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LATCHING DEVICE

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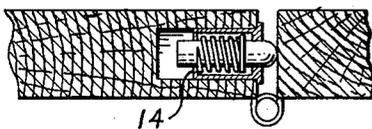
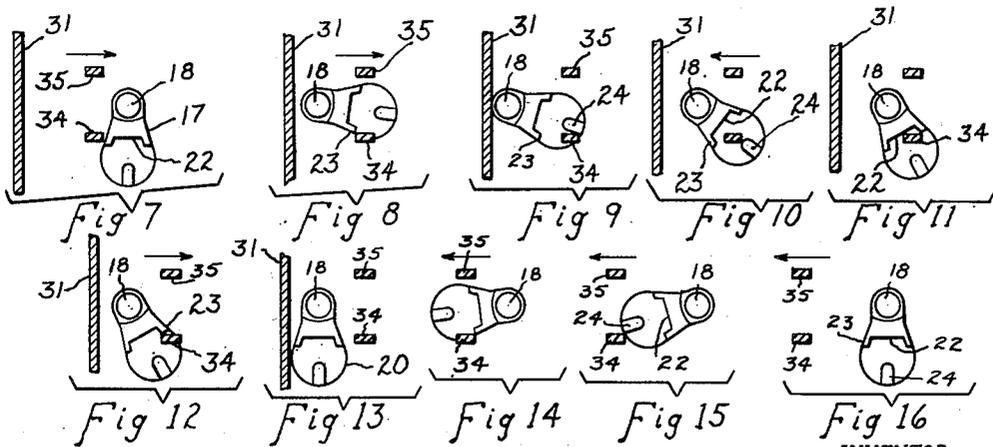
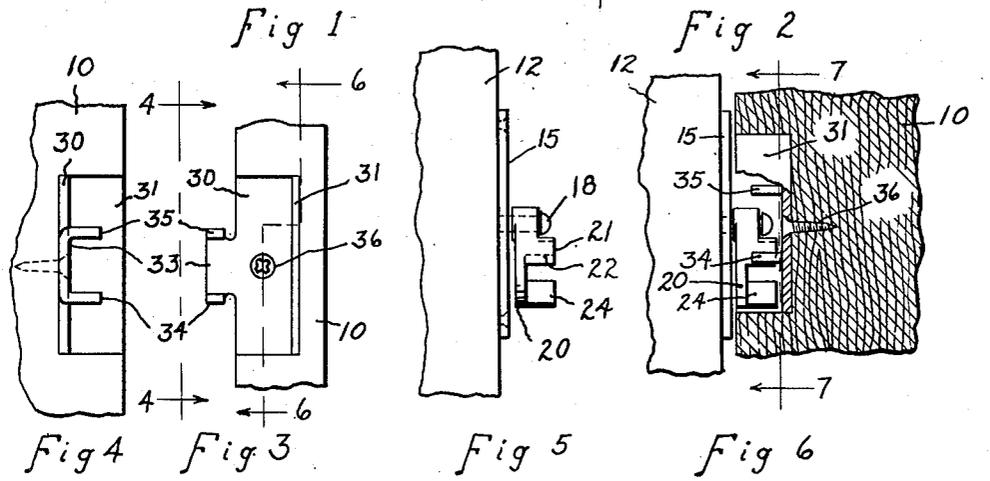
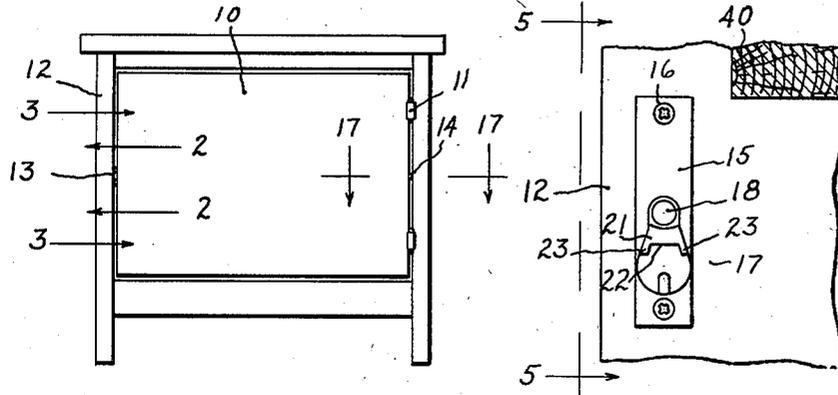


Fig 17

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# UNITED STATES PATENT OFFICE

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## LATCHING DEVICE

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The present invention relates to latching devices such as may be suitable for use in connection with doors, drawers, windows, and the like.

It is a primary object of the present invention to provide a new and improved latching device which may be mounted, for example, on a cabinet door, and which is operable solely in response to pressure exerted against the front side of the door. The latching device is entirely concealed, with no portions thereof protruding from or visible from the front side of the door. The door is latched in the closed position upon closing movement of the door and is unlatched merely by exerting a further slight pressure against the front surface of the door.

Another object of the present invention is to provide a new and improved latching device of the class described which is effective for retaining the door in the closed condition substantially irrespective of the force or speed with which the door may be closed.

A still further object of the present invention is to provide a new and improved latching device of the type described and which comprises a minimum number of movable parts, all of the parts of the device being of simple design and of low cost manufacture.

Additional objects and advantages of the invention will appear from the following description taken in connection with the accompanying drawings while the features of novelty will be pointed out with greater particularity in the appended claims.

In the drawings Fig. 1 is a front elevation illustrating a cabinet with the flush type door equipped with a latching device of the present invention; Fig. 2 is a front elevation of one portion of the latching device of the present invention and taken along the line 2—2 of Fig. 1; Fig. 3 is a front elevation illustrating a second part of the latching device of the present invention and taken along the line 3—3 of Fig. 1; Fig. 4 is a side elevation taken along the line 4—4 of Fig. 3; Fig. 5 is a side elevation taken along the line 5—5 of Fig. 2; Fig. 6 is a sectional view illustrating the parts in proper relative position of mounting; Figs. 7 to 16 inclusive are fragmentary detail views explanatory of the operation of the latching device of the invention; and Fig. 17 is a fragmentary sectional view taken along the line 17—17 of Fig. 1.

Referring now to the drawings, the latching device of the invention will be described as it may be mounted in a cabinet. It will become apparent, however, as the description proceeds

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that the latching device may be used in connection with other applications in which it may be desired to latch a movable member in any limit position relative to a stationary member. The cabinet shown in Fig. 1 comprises a movable member or door 10 hingedly mounted by hinges 11 within a stationary member or casing 12 defined by the cabinet frame. The door 10 is of the flush type and is held closed by the latching device, the cooperating parts of which are mounted as indicated at 13 at adjacent points of the outer edge of the door and of the door casing. The latching device has no parts projecting from the outer surface of the cabinet and is wholly concealed from view from the front side of the cabinet. No knob, handle or pull is required so that there is no hardware fixture extending from the front surface to interfere with dusting, polishing or cleansing the outer surface of the cabinet. The door is biased outwardly at least when in the closed and partially closed conditions by any suitable spring means such as the button spring unit 14 sunk in the hinged edge of the door and shown in Fig. 17. The spring means may equally well be incorporated in the hinges or otherwise as desired.

The latching device of the present invention is comprised essentially of two parts, a latch part and a keeper part, one of which is adapted to be mounted on one of the relatively movable cabinet members while the other cooperating part is adapted to be mounted on the other cabinet member. As illustrated in Figs. 2 and 5 the keeper is mounted on a rectangular metal mounting plate 15 secured as by screws 16 to one of the cabinet members, such as the door casing 12. A keeper indicated generally at 17 is loosely mounted for free pivotal movement upon the plate 15 by means of pin 18. The keeper being generally elongate, depends vertically downwardly from the pin 18 in the inoperative position as shown in Figs. 2 and 5. While the keeper 17 may be machined it is preferred for reasons of greater economy of manufacture to die cast the same of suitable metal alloy. The keeper comprises a pear-shaped back portion 20 with an outstanding boss 21 having symmetrical front and rear sides and defining a shoulder 22 therebetween facing away from the pin 18, there being a depending lip 23 on each of the opposite sides of the shoulder 22 extending toward the lower end of the body member. A stop portion 24 projects outwardly from the lower end of the back portion 20, the stop portion 24 being centrally

aligned with the pin 18 and spaced a slight distance from the shoulder 22.

A latch member is provided for cooperative engagement with the keeper 17 and as shown more particularly in Figs. 3 and 4 consists of a metal stamping including a base portion 30 and a right angularly extending flange portion 31. Integral with an extension 33 of the edge of the base portion 30 opposite the flange 31 are a pair of prongs 34 and 35 struck outwardly at right angles to the base portion 30. The prongs 34, 35, extend parallel with each other and with the flange portion 31, the prongs being somewhat shorter than the width of the flange 31. The latch unit as shown is adapted to be mounted within a mortised recess provided in the rear edge of the door and to be secured in place such as by screw 36. In Fig. 6 is illustrated the proper relative locations for the latch unit and the keeper unit in the corresponding portions of the cabinet. The prongs 34, 35 extend in a vertical plane parallel with the vertical plane through the axis of the keeper pin 18 and are symmetrically spaced above and below the horizontal plane of the keeper pin 18. The lower prong 34 will hereafter be referred to as a latch pin while the upper prong 35 will be referred to as the stop pin.

Referring now particularly to the views of Figs. 7 to 16 inclusive the mode of operation of the latching device of the present invention will now be described. Referring first to Fig. 7 particular attention is directed to the fact that the upper surface of the latch pin 34 is spaced closer to the keeper pin 18 than the shoulder 22 of the keeper. As the cabinet door is moved to the closed position the latch pin 34 will bear against the forward side of the boss 21 and cause the keeper to swing about its pivotal axis in the direction to the right, as viewed in Fig. 8. In Fig. 8 the keeper is shown in the position at the instant the edge of the lip 23 clears the edge of the latch pin 34. As the lip 23 clears the latch pin the keeper will drop downwardly until the stop portion 24 of the keeper comes to rest against the upper surface of the latch pin as shown in Fig. 9. Engagement of the flange 31 with the end of the keeper arrests further inward movement of the door so that the latch pin 34 cannot pass beyond the lower end of the stop 24. The position illustrated in Fig. 9 therefore represents the inward limit position of the latch device and of the door. As pressure upon the front side of the door is released, the door will be urged outwardly by virtue of the biasing spring 14 mounted at the hinge edge of the door whereupon the latch pin will move outwardly a slight distance and the stop portion 24 of the keeper will drop from the forward edge of the latch pin as shown in Fig. 10. Continued outward movement of the latch pin 34, and hence of the door, will be arrested by engagement of the latch pin against the shoulder 22 of the keeper. The latched position is illustrated in Fig. 11 and it will be observed that in this position the keeper is tilted at an angle which may, for convenience, be referred to as the operative or latched position of the keeper. Outward movement of the latch pin, or to the left, as viewed in Fig. 11 is rendered impossible due to the fact that the distance between the horizontal plane through the pivotal axis of the keeper and the upper surface of the latch pin is less than the distance between the pivotal axis of the keeper and the shoulder 22.

Attention is directed to the fact that latching occurs irrespective of the speed or force with which the door may be closed. Complete rota-

tion of the keeper unit 17 as upon sharp impact by latch pin 34 is precluded for as viewed in Fig. 8 the upper prong 35 forms a stop against which the swinging keeper will strike causing it to rebound against the latch pin 34. Since inward movement of the door is positively arrested by engagement of the angle flange 31 against the head of the keeper, as shown in Fig. 9, it is impossible for the latch pin 34 to move beyond latching position, or beyond the stop portion 24 of the keeper. Thus upon slight outward movement of the door following the initial closure thereof engagement of the latch pin against the shoulder 22 of the keeper is assured.

Unlatching is accomplished merely by exertion of a slight pressure against the front side of the door and movement of the door inwardly beyond the latched position as illustrated in Fig. 11 toward the inward limit position, or as illustrated in Fig. 12. In Fig. 12 is illustrated the relative positions of the latch parts following slight inward movement of the door and in which position the rear lip 23 of the keeper is shown ready to slip free from the upper surface of the latch pin 34, to the inoperative position. In Fig. 13 the keeper is shown in the vertical or inoperative position free of the latch pin. Outward movement of the door under force of the biasing spring 28 is thus permitted and as illustrated in Fig. 14 the keeper is tilted toward the left and the boss 21 passes between the two pins 34 and 35 until finally it swings entirely free as illustrated by the successive relative positions shown in Figs. 15 and 16.

Attention is directed to the fact that the keeper is symmetrical on opposite sides of the vertical plane through the pivotal axis and the stop portion 24 thereof and that the latch pin 34 and stop pin 35 are symmetrical above and below the horizontal plane through the pivotal axis of the keeper. The two latch parts may therefore be inverted for use on a left hand door instead of on a right hand door as shown. Also, the keeper 17 is shown biased to the inoperative position by force of gravity which is satisfactory where the latch device is to be mounted in a vertical position. It will be obvious that if the device is to be mounted in a horizontally extending position, suitable spring means may be provided for biasing the keeper to the inoperative position. Furthermore, it is not essential that the stop flange 31 be provided on the latch plate 30. A suitable inward limit stop for the door of the cabinet may be provided by the forward edge of a shelf, such as is indicated at 40 in Fig. 2.

Reduced to its essential elements therefore, the invention comprises a latch pin and a pivoted keeper, the keeper having a shoulder which engages the latch pin upon closing of the door to hold it in a latched position, the latch pin being released upon a further inward movement of the door which results in the keeper swinging free of the latch pin to an inoperative position.

I am familiar with the prior United States Patents 1,493,794 and 1,509,780, both to Neill A. Robertson and no claim is made herein to anything disclosed in such patents.

What I claim is:

1. In a latching device for a pair of members movable relative to each other along a predetermined line of movement and normally biased apart, said device comprising a latch pin adapted to be mounted on one of said members, a keeper adapted to be pivotally mounted on the other of said members, said keeper including a boss hav-

ing forward and rear sides and defining a shoulder therebetween facing away from and spaced from the pivotal axis of said keeper a distance slightly greater than the distance between said pivotal axis and the path of travel of said latch pin, said latch pin engaging the forward side of said boss of said keeper upon movement of said members relatively together and swinging said keeper from a normal inoperative position to an operative position angularly disposed with respect to said inoperative position, said latch pin upon slipping past the edge of said boss engaging said shoulder whereby said latch pin is restrained against outward movement in a latched position, said keeper including a stop portion spaced from said shoulder for precluding return movement of said keeper to said inoperative position prior to engagement of said latch pin against said shoulder, stop means on said one member for limiting movement of said members relatively together to a limit position slightly beyond said latched position, said latch pin being releasable in response to a subsequent movement of said members toward said limit position whereupon said latch pin disengages said shoulder permitting said keeper to swing freely to said inoperative position, said members being then free to separate.

2. In a latching device for a pair of members movable relative to each other along a predetermined line of movement and normally biased apart, said device comprising a latch pin adapted to be stationarily mounted on one of said members, a keeper adapted to be pivotally mounted on the other of said members, said keeper including a boss having forward and rear sides and defining a shoulder therebetween facing away from and spaced from the pivotal axis of said keeper a distance slightly greater than the distance between said pivotal axis and the path of travel of said latch pin, said latch pin engaging the forward side of said boss upon movement of said members relatively together for swinging said keeper from an inoperative to an operative position, stop means on said one member spaced from said latch pin for limiting the swinging movement of said keeper on said other member, said latch pin upon slipping past the edge of said boss engaging said shoulder whereby said latch is restrained against outward movement in a latched position, said keeper including a stop portion spaced from said shoulder for precluding return swinging movement of said keeper prior to engagement of said latch pin with said shoulder, said latch pin being releasable in response to movement of said members toward each other beyond said latched position whereupon said latch pin passes between said shoulder and said stop portion permitting said keeper to swing freely from said latch pin, said latch pin engaging with the rear side of said boss to swing said keeper forwardly as said members are subsequently moved relatively apart.

3. In a latching device for a pair of members movable relative to each other along a predetermined line of movement and normally biased apart, said device comprising a latch pin adapted to be mounted on one of said members, a keeper adapted to be pivotally mounted on the other of said members, said keeper including a boss having forward and rear sides and defining a shoulder therebetween facing away from and spaced from the pivotal axis of said keeper a distance slightly greater than the distance between said pivotal axis and the path of travel of said latch

pin, said latch pin engaging the forward side of said boss of said keeper upon movement of said members relatively together, said latch upon slipping past the edge of said boss engaging said shoulder whereby said latch pin is restrained against outward movement in a latched position, said keeper including a stop portion spaced from said shoulder, said stop portion engaging said latch pin prior to engagement of said latch pin with said shoulder to prevent pivotal movement of said keeper to an inoperative position, said latch pin being releasable in response to subsequent movement of said members toward each other beyond said latched position, whereupon said latch pin slips between said shoulder and said stop portion free of said keeper, said latch pin engaging with the rear side of said boss to swing said keeper outwardly to an inoperative position permitting free relative separation of said members.

4. In a latching device for a pair of members movable relative to each other along a predetermined line of movement and normally biased apart, said device comprising a latch adapted to be mounted on one of said members, a keeper adapted to be pivotally mounted on the other of said members, said keeper including a boss having forward and rear sides defining a shoulder therebetween facing away from and spaced from the pivotal axis of said keeper a distance slightly greater than the distance between said pivotal axis and the path of travel of said latch, said latch engaging the forward side of said boss upon movement of said members relatively together and swinging said keeper from an inoperative to an operative position, said latch upon slipping past the edge of said forward side of said boss engaging said shoulder whereby said latch is restrained against outward movement in a latched position, means on said keeper for precluding return movement of said keeper to said inoperative position prior to engagement of said latch against said shoulder, said latch being releasable in response to a further movement of said members relatively together beyond said latched position whereupon said shoulder slips free of said latch, said latch engaging with the rear side of said boss to swing said keeper outwardly to an inoperative condition permitting free relative separation of said members.

5. In a latching device for cooperating fixed and movable members normally biased apart at least when in close proximity to each other, said members being movable toward each other to a limit position, said device comprising a latch stationarily carried by one of said members, a keeper pivotally carried by the other of said members, said keeper being actuated to an operative position by said latch upon a first movement of said members together, said keeper including a shoulder for engaging and restraining said latch in said operative position against withdrawal, said keeper including stop means for maintaining said keeper in said operative position in event of movement of said members past said operative position to said limit position during said first movement, said stop means being spaced from said shoulder whereby upon a subsequent movement of said members from said latched position toward said limit position, said latch may pass between said shoulder and said stop means to permit pivotal movement of said keeper to an inoperative position and separation of said members.

6. A latching device comprising a latch and a keeper adapted to be mounted for movement rela-

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tive to each other along a predetermined path of travel, said keeper being elongated and pivotally mounted at one end for pivotal movement about an axis extending at right angles to said path of travel, said keeper being pivotally movable in a plane parallel to said path of travel, said keeper in the inoperative position extending in a direction at right angles to said path of travel, said latch including a portion engageable with the side of said keeper upon a first movement of said latch relatively toward said keeper for swinging said keeper about said axis to an operative position, said keeper including a shoulder which in said operative position engages said latch portion to restrain said latch in a predetermined position, said keeper being restored to said inoperative position by further relative movement of said keeper and said latch toward each other whereby said latch is released for relative movement away from said keeper, said keeper including means for precluding return movement of said keeper from said operative to said inoperative position prior to engagement of said latch against said shoulder upon said first movement of said latch toward said keeper.

7. In a latching device for a pair of relatively movable members, said device comprising a first unit including a latch adapted to be mounted on one of said members, and a second unit including a keeper adapted to be mounted on the other of said members, a pivot pin pivotally supporting said keeper on said second unit, said keeper defining a shoulder facing away from said pivot pin, said first and second units being adapted to be so positioned with respect to each other that upon a first relative closing movement of said members said latch engages behind said shoulder to restrain said members in latched position, and a stop portion on said second unit spaced from said shoulder and adapted to be engaged by said latch upon said first movement for ensuring engagement of said latch against said shoulder, said latch upon subsequent movement of said members in the same direction beyond said latched position disengaging said shoulder and passing between said shoulder and said stop portion to permit separation of said members.

8. In a latching device for use with a pair of relatively movable members, said device comprising a first unit including a latch adapted to be associated with one of said members, and a second unit including a keeper adapted to be associated with the other of said members, a pivot pin pivotally supporting said keeper on said second

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unit, said keeper defining a shoulder facing away from said pivot pin, said first and second units being adapted to be so positioned with respect to each other that upon a first relative closing movement of said units said latch engages behind said shoulder to restrain said units in latched position, and a stop portion on said second unit spaced from said shoulder and adapted to be engaged by said latch upon said first movement for ensuring engagement of said latch against said shoulder, said latch upon subsequent movement of said units in the same direction beyond said latched position disengaging said shoulder and passing between said shoulder and said stop portion to permit separation of said units.

9. In a latching device for use in latching two separable members together against the force of means urging the members apart, the improvement comprising a first latching unit adapted to be mounted on one member, a latch mounted on said first unit, a second latching unit adapted to be mounted on the other member to cooperate with said first unit whereby to hold said members in latched relation to each other, a pivot pin mounted on said second unit, a keeper pivotally mounted on said pivot pin and defining a shoulder facing away from said pivot pin, and a stop mounted on said second unit, said stop being engageable by said latch upon a first relative closing movement of said units to such an extent that said latch passes beyond said shoulder, said stop relatively guiding said latch and keeper into latching relation to each other upon the initiation of separating movement of said units whereby the force of said means is restrained by said latch and keeper to hold the units in latched position, said latch and said stop being in such relative position when the force of said means is being restrained thereby as to permit said latch to pass beyond said stop upon a subsequent movement in the direction of closing whereby said members may thereupon be separated.

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## REFERENCES CITED

The following references are of record in the file of this patent:

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