# EMERGENCY EXIT WINDOW SYSTEM

## TECHNICAL FIELD

[0001] The present invention relates to window egress systems, and more particularly to child safety mechanisms for window egress systems.

## BACKGROUND

[0002] Some types of windows are designed to function as an emergency exit, for example in case of fire. While such a window may be a lifesaving portal to safety in case of a conflagration, they can also open the way to tragedy, since they pose a risk that a young child may fall through the escape opening. To guard against this risk, ASTM 2090 provides that the emergency escape release mechanism for such a window must require two distinct actions to operate, in addition to the action of opening the fall prevention screen or window guard.

[0003] One approach is to provide a spring-mounted locking arm on the window sash that cooperates with a locking catch on the window frame, with a safety catch being pivotally mounted on the frame. The safety catch can pivot between an engaged position in which the safety catch obstructs movement of the locking arm and a disengaged position in which the safety catch permits the locking arm to move away from the locking catch and release the window sash to open. A problem with this arrangement, however, is that if the window is opened, the safety catch may remain in the disengaged position even after the window is closed.

## SUMMARY

[0004] The present disclosure describes an emergency exit window system in which, when the sash is moved to the closed position, the locking arm is placed in the lock position and a safety guard is placed in the engaged position so as to secure the locking arm in the lock position, regardless of whether the safety guard started out in the engaged position or the disengaged position when the sash was closed.

[0004a] In one aspect, the present disclosure refers to an emergency exit window system, comprising:

a frame;

a sash pivotally carried by the frame so as to pivot between:

a closed position in which the sash is flush with the frame; and

an open position permitting human egress through the frame;

a locking mechanism adapted for locking the window sash in the closed position, the locking mechanism comprising:

a locking arm movably carried by the sash, wherein:

the locking arm is movable relative to the sash between a lock position and an unlock position; and

at least one biasing member acts between the locking arm and the sash to bias the locking arm toward the lock position;

an inwardly projecting locking catch fixedly carried by the frame; and

an inwardly projecting safety guard movably carried by the frame, wherein:

the safety guard is movable relative to the frame between an engaged position and a disengaged position;

wherein:

upon pivotal movement of the sash into the closed position, the locking catch acts against the locking arm to urge the locking arm toward the unlock position to permit a locking portion of the locking arm to move interiorly past a locking portion of the locking catch;

when the locking portion of the locking arm is disposed interiorly of the locking portion of the locking catch, the locking arm returns to the lock position;

and wherein:

when the sash is in the closed position and the locking arm is in the lock position, the locking portion of the locking arm is disposed interiorly of and overlaps the locking portion of the locking catch to obstruct pivotal movement of the sash toward the open position; and

when the sash is in the closed position and the locking arm is in the unlock position, the locking portion of the locking arm is clear of the locking portion of the locking catch to permit pivotal movement of the sash toward the open position;

and wherein:

when the sash is in the closed position and the locking arm is in the lock position and the safety guard is in the engaged position, the safety guard obstructs movement of the locking arm from the lock position into the unlock position; and

when the sash is in the closed position and the locking arm is in the lock position and the safety guard is in the disengaged position, the safety guard permits movement of the locking arm from the lock position into the unlock position;

and wherein:

if the safety guard is in the disengaged position when the sash moves into the closed position, the locking arm acts on the safety guard to move the safety guard into the engaged position.

[0004b] In another aspect, the present disclosure refers to a window system, comprising:

a frame;

a sash pivotally carried by the frame so as to pivot between:

a closed position in which the sash is flush with the frame; and

an open position permitting egress through the frame;

a locking mechanism adapted for locking the window sash in the closed position, the locking mechanism comprising:

a locking arm pivotally carried by the sash, wherein:

the locking arm is pivotable relative to the sash between a lock position and an unlock position;

at least one biasing member acts between the locking arm and the sash to bias the locking arm toward the lock position;

the locking arm has a sash detent at an outer end thereof;

the sash detent has a sash detent engagement surface on an exterior side thereof and has a sash detent guide surface on an interior side thereof; and

an inwardly projecting locking catch fixedly carried by the frame, wherein:

the locking catch has a frame detent at an inner end thereof; and

the frame detent has a frame detent engagement surface on an interior side thereof and has a frame detent guide surface on an exterior side thereof; and

an inwardly projecting safety guard pivotally carried by the frame, wherein:

the safety guard is pivotable relative to the frame between an engaged position and a disengaged position;

wherein:

upon pivotal movement of the sash into the closed position:

the sash detent guide surface and the frame detent guide surface engage with one another whereby the locking catch acts against the locking arm to urge the locking arm toward the unlock position until the sash detent guide surface

clears the frame detent guide surface so that the sash detent is disposed interiorly of the frame detent;

once the sash detent is disposed interiorly of the frame detent, the at least one biasing member urges the locking arm toward the lock position; and

when the locking arm is in the lock position, the sash detent overlaps the frame detent to obstruct pivotal movement of the sash toward the open position by engagement of the sash detent engagement surface with the frame detent engagement surface; and

when the sash is in the closed position and the locking arm is in the unlock position, the locking portion of the locking arm is clear of the locking portion of the locking catch to permit pivotal movement of the sash toward the open position;

and wherein:

when the sash is in the closed position and the locking arm is in the lock position and the safety guard is in the engaged position, the safety guard obstructs movement of the locking arm from the lock position into the unlock position; and

when the sash is in the closed position and the locking arm is in the lock position and the safety guard is in the disengaged position, the safety guard permits movement of the locking arm from the lock position into the unlock position;

characterized in that:

the safety guard has a safety guard guide surface; and

if the safety guard is in the disengaged position when the sash detent guide surface clears the frame detent guide surface, movement of the locking arm into the lock position after the locking arm clears the frame detent guide surface causes the sash detent guide surface to engage the safety guard guide surface and move the safety guard into the engaged position.

WHAT IS CLAIMED IS:

1. An emergency exit window system, comprising:

a frame;

a sash pivotally carried by the frame so as to pivot between:

a closed position in which the sash is flush with the frame; and

an open position permitting human egress through the frame;

a locking mechanism adapted for locking the window sash in the closed position, the locking mechanism comprising:

a locking arm movably carried by the sash, wherein:

the locking arm is movable relative to the sash between a lock position and an unlock position; and

at least one biasing member acts between the locking arm and the sash to bias the locking arm toward the lock position;

an inwardly projecting locking catch fixedly carried by the frame; and

an inwardly projecting safety guard movably carried by the frame, wherein:

the safety guard is movable relative to the frame between an engaged position and a disengaged position;

wherein:

upon pivotal movement of the sash into the closed position, the locking catch acts against the locking arm to urge the locking arm toward the unlock position to permit a locking portion of the locking arm to move interiorly past a locking portion of the locking catch;

when the locking portion of the locking arm is disposed interiorly of the locking portion of the locking catch, the locking arm returns to the lock position;

and wherein:

when the sash is in the closed position and the locking arm is in the lock position, the locking portion of the locking arm is disposed interiorly of and overlaps the locking portion of the locking catch to obstruct pivotal movement of the sash toward the open position; and

when the sash is in the closed position and the locking arm is in the unlock position, the locking portion of the locking arm is clear of the locking portion of the locking catch to permit pivotal movement of the sash toward the open position;

and wherein:

when the sash is in the closed position and the locking arm is in the lock position and the safety guard is in the engaged position, the safety guard obstructs movement of the locking arm from the lock position into the unlock position; and

when the sash is in the closed position and the locking arm is in the lock position and the safety guard is in the disengaged position, the safety guard permits movement of the locking arm from the lock position into the unlock position;

and wherein:

if the safety guard is in the disengaged position when the sash moves into the closed position, the locking arm acts on the safety guard to move the safety guard into the engaged position.

2. The window system of claim 1, wherein:

if the safety guard is in the engaged position when the sash moves into the closed position, as the locking portion of the locking arm moves interiorly past the locking portion of the locking catch, the locking arm first acts on the safety guard to move the safety guard out of the engaged position until the locking portion of the locking arm is disposed interiorly of the locking portion of the locking catch, and then the locking arm further acts on the safety guard to return the safety guard to the engaged position.

3. The window system of claim 2, wherein:

the locking portion of the locking arm includes a terminal sash detent that is generally sagittate in cross-section;

the sash detent has a sash detent guide surface on an interior side thereof;

the safety guard has an exteriorly-facing sphenoidal protrusion, wherein the sphenoidal protrusion forms an inwardly-facing safety guard guide surface;

and wherein the locking arm acts on the safety guard to return the safety guard to the engaged position by engagement of the sash detent guide surface with the safety guard guide surface.

4. The window system of claim 3, wherein:

the sphenoidal protrusion forms an outwardly-facing safety guard engagement surface; and

abutment of the safety guard engagement surface against a sidewall of the frame defines the engaged position of the safety guard.

5. The window system of claim 4, wherein:

the safety guard includes a hook portion pointing toward the safety guard guide surface;

when the sash is in the closed position and the locking arm is in the lock position and the safety guard is in the engaged position:

the point of the hook portion is received in a chevron channel formed in the sash detent to trap the sash detent between the hook portion and the safety guard guide surface and thereby trap the locking arm in the lock position.

6. A window system, comprising:

a frame;

a sash pivotally carried by the frame so as to pivot between:

a closed position in which the sash is flush with the frame; and

an open position permitting egress through the frame;

a locking mechanism adapted for locking the window sash in the closed position, the locking mechanism comprising:

a locking arm pivotally carried by the sash, wherein:

the locking arm is pivotable relative to the sash between a lock position and an unlock position;

at least one biasing member acts between the locking arm and the sash to bias the locking arm toward the lock position;

the locking arm has a sash detent at an outer end thereof;

the sash detent has a sash detent engagement surface on an exterior side thereof and has a sash detent guide surface on an interior side thereof; and

an inwardly projecting locking catch fixedly carried by the frame, wherein:

the locking catch has a frame detent at an inner end thereof; and

the frame detent has a frame detent engagement surface on an interior side thereof and has a frame detent guide surface on an exterior side thereof; and

an inwardly projecting safety guard pivotally carried by the frame, wherein:

the safety guard is pivotable relative to the frame between an engaged position and a disengaged position;

wherein:

upon pivotal movement of the sash into the closed position:

the sash detent guide surface and the frame detent guide surface engage with one another whereby the locking catch acts against the locking arm to urge the locking arm toward the unlock position until the sash detent guide surface clears the frame detent guide surface so that the sash detent is disposed interiorly of the frame detent;

once the sash detent is disposed interiorly of the frame detent, the at least one biasing member urges the locking arm toward the lock position; and

when the locking arm is in the lock position, the sash detent overlaps the frame detent to obstruct pivotal movement of the sash toward the open position by engagement of the sash detent engagement surface with the frame detent engagement surface; and

when the sash is in the closed position and the locking arm is in the unlock position, the locking portion of the locking arm is clear of the locking portion of the locking catch to permit pivotal movement of the sash toward the open position;

and wherein:

when the sash is in the closed position and the locking arm is in the lock position and the safety guard is in the engaged position, the safety guard obstructs movement of the locking arm from the lock position into the unlock position; and

when the sash is in the closed position and the locking arm is in the lock position and the safety guard is in the disengaged position, the safety guard permits movement of the locking arm from the lock position into the unlock position;

characterized in that:

the safety guard has a safety guard guide surface; and

if the safety guard is in the disengaged position when the sash detent guide surface clears the frame detent guide surface, movement of the locking arm into the lock position after the locking arm clears the frame detent guide surface causes the sash detent guide surface to engage the safety guard guide surface and move the safety guard into the engaged position.