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OPERATING MECHANISM FOR THE CLOSURE MEANS OF VENTILATING OR SKYLIGHT CONSTRUCTIONS

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Fig. 1.

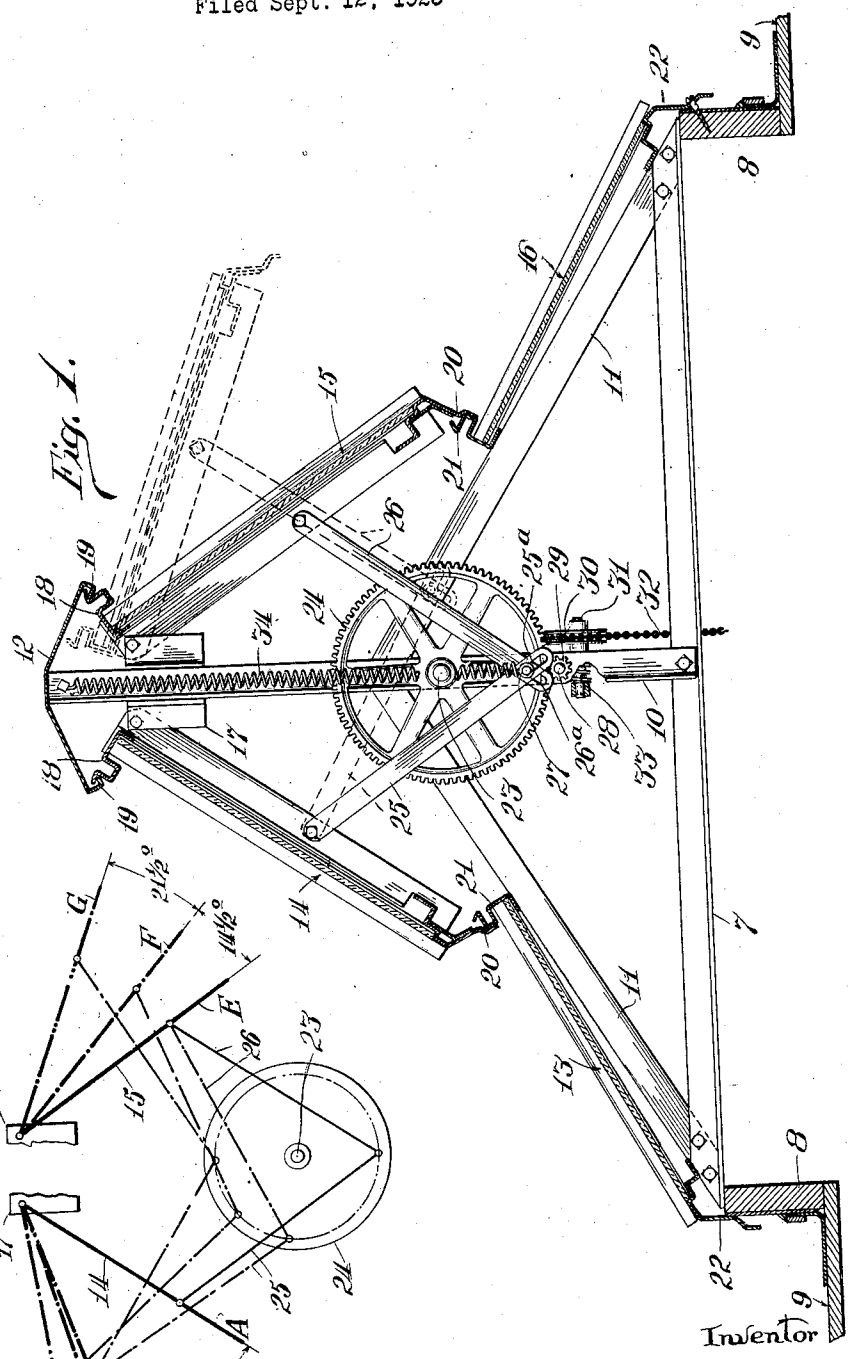
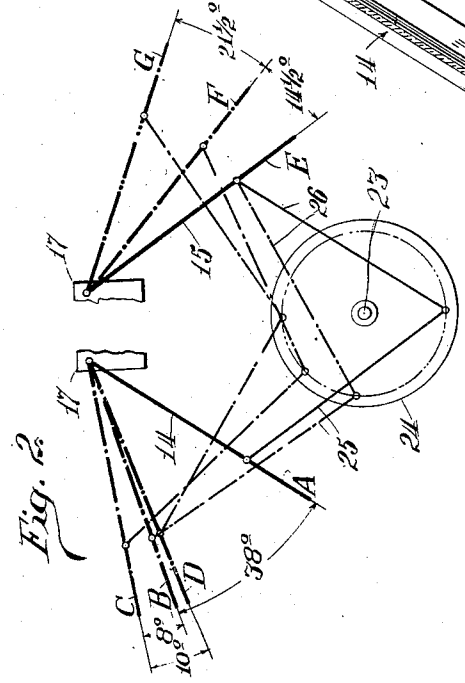


Fig. 2.



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OPERATING MECHANISM FOR THE CLOSURE MEANS OF VENTILATING OR SKYLIGHT CONSTRUCTIONS.

Continuation of application Serial No. 604,423, filed December 1, 1922. This application filed September 12, 1923. Serial No. 662,170.

My invention relates to ventilating or skylight constructions and more particularly to the operating mechanism for a pair of closure sections which are arranged to cover the opening in the roof or other supporting structure.

This application is a continuation of my co-pending application Serial No. 604,423, filed December 1st, 1922.

One of the objects of my invention is the provision of means of simple, durable and reliable construction for swinging the closure sections to open or close the same.

A further object of my invention is to provide operating mechanism for the closure sections which, preferably, is of such construction that either of the two sections may be swung from its closed position into an open position without disturbing the other section, but, while the opening, swinging movement of the first section is continued the other section is swung differentially, preferably at a faster rate of speed, from its closed position into an open position; whereby independent or co-operative operation of the sections is obtained.

A further object of my invention is the provision of operating means for the closure sections which is so constructed that during each cycle of operation, one of the sections will be swung from its closed position into an open position, then the other section swung from its closed position into an open position, and finally both sections returned to their closed positions. This feature of my invention is advantageous when it is desired to ventilate quickly a building.

A further object of my invention is the provision of operating mechanisms for the closure sections so constructed that the driving mechanism may be operated continuously, and preferably in either direction, without danger of any of its parts becoming wedged or jammed.

A further object of the invention is the provision of operating mechanism for the closure sections in which means is employed, preferably spring means, for assisting in the swinging of the closure sections from their closed positions into their open positions.

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 construction embodying the principles of my invention; and

Fig. 2 is a diagrammatic view of the construction showing the various positions into which the closure sections may be swung and illustrating the differential operation.

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

The skylight frame includes transversely extending members 7, the opposite ends of which rest on curb members 8 fixed to the roof 9, upright members 10, fixed at their lower ends to the members 7, and rafters 11 which are fixed at their lower ends to the extremities of the members 7 and at their upper ends to the members 10. A longitudinally extending ridge cap member 12 is mounted on the upper ends of the upright members 10. It will be understood that the ends of the skylight are closed by any suitable end wall construction.

The space on each side between the end walls, the ridge member 12 and the curb 8 defines the skylight opening, that on the left side being covered by closure sections 13 and 14, and that on the right side by closure sections 15 and 16. The sections 14 and 15 are hingedly connected at several points along their adjacent upper edges to plates 17 carried by the respective upright frame members 10. The upper edges of the sections 14 and 15 are provided with outwardly extending flange members 18 adapted to overlap the inwardly extending flanges 19 carried by the ridge cap member 12, thus providing a weather-tight construction. The lower edges of the respective sections 14 and 15 are provided with downwardly extending flange members 20 adapted to overlap upwardly extending flange members 21 carried by the respective lower sections 13 and

16, whereby weather-tight joints are provided between the sections 13 and 14 and the sections 15 and 16. The lower edges of the sections 13 and 16 are provided with downwardly extending flanges 22 adapted to overlap the respective sides of the curb.

The operating mechanism for the hinged sections 14 and 15 includes a longitudinally extending shaft 23 journaled in the frame members 10 on which a plurality of gears 24 are keyed, only one of said gears being shown in the accompanying drawings. Links 25 and 26 are pivotally connected at their upper ends to the respective swinging sections 14 and 15. The lower ends of said respective links are provided with slots 25^a and 26^a which are adapted to receive a lug 27 projecting laterally from one side of the gear 24. The slots 25^a and 26^a are so positioned that the upper ends thereof receive the lug when the sections are in their closed positions and the slots are of such length that the gear 24 may be rotated counter-clockwise and section 15 moved from the full line position to the dotted line position, shown in Fig. 1, without disturbing section 14, or the gear may be rotated clockwise to open section 14 initially without disturbing section 15. A shaft 28, extending parallelly with the shaft 23 and also journaled in the frame supports 10, is provided with a plurality of pinions 29 which are in mesh with the respective gears 24. The shaft 28 may be driven by any preferred means, a wheel 30 keyed to a stud shaft 31 being shown in Fig. 1, over which an endless chain 32 hangs, the lower end of the chain being within reach of the operator standing on the floor of the building. The stud shaft 31 may be operatively connected with the shaft 28 by worm gearing 33. A strong tension spring 34 is preferably employed in connection with each of the gears 24 for assisting in the swinging of the sections 14 and 15 from closed position into their open position, said springs at their upper ends being attached to the upper ends of the respective frame supports 10 and at their lower ends to the lugs 27 of the respective gears 24.

The operation of the mechanism will be best understood by reference to Fig. 2 of the drawings.

When the gear 24 is positioned with its lug 27 in the lowermost position, the respective sections 14 and 15 are in their closed positions as indicated at A and E. Assuming now that the chain 32 is pulled so that gear 24 is caused to rotate in a clockwise direction approximately one-quarter revolution, it will be noted that section 14 will be swung from its closed position into position B, without disturbing section 15. By rotating gear 24 additionally in the same direction approximately one-eighth revolution, section 14 may be moved into its full, open position C, section 15, at the same time, moving from its closed position to its partially open position F. By continuing the rotation of gear 24 in the same direction approximately another eighth of a revolution, section 14 will be lowered into its position D and section 15 will be raised from its position F to its position G, both sections then being substantially in their fully opened positions. By rotating gear 24 one-half revolution in either the same direction or the opposite direction, both sections may be brought into their closed position.

The differential swinging movement of the sections is clearly shown in Fig. 2. As indicated thereon, section 14 in swinging from its closed position to its position B moves through an arc of 38°; in moving from its position B to its position C it swings through an arc of 8° while section 15 swings through an arc of 14½°; and section 14 in moving from its position C to its position D swings through an arc of 10°, while section 15 swings through an arc of 21½°. In other words, while section 14 moves from its position B to its position C and back to its position D through a total of 18°, section 15 moves from its position E to its position G through an arc of 36°. It will be obvious that the swinging movement of the sections just described will be reversed if section 15 be opened initially. The movement of one section at a faster rate of speed makes it possible to operate the section in a minimum period of time.

It is impossible for the parts to become jammed or wedged when operated by a careless person, which so often happens in skylight constructions. Either run of the operating chain may be pulled continuously and the only result will be to open and close the sections. The building may readily be ventilated by continuously manipulating the sections.

The arrangement shown for operating the swinging sections is very simple in construction, reliable in operation and requires very little effort on the part of the operator to manipulate. The sections readily close under their own weight and are easily raised particularly when the springs 34 are employed. By the use of the rotatable member 24, the lug 27 and the connected end portions of the links 25 and 26 are moved about a circular path or circuit whereby upon a complete cycle or movement (one complete rotation of the gear 24) the sections 15 and 14 are successively opened and closed for effecting the desired convenient control of the ventilation.

I do not intend to limit my invention to the details of construction shown and described except only in so far as certain of the appended claims are specifically so

limited, as it will be obvious that modifications may be made without departing from the principles of my invention.

I claim:

1. In a ventilating or skylight construction, the combination of a supporting structure having an opening therein, a hinged section adapted for closing said opening, a link pivotally connected at one end portion with said section, and means connected with the other end portion of said link for moving it about a circuit, adapted by a quarter of the movement along the circuit to swing the section into substantially its fully opened position, by the succeeding quarter of the movement to hold the section in opened position, by the next succeeding quarter of the movement to swing the section into substantially closed position, and by the final quarter of the movement to maintain the section in such substantially closed position.

2. In a ventilating or skylight construction, the combination of a supporting structure having an opening therein, a hinged section adapted for closing said opening, a link pivotally connected at one end portion with said section, and means connected with the other end portion of said link for moving it about a circuit, adapted by a quarter of the movement along the circuit to swing the section into substantially its fully opened position, by the succeeding quarter of the movement to swing the link with respect to the section with a comparatively small change in the position of the section, by the next succeeding quarter of the movement to swing the section into substantially closed position, and by the final quarter of the movement to swing the link with respect to the section serving to maintain the section in such substantially closed position.

3. In a ventilating or skylight construction, the combination of a supporting structure having an opening therein, a hinged section adapted for closing said opening, a link pivotally connected at one end portion with said section, and means connected with the other end portion of said link for moving it about a circuit, adapted by a quarter of the movement along the circuit to swing the section into substantially its fully opened position, by the succeeding quarter of the movement to swing the link with respect to the section with a comparatively small change in the position of the section, by the next succeeding quarter of the movement to swing the section into substantially closed position, and by the final quarter of the movement to swing the link with respect to the section, said link having a lost-motion connection with the moving means whereby the section is permitted to remain in its said closed position during said final quarter of the movement.

4. In a ventilating or skylight construction, the combination of a supporting structure having an opening therein, a pair of hinged sections adapted to close said opening, a movable member, and connections between said movable member and said sections serving automatically upon movement of said member in one direction to swing said sections successively into substantially fully opened position.

5. In a ventilating or skylight construction, the combination of a supporting structure having an opening therein, a pair of hinged sections adapted to close said opening, a movable member, and connections between said movable member and said sections serving automatically upon movement of said member in one direction to swing said sections successively into substantially fully opened position, and serving thereafter upon further movement of said member in the same direction automatically to swing said sections successively into their closed position.

6. In a ventilating or skylight construction, the combination of a supporting structure having an opening therein, a pair of hinged sections adapted to close said opening, a movable member, and connections between said movable member and said sections serving automatically upon movement of said member in one direction to swing said sections successively into substantially fully opened position, and serving alternatively either upon further movement of the member in the same direction automatically to swing said sections successively into their closed position in the order in which they were opened or upon reverse movement of the member automatically to swing said sections successively into their closed position in the reverse order.

7. In a ventilating or skylight construction, the combination of a supporting structure having an opening therein, a pair of hinged sections adapted to close said opening, a rotatable member, and link connections between said rotatable member and said sections respectively adapted upon the rotation of said member in one direction to swing one of said sections to substantially its fully opened position and thereafter upon continued rotation in the same direction to swing the other section also into substantially its fully opened position.

8. In a ventilating or skylight construction, the combination of a supporting structure having an opening therein, a pair of hinged sections adapted to close said opening, a rotatable member, and connections between said rotatable member and said sections respectively adapted upon the rotation of said member in one direction to swing one of said sections to substantially its fully opened position and thereafter upon continued rotation in the same direction to give

the other section a swinging movement with respect to the first opened section for carrying said other section into substantially its fully opened position.

9. In a ventilating or skylight construction, the combination of a supporting structure having an opening therein, a pair of hinged sections adapted to close said opening, a rotatable member, and connections between said rotatable member and said sections respectively, adapted alternatively upon the rotation of said member in one direction to open said sections in succession one after the other or upon rotation of said member in the opposite direction to open said sections in succession in the reverse order, in either case one of said sections being moved to substantially its fully opened position and thereafter by continued rotation of the member in the same direction the other section being given a swinging movement with respect to the first opened section.

10. In a ventilating skylight construction, the combination of a supporting structure having an opening therein, a pair of hinged sections adapted for closing said opening, two links each pivotally connected at one end portion with one of said sections, and means connected with the other end portions of said links for moving such end portions about a circuit, adapted by one portion of the movement to swing one of said sections into opened position, by a succeeding portion of the movement to swing the other section into opened position, by a succeeding portion of the movement to swing the first opened section into closed position, and by the final portion of a complete cycle of movement to swing the second opened section into closed position.

11. In a ventilating or skylight construction, the combination of a supporting structure having an opening therein, a pair of hinged sections adapted for closing said opening, two links each pivotally connected at one end with one of said sections, and means connected with the other end portions of said links for moving such end portions about a circuit, adapted by one portion of the movement to swing one of said sections into opened position, by a succeeding portion of the movement to swing the other section into opened position and at the same time to swing the link of the first opened section with respect to said section with a comparatively small change in the position of said section, by a succeeding portion of the movement to swing said first opened section into substantially closed position and at the same time to swing the link of the second opened section with respect to said section with a comparatively small change in the position of the section, and by the final portion of a complete cycle of movement to swing the second opened section into closed position.

12. In a ventilating or skylight construction, the combination of a supporting structure having an opening, a pair of hinged sections adapted to close said opening, a rotatable member, a pair of links connected at one end to said member and at the other end to said respective sections and so arranged that said sections may be moved differentially by rotating said member, and means to drive said member.

13. In a ventilating or skylight construction, the combination of a supporting structure having an opening, a pair of hinged sections adapted to close said opening, a rotatable member, means to drive said member, and a pair of links, said links being connected at one end to said respective sections and at the other end to said member, the connection at one end of one of said links being such that one of said sections may be moved relatively to and without disturbing the other section.

14. In a ventilating or skylight construction, the combination of a supporting structure having an opening, a pair of hinged sections adapted to close said opening, a rotatable member, means to drive said member, and a pair of links, said links being connected at one end to said member and at the other end to said respective sections, the connection at one end of each of said links being such that either of said sections may be moved relatively to and without disturbing the other section.

15. In a ventilating or skylight construction, the combination of a supporting structure having an opening, a pair of hinged sections adapted to close said opening, a rotatable member, means to drive said member, and a pair of links connected at one end to said member and at the other end to said respective sections, the connection at one end of one of said links being such that said member may be partially rotated without disturbing one of the sections.

16. In a ventilating or skylight construction, the combination of a supporting structure having an opening, a pair of hinged sections adapted to close said opening, a rotatable member, means to drive said member, and a pair of links connected at one end to said member and at the other end to said respective sections, the connection at one end of each of said links being such that said member may be partially rotated to move either section into an open position without disturbing the other section.

17. In a ventilating or skylight construction, the combination of a supporting structure having an opening, a pair of hinged sections adapted to close said opening, means for operating said sections including a rotatable member, a pair of links connected at one end to said member and at the other end to said respective sections, means to drive said

member, and means connected to said member for assisting in rotating it whereby the swinging of said sections into their open positions is facilitated.

18. In a ventilating or skylight construction, the combination of a supporting structure having an opening, a pair of hinged sections adapted to close said opening, means for operating said sections including a rotatable member, a pair of links pivoted at one end to said member and at the other end to said respective sections, means to drive said member, and a spring connected at one end to said structure and at the other end to said member, for the purpose specified.

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