July 12, 1955 W. R. ANDREWS 2,712,955

DRAW-IN TYPE FLUSH LATCH

Filed Sept. 15, 1952 2 Sheets-Sheet 1

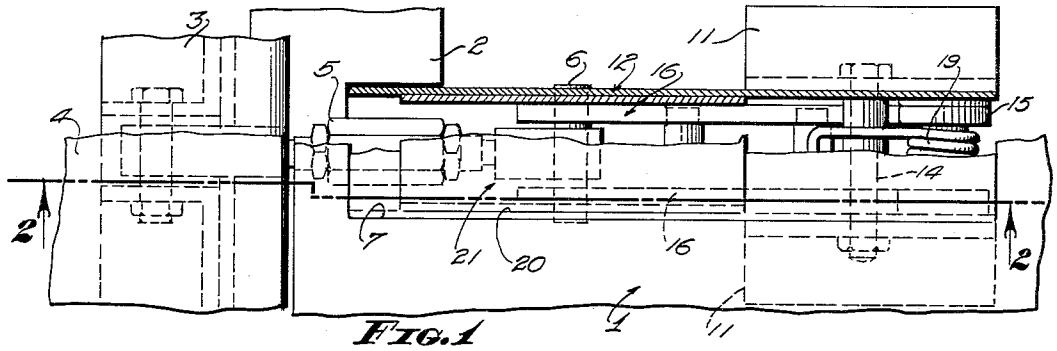


FIG. 1

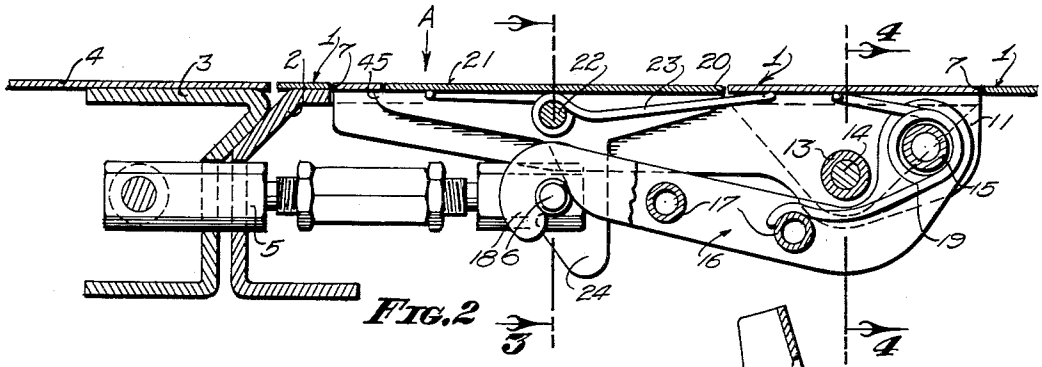


FIG. 2

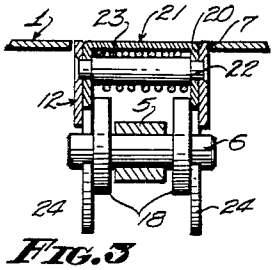


FIG. 3

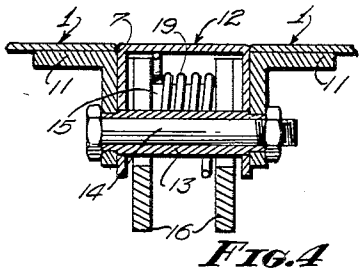
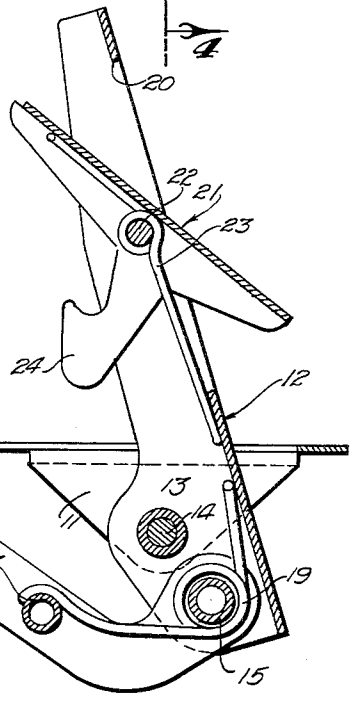


FIG. 4



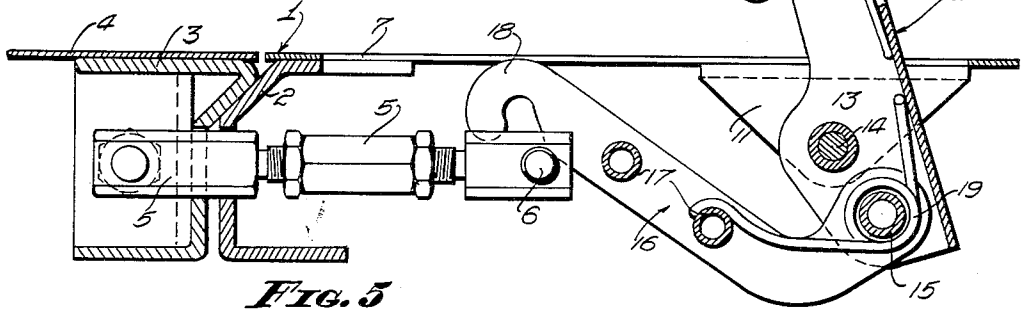


FIG. 5

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July 12, 1955 W. R. ANDREWS 2,712,955

DRAW-IN TYPE FLUSH LATCH

Filed Sept. 15, 1952 2 Sheets-Sheet 2

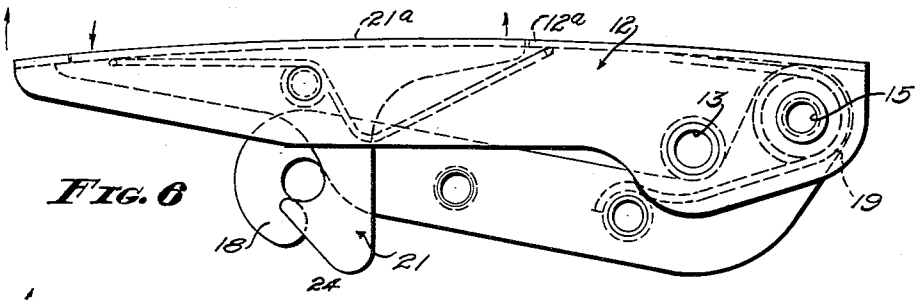


FIG. 6

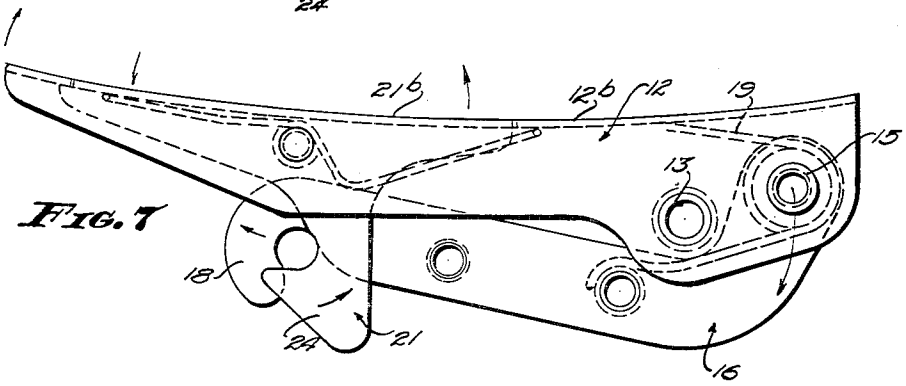


FIG. 7

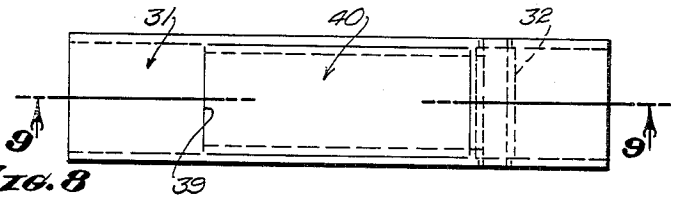


FIG. 8

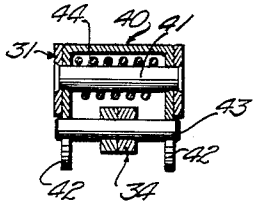


FIG. 11

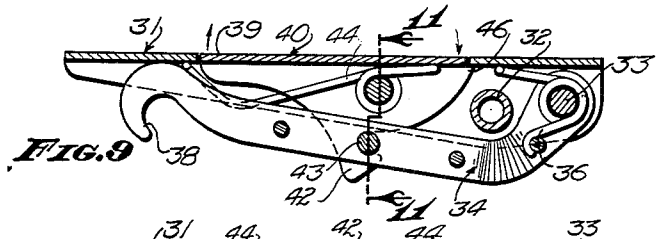


FIG. 9

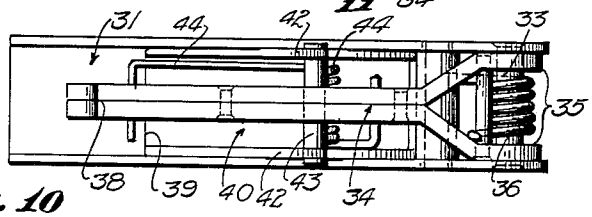


FIG. 10

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2,712,955

# DRAW-IN TYPE FLUSH LATCH

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Application September 15, 1952, Serial No. 309,710

9 Claims. (Cl. 292—113)

My invention relates to draw-in type flush latches, and included in the objects of my invention are:

First, to provide a latch which is particularly designed for use under circumstances wherein a latch hook or arm can be initially extended to engage its keeper and can then be retracted to draw the latch and keeper carrying structures together, and wherein the latch, when closed, will lie flush with the surface of such structures. For example, the latch is particularly suitable for securing removable panels or hinged panels or doors employed in aircraft.

Second, to provide a latch of this type which is inherently constructed so that pressure differences between the interior and exterior of the structure secured by the latch produces no appreciably unbalanced force which would cause the latch to snap open.

Third, to provide a latch of this type wherein the latch hook may have a substantial "reach" so as to engage its keeper from a distance to draw the mating structures together.

Fourth, to provide a latch of this type wherein the flush fitting portions may be variously shaped to conform to any curvature of the surfaces of the mating structures without altering the operation of the latch, that is, the flush fitting portions may be flat, convex or concave in contour.

Fifth, to provide a latch of this type which is so arranged that, when open, the normally flush fitting portions form a substantial and readily grasped handle.

With the above and other objects in view as may appear hereinafter, reference is directed to the accompanying drawings, in which:

Figure 1 is a plan view of one form of my latch with portions broken away and in section and showing the latch set in a panel structure, the surrounding structure being shown fragmentarily.

Figure 2 is a longitudinal sectional view through 2—2 of Figure 1 showing the latch in its closed position.

Figure 3 is a transverse sectional view through 3—3 of Figure 2.

Figure 4 is a transverse sectional view through 4—4 of Figure 2.

Figure 5 is a longitudinal sectional view similar to Figure 1 but showing the latch in its open position.

Figure 6 is a side view of a modified latch designed to conform to convex surfaces.

Figure 7 is a side view of my latch modified to favor concave surfaces.

Figure 8 is a reduced plan view of another modified form of my latch.

Figure 9 is a longitudinal sectional view thereof, taken through 9—9 of Figure 8.

Figure 10 is a bottom view thereof.

Figure 11 is a transverse sectional view thereof.

My draw-in type latch is intended primarily for use in aircraft although it may be employed wherever a draw-in type flush latch is desired.

For purposes of illustration, my latch is shown as set



in a door or panel structure 1 having a marginal flange 2 of channel-shaped cross section and adapted to fit within a mating frame 3 of a surrounding body structure 4. The body structure or its frame is provided with one or more keeper mountings 5 which are preferably adjustable and which carry at their extremities a transverse keeper bar 6. The door or panel structure is provided with an accommodation slot 7 disposed in registry with each keeper bar.

At the inner side of the door or panel structure, adjacent the end of the accommodation slot 7, remote from the margin of the panel structure, is a pair of brackets 11. A handle 12 is adapted to fit within the accommodation slot 7; the handle 12 may be formed of sheet material and is channel-shaped in cross section so that the web of the channel thus formed completely fills the slot 7. The flanges of the handle are extended adjacent the brackets 11 and connected by a bushing 13 which receives a journal pin 14 extending through the brackets 11.

Beyond the journal pin 14, that is, on the side thereof, opposite from the marginal flange 2, the handle 12 is provided with a tubular journal 15 which pivotally supports a pair of hook members or latching arms 16. The hook members are substantially L-shaped in side aspect so as to curve downwardly and clear the journal pin 14. The hook members are joined together by spacers 17, and extended ends form hook portions 18 which straddle the keeper mounting 5 and engage the keeper bar 6. A spring 19 is coiled about the tubular journal 15, one end bears against the handle 12 and the other end of the spring bears against one of the spacers 17 so as to urge the hook members or latching arms downwardly away from handle 12, or if the latching arms are restrained, to pivot the handle outwardly to the position shown in Figure 5.

The handle 12 is provided with a slot 20 which receives a trigger member 21. The trigger member is T-shaped in side aspect and is formed of sheet metal and folded so as to be U-shaped or channel-shaped in cross section. The web of the channel thus formed completely fills the slot 20. A cross pin 22 extends through the flanges of the handle 12 and trigger member 21 so that the web or trigger member may be pivoted between a flush portion in the handle 12 and in an angular position. A spring 23 is coiled about the pin 22 and bears against the trigger member and handle in such a manner as to urge the trigger member towards its flush position shown in Figure 2. It should be noted in Figure 5 that the trigger member is shown in an angular position in opposition to the action af the spring 23. The legs of the trigger member terminate in hooked ends 24 which are adapted to straddle the hooked portions 19 of the hook members or latching arms 16 and engage the keeper bar 6.

Operation of the latch is as follows:

Assuming the latch to be in the position, shown in Figure 2, the latch is released by pressing in the direction marked A on the end of the trigger member adjacent the margin of the panel structure. This pivots the hook ends 24 clear of the keeper bar 6. The spring 19 urges the handle 12 in a clockwise direction as viewed in Figures 2 and 5, causing the hook portions 18 of the hook member to clear the keeper bar. The outwardly extending end of the handle 12 may then function as a handle to remove or open the panel structure. To close the latch, the handle 12 is rotated counterclockwise against the action of the spring 19, causing the hook member to engage and draw on the keeper bar. The trigger member automatically snaps into place as the handle 12 is forced flush with the panel structure.

In the structure shown in Figures 1 through 5, the web portions of the handle 12 and trigger member 21

are flat. It is desirable, however, that these webs conform to the curvature of the structure in which the latch is to be mounted. The construction of the latch is uniquely arranged so that the webs of the handle and trigger may be convexly curved as indicated by **12***a* and **21***a* in Figure 6 or may be concavely curved as indicated by **12***b* and **21***b* in Figure 7, without changing the operation of the latch.

Reference is now directed to Figures 8–11, inclusive. The structure here shown is, in more respects, similar to the first described structure except that the trigger member does not engage the same keeper bar as the hook member. In this construction, a handle **31** of channel-shaped cross section is provided. This handle may be essentially the same as the handle **12** and it is arranged to be flat, concave or convex. The flanges of the handle **31** are connected near one end of the handle by a bushing **32**, corresponding to the bushing **13**. A journal **33**, similar to the tubular journal **15**, pivotally supports a hook member or latching arm **34**. The hook member may be formed of two similar members, preferably riveted together, except for its pivoted end which is arranged to form a yoke **35**. A spring **36**, corresponding to the spring **19**, is coiled about the journal **33** and is arranged to bear against the handle **31** and a cross pin **37**, provided in the yoke ends of the hook member. The extended end of the hook member or latching arm is provided with a hook portion **38**, corresponding to the hook portion **18** of the first described structure. The handle **31** is provided with a slot **39** which receives a trigger member **40** of channel-shaped cross section and is arranged that its web fills the slot **39**.

As in the first described structure, the trigger member journals on a cross pin **41**, extending between the flanges of the handle **31**. The flanges of the trigger member terminate in hooks **42**, adapted to straddle the hook member **34** and engage the protruding ends of an anchor pin **43**, extending transversely through the hook member or latching arm **34**. A spring **44** is wrapped on the cross pin **41** and its extremities are arranged to bear against the handle **31** and trigger member **40** in the direction to urge the hooks **42** into engagement with the anchor pin **43**. It will be noted that the trigger member **40** is arranged to pivot in the opposite direction from the trigger member **21**. However, the direction in which either of these members may pivot is a matter of choice, depending on which side it is desired to engage the keeper. In order that either of the trigger members **21** or **40** may move into flush position to be restrained from further movement, the respective webs of the trigger members may form stops **45** and **46**, respectively, which engage under the web of the corresponding handle.

Operation of the structure, shown in Figures 8–11, inclusive, is essentially the same as the first described structure, except that the trigger member **40** engages the anchor pin **43** carried by the hook member rather than the keeper bar **6**.

It will be observed that the trigger member may be centered relative to its pivoted axis so that pressure differentials between the inside and outside of the structure in which the latch is mounted need have little or no effect to cause the latch to release.

Having fully described my invention, it is to be understood that I do not wish to be limited to the details herein set forth, but my invention is of the full scope of the appended claims.

I claim:

1. A latch structure, comprising: a pivotable handle member having a fulcrum axis near one end; a latching member pivotally connected at said one end immediately beyond said fulcrum axis and extending around and past said fulcrum axis toward the other end of said handle member, said latching member having means at its extremity for engaging a keeper; and a trigger member pivotally mounted in said handle member and cooperating with said latching member to secure said latching member in its keeper engaging position.

2. A latch structure, comprising: a pivotable handle member having a fulcrum axis near one end, said handle member being channel-shaped in cross section, the web thereof being shaped to conform to the surface of a structure in which said handle member is adapted to be mounted, said web having a slot therein; a trigger member pivotally supported by said handle member, said trigger member being of channel-shaped cross section and the web thereof adapted to occupy a position flush with the web of said handle member; a latching member pivotally connected to said handle member immediately beyond the fulcrum axis of said handle and extending around and past said fulcrum axis for movement of its pivoted end in an arc about the fulcrum axis of said handle and having latching means at its extremity adapted for engagement with a keeper; said trigger member adapted to cooperate with said latching member to secure said latching member against pivotal movement relative to said handle and maintain said latching member in engagement with said keeper.

3. A latch structure, comprising: a pivotable handle member of channel-shaped cross section forming a web contoured to be disposed flush with a surrounding structure in which the latch is intended to be mounted, the web of said handle member having an aperture; a trigger member pivotably mounted in said handle member and having a portion adapted to fill said aperture and be disposed flush with the web of said handle member; a latching member pivotally connected to said handle member and movable between a latching position substantially parallel with said handle and in an angular position, said trigger member having catch elements straddling said latch member and cooperating with said latching member to secure said latching member in its latching position.

4. A latch structure, comprising: a handle member of channel-shaped cross section forming a web contoured to be disposed flush with a surrounding structure in which the latch structure is intended to be mounted, said handle member having a fulcrum axis near one end; a latching arm pivotally attached to said handle member at said one end immediately beyond said fulcrum axis and extending around and past said fulcrum axis toward the other end of said handle member, said latching arm having means at its extremity for engagement with a keeper, the pivoted end of said latching arm movable in an arc about the fulcrum axis of said handle member, said latching arm also movable between a latching position in approximate parallelism with said handle and an angular releasing position; and a trigger member pivotally mounted in said handle member and having a manually engageable portion pivotable between a flush position in the web of the handle member and an angular position, and a latching portion adapted to traverse said latching arm and cooperating with said latching arm to restrain said latching arm in its latching position when said manually engageable portion is in its flush position.

5. A latch structure as set forth in claim 4, wherein: the latching portion of said trigger member is adapted for engagement with the keeper engageable by said latching arm.

6. A latch structure as set forth in claim 4, wherein: the latching arm carries a second keeper and the latching portion of said trigger member engages said second keeper.

7. A latch structure, comprising: a handle member of channel-shaped cross section forming a web contoured to be disposed flush with a surrounding structure in which the latch structure is intended to be mounted, said handle member having a fulcrum axis near one end; a latching

arm pivotally attached to said handle member at said one end immediately beyond said fulcrum axis and extending around and past said fulcrum axis toward the other end of said handle member, said latching arm having means at its extremity for engagement with a keeper, the pivoted end of said latching arm movable in an arc about the fulcrum axis of said handle member, said latching arm also movable between a latching position in approximate parallelism with said handle and an angular releasing position; a trigger member pivotally mounted in said handle member and having a manually engageable portion pivotable between a flush position in the web of the handle member and an angular position, and a latching portion traversing said latching arm and cooperating with said latching arm to restrain said latching arm in its latching position; a first spring disposed so as to urge said latching arm toward its angular position; and a second spring disposed so as to urge said trigger member



toward its flush position and said latching portion toward its latching arm restraining position.

8. A latch structure as set forth in claim 7, wherein: the latching portion of said trigger member is adapted for engagement with the keeper engageable by said latching arm.

9. A latch structure as set forth in claim 7, wherein: the latching arm carries a second keeper and the latching portion of said trigger member engages said second keeper.

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