

Dec. 12, 1950

D. W. KEEF
DOOR LATCH

2,533,377

Filed Oct. 10, 1947

3 Sheets-Sheet 1

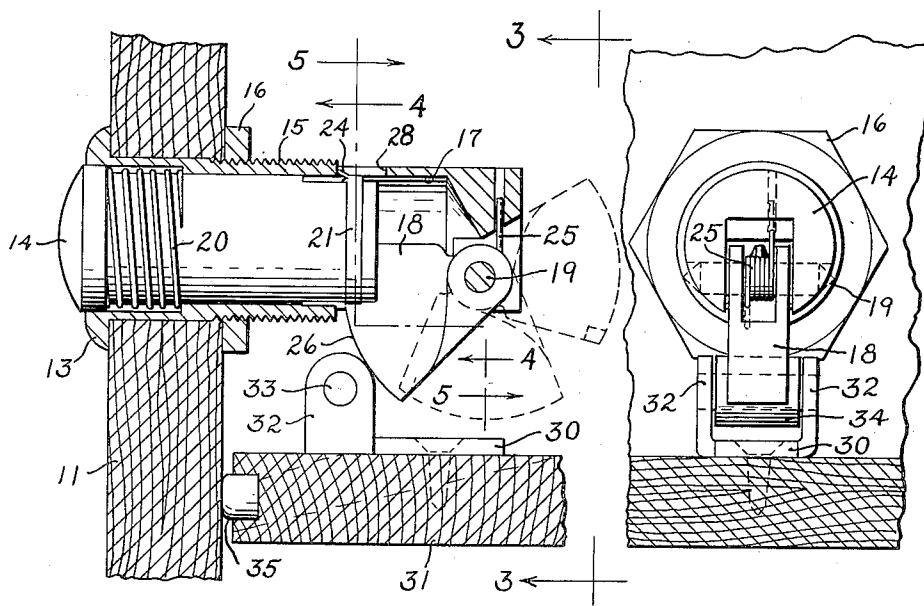


Fig. 2

Fig. 3

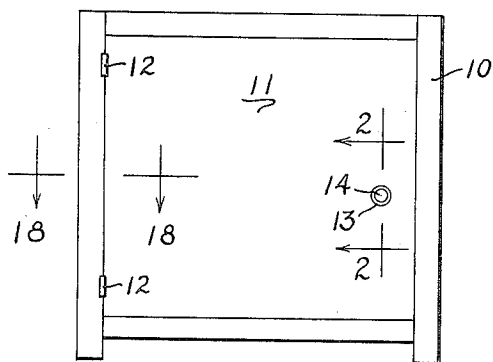


Fig. 1

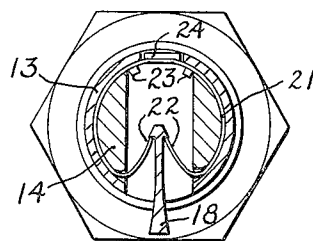


Fig. 4

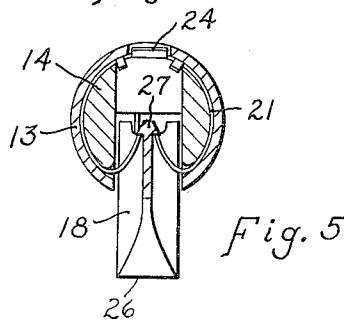


Fig. 5

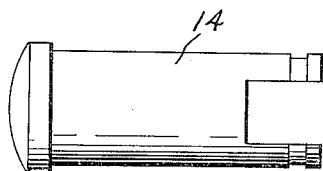


Fig. 6

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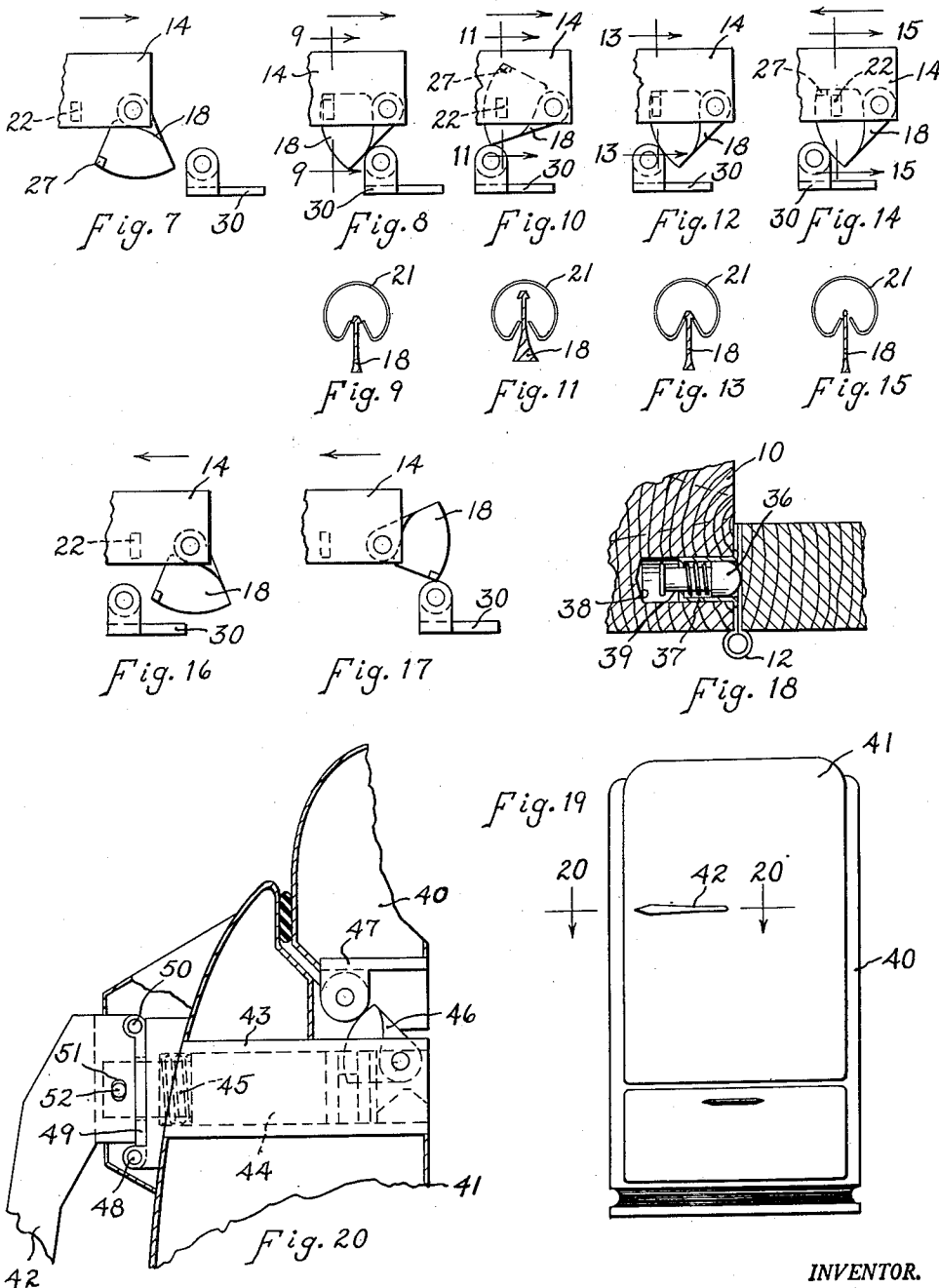
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3 Sheets-Sheet 2



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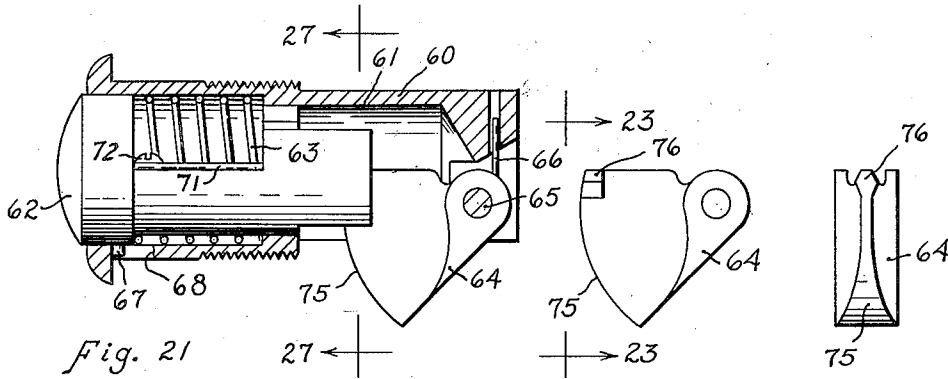
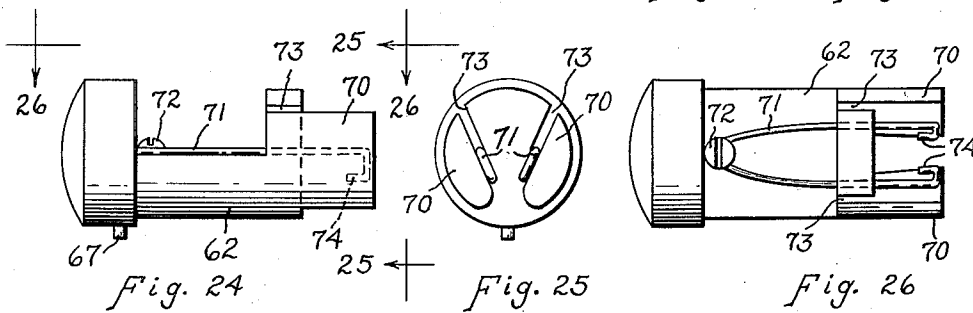
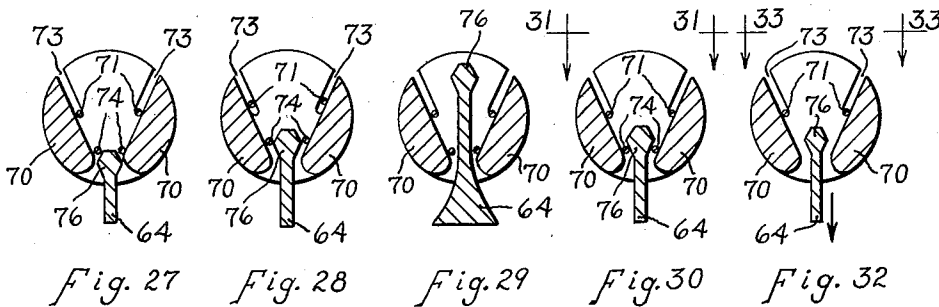
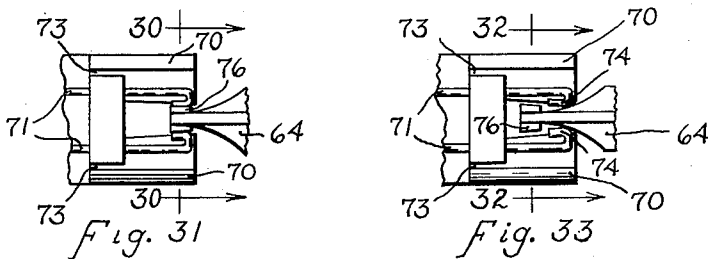
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3 Sheets-Sheet 3



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2,533,377

DOOR LATCH

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Application October 10, 1947, Serial No. 779,167

12 Claims. (Cl. 292—227)

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My present invention relates to means for latching together two separable members by the use of a touch-latch comprising a device having a button or other manually engageable or operatable member associated with a plunger for releasing the latch, the invention being such that a separable member such as a door for a cabinet may be latched in closed position when brought into engagement with the cabinet, and may be released by simply touching the plunger or pressing or pulling against a member associated with the plunger. The principal object of the present invention is to lighten housework by permitting the opening and closing of cabinet doors or the like when the operator's hands are full.

The present invention is an improvement upon the invention disclosed and claimed in the co-pending application of Ralph K. Nottingham, Serial No. 732,193, filed March 4, 1947. In the aforesaid application a touch-latch includes a dog pivotally mounted upon the end of the plunger. My invention includes a dog pivotally mounted upon the support for the plunger, and hence the pivot thereof is always maintained in the same relative position with respect to the member to which the support is attached.

An object of the present invention is to provide means in a touch-latch whereby positive locking of one of the separable members with respect to the other when in latched position is assured. In the aforesaid application and in all examples of the prior art of which I am aware, mounting of the latching dog on the movable plunger permits movement of the members with respect to each other when latched, to the extent of compressibility of the spring for maintaining the plunger in its normal position, thus permitting a door, for example, to rattle or vibrate when in closed position. When the door is attached to a cabinet enclosing moving or oscillating elements such as in a refrigerator, radio cabinet, phonograph, and many others of similar nature, annoying noises may be produced. In the present invention the separable elements are maintained firmly in closed position without rattling or vibrating.

A further object of the present invention is to prevent partial separation of latched together members when in closed position. The device of the aforesaid application may permit compression of the plunger spring when the door is latched to the cabinet to an extent sufficient to permit an article to become wedged between the door and a shelf, and therefore the plunger which is normally operatable to release the holding

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dog may not be released and it becomes necessary to dismantle the door entirely in order to permit separation of the dog from its holding abutment.

5 A further object of the present invention is to provide a touch-latch including a swinging dog which is positively retained in holding position. In the aforesaid application the dog is maintained in latching engagement by the compression of plunger spring. Hence if one of the members should sag or warp with respect to the other, or if the plunger or the abutment should not be accurately locked, efficient operation at all times may not occur. In the present invention the dog is maintained in holding position by positive means and slight inaccuracies in placement of the plunger or the holding abutment are not necessarily fatal to the operation of the device.

20 A further object of the present invention is to provide a touch-latch having a swinging dog which may operate by gravity when placed in proper position, or preferably, may be operated by a spring normally maintaining the dog in laterally projecting position.

A further object of the present invention is to provide a touch-latch which is made of relatively simple, sturdy and easily assembled parts.

The foregoing and further objects and advantages of the present invention may be ascertained from an inspection of the following specification taken in connection with the accompanying drawings while the features of novelty will be more distinctly pointed out in the appended claims.

In the drawings Fig. 1 is a front elevation of a cabinet having the present invention applied thereto;

Fig. 2 is a partial section on an enlarged scale taken substantially along line 2—2 of Fig. 1;

Fig. 3 is an end elevation taken substantially along line 3—3 of Fig. 2;

Fig. 4 is a vertical section taken substantially along line 4—4 of Fig. 2;

Fig. 5 is a vertical section taken substantially along line 5—5 of Fig. 2;

Fig. 6 is a detail view looking down upon the top of the plunger;

Fig. 7 is a schematic illustration of the latch when the dog is being moved into engagement with the abutment;

Fig. 8 is a similar view at a later stage in the closing movement;

Fig. 9 is a partial vertical section taken along line 9—9 of Fig. 8;

Fig. 10 is a view similar to Fig. 7 at a later stage in closing movement;

Fig. 11 is a view similar to Fig. 9 taken along line 11—11 of Fig. 10;

Fig. 12 is a view similar to Fig. 7 showing the parts in latching position;

Fig. 13 is a vertical section taken along line 13—13 of Fig. 12;

Fig. 14 is a view similar to Fig. 7 showing the first stage in releasing movement;

Fig. 15 is a vertical section taken along line 15—15 of Fig. 14;

Fig. 16 is a view similar to Fig. 7 showing a succeeding stage in the releasing movement;

Fig. 17 is a view similar to Fig. 7 showing the final stage of the releasing movement;

Fig. 18 is a partial horizontal section on an enlarged scale taken substantially along line 18—18 of Fig. 1;

Fig. 19 is a view in front elevation of a modified cabinet showing a form of plunger actuating member;

Fig. 20 is a horizontal section on an enlarged scale taken substantially along line 20—20 of Fig. 19;

Fig. 21 is a vertical section similar to Fig. 2 showing a modified form of the invention;

Fig. 22 is a detailed view in elevation of the latching dog of Fig. 21;

Fig. 23 is an end elevation taken substantially from line 23—23 of Fig. 22;

Fig. 24 is a side elevation of the modified plunger of Fig. 21;

Fig. 25 is an end elevation taken from line 25—25 of Fig. 24;

Fig. 26 is a plan view taken from line 26—26 of Fig. 24;

Fig. 27 is a vertical section taken substantially along line 27—27 of Fig. 21 showing the dog and latching spring at the beginning of a latching movement;

Fig. 28 shows a succeeding stage in the latching movement;

Fig. 29 shows a succeeding stage in the latching movement;

Fig. 30 is a similar view showing the parts in latched position;

Fig. 31 is a plan view taken substantially from line 31—31 of Fig. 30;

Fig. 32 is a vertical section taken substantially along line 32—32 of Fig. 33; and

Fig. 33 is a plan view taken from the plane of line 33—33 of Fig. 32.

Referring to the construction set forth in Figs. 1 to 18 inclusive, two separable members, such as a cabinet 10 and a door 11 hinged thereto by hinges 12, may be provided with a touch-latch including a support 13 and a plunger 14. The support preferably comprises a substantially cylindrical member having an outer flange adapted to engage the outer surface of the door 11 when the support is inserted through a hole drilled through the door. The inner intermediate portion of the support 13 is preferably provided with screw threads 15 adapted to engage a nut 16 which may be drawn tightly against the inner surface of the door 11. The inner extremity of the support 13 is provided with a large cavity 17 opening toward one side, to provide room for reception of a dog 18 pivotally mounted upon a pin 19 at the overhanging end of the support and located toward the lower edge thereof. The support is slotted outwardly from the pivot 19 so that the dog may project forwardly in line with the plunger or may extend laterally, or may

swing inwardly at least partially into the cavity 17 as seen in full outline in Fig. 2. The plunger 14 comprises an outwardly protruding head adapted to be slidably guided in a cylindrical bore in the outer end of the support and which provides a shoulder between which and the enlarged head may be compressed a spring 20 coiled about the plunger and which normally maintains the plunger projecting slightly beyond the support so that the plunger may be manually engaged. The inner end of the plunger is provided with a groove in which a spring clip device 21, substantially encircling the plunger, may be positioned between the surface of the plunger and the inner surface of the bore through the support.

The spring clip device 21 comprises a band spring substantially encircling the plunger, and has free ends 22 extending into the lower part of the cavity 17. The upper forward edge of the spring 21 may be provided with inwardly bent prongs 23 serving to prevent circumferential movement of the spring 21 by engaging the sides of the slot in the plunger 14. Between the prongs 23 there may be provided a tab 24 adapted to be bent upwardly to engage the inner end of an opening 28 in the wall of the support through which the tab 24 may be manipulated in order to cause it to stand up and engage the support 13 to limit outward movement of the plunger due to the spring 20, and also to prevent it from rotating.

The dog 18 comprises spaced ears encircling the pin 19 and embracing a spring 25 coiled about the pin 19 and having one end projecting into a hole drilled in the dog 18 and its opposite end projecting into a hole drilled through the end of the plunger 14 whereby the spring 25 may be maintained at zero compression when the dog is projecting laterally outward, placed under compression when the dog swings rearwardly, and placed under tension when the dog swings forwardly. The spring 25 thus tends normally to maintain the dog in laterally projecting position. The outer end of the dog is provided with an arcuate face 26, the center of curvature of which may be located at the axis of pin 19. The dog tapers inwardly to a narrow inner edge, and at the junction of the inner edge and the arcuate face 26 is provided with a double wedge enlargement 27.

While the face 26 may lie along a true arc, it is preferred to have it assume a slightly spiral contour with the shortest radius at the edge carrying the wedge enlargement. Therefore the point of engagement of the face 26 with a roller abutment will be below (or outside of) a line through the axis of pin 19 and the axis of the roller as will appear later.

An abutment for engagement with the dog 18 is provided by fastening an abutment of any suitable type mounted on a support 30 to a fixed portion of the other separable member such as a shelf 31 in the cabinet 10. The support 30 may comprise a plate having upwardly extending ears 32 journalling a pivot 33 for a roller 34 whose axis extends normally to the axis of plunger 14 or parallel to the pin 19. The periphery of the roller 34 is so positioned as to cause swinging movement of the dog 18 when either edge thereof is engaged by the roller, and when the dog is positioned in latching position, as seen in Fig. 2, it is at such a distance from the axis of pin 19 that no more than a fractional inch of displacement may be permitted. However, if the dog 18

is not maintained in latching position by the spring 21, as will be explained later, the arcuate face 26 permits the dog to move to its laterally projecting position. If the cabinet construction is rigid the parts may be so adjusted that when the door 11 is firmly against the shelf 31 the dog 18 will have but a few thousandths of an inch play between it and the roller 34. However, in order to permit of some inaccuracy or subsequent warping of one part with respect to the other, and in order to assure firm contact against rattling, the outer edge of the shelf 31 is preferably provided with a rubber bumper button 35 which may be compressed slightly by pressure against the plunger 14 and the portion of the support 13 surrounding the plunger to assure freedom of swinging movement of the dog 18 when necessary.

If the face 26 is formed as a spiral there will be a slight component of force always tending to force the dog outwardly so that when the spring 21 is removed from the wedge enlargement the dog will be forced to swing outwardly while the roller 34 turns.

In order to have the door swing open automatically when the dog 18 is released from latching position it is preferable to provide a spring opening device such as the plunger 36, mounted in a thimble 37 adapted to be forced into a bore 38 in the edge of the cabinet 10, and normally forced outward by a spring 39, the plunger 36 bearing against a portion of the door 11 in such fashion as to swing the door outwardly when the latch is released.

Operation of first modification

As seen in Figs. 2 to 5 inclusive the dog is mounted in latching position by the ends 22 of the band spring, which has been wedged apart by the wedge enlargement 27 and subsequently has snapped behind the lower surfaces of the wedge enlargement positively to hold the dog in the position illustrated with its arcuate face against the roller 34. Figs. 7 to 13 inclusive illustrate the movement of the dog to its latched position. As the door is swung shut the leading edge of the laterally projecting dog 18 engages the roller 34, causing the dog to swing inwardly. In subsequent stages the wedge enlargement is shown spreading the ends of the spring latch and passing beyond to an extent necessary to permit the dog to drop behind the roller 34 until further movement thereof is prevented by the spring clip engaging the lower surfaces of the wedge enlargement. The door is thus maintained in latched position until the plunger 14 is moved longitudinally by manual engagement. As seen in Figs. 14 and 15 the manual engagement of the plunger moves the ends 22 of the spring clip from beneath the wedge enlargement of the dog, thus permitting the force of gravity or the compression of spring 25, aided by the component of force due to the spiral face, to move the dog to its normal, laterally projecting position as seen in Fig. 16. When the hand is removed from the plunger 14 the spring opening device causes the door to swing open. The leading edge of the dog will engage the roller 34 and the dog will be swung inwardly beyond the end of support as seen in Fig. 17. As soon as the dog has cleared the roller 34 the tension of spring 25 or the force of gravity will return the dog to its normal, laterally projecting position in readiness for the next closing movement.

Second modification

In Figs. 19 and 20 a modified form of cabinet such as a refrigerator 40 is provided with a hinged door 41 adapted to be opened by a handle lever 42. A support 43 is adapted to be mounted in the door and is provided with a plunger 44 and spring 45 normally retaining the plunger in inwardly projecting position. The support carries a dog 46 such as the dog 18 which is adapted to be retained by a spring clip such as the clip 21 mounted upon the support. The cabinet is provided with an abutment mounting member 47 carrying a roller such as the roller 34. The support 43 mounts a pivot pin 48 upon which is pivotally mounted a laterally projecting plate 49 having an opening through which the end of the plunger 44 projects. The free end of the plate 49 carries a pivot 50 parallel to the pivot 48 and upon which the handle 42 is pivotally mounted, the handle having a recess therein for reception of the projecting end of the plunger 44. The handle is provided with elongated openings 51 through which a pin 52 passes, the pin 52 projecting through the plunger 44. If the handle 42 is pressed toward the door the plate 49 will be rocked about pivot 48 to pull the plunger 44 outwardly and cause release of the dog. If the handle 42 is pulled outwardly from the door it will pivot about pivot 50 to pull the plunger 44 outwardly and release the dog. The operation of the dog is exactly as previously described.

The modification herein illustrated is meant to emphasize the universal adaptability of the touch-latch to various forms of cabinets or the like and to illustrate the fact that the plunger 44 need not be moved in one direction only, since in the first modification releasing movement is accomplished by pushing the plunger inwardly while in this modification releasing of the dog is accomplished by pulling the plunger outwardly. This modification also illustrates the adaptability of the invention to handle or lever operated devices.

Third modification

In the modification illustrated in Figs. 21 to 33 inclusive certain details of the plunger and dog have been altered. This modification may be more desirable since retention of the dog in latched position is accomplished by a wedging effect rather than by the tension of the spring clip device alone.

In this modification the support 60 adapted to be mounted upon a door or the like is provided with a central bore 61 mounting a plunger 62, the plunger being normally retained outwardly by a coiled spring 63. The inner end of the support 60 carries a dog 64 mounted upon a pivot pin 65 and normally retained in laterally projecting position by a spring 66 similar to the spring 25. The plunger 62 is maintained in its normal outward position by a pin 67 projecting into a slot 68 in the support 60 through which the pin may be inserted after the plunger is in position. The inner end of the plunger 62 is longitudinally slotted, leaving projecting side members 70, the inner surfaces of which converge downwardly and toward the bottom of the slot and inwardly away from the head of the plunger. The converging sides exert a slight wedging effect so that a very slight push on the outer end of the plunger serves to augment the wedging thrust and unlock the dog. A wishbone spring 71 is extended longi-

tudinally of the plunger 62 on the lower surface of a deep notch cut in the upper half of the plunger, the spring being retained by a screw 72. The projecting ends of the legs of the spring extend through slots 73 aligned with the inner surfaces of the portions 70 and the ends are reversely directed to provide a spaced pair of tips 74 lying against the sloping walls of the members 70. The dog 64 is provided with a curved latching face 75 as in the dog 13. The inner corner of the dog is provided with a double wedge enlargement 76 similar to the enlargement 27 of dog 18 but having lower sloping faces diverging at substantially the same angle as the angle between the inner surfaces of the portions 70. The wedge enlargement is capable of passing upward through the slot in the plunger as seen in Figs. 27 and 28 but in doing so the wedge enlargement engages the tips 74 and moves the ends of the wishbone spring upwardly a slight distance until the wedge enlargement passes beyond a point at which the tips 74 may snap back into normal position. When the dog has cleared the abutment (not herein illustrated, but an abutment similar to that illustrated in Fig. 2 may be utilized) the spring 66 swings the dog outwardly until the tips 74 wedgingly engage the lower surfaces of the enlargement 76 to retain the dog in latching position as seen in Figs. 30 and 31. When the plunger 62 is displaced longitudinally the tips 74 move beyond the wedge enlargement to permit the spring 66 to swing the dog outwardly. In all other respects this modification operates as previously described.

In this modification it is apparent that the latching action of the dog is not dependent upon the strength of a spring member since the latching action is accomplished by wedging the tips between converging members. Also the construction of the dog is sturdier and the wedge enlargement will not become worn to any extent.

Having illustrated and described several embodiments which my invention may assume it should be immediately apparent to those skilled in the art that various modifications in detail and arrangement may be achieved within the teachings of the present disclosure. All such modifications as come within the true spirit and scope of the appended claims are considered to be a part of my invention.

I claim:

1. Means for latching together two separable members such as a cabinet and a door therefor, comprising an elongated, hollow support adapted to be mounted on one of said members, a plunger slidably mounted for longitudinal movement in said support, said plunger having a recess therein, a spring biased between said support and said plunger and normally maintaining said plunger in one position with respect to said support, a dog pivotally mounted on said support and swingable from a laterally projecting position to a partially retracted position in either direction longitudinally of said plunger, said dog and said plunger being so related that a portion of said dog may enter said recess when said dog is retracted in one direction, and a spring catch device mounted upon said plunger in position to engage said portion of said dog when swung into said recess while said plunger is in said normally maintained position, said plunger being movable longitudinally against the force of said spring to another position at which said spring catch device is removed from engagement with said dog.

2. The construction set forth in claim 1 in

which said dog comprises a wedge enlargement and said spring catch device comprises a resilient part projecting into the recess in said plunger in position to snap past said wedge enlargement.

3. The construction set forth in claim 1 wherein said dog comprises a double wedge enlargement and said spring catch device comprises a spring clip including opposed portions adapted to be spread apart by said enlargement.

4. The construction set forth in claim 1; in combination with a second spring biased between said support and said dog to normally maintain said dog in laterally projecting position.

5. The construction set forth in claim 1 wherein the free end of said dog conforms to an arc centered substantially at the pivotal mounting thereof.

6. The construction set forth in claim 1 wherein the free end of said dog conforms to a spiral.

7. The construction set forth in claim 1 wherein the free end of said dog conforms to a spiral of increasing radius toward its forward edge.

8. Means for latching together two separable members such as a cabinet and a door therefor, comprising a support adapted to be mounted on one of said members, a plunger slidably mounted for longitudinal movement in said support, a first spring biased between said support and said plunger and normally maintaining said plunger in one position with respect to said support, a dog pivotally mounted on said support and having a wedge enlargement thereon, said dog being swingable from a laterally projecting position to a partially retracted position in either direction longitudinally of said plunger, a spring catch device mounted upon said plunger in position to snap past said wedge enlargement when said dog is swung in one direction while said plunger is in said normally maintained position, said plunger being movable longitudinally against the force of said first spring to another position at which said spring catch device is removed from engagement with said wedge enlargement, and a second spring biased between said support and said dog to normally maintain said dog in laterally projecting position.

9. The construction set forth in claim 8 wherein said dog comprises a double wedge enlargement and said spring catch device comprises a spring clip adapted to be spread apart by said double wedge enlargement.

10. Means for latching together two separable members such as a cabinet and a door therefor, comprising a support adapted to be mounted on one of said members, a plunger slidably mounted for longitudinal movement in said support, a spring biased between said support and said plunger and normally maintaining said plunger in one position with respect to said support, a dog pivotally mounted on said support and swingable from a laterally projecting position to a partially retracted position in either direction longitudinally of said plunger, said plunger being provided with a longitudinal recess adapted to receive a portion of said dog therein, and a spring catch device mounted upon said plunger in position to engage said portion of the dog when said dog is swung in one direction while said plunger is in said normally maintained position, said spring catch device comprising a spring clip having its ends projecting into said plunger from opposite sides of said recess, said plunger being movable longitudinally against the force of said spring to another position at which said spring catch device releases said dog.

11. The construction set forth in claim 10 wherein said spring clip comprises a wishbone spring extending longitudinally of said plunger and having reversely directed ends lying in said recess, and said recess is tapered inwardly toward the side which said dog enters.

12. The construction set forth in claim 10 wherein said spring clip comprises a band spring almost entirely encircling said plunger and having free ends extending into said recess from the side which said dog enters.

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