June 15, 1943. C. C. GARDNER 2,321,591

AUTOMATIC RELEASE MECHANISM FOR WINDOW SASHES OR THE LIKE

Filed Aug. 31, 1940

Fig. 1

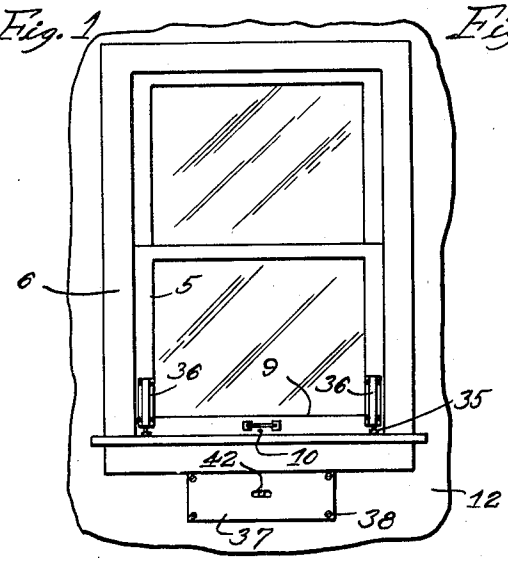


Fig. 2

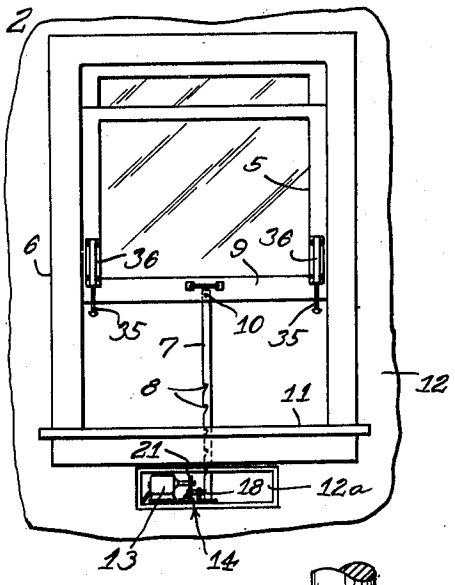


Fig. 3

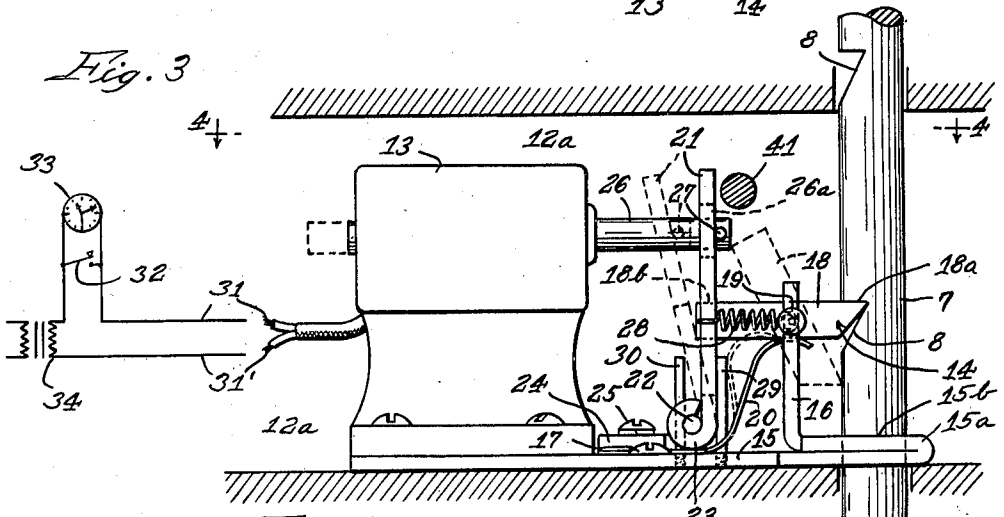
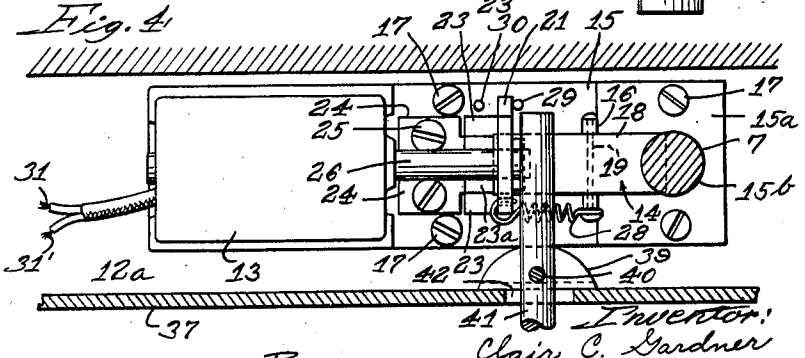


Fig. 4



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AUTOMATIC RELEASE MECHANISM FOR WINDOW SASHES OR THE LIKE

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7 Claims. (Cl. 292—201)

This invention relates to a device for controlling the movement of an object such as a window sash either through a manual remote control or an automatic remote control means which is operative on the passage of a predetermined interval of time.

The pricipal object of this invention is to provide an improved and positively acting device for automatically releasably interlocking with the object when it is moved in one direction and to support the movable object at one of a number of vertically spaced positions, and means for releasing the same either automatically or selectively, permitting the object to move in the opposite direction.

Another object of this invention is to provide a device to accomplish the foregoing objects having a novel release mechanism so constructed that very little force is required to operate the same, whereby the same is adapted to be operated by a low voltage solenoid.

In the drawing:

Figure 1 is an inner elevation of a window sash in a closed position showing a plate closing off the wall compartment containing the solenoid and automatic release mechanism of my invention;

Fig. 2 is another elevation showing the window sash in an open position, the wall plate being removed to expose the solenoid and automatic release mechanism;

Fig. 3 is a detailed side elevation of the solenoid and automatic release mechanism including a wiring diagram, and

Fig. 4 is a horizontal section on the line 4—4 of Fig. 3.

The same reference numerals are applied to corresponding parts in these views.

Referring to Figs. 1 and 2, the sash 5 of conventional design is adapted to slide vertically within channels in the frame 6, and when supported in a raised open position to close by gravity upon removal of the support. A rod 7, containing a plurality of vertically spaced notches 8, is fixed at its upper end to the middle of a bottom cross-rail 9 of the sash 5, by entering the said upper end of the rod 7 into a hole in the cross-rail 9 and suitably securing it therein as by a pin 10. A vertical hole is made in the sill 11 to permit the rod 7 to reciprocate vertically inside the wall 12 as the sash 5 is raised and lowered. A casing 12a is provided in the wall beneath the sill 11 for the reception of a solenoid 13 and an automatic release mechanism 14 for cooperation with the rod 7 which extends through the casing 12a, as shown. The mid-location of the rod 7 is of advantage in several ways; it makes for a well balanced and easy operating structure, besides affording a certain measure of protection against burglars entering the house through the open window, there being hardly enough room left on either side of the rod for such entry.

A one-piece generally L-shaped bracket 15 has a folded end portion 15a which is perforated to provide a bearing 15b for the rod 7. This end portion terminates in a bent-up forked portion 16 of reduced width. Screws 17 fasten the bracket to the bottom of the casing 12a. A latch bolt 18 is pivotally mounted in the forked portion 16 on a crosspin 19 for teeter movement, the bolt being adapted to serve as a dog to hold the rod 7 so long as the bolt is in a horizontal operative position, but being adapted to release the rod and allow the window to close when the bolt teeters. One end 18a of the bolt 18 is shaped to engage in the notches 8 in the rod 7, and when the bolt 18 is thus engaged and is locked releasably against pivotal movement relative to pin 19, as in Fig. 3, the rod 7 and window sash 5 are releasably supported in raised position. A leaf spring 20 is suitably secured to the bracket 15 at its lower end while its free upper portion is arranged to exert pressure on the bolt 18 beneath the pin 19, tending to urge the bolt 18 to move into a horizontal position when the bolt, for example, is in an inclined position, as shown in dotted lines in Fig. 3.

An abutment plate 21 is pivotally mounted at its forked lower end on a pin 22 that extends through knuckles 23 on the plate 21 and through a knuckle 23a similarly formed on the base plate 24 and projecting between the knuckles 23. Screws 25 secure the base plate 24 to the bracket 15. The armature 26 of the solenoid 13 extends freely through a slot 26a in the plate 21 and has a crosspin 27 on the projecting end portion which, when the armature moves to the left upon energization of the solenoid, is arranged to engage and move the plate 21 to the dotted line position shown in Fig. 3. As is evident from Fig. 3, when the bolt 18 is in the latching position, the rear end portion thereof extends into the slotted portion 18b of the plate for support against clockwise movement. When the solenoid 13 is energized, the armature 26 is retracted and the plate 21 is moved away from supporting relation to the bolt 18. The rod 7 and sash 5 accordingly drop down, moving the bolt 18 to the dotted position of Fig. 3. A tension spring

28, which is secured at one end to the plate 21 and at its other end to the end of pin 19, constantly urges the plate 21 toward the vertical or locking position so that upon the opening of the circuit energizing the solenoid 13, the plate 21 retakes that position. Forward movement of the plate 21 is limited by pin 29 projecting upwardly from the bracket 15, while backward movement is limited by pin 30, which also projects upwardly from the bracket in parallel spaced relation to the pin 29. It should be clear that although the bolt 18 supports a considerable amount of weight on the rod 7, only a relatively small amount of electrical energy is required to trip the bolt 18 and allow the window supported thereby in raised open position to drop to closed position. The slot 18*b* is long enough in a vertical direction so that the bolt 18 can move in a counterclockwise direction relative to the plate 21 when the latter is in the vertical position, as for example, when the window sash is supported in a raised position but not fully opened and is then raised farther. The bolt 18 in such cases rides out of the notch 8 and later into another as the rod 7 rises with the sash.

The bolt 18, after the closing of the window, is in the inclined position shown in dotted lines in Fig. 3, but has its end 18*a* urged by the spring 20 into engagement with the rod 7 so that in the upward movement of the rod 7 the end 18*a* of the bolt will project into the first notch 8 enough to cause the bolt to be turned positively in a counterclockwise direction as the rod 7 moves upwardly with the sash. In this movement the bolt 18 is "indexed" from its inoperative window-releasing position to its operative window-supporting position, the plate 21 being forced out of the way by the butt end of the bolt against the action of the spring 28 until the butt end of the bolt is disposed in the slot 18*b*.

The solenoid 13 which is suitably secured to the bracket 15 by screws has conductors 31 and 31′ which extend to a circuit closing means, such as the manual push button switch 32 or an automatic audible alarm or silent clock 33, that acts to close the circuit at a predetermined time, although both automatic and manual type controls are shown and may be used. The source of electrical energy is here indicated as a transformer 34, which is arranged to be plugged into a convenient outlet in the home. Air cushioned plungers 35 contained in casings 36 on opposite sides of the sash 5 serve by engagement with the sill 11 to cushion as well as silence the dropping of the sash and avoid danger of shattering the window pane.

A cover plate 37 conceals the casing 12*a* from view and is suitably secured to the wall by screws 38. An inwardly projecting bracket 39 secured to the cover 37 has pivotally mounted thereon at 40 a manual trip rod 41. This rod 41 projects through a horizontal slot 42 in the cover plate 37 to a point adjacent the upper free end of the plate 21. When the outer end of the rod 41 is moved to the right, the upper end of the plate 21 is accordingly moved to the left, permitting the release of the bolt 18 and the descent of the rod 7 and sash 5. It is clear, therefore, that the window may be closed by direct manual manipulation of the control rod 41 or by operation of either of the remote control devices 32 and 33, previously described.

It should be clear that this invention is not limited to application to a window sash, but may be used in connection with any member movable in a similar way which it may be desired to lock releasably in one position, to gravitate to another position when released. It should also be clear that a counterweighted upper sash may be locked releasably in a lowered position by a mechanism substantially as herein disclosed, the sash moving upwardly to closed position upon release. The term "window sash" as used herein must accordingly be taken to include any member movable normally in one direction and adapted to be locked releasably in a moved position so that upon release it returns automatically to initial position.

It is believed the foregoing description conveys a good understanding of the objects and advantages of my invention. The appended claims have been drawn to cover all legitimate modifications and adaptations.

I claim:

1. A device of the class described comprising a substantially vertical rod adapted for attachment to a gravitating window sash or the like, said rod having a plurality of notches provided therein in vertically spaced relation, an elongated teeter type latch bolt adapted in a substantially horizontal position to engage one end selectively in any one of said notches, means pivotally supporting said bolt intermediate the ends thereof to teeter in a substantially vertical plane, said latch bolt tending normally to move toward substantially horizontal position with the said one end engaged in a notch in said rod, the latter end of the bolt being movable downwardly by the rod when the bolt is released, and means for releasably holding the other end of said latch bolt against upward movement while the bolt is in said horizontal operative position.

2. A device of the class described comprising a substantially vertical rod adapted for attachment to a gravitating window sash or the like, said rod having a plurality of notches provided therein in vertically spaced relation, an elongated teeter type latch bolt adapted in a substantially horizontal position to engage one end selectively in any one of said notches, means pivotally supporting said bolt intermediate the ends thereof to teeter in a substantially vertical plane, said latch bolt tending normally to move toward substantially horizontal position with the said one end engaged in a notch in said rod, the latter end of the bolt being movable downwardly by the rod when the bolt is released, an elongated abutment member pivotally mounted at one end in spaced relation to the pivot of said latch bolt for swinging movement toward and away from the other end of said latch bolt, said abutment member having a shoulder thereon intermediate its ends for releasably engaging the latter end of the bolt to hold it in the horizontal operative position, and means for swinging the abutment member operatively associated with the free end thereof.

3. A device of the class described comprising a substantially vertical rod adapted for attachment to a gravitating window sash or the like, said rod having a plurality of notches provided therein in vertically spaced relation, an elongated teeter type latch bolt adapted in a substantially horizontal position to engage one end selectively in any one of said notches, means pivotally supporting said bolt intermediate the ends thereof to teeter in a substantially vertical plane, said latch bolt tending normally to move toward substantially horizontal position with the said one end engaged in a notch in said rod,

the latter end of the bolt being movable downwardly by the rod when the bolt is released, an elongated abutment member pivotally mounted at one end in spaced relation to the pivot of said latch bolt for swinging movement toward and away from the other end of said latch bolt, said abutment member having a shoulder thereon intermediate its ends for releasably engaging the latter end of the bolt to hold it in the horizontal operative position, an electrical solenoid having an armature operatively connected with the free end of said abutment member to move the same to retracted position, the connection permitting retracting movement of said member independently of movement of said armature, means for selectively connecting said solenoid with a source of electrical energy, and manually operable means operatively associated with the free end of said member for moving the same to retracted position.

4. A device of the class described comprising a substantially vertical rod adapted for attachment to a gravitating window sash or the like, said rod having a plurality of notches provided therein in vertically spaced relation, an elongated teeter type latch bolt adapted in a substantially horizontal position to engage one end selectively in any one of said notches, means pivotally supporting said bolt intermediate the ends thereof to teeter in a substantially vertical plane, said latch bolt tending normally to move toward substantially horizontal position with the said one end engaged in a notch in said rod, the latter end of the bolt being movable downwardly by the rod when the bolt is released, an elongated abutment plate pivotally mounted in spaced relation to the pivot of said latch bolt for swinging movement toward and away from the other end of said latch bolt, said plate having a vertically elongated slot provided therein intermediate the ends thereof for reception and support of the latter end of the bolt in the horizontal operative position thereof, spring means normally urging said abutment plate toward said latch bolt, means limiting swinging movement of said abutment plate under action of said spring means, the slot in said abutment plate being elongated so as to allow downward movement of the bolt end therein from horizontal operative position without changing the position of said abutment plate, whereby the rod may be raised higher from a given raised position without releasing the rod for downward movement, and means operatively associated with the free end of said plate to move the same to retracted position for release of the latch bolt.

5. A device of the class described, comprising a substantially vertical rod element adapted for attachment to a gravitating window sash movable in a window frame, said rod element disposed substantially vertically on the true longitudinal center line of the sash and frame and also in the central plane of the sash so that the longitudinal center line of the rod element when extended passes through the center of gravity of the sash, said rod element being attached to the lower end of the sash and arranged to be supported on the frame to hold the sash in an open position against its normal tendency to close, and mechanism for releasably gripping the rod whereby upon release of the rod the sash is allowed to return to normal position without tendency to chatter or bind in such movement.

6. In a device of the kind described, a vertical rod adapted for attachment to a gravitating window sash or the like, said rod having a plurality of V-notches provided therein in vertically spaced relation, an elongated teeter type latch bolt the forward end of which is beveled off on its under side and adapted to engage selectively in any one of said notches, a bracket for pivotally supporting the latch bolt near its bevelled end for teeter movement in a substantially vertical plane, resilient means for urging the latch bolt toward substantially horizontal locking position, a substantially vertical elongated plate having a vertical slot therein intermediate its ends in which the other end of said latch bolt remote from the bevelled end is arranged to engage for support, means pivotally supporting said plate by its lower end, spring means for urging the plate in a direction toward the coacting end of said latch bolt, and manually controlled means operatively associated with the upper end of said plate for moving the same to retracted position against the action of said spring means.

7. A device of the class described comprising a vertical rod adapted for attachment to a gravitating window sash or the like and adapted to support the same in any one of a plurality of different raised positions, an elongated holding dog arranged to engage the rod so as to hold the same against downward movement for support of the sash in raised position, means pivotally supporting said dog intermediate the ends thereof for teetering movement, the pivot being located nearest the rod engaging end of the dog, the latter end of the dog being movable downwardly by the rod when the dog teeters, spring means normally urging the dog toward a substantially horizontal position for operative engagement with the rod, and a releasable support for the end of said dog remote from the rod to hold the same in substantially horizontal operative position, comprising a member pivotally mounted at one end and having operative engagement with the dog near the pivoted end, said member being movable at its other end remote from the pivot and dog to release the dog for teetering movement.

CLAIR C. GARDNER.