

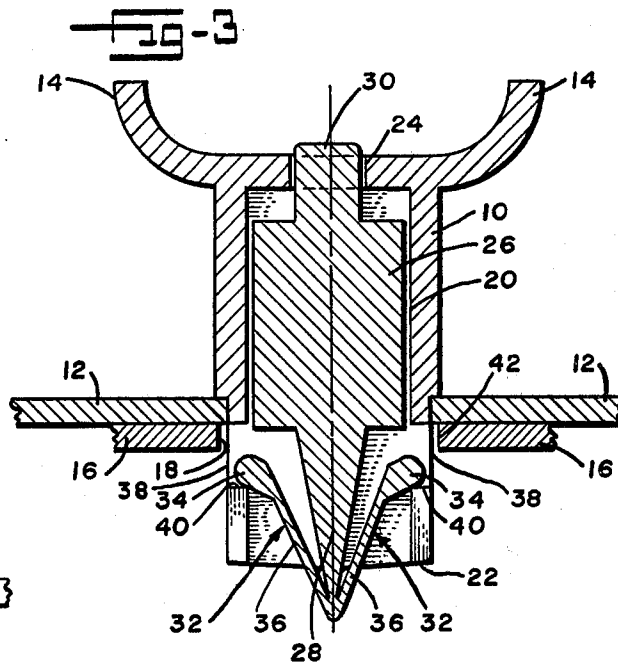
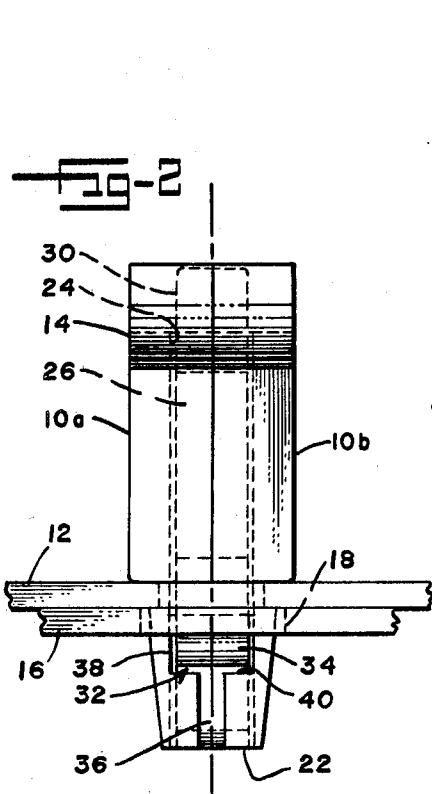
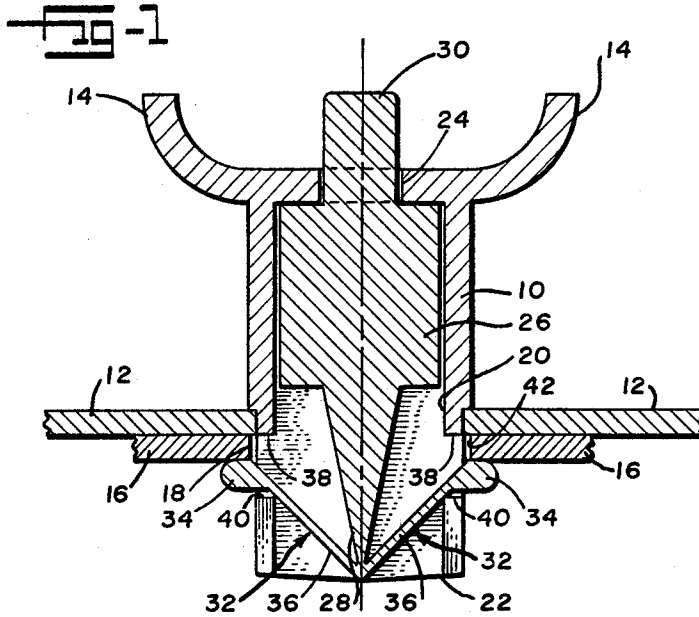
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LATCHING DEVICE

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3,479,075

LATCHING DEVICE

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9 Claims

ABSTRACT OF THE DISCLOSURE

A latching device for a closure member or lid of a cabinet includes a plastic body attached to the closure member and within which a longitudinally movable latch member is slidably carried. The latch member supports resilient arms extending through side apertures in the body for engaging the underside of the cabinet surface in a locking position. The resilient arms provide shear sections under the cabinet's surface between the cabinet surface and edges of the aforementioned apertures for preventing undesired opening of the closure member. The body of the latching device is provided with hand gripping means which may be grasped for opening the closure member, while at the same time one end of the latch member is depressed for moving the resilient arms out of locking position.

This invention relates to a latching device and particularly to an automatically operated latching device of economical construction.

Cabinet enclosures, for example of the type for housing electronic equipment, frequently include a lid or closure member and some kind of latching mechanism for selectively locking the closure member in place. Prior latching devices have employed a plurality of metal parts of moderately complex construction, particularly in instances where the lid is to be automatically locked when closed. Prior art devices have also frequently required a separate unlocking motion or operation in order to unlock the latching device prior to opening of the closure member.

It is therefore an object of the present invention to provide an improved and less complicated latching device which automatically latches into locked position when a movable closure member is closed.

It is another object of the present invention to provide an economically constructed automatically operating latching device which provides positive and reliable self-locking action.

It is another object of the present invention to provide an improved latching device which can be disengaged or unlocked in substantially one operation with the opening of the closure member to which the latching device is attached.

It is another object of the present invention to provide an improved latching device employing a minimum of parts.

According to the present invention, a latching device comprises a body member for attachment to a movable closure member and which is insertable into engagement with a locking surface member of a cabinet or the like when such closure member is closed towards the locking surface member. This body, which is substantially unitary, includes therewithin a longitudinally movable latch member carrying resilient arms at the sides thereof. These resilient arms extend through side apertures in the body member and engage the edge of the locking surface member on the cabinet when the latching device is in locked position. The latch member also includes an operating button or the like extending up between hand gripping means located on either side of the body member, and when this operating button is depressed the resilient arms

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are withdrawn to a position substantially completely within the body member and out of engagement with the locking surface member. When the operating button is depressed, the resilient arms are caused to cam against the inner surface of the body member and out of engagement with the locking surface member. The movable closure member may be opened by movement of the hand gripping means substantially coincident with depression of the aforementioned operating button.

The latching device automatically engages the edges of the locking surface member when the movable closure member is moved toward its closed position. As the resilient arms engage the edge of the locking surface member, they are automatically forced within the interior of the body member until they snap out under the surface of the locking surface member. Thus the locking operation is substantially automatic and positive.

According to a feature of the present invention, the latch member including the resilient arms is substantially unitary and formed of resilient plastic material, for example nylon molding resin. Since the enclosing body member is also substantially unitary, the entire latching device as completed may be effectively formed of two pieces. Although this construction renders production of the device quite economical, the device nonetheless provides the advantage of automatic and positive latching, together with rapid unlatching readily achieved in one motion with the opening of the closure member.

The subject matter which I regard as my invention is particularly pointed out and distinctly claimed in the concluding portion of this specification. The invention, however, both as to organization and method of operation, together with further advantages and objects thereof, may best be understood by reference to the following description taken in connection with the accompanying drawings wherein like reference characters refer to like elements and in which:

FIG. 1 is a vertical cross section through the latching device according to the present invention;

FIG. 2 is a side view of the FIG. 1 latching device;

FIG. 3 is a vertical cross section of the FIG. 1 latching device with the latch member in retracted position.

Referring to the drawings, the latching device according to the present invention comprises a body 10 secured to a movable closure member 12, e.g. by means of a close fit of the former within an aperture in the latter. The body 10 extends above the movable member 12 and is provided at the upper extremity thereof with hand gripping means 14 whereby the same may be grasped to raise movable closure member 12 in a vertically upward direction.

The movable closure member 12 may suitably comprise a hinged lid for a cabinet or other enclosure, rendering accessible the interior of the otherwise closed enclosure. Such cabinet or enclosure includes a top surface or locking surface member 16 having an aperture 18 aligned to receive the body 10 of the latching device in closed position. Thus when movable member 12 is closed with respect to the locking surface member 16, the body 10 enters the aperture 18.

The body 10 is rigid and substantially unitary in final construction but may be initially formed of two complementary side parts 10a and 10b of acetal molding resin joined along the center line in FIG. 2 to form such body member. The body member is provided in this manner with an interior bore 20. The molding resin for the body may suitably comprise a product known as Delrin 500. The interior bore 20 is of substantially uniform cross section from gripping means 14 downward to a lower opening 22, but is constricted at its upper end to form a smaller aperture 24 extending between the hand gripping means 14. Within this bore a latch member is slidably received and includes a substantially solid central actuating mem-

ber 26 having a cross section slightly less than bore 20 and a longitudinal extent about half the vertical length of bore 20. The latch member includes a vertical extension 28 of reduced cross section depending downwardly from the center of the actuating member 26 and normally extending to the opening 22. The central actuating member 26 also comprises an operating end 30 extending upwardly through aperture 24 to provide an unlocking push button. Vertical extension 28 of the actuating member carries a pair of resilient arms 32 extending laterally outwardly from the sides of such extension at a point on said extension remote from the main body of the actuating member 26. These arms, which are symmetrically positioned at either side of the extension, are suitably carried by the vertical extension 28 at the lower extremity thereof substantially coincident with the plane of opening 22. Each of these actuating arms includes an enlarged portion 34 at its outer extremity, and a stem 36 of reduced cross section located between vertical extension 28 and enlarged portion 34. The enlarged portions 34 extend through side apertures 38 in body 10 and bear upon the lower edges 40 of such apertures. The arms 32, and particularly stems 36 thereof extend partially upwardly toward operating end 30 making an angle of less than 90 degrees with the center line of the central actuating member. In normal extended position, as shown in FIG. 1, these arms preferably make an angle of approximately 45 degrees with the vertical center line of central actuating member 26. The arms, being resilient, tend to urge the central actuating member 26 towards its upwardmost position such that operating end 30 protrudes from body 10 as indicated.

In the FIG. 1 view, the latching device is shown in locked position such that enlarged portions 34 extend under locking surface member 16, providing a large shear section thereof between locking surface member 16 and the edge 40 of aperture 38 to restrain upward movement of body 10. An effort to move the movable member 12 upwardly, as by grasping hand gripping means 14, will tend to rotate the enlarged portions 34 around edge 40, developing moments about edge 40. Thus an attempt to disengage the latching device when locked will result in a firmer latching engagement because enlarged portions 34 become wedged downwardly from member 16 around edge 40. Therefore the device cannot easily be unlocked by force. It is noted the stems 36, of reduced cross section, provide the primary resilience for arms 32, and allow the enlarged portions 34 to bend downwardly about edge 40.

For initially locking the device, the movable member 12 is merely closed against locking surface member 16 from an upraised position. At such time the arms 32 including enlarged portions 34 engage the edges 42 of aperture 18, and these edges urge the resilient arms to a position within the bore 20 of body 10 (similar to the position illustrated in FIG. 3). As enlarged portions 34 are forced within apertures 38, the actuating member 26 is also urged in a downward direction. After the enlarged portions 34 pass the edges 42, the arms, being resilient, will extend into their locking position shown in FIG. 1 under the edge of locking surface member 16, i.e. on the opposite side of the locking surface member from the movable member 12.

To unlock the latching device, the operating end 30 is compressed, as by grasping the hand gripping means between the fingers and pressing the operating end 30 with a finger or thumb, to force the central actuating member in a downward direction. At this time, the resilient arms, and especially enlarged ends 34 thereof, bear against the inner sides of bore 20 in body 10, i.e. against the lower edges 40 of apertures 38. The arms 32 are inwardly compressed within the body to the position shown in FIG. 3, by the camming of such arms against the inner surface of body 10. When the enlarged portions 34 of arms 32 are thus compressed within the body 10 and the device is unlocked, the movable member 12 is readily

raised by continued upward pressure on the lower sides of hand gripping means 14.

The length of operating end 30 is such that full downward movement thereof does not force the central actuating member completely out of body 10. Moreover, enlarged portions 34 tend to restrain the maximum downward movement of the actuating member.

The actuating member 26, including downward extension 28 and arms 32, is preferably formed as a unitary plastic body having resilient properties. An advantageous material for the formation of this unitary body is nylon molding resin and in particular a product known as Zytel 101 is suitably employed. The stems 36 being of smaller cross section impart the desired resiliency to the member while the remainder of the member provides sufficient rigidity and desired shear section to insure firm latching engagement.

There is thus provided a positive self-latching device of economical construction employing a minimum number of parts. Closing of the movable member 12 automatically snaps the latching device into positive locking engagement. Therefore, no attention need be given to the locking operation, but rather the movable member is securely locked in position whenever closed. Then, merely by grasping hand gripping means 14 and depressing operating end 30, the resilient arms 32 are cammed within the body of the device and the movable member is readily unlocked and lifted in substantially one operation. The device is reliable, easy to operate, and easy to manufacture.

While vertical operation of the latching device has been described in the foregoing discussion for ease of explanation, it is apparent the latching device may be employed with any desired orientation.

While I have shown and described a preferred embodiment of my invention, it will be apparent to those skilled in the art that many changes and modifications may be made without departing from my invention in its broader aspects.

I claim:

1. In combination with a movable closure member and a locking surface member, a latching device for selectively securing a movable closure member to a locking surface member comprising:

a body attached to the movable closure member and having a portion extending for insertion into said locking surface member,

a latch member within said body comprising a central actuating member constrained for limited longitudinal movement within said body, said latch member carrying a pair of resilient arms at sides thereof protruding outwardly from the sides of said body in their normal extended condition for yieldable engagement with the edge of said locking surface member, said engagement urging said resilient arms within said body when said movable member is closed toward said locking surface member, said arms extending into locking position with said locking surface member on the opposite side of said surface member after passing the edge of said locking surface member when said closure member is closed against said locking surface member, for holding said closure member and locking surface member together,

said arms providing surfaces and shear sections along and abutting the said opposite side of the locking surface member for preventing undesired opening of said movable closure member when said arms are in locking position,

said resilient arms normally forcing said central member to a first longitudinal position thereof, said resilient arms bearing against inner sides of the said body with longitudinally opposite movement of the central member, such opposite movement within said body compressing said resilient arms longitudinally

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against the inner sides of said body and out of locking position with said locking surface member to unlock said latching device, and

hand gripping means provided on said body for moving said closure member relative to said locking surface member,

said latch member's central actuating member having an operating end protruding upwardly from said body in the first longitudinal position of said central actuating member, and

wherein said arms are joined to said central member at a point remote from said operating end and extend toward said operating end and toward the direction said central actuating member is urged by said arms, said arms being carried on an extension depending longitudinally from said central actuating member and providing said point remote from said operating end, said extension having a cross section reduced as compared to that of said central actuating member, said arms extending angularly back toward said closure member from said point, said arms making an angle of less than ninety degrees with said central actuating member when said arms are in normal extended condition.

2. The combination according to claim 1 wherein said body is provided with side apertures for passing said resilient arms in their normal extended condition and for receiving said arms within said body when longitudinal movement of said central member compresses the arms inwardly, the edges of said apertures providing bearing edges for said resilient arms against which said resilient arms are compressed by the longitudinal movement of said central member, said arms, where they protrude inwardly from said body in the locking position of said arms, being wedged between aperture edges and said locking surface member.

3. The combination according to claim 2 wherein said latch member including said actuating member and said resilient arms comprises a unitary member of resilient plastic material.

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4. The combination according to claim 3 wherein said latch member is formed of nylon molding resin.

5. The combination according to claim 3 wherein said body is also formed as a substantially unitary plastic member.

6. The combination according to claim 3 wherein said arms are outwardly turned and enlarged where they pass through said apertures in the extended position thereof to engage said locking surface member and provide an enhanced locking shear section.

7. The combination according to claim 6 wherein the said arms between said enlarged portion and said central actuating member are of reduced cross section for maintaining substantial resiliency for said arms and allowing outward bending of the enlarged portions of said arms around the bearing edge of said apertures with said arms in locking engagement with said locking surface member.

8. The combination according to claim 1 wherein said angle is approximately forty-five degrees.

9. The combination according to claim 1 wherein said arms are symmetrically carried from either side of said central actuating member.

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U.S. Cl. X.R.

24—211

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,479,075 Dated Nov. 18, 1969

Inventor(s) J. E. SWANNO

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, line 69, "i.e." should read --e.g.--

Column 4, line 59, after "said" insert --locking-- .

SIGNED AND
SEALED
JUN 9 1970

(SEAL)

Attest:

Edward M. Fletcher, Jr.

Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents