Sept. 24, 1968 J. K. BARRY 3,402,958

DOOR OR PANEL FASTENER

Filed March 28, 1967 2 Sheets-Sheet 1

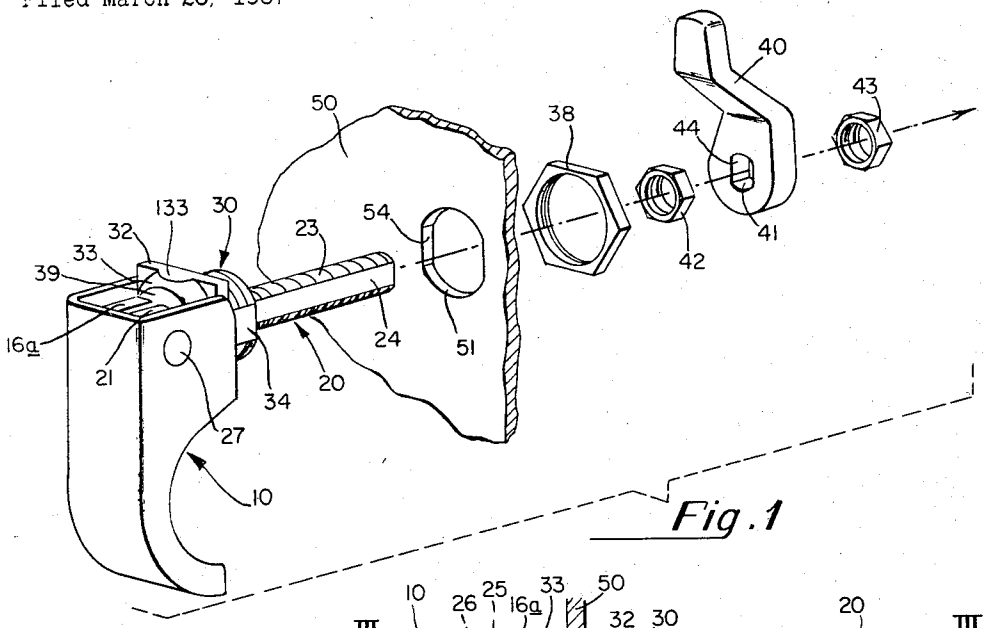


Fig. 1

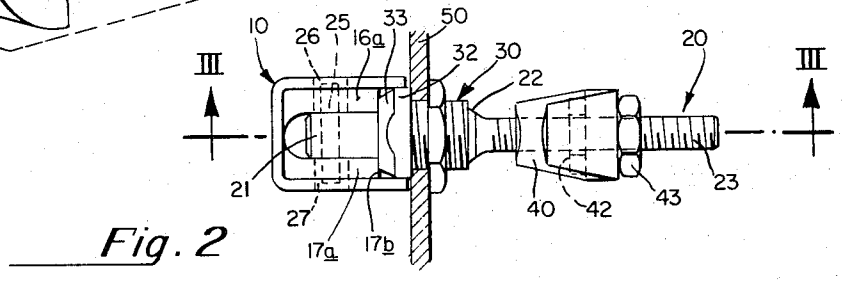


Fig. 2

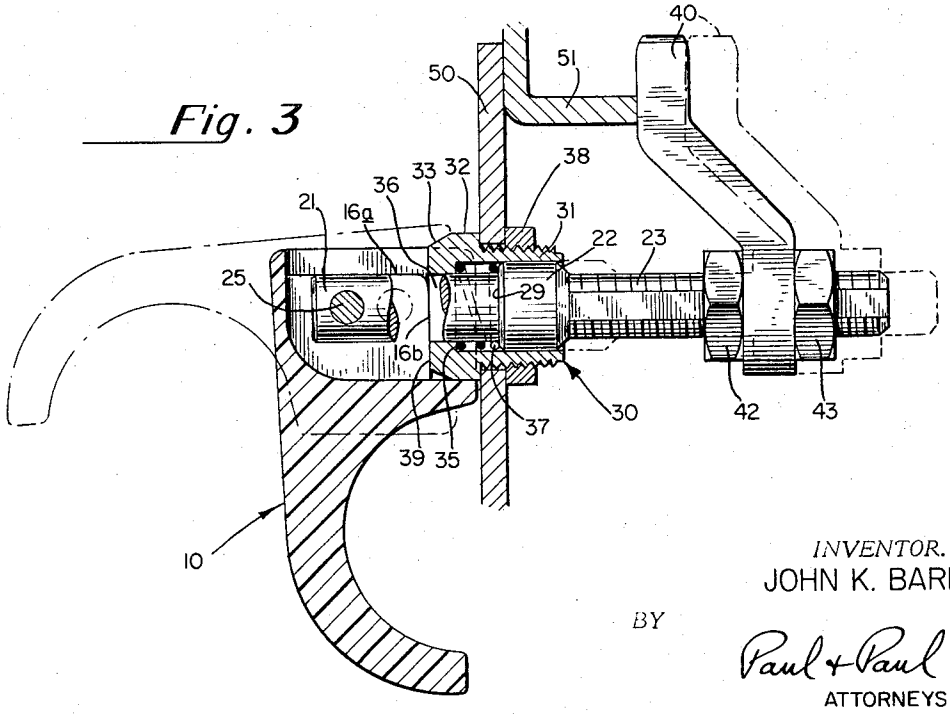


Fig. 3

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DOOR OR PANEL FASTENER

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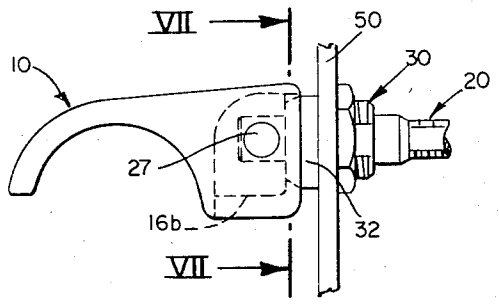


Fig. 6

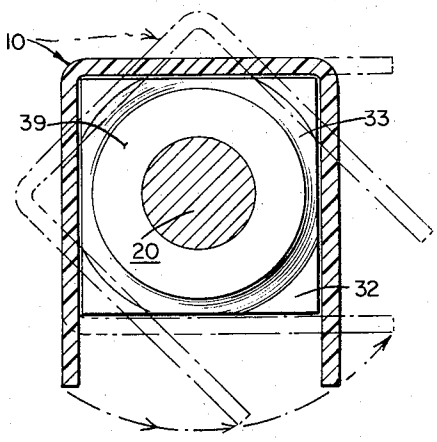


Fig. 7

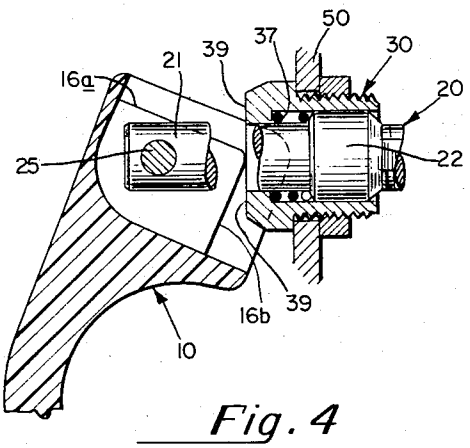


Fig. 4

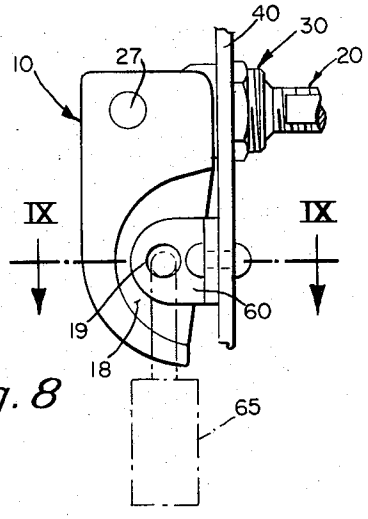


Fig. 8

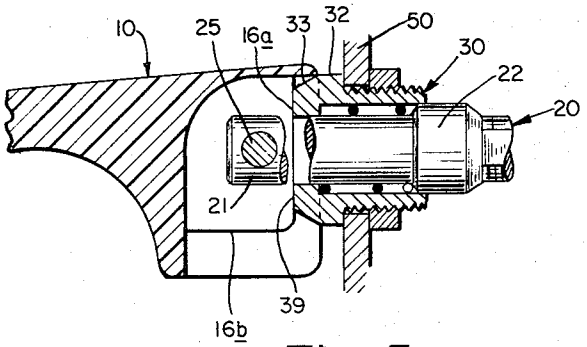


Fig. 5

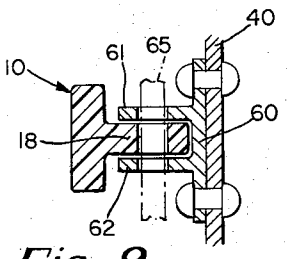


Fig. 9

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3,402,958

DOOR OR PANEL FASTENER

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6 Claims. (Cl. 292—62)

ABSTRACT OF THE DISCLOSURE

A rotary operated latch is disclosed having a cam action in the lever or handle providing a pull-up on the pawl to compress the door or panel against the frame or gasket to provide a tight seal. An over-center action prevents accidental release. The latch has a positive feel providing an indexing signal that the latch has been rotated 90° from the latched to the unlatched position (or vice-versa) with automatic or self-alignment. A tamper-proof feature is also disclosed.

Background of the invention

This invention relates to door or panel fasteners of the type adapted to be mounted along the edges of doors or panels which overlap a wall or frame. The fastener has a latching finger or pawl which is swingable over the inside frame of the door- or panel-opening to lock the panel against the frame.

Description of the prior art

The fastener disclosed in the present application constitutes an improvement over Barry et al. Patent 2,860,904, and over Barry Patent 3,302,964.

Summary of the invention

The latch disclosed in the present application has several improvements or features not found in the latches of the prior art. In the first place, the latch of the present application is so designed that accidental release is prevented. Secondly, a positive feel is provided signalling that the latch has been rotated 90° from the latched to the unlatched position, or vice-versa. Thirdly, automatic or self-alignment is provided so that the lever may be properly depressed to cam the pawl in the direction of the panel and provide the type of closure that is desired. Fourthly, the latch has a feature which makes it tamper-proof, in that when used with a lock in which the locking position is the DOWN position, the handle cannot be separated from the shaft without leaving evidence that such separation has occurred. This feature is important when the latch is used on large shipping or cargo containers to seal access doors and panels. If unauthorized access to the container through these panels is attempted, evidence that such attempt has been made is there for the inspector to see. Lastly, the general design of the handle and square-headed sleeve is such that the camming surface of the handle and the mating surface of the sleeve are protected from dirt and weather and are concealed from view to improve the overall appearance of the latch and to disguise the method by which the fastener is operated when the handle is down and locked, thereby to discourage tampering with the latch.

Brief description of the drawing

FIG. 1 is an exploded assembly view of the new latch;

FIG. 2 is a plan view of the latch with handle down in latched position;

FIG. 3 is an enlarged elevational view, partly in section, along the line III—III of FIG. 2;

FIG. 4 is a partial view, in section, showing the handle partly raised from the DOWN or latched position;

FIG. 5 is a partial view, in section, showing the handle in the UP or unlatched position;

FIG. 6 is an elevational view of the latch assembly in unlatched position;

FIG. 7 is a view, in section, along the line VII—VII of FIG. 6, showing in dot-and-dash line the position of the handle mid-way between the unlatched and latched position;

FIG. 8 is a partial elevational view of a modified form of latch the handle of which has a central web, adapted for padlock latching; and

FIG. 9 is a view, in section, along the line IX—IX of FIG. 8.

Description of the preferred embodiment

Referring now to the drawings, the latch assembly is shown to include a lever or handle **10**, a screw **20**, and a sleeve **30**. Reference numeral **50** identifies a portion of a door or panel having a hole **51** therein into which the screw **20** and sleeve **30** are inserted. The hole **51** is of a size and shape corresponding to that of sleeve **30**. To prevent rotation of sleeve **30** in the hole **51**, both the sleeve **30** and the hole **51** are provided with opposing flat sides, identified by the reference numeral **34** for the sleeve and **54** for the hole.

A pawl **40** is provided having therein a hole **41** of a size and shape to receive the shank **23** of the screw **20**. To allow axial rotation of the screw **20** (as by the handle **10**) to move the pawl **40** rotationally, both the hole **41** in the pawl **40** and the shank **23** of the screw **20** are provided with flat sides, identified by the reference numeral **44** for the pawl and **24** for the screw.

The inward end portion **31** of sleeve **30** is externally threaded for receiving a nut **38** whose function is to hold the latch assembly tightly against the door or panel **50**. A pair of nuts **42** and **43** are threaded on the externally threaded shank **23** of the screw **20**. Their function is to lock the pawl **40** in its desired position on the screw **20**.

The screw **20** has an enlarged nonthreaded center portion **22** of a diameter adapted to be received by the larger bore of the sleeve **30**, at the inward or lower end of the sleeve. The outward or head end of the sleeve **30** has a bore **36** of smaller diameter, forming between the smaller and larger bores the annular shoulder **35**. The nonthreaded upper or head end **21** of screw **20** is of reduced diameter, relative to the center portion **22**, and is of a size corresponding to that of the smaller bore **36** of sleeve **30**. A helical spring **37** is placed within the sleeve **30**, one end of the spring **37** abutting against the shoulder **35** and the other end abutting against the shoulder **29** formed by the enlarged center portion **22** of screw **20**. Thus, spring **37** exerts a thrust against the screw **20** which tends to move the screw **20** inwardly. The extent to which the spring **37** is able to move the screw inwardly is dependent upon, and controlled by, the latch handle **10**, as will be described.

Handle **10** is secured pivotally to the head end of screw **20** by a pin **25**, which, in a preferred form, is held and supported by a pair of opposed T-shaped bushings **26** and **27**. When the bushings **26** and **27**, having narrow body and enlarged head, are pressed into the handle **10**, flush with the surface of the handle, the bushings cannot be pushed through the handle, and cannot be withdrawn from the handle, without damage to the handle. This design not only provides a tamper-proof feature for the handle to screw assembly but also provides an excellent bearing surface for the pin **25** about which the handle **10** pivots and reduces wear. The design also provides a pleasing appearance to the finished assembly.

The screw **20** is movable rotatably and slidably, relative to the sleeve **30**, by the handle **10**. The coil spring **37** bearing against the shoulder **35** at one end of the sleeve cavity and against shoulder **29** on the screw **20** at the other end, exerts a thrust which keeps the handle

10 and the sleeve 30 in constant contact, as will become clear as the description proceeds.

Sleeve 30 has a square head 32 above which rises a conical section 33, the slope of which may preferably be 30°.

The head end of handle 10, in which pivot pin 25 is mounted, is hollow having a generally rectangular cavity therein which is closed on four sides but is open in the inward and upward directions when the handle is in the DOWN position, as shown in FIG. 1. Mounted within the handle cavity, and shrouded by the side walls of the cavity (which extend beyond the cam members) are two square cam members 16 and 17, each having camming surfaces, identified by the suffixes *a* and *b*, at right angles to each other, the corner or junction therebetween being slightly rounded. Surfaces of cam members 16 and 17 tend to be in constant touch with the top flat annular bearing surface 39 of the conical section 33 of sleeve 30 due to the thrust developed by the coil spring 37 through the screw 20 to which the handle 10 is pinned. When the handle 10 is pivoted about the pin 25, surfaces of cam members 16 and 17, by bearing on the bearing surface 39 of the sleeve 30, cause the screw 20 to move axially outward through the sleeve 30, thereby allowing a compressive force to be applied through the pawl 40 to pull the panel 50 tightly against the frame or gasket 51.

The sides of the handle 10, extending beyond the cam members 16 and 17, fit closely around three sides of the square head 32 at the head end of the sleeve 30 when the handle 10 is in the DOWN or latched position. When in this position, the extending sides of the handle function like an open-ended end wrench, and prevent rotation of the handle 10 so long as it is in the DOWN position.

As mentioned above, sleeve 30 has a conical section 33, preferably 30°, which rises from the square head 32 on the head of the sleeve. The diameter of the conical section 33 at the base of the cone is larger than the width across the square head 32, and that part of the cone which would otherwise extend beyond the square head 32 is cut away, leaving the flat surfaces 133, one of which is seen in FIG. 1. The diameter of the cone 33 at the base is also larger than the inner dimension between opposed extended side walls of the handle 10. When the handle 10 is raised to the UP or "cam away" position, the extended sides of the handle fit closely to, but do not extend down over the flat edges of the square head 32 of the sleeve 30. As a result of the structure and relative dimensions just described, when the handle 10 is raised to the UP position, shown in phantom in FIG. 3, and then rotated (relative to the axis of screw 20) to swing the pawl 40 from the latched toward the unlatched position (or vice-versa), the opposed extended sides of the handle 10 are cammed up by the conical surface 33 of the sleeve 30. This is illustrated in FIG. 7. This outward movement of handle 10 pulls screw 20 outward relative to sleeve 30 and compresses the spring 37. This outward movement of handle 10 lifts the cam members 16 and 17 away from the top flat annular bearing surface 39 of the sleeve 30 until the extended sides of the handle encounter a diameter on the sloping surface of the cone 33 equal to the inner dimension between the said extended sides. When this diameter is reached, the lifting action ceases, and the extended sides of the handle thereafter rotate about the cone 33, all the while bearing down upon the sloping wall of the cone 33 under the action of the thrust of the spring 37. This continues, as the operator continues to turn the handle 10 until, upon completion of 90° of rotation, the extended sides of the handle 10 meet the flattened portions 133 of the cone section 33 and again mate with the flat sides of the square head 32 of the sleeve 30. At this position, the extended sides of the handle are clear of the edges of the square head 32, and the handle 10, under the urging of the spring 37, snaps inward or downward until the came surfaces 16 and 17 of the handle 10 again encounter the flat top annular bearing surface 39 of the sleeve 30. The handle is now exactly oriented in the unlatched (or latched) position 90° distant from the position where rotation began. This action not only correctly positions the pawl 40, retaining it in this position against axial movement, but it also aligns the handle 10 so that the extended sides will nest properly around the square head 32 of the sleeve 30 when the handle is pressed into the DOWN or "cam in" position, to complete the panel latching action.

It will be understood that when the handle 10 is raised from the DOWN or latched position to the UP or unlatched position (or vice-versa) the camming action of the cam members 16 and 17 on the bearing surface 39 of sleeve 30 occurs. During this camming action, a point is reached where the junction of camming surfaces 16*a* and 16*b*, and the junction of camming surfaces 17*a* and 17*b* are in line with the center axis of pivot pin 25. This point is the "top dead center" position of the two 90°-displaced cam surfaces *a* and *b* of cam members 16 and 17. On either side of this dead-center point, the thrust from the spring 38 creates a force moment, and as a result the screw 20 is urged inwardly, and handle 10 moves in the direction from top dead center to which it is displaced. This provides an over-center action in both directions and as a result the handle 10 in DOWN position tends to stay down, and in UP position tends to stay up. Thus, handle 10 cannot vibrate open. It cannot fall into the opposite position from which it is placed without overcoming an increase in force, as the spring moves to maximum load position when the handle 10 moves through the dead center position.

The camming surfaces 16*b* and 17*b* of cam members 16 and 17, and the sides of the holder which extend beyond these surfaces, are more distant from the center axis of pivot pin 25 than are the other camming surfaces 16*a* and 17*a* and the other side walls. Thus, when the handle is in the DOWN position, as shown in solid line in FIG. 3, and the camming surfaces 16*b* and 17*b* are bearing against the annular bearing surface 39 of the sleeve 30, the side walls of the holder embrace the square head 32 of the sleeve and pin 25 is more remote from the panel 50. The pawl 40 is then in the position shown in solid line in FIG. 3. This is the latched position. When the handle 10 is raised to the UP position, as shown in phantom in FIG. 3, the nearer-to-the-pin camming surfaces 16*a* and 17*a* bear against the bearing surface 39 of the sleeve 30, the side walls of the holder do not embrace the square head 32 of the sleeve, and the pivot pin 25 takes the position shown in phantom in FIG. 3. This position of pin 25 is substantially closer to the panel 50, and the screw 20 and pawl 40 move to the inward positions shown in phantom in FIG. 3. This is the unlatching position of the pawl, from which the pawl is turned angularly 90° by the handle 10.

Before referring to a modification illustrated in FIGS. 8 and 9, the illustrations in FIGS. 1–7 will be briefly reviewed. FIG. 1 is an exploded view of the latching assembly, and includes a portion of a panel 50. In FIG. 1, the handle is shown in the DOWN or latched position. FIG. 2 is a plan view of the latch, the handle being down in the latched position. FIG. 3 is a side view of the latch, enlarged, and in section. FIG. 4 shows the handle in between the latched and unlatched positions. FIGS. 5 and 6 show the handle in UP or unlatched position. FIG. 7 shows, in phantom, the handle rotated (axially relative to the axis of the screw 20) to bring out how the sides of the handle cavity are cammed up on the conical section 33 of the sleeve 30 as the handle is rotated to rotate the pawl.

FIGS. 8 and 9 illustrate a slight modification which adapts the latch for padlock locking. The latching mechanism in FIGS. 8–9 is the same as has already been described with respect to FIGS. 1–7, but the handle 10 is provided with a center web 18 having a hole 19 therethrough. A bracket 60 having a pair of apertured prongs

61, 62 is secured, as by rivets, to the panel 40 in such position, relative to the latch, that when the handle 10 is in the DOWN position, the hole 19 in the web 18 is in alignment with the holes in the prongs 61, 62 of the bracket 60. The padlock 65, shown in phantom, is then inserted, as illustrated.

Other configurations than those shown and described could, of course, be used. For example, the bushings 26 and 27 for pin 25 need not have the enlarged head, the handle 10 could be differently shaped or proportioned, the sleeve 30 could be differently proportioned, and the spring 37 could be outside the sleeve 30 and bear on one of the nuts 42, 43. Other modifications within the scope and spirit of the appended claims will occur to those skilled in the art.

What is claimed is:

1. A latch assembly having a pull-up action for developing a compressive force between two closure members which are to be pressed together, said latch assembly comprising:

(a) a sleeve adapted to project through a hole in one of said closure members and to be secured non-rotatably therein, said sleeve having a square head and a frusto-conical cap on said square head, the diameter at the base of said conical cap being larger than the diameter of the square head, the portion of said conical cap which would otherwise project beyond said square head being cut off, the outward surface of said cap forming a flat annular bearing surface;

(b) a screw through said sleeve and movable axially and rotatably with respect thereto, said screw having a head portion extending outwardly beyond said sleeve and a threaded shank section extending inwardly beyond said sleeve, said inwardly extending shank being adapted to support a pawl for inward and outward movement with said screw and for angular movement with said screw;

(c) a handle pivotally pinned by a pivot pin to the outwardly extending head portion of said screw, said handle having a generally rectangular cavity through which the pivot pin passes;

(d) a pair of rectangular cam members within said cavity, one on each side of the screw head, said cam members secured to the side walls of said handle, said pin passing through said side walls of the handle and through the cam members substantially closer to one edge of each than to the edge at right angles thereto, one or the other edges of said cam members tending to bear against the flat annular bearing surface of said conical cap, the side walls of said handle which define said cavity extending beyond said cam members;

(e) said pivot pin being so located relative to said camming edges and to the side walls of said handle that when the cam edge which is more remote from said pin is against said flat annular bearing surface the side walls of said handle embrace the square head of said sleeve to prevent angular rotation of said handle;

(f) said pivot pin being so located that when the cam edge which is nearer to said pin is against said bearing surface the side walls of said head clear the square head of said sleeve so that said handle may be rotated relative to the axis of said pin to rotate said screw axially, thereby to turn said pawl angularly;

(g) the extending edges of the side walls of said handle being cammed up on said conical cap away from said square head when said handle is rotated; and

(h) resilient means urging said handle to return toward said square head and effective to pull said handle theretoward upon completion of 90° angular rotation.

2. A latch according to claim 1 characterized in that said conical cap has a slope of the order of 30°.

3. A latch according to claim 1 characterized in that:

(a) said sleeve has a smaller bore at the outward end and a larger bore at the inward end, forming an annular shoulder therebetween;

(b) said screw has a center section within said sleeve which is larger in diameter than the head portion of said screw, forming a shoulder therebetween;

(c) said resilient means is a coil spring disposed between said sleeve shoulder and said screw shoulder, said spring tending to thrust said screw inwardly.

4. A latch according to claim 3 characterized in that the ends of said pivot pin are supported in said handle in a pair of bushings.

5. A latch according to claim 4 characterized in that said conical cap has a slope of the order of 30°.

6. A latch according to claim 1 characterized in that said handle, beyond the cavity portion, is provided with a web portion having an aperture therethrough for receiving the shackle of a padlock, said latch being adapted to cooperate with a fixed bracket on said one closure member to effect locking said closure members together.

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