Sept. 11, 1962 W. B. FLANIGEN ETAL 3,053,560

PUSH RELEASE LATCH

Filed May 2, 1961

FIG. 1.

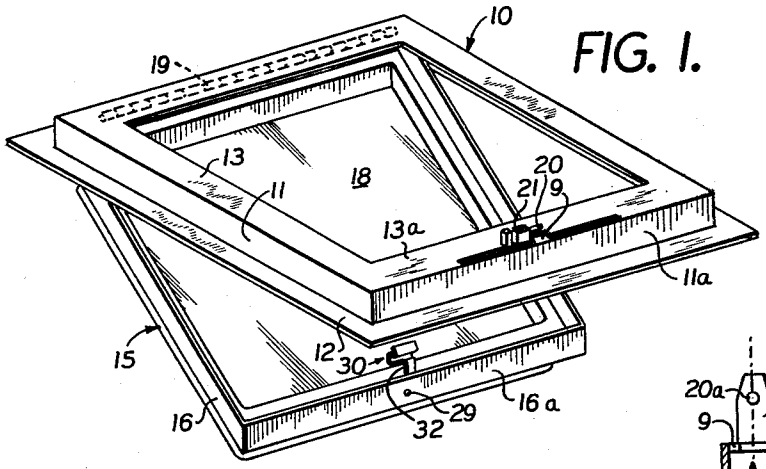



FIG. 2.

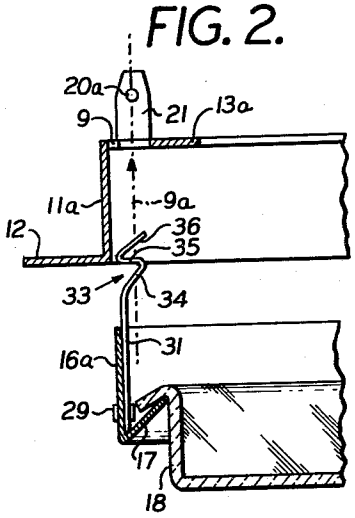



FIG. 3.

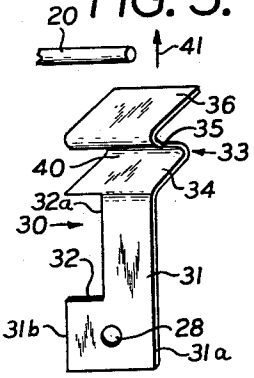



FIG. 5.

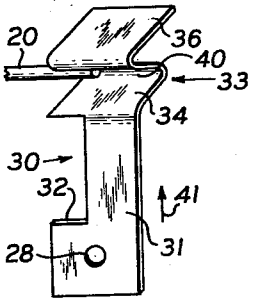



FIG. 6.

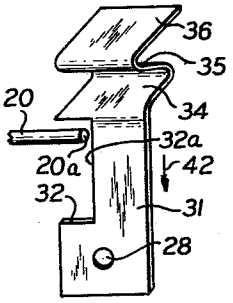



FIG. 4.

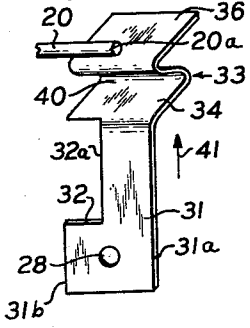
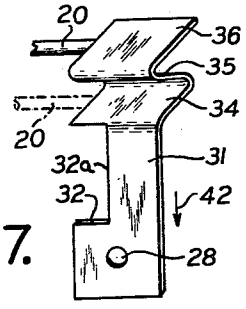



FIG. 7.




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# PUSH RELEASE LATCH

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This invention relates to an improved push release latch.

The general principle of a push release latch is that in its use, a movable member to be latched is first pushed into latching position relative to a cooperating fixed member; and the movable member may then be unlatched simply by pushing it further in the same direction that it was pushed to latch it, this causing the latch automatically to be released. This action is in contrast to the usual latching action, in which the latch itself must be manipulated in order to release it.

One object of this invention is to provide an improved push release latch which is economical to make and to install, does not require critical adjustment and may be readily operated. Another object of this invention is to provide an improved push release latch which is substantially foolproof in operation.

Without limitation thereto, the invention has particular application to a ceiling lighting fixture, and the invention will be described with reference to a ceiling fixture. However, it will be understood that the latch may be also used in conjunction with a wall fixture, or in conjunction with any two members which are to be releasably latched together.

In accordance with a preferred embodiment of the invention, the keeper or pin is mounted on the front of a fixed frame of a ceiling lighting fixture in such a way that the pin extends laterally and has one end free, and so that the pin is accessible to a latch member mounted on the front of a movable diffuser frame hinged at its rear to the fixed frame. Said latch member is in the form of a flat blade spring having a shank connected at its lower end to the diffuser frame in such a way that the shank extends laterally and also extends vertically upwardly from the diffuser frame. Normally, said shank is located forwardly of the pin, as taken in the closing position of the diffuser frame. The pin's mounted end is located laterally outwardly of the shank; and the pin extends past one side edge of the shank, with the free end of the pin located intermediate the side edges of the shank. The shank has a cutout extending to its upper end and to its said one side, the inner edge of the cutout being located clearingly with respect to the inner or free end of the pin.

The latch spring has a head which is integral with the shank and which comprises a lower leg connected to the top of the shank and inclined upwardly rearwardly with respect thereto, an intermediate leg extending forwardly from the upper end of the lower leg, and a top leg extending upwardly rearwardly from the front of the intermediate leg. The pin is normally located longitudinally intermediate the front and rear edges of the aforesaid legs.

As a result of the above description, the upper leg is adapted upon upward movement of the diffuser frame to strike the pin cammingly, the shank being thereby deflected rearwardly until the pin clears the upper leg and is located in the recess between the intermediate leg and the lower leg, the shank being then adapted to return towards its normal position so as to lock the two frames releasably together.

When it is desired to unlatch the two frame members, it is only necessary to move the diffuser frame still further upwardly, the lower leg then striking the pin cammingly so as to again deflect the shank rearwardly until the pin clears the lower leg and is in registration with the cutout in the shank. The shank then returns to its normal position with the pin passing through the cutout so as to be again located behind the shank. When the diffuser frame is then released, it drops downwardly by gravity, with the pin then striking the lower and upper legs on the rear surfaces thereof and deflecting the shank forwardly until the pin is again located above the level of the latch.



This construction is highly advantageous in that no accurate machining of parts is required, and in view of the simplicity of the construction.

Other objects and advantages of this invention will become apparent from the following description, in conjunction with the annexed drawing, in which a preferred embodiment of the invention is disclosed.

In the drawing,

FIG. 1 is a perspective view of ceiling lighting fixture frame members, showing the improved latch mounted thereon, the frame members being unlatched.

FIG. 2 is a vertical sectional view through the frame members, showing the two latch members in side elevation and in unlatched condition.

FIGS. 3–7 are respectively fragmentary perspective views of the latch spring and latch pin, showing successive stages of operation of the latch members. FIG. 3 shows the movable latch spring being moved upwardly to locking engagement with the fixed latch pin or keeper.

FIG. 4 shows the latch spring being deflected by the pin during continued upward movement of the diffuser frame.

FIG. 5 shows the latch members in latching position.

FIG. 6 shows a step in the unlatching operation, after the diffuser frame has been raised from locking position for clearing movement of the pin through the cutout in the shank of the latch spring shank.

FIG. 7 shows further separation of the diffuser frame from the main ceiling frame, with the pin striking the rear of the head of the latch spring.

Upon reference to the drawing in detail, it will be noted that the views thereof show a fixed frame member **10** and a movable frame member **15**. The fixed frame member **10** is illustratively shown as a frame member of a ceiling lighting fixture. Said frame member **10** is optionally rectangular in shape and includes upstanding side wall **11**, peripheral flange **12** extending perpendicularly outwardly from side wall **11** at the lower end thereof, and peripheral flange **13** extending perpendicularly inwardly from wall **11** at the upper end thereof. Side wall **11** has a front laterally extending portion **11***a*. Flange **13** has a front laterally extending flange portion **13***a*.

Diffuser frame **15** is of rectangular shape which complements the shape of fixed frame member **10**, in the usual way. Frame member **15** has an upstanding peripheral wall **16** which is received nestingly within wall **11** in the closed position of diffuser frame **15**. Wall **16** has a bottom, inwardly extending peripheral flange **17** which is optionally upwardly inclined, as shown in FIG. 2. Diffuser **18** is mounted upon flange **17** in the usual manner. Wall **16** has a front laterally extending portion **16***a*.

The rear of diffuser frame **15** is connected to the rear of ceiling frame **10** by any suitable means, such as the hinge **19** shown diagrammatically and in broken lines in FIG. 1, said hinge **19** being turnable about a lateral pivot so that wall **16** may be moved into and out of nested position with respect to wall **11**. As diffuser frame **15** approaches its closed position, as shown in

FIGS. 1 and 2, the wall portion 16*a* may be considered as moving substantially vertically.

Block or bracket 21 is mounted upon the upper face of flange portion 13*a* adjacent the center thereof. Pin 20 is fixed to one side of bracket 21 and extends laterally therefrom. The free end of pin 20 is designated as its inner end and is designated by the reference numeral 20*a*. Said pin 20 is located adjacent the front of flange portion 13*a* and is spaced above flange portion 13*a*. Flange portion 13*a* has a slot 9 under pin 21. This slot 9 extends rearwardly from the front edge of flange portion 13*a*, and extends from bracket 21 past the free or inner end 20*a* of pin 20.

Latch member 30 is in the form of a blade spring having a straight, generally rectangular shank 31. Said shank 31 is fixed to the rear face of wall portion 16*a* by means of rivet 29 which extends through the aperture of flange portion 16*a* and also through aperture 28 of shank 31, the rivet being headed over the usual way. The bottom of shank 31 abuts the junction of wall 16 and flange 17, to prevent turning of shank 31. Shank 31 extends vertically and laterally and extends above the upper edge of wall portion 16*a*. Said shank 31 has parallel side edges 31*a* and 31*b*. Shank 31 has a rectangular cutout 32 extending inwardly from its side edge 31*b* and extending from a point above the lower edge of shank 31 to the upper edge thereof. Cutout 32 extends at least as low as the upper edge of wall portion 16*a*. Bracket 21 is located proximate to and outwardly of shank side edge 31*b*, so that pin 20 registers longitudinally with cutout 32. The inner edge 32*a* of cutout 32 is located clearingly inwardly of the inner end 20*a* of pin 20. As shown in FIG. 2, an imaginary vertical line 9*a* drawn through pin 20 is located rearwardly of shank 31 when diffuser frame 15 is in its position just below closing position with respect to ceiling frame 10.

Latch spring 30 has an integral head generally designated by the reference numeral 33. This head 33 comprises lower leg 34, intermediate leg 35 and upper leg 36. Lower leg 34 is connected to the upper edge of shank 31 and extends upwardly rearwardly with respect thereto. Intermediate leg 35 is connected to the upper end of leg 34 and extends forwardly and generally horizontally (as viewed in FIG. 2) therefrom. Leg 36 is connected to the front end of leg 35 and is upwardly rearwardly inclined. Legs 34, 35 and 36 are laterally coextensive with the bottom portion of shank 31 (below cutout 32).

The aforesaid imaginary line 9*a* intersects the three legs 34, 35 and 36 approximately centrally with respect to the respective front and rear edges thereof. The front edge of leg 35 is in approximately the same plane as that of shank 31 and passes clearingly rearwardly of flange portion 16*a* while the frame members are being latched. The rear ends of legs 34 and 36 are in an approximately generally vertical plane. The total longitudinal dimension of head 33 is less than the longitudinal dimension of slot 9. The width of member 30 is less than the width of slot 9, and they are in vertical registration.

The operation of the latch is as follows:

With diffuser frame 15 initially in open position relative to fixed ceiling frame 10, as shown in FIGS. 1 and 2, diffuser frame 15 is moved upwardly, as indicated by arrow 41 in FIGS. 3, 4 and 5.

FIG. 3 shows latch member 30 still below pin 20. Upon further upward movement of latch spring 31, upper leg 36 strikes pin 20, and upon continued upward movement of latch member 31, leg 36 moves cammingly upwardly against pin 21, as shown in FIG. 4, so that shank 31 is flexed to move its head 33 rearwardly. The longitudinal dimension of slot 9 is sufficiently great to permit this action without interference. Preferably, lower leg 34 has at least mostly passed through slot 9 when leg 36 strikes pin 20, so as to minimize the clearance problem.



Upon continued upward movement of diffuser frame 15, pin 20 clears leg 36, permitting latch spring 31 to return to its normal position, in which pin 20 is located in the recess 40 defined by legs 34 and 35. When diffuser frame 15 is released, leg 35 rests upon pin 20 which serves as a stop to prevent diffuser frame 15 from dropping. This is shown in FIG. 5.

When it is desired to unlatch diffuser frame 15, it need merely be pushed further upwardly, with pin 21 then riding on leg 34, and shank 31 again being rearwardly flexed. Finally, pin 20 is located in registration with cutout 32, as shown in FIG. 6, and shank 31 springs forwardly again so that pin 20 is again located rearwardly of shank 31. Upon release of diffuser frame 15, it drops downwardly by gravity in the direction of arrow 42 (FIGS. 6 and 7). As shown in the broken line position of pin 20 in FIG. 7, the rear surface of lower leg 34 then rides upon pin 20, shank 31 being flexed forwardly. Similarly, as shown in FIG. 7, the rear surface of leg 36 subsequently rides upon pin 20, and shank 31 is again forwardly flexed. Finally, the parts return to their relative position of FIG. 3 in which the latch spring 30 is completely clear of pin 20.

It will be apparent that head 33 does not necessarily have to be integral with shank 31, and that the recess between legs 35 and 36 can be filled in. It is necessary that the front recess 40 be provided and that the upper and lower surfaces of head 33 by inclined in the manner shown in the drawing.

It will also be apparent that the invention is not limited to a ceiling fixture. For example, frame 10 may be the frame of a wall fixture; and any suitable means, such as a spring, may be provided to bias frame 15 to opening position. Also, frame 15 may be provided with a handle or other means for moving it manually into and out of latching position.

Alternately, also, the invention may be used with frame members other than the frame members of a lighting fixture.

While a preferred embodiment of the invention has been disclosed, and various possible changes, omissions and additions have been indicated therein, it will be apparent that various other changes, omissions and additions may be made in the invention without departing from the scope and spirit thereof.

In the claims, for convenience of terminology, the frame members are defined as being vertically movable and the latch spring is defined as extending vertically. However, it will be understood, as explained above, that the operating parts of the assembly can be oriented in other positions; and the structure specified in the claims is not to be limited to the precise orientation set fourth therein.

Further for convenience of terminology, in the claims, the frame member carrying the latch spring is defined as being the lower frame member and as moving relative to the frame member which carries the pin. However, it will be understood that the latch member can be on the upper frame member with the pin on the lower frame member, and that the frame member carrying the pin can be movable with the frame member carrying the latch member stationary. Furthermore, both frame members can be movable. Accordingly, the claims are to be construed and read in the light of these variations.

We claim:

1. Latch for first and second members which are movable toward and away from each other along a vertical axis, said latch comprising a laterally extending pin, means mounting said pin on said first member so that said pin has one end free and so that said pin is accessible for latching, a latch spring mounted on said second member and extending axially toward said first member, said latch

spring having a shank attached to said second member in the form of a laterally and axially extending blade spring, said latch spring being adapted to be flexed forwardly and rearwardly and being normally located forwardly of said pin when said latch spring is in general latching position, said latch spring also comprising a head on the upper end of said shank, the free end of said pin being located intermediate the sides of said shank, said shank having a cutout in the side thereof which is proximate said pin, the inner side of said cutout being located beyond the free end of said pin, said head having a recess in the front thereof and having upwardly rearwardly inclined upper and lower surfaces extending rearwardly of said shank, said pin being normally located intermediate the front and rear ends of said inclined surfaces of said head, said upper surface of said head being adapted to be struck cammingly by said pin during upward movement of said second member so as to deflect said shank rearwardly until said pin clears said upper surface and opposes the front of said head, said pin being thereby adapted to enter said front recess to hold said members releasably latched together, the lower surface of said recess being shaped to act cammingly upon said pin, upon further raising of said lower member, so as to again deflect said spring rearwardly until said pin leaves said recess, until the upper movement of said lower member brings said pin into registration with said cutout, said spring being adapted then to return to its normal position with said pin passing through said cutout, said pin being adapted to strike said lower surface of said head and deflect said spring forwardly upon release of said lower member until said pin clears said head.

2. Latch for top and bottom members vertically movable relative to each other comprising a laterally extending pin, means mounting said pin on said top member so that one end of said pin is free and so that said pin is accessible from said bottom member for latching purposes, a flat blade latch spring connected at its lower end to said bottom member and extending vertically upwardly therefrom. said blade spring also extending laterally, said spring having a bottom shank portion normally located forwardly of said pin, the free end of said pin being located intermediate the sides of said spring, said shank having a cutout extending to the upper end thereof in the sides thereof which is proximate to said pin, the inner edge of said cutout being located clearingly with respect to the free end of said pin, said latch member having an integral head comprising a lower leg connected to the top of said shank and inclined upwardly rearwardly with respect thereto, an intermediate leg extending forwardly from the upper end of said lower leg and a top leg extending upwardly rearwardly from the front of said intermediate leg, said pin being located intermediate the front and rear edges of said legs, said upper leg being adapted upon upward movement of said lower member to strike said pin cammingly and said shank being adapted thereby to be deflected rearwardly until said pin clears said upper leg and is located in the recess between said intermediate leg and said lower leg, said shank being thereby adapted to return toward its normal position so as to releasably lock said members together, said lower leg being adapted to strike said pin cammingly upon further upward movement of said lower member so as to again deflect said shank rearwardly until said pin clears said third leg and is in registration with said cutout, said shank being then adapted to return again to its normal position with said pin passing through said cutout so as to be again located behind said shank, said pin being adapted upon resulting lowering of said bottom member to strike said lower and upper legs and deflect said shank forwardly until said pin is located above the level of said latch.

3. Latch for first and second members which are movable toward and away from each other along a vertical axis, said latch comprising a laterally extending pin, means mounting said pin on said first member so that said pin has one end free and so that said pin is accessible for latching, a latch spring mounted on said second frame member and extending axially toward said first frame member, said latch spring having a shank attached to said second member in the form of a laterally and axially extending blade spring, said latch spring being adapted to be flexed forwardly and rearwardly and being normally located forwardly of said pin when said latch spring is in general latching position, said latch spring also comprising a head on the upper end of said shank, the free end of said pin being located intermediate the sides of said shank, said shank having a cutout in the side thereof which is proximate said pin, the inner side of said cutout being located beyond the free end of said pin, said head having means to engage said pin and adapted thereby to flex said latch spring rearwardly upon raising of said second member so that said latch spring head moves upwardly beyond said pin in engagement therewith, said head having a detent recess positioned and adapted thereby to receive said pin releasably and to hold said latch spring in releasably locked condition, said latch spring being adapted to be further raised to clear said pin from said detent recess until the upper movement of said second member brings said pin into registration with said cutout, said spring being adapted then to return to its general latching position with said pin passing through said cutout, said head having means adapted to be struck by said pin to deflect said spring forwardly upon release of said second member until said pin clears said head.

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