May 28, 1929. A. R. BLASKI 1,715,274

AUTOMATIC LOCK FOR SHUTTER OPERATING MECHANISM

Filed March 13, 1925

Fig. 1.

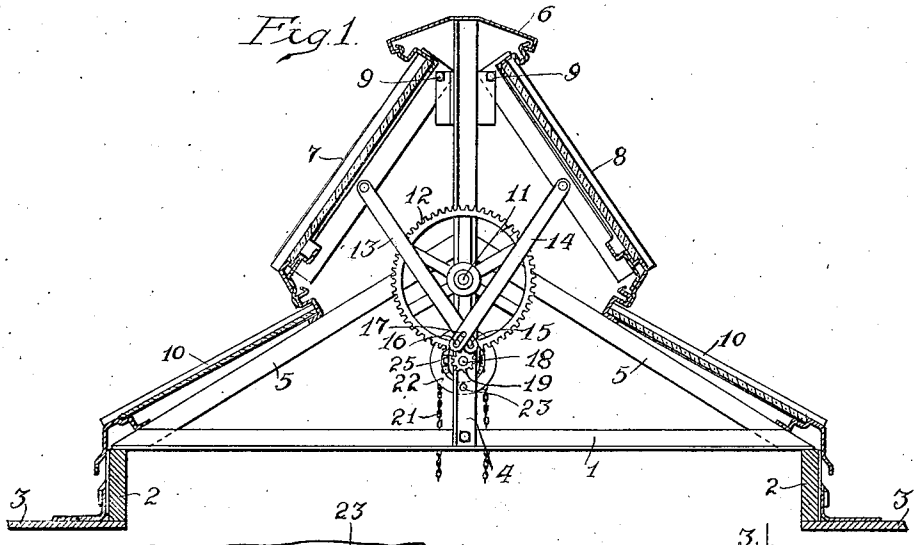


Fig. 3.

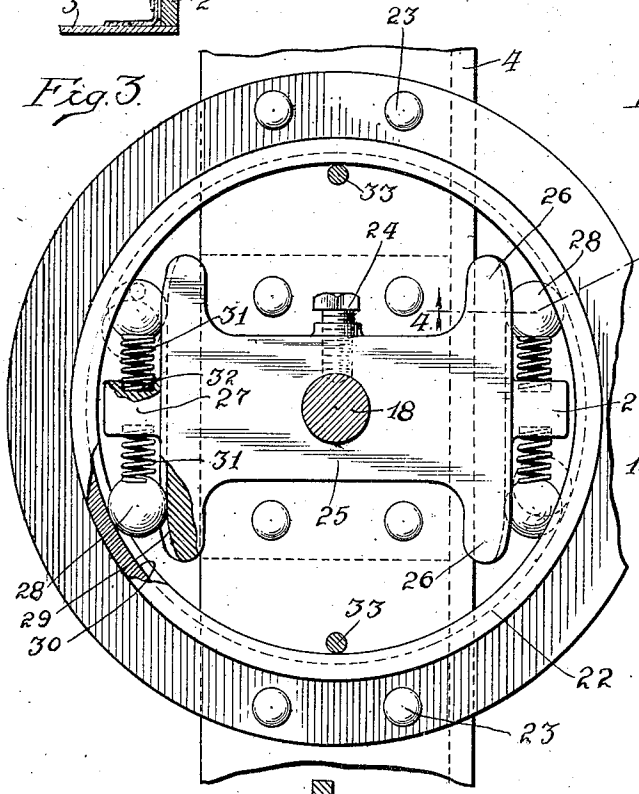


Fig. 2.

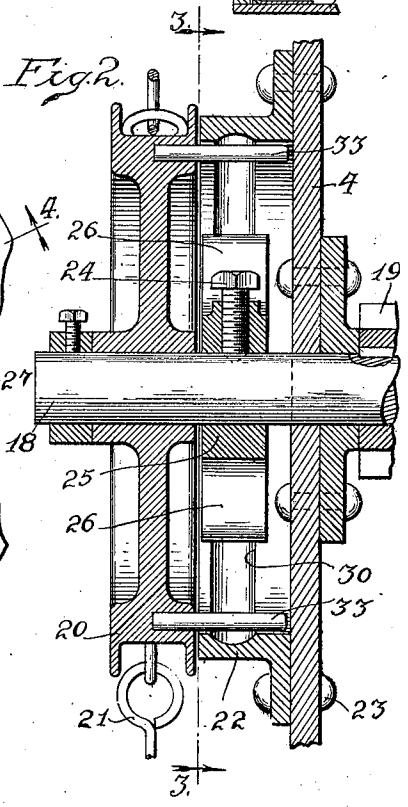
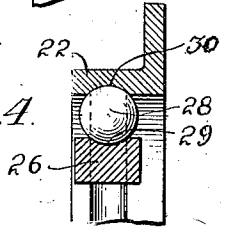


Fig. 4.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC LOCK FOR SHUTTER-OPERATING MECHANISM.

Application filed March 13, 1925. Serial No. 15,355.

My invention has reference to a device for automatically locking and releasing an adjusting mechanism to prevent unintended operation or shifting thereof, and it is particularly useful in connection with shutters or adjustable ventilator elements of skylights and the like.

Ventilating devices and the like, such as the ventilating elements or shutters of skylights are usually located at elevated points where they are not conveniently accessible for direct operation and are usually equipped with an adjusting mechanism in proximity thereto and operable from a remote point for opening and closing the same. These ventilating elements or shutters are usually subjected to vibration or varying wind pressures or draughts which tend to disturb the adjustment thereof, and the adjusting or operating mechanism must be adapted to hold effectively the ventilating elements or shutters against any displacement except through the normal operation of the adjusting mechanism.

The principal objects of my invention are to hold effectively shutters, adjustable ventilating elements and the like against displacement or shifting from the positions to which they are adjusted; to lock positively the adjusting mechanism at any stage of its operation so that it can be actuated only under the control of the operator; to insure prompt releasing and locking of the adjusting mechanism at the proper time; to construct the locking device so that it does not interfere with the freedom of operation of the adjusting mechanism by the operator; to provide remote control of the locking device by the same means which is employed to operate the adjusting mechanism; and in general, to afford a simple, convenient, reliable and positive lock for use in connection with an adjusting mechanism whereby the latter cannot be operated except under the control of the operator.

The invention consists in the novel constructions, arrangements and devices to be hereinafter described and claimed for carrying out the above stated objects and such other objects as will appear from the following description of a certain preferred embodiment illustrated in the accompanying drawings, wherein—

Fig. 1 is a transverse sectional view of a skylight structure with adjusting mechanism for ventilating elements embodying the principles of my invention;

Fig. 2 is a vertical sectional view through the locking device and adjoining parts of the adjusting mechanism;

Fig. 3 is a side view of the locking device, taken on the line 3—3 of Fig. 2, with parts broken away to disclose details of construction; and

Fig. 4 is a detail sectional view on the line 4—4 of Fig. 3.

Like characters of reference designate like parts in the several views.

Referring to the drawings, the reference numeral 1 indicates one of a number of transverse members of a skylight frame, said members being suitably spaced and having their opposite ends supported on curb members 2—2 at opposite sides, respectively, of an opening in the roof 3. Each transverse member 1, at its middle, has an upright 4 secured thereto and extending upwardly therefrom, and oppositely inclined rafters 5—5 have their inner ends secured to the uprights 4 about midway between the upper and lower ends of the latter, and have their outer ends secured to the respective outer ends of the transverse member 1. A ridge cap 6 extends longitudinally over and midway between the sides of the skylight opening, being supported on the upper ends of the uprights 4, and has one or more shutters or ventilating elements 7 and 8, respectively, at each side thereof and hinged to the uprights 4 as at 9. Deck sections 10 extend part way up the rafters 5 from each curb 2 so as to leave openings between their upper edges and the ridge cap, which openings are adapted to be closed by the hinged shutters or ventilating elements 7 and 8, which are arranged so that their lower edges seat against and over the upper edges of the deck sections 10 and are adapted to be swung on their pivots 9 away from the deck sections 10 to various positions to permit any desired extent of air circulation through the skylight openings.

The deck sections 10 and ventilator sections or shutters 7 and 8 are in practice, usually glazed to admit light through the roof opening, the joints are sealed or close fitting, so as to keep out the weather, and the ends of the skylight are closed by any suitable end wall construction.

The hinged shutters or ventilator sections 7 and 8 are adjustable to and from the closed position by means of a mechanism, similar to that shown and describel in my co-pending application, Serial No. 662,170, filed September 12, 1923, which includes a longitudinally extending shaft 11, journaled in the uprights 4, and having a plurality of gears 12 keyed thereon. Links 13 and 14 are pivotally connected at their upper ends to the respective swinging sections 7 and 8, and the lower ends of said respective links are provided with slots 15 and 16 respectively, which engage a lug 17 projecting laterally from one side of the gear 12. The slots 15 and 16 are so positioned that the upper ends thereof contain the lug 17 when the sections 7 and 8 are in their closed positions, and the slots are of such length that the gear 12 may be rotated in either direction as required to open either one of the sections 7 and 8 almost to the extreme open position without disturbing the other section.

A shaft 18 extending parallel with the shaft 11 and also journaled in the uprights 4 is provided with a plurality of pinions 19, which are in mesh with the respective gears 12.

A chain wheel 20 is mounted to rotate on the shaft 18, preferably near to one of the uprights 4, and has an operating chain 21 passed thereover whereby the wheel 20 may be operated from the floor of the building or other convenient point. Between the wheel 20 and the upright 4 is a ring or band 22, which is fixed to the upright 4 by rivets 23 or other suitable means, and has its inner face concentric with the shaft. Within this band or ring and secured to the shaft 18 by a set screw 24, is a head or cross arm 25 having the opposite ends, which lie close to the inner face of the band or ring 22, elongated, as indicated at 26, for a purpose that will hereinafter be apparent. A lug 27 extends outwardly at each end of the block or cross arm 25, midway between the extremities of the end faces, and the portions of these end faces at opposite sides of the lugs 27 are arranged with respect to the inner face of the band or ring 22, to afford oppositely converging spaces therebetween. A ball 28 is located in each of these converging spaces and is retained in position by a transversly curved channel 29 in the end face of the block or cross arm 25 and a corresponding transversely curved channel 30 extending around the inner face of the ring or band 22, said channels serving as guideways along which the balls 28 are capable of movement. Each ball 28 is normally held at the outer contracted end of the space between the guideways or channels 29—30 by a spring 31, which at one end engages the ball and at the other end is engaged in a seat 32 in the lug 27. In view of the opposite convergence of the spaces in which the pair of balls at each end of the block or cross arm 25 are located, and the pressure of the springs upon the balls, a two-way locking arrangement is afforded to lock the arm 25 against rotation in either direction. An attempt to turn the arm 25 in the one direction causes the set of diametrically opposite balls at the rear or trailing ends of the extensions 26 to bind between the end faces of the arm 25 and the inner surface of the ring or band 22, and since the ring or band 22 is stationary, movement of the arm 25 is effectively prevented. Likewise any attempt to rotate the arm 25 in the reverse direction brings into action the other set of balls 28 and in the same manner prevents such movement.

When either or both of the shutters or closing elements 7 and 8 are open to any extent, they have a tendency to rotate the gear 12 and return to the closed position. This is effectively resisted by the ball locking mechanism above described; said mechanism, because of its wedge action, being incapable of slipping or otherwise yielding under vibration or wind or draught pressure to which the shutters or sections 7 and 8 are subjected. Moreover, the same locking function is present when the shutters or sections 7 and 8 are closed, and these sections cannot therefore be opened from the outside for unauthorized access to the building.

When it is desired to operate the shutters or sections 7 or 8, or either of them, it is necessary that the balls, which lock the arm 25 and the shaft 18 against movement in the intended direction, be released from locking engagement. This is accomplished through the operating wheel 20, which as hereinbefore stated, is loose on the shaft 18, said wheel being provided with a pair of diametrically positioned, laterally extending pins 33, which are capable of passing through the gap between the ends of the extensions 26 and the inner face of the ring or band 22. Rotation of the wheel 20 in one direction, brings the pins 33 against one set of the balls, backing same up in their convergent guides 29—30 against the tension of the springs 31, and at the same time applying pressure to rotate the block or cross arm 25 and the shaft 18. The balls engaged by the pins 33 are the ones normally serving to lock the head or cross arm 25 against movement in the direction in which the wheel 20 is being turned, and as the other set of balls do not have any locking effect in this direction, it will be understood that the head 25 is thus free to be rotated as long as the turning pressure is applied by the wheel 20. As soon as the turning pressure of the wheel 20 is relaxed, the set of balls 28 which

were engaged by the pins 33, are returned by the pressure of the springs to the locking position and the head 25 is immediately clamped to the ring 22 against movement in either direction. Turning of the wheel 20 in the direction opposite to that assumed above, in like manner, brings the pins 33 against the other set of locking balls and releases the same so that the head 25 and the shaft 18 are free to rotate in the direction of applied pressure.

Thus the shutters or sections 7 and 8 are freely operable by turning of the wheel 20, which may be effected, through the chain 20, from a remote point, but the mechanism is immediately locked, when the shutters are closed or in any position of adjustment, as soon as the wheel 20 stops, and any attempt or tendency to operate the shutters or sections 7 and 8 otherwise than by the wheel 20, merely increases the grip of the lock. It is also to be noted that with this device, no connection other than the operating chain 21 is required to control the locking mechanism or effect the locking or release thereof as the construction is such that the initial movement of the wheel 20 in either direction accomplishes the necessary unlocking.

I have shown and described my present invention in connection with a link and gear wheel structure of the type shown and described in my co-pending application hereinbefore referred to, but it is to be understood that other forms of connections may be used, and other changes and modifications may be made without departing from the spirit of my invention, the scope of which is to be determined by the appended claims.

I claim as my invention:

1. An operating mechanism for the shutter of a skylight, comprising in combination a shaft adjacent to the shutter, means driven by said shaft for opening and closing the shutter, a ring fixedly mounted in concentric position about said shaft and having a groove in its inner face, a head mounted on said shaft and rotatable therewith within said ring and having facing portions convergent with the inner face of the ring, said facing portions of the head being also provided with grooves opposite the groove in the ring, gripping devices adapted to roll along said grooves for locking the head and shaft by friction against rotation with respect to the ring, springs adapted normally to hold the gripping devices in operative gripping position in the grooves, and operating means adapted by its initial operation to move said gripping devices against the action of the springs out of operative position and adapted by continued operation to rotate said head and shaft for adjusting the shutter.

2. An operating mechanism for the shutter of a skylight, comprising in combination a shaft adjacent to the shutter, means driven by said shaft for opening and closing the shutter, a ring fixedly mounted in concentric position about said shaft and having a groove in its inner face, a head mounted on said shaft and rotatable therewith within said ring and having facing portions convergent with the inner face of the ring, said facing portions of the head being also provided with grooves opposite the grooves in the ring, gripping devices adapted to roll along said grooves for locking the head and shaft by friction against rotation with respect to the ring, springs adapted normally to hold the gripping devices in operative gripping position in the grooves, an operating wheel revolubly mounted on said shaft adjacent to said head, means for rotating said operating wheel in either direction, and pins carried by said operating wheel adapted on the rotation of the wheel to pass between the head and the ring for displacing the gripping devices and adapted on further rotation of the wheel to rotate said head and shaft.

3. An operating mechanism for the shutter of a skylight, comprising in combination a shaft adjacent to the shutter, means driven by the shaft for opening and closing the shutter, a ring fixedly mounted in concentric position about said shaft and having a groove in its inner face, a head mounted on said shaft and rotatable therewith within said ring and having edge face portions convergent with the inner face of the ring, said edge face portions of the head being also provided with grooves opposite the groove in the ring, gripping devices adapted as said head rotates to roll along said grooves into wedging engagement between the head and the ring for locking the head normally against rotation with respect to the ring, an operating member mounted on said shaft and rotatable with respect thereto, means for driving said operating member, and means carried by said operating member and extending into said ring in the path of movement of said gripping devices adapted upon initial rotation of the operating member in either direction to loosen such of said gripping devices as tend to prevent rotation of the shaft in the same direction and adapted upon further rotation of the operating member to drive said head and shaft.

ALOYZIOUS R. BLASKI.