Dec. 6, 1955 M. O. TEETOR 2,726,110

MAGNETIC CATCH

Filed Oct. 8, 1954

Fig. 1.

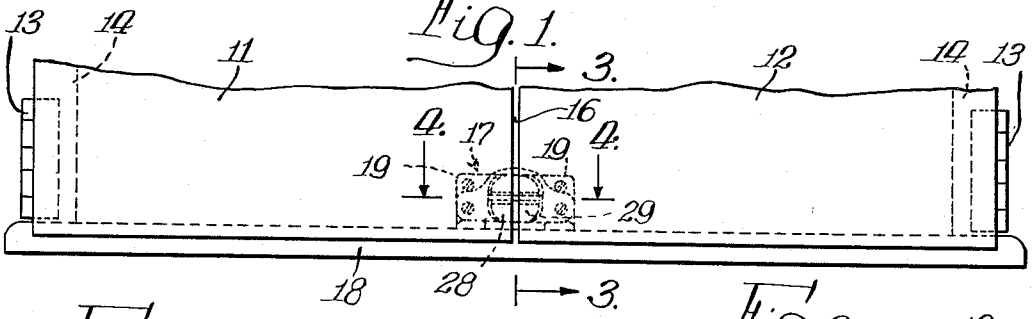


Fig. 2.

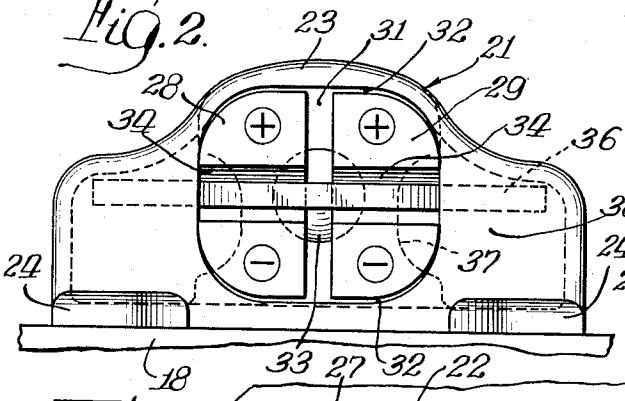


Fig. 3.

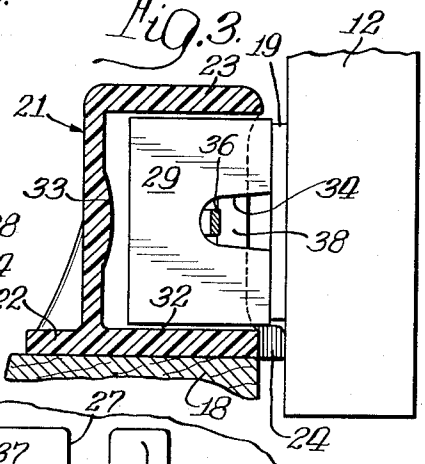


Fig. 4.

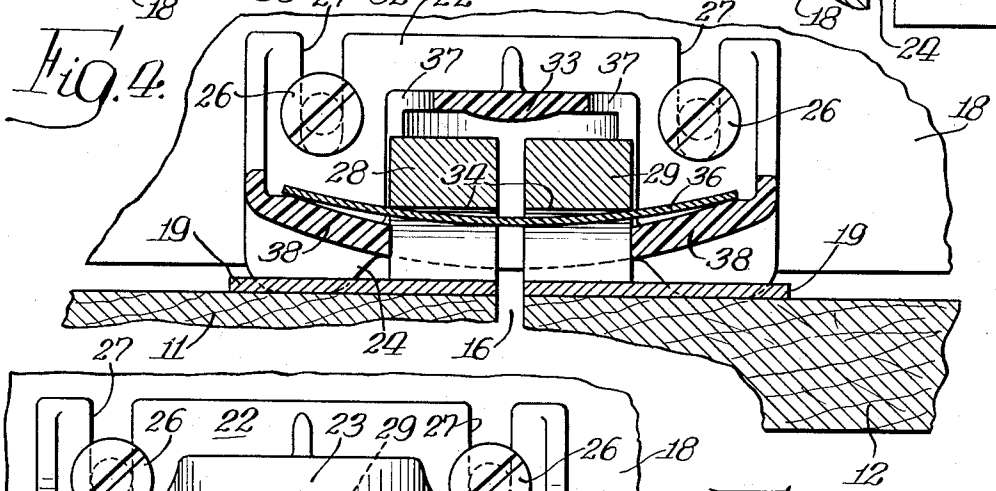
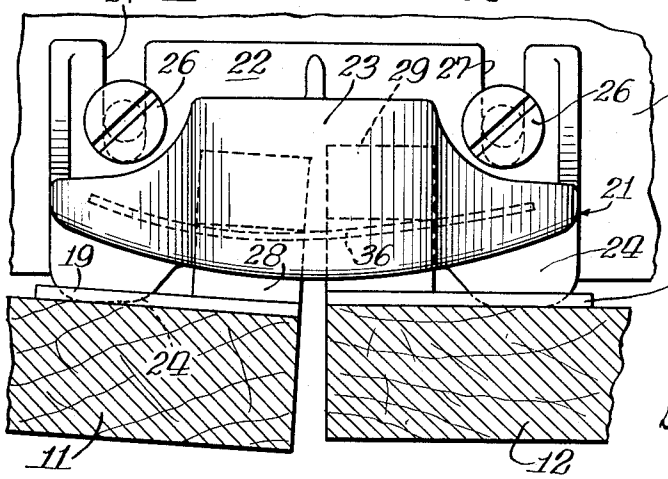


Fig. 5.



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United States Patent Office 2,726,110
Patented Dec. 6, 1955

2,726,110

MAGNETIC CATCH

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Application October 8, 1954, Serial No. 461,269

6 Claims. (Cl. 292—251.5)

This invention relates to a novel magnetic catch for retaining a closure member, such as a cabinet door, in closed position adjacent a frame member. More particularly, the invention relates to a novel magnetic catch for use on double doors.

Magnetic door catches of various types have been suggested heretofore in which the cooperating magnet and armature units are mounted in coacting positions on door and frame members. In my prior Patents Nos. 2,508,305 and 2,690,348 I have described a highly effective type of magnetic catch which affords several important advantages not previously available in the magnetic catch art. One important feature of my prior invention involves the movable mounting of one of the catch elements, e. g. the magnet element, in combination with a spring member operatively coacting with the movable catch element for normally urging the latter into retracted position relative to the supporting door or frame member. By means of such arrangement, the catch readily compensates for relative misalignment between the door and frame members so that full surface contact between the catch elements is obtained.

The present invention is directed to a novel adaptation of a magnetic catch of the foregoing type which is particularly suited for use with double doors. In a double door cabinet it might be supposed that a separate armature element could be provided on each door and that a single movable magnet unit could then be mounted on the cabinet frame so as to span the space between the free edges of the hinged doors and extend into operative relation with both of the armature elements on the double doors. However, I have found that the solution is not quite so simple. In the first place, the armature on the first door to be closed completes the magnetic circuit with the magnet so that the magnet then has a substantially reduced attraction for the armature on the second door. Consequently, at any given time an efficient closing action is provided for only one of the doors. For the same reasons, when both doors are closed the first door to be opened requires too little force or pull whereas only the remaining door has proper resistance to opening pull.

However, an even greater difficulty is encountered because of the self-aligning characteristics of the magnet element as described more fully in my aforementioned Patents Nos. 2,508,305 and 2,690,348. When the first door is closed, the spring mounted magnet automatically aligns itself with the armature on the first door so that full surface contact is obtained therebetween. However, it is extremely unlikely that the face of the second door when closed will be in exact coplanar alignment with the first door. Since the magnet has already made the necessary adjustment with the first door, this relationship will be retained and when the second door is closed its armature will necessarily make only incomplete line or point contact with the magnet so that the last door to be closed is held only ineffectively at best because of the reduced magnetic contact area.

Accordingly, a primary object of the present invention is to overcome such difficulties and provide a novel and effective magnetic catch arrangement for double doors which utilizes only a single magnet unit for both doors.

A further object of the invention is to provide a simplified magnetic catch mechanism for use on double doors which permits equally effective closing and opening of both doors.

Another object of the invention is to provide a novel magnetic catch device for use on double doors which utilizes only a single magnet unit but at the same time compensates for relative misalignment between the two doors and between the doors and their supporting frame.

Other objects and advantages of the invention will become evident from the subsequent detailed description taken in conjunction with the accompanying drawing, wherein:

Fig. 1 is a fragmentary front elevational view of the lower portion of a double door cabinet in closed position and having mounted thereon a magnetic catch embodying the principles of the invention;

Fig. 2 is an enlarged front elevational view of the magnet unit of the catch as seen with the cabinet doors open;

Fig. 3 is an enlarged vertical sectional view as taken along the line 3—3 of Fig. 1;

Fig. 4 is an enlarged horizontal sectional view as taken along the line 4—4 of Fig. 1; and

Fig. 5 is a view similar to Fig. 4 but showing the manner in which the catch compensates for misalignment between the two doors.

Referring first to Fig. 1 of the drawing, a cabinet is shown comprising a pair of double doors **11** and **12** having hinged mountings **13** at their opposite edges on the upright side portions **14** of the cabinet frame. The adjacent free edges of the doors **11** and **12** are spaced a slight distance apart in the usual manner, as indicated at **16**. The cabinet is provided with a magnetic catch embodying the features of my invention and consisting of a magnet unit **17** mounted centrally on the base portion **18** of the cabinet frame and a pair of cooperation armature units **19** (Figs. 3, 4, and 5) affixed to the inner faces of the doors **11** and **12**. The magnet unit and the two armature units are thus mounted in coacting positions on the cabinet frame and doors, respectively, so that either or both of the armature units **19** is in operative engagement with the magnet unit **17** when either or both of the cabinet doors are in closed position against the frame. It should be understood that the cooperating magnet and armature units may be mounted in any desired coacting positions on the door and cabinet structure as long as the magnet unit **17** is so mounted as to coact with both of the armature units **19**. For example, the catch units may be affixed adjacent the upper portion of the cabinet frame and doors or adjacent an intermediate shelf portion of the cabinet instead of at the base of the cabinet as shown in Fig. 1.

Referring now to Figs. 2 to 4, the magnet unit **17** of the device comprises an elongated magnet housing or body portion, indicated generally at **21**, having a mounting flange **22** along one longitudinal side thereof, a centrally located cup-shaped recess or socket portion **23** extending inwardly from the front of the housing for receiving the magnet means, and a pair of forwardly extending flanges or abutments **24** at the front of the housing adapted to protect the magnet means from direct striking impact with the armature units, as hereinafter described in detail. The housing **21** is rigidly affixed to the cabinet frame, in this instance to the base portion **18** thereof, by means of a pair of screws **26** extending through a pair of edgewise slots or openings **27** in the mounting flange **22**. The openings **27** extend inwardly a substantial distance from

the rear edge of the flange 22 to permit the magnet unit 17 to be adjusted to proper position adjacent the edge of the cabinet frame when being mounted.

The magnet housing 21 is formed from an appropriate non-magnetic material such as brass, zinc, aluminum or a suitable plastic material. A pair of generally U-shaped complementary magnet elements 28 and 29 are disposed loosely within the socket or recess 23, the latter being open and unobstructed at the front of the housing 21. In this case, the magnet-receiving socket or recess 23 has a generally rectangular configuration with rounded corner portions, and the magnet elements 28 and 29 are shaped accordingly to conform to the configuration of the socket portion 23. The magnet elements 28 and 29 are formed from a magnetic metal or alloy, particularly the highly effective alloy of aluminum, nickel, and cobalt known commercially as "Alnico." Because of the generally U-shaped or channel-shaped form of the magnet elements 28 and 29, these may conveniently be manufactured from an elongated cast channel-shaped bar of magnetic metal or alloy which is then cut into sections of suitable size. These sections may then be ground to provide the desired external configuration complementing the inner configuration of the socket 23. On the other hand, it is also possible to utilize available pre-cast or preformed magnet elements of a relatively larger size merely by cutting the magnet elements in half to provide the coacting elements 28 and 29. In either event, the magnetization of the elements 28 and 29 is very important for the purposes of the present invention. Briefly, I have found that for proper operation it is necessary that the mutually adjacent pole portions or legs of the respective magnet elements 28 and 29 have a like polarity so that the magnet units 28 and 29 repel each other and are normally spaced apart within the socket 23, as indicated at 31 (Fig. 2). The desired magnetic condition is indicated by means of plus and minus signs in Fig. 2 so that it will be evident that the pole portions of the respective elements 28 and 29 at opposite sides of the catch are similar or have like polarity. Thus, there is a mutual magnetic repulsion between the adjacent pole portions or legs of the respective magnet elements.

As described earlier, I have found that the catch becomes ineffective for double door operation if only a single magnet element is employed to coact with two separate armature elements on the respective doors of the cabinet. For exactly the same reasons, even the pair of magnet elements 28 and 29 will be ineffective unless the magnetic poles of the respective magnet elements are oriented in mutually repellent relation as shown in Fig. 2. For example, if the polarity or magnetization between the leg portions of each of the elements 28 and 29 were reversed from the condition shown in Fig. 2, it will be evident that there would then be a strong attraction between the two magnet elements 28 and 29 so that they would adhere together and function as a unit in exactly the same manner as if only a single large magnet element were employed. Consequently, the important principle of my invention is to utilize a single magnet housing containing two independent magnet elements which are so magnetized as to be mutually repellent whereby the magnet elements are normally maintained in spaced apart and independently movable relation.

In addition to the space 31 between the mutually repelled magnet elements 28 and 29, it will also be seen that the dimensions of the magnet elements are sufficiently restricted as compared with the size of the socket 23 to provide a slight clearance 32 at the front and rear sides of the magnet unit. Thus, when required, each of the magnet elements 28 and 29 can automatically assume a limited angular or cocked position relative to the stationary socket 23 in order to accommodate structural misalignments, as hereinafter described in connection with Fig. 5. The base of the socket portion 23 at the rear of the catch is provided with a dome-shaped bump or projection 33 (Fig. 3) upon which the magnet elements 28 and 29 rest when in retracted position within the socket, and the depth of the socket 23 is such as to permit the full axial height of the magnet elements 28 and 29 to be fully enclosed by the socket 23 and to be protected when in normal retracted position.

As previously described, the magnet elements 28 and 29 are generally U-shaped so as to provide a central groove 34 in each of the magnet elements in the manner of a horse-shoe type magnet. An elongated bar spring 36, formed from a suitable resilient and non-magnetic spring material such as a strip of phosphorus-bronze spring metal, is disposed lengthwise within the housing 21 and extends through the aligned magnet groove 34. The end walls of the magnet-receiving socket portion 23 are cut away or open, as shown at 37 in Fig. 4, so that the ends of the bar spring 36 extend beyond the socket portion 23 and are seated against or engaged behind a pair of upright front walls or shoulder portions 38 at the front of the housing. As will be evident from the drawing, the intermediate portion of the bar spring 36 which is contained within the socket portion 23 directly engages the magnet elements 28 and 29 at the base portions of the grooves 34 therein and the magnet elements are thereby normally retained in a retracted position (not shown) in contact with the projection 33 at the bottom of the socket 23. Consequently, it will be seen that the intermediate portion of the spring 36 is free to move transversely relative to the elongated housing 21 thereby permitting outward resilient movement of the magnets 28 and 29 in the direction of and through the open front portion of the socket 23.

The armature units 19 comprise in this case a pair of flat metal plates formed from a magnetic metal such as iron or steel and secured to the inner faces of the doors 11 and 12 adjacent the free edges thereof by means of screws (not shown) or the like. Of course, the dimensions of the armature plates 19 are sufficient to fully accommodate the outer contact faces of the respective magnet elements 28 and 29. As will be readily understood, the strength of the magnetic attraction between the magnet elements 28 and 29 and their respective armatures 19 is greater than the tension exerted by the spring 36 tending to hold the magnets in retracted position. Thus, outward movement of the magnet elements 28 and 29 into engagement with the armatures 19 on the doors is readily permitted when the doors are closed as seen in Figs. 3 and 4. However, it will also be understood that when either or both of the doors 11 and 12 are in open position away from the cabinet frame, the magnetic forces between the magnet elements and their respective armatures is disrupted so that the spring 36 retracts one or both of the magnet elements into the socket portion 23. By reason of the fact that the magnet elements 28 and 29 are repelled into spaced-apart relation by magnetic repulsive forces, it will be seen that the two magnet elements 28 and 29 although contained within a single unitary housing are free to act independently of each other to a large extent. Thus, if door 11 is closed first, the magnet element 28 moves outwardly in resilient fashion against the tension of spring 36 and engages the armature 19 on the door 11 so that the latter is held securely in closed position by the action of the spring 36. However, since the magnet 29 is repelled in spaced apart relation from the magnet element 28, the closure of the door 11 does not exert any detrimental effect on the magnetic attraction exerted by the magnet element 29 and, of equal importance, the magnet element 29 is unaffected by any angular or cocking movement of the magnet 28 which automatically takes place to effect full surface contact between the magnet element 28 and its armature 19. When the door 12 is closed thereafter, the magnet element 29 exerts

full magnetic attraction for the armature **19** on the door **12** and is self-aligning therewith as required.

The independent self-adjustability of the two magnet elements **28** and **29** as described above is more fully illustrated in Fig. 5. As shown therein, the door **11** is warped or bulged to a slight extent and fails to align itself properly with the base **18** of the cabinet frame. However, because of its loose resilient mounting as hereinbefore described, the magnet **28** undergoes angular or twisting movement as shown in Fig. 5 whereby to permit full surface flat-wise engagement between the outer ends of the magnet poles and the corresponding armature plate **19** on the door **11**. It will be understood that a similar angular or cocking movement can likewise occur when necessary to compensate for misalignment in a vertical plane. At the same time, because of the magnetic repellent forces which are exerted between the magnet elements **28** and **29**, the angular twisting of the magnet **28** as shown in Fig. 5 does not exert any detrimental effect on the magnet **29**. Accordingly, the magnet **29** is free to align itself as required for full surface engagement with the armature plate **19** on the door **12**. In other words, the magnet elements **28** and **29** have substantially independent self-aligning characteristics so as to accommodate any misalignment which may ordinarily be encountered between the door **11** and the cabinet frame or between the door **12** and the cabinet frame or both. In the situation illustrated in Fig. 5, the door **11** is out of alignment with the cabinet frame but the door **12** is shown in substantially exact alignment. Obviously, if only a single magnet element were used or if the magnet element **29** were effected by the aligning movement of the magnet **28**, then only the first door to be closed would have proper holding engagement between the magnet and armature elements and to second door to be closed would have only restricted ineffective magnetic contact between the catch elements.

It should also be mentioned that in mounting the magnet unit housing **21** in the cabinet frame, the forwardly projecting flanges or abutments **24** are allowed to extend beyond the supporting surface such as the base **18** on the cabinet frame. This arrangement accomplishes a two-fold purpose. First of all, the doors when closed abut against the flanges **24** (as seen in Figs. 3 and 4) so that the armature **19** is necessarily held outwardly in spaced relation from the magnet housing **21** and as a result the magnet elements **28** and **29** must move outwardly under magnetic attraction to engage the armature elements thereby placing the spring **36** under tension and insuring the desired resilient retention of the doors in closed position by the spring action. Another purpose of the flanges **24** is to protect the relatively brittle magnet elements **28** and **29** from severe direct striking impact with the armatures **19** when the doors are forcibly closed. In other respects, the operation of the catch of the present invention is similar to the arrangement described in my previously mentioned prior patents, particularly Patent No. 2,690,348.

Although the invention has been described with particular reference to a certain specific structural embodiment thereof, it will be understood that various modifications and equivalent structures may be resorted to without departing from the scope of the invention as defined in the appended claims.

I claim:

1. A magnetic catch for holding double doors in closed position adjacent a frame, said catch comprising a non-magnetic housing, a pair of magnet elements each having dissimilar pole portions and loosely disposed in said housing, said magnet elements being arranged side-by-side in said housing with the similar pole portions of the respective magnet elements disposed in adjacent mutually repellent relation whereby said magnet elements are normally urged to spaced-apart position within said housing, said housing being mountable on the frame centrally of the double doors, resilient means normally urging the magnet elements inwardly of said housing, and a pair of coacting armature elements adapted to be secured to said doors for coaction with said magnet elements, each of the magnet elements being movable outwardly toward and selectively self-alignable with its respective armature element.

2. In a magnetic catch, a magnet unit adapted to be mounted on a frame for coaction with a pair of double doors each having its own armature element, said magnet unit comprising a non-magnetic housing rigidly securable to the frame and having a magnet-receiving recess, a pair of magnet elements loosely and movably disposed in said recess, each of said magnet elements having a pair of spaced forwardly-extending poles of opposite polarity with the like and unlike poles of the respective magnet elements being oriented in side-by-side mutually repellent relation whereby said magnet elements are normally urged to spaced-apart position within said recess, and resilient means for normally urging the magnet elements into retracted position in said recess, said resilient means permitting forward movement of the magnet elements into contact with the armature elements on the doors and each of the magnet elements being individually alignable with its respective armature element.

3. In a magnetic catch, a magnet unit adapted to be mounted on a frame for coaction with a pair of double doors each having its own armature element, said magnet unit comprising a non-magnetic housing rigidly securable to the frame and having a magnet-receiving recess, a pair of magnet elements loosely and movably disposed in said recess, each of said magnet elements having a pair of spaced forwardly-extending poles of opposite polarity with the like and unlike poles of the respective magnet elements being oriented in side-by-side mutually repellent relation whereby said magnet elements are normally urged to spaced-apart position within said recess, and an elongated bar spring disposed in said housing and extending between the poles of the magnet elements and resiliently engaging the latter for normally urging the magnet elements into retracted position in said recess, said magnet elements being movable forwardly under magnetic attraction against the action of said spring into contact with the armature elements on the doors and each of the magnet elements being selectively alignable with its respective armature element.

4. The structure of claim 3 further characterized in that said magnet elements are generally U-shaped elements with the spaced legs thereof comprising the poles of the magnets and the like poles of one polarity of the respective magnet elements are at one side of said spring and the like poles of opposite polarity are at the other side of said spring.

5. A magnetic catch for a pair of doors hingedly mounted on a frame with the free edges of the doors in slightly spaced relation when the doors are closed, said catch comprising unitary housing structure mountable on the frame and adapted to extend across the space between the free edges of the doors, a pair of movable magnet elements loosely disposed in said housing structure and arranged in magnetically repelled relation for independent movement, unitary resilient means coacting with the housing structure and both of said magnet elements for normally urging the latter into retracted position within the housing structure, and a pair of armature elements mountable on the doors in coacting relation with said magnet elements, said magnet elements being movable outwardly under magnetic attraction against the action of said resilient means into contact with said armature elements and being rockable separately for independent alignment with the armature elements.

6. In combination, a frame, a pair of hinged doors on said frame, a magnet unit mounted on the frame and overlying both of said doors when the latter are closed, and a pair of separate armature elements mounted on said

doors in operative relation with said magnet unit whereby the single magnet unit serves to hold both doors closed, said magnet unit comprising a non-magnetic housing rigidly fastened to the frame, a pair of magnet elements loosely contained within said housing in mutually repellent relation whereby said magnet elements are normally spaced-apart within said housing, and means resiliently urging said magnet elements into retracted position within said housing, each of said armature elements being co-

operable with one of said magnet elements and said magnet elements being movable outwardly and individually alignable for full surface contact with the respective armature elements.

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