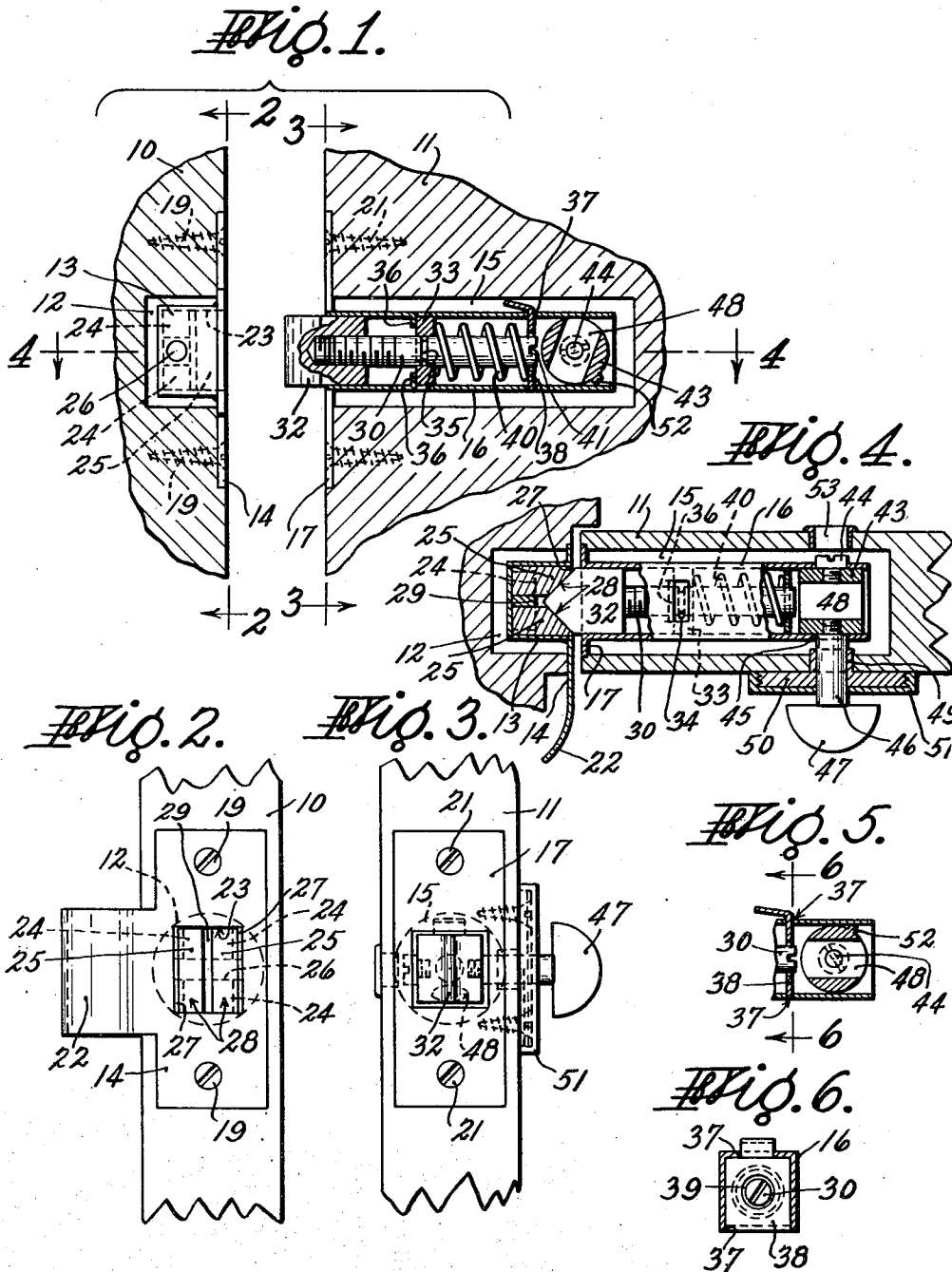


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MAGNETIC DOOR LATCH
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MAGNETIC DOOR LATCH

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This invention relates to improvements in magnetic latch structures and particularly to such latches for doors.

An object of this invention is to provide a latch construction which will firmly hold a door closed and prevent rattling, yet which will allow the door to be easily opened and closed without the necessity of turning a door knob.

Another object of the invention is to provide a magnetic latch with conveniently accessible means for adjustment of the latch to compensate for shrinkage or expansion of a door.

A further object of the invention is to provide a latch of simplified yet durable design which can easily be installed with a minimum of labor.

A still further object of the invention is to provide a permanent magnet in a door latch with a simplified mechanical locking device and all mounting structure concealed except for a lock lever at the side of a door.

These and other objects and advantages of the invention will become apparent from the following description of the same as disclosed by the accompanying drawings, in which:

Fig. 1 is a sectional view with parts broken away of a latch structure constructed in accordance with the invention and shown with the two sections thereof mounted in position on a door and door jamb respectively;

Fig. 2 is a front view on line 2-2 of the latch strike shown in the door-jamb as in Fig. 1;

Fig. 3 is a similar view on line 3-3 showing the latch portion on the door as in Fig. 1;

Fig. 4 is a section taken on line 4-4 of Fig. 1 with the latch engaged in the strike;

Fig. 5 is a fragmentary detail view to show the lock of the device in unlocked position; and

Fig. 6 is a view on line 6-6 of Fig. 5.

Referring to the drawings, 10 represents a casing member or door-jamb and 11 a closure member for the casing as a door. An opening or recess 12 is bored or otherwise formed in the edge of door-jamb 10 for a magnet housing 13 and is mortised for a strike plate 14 attached to the housing 13. The door 11 also has an opening or recess 15 for a latch bolt housing 16, the door edge being mortised for a latch plate 17. Strike plate 14 is provided with mounting holes and screws 19 hold the plate 14 and housing 13 firmly in the casing 10. Latch plate 17 is likewise fixed to the facing edge of door 11 as by screws at 21. Strike plate 14 has a usual curved striking portion 22 (Fig. 4) which extends beyond the jamb at the side toward

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which the door opens. The openings 12 and 15 are here shown as circular bored holes as the most convenient method of providing recesses for the housings which are tubular in form and rectangular or square in cross section to fit snugly in said openings.

Strike plate 14 is provided with a latch receiving recess or opening 23 and the magnet housing 13 is soldered or otherwise attached to the back of the strike plate bordering the opening 23.

In the magnet assembly shown by the drawings, housing 13 contains permanent magnets 24 with pole pieces 25. Both housing 13 and strike plate 14 are of non-magnetic material, such as brass, and magnets 24 are separated in the housing 13 by a brass rivet 26. Pole pieces 25 have leading edge portions 27 flush with the strike plate 14 and beveled faces 28 extending inwardly into the housing 13 to form a latch recess.

A plate of brass 29 or other non-magnetic material is interposed between magnets 24 and the inner edges of faces 28 of pole pieces 25 filling the space between the two pole piece faces 28 in the latch recess.

The latch bolt housing 16 and latch plate 17 are also of non-magnetic material, such as brass. Housing 16, as illustrated, is an open-ended tube soldered or otherwise attached at one end to latch plate 17.

The latch bolt is mounted for reciprocating movement in housing 16 as will be described. The bolt consists of a plunger 30 having a threaded forward end which engages a threaded socket in the inner end of a ferromagnetic or paramagnetic latch piece 32. The outer or forward end of latch 32 is beveled at each side to fit in the latch recess of strike plate 14 and seat against the beveled faces 28 of pole pieces 25.

A plate or nut 33 is attached to plunger 30 as by a pin 34 extending through the plate 33 and in a circular groove as at 35 cut transversely in the cylindrical surface of plunger 30. Plate 33 slidably abuts the inner surfaces of the rectangular housing 16 and flanges 36 are struck inwardly from the walls of housing 16 to provide a forward stop for the plate 33. Slots 37 cut in opposite walls of the housing 16 rearwardly thereof hold tongue extensions of a stationary plate 38 which is spaced from the forward position of plate 33. Spacer plate 38 also has a central opening 39 for movement of plunger 30 rearwardly of the plate.

In the bolt housing 16 between plate 33, fixed to plunger 30, and spacer plate 38, fixed on the

housing, is a compressed spring 40 coiled around plunger 30. The rear end of spring 40 abuts plate 38 and the front end of the spring abuts plate 33 so that plate 33 is normally urged against the flanges 36. Thus latch 32 is normally positioned outwardly of the plate 17. When the door is closed it is seated into the recess of plate 14 being firmly held by pole pieces 25 of magnets 24.

A screw driver slot 41 is provided in the end of the plunger 30 for adjustment of the latch 32 when necessary to compensate for door shrinkage or warpage. Slot 41 is accessible through the open rear end of bolt housing 16 as will be apparent. Turning of the plunger will thread the latch 32 inwardly or outwardly of plate 17 for the extension desired. The plunger 30 is held limited to the same relative position with respect to plate 33 by the pin 34 keyed in groove 35.

As shown by the drawings the locking device for the latch consists of a cylinder 43 mounted at the inner end of housing 16. A screw 44 is mounted in one side wall of housing 16 and being threaded in the adjacent wall of the cylinder rotatably supports the cylinder. In the opposite side wall of housing 16 is an opening 45 receiving the stem 46 of a handle or finger piece 47 for the lock. The reduced end of stem 46 is threaded in the cylinder wall opposite screw 44. A passage 48 of large enough diameter to allow plunger 30 to pass through is provided in cylinder 43 transversely thereof.

A hole is bored through the side of door 11 to receive a flanged bearing sleeve 49 of a mounting plate 50 attached as by screws to the door. A cover plate 51 with an internally threaded peripheral flange is secured to external threads on plate 50 and provides an attractive plate for the mounting of the stem and finger piece.

The diameter of cylinder 43 is slightly less than the inside dimensions of housing 16 to permit rotation in the housing. A stop projection 52 raised on the face of cylinder 43 is adapted to abut the upper edge of housing 16 when stem 46 is turned to rotate the cylinder in one direction and to position the finger piece horizontally. In this position of the stop, the central plunger receiving passage 48 in cylinder 43 is in alignment with the plunger. A door may thus be opened or closed when pushed or pulled with force in excess of that exerted by magnets 24. The beveled edges of latch 32 and pole pieces 25 act as cam surfaces in allowing the latch and plunger to retract into bolt housing 16. On retraction, the plunger carries plate 33 with it to compress spring 40 and the rear end of plunger 30 is carried through central opening 48 of cylinder 43.

When the latch is carried past the curved striking portion 22 of plate 14 it is again urged outwardly by spring 40 thus withdrawing the end of the plunger from cylinder hole 48. The same action occurs as the door is closed. When latch 32 traverses striking plate 14 it will retract to enter the recess and be positioned against the beveled faces 28 of pole pieces 25.

When finger piece 47 is turned to a vertical position to rotate cylinder 43 and move opening 48 out of alignment with the end of plunger 30, stop projection 52 abuts the lower edge of bolt housing 16 (Fig. 1). In this position the latch is locked against retraction, the end of the plunger abutting the solid portion of cylinder 43. If the latch is in the recess of plate 14 the door is in locked condition.

As a safety feature in the lock construction, a small opening or hole 53 (see Fig. 4) may be provided in the door, if desirable, for access to screw 44 attached to the end of cylinder 43 as described. If in a locking position, cylinder 43 may be revolved by inserting a screw driver blade into hole 53 on this side of the door. Screw 44 will turn the cylinder back to align the opening 48 with the end of plunger 30 to permit bolt retraction. The opening 53 is designed for emergency unlocking and may be entirely omitted.

It will be noted from Fig. 1 that the latch recess with the pole pieces therein will overlie the top and bottom of the latch 32, being of greater dimension. This will enable proper functioning of the latch and insure its being received in the opening 23 under conditions when the door has for one reason or another changed its position either by sagging slightly or otherwise. The latch will thus operate equally well within wide limits. Furthermore, if the extension of latch 32 from plate 17 is excessive or insufficient for properly functioning with respect to the strike plate and recess it may be adjusted by the simple removal of the housing 16 and the turning of plunger 30 in the threaded socket of the latch piece 32 as described.

It will be appreciated that door 11, as operated with the new latch construction may be provided with any desirable type of door pull for the opening or closing of the same.

In the construction of the latch a permanent magnet of material such as that marketed by General Electric Company and known under the trade name "Alnico No. 5" is preferred. This is a magnetic alloy containing as essential ingredients, iron, nickel and aluminum. However, any permanent magnet of sufficient force to hold a door securely may be used.

Having disclosed my invention, I claim:

1. In a magnetic latch structure a strike plate with a latch recess, a permanent magnet in said recess with pole pieces forming side surfaces of the recess, said surfaces being inwardly directed from opposite outer edges of said recess, in combination with a latch device comprising a reciprocable latch piece of magnetic material having surfaces mating with the surfaces of said pole pieces and spring actuated plunger means normally urging said latch piece outwardly of the device into latch engaging position.

2. Magnetic door latch construction comprising in combination a strike plate having a recess and a permanent magnet therein with pole pieces forming opposite sides of said recess, a casing with a movable latch piece of magnetic material projecting therefrom and having oppositely disposed cam surfaces for mating with said pole pieces in the recess, and spring actuated means normally urging said latch piece into extended position from said casing for engagement in said recess, said means permitting retraction of the piece within the casing and from the recess on application of sufficient sidewise force against said cam surfaces of the latch to overcome the resistance of the magnet and said spring actuated means.

3. Magnetic latch construction for a door comprising a strike for the edge of a door opening with said strike having a recess and a permanent magnet therein and pole pieces with inwardly sloping surfaces from opposite outer edges of said recess, a latch device for the adjacent edge of a door in said opening including a housing with a reciprocable latch piece projecting therefrom,

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a spring in the housing normally urging the piece outwardly of the door edge to engage said strike recess when said door is in closed position, and manually operable locking means to prevent retraction of said piece against the spring.

4. Magnetic latch construction comprising a latch plate having a square opening therein, a tubular housing of square cross section affixed to the edges of said opening and containing a latch piece of magnetic material slidably mounted in said opening, a plunger in said housing threaded into the inner end of the latch piece, a spring support plate keyed to said plunger inwardly of the latch piece and slidable longitudinally in the housing, said plunger being rotatable with respect to said plate, a stop in the housing limiting forward movement of said plate, a spring seating plate fixed to the housing rearwardly thereof with a central opening for passage of said plunger therethrough, and a spring between said fixed plate and said slidable plate for urging the latter forwardly in the tube, and a latch strike having a permanent magnet recessed therein with pole pieces forming cam surfaces sloping outwardly from the magnet to receive said latch piece in the strike.

5. In a magnetic latch structure, the combination of a reciprocable plunger having a threaded forward end, a latch threaded on said end, a strike plate with a latch recess therein, a magnet housing attached to said plate and a magnet in said housing, pole pieces in the housing connected with the magnet and having cam surfaces to receive the latch, a latch plate with an opening for extension of said latch therethrough, a latch plunger housing attached to said latch plate, a compression spring in the housing and a spring abutment at the rear of said housing, a spring abutment keyed on the plunger and slidable in said housing, and a stop in the housing limiting forward movement of said plunger and its spring abutment therein and adapted to bias the latch outwardly of said latch plate.

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6. In a magnetic latch structure, the combination of a reciprocable plunger having a threaded forward end, a latch threaded on said end, a strike plate with a latch recess therein, a magnet housing attached to said plate and a magnet in said housing, pole pieces in the housing connected with the magnet and having cam surfaces to receive the latch, a latch plate with an opening for extension of said latch therethrough, a latch plunger housing attached to said latch plate, a compression spring in the housing and a spring abutment at the rear of said housing, a spring abutment keyed on the plunger and slidable in said housing, a stop in the housing limiting forward movement of said plunger and its spring abutment therein and adapted to bias the latch outwardly of said latch plate, a cylinder rotatably mounted crosswise at the rear end of the plunger housing, a transverse opening in the cylinder, a lock lever attached to one end of the cylinder to rotate the same, and stop means on the cylinder to permit positioning of its transverse opening in and out of alignment with the path of the plunger for an unlocked and locked condition respectively of said plunger and latch.

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