

July 26, 1949.

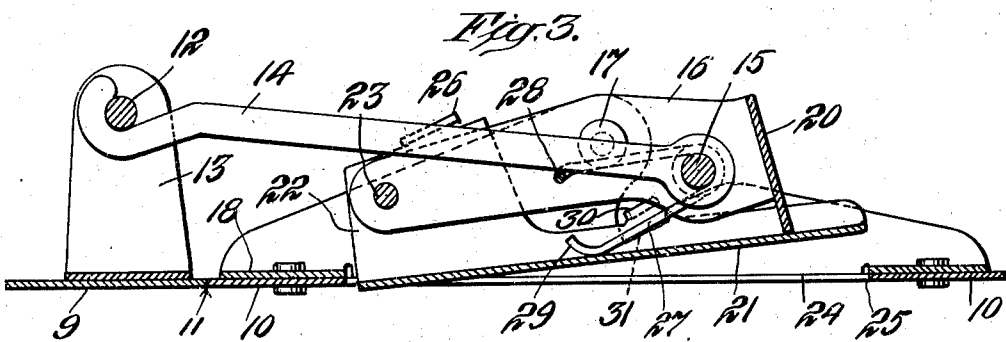
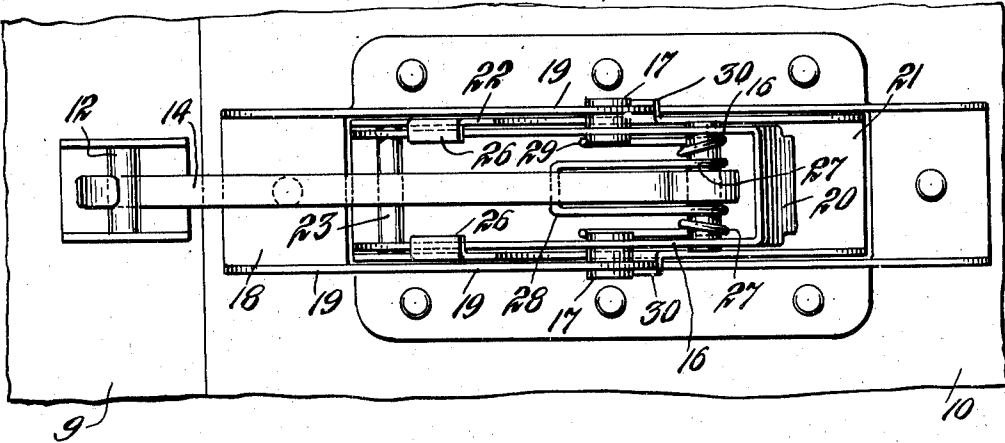
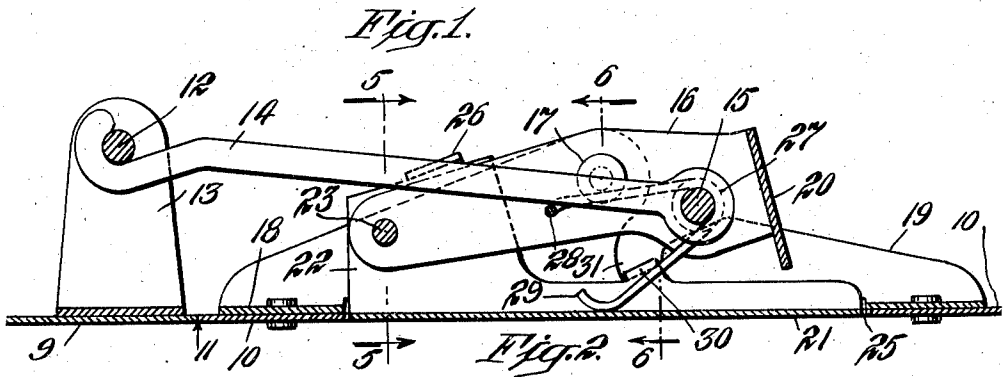
M. P. WRIGHT

2,477,472

SELF-LOCKING FLUSH LATCH

Filed Feb. 21, 1947

2 Sheets-Sheet 1



MIL O P. WRIGHT
INVENTOR.

BY

Philip S. Moran
ATTORNEY

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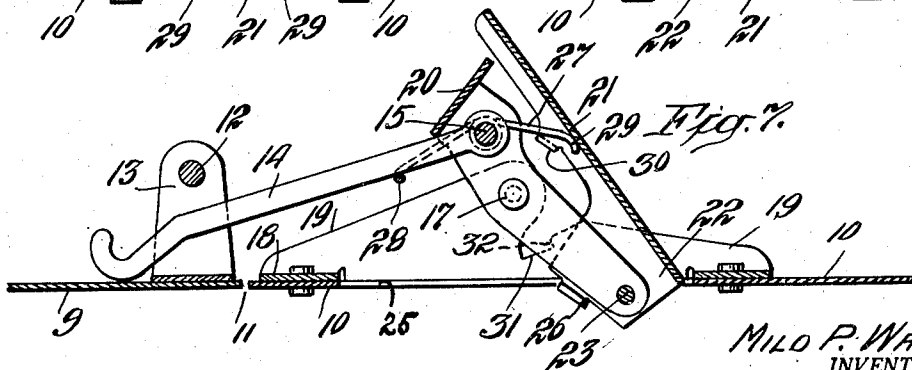
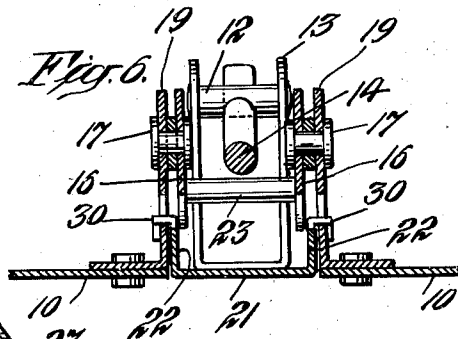
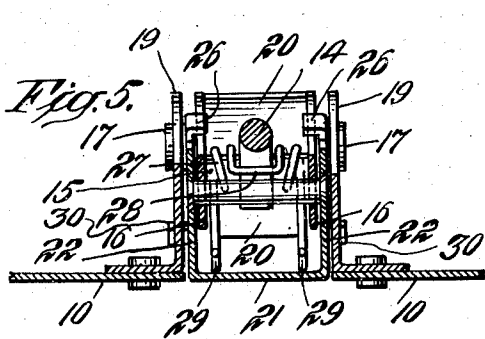
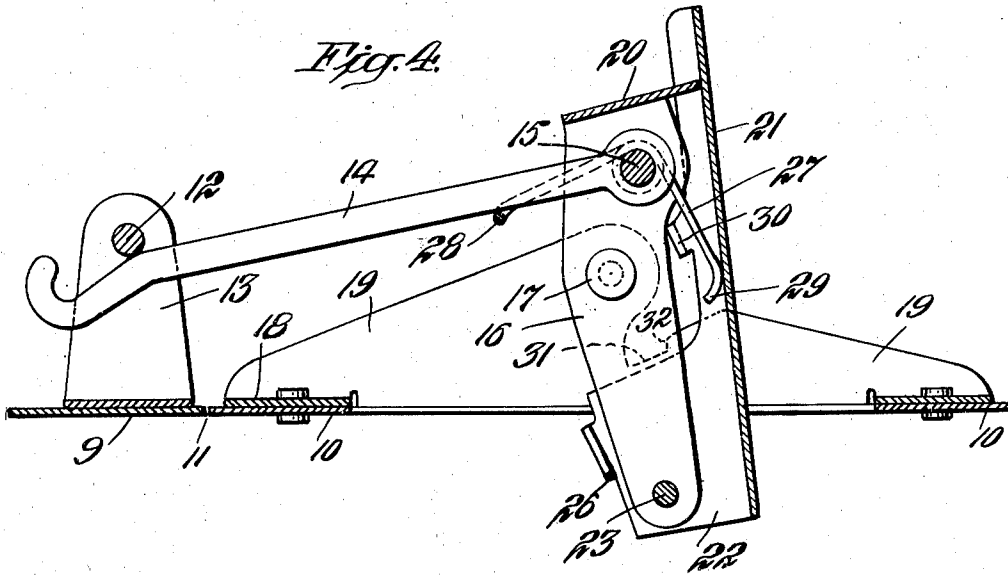
M. P. WRIGHT

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SELF-LOCKING FLUSH LATCH

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2 Sheets-Sheet 2



MILD P. WRIGHT
INVENTOR.

BY

Philip S. Wright
ATTORNEY

UNITED STATES PATENT OFFICE

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SELF-LOCKING FLUSH LATCH

Milo P. Wright, Wichita, Kans., assignor to Beech Aircraft Corporation, Wichita, Kans., a corporation of Delaware

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14 Claims. (Cl. 292-113)

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The invention herein disclosed relates to latches of the type employed for securing cowlings on airframes, and the like.

Special objects of the invention are to provide a pull-in, flush construction latch which will automatically lock in the closed position.

A further object is to provide such a latch which while securely locked against vibration and other forces, can be instantly unlocked and quickly and easily opened or released by one familiar with the action of the device.

Other special objects of the invention are to provide a latch construction such as indicated, which will be of simple, rugged design, low in cost and generally practical, safe and efficient.

Other desirable objects and the novel features constituting the invention and through which the purposes of the invention are attained are set forth or will become apparent in the course of the following specification broadly defining and claiming the invention.

The drawings accompanying and forming part of the specification illustrate a present commercial embodiment of the invention. Structure, however, may be modified and changed as regards this illustration, all within the true intent and scope of the invention as hereinafter set forth.

Figure 1 in the drawing is a longitudinal sectional view of the latch as installed and showing it in the closed and locked position.

Figure 2 is a plan view of the same.

Figure 3 is a part longitudinal sectional view similar to Figure 1 but showing the latch unlocked and ready to be opened and released.

Figure 4 is a similar view showing the parts in the fully released relation.

Figure 5 is a transverse sectional view on substantially the plane of line 5-5 of Figure 1.

Figure 6 is a transverse sectional view as on line 6-6 of Figure 1.

Figure 7 is a longitudinal sectional detail showing how the toggle lever in swinging all the way over in the releasing direction, positively shifts the hook clear of the holding abutment.

In the illustration, the relatively separable members which are to be connected by the latch mechanism are indicated at 9 and 10. The part 9 may be considered, for example, a removable cowling, separable from the body of the aircraft on the line 11.

The latch mechanism consists of an abutment or keeper on one of these parts and a toggle actuated hook for engagement therewith mounted on the other of such parts.

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In the illustration the abutment element is shown as a short length of rod 12 carried by a bracket 13 on the cowling 9.

The cooperating hook is shown at 14 pivoted at 15 in one end of a swinging toggle lever 16 pivoted intermediate its ends at 17 in a supporting bracket 18 secured on the fuselage or body portion 10.

The toggle lever is shown in the form of a generally U-shaped yoke and the pivotal mounting 17 of the same is shown as effected by rivets set in the upstanding side walls 19 of the mounting bracket to leave the intermediate space clear for the swing of the hook in the opposite direction past dead center.

The pivot 15 for the hook is shown as a stud riveted across the sides of the yoke near the closed end 20 of this U-shaped piece.

Automatic locking of the latch in the closed relation shown in Figures 1 and 2 is effected by a trigger plate 21 underlying the toggle lever 16. This trigger is shown as having upstanding side wings 22 at one end projecting up over the outer sides of the toggle lever, near the open end of the yoke and there pivotally connected with the yoke by a cross rivet or stud 23.

The trigger is thus pivotally hung from what may be considered the inner or free end of the toggle lever and, supported in this relation, it is utilized as a freeing and actuating member for the toggle and as a flush closure for the opening in the structure which exposes it for actuation.

Specifically, in the example illustrated, the trigger is a substantially rectangular plate of a size to close a correspondingly shaped opening 24 in the base portion of the mounting bracket, this opening being carried through at 25 in the covering of the aircraft and the trigger hanging from the toggle lever sufficiently to enter the latter opening and normally stand substantially flush with the outer surface of the covering, as in Figure 1. The movement required for this purpose may be fixed and determined by lugs 26 turned inward from the wings or side flanges 22 of the trigger over the upper edges of the toggle lever.

A spring 27 coiled about the hook pivot 15 and bearing, at its opposite ends upwardly at 28 against the hook and downwardly at 29 against the free end portion of the trigger, serves to urge the hook in the abutment engaging direction, Figure 4, and the trigger into position closing the opening 25, Figure 1.

In the closed position referred to, the trigger 55 secures the toggle lever against movement in the

toggle releasing direction, in the structure illustrated, by having laterally projecting locking lugs 30 at opposite edges, near the free end of the same, which drop into locking notches 31 in the side walls 19 of the mounting bracket. In the fully seated relation shown in Figure 1, the notches provide at their rearward edges, abutment shoulders 32 engageable by the adjoining edges of the lugs 30 to stop shifting movement of the trigger in a right-handed direction in Figure 1, and hence prevent releasing movement of the toggle lever 16 which would occasion such shifting movement of the trigger.

To overcome this positive locking of the toggle in the closed or holding position, the locking lugs 30 must be lifted out of the locking notches 31. This can be readily effected by one familiar with the action by simply pressing inward on the free end of the trigger, against the tension of the spring arms 29, as in Figure 3.

After unlocking the toggle, continued pressure on the trigger plate will cause it to engage the outer end wall 20 of the toggle lever to rock the same past dead center and into the hook releasing positions indicated in Figures 4 and 7.

In the extreme position shown in Figure 7, the upper edge of the end wall 20 of the toggle lever engages over the top of the hook to positively force the same downward clear of the rod or other holding abutment 12.

In carrying over to the unlocked position, the inner ends of the lever and the trigger swing outward through the opening 24, 25, rendering them accessible for fully controlled operation of the latch both for releasing and for restoring purposes. In the Figure 7 position, the toggle lever holds the hook down so as to be clear of the co-operating abutment 12 when the cowl or other separated member is returned to position. Then when the separated parts are correctly disposed, the swinging of the toggle lever back in the return direction will, through the spring 27, throw the hook up into engagement with abutment 12 automatically effecting the required coupling.

Continued movement of the toggle lever and trigger will carry the hook center 15 past the lever center 17 to "lock" the toggle and the toggle will then be positively secured in this relation by the outstanding locking lugs 30 on the trigger dropping into the locking notches 31 in the mounting bracket. The latch will thus be secured against vibration or other forces tending to shift the toggle lever in the releasing direction. Authorized unlocking and release of the toggle, however, may be instantly effected at any time by simply pressing inward on the free or inwardly swinging end of the trigger 21 as above described.

The structure is simple and strong and free of any complicated parts that might possibly get out of order. The member 14, while described as a hook, may be of other than actual hook conformation, the term being employed in this sense since it is realized that members 12 and 14 may be constructed to cooperatively engage in various ways other than illustrated, the only requirement being that they interlock with a hooking action so that with the closing operation of the toggle, they will be effective to pull the relatively separable members 9 and 10 together or toward each other.

What is claimed is:

1. A self-locking flush latch comprising a base having an opening therethrough, a toggle lever pivoted on said base over said opening, a securing hook having a pivotal connection with said toggle lever arranged to pass a dead center relation in

respect to the pivotal mounting of said toggle lever to effect the securing of the latch in closed condition, a trigger lever pivotally connected with the toggle lever on a center at the opposite side of the pivotal mounting of said lever from the pivotal connection of the securing hook thereto, said trigger being disposed in said opening in the base to form a closure thereto in the securing position of the toggle lever and a locking lug on said trigger having interlocking engagement with said base to prevent accidental releasing movement of the toggle lever in said position of the parts.

2. A self-locking flush latch comprising a base having an opening therethrough, a toggle lever pivoted on said base over said opening, a securing hook having a pivotal connection with said toggle lever arranged to pass a dead center relation in respect to the pivotal mounting of said toggle lever to effect the securing of the latch in closed condition, a trigger lever pivotally connected with the toggle lever on a center at the opposite side of the pivotal mounting of said lever from the pivotal connection of the securing hook thereto, said trigger being disposed in said opening in the base to form a closure thereto in the securing position of the toggle lever and a locking lug on said trigger having interlocking engagement with said base to prevent accidental releasing movement of the toggle lever in said position of the parts, said base having a seat disposed to receive said locking lug in said securing position of the toggle lever and to then oppose rocking movement of the toggle lever in the releasing direction and said trigger having free movement about the center of pivotal connection with the toggle lever sufficient to carry said locking lug out of said seat.

3. A self-locking flush latch comprising a base having an opening therethrough, a toggle lever pivoted on said base over said opening, a securing hook having a pivotal connection with said toggle lever arranged to pass a dead center relation in respect to the pivotal mounting of said toggle lever to effect the securing of the latch in closed condition, a trigger lever pivotally connected with the toggle lever on a center at the opposite side of the pivotal mounting of said lever from the pivotal connection of the securing hook thereto, said trigger being disposed in said opening in the base to form a closure thereto in the securing position of the toggle lever and a locking lug on said trigger having interlocking engagement with said base to prevent accidental releasing movement of the toggle lever in said position of the parts, said base having a seat disposed to receive said locking lug in said securing position of the toggle lever and to then oppose rocking movement of the toggle lever in the releasing direction and said trigger having free movement about the center of pivotal connection with the toggle lever sufficient to carry said locking lug out of said seat and said toggle lever having an abutment in the path of said unlocking movement of the trigger and whereby said toggle lever may be shifted in the releasing direction by said trigger as a continuation of said unlocking movement.

4. A self-locking flush latch comprising a base having an opening therethrough, a toggle lever pivoted on said base over said opening, a securing hook having a pivotal connection with said toggle lever arranged to pass a dead center relation in respect to the pivotal mounting of said toggle lever to effect the securing of the latch in closed condition, a trigger lever pivotally connected with the toggle lever on a center at the opposite side

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of the pivotal mounting of said lever from the pivotal connection of the securing hook thereto, said trigger being disposed in said opening in the base to form a closure thereto in the securing position of the toggle lever and a locking lug on said trigger having interlocking engagement with said base to prevent accidental releasing movement of the toggle lever in said position of the parts, said base having a seat disposed to receive said locking lug in said securing position of the toggle lever and to then opposite rocking movement of the toggle lever in the releasing direction and said trigger having free movement about the center of pivotal connection with the toggle lever sufficient to carry said locking lug out of said seat and said toggle lever having an abutment in the path of said unlocking movement of the trigger and whereby said toggle lever may be shifted in the releasing direction by said trigger as a continuation of said unlocking movement and a spring yieldingly holding said trigger in the locking position of the same closing said opening in the base.

5. A self-locking flush latch comprising a base having an opening therethrough, a toggle lever pivoted on said base over said opening, a securing hook having a pivotal connection with said toggle lever arranged to pass a dead center relation in respect to the pivotal mounting of said toggle lever to effect the securing of the latch in closed condition, a trigger lever pivotally connected with the toggle lever on a center at the opposite side of the pivotal mounting of said lever from the pivotal connection of the securing hook thereto, said trigger being disposed in said opening in the base to form a closure thereto in the securing position of the toggle lever and a locking lug on said trigger having interlocking engagement with said base to prevent accidental releasing movement of the toggle lever in said position of the parts and an expansion spring acting in opposite directions against said securing hook and said trigger.

6. A latch for connecting relatively separable members and comprising a toggle unit for mounting on one member for engagement with a keeper element on the other member, said toggle unit comprising a pivotally supported toggle lever, a hook for engagement with the keeper element, said hook being pivotally connected with said toggle lever at one side of the center of pivotal support of said lever, a trigger pivotally connected with said lever at the opposite side of said center of pivotal support and means for locking said trigger in position to oppose pivotal movement of the toggle lever in the latch releasing direction and including a stationary member and a locking element on the trigger engageable with said stationary member, said trigger having a free swinging movement about the center of pivotal connection with the toggle lever in a direction to carry said locking element out of interlocking engagement with said stationary member and into engagement with the toggle lever in the latch releasing direction of movement of the latter and whereby said trigger may be swung first to unlock it and then to rock the toggle lever in the latch releasing direction.

7. A latch for connecting relatively separable members and comprising a toggle unit for mounting on one member for engagement with a keeper element on the other member, said toggle unit comprising a pivotally supported toggle lever, a hook for engagement with the keeper element, said hook being pivotally connected with said

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toggle lever at one side of the center of pivotal support of said lever, a trigger pivotally connected with said lever at the opposite side of said center of pivotal support, means for locking said trigger in position to oppose pivotal movement of the toggle lever in the latch releasing direction and including a stationary member and a locking element on the trigger engageable with said stationary member, said trigger having a free swinging movement about the center of pivotal connection with the toggle lever in a direction to carry said locking element out of interlocking engagement with said stationary member and into engagement with the toggle lever in the latch releasing direction of movement of the latter and a spring for yieldingly holding said trigger in position away from the toggle lever to interlock with said stationary member.

8. A latch for connecting relatively separable members and comprising a toggle unit for mounting on one member for engagement with a keeper element on the other member, said toggle unit comprising a pivotally supported toggle lever, a hook for engagement with the keeper element, said hook being pivotally connected with said toggle lever at one side of the center of pivotal support of said lever, a trigger pivotally connected with said lever at the opposite side of said center of pivotal support, means for locking said trigger in position to oppose pivotal movement of the toggle lever in the latch releasing direction and including a stationary member and a locking element on the trigger engageable with said stationary member, said trigger having a free swinging movement about the center of pivotal connection with the toggle lever in a direction to carry said locking element out of interlocking engagement with said stationary member and into engagement with the toggle lever in the latch releasing direction of movement of the latter and a spring coiled about said pivotal connection of the securing hook and bearing at one end against said hook and at the opposite end against said trigger to urge said hook toward the keeper element and to yieldingly thrust the trigger into interlocked engagement with the stationary member.

9. A latch of the character disclosed comprising a pivotally mounted yoke lever closed at one end and open through the opposite end, said lever being pivotally mounted between its ends, a securing hook pivoted at one end within the closed end of the yoke lever and free to swing through the open end of the yoke lever, a trigger pivoted at one end to the open end of the yoke lever, a locking element on said trigger lever and a stationary member for interlocking connection with said locking element in position to secure the yoke lever against movement.

10. A latch of the character disclosed comprising a pivotally mounted yoke lever closed at one end and open through the opposite end, said lever being pivotally mounted between its ends, a securing hook pivoted at one end within the closed end of the yoke lever and free to swing through the open end of the yoke lever, a trigger pivoted at one end to the open end of the yoke lever, a locking element on said trigger lever, a stationary member for interlocking connection with said locking element in position to secure the yoke lever against movement and spring means interposed between said yoke lever and trigger for yieldingly holding the latter in position to interlock with said stationary member.

11. A latch for connecting relatively separable

members and comprising a toggle unit for mounting on one member for engagement with a keeper element on the other member, said toggle unit comprising a pivotally supported toggle lever, a hook for engagement with the keeper element, said hook being pivotally connected with said toggle lever at one side of the center of pivotal support of said lever, a trigger pivotally connected with said lever at the opposite side of said center of pivotal support, means for locking said trigger in position to oppose pivotal movement of the toggle lever in the latch releasing direction and including a stationary member and a locking element on the trigger engageable with said stationary member, said trigger having a free swinging movement about the center of pivotal connection with the toggle lever in a direction to carry said locking element out of interlocking engagement with said stationary member and into engagement with the toggle lever in the latch releasing direction of movement of the latter and a spring for yieldingly holding said trigger in position to interlock with said stationary member, said toggle lever having an abutment engageable with the back of the hook in the full releasing movement of the toggle lever to shift said hook against the tension of said spring clear of engagement with said keeper element.

12. A self-locking, pull-in flush latch comprising companion hook and abutment elements, a toggle lever pivotally supported intermediate its ends, said hook element being pivotally connected with one end of said toggle lever and said toggle lever having a range of travel to carry the pivotal point of connection of the hook element to opposite sides of the dead center position of the pivotal mounting of the toggle lever, a trigger pivoted at one end to the opposite end of the toggle lever and extended past the pivotal center of the toggle lever to a position adjacent the hook pivot end of the toggle lever for applying pressure to the latter end to swing the toggle in the hook releasing direction and mounting means for said toggle lever, said mounting means having an opening and said trigger closing said opening in flush relation to provide flush exposed means for actuating the toggle lever.

13. A self-locking, pull-in flush latch comprising companion hook and abutment elements, a toggle lever pivotally supported intermediate its ends, said hook element being pivotally connected with one end of said toggle lever and said toggle

lever having a range of travel to carry the pivotal point of connection of the hook element to opposite sides of the dead center position of the pivotal mounting of the toggle lever, a trigger pivoted at one end to the opposite end of the toggle lever and extended past the pivotal center of the toggle lever to a position adjacent the hook pivot end of the toggle lever for applying pressure to the latter end to swing the toggle in the hook releasing direction and mounting means for said toggle lever, said mounting means having an opening and said trigger closing said opening in flush relation to provide flush exposed means for actuating the toggle lever and spring means for yieldingly holding the trigger in said closing position with the free end of the trigger spaced away from the toggle lever.

14. A self-locking, pull-in flush latch comprising companion hook and abutment elements, a toggle lever pivotally supported intermediate its ends, said hook element being pivotally connected with one end of said toggle lever and said toggle lever having a range of travel to carry the pivotal point of connection of the hook element to opposite sides of the dead center position of the pivotal mounting of the toggle lever, a trigger pivoted at one end to the opposite end of the toggle lever and extended past the pivotal center of the toggle lever to a position adjacent the hook pivot end of the toggle lever for applying pressure to the latter end to swing the toggle in the hook releasing direction, mounting means for said toggle lever, said mounting means having an opening and said trigger closing said opening in flush relation to provide flush exposed means for actuating the toggle lever, spring means for yieldingly holding the trigger in said closing position with the free end of the trigger spaced away from the toggle lever and toggle lever locking elements on said trigger and mounting means automatically engageable in said closing position of the trigger.

MILO P. WRIGHT.

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