

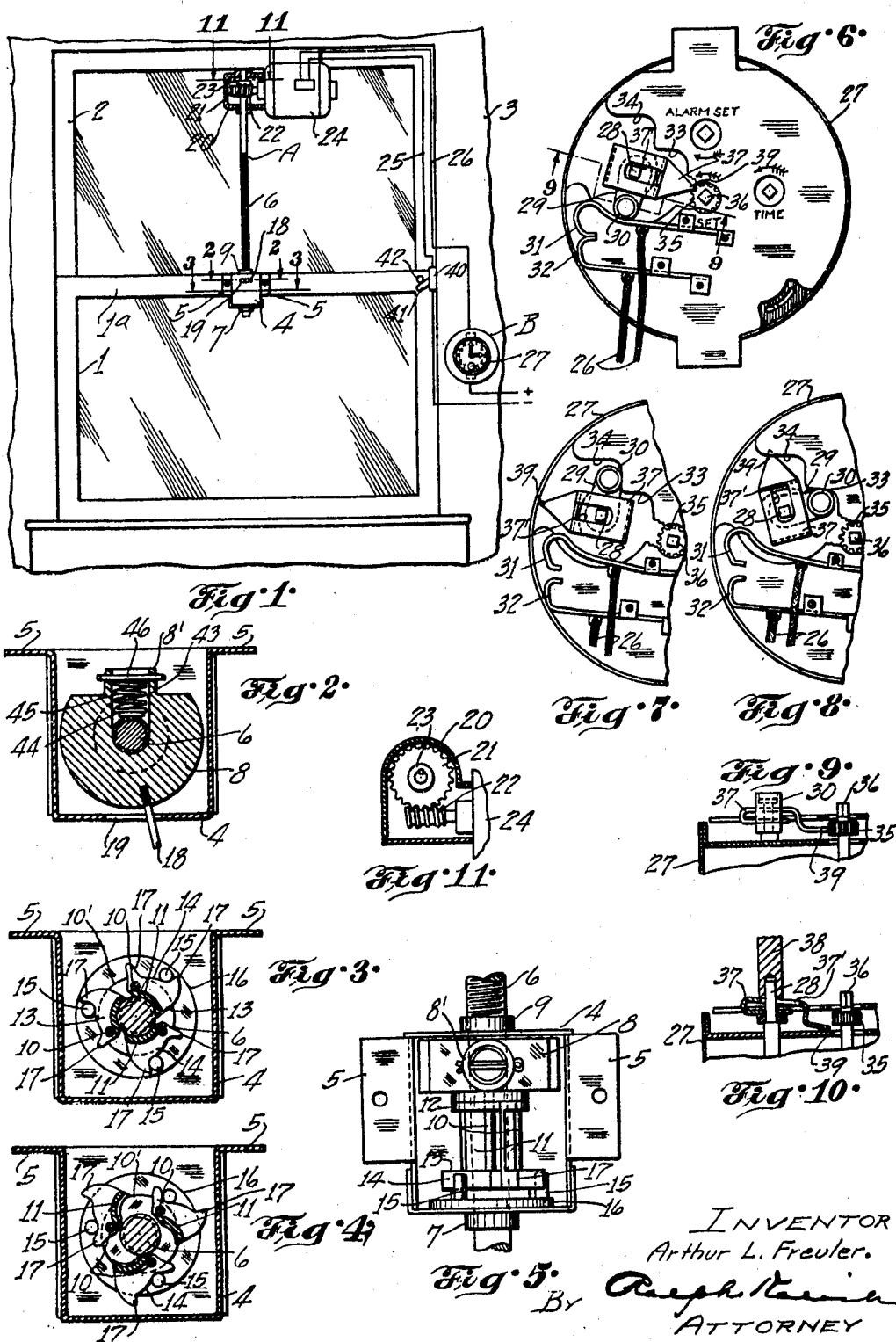
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A. L. FREULER

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VENTILATION REGULATING APPARATUS

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INVENTOR
Arthur L. Freuler.

By *Alph. R. ...*
ATTORNEY

UNITED STATES PATENT OFFICE

ARTHUR L. FREULER, OF ST. LOUIS, MISSOURI, ASSIGNOR OF NINETY PER CENT TO JULIAN MAAS AND TEN PER CENT TO CHESTER E. MYERS, BOTH OF ST. LOUIS, MISSOURI

VENTILATION REGULATING APPARATUS

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This invention relates to a certain new and useful improvement in ventilation regulating apparatus and has particular reference to a preferably time set power-actuator for automatically closing a window or other movable or shiftable closure at a predetermined time.

The chief objects of my invention are to provide efficient power actuated means for closing the window or other closure; to provide means for manually disconnecting the power-actuated means when the window or closure is to be manually opened or closed; to provide means for automatically restoring the operative connection between the power-actuated means and the window when the window is to be power-actuated in closing movement; to provide means for operating the power actuated means by remote control; to provide a time-set means or clock-controlled switch for operation of the power-actuated means at a predetermined time; and to provide other means for automatically stopping the power-actuated means at a predetermined position of the window.

And with the above and other objects in view, my invention resides in the novel features of form, construction, arrangement, and combination of parts hereinafter described and pointed out in the claims.

In the accompanying drawing,—

Figure 1 is an elevational view of a double-hung window equipped with a ventilation controlling apparatus of my invention;

Figure 2 is a detail sectional view taken approximately along the line 2—2, Figure 1, showing the means for manually disconnecting the power device and for automatically restoring the operative connection on actuation of the power device;

Figure 3 is a detail sectional view taken approximately along the line 3—3, Figure 1, showing the expansible-nut-device in actuator-engaging position;

Figure 4 is a detail sectional view similar to Figure 3, showing the expansible-nut-device in actuator-releasing position for operatively disconnecting the power device;

Figure 5 is a back view of the expansible-nut-device as mounted in its housing, a por-

tion of the actuator-screw being shown in connection therewith;

Figure 6 is a rear view of the time-switch and its clock, showing the contact-actuator in contact-closing position for operation of the power-device;

Figure 7 is a fragmentary view of the time-switch and its clock, showing the contact-actuator in contact-releasing position;

Figure 8 is a fragmentary view similar to Figure 7, showing the contact-actuator returned to time-set position;

Figure 9 is a fragmentary sectional view taken approximately along the line 9—9, Figure 6, showing the contact-actuator-detent engaging the time-release gear of the clock;

Figure 10 is a fragmentary sectional view similar to Figure 9, showing the manner in which the contact-actuator-detent may be yieldingly depressed below the time-release gear in returning the contact-actuator to clock-controlled position; and

Fig. 11 is a horizontal section along the line 11—11 of Fig. 1.

Referring now more in detail and by reference characters to the drawing, which illustrates a preferred embodiment of my invention, the apparatus is shown in connection with a so-called double-hung window comprising a lower sash 1 and an upper sash 2 arranged to shiftablely slide in a window-frame 3 in a manner well known to those skilled in the art.

The present apparatus is adapted especially, though not exclusively, to permit the manual opening of the window, that is to say, the lifting of the lower sash 1, and the subsequent power closing or lowering of the sash 1, and for such purpose the apparatus includes a window-actuator A having operative connection with the sash 1, motivation of the window actuator A being electrically controlled by a time-switch B for closure of the window at a predetermined time.

The actuator A includes a shell or so-called carriage 4 preferably in the form of a hollow body-member or casing for protective enclosure of the moving parts housed therein. The shell 4 is adapted for attachment to the

window-sash to be shiftably moved and, in the present instance, is secured to the upper rail 1a of the lower sash 1 by suitable fastening elements passed through lateral lugs 5, 5, extending from each side of the housing 4, as best seen in Figure 1.

6 designates a threaded actuator-member or shaft, the lower journal 7 of which is fixed in the shell-casing 4. The upper journal of the shaft 6, however, is preferably included in a swingable-head-block 8 slidably mounted on the shaft 6 and having a collar 9 passed through the upper wall of the casing 4 for permitting an oscillatory movement to the block 8 while centralizing the shaft 6 in the shell 4. The block 8 is preferably in the form of a short generally cylindrical member having an interrupted periphery to provide a flattened portion from which is presented a boss 8', for purposes later appearing.

Suspended from the cage-head or block 8, is a plurality of pins 10 united at their depending lower end by a disk or circular end piece 10' and forming, as it might be said, a pin-cage depending from the head-block 8 in parallelism with the shaft 6. Swingably mounted on the respective pins 10, is a plurality of nut-segments 11, each adapted for movement into or out of engagement with the threaded shaft 6, and, as a whole, forming an expansible-sleeve-nut-device for selectively supporting the shell 4 on the actuator 6 and for establishing an operative mechanical connection between the actuator-shaft 6 and the shell or carriage 4. Each nut-segment 11 is, as may be said, pivotally connected to the pin-cage and preferably comprises a longitudinally cylinder-segmental interiorly threaded body portion having at its opposite ends suitable laterally presented lugs or brackets 12, 13, each journaled on the adjacent end of one of the pins 10 for swingable actuation of the respective segment between the block 8 and end piece 10', and for such actuating purpose the preferably lower lug, as 13, is provided with an edgewise cam-face 14 having co-operation with a suitable fixed pin 15 upstanding preferably from a flanged portion 16 of the lower journal member 7, the cam 14 being provided with end stops 17, 17, for causing the swing of the nut-segment 11.

Such swingable movement of the expansible-nut segments 11 is accomplished by oscillating the head-member 8 on the shaft 6, on which movement the several pins 10 will be rotarily shifted both relatively to the shaft 6 and the pins 15. When the pins 10 are angularly furthest from the pins 15, the cams 14 act to close the respective nut-segments 11 into co-operative threaded engagement with the shaft 6. Figure 3, and when the pins 10 are angularly nearest to the pins 15, the latter impinge the respective adjacent stops 17,

whereby the segments 11 are swung apart out of operative connection with the shaft 6, Figure 4.

For manually oscillating the cage-block 8, a pin 18 is laterally presented from the block for swingable movement in a suitable aperture 19 provided for the purpose in the front wall of the shell or carriage 4, Figure 2, the pin 18 being readily accessible for manipulation by a person located in front of the window. By such manipulation, the shell 4 may be operatively connected to or disconnected from the shaft 6, and when so operatively or mechanically connected to the shaft 6, rotation of the shaft 6 will cause the movement therealong of the carriage 4, the raising or lowering of the window-sash 1 resulting.

For such purposes, the shaft 6 is rotatably anchored against endwise displacement preferably to some relatively non-moving or fixed member, as the upper part of the window frame 3, whereby, on rotation of the shaft 6, the sash 1 will be shifted toward or from said fixed point. Preferably such anchoring means includes a housing or support 20 for protective enclosure of a suitable operative means, as a gear and worm arrangement 21, 22, Figure 11, of which the gear 21 is mounted on a suitable hub or like element 23 fixed on the shaft 6, the latter being suitably journaled through the housing 20 and the element 23 being adapted to impingingly revolvingly bear its opposite ends on the like walls of the housing 20 for limiting the endwise or axial movement of the shaft 6 with respect thereto. For rotative actuation of the shaft 6, the gear 21 meshes with its co-operating worm 22 having operative connection with a suitable prime-mover or power-device, which, in the present instance, includes an electric-motor 24, which, as will be understood, is motivated on supply of current in proper manner and degree for lowering the sash 1, and it may be here said that preferably, for constructional reasons, the motor 24 is fixed or mounted on the window frame 3 or its adjacent wall, and the housing 20 is, in turn, supported from the frame of the motor 24, as shown in Figure 1.

Such motivation of the electric motor 24 is accomplished by supplying electric current thereto through a suitable circuit comprising leads 25, 26, having suitable connection with a source of potential, as shown by the plus-and-minus signs in Figure 1, and it will be understood that, by the employment of suitable switching means, the motor may be actuated for raising and lowering the window at will when and if the carriage or shell 4 is mechanically connected to the shaft 6. However, one practical use of the apparatus is to provide an automatic window-closing device, the sash 1 in such regard being closed from a selected open position to

which it had been previously manually raised after mechanically disconnecting the carriage 4 from the power-actuated shaft 6.

For such purposes, a clock-controlled or time-set switch B is provided in the electrical circuit associated with the power device A. While any suitable standard clock-controlled mechanism may be employed, I prefer to employ the form of clock-controlled switching mechanism best seen in Figures 6 to 10, both inclusive, which includes a clock 27, on the alarm-shaft 28 of which is mounted a contact-actuator-arm 29 carrying at its oscillatory end a roller 30 adapted at its mid-position to closely engage one of a pair of normally spaced preferably resilient switch-contacts 31, 32, inserted in one of the leads, as 26, for normally interrupting the electrical circuit of the motor 24.

As is well known to those skilled in the art, the alarm shaft 28 is actuated by the clock-mechanism at a predetermined time or times controlled by the setting of the alarm mechanism; however, in the present embodiment, the shaft 28 and its carried contact-actuating arm 29 has an oscillatory or swinging movement limited by the impingement of the roller 30 at its extreme positions on suitable stops or shoulders 33, 34, preferably formed by cut-out portions of the back-wall of the clock in such manner as to be in the path of movement of the roller 30. Hence, when the roller 30 impinges the stop 33, the contact-actuator 29 is in what may be described as its clock-controlled position, from thence to be swingably moved or rotated on actuation of the alarm-shaft 28 by the clock-mechanism at the time determined by the setting of the alarm-mechanism. At an intermediate point of its swinging movement, the roller 30 engages the contact-member 31 for shifting the same into circuit-closing contact with the contact-member 32, the motivation of the window-actuator A being thereby effected in such manner as to lower the sash 1 from its raised position.

Having regard to the time required to effect such lowering of the sash 1, means is provided for maintaining the motivation of the motor 24 for the desired period by retaining the contact-actuating roller 30 in circuit-closing position for a selected or predetermined interval of time, such interval being selected suitably for the purpose of avoiding the overloading of the motor in the event of a "stuck" window, as may occur in damp or cold weather, but in order that the motor 24 may be cut out after such time interval, the arm 29 is thereafter caused to move by the spring of the alarm-mechanism to circuit-opening position, wherein the roller 30 releases the contact 31 for disengagement from the contact 32, the roller 30 coming to rest impingingly against the stop 34.

For such purposes, a spur gear 35 is

mounted or fixed on the minute-hand shaft 36 of the clock 27, and on the alarm shaft 28 is mounted or fixed a resilient detent 37 disposed for co-operative meshing engagement with a tooth of the gear 35 when and as the contact actuator arm 28 is in contact-closing position, Figure 6. Preferably the gear 35 rotates in detent releasing direction after the manner of a gear and pinion arrangement, and hence it will be seen that, after a certain period of revolution of the continuously rotating minute-hand shaft 36, the detent 37 will be released from its engaged gear-tooth for movement of the actuator arm 28 to circuit-opening position, as described, Figure 7.

When it is desired to reset the time-switch B, preferably a suitable detachable key 38 is caused to engage the complementary alarm shaft 28 for rotative purposes. Preferably the detent 37 is formed of spring material and has one end fitting over the usual squared end of the alarm shaft 28, in flat-wise engagement with the hub of the arm 29 for rotation therewith, thence the member 37 is folded encirclingly over the end of the shaft 28, the shaft 28 being upwardly presented through a suitable aperture 37' in the member 37, thence down and outwardly from said shaft to form a tooth-like presented detent end 39 normally disposed in the plane of the gear 35. When the key 38 is engaged with the shaft 28, the detent 37 will yield to the impingement of the key 38 in such manner as to depress the tooth-engaging end 39 of the detent 37 below the plane of the gear 35 for free swingable movement thereunder, Figure 10, such movement occurring on swinging actuation of the arm 29 to clock-controlled or time-set position, Figure 3.

To avoid useless expenditure of power, a limit-switch 40 is inserted in the circuit-wire 25 in a manner and for a purpose well known to those skilled in the art, the switch 40 having, as is usual in such constructions, a lever 41 adapted for impingement by a stop 42 on the sash 1, the switch 40 being preferably mounted on the window frame 3 for cutting out the motor 24 when and as the window is closed, Figure 1, although the limit-switch 40 may be otherwise disposed, and there may be more than one limit-switch, at the option of the person constructing or using the apparatus.

In the present embodiment, the apparatus is, as has been said, especially, though not exclusively, adapted for use as a window-closing device, and it will be seen that in such particular use the shaft 6 is power-actuated in window-closing direction only. Advantage is taken of this fact in providing for the automatic mechanical connection of the shell 4 with the shaft 6 if the expandible-nut members 11 should be left in actua-

tor-shaft disconnected position, as may occur when using a counterweighted sash. For such purpose, the cage-block 8 is provided with a bore 43 opening at its inner end on the shaft 6 journaled, as has been said, in the block 8, and at its other end opening through the boss 8'. In the bore 43 is slidably mounted, for frictionally engaging the shaft 6, a spring-pressed member 44, which caps one end of a tensional member or spring 45, whose other end bears against, and in such manner is retained in the bore 43 by, a cotter or pin 46 suitably secured in the walls of the boss 8', Figure 2.

Hence, rotation of the actuator or shaft 6 in window-closing direction will swingably actuate the head-block 8, and it may be said that the several parts are so arranged that such actuation of the block 8 will automatically close the expansible-nut members 11 into engagement with the threaded shaft 6 irrespective of the original position thereof. However, reverse actuation of the shaft 6 will disconnect or disengage the carriage 4 from the actuator 6, if such be desired. I may add that for a non-counterbalanced sash, the manually operable expansible-nut device provides a convenient means for setting or holding the sash in any desired or selected more or less opened position, that is to say, the sash 1 may be disconnected from the actuator shaft 6, lifted to the desired position, and then reconnected to the shaft 6, and thereby held or locked, as it may be said, in such latter position. Further, in all types of sash, the same may be manually opened or closed at will by mechanically disconnecting the sash from the actuator shaft.

The use of the apparatus has been set forth as the description has proceeded. However, obviously, the apparatus is not to be limited in its practical uses to the double-hung sash shown, or to its employment as a window or other closure actuating or closing device, for it will be evident that the apparatus may be used as a time-set window-opening-device or for both opening and closing purposes, so that, in such regard, the apparatus provides highly effective, efficient, and practical means for actuation of windows generally and more especially for the remote-control of said actuator means, if desired, by a time-set means, and in such respect the apparatus finds useful applications in residences, stores, factories, and the like, wherever, as may be more particularly pointed out, it is desired to control the ventilation of a building by regulation of the window openings therein at predetermined time and degree.

While I have herein described the preferred embodiment of my invention, it is to be understood that changes and modifications in the form, construction, arrangement, and combination of the several parts thereof may be made and substituted for those

herein shown and described without departing from the nature and principle of my invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. Apparatus comprising, in combination, a carriage adapted for attachment to a movable closure, a rotative threaded shaft adapted to be actuated for shifting movement of said carriage thereby and therealong, an expansible-nut-device for selectively engaging the carriage with the shaft, said device including a plurality of threaded members adapted for swingable actuation into or out of co-operative engagement with the shaft, means for swingingly actuating said threaded members, said last means including an oscillatory member pivotally conjoined to said threaded members, and cam means on said threaded members having operative co-action with fixed members on the carriage on actuation of said oscillatory member.

2. Apparatus comprising, in combination, a carriage adapted for attachment to a movable closure, a rotative threaded shaft adapted to be actuated for shifting movement of said carriage thereby and therealong, an expansible-nut-device for selectively engaging the carriage with the shaft, said device including a plurality of threaded members adapted for swingable actuation into or out of co-operative engagement with the shaft, means for swingingly actuating said threaded members, said last means including an oscillatory member pivotally conjoined to said threaded members, and spring-set means carried by said oscillatory member for frictional engagement with said shaft.

3. Closure actuating apparatus comprising, in combination with a movable closure and its casing, a carriage fixed on the closure, a threaded rotary shaft journaled for rotation on the casing, means for rotarily actuating the shaft, and means including a cage on the carriage and a plurality of nut-segments pivotally mounted on the cage for engagement with the shaft for operatively connecting the carriage to the shaft.

4. Apparatus comprising, in combination, a carriage adapted for attachment to a movable closure, a rotative threaded shaft adapted to be actuated for shifting movement of said carriage thereby and therealong, an expansible-nut-device including an oscillatory cage on the carriage for selectively engaging the carriage with the shaft, and means for rotarily actuating the shaft.

5. Apparatus comprising, in combination, a carriage adapted for attachment to a movable closure, a rotative threaded shaft adapted to be actuated for shifting movement of said carriage thereby and therealong, an expansible-nut-device including an oscillatory cage on the carriage for selectively engaging

the carriage with the shaft, a support for the shaft fixed with respect to said carriage, and means for rotarily actuating the shaft.

6. Closure actuating apparatus comprising, in combination with a movable closure, a carriage fixed to the closure, a rotative threaded shaft, a cage mounted on the carriage, and an expansible-nut-device including a plurality of threaded members pivotally mounted for swingable actuation on the cage for selectively engaging the carriage with the shaft.

7. Closure actuating apparatus comprising, in combination with a movable closure, a carriage fixed on the closure, a rotative threaded shaft, a cage mounted for oscillation on the carriage, and an expansible-nut-device including a plurality of threaded members pivotally mounted for swingable actuation on the cage for selectively engaging the carriage with the shaft.

8. Closure actuating apparatus comprising, in combination with a movable closure and its casing, a carriage fixed on the closure, a threaded shaft having an end journaled for rotation on the casing, an expansible-nut-device including a plurality of threaded members adapted for swingable actuation into or out of co-operative engagement with the shaft for selectively engaging the carriage with the shaft, and means including a cage mounted for oscillation on the carriage for swingingly actuating said threaded members.

In testimony whereof, I have signed my name to this specification.

ARTHUR L. FREULER.

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