Aug. 21, 1928. 1,681,798

A. H. CARRIER

CASEMENT WINDOW ATTACHMENT

Filed July 20, 1927 2 Sheets-Sheet 1

Fig. 1.

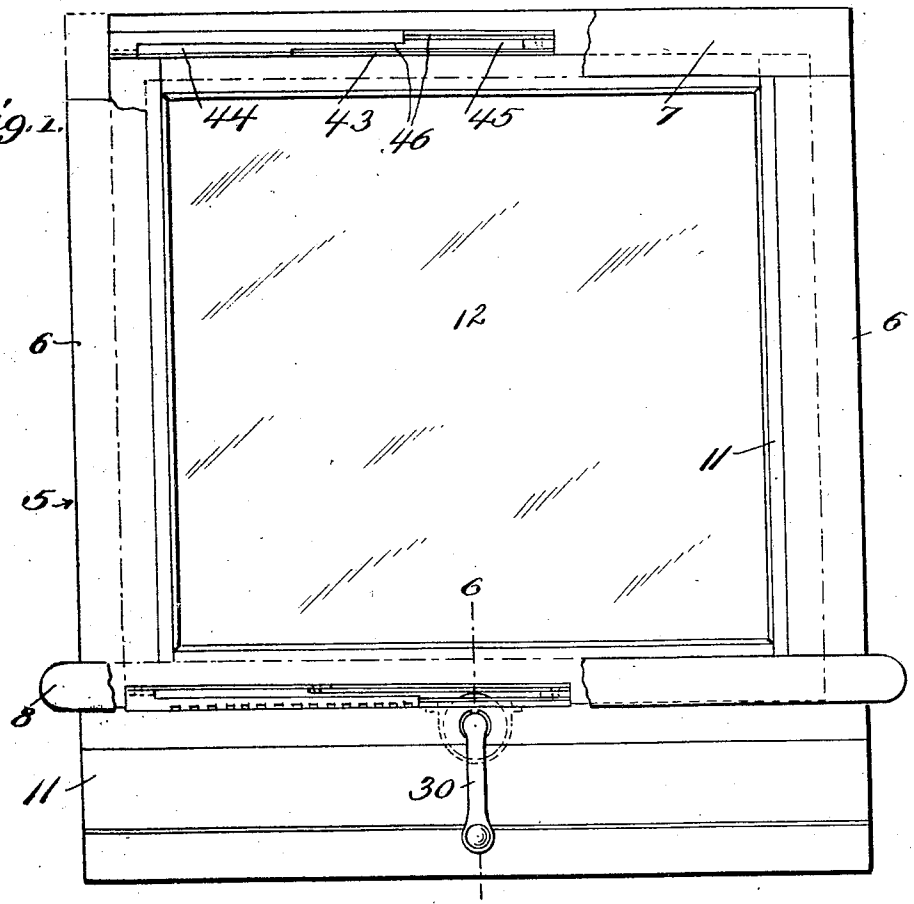


Fig. 2.

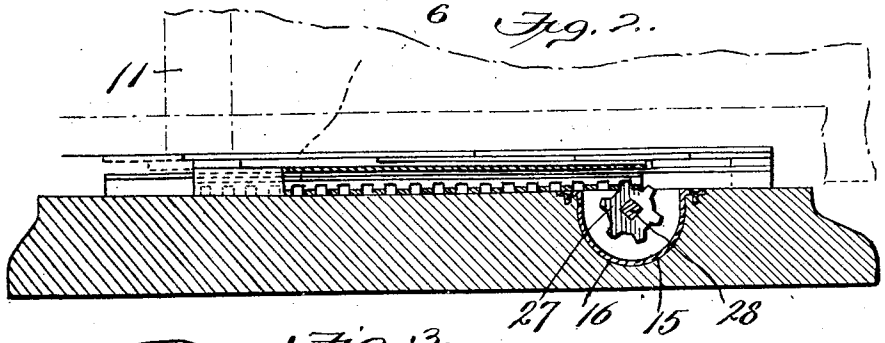
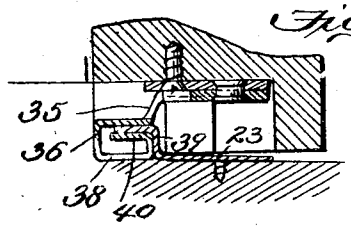


Fig. 3.



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Fig. 4.

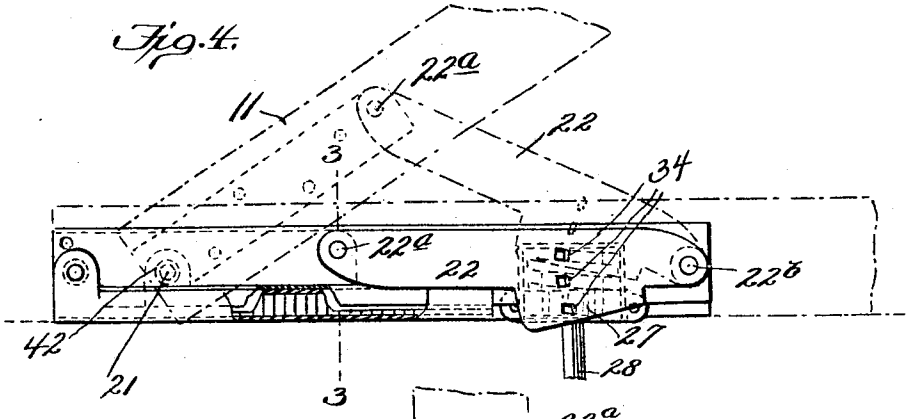


Fig. 5.

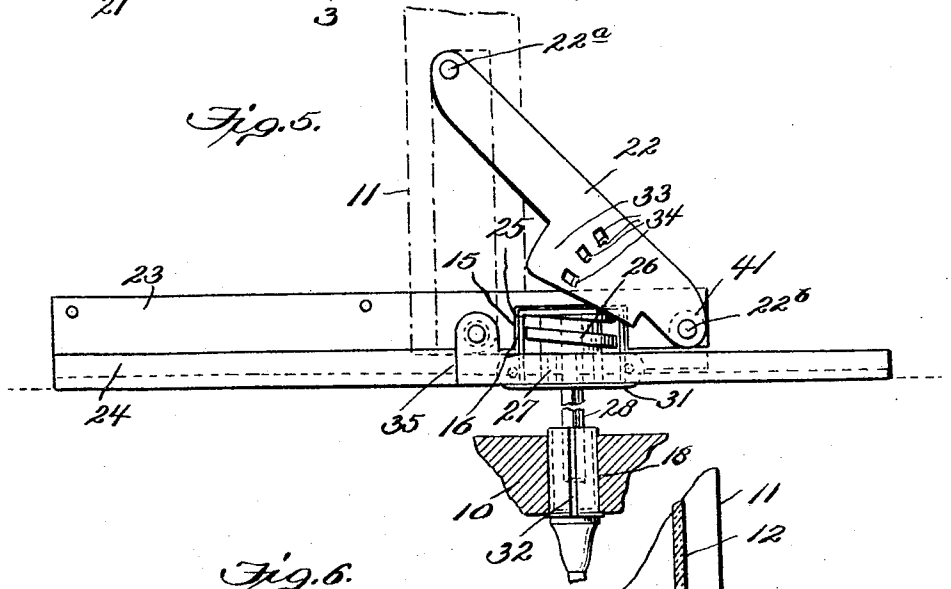
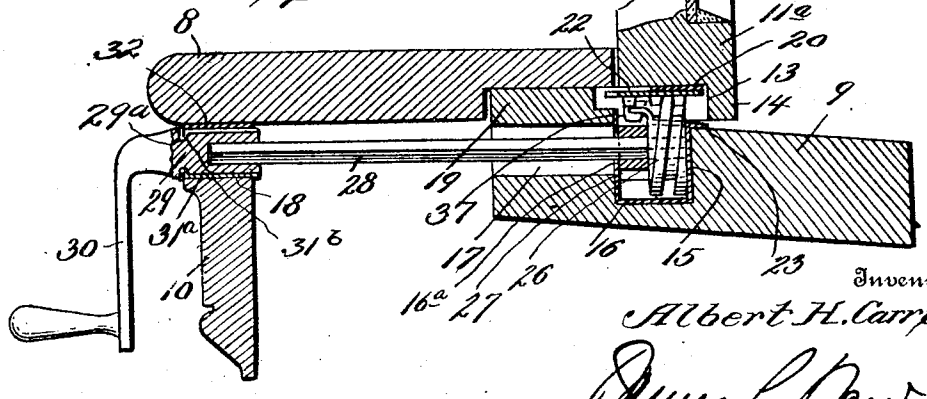


Fig. 6.



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Patented Aug. 21, 1928. 1,681,798

UNITED STATES PATENT OFFICE.

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CASEMENT-WINDOW ATTACHMENT.

Application filed July 20, 1927. Serial No. 207,289.

This invention relates to a casement window attachment, and the improvement proposes a comparatively simplified means for adjustment of the sash either into partially or fully opened position to any degree desired for ventilation, or in fully closed position, or to position the sash so that the glass thereof may be rendered readily accessible at opposite sides for cleaning or other purposes, and also provide a simple form of lock solely and operatively exposed within a room or compartment with which the casement window is structurally associated to reliably hold a casement sash closed by means which can not be reached from the exterior of the sash when the latter is closed.

The present structure is an improvement of the casement window operating means disclosed by my prior patents, and especially No. 1,300,925, April 15, 1919, and No. 1,553,137, September 8, 1925, wherein is embodied particular forms of toothed quadrants and worms for swinging the casement sash in opposite directions.

In the present construction, among other advantageous features of the improvement, are the formation of the parts mainly from sheet metal; the elimination of particular preparation of the woodwork of the frame to apply the working mechanism, and in a metal frame the shaping of portions of said latter frame to replace the separate worm box or casing structure, and provision for cutting the frame solely on the outside and the formation of a single opening through the lower portion of the frame for operative placement of the working parts to the frame and sash and thereby render it possible to readily apply the improved structure of frames now in use.

The invention also consists in details of construction and arrangement of the several parts which will be more fully hereinafter described and claimed.

In the drawings:—

Figure 1 is an inner side elevation of a casement window sash and frame, broken through in parts, and showing the improved sash operating mechanism applied thereto in elevation.

Figure 2 is a longitudinal vertical section of the improved sash operating mechanism, a portion of the sash being shown in dotted lines and the lower part of the frame illustrated in section.

Figure 3 is a transverse vertical section on the line 3—3 of Figure 4, showing also portions of the sash and frame.

Figure 4 is a bottom plan view, partially in section, showing a portion of the sash and parts of the improved mechanism in full and dotted lines.

Figure 5 is a view similar to Figure 4 with an addition of part of the frame in section, and showing the members of the improved mechanism in a different position.

Figure 6 is a transverse vertical section taken in the plane of the line 6—6 of Figure 1, with an addition of part of the frame which is shown in section.

The numeral 5 designates a casement frame of a simple construction and may be either wood or metal, but as shown particularly in the drawings is constructed of wood and comprises side and top members 6 and 7 of usual form rising from a stool 8 with which is associated a sill 9 and an apron 10. As clearly shown by Figure 6, the casement sash 11 is located and operates close to the outer edge of the stool 8 over the sill 9, the foregoing structure being that commonly adopted in casement window structures or installations, and as before indicated, may be either of wood or metal. In the present instance, as in all structures of this class, the sash 11 is mounted to swing within the frame in outward and inward directions to different degrees in open condition for ventilation and also to conveniently expose opposite sides of the glass 12 for convenience in cleaning the same. The bottom of the sash is formed with a longitudinally disposed mortise or seat 13 which extends fully inward through the inner side of the lower rail of the sash from an outer depending guard wall 14 so as to exteriorly enclose a part of the mechanism, as will be hereinafter explained, and the sill 9, when formed of wood, has a seat or recess 15 of suitable depth in which is mounted a casing 16. If the casement window frame is constructed of metal the said seat or recess 15 and the casing 16 will be replaced by suitable shaping the metal forming the said casing to provide the seat, which is an obvious structure and does not require other than ordinary mechanical skill to effect the formation of said seat. In either structure, an opening 17 of suitable dimensions extends from the inner side of the casing 16 and continues through the apron 10, as at 18. It will be seen that

the preparation of the frame and sash for the reception of the working parts or improved attachment are at the outer portion of the frame and at the bottom of the sash, the seat or recess 13 continuing into an inner upwardly projecting portion 19 of the sill 9, so as to give ample room for the operation of the movable parts of the attachment. Secured to the bottom of the sash or the top wall of the seat or recess 13 formed in the lower rail 11[a] of the sash, is a metal plate 20 which has a depending pivot 21 located at the outer end of the plate. The opposite extremity of the plate 20 has the outer end of a brace-arm 22 connected thereto by a pivot 22[a], the opposite terminal of said brace-arm being pivoted, as at 22[b], to one end of a plate 23 secured to the sill 9, and having an inner angular upstanding flange 24, to form a guideway opening towards the stool 8. The casing 16 is open at the top and coincides with an opening 25 in the plates 23, so that the working mechanism consisting of a worm 26 and a pinion 27 may be exposed therethrough. The worm 26 is of greater diameter than the pinion 27, and is comparatively narrow, and has a limited number of worm convolutions surrounding the same, both the worm and the pinion being keyed on the outer end of a shaft 28 which is angular in cross section and extends through an opening 16[a] at the inner side of the casing 16 and through the opening 17 of the sill 9 and into the opening 18 of the apron 10. The worm 26 and the pinion 27 are closely arranged so as to dispose these rotating parts in compact form, ample space being provided within the casing 16 for the free operation of the worm 26 which is prevented from becoming displaced by having its outer side closely fitted with relation to the outer wall of the said casing, as shown by Figure 6. The opening 16[a] at the inner side of the casing 16 in line with the opening 17 through the stool is just large enough to permit the shaft 28 to pass through and operate therein, the angular form of the shaft 28 providing for a reliable operation of the said worm and pinion which are secured by any well known form of specific fastening devices to key them to the shaft. The said shaft at its inner extremity is fitted in an outwardly projecting hub 29 of a crank handle 30 located at a suitable distance from the inner side of the apron 10 and readily accessible for operation. The hub 29 is secured to an escutcheon 31 by insertion in the tube 31[a] of the escutcheon which is clamped or otherwise fastened to the apron, the said tube 31[a] and escutcheon being slotted, as at 32, as clearly shown by Figure 5, to permit the positive application and securement of the hub 29 therein, the tube 31[a] and hub 29 being respectively provided with an interlocking rib 31[b], and an annular groove 29[a] to receive said latter rib, and whereby the escutcheon is held within the apron 10 and attached to said hub 29. It will be seen that this structure, which occupies a minimized space, provides means for securing the crank handle and its hub within the apron, and positively associated with the inner end of the shaft.

The brace-arm 22 is formed with an intermediate segment 33 which projects inwardly, and at an intermediate point therein are a series of worm engaging teeth 34 formed by slotting the said intermediate segment 13 to liberate the cut metal which is struck downwardly, the teeth 34 being in substantial arcuate alinement in transverse relation relatively to said segment 33 and positioned for engagement by the convolutions of the worm 26. These teeth 34 move closely over the upper opening 25 of the casing 16, and at intervals they are disengaged from the convolutions of the worm 26. Extending transversely from the pivot 21 of the sash 11 is an arm 35 which extends over in close relation to the horizontal member of the angular flange 24 of the plate 23 and continues into a sheet metal box-like rack 36, as clearly shown by Figure 3, said rack being substantialy rectangular in form and free to longitudinally slide between the vertical angular portion of the flange 24 of the blade 23 and the upper inner side wall 37 of the casing 16. The rack teeth are formed by regularly spaced slots 38 in the lower horizontal member of the said rack, and in position for engagement by the teeth of the pinion 27. From the inner end of the blade 23 an angular arm 39 projects inwardly and bears on the upper horizontal member 40 of the rack, and surrounding and depending with the pivot 22[b] is a circular boss 41 which bears firmly against the inner vertical portion of the flange 39 at the inner end of the plate 23 and holds the rack 36 against irregular movement or distortion, and likewise around the pivot 21 is a depending boss 42 which bears against the vertical portion of the inwardly projecting flange 24 of the plate 23 beneath the arm 35, and by this further means the movement of the sash 11 is steadied, said boss 42 sliding regularly and longitudinally in contact with the inner vertical portion of the said flange 34. Through the arm 35 the rack is moved proportionately inwardly to be in proper position for engagement of the teeth 38 thereof with the teeth of the pinion 27, but this engagement with the rack is not effected until the convolutions or teeth of the worm 26 are disengaged from the teeth 34 of the brace-arm 22. The brace-arm 22 operates to start the outer movement of the sash 11 which swings on the pivot 21, and the angle of the brace-

arm is modified regularly in accordance with the opening of the sash 11, a pull in an inward direction being exerted on the sash 11 and at the same time the rack 35 is longitudinally reciprocated and just as the convoluted teeth of the worm 26 disengage from the teeth 34 of the segment 33 of the brace-arm 22, the inner teeth 38 of the rack 36 will be in position for engagement by the pinion 27 and the latter and rack continue to move or swing the sash 11 outwardly, the brace-arm 22 then operating to stabilize the movement of the sash. The rack and pinion organization continue to move the sash 11 until it occupies the position as shown by Figure 5, or when the rack will have reached the limit of its inward reciprocation, and a reverse movement of the shaft 28 will cause the rack 36 to move in an outward direction and gradually swing the sash 11 inwardly and at the same time draw the brace-arm at an angle until the convoluted teeth of the worm 26 again engage the teeth 34 of the segment 33 of the said brace-arm and close the sash fully against and in parallel relation to the stool 8, as shown by Figure 6. The operation of the several parts are so timed that the disengagement of the worm 26 from the teeth 34 will ensue just at the period that the teeth 38 of the reciprocating rack 36 are in position for engagement with the pinion 27, and in the reverse movement the rack is not disengaged by the pinion until the worm just takes hold or engages the teeth 34 of the brace-arm 22.

At the upper side or top of the sash 11 a part of the mechanism heretofore described a pivotal means is applied and comprises a plate 43, which is secured to the top of the sash and in turn pivoted to a plate 44 corresponding respectively to the plates 20 and 23 heretofore described and in reverse positions and similarly pivoted and having a brace-arm 45 corresponding to the arm 22, the upper portion of the frame being slotted or mortised, as at 46, to accommodate the mounting of these parts, and by means of which the pivotal connection at the upper part of the sash corresponds to the pivotal organization at the lower part of the sash without the rack 36 and toothed segment 33 of the arm 22 heretofore described. Obviously the object in view is to correspondingly pivot or hinge the upper or top portion of the sash so that it will move in consonance with the lower movement or pivotal or hinged connection of the sash. It is obvious also that by simply reversing the parts of the operating mechanism heretofore described in connection with the lower part of the sash might be applied to the upper part of the sash, the only change necessary would be a slight modification of the worm which would be within the range of mechanical skill and not involving features of invention.

As heretofore described the improved casement window attachment is very much simplified as compared to the structures of my patents heretofore described and other previous analogous devices, and embodies the sliding or reciprocating rack as the most essential feature, which by its actuation continues the outward and inward movement of the sash when the worm is disengaged at intervals from the teeth 34 of the segment 33 of the arm 22, the arm 22 at the intervals during which the worm is disengaged from the said teeth 34 serving to steady the movement of the sash, but by engagement of the worm with said teeth 34 at intervals starting the sash to open and fully close. As heretofore also noted the cutting of the woodwork of the lower part of the frame, or the shaping of a metal frame to receive the working mechanism is wholly on the outside, but is shielded from tampering by the sash disposed thereover at all times. The sash 11 is regularly operated without restriction in its opening and closing movements, and the improved attachment materially economizes in the cost of construction and application of the attachments ordinarily used in operating a casement window sash.

A further material advantage in the present construction is that sheet metal, preferably of non-corrosive type, will be used in forming the several parts, and thereby reduce the cost of casting the rack 36 and the arm 22, the remaining parts associated therewith being in the form of plates of similar sheet metal and all connected up with sufficient strength and durability to effectively operate in the particular service application thereof.

What is claimed as new is:—

1. In an attachment of the class specified, the combination with a frame and a casement sash, of means for opening and closing the sash and consisting of pivot devices connected to the sash and a portion of the frame and including a brace-arm pivoted at its ends to the frame and sash, a sliding rack operatively associated with the sash and frame, and an operating shaft carrying means to operate the brace arm and a pinion to mesh with the teeth of the rack and swing the sash inwardly and outwardly.

2. An attachment of the class specified, comprising a frame and a casement sash mounted to swing therein, pivotal means connected to the sash and frame and including a brace-arm having depending teeth, a longitudinal reciprocating rack bar operatively associated with the sash and frame, and a shaft carrying a worm to engage said teeth of the brace-arm and a pinion to engage the teeth of the rack for opening and closing the sash.

3. An attachment of the class specified,

consisting of a frame with a casement sash mounted therein to swing inwardly and outwardly, means for pivotally disposing the sash and the frame and including a brace-arm connected to the sash and also to the frame and having teeth depending therefrom, a longitudinally reciprocating rack operatively associated with the sash and frame, and a shaft extending through a portion of the frame and provided with a worm to engage the teeth of the brace-arm and a pinion to engage the teeth of the rack, the parts being so arranged that as the worm disengages and engages the teeth of the brace-arm the pinion will engage and disengage the teeth of the rack, the brace-arm being arranged to partially open and close the sash and the rack continuing the opening and closing movement of the sash.

4. An attachment of the class specified, consisting in combination with a casement sash and frame, of means for pivoting the sash within the frame to swing into various positions in open and closed position, the means for pivoting the sash in the frame including a device having depending teeth, a longitudinally reciprocating rack operatively associated with the sash and frame, and a shaft extending through a portion of the frame to the inner side thereof and carrying a closely arranged worm and pinion to respectively engage the teeth of said device and the teeth of the rack, the worm and the pinion conjointly operating at alternate intervals to engage the teeth of a portion of the said device of the pivotal means and the teeth of the rack to continue the operation of opening or closing the sash when the teeth of said pivot device become disengaged from and engage the teeth of the device and engage and disengage the teeth of the rack relatively to the pinion.

5. An attachment of the class specified, consisting in combination with a casement frame and sash, of means for pivoting the sash within the frame and including a brace-arm attached to the sash and frame, a longitudinally reciprocating rack operatively associated with the sash and frame, a worm for alternately engaging and disengaging a portion of the said brace-arm, a pinion for engaging and disengaging the teeth of the rack to relatively continue the operation of opening and closing the sash by independent actuation, and operating means common to both the worm and pinion for accomplishing said independent actuation.

6. In an attachment of the class set forth, the combination of a frame and casement sash, of means for pivotally mounting the said sash within the frame and means for and including a pivoted brace-arm for partially opening and closing the sash and a longitudinally reciprocating rack operatively associated with the sash and frame for completing the opening and closing the sash, and single shaft carrying dual means for actuating the arm and rack.

7. In an attachment of the class specified, the combination with a casement frame and sash, of means for pivotally mounting the sash within the frame and including a transversely toothed arm pivotally connected to the sash and frame, a worm for engaging the teeth of said arm for a portion of its movement to actuate the same and then become disengaged from said arm, a longitudinally reciprocating rack associated with the frame and sash and a pinion to engage the said rack when the arm is disengaged with relation to the means for engaging the same, and a single shaft on which said worm and pinion are mounted.

8. In an attachment of the class specified, the combination with a casement frame and sash, of sheet metal means for pivotally connecting the sash to the frame and including a brace-arm with teeth cut and struck downwardly from an intermediate portion thereof, a longitudinally reciprocating rack consisting of doubled sheet metal with teeth formed by slots in the lower portion thereof, an operating shaft carrying a worm to engage the teeth of the arm, and a pinion to engage the teeth of the rack for operating the said arm and teeth and the rack at timed intervals.

In testimony whereof I have hereunto set my hand.

ALBERT H. CARRIER.