoted armature for acting against the door to hold the said armature in an inclined position relative to the plane of the door and within the sphere of influence of the magnet when the said door is closed, said magnet pulling said armature up against gravity, means on the said armature and magnet comprising a latch when the said armature is pulled up by the magnet, said latch resisting opening of the door but not the swinging of the armature about its pivot, and a second armature adapted to be fixed to the door and adapted to be attracted to the magnet when the door is closed and to perform the major portion of the holding function of the catch.

5. A catch as described in claim 4, said horizontal pivot being mounted on the second armature such that said pivotally mounted armature and said second armature form a unit for attachment to the door.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,453,021	Konelsky	Nov. 2, 1948
2,475,226	Ellis	July 5, 1949
2,497,697	Smith	Feb. 14, 1950
2,519,435	Byrd	Aug. 22, 1950

FOREIGN PATENTS

Number	Country	Date
21,263	Great Britain	Dec. 5, 1891