This invention relates generally to window closures for building structures and, more particularly, to a window closure wherein means are provided for automatically closing the window in the event of fire. By thus closing the windows, undesirable drafts through the windows which may cause the fire to spread are eliminated. This invention represents an improvement of the subject-matter of my copending applications, Serial No. 400,537 filed on October 6, 1954, Patent No. 2,887,340 issued March 18, 1959, and Serial No. 523,200 filed July 20, 1959.

One of the objects of the present invention is to maintain a window sash, particularly the upper sash, effectively locked in the closed position after it has been automatically closed. The lower window sash is maintained in closed position by gravity and presents no difficulty in this respect. The upper window sash, on the other hand, is held in raised position by the window closing means. In the event that the window closing means is damaged by the fire, the upper sash may happen to fall to open position, causing undesirable drafts which may permit the fire to spread.

In the window construction of the present invention, the upper sash is adapted to be closed by a spring urged striker member which is normally maintained in an inoperative position by a fusible connection. In the event of fire, the striker member is released and permitted to engage and raise the upper sash to closed position. Thereafter, the upper sash is held in raised position by the striker member and the spring which supplied the energy to close the sash.

As a safety feature to maintain the upper sash in raised position, notwithstanding any damage to the spring, a latch is provided to lock the upper sash in raised position. The latch is mounted out of the path of travel of the upper sash so that it will not interfere with the adjustment of the sash in ordinary use. Furthermore, although the latch is disposed in the path of travel of the striker member, it is retractable to an inoperative position during the upward travel of the striker member. Thus, the latch does not interfere with the operation of the striker member in closing the sash. The latch, however, is normally urged to operative position. Therefore, as soon as the striker member has cleared the latch during the upward travel thereof, the latch returns to operative position, in which position it is an effective lock which prevents retrogressive movement of the striker member and the sash. Thus, the latch maintains the sash in closed position, regardless of failure of the spring.

For a complete understanding of the present invention, reference may be made to the detailed description which follows and to the accompanying drawings in which:

Figure 1 is a fragmentary perspective view, with portions broken away, of a window construction embodying the present invention, the lower sash being removed;

Figures 2 and 3 are cross-sectional views taken along the lines 2—2 and 3—3, respectively, of Figure 1 looking in the direction of the arrows;

Figure 4 is a view taken along the line 4—4 of Figure 3 looking in the direction of the arrows;

Figures 5, 6, 7 and 8 are elevation views of the structure shown in Figure 1 illustrating the operation of the sash-locking means of the present invention;

Figures 9 and 10 are elevation views illustrating the means for automatically closing the lower sash of the window;

Figures 11 and 12 are enlarged cross-section views of the fusible connection between the lower window sash and the spring balance therefor before and after the severance thereof;

Figures 13 and 14 are enlarged cross-section views, similar to Figures 11 and 12, of another alternative construction before and after the severance of the parts; and

Figure 15 is a perspective view illustrating the severance of the fusible connection when subjected to heat.

Referring to the drawings, particularly to Figure 1, an upper sash 10 is guided for upward and downward movement between a pair of vertical jambs 11 (only one of which is shown in the drawings). A lower sash 12 (shown in Figures 9 and 10) is guided for upward and downward movement between a pair of vertical jambs 13 (only one of which is shown in the drawings). The vertical jambs 11, 13 extend between a horizontally disposed sill 14 and an upper header 15 (see Figures 5 to 10).

In order to counterbalance the weight of the upper sash 10 and to facilitate the opening and closing thereof, the upper sash is hung by means of conventional spring balances 16 from the upper header 15. The lower ends of the spring balances 16 are attached to the sash 10. The spring balances 16 permit the sash to be closed or moved to the desired position between the sill 14 and the header 15.

In the event of fire, the upper sash 16 is adapted to be raised to closed position by the engagement of a striker member 20 with the fitting 18 attached to the upper sash. Accordingly, the striker member 20 is adapted to be attached to the lower end of a vertically disposed tension spring 23, the upper end of which is attached to the header 15. The striker member 20 is normally attached between closely spaced parallel walls of a U-shaped holder 23 by means of a steel ball or pellet 24. The holder, in turn, is fastened to or near the sill 14 of the window. The striker member 20 and at least one of the walls of the holder 23 are provided with substantially aligned holes to receive the steel ball or pellet 24 which is held in place by a seal 25 which fuses when subject to high temperature.

Because of the close spacing between the parallel walls of the holder 23, when the steel ball or pellet 24 is held in place within the aligned openings, the striker member 20 is securely anchored to the holder. At high temperatures, such as those caused by fire, the seal 25 will become fused, and the tension of the spring 21 will urge the striker member 20 upwardly, forcing the steel ball or pellet 24 out of the aligned openings in the striker member 20 and the wall of the holder 23, as indicated in Figures 6, 7 and 8. Upon the severance of the fusible connection by the high temperature of a fire, the energy of the spring 21 will bring the striker member 20 into engagement with the lower edge of the fitting 18, as shown in Figure 6, raising the upper sash 10 to closed position, as indicated in Figures 7 and 8.

In order to maintain the upper sash 10 in closed position, notwithstanding any damage that may be done to the spring 21 by the fire, a pivoted latch 30 is provided to securely lock the upper sash in closed position. The
latch 30 is pivotally mounted on a stud 31 within the jamb 11, the stud being attached to the wall 11a of the jamb. The latch 30 is disposed in a vertical plane substantially parallel to and forward of the plane of the sash 10, so that the latch does not interfere with the adjustment of the sash in ordinary use. The latch 30, however, when in operative position, that is, the position determined by the engagement of the corner 30a of the latch with the side wall 11b of the jamb, is interposed in the path of travel of the striker member 20. When, therefore, the fusible connection between the striker member 20 and the holder 23 is broken, the striker member 20, during its upward travel, will engage the sloped edge 30e of the latch, pivoting the latch in the direction indicated by the arrow in Figure 4 out of the path of travel of the striker member. As shown in Figure 8, when the striker member has passed the corner 30c of the latch, the latch will drop by gravity beneath the lower edge of the striker member 20, thereby resuming the position shown in Figure 4, with the upper edge 30d beneath the striker member and the corner 30a in engagement with the wall 11b of the jamb. In the event of failure of the spring 21, the upper sash 10 is, nevertheless, supported in its uppermost closed position by the latch 30.

From the foregoing description, it is evident that the wall 11b of the jamb defines the limits of movement of the latch 30. For example, the operative position of the latch 30 is determined by the engagement of the corner 30a with the wall 11b, so that the wall 11b serves as a stop to determine the operative position of the latch. Furthermore, in inoperative or retracted position, the counterclockwise pivotal movement of the latch is determined by its engagement with the wall 11b. Throughout this range of movement of the latch, the center of gravity is at all times so disposed in relation to the pivot that the latch is always urged by gravity toward the operative position. Thus, the latch does not depend on the action of a spring to move it to operative position after being urged to inoperative retracted position by the engagement of the striker member therewith.

The latch 30, therefore, provides, a safety feature which normally does not interfere with the opening and closing of the upper sash 10. Furthermore, in the event of fire, the latch 30 does not impede the normal function of the striker member 20 in raising the sash 10 to closed position. Once, however, the sash has been raised to closed position, the latch 30 drops by gravity into operative position beneath the striker member 20 and effectively locks the upper sash in closed position.

As shown in Figures 9 to 15, the lower sash 12 is also automatically closed in the event of fire. More specifically, the lower sash 12 is supported by a conventional spring balance 35 (which includes a spring 35a and a spiral member 35b), and the lower end of the balance is attached by means of a fusible connection to a bracket 37. The bracket 37 includes a portion 37a which is affixed to the sash 12, and a circular curved end 37b which receives the lower end of the spring balance 35.

The lower end of the spring balance 35 is provided with an annular collar 40 affixed thereto by means of the rim 35c formed integrally with the lower end of the balance (as shown in Figures 11 and 12) or by means of a retaining ring 41 attached to the lower end of the spring balance (as shown in Figures 13 and 14). The outer periphery of the annular collar 40 is provided with depressions a therein which are capable of alignment with holes b in the circularly curved end 37b of the bracket 37. The bracket 37 and the collar 40 are attached together by steel balls or pellets 38 which are sealed within the holes b and in engagement with the depressions a by fusible seals 39. In the event of fire, the fusible seals 39 melt, disconnecting the lower end of the balance from the bracket 37, and permitting the lower sash 12 to fall to closed position by gravity.

The invention has been shown by way of example only, and obviously many modifications and variations may be made therein without departing from the spirit of the invention. The invention, therefore, is not to be limited to any specified form or embodiment, except in so far as such limitations are set forth in the appended claims.

I claim:

1. A self-closing window comprising an adjustable upper sash, a spring urged striker member engageable with said sash for moving the sash to closed position, a fusible connection for maintaining said striker member in inoperative position, but disconnectable to release said striker member when subjected to heat, said lock means retractable to permit the sash to be raised to closed position but movable to operative position to prevent the sash from falling to open position when closed by the striker member, a pair of fixed members spaced apart, said striker member being accommodated therebetween in inoperative position, and aligned openings in at least one of said fixed members and the striker member for receiving the fusible connection.

2. A self-closing window as set forth in claim 1 wherein the fusible connection includes a non-fusible pellet accommodated at least in part within said aligned openings and a fusible seal for sealing said pellet therein.

References Cited in the file of this patent

UNITED STATES PATENTS

690,535 Swaney -------------- Jan. 7, 1902
709,800 Rupp -------------- Sept. 23, 1902
728,135 Rupp -------------- May 12, 1903