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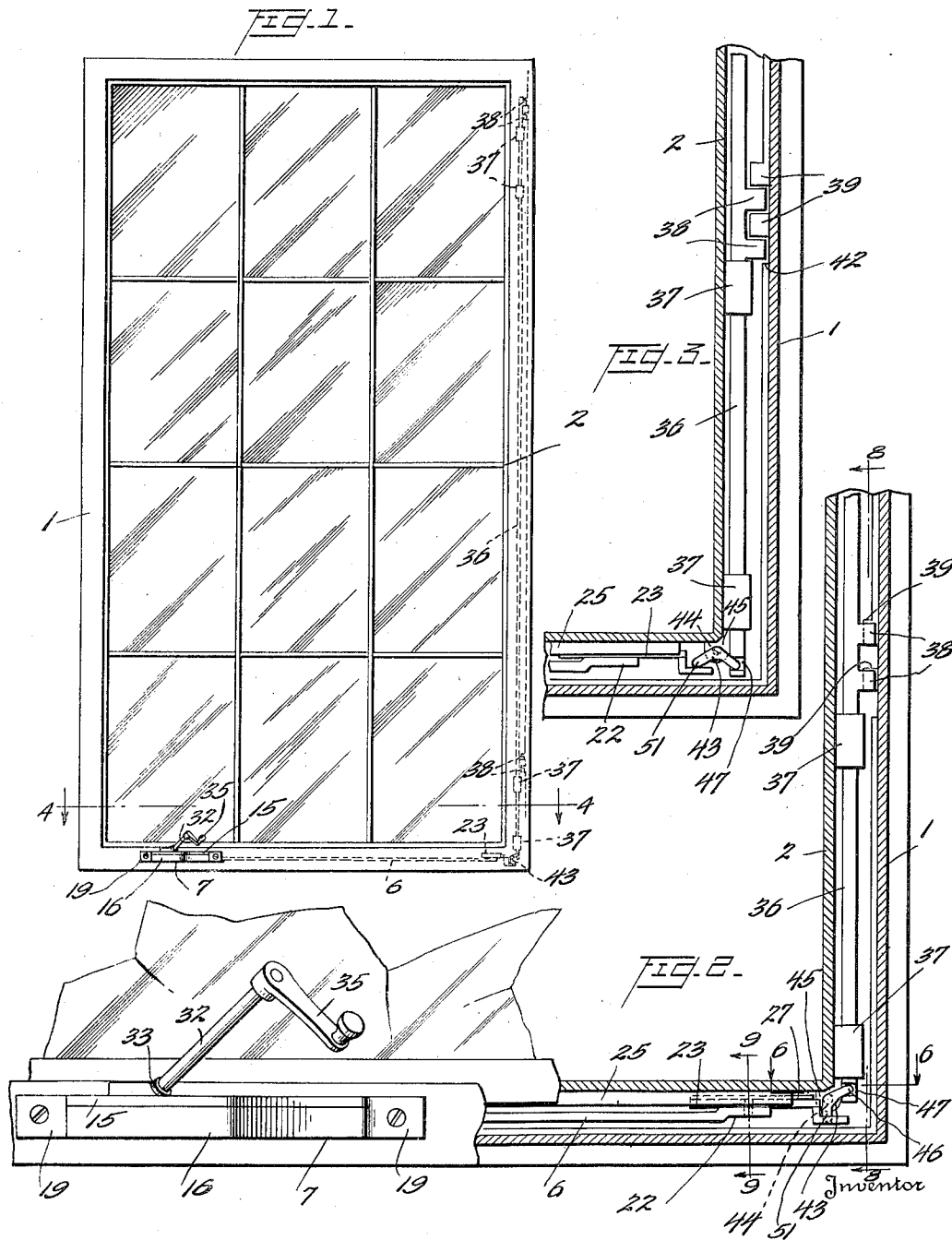
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WINDOW OPERATING AND LOCKING MECHANISM

Filed Aug. 7, 1936

3 Sheets-Sheet 1



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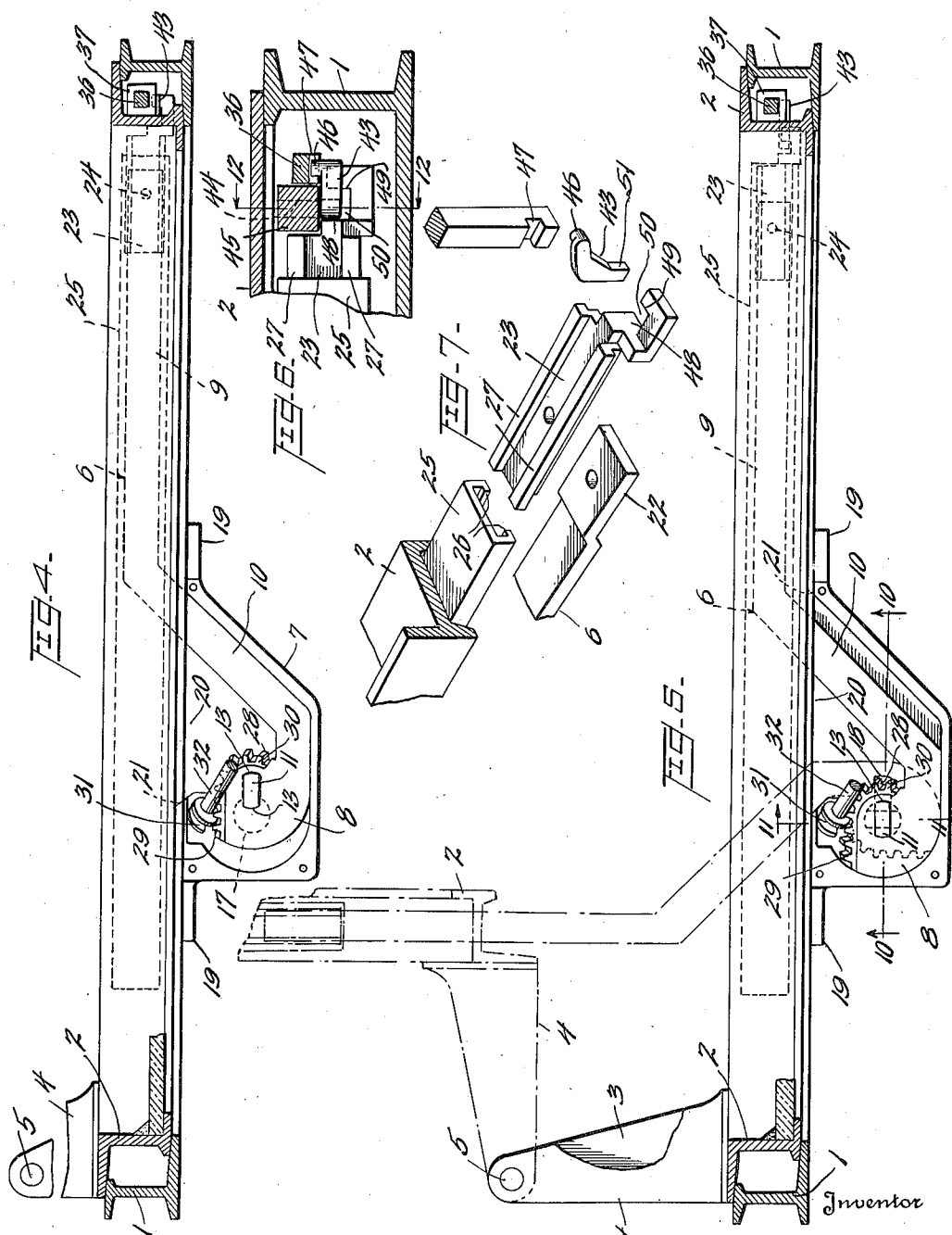
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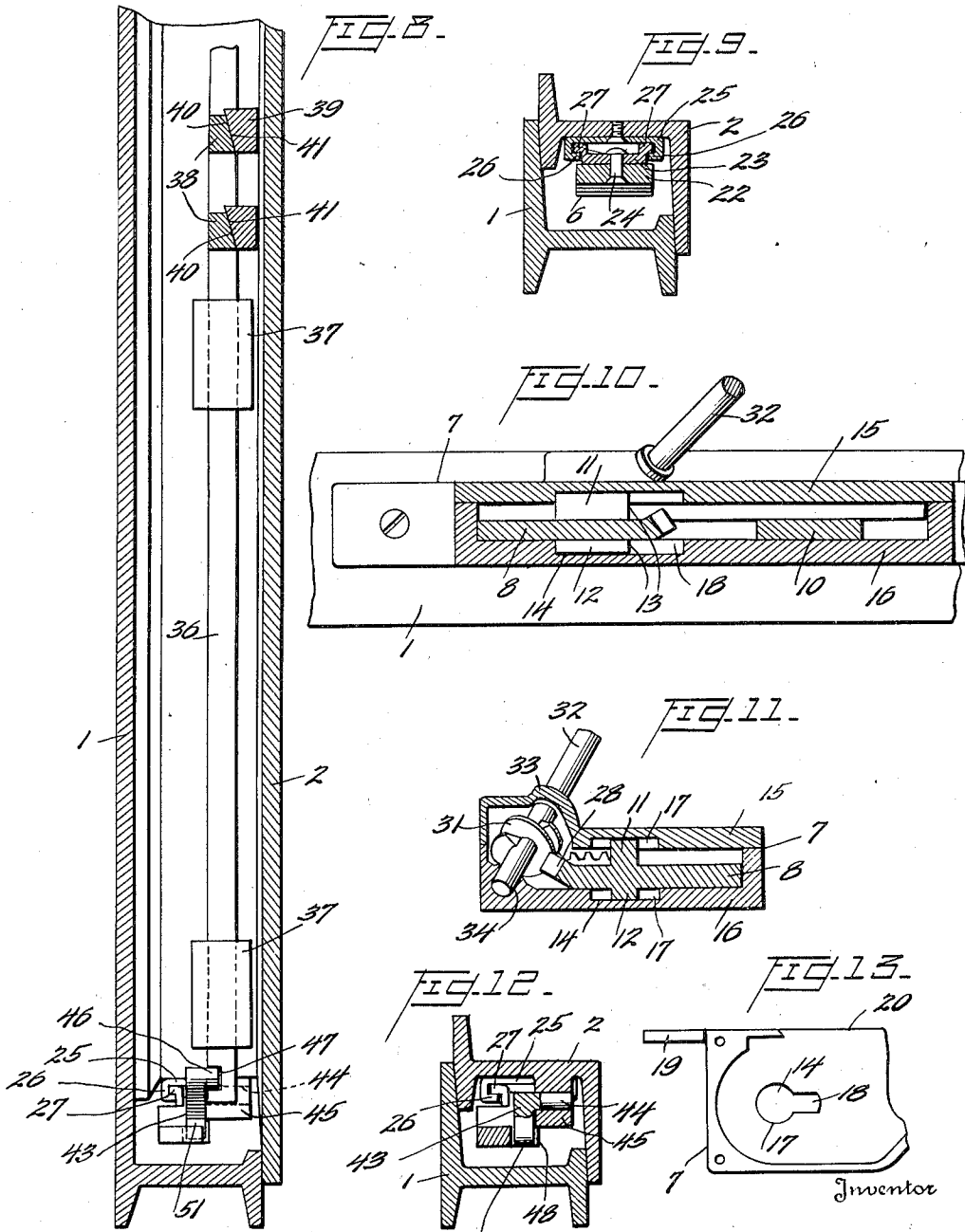
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3 Sheets-Sheet 3



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WINDOW OPERATING AND LOCKING
MECHANISMWilliam Henry van Benschoten,
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9 Claims. (Cl. 268—117)

The invention relates to operating and locking mechanism for metal casement windows.

An object of the present invention is to provide for the standard steel casement windows a simple, practical, and efficient adjusting and locking mechanism of strong, durable and comparatively inexpensive construction which will be adapted to be readily applied to any standard metal casement window which will, from any open position, close the window and securely lock it through a continuous manipulation of an operating handle in the same direction and manner throughout both the closing and locking operations and which, from the locked position of the window, will unlock and open it to any desired position through a continuous manipulation of the operating handle, reverse in direction to that effecting the closing and locking operations but similarly constant in direction and manner throughout both operations.

A further object of the invention is to provide a casement window adjusting and locking mechanism in which locking devices at any points along the free swinging side of the window sash may be actuated by a longitudinal sliding movement of a window adjusting lever arm, said longitudinal movement of the lever arm being automatically substituted for a pivotal window closing movement of the lever arm at the instant of complete closure and produced by the continuous manipulation of the operating handle in identically the same manner and same direction that causes pivotal movement of the lever arm up to the point of complete closure.

Another object of the invention is to provide a casement window operating and locking device which through manipulation of the operating handle in one direction will close the window and through a continuation of identical manipulation in the same direction will lock the window, and which also through manipulation of the operating handle in the opposite direction will unlock the window and through a continuation of identical manipulation in the same direction will open the window.

Another object of the invention is to provide a casement window operating mechanism which on discontinuation of the manipulation that causes opening of the window will hold the window firmly in the position to which it is opened.

A further object of the invention is to provide a window operating and locking mechanism which, on completion of the manipulation causing closing and locking of the window, will hold the window along its free swinging side securely

locked at two spaced points near the top and bottom of the window, respectively, or at as many points as desired and then through wedging action at each of said points draw the sash so snugly against the window frame as to exclude penetration of the most severe attacks of wind, weather and trespasses.

A further object of the invention is to provide a casement window operating and locking mechanism having sufficient leverage to enable the opening, closing and adjusting of the casement window and a positive and powerful locking of the same to be effected with ease.

A further object of the invention is to enable a locking mechanism carried on the free swinging side of the window to be actuated by a longitudinal sliding movement of the window actuating lever arm and to cause such longitudinal sliding movement to be automatically substituted at the instant of closure for the pivotal movement involved in the opening and closing of the window.

With these and other objects in view, the invention consists in the construction and novel combination and arrangement of parts herein-after fully described, illustrated in the accompanying drawings and pointed out in the claims hereto appended, it being understood that various changes in the form, proportion and minor details of construction, within the scope of the claims, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings:

Figure 1 is an elevation of a casement window operating and locking mechanism constructed in accordance with this invention.

Figure 2 is an enlarged elevation partly in section of a portion of the casement window showing the operating and locking mechanism in position for locking the window.

Figure 3 is a vertical sectional view similar to a portion of Figure 2 showing the locking bar in its unlocked position.

Figure 4 is a horizontal sectional view taken substantially on line 4—4 of Figure 1 and illustrating the position of the parts when the window is locked.

Figure 5 is a similar view showing in full lines the position of the parts when the window is unlocked and in dotted lines the position of the parts when the window is open.

Figure 6 is an enlarged detail sectional view taken substantially on the line 6—6 of Figure 2.

Figure 7 is a detail view showing unassembled

the parts comprising the means for transmitting motion from the window operating lever arm to the slidable locking bar.

Figure 8 is an enlarged detail sectional view taken substantially on the line 8—8 of Figure 2.

Figure 9 is a transverse sectional view on the line 9—9 of Figure 2.

Figure 10 is a vertical sectional view on the line 10—10 of Figure 5.

Figure 11 is a sectional view on the line 11—11 of Figure 5.

Figure 12 is a detail sectional view on the line 12—12 of Figure 6.

Figure 13 is a detail view of the lower section of the housing showing the substantially keyhole-shaped recess which forms a combined bearing and guide for the pivot of the lever arm.

In the accompanying drawings in which is illustrated one embodiment of the invention applied to a standard steel casement window, 1 designates the window frame and 2 the window sash which is hinged at one of its vertical edges to the window frame by hinges having leaves 3 and 4 in the form of brackets pivotally connected by a pintle 5. The window operating and locking mechanism comprises in its construction a horizontally swinging and slidable lever arm 6 pivotally and slidably mounted at one end in a stationary housing 7 and pivotally and slidably connected at its other end to the sash adjacent the free swinging edge thereof.

The lever arm has its inner pivotally and slidably mounted end portion 8 in the form of a head which is offset from the plane of the window frame and also from the plane of its other end portion 9 by an intermediate, angularly disposed portion 10 arranged at an obtuse angle to the portion 9, but the shape of the sash actuating or adjusting lever arm may be varied as will be readily understood. The lever arm operates in a horizontal plane, and it is provided at its terminal portion 8 with a combined slide and pivot consisting of upper and lower integral lugs 11 and 12 substantially oblong in cross section and provided with rounded end edges 13. The pivot studs 11 and 12 operate in approximately keyhole-shaped recesses 14 in upper and lower sections 15 and 16 of the housing 7. The recesses 14 consist of a circular bearing portion 17 and a straight guiding portion 18, the circular bearing portion having a diameter substantially the same as the major axis of the pivot lugs 11 and 12 of the lever arm and the straight guiding portion 18 having a width corresponding to the minor axis of the pivot lugs 11 and 12. By this construction the pivot lugs are adapted to have rotative movement in the circular portions of the recesses to permit horizontal swinging movement of the lever arm, and the said pivot studs are also adapted to have slidable movement in the straight guiding portions of the recesses to permit slidable movement of the lever arm for operating the window locking device hereinafter described after the sash has been closed by a swinging movement of the lever arm.

The housing 7 is divided horizontally to form the upper and lower sections 15 and 16, and it is tapered at one end as clearly shown in Figures 4 and 5 of the drawings. The sections are secured together by suitable fastening devices, and one of the sections, preferably the lower section 16, is provided with attaching flanges 19 which are suitably secured to the window frame at the sill thereof. The housing is provided at its inner attached side with a longitudinal opening 20

which registers with an opening 21 in the sill of the window frame. The lever arm extends through the slots or openings 20 and 21 and its free terminal portion 22 which is upwardly offset to space the body portion of the lever arm from a slide 23 is connected by a suitable pivot 24 with said slide 23 which operates in a guide 25 secured to the window sash at the bottom thereof. The guide 25 is of channel formation as clearly illustrated in Figure 7 of the drawings, and it is provided with inwardly extending flanges 26 which form guides to receive laterally extending flanges 27 of the slide 23, also preferably of channel formation. By this construction the lever arm is pivotally and slidably connected with the hinged window sash and, when swung horizontally by the operating means hereinafter described, the lever arm is adapted to swing the sash to open and close the window and, after closing the window, is capable of longitudinal slidable movement independently of the sash to operate the window locking device.

The head or end portion 8 of the lever arm is provided with a rack 28 consisting of a straight portion 29 and a curved or arcuate portion 30; the straight portion is arranged in substantial parallelism with the straight portion of the bearing for the pivot of the lever arm and the curved portion 30 of the rack is arranged concentric with the circular portion of said bearing. The rack is preferably set at an angle with the teeth extending upwardly from the plane of the body portion of the lever arm so as to mesh with a worm 31 of an inclined operating shaft 32 journaled in suitable bearings 33 and 34 of the upper and lower sections 15 and 16 of the housing 7 and extending upwardly and outwardly from the housing at an inclination to arrange an operating handle 35 in convenient position for ready manipulation, as clearly illustrated in Figures 1 and 2 of the drawings. The shaft is adapted to be continuously rotated in one and the same direction for actuating the rack to impart a horizontal swinging movement to the lever arm and at the completion of the swinging movement to automatically change the swinging movement to a horizontal or longitudinal sliding movement of the lever arm. The horizontal swinging movement opens or closes the window according to the direction of rotation of the shaft and the sliding movement of the lever arm operates the window locking device hereinafter described. By this construction the window is adapted to be unlocked and opened by a single continuous movement of the operating handle in one and the same direction, and it is also adapted to be rotated in the reverse direction and, by a similar single continuous manipulation, close the window and then operate the locking device for locking the window in its closed position. While in the accompanying drawings the gear element for meshing with and actuating the rack is shown in the form of a worm and the shaft is arranged at an inclination, a gear element of any other desired form may be employed and the shaft connection of the same with the operating handle may be of any other desired construction and arrangement.

The window locking device comprises in its construction a vertically slidable locking bar 36 70 mounted in suitable guides 37 at the free swinging edge of the window sash and provided at spaced points with sets of lugs 38 which coact with sets of fixed lugs 39 mounted on the window frame. The lugs 38 of the slidable locking bar 75

have inclined engaging faces 40 forming upwardly tapering, approximately wedge-shaped lugs and the stationary lugs 39 have inclined faces 41 forming downwardly tapered wedge-shaped lugs 39.

5 When the sash is closed and the locking bar is moved upwardly by the slidable movement of the lever arm, the lugs of the locking bar are carried into engagement with the lugs of the window frame, and the sash is snugly, tightly and
10 firmly locked in its closed position. While the sets of lugs are shown in pairs arranged at the upper and lower portions of the window, the sets may be of any desired number and any number of sets may, of course, be provided. When the
15 locking bar is moved downwardly by a sliding movement of the lever arm, the lugs 38 of the locking bar are moved downwardly from their engaging position illustrated in Figure 2 of the drawings to the position shown in Figure 3 to un-
20 lock the sash and permit opening of the same. The window frame is cut away at 42 to provide passageways for the lugs 38 to permit opening and closing of the sash.

The slidable movement of the lever arm is
25 transmitted to the locking bar by the slide 23 and a bell crank lever 43 pivotally mounted at its angle on a suitable pivot 44 carried by a block or lug 45 suitably fixed to the sash at the lower end of the free swinging edge of the sash, as
30 clearly illustrated in Figures 2 and 3 of the drawings. One arm of the bell crank lever is provided with an integral pivot stud 46 which operates in a horizontal transversely disposed recess 47 in the lower end portion of the vertically slid-
35 able locking bar, and the other arm of the bell crank lever is arranged to be engaged by opposite abutment faces 48 and 49 of the outer end of the slide 23. The slide is provided at its outer end with a downwardly offset portion approxi-
40 mately L-shaped and provided with a recess 50 and defined by the abutment faces 48 and 49 and adapted to receive the arm 51 of the bell crank lever when the same is actuated by the slide to move the locking bar upwardly to the
45 position illustrated in Figure 2 of the drawings for locking the window. In such movement of the bell crank lever 43 its arm 51 is engaged by the abutment face 48 of the slide through an out-
50 ward movement thereof and, when the slide is moved inwardly, its abutment face 49 engages the arm 51 of the bell crank lever for moving the locking bar downwardly to carry the lugs 38 out of engagement with the lugs 39 to unlock the window. While the bell crank lever illustrated in
55 the accompanying drawings has been found a simple and practical means for transmitting motion from the slide to the locking bar, any other form or arrangement of lever may, of course, be provided.

60 What is claimed is:

1. Window operating and locking mechanism including a member having at its upper and lower faces integral projecting lugs forming a pivot, a housing receiving the said member and having
65 upper and lower bearings receiving the upper and lower pivot lugs and composed of a circular bearing portion to permit a swinging movement of said member and a substantially straight guiding portion to permit a sliding movement of said
70 member, a rack carried by the member and having a curved portion and a substantially straight portion, the curved portion being concentric with the circular portion of the bearing and the straight portion of the rack being arranged in
75 substantially parallelism with the straight guid-

ing portion of the bearing, and a gear element meshing with the rack and adapted to impart a swinging and sliding movement to the member by a continuous rotary movement of the gear element for swinging a hinged sash and for oper-
5 ating a sash locking device.

2. Window operating and locking mechanism including a lever arm, means for pivotally and slidably mounting the lever arm, means for connecting the lever arm with a hinged sash includ-
10 ing a guide fixed to the sash and a slide operating in the guide and pivoted to the lever arm, a window locking device for locking the sash in its closed position, means for connecting the locking device with the slide, a rack carried by the lever
15 arm and having an arcuate portion and a straight portion, and a rotatable gear element meshing with the rack for effecting pivotal movement of the lever arm to open and close the sash and a
20 sliding movement of the lever arm to cause the slide to operate the locking device for locking or unlocking the sash.

3. Window operating and locking mechanism including a lever arm, means for pivotally and slidably mounting the lever arm, means for connect-
25 ing the lever arm with a hinged sash including a guide fixed to the sash and a slide operating in the guide and pivoted to the lever arm, a locking device operable by the sliding movement of the slide, a rack carried by the lever arm
30 and having a curved portion and a straight portion and a worm meshing with the rack for effecting pivotal and sliding movements of said lever arm to open and close the sash and to actuate the slide and thereby operate the locking
35 device, said worm and rack operating as a lock to hold the sash in the adjustment thereof.

4. Window operating and locking mechanism including a member, means for pivotally and slidably mounting the member, means for connect-
40 ing the member with a hinged window sash including a guide fixed to the sash and a slide operating in the guide and pivoted to said member, a window locking device operated by the sliding movements of the slide, a rack carried by
45 said member and having curved and straight portions, a worm meshing with the rack, and an operating handle connected with the worm and adapted to effect slidable and pivotal movements of the member to close the window and to actuate
50 the slide to lock the window by a continuous manipulation of the handle in the same direction throughout both the closing and locking operations, said handle being also adapted for produc-
55 ing slidable and pivotal movements of said member to actuate the slide to unlock the window and to swing the sash to open the window by a continuous rotation in a reverse direction to that effecting the closing and locking of the sash.

5. Window operating and locking mechanism including a member having a portion arranged beneath the lower edge of the sash of a window and extending longitudinally thereof when the sash is closed and another portion extending be-
60 yond the plane of the sash at an angle to the same, means located at the outer end of said outwardly extending portion of said member for pivotally and slidably mounting said member, means for connecting the member with a hinged
65 window sash including a guide fixed to the lower edge of the sash and a rectangular slide operating in the guide and pivoted to said member, a window locking device operated by the sliding movement of the slide, and means for effecting
70 slidable and pivotal movements of the member
75

to close the window and to move the slide to lock the window by a continuous manipulation of an operating device in the same direction throughout the closing and locking operations and for producing slidable and pivotal movements of said member to move the slide and unlock the window and to swing the sash and open the window.

6. Window operating and locking mechanism including a lever arm having a portion arranged beneath the lower edge of the sash of a window and extending longitudinally thereof when the sash is closed, said lever arm having another portion extending beyond the plane of the sash at an angle thereto when the sash is closed, means for pivotally and slidably mounting the lever arm, means for pivotally and slidably connecting the lever arm with a hinged sash including a guide fixed to the sash and a slide operating in the guide and pivoted to the lever arm, a window locking device including a slidable locking bar, and means operated by the slidable movements of the slide for transmitting motion to the slidable locking bar for operating the locking device.

7. A device of the class described including a member, means for mounting the member for pivotal and sliding movements, a slide pivotally connected with said member and having a downwardly offset portion provided with a recess forming spaced abutment faces, a fixed guide for slidably mounting the slide on a hinged sash, a window locking device including a slidable locking bar, and a bell crank lever pivoted at its angle to the sash and having one arm operatively connected with the slidable locking bar and the other arm arranged to be engaged by the abutment

faces and arranged to be actuated by said slide to operate the locking device to lock and unlock the sash.

8. A window operating and locking mechanism including a lever arm, means for pivotally and slidably mounting the lever arm, means for connecting the lever arm with a hinged sash including a horizontal guide fixed to the sash at the lower edge thereof and having spaced guiding flanges defining a guideway and a slide operating in the guideway and having side flanges engaging the longitudinal flanges of the guide, a vertical pivot connecting the slide to the lever arm, a window locking device for locking the sash in its closed position, means actuated by the slide for operating the window locking device, and means for imparting to said lever arm a sliding movement to operate the locking device and a swinging movement to open and close the sash.

9. Window operating and locking mechanism including a member having at its upper and lower faces integral projecting lugs forming a pivot, a sectional housing divided longitudinally into upper and lower sections receiving said member and having upper and lower vertically aligned bearings receiving the upper and lower pivot lugs and composed of a circular bearing portion to permit a swinging movement of said member and a substantially straight guiding portion to permit a sliding movement of said member, and means for actuating the member to impart to the same swinging and sliding movements for swinging a hinged sash and for operating a sash locking device.

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