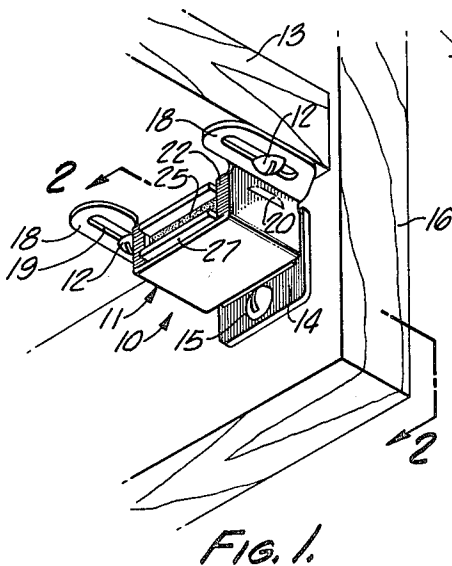
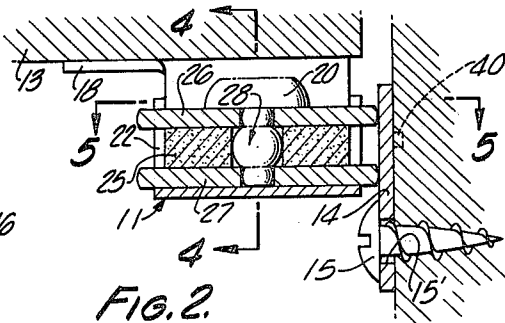
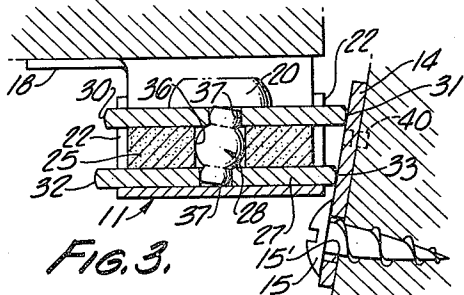
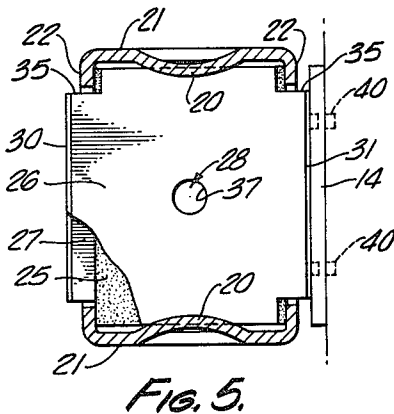
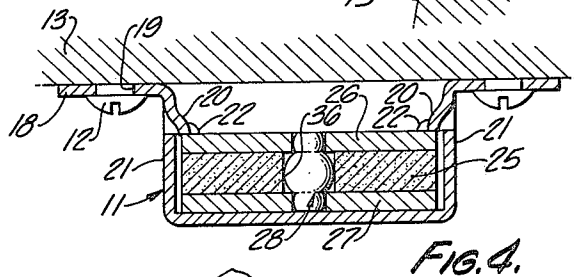
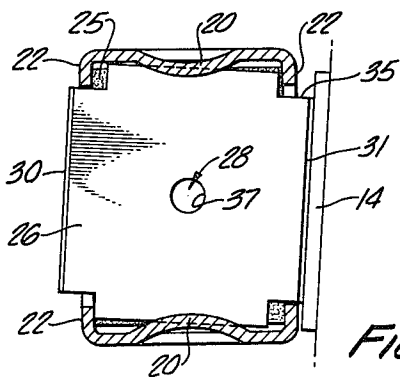
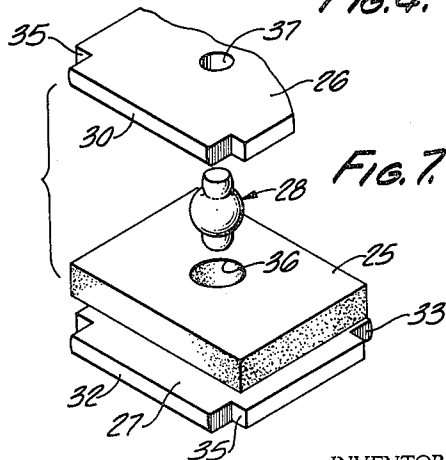


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MAGNETIC CATCH ASSEMBLY

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1

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MAGNETIC CATCH ASSEMBLY
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This invention relates to door catch assemblies and more particularly to an improved inexpensive latch of the magnetic type featuring an improved and simplified construction and a highly effective arrangement for automatically accommodating the pole pieces to the striker armature irrespective of gross misalignment of the components in the operating environment.

A commonly employed type of door catch makes use of a magnetized block of material sandwiched between a pair of pole pieces having a pair of ends positioned to seat against and to be bridged by a striker plate or armature carried by the member desired to be retained in a particular position, as a cabinet door. So long as the striker is engaged with the pole pieces the flux field of the magnetized block is highly effective in holding the door closed. Separation of the striker from contact with either pole piece by even a slight distance greatly reduces the holding strength of the catch. Since the holding power is so dependent upon firm contact between the pole ends and the striker member, mismounting of the parts, warpage of the cabinet or of the door, settling of components of the cabinet structure or of the structure on which the cabinet is supported and other defects disturbing this actual contact or preventing it in whole or in part greatly impairs the effectiveness of magnetic catches.

To overcome these shortcomings various proposals have been made to compensate for misalignment of the critical surfaces and parts. For example, it has been proposed to mount the striker on rubber or on a spring member permitting a degree of self-alignment of the striker with the pole pieces. These have achieved some success but are subject to numerous shortcomings including higher cost, need for skill during installation, and servicing by a skilled person.

The foregoing and other shortcomings of magnetic catch devices as heretofore designed are resolved in a highly satisfactory manner by the present invention. This is accomplished essentially by the provision of a pole piece subassembly wherein the magnetized wafer is provided with an opening communicating with separate openings in each of the pole pieces. Seated in these openings is a rigid equalizer member sized to fulcrum against the side walls of the openings in the three members of the subassembly. The magnetic wafer is effective in holding the pole members against its opposite faces whereas the equalizer member permits the two pole pieces to move in any direction in the plane of the pole pieces. Desirably the magnetized wafer is sized to be held stationary within the casing whereas the two pole pieces have limited freedom of both arcuate and linear movement. Thus it will be understood that the pole pieces are free to rotate through small arcs in their own planes but they are also free to shift laterally to and fro over the surface of the magnetized wafer but always in opposite directions. The permitted rotary and shifting movement of the pole pieces provides the equivalent of universal adjustment between the edges of the pole pieces and the striker or arma-

2

ture. As a consequence, wide range misalignment between the part of the cabinet carrying the striker and that carrying the casing for the pole pieces occasions no loss of holding power or no loss in the full operating efficiency of the catch device.

Accordingly it is a primary object of the present invention to provide an improved magnetic type catch device featuring provision for automatic self-alignment between the striker and the two pole pieces under a wide range of adverse operating conditions.

Another object of the invention is the provision of a magnetic catch device operating at full effectiveness and efficiency despite wide range misalignment between the striker and holding components of the device.

Another object of the invention is the provision of a magnetic assembly comprising a magnetized member sandwiched between a pair of pole pieces and incorporating equalizer means for automatically shifting the pole pieces in opposite directions by equal increments.

These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawing to which they relate.

Referring now to the drawing in which a preferred embodiment of the invention is illustrated.

FIGURE 1 is a perspective view showing the invention catch assembled to a cabinet door structure according to one preferred mode of use;

FIGURE 2 is an enlarged cross-sectional view taken along line 2—2 on FIGURE 1;

FIGURE 3 is a view similar to FIGURE 2 but showing the position of the components with the door seriously misaligned with the catch proper;

FIGURE 4 is a cross-sectional view taken along line 4—4 on FIGURE 2;

FIGURE 5 is a fragmentary cross-sectional view taken along line 5—5 on FIGURE 2;

FIGURE 6 is a view similar to FIGURE 5 but showing the position of the parts with the door misaligned with the catch casing; and

FIGURE 7 is an exploded view of components of the pole piece subassembly.

Referring more particularly to FIGURES 1 to 4, there is shown one preferred embodiment of the catch device designated generally 10 having its main housing 11 secured by screws 12 to the underside of a cabinet shelf 13. The one-piece armature or striker plate 14 is secured by a screw 15 to the cabinet door 16.

The one-piece housing 11 is formed from any suitable nonmagnetic material as aluminum, brass or plastic and is U-shaped in cross-section as best appears from FIGURE 4 with the ends of its legs bent outwardly to lie in a common plane and provide mounting tabs 18. These tabs have elongated slots 19 permitting the casing to be shifted as necessary to suit the needs of a particular operating environment. Tangs 20 struck inwardly from the two side walls of the casing serve to lock the pole piece subassembly assembled within the casing as will be described more fully presently. The opposite ends of the side wall are also bent inwardly to provide abutment tangs or stops 22 for components of the pole piece subassembly.

Loosely supported within the cavity provided within the casing between the four stop tabs 22 is a four-piece pole piece subassembly comprising a rectangular block or wafer of high-strength permanently magnetized mate-

3

rial 25, a pair of identical pole piece plates 26, 27, and an equalizer member or pin 28. Magnetized wafer 25 is sized to fit rather snugly in the casing cavity with its corners abutting stop tabs 22 in the manner best shown in FIGURE 5. These stop tabs cooperate to prevent any substantial movement of the wafer when in its assembled position.

The identical soft iron pole piece plates 26, 27 have the shape shown and preferably both of their opposite lateral edges 30, 31 and 32, 33 are beveled or rounded and project very substantially beyond the adjacent edges of wafer 25 as well as beyond the exterior faces of stop tabs 22. The width of the pole pieces between assembly tangs 20 (FIGURE 5) corresponds substantially to that of the magnetized wafer and is such that these edges underlie locking tangs 20, 20 struck inwardly toward one another from the end walls 21 of the casing.

The corner portions of the pole pieces are notched as indicated at 35 in FIGURE 5 to provide ample clearance from all portions of stop tabs 22. Accordingly, it will be understood that both pole piece plates are free to shift through a rather large but restricted distance crosswise of the casing cavity as well as lengthwise thereof. Likewise both pole pieces are free to rotate either clockwise or counterclockwise through small arcs. Both the arcuate or rotary motion and the to-and-fro movement of the plates all occur in the plane of the plates parallel to the opposite sides of the magnetized block.

A further and important feature of the invention is the provision of an equalizer member or pin 28 socketed in openings communicating with one another and passing through wafer 25 and each of the pole pieces. In a preferred construction equalizer pin 28 has a length not in excess of the combined thicknesses of two pole plates and the magnetized wafer so as not to protrude beyond the remote faces of the pole pieces. Both its enlarged midportion and its reduced diameter ends desirably have spherical surfaces fitting loosely in their respective seating openings, the enlarged center portion of the equalizer pin being journaled loosely in opening 36 of the wafer whereas the reduced ends are similarly seated in openings 37, 37 of the two pole pieces. Owing to the larger midportion of the equalizer pin it is held captive in the pole piece subassembly once the pole pieces are placed against the opposite sides of the magnetized wafer. If the pin is made of magnetic material, as it preferably is, it is readily held in position during the assembly operation by the flux field of the wafer.

The combined armature and striker plate 14 is made of any suitable magnetic material, such as soft iron, and preferably has a mounting hole 15' offset laterally from the catch casing as best shown in FIGURE 1. A feature of the striker is the provision thereon of a pair of sharp pointed protrusions 40, 40 which are punched to project from the underside or the door-contacting surface of the striker. The projecting height of these protrusions approximates one-half the thickness of the striker plate. These protrusions are positioned approximately half way between the two pole plates, as is shown in FIGURE 2, a feature which greatly facilitates the proper installation of the striker on the cabinet initially. Thus the workman first installs the main body of the catch on the edge of the cabinet shelf and then places the striker against the outer ends of the pole pieces with marking dimples or protrusions 40 facing outwardly and positioned approximately midway between the two pole plates. The cabinet door is then closed sharply against dimples 40 so that the latter penetrate into the surface of the wood. The workman then detaches the striker from the pole pieces and places protrusions 40 in the indentations just made by them and proceeds to secure the plate in place with screw 15.

It is pointed out that the pole pieces are cut off from iron strapping of the proper width and having the semi-rounded edges 31, 32, 33 and 34 already present as re-

4

ceived from the rolling mill. The severing operation from strip stock is accomplished simultaneously with the formation of notches 35 and central opening 37. A pair of these pole pieces is placed against the opposite faces of the molded block 25 with the equalizer pin 28 installed in the communicating openings, this pin being readily held in place by the flux field as, in fact, are all parts of the pole piece subassembly. This subassembly may be installed as a unit within casing 11, the assembler merely flexing end walls 21 of the resilient casing apart under light pressure until the top pole piece snaps beneath locking tangs 20, 20. The main housing is then mounted on the cabinet wall or shelf and the striker plate is thereafter assembled to the interior of the door in the manner referred to above using projections 40, 40 to identify the proper mounting plate for the striker.

Not infrequently it will be found that the mounting place for the main body of the catch or for the striker or both lacks mounting surfaces lying accurately at 90 degrees to one another as they do in FIGURE 2. One exaggerated relationship of the mounting of surfaces typical of those occurring in practice is indicated in FIGURE 3 wherein door 16 lies at an angle substantially less than 90 degrees to shelf 13. This misalignment does not interfere in any way with utilization of the full holding power of the magnetic catch since striker 14 will engage rounded edge 33 of pole piece 27 causing this pole piece to shift to the left as viewed in FIGURE 3. Owing to the described action of equalizer pin 28, any movement of pole piece 27 to the left effects an equal movement of the other pole piece 26 to the right. This action is assured by the fact that the equalizer pin always fulcrums about its midportion and its point of contact with the side wall of opening 36. It is therefore apparent that any linear movement of either pole piece is accompanied by an equal and opposite linear movement of the other.

Should the misalignment of the striker with the pole piece be with respect to the longitudinal edge of the pole piece, as is indicated in FIGURE 6, proper corrective compensation requires rotary movement of the pole plates about the axis of the equalizer pin. This corrective adjustment is readily accommodated by the present structure for reasons explained above in connection with notches 35 and stop tangs 22. In the usual case it will be appreciated that the misalignment is not purely of the type described in connection with FIGURE 3 or of the type described in connection with FIGURE 6 but involves a component of both.

It remains to be pointed out that some doors have recessed rim edges to provide a flange or lip projecting beyond and concealing the gap between the door edge and the edge of the door opening into the cabinet. In this type of door it is often advantageous to position the invention catch body so that the pole ends 30, 32 are the ones positioned to contact with the striker plate. In this event the catch is rotated 180 degrees from the position shown in FIGURES 1 and 2 during the installing operation in order that pole ends 30, 32 may be positioned to engage the striker plate. The operation of the device when so installed is exactly the same as that described above and it will be evident that the striker remains in full contact with both pole ends until actual pull-away occurs simultaneously from both poles. Irrespective of which mode of installation is employed, the full holding strength of the magnet is always utilized and available despite extreme misalignment of the parts, this full strength being maintained right up to the moment of separation of the striker from both pole pieces. Furthermore and as will be appreciated from the foregoing, the catch is automatically self-adjusting at all times and to the extent necessary to correct for accidental or suddenly occurring misalignment of the principal components or of individual components.

While the particular magnetic catch assembly herein shown and disclosed in detail is fully capable of attain-

5

ing the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiments of the invention and that no limitations are intended to the details of construction or design herein shown other than as defined in the appended claims.

I claim:

1. A magnetic catch device the pole pieces of which are automatically self-aligning with the pole piece armature, said device having a main body, a pair of pole piece plates having a wafer of permanent magnetic material loosely sandwiched therebetween, means for holding said magnetic wafer against substantial movement relative to said main body, means interconnecting said pole pieces and adapting the same to rotate in unison through limited arcs in the plane thereof and to cause the same to shift bodily in equal but opposite directions parallel to one another, and an armature for said pole pieces adapted to be mounted on an object movable toward and away from said catch device.

2. A magnetic catch device for use on cabinet doors and the like, said device having a main frame, a wafer of magnetized material mounted in said frame in a generally fixed position, a pair of pole pieces having at least one edge of each projecting laterally beyond the adjacent edge of said wafer and positioned against the opposite faces thereof, means interconnecting said pole pieces and holding the same loosely assembled to said main frame and providing for limited rotary movement of said pole pieces in any direction parallel to one another and in the plane of said pole pieces, and for causing said pole pieces to shift bodily by substantially equal amounts in opposite directions relative to one another in their respective planes.

3. A magnetic catch as defined in claim 2 characterized in that the edges of said pole pieces projecting beyond the adjacent edges of said magnetized wafer are rounded to provide a rocking contact between each edge and the surface of an armature, and an armature plate of magnetic material adapted to be used with said device and to bridge the rounded edges of said pole pieces in the closed position of said magnetic catch device.

4. A magnetic catch device for use with cabinet doors and the like, said device comprising a one-piece main case adapted to be mounted in a cabinet adjacent a door therefor, said main case having opposed end walls with intumed tangs at their opposite ends, a block of magnetized material supported generally fixedly between said tangs and said end walls, pole plates of magnetic material having notched corners sandwiched against the opposite sides of said block with one pair of lateral edges spaced inside the end walls of said main case and their other lateral edges projecting substantially beyond said tangs and the adjacent exterior surfaces of said main case, said pole pieces being movable in any direction in the plane thereof to the extent permitted by the notches in their respective corners and the associated tangs carried by said casing end walls, and equalizing pin means having its opposite ends journaled in a respective one of said pole pieces and its midportion pivotally socketed in said block of magnetized material for limited universal pivotal movement in any direction about its midpoint.

5. A catch device as defined in claim 4 characterized in that the edges of said pole pieces projecting from said main casing are rounded to provide a smooth rocking surface for contact with a combined armature and striker for said catch device, and an armature plate of magnetic material adapted to be mounted on a door in a position to engage one pair of rounded edges of said pole pieces in the closed position of said door.

6. A catch device as defined in claim 4 characterized in that said main casing includes tang means engageable with the edges of one of said pole pieces and cooperating therewith to hold said magnetized block and both pole pieces assembled to said casing.

6

7. A pole piece subassembly for use in a catch device or the like comprising a wafer of magnetized material having an opening between its opposite faces, a pair of pole pieces of magnetic material positioned against said opposite faces and held movably thereagainst by the flux field of said wafer, said pole pieces having openings therethrough in communication with the opening through said wafer and having one edge of each projecting substantially beyond the intervening adjacent edge of said wafer, and rigid equalizer means having an enlarged midportion held captively and loosely assembled between the adjacent ends of the openings in said pole pieces and fulcrumed on the wall of the opening through said wafer and with its ends fulcrumed in the openings of a respective one of said pole pieces and being effective to require said pole pieces to shift in equal but opposite directions relative to the adjacent faces of said wafer whenever either pole piece is shifted bodily in the plane thereof and relative to the other pole piece.

8. A pole piece subassembly as defined in claim 7 characterized in that said equalizer means has reduced ends and an enlarged central portion of greater diameter than the openings in said pole pieces whereby said pin is held assembled between said pole pieces without need for fasteners.

9. A subassembly as defined in claim 7 characterized in that said equalizer means is of magnetic material whereby the same is held in assembled position by the magnetic flux field generated by said magnetized block.

10. A subassembly as defined in claim 7 characterized in that said pole pieces have notches in their rim portions adapted to receive loosely therein stop means permitting said pole pieces to move through a limited distance in any direction lying in the plane of said pole pieces.

11. A subassembly as defined in claim 7 characterized in that the opposite lateral edges of both pole pieces project beyond the adjacent lateral edges of said magnetized wafer, said projecting edges being straight and parallel and rounded transversely of the edge of the pole pieces.

12. A pole piece subassembly comprising a wafer-like rectangular block of magnetized material having an opening therethrough, a pair of plate-like pole pieces having one width dimension corresponding with a width dimension of said block and its other dimension substantially greater than the other dimension of said block, said pole pieces being of magnetic material and assembled against the opposite faces of said wafer block, openings in said pole pieces positioned to communicate with the adjacent ends of the opening through said block, and equalizer pin means held pivotally captive in said communicating openings with its midportion fulcrumed in said block opening and its opposite ends fulcrumed in said pole piece openings and effective to cause simultaneous relative movement between said block and both pole pieces with said pole pieces moving bodily in opposite directions across the faces of said block.

13. A subassembly as defined in claim 12 characterized in that said equalizer pin has a bulbous midportion and rounded opposite ends of reduced diameter.

14. A subassembly as defined in claim 13 characterized in that said equalizer pin has an overall length not in excess of the combined thickness of said block and of the two pole pieces.

15. The subassembly defined in claim 12 characterized in the provision of a one-piece casing therefor having a cavity sized to loosely seat said subassembly therewithin and having open sides through which said pole piece ends project in all adjusted positions thereof, said casing having means thereon engageable with the rim of said magnetized block and cooperating therewith to hold said block substantially stationary while permitting said pole pieces limited freedom of movement in their respective planes of said pole pieces and parallel to the opposite faces of said block, and means integral with said casing for holding said subassembly loosely captive within said cavity.

16. The combination defined in claim 15 characterized in the provision therewithin of a striker plate of magnetic material adapted to be secured to a movable member as a door in a position to bridge and seat across one pair of said pole piece ends in the closed position of the door, said striker plate having a pair of sharp edged protrusions projecting from the rear face thereof and adapted to penetrate the door surface and mark the assembly point for the striker after said casing has been secured in its proper operating position in a cabinet, and said striker having an opening for a fastener positioned to one side of said casing.

References Cited by the Examiner

UNITED STATES PATENTS

2,837,366	6/58	Loeb	292—251.5
2,943,881	7/60	Duhm	292—251.5
2,962,318	11/60	Teetor	292—251.5
3,050,324	8/62	Faber	292—251.5
3,102,749	9/63	Heyer	292—251.5

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