April 23, 1946. R. L. GEER ET AL 2,399,109

WINDOW

Filed April 10, 1944 2 Sheets-Sheet 1

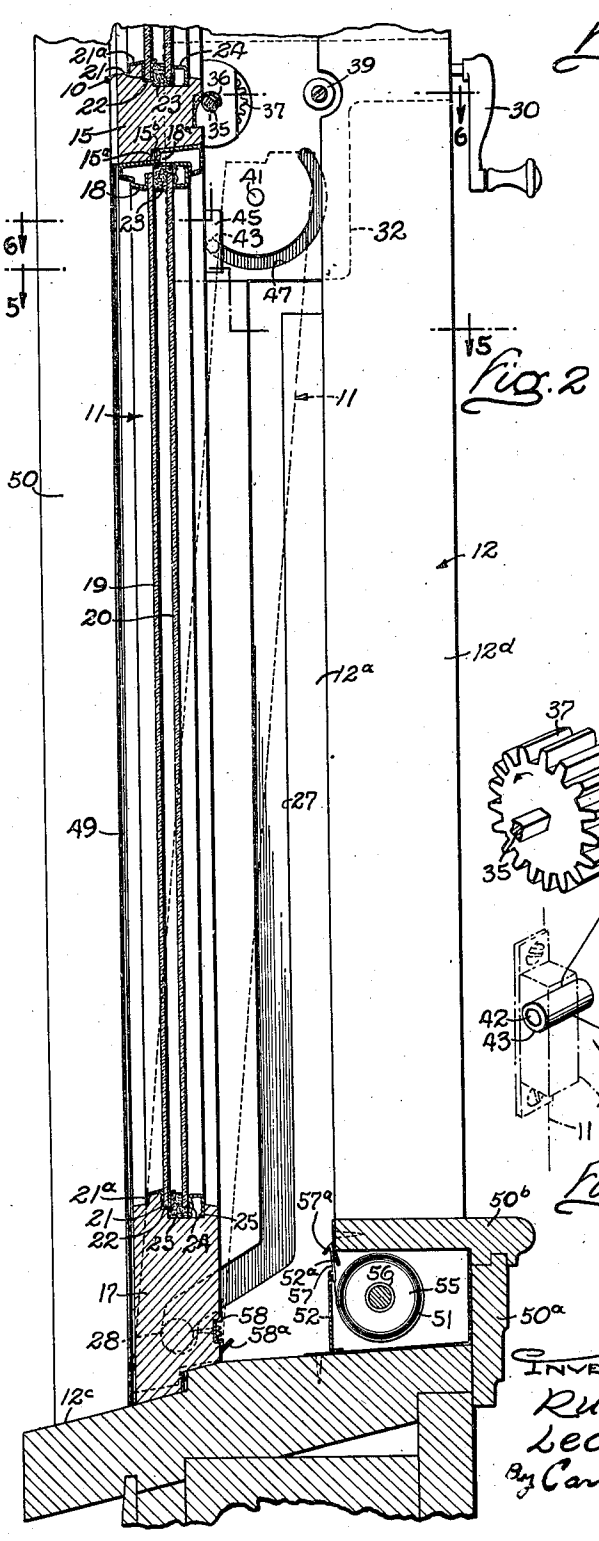


Fig. 2

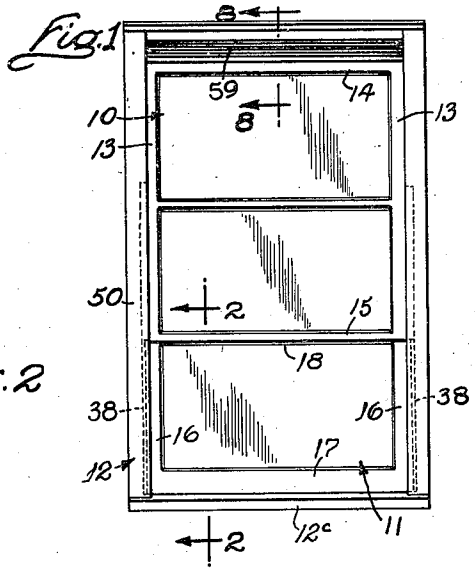


Fig. 1

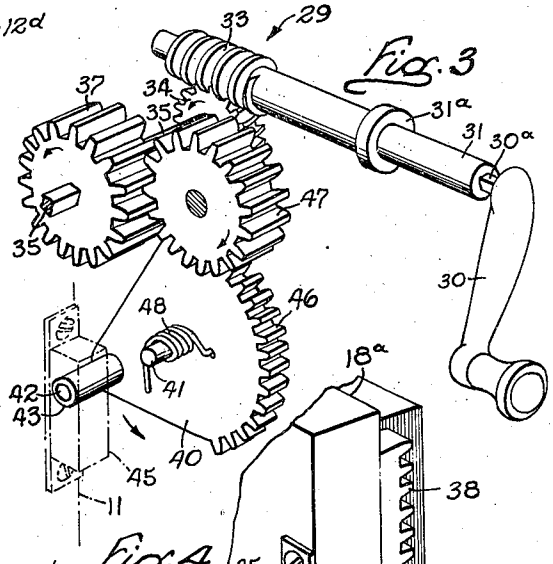


Fig. 3

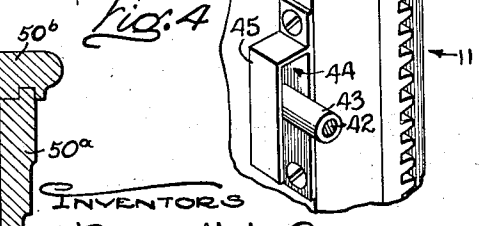


Fig. 4

INVENTORS
Russell L. Geer
Leonard A. Melkus
By Carlson, Pitzner, Hubbard & Wolfe
ATTORNEYS

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WINDOW

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Fig. 5

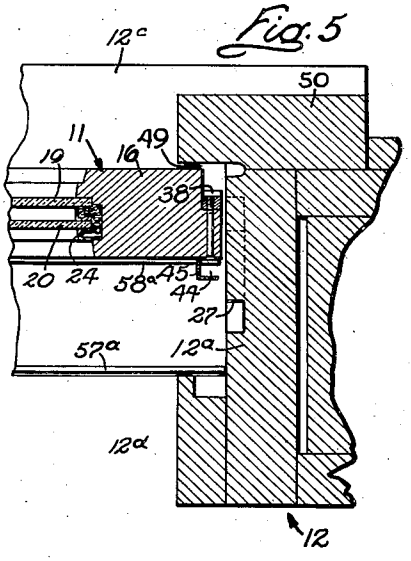


Fig. 6

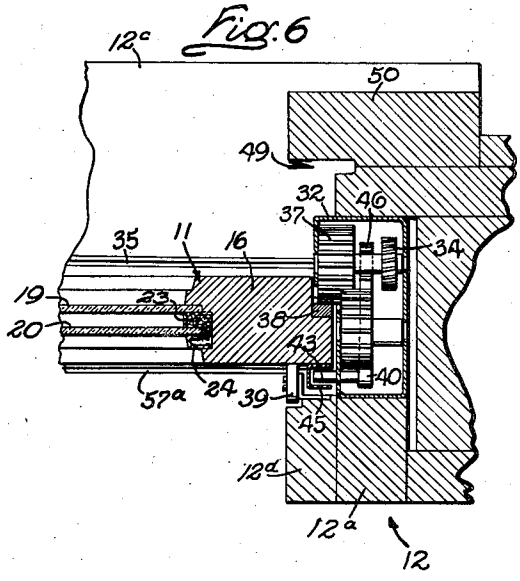


Fig. 7

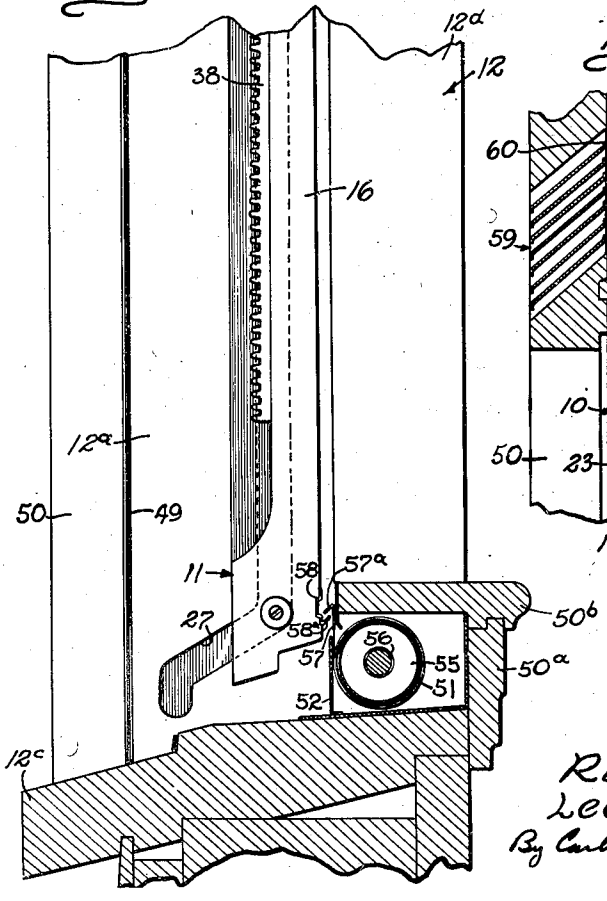


Fig. 8

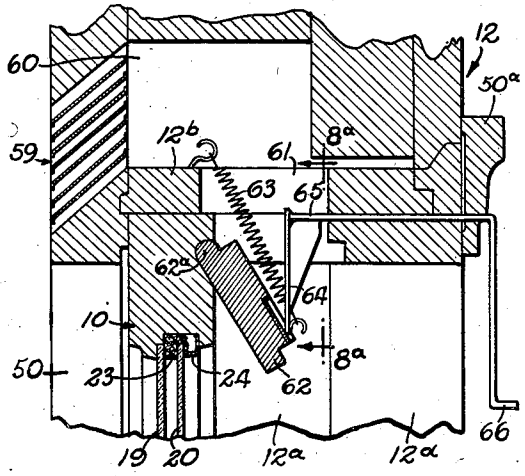
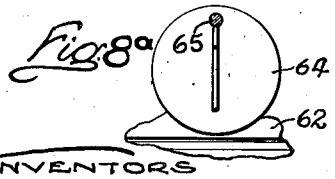


Fig. 8a



INVENTORS

Russell L. Geer

Leonard A. Melkus

By Carlson, Pitzner, Hubbard & Wolfe

ATTORNEYS

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UNITED STATES PATENT OFFICE

2,399,109

WINDOW

Russell L. Geer and Leonard A. Melkus,
Grand Island, Nebr.

Application April 10, 1944, Serial No. 530,430

11 Claims. (Cl. 160—28)

The present invention pertains to windows and has particularly to do with a novel window unit although in certain of its aspects the invention is applicable to window constructions generally, as distinguished from purely unit types. The term "window unit" as used herein is intended to designate a structure all parts of which are prefitted at the mill or factory and are wholly or partially assembled there, so that they may be merchandized, shipped and handled as a single unit and installed as such in a window opening to form a complete window.

One general aim of the invention is to provide a novel window unit with movable sash which is suited for year-around use without the necessity of seasonal installation and removal of storm sash and screens.

Another object of the invention is to provide a novel and simplified window unit which is, when installed, suited for use with ordinary shades or Venetian blinds and draperies, and whose operating mechanism does not interfere with the same in any way.

Another object is to provide a novel and improved window unit embodying a fixed sash together with a complemental movable sash which can be raised or lowered into varying degrees of overlap with respect to the fixed sash, but in which the two sash are coplanar when the movable sash is closed.

More particularly, it is an object to provide such a unit as that identified in the immediately preceding statement of object, which is characterized not only by its superior exterior architectural appearance but which also permits the use of narrow jambs due to the elimination of the parting stops which are requisite in ordinary double hung sash.

Another object is to provide in a window construction a novel sash and operating arrangement such that a weightless movable sash is automatically locked securely in any position of rest which it may occupy and yet is, unlike most previous weightless sash, completely freed during its movement from frictional contact with a compression type weather strip employed in sealing the same when closed.

Another object is to provide a novel and improved operating mechanism for shifting a movable sash into and out of the plane of a complemental fixed sash, as well as for shifting the movable sash in a plane paralleling that of the fixed sash.

The invention also resides in various structural improvements and novel combinations of elements which will become apparent as the following description proceeds, taken in connection with the accompanying drawings in which:

Figure 1 is a front (exterior) elevation of a window unit embodying the present invention.

Fig. 2 is an enlarged partial vertical sectional view taken substantially along the line 2—2 in Fig. 1, showing the window unit installed and the movable sash closed.

Fig. 3 is a detail perspective view of one of the pair of operating mechanisms for the movable sash of the window unit of Fig. 1.

Fig. 4 is an enlarged fragmentary detail view of one upper corner portion of the lower movable sash included in the window unit of Fig. 1.

Figs. 5 and 6 are fragmentary transverse sectional views taken, respectively, substantially along the lines 5—5 and 6—6 in Fig. 2, each being rotated 90° clockwise.

Fig. 7 is a fragmentary vertical sectional view similar to the lower portion of Fig. 2, but showing the lower movable sash shifted from the closed position of Fig. 2 to a partially opened position.

Fig. 8 is an enlarged detail sectional view taken substantially along the line 8—8 in Fig. 1 and showing the detail of the mechanism for controllable indirect ventilation.

Fig. 8*a* is a fragmentary detail sectional view taken substantially along the line 8*a*—8*a* in Fig. 8.

While the invention is susceptible of various modifications and alternative constructions, we have shown in the drawings and will herein describe in detail the preferred embodiment, but it is to be understood that we do not thereby intend to limit the invention to the specific form disclosed, but intend to cover all modifications and alternative constructions falling within the spirit and scope of our invention as expressed in the appended claims.

Referring more particularly to the exemplary embodiment of the invention illustrated in the drawings, the invention has been shown therein as embodied in a window unit (Fig. 1) suitable for complete fabrication at a factory and installation as a self-contained unit at the point of use.

The window unit of Fig. 1 comprises upper and lower sash 10, 11 mounted in a border frame 12. Such frame 12 consists of jambs 12*a* joined at top and bottom, respectively, by a head jamb or yoke 12*b* and sill 12*c* (see Figs. 2, 7 and 8). Because of the omission of parting stops which the present construction makes possible, the jambs 12*a* can be narrower than usual. The customary

outside casing 50 is applied as well as the usual inside casing 50a and stool 50b.

In the particular construction shown, the upper sash 10 has wood side stiles 13 and top and bottom rails 14, 15. The lower sash 11 also has wood side stiles 16 and bottom rail 17 but has a pressed metal top rail 18 (see Fig. 2). This top rail 18 is of hollow form, being fashioned from sheet metal, and has an offset shoulder 18a in its upper surface complemental to a shoulder 15a in the lower side of the rail 15 to insure a tight seal between the two rails when the lower sash is closed. If desired, a sealing strip 15b of felt or other weather stripping may be interposed between the opposed shoulders. Upon reference to Fig. 2 it will be observed that the upper and lower sash 10, 11 are substantially coplanar when closed. The window thus presents a very pleasing and symmetrical external architectural appearance (see Fig. 1).

Sash 10, 11 are both double glazed to obviate the necessity for separate storm sash. In each sash outer and inner glass panes 19, 20 are provided, the lower edge of each outer pane 19 being received in a metal channel 21 seated in a complemental groove 22 in the wooden bottom portion of the sash and having a forwardly and downwardly projecting flange 21a which extends forwardly and downwardly over the correspondingly shaped rib on the wooden portion of the sash. These metal channels 21 at the lower edge of each outer pane 19 inhibit condensation and leakage. The inner panes 20 are separated from the outer panes by compressed strips of felt 23. Spring metal channels 24 pressed into the grooves 25 which receive the felt strips and edges of the panes hold the latter securely in place. The glazing can be readily installed, removed or replaced from the inside of the room. To remove the glazing it is necessary merely to pull out the spring metal channels 24 and then lift out the freed panes 19, 20.

In the construction illustrated, the upper sash 10 is fixed or immovable, being secured by suitable screws (not shown) to the side jambs 12a. The lower sash 11 is, on the other hand, movable from the closed position of Fig. 2 in which it is coplanar with the upper sash, to a fully open position in which it is vertically disposed behind the upper sash. The degree of overlap or, in other words, amount of opening for the lower sash, can be varied at will. In general, the motion imparted to the movable sash 11 is such that it is tilted inwardly about its lower edge from the full line position shown in Fig. 2 to the dotted line position shown in that same figure and is thereafter drawn vertically upward.

To form a pivot for the bottom end of the lower sash 11 during the inward tilt of the latter and to guide such bottom of the sash during the vertical movement of the same, guideways 27 are fashioned in the jambs 12a at opposite sides of the window and receive rollers 28 projecting laterally from the lower corners of the sash 11. When the sash 11 is closed these rollers 28 are disposed in the vertically extending lower end portions of the guideways 27 (see Fig. 2). Consequently, as the upper end of the sash 11 is tilted rearwardly to the dotted line position shown in Fig. 2 (by thrusting inwardly the upper end of the sash) the rollers 28 are confined in the lower ends of the guideways 27 so that the sash pivots about these rollers. As the sash 11 is thereafter pulled upward, the rollers 28 move up through the inclined portions of the guideways 27 to the position indicated in Fig. 7 so that the lower end of the sash is moved inward until the sash stands substantially vertically. Thereafter, during the continued upward movement of the sash, the same is held in substantially vertical position, the rollers 28 riding along through the remaining main vertical portions of the guideways 27.

Tilting and vertical movement of the lower sash 11 is accomplished by a pair of operating mechanisms designated generally as 29, inset into the jambs 12a in the respective sides of the frame 12 at points adjacent the lower edge of the upper sash 10 (see Figs. 2, 3 and 6). Since these two mechanisms are substantially identical in construction except that they are adapted, respectively, for right and lefthand installation, and since the two are interconnected for operation in unison by a single operating handle, a detailed illustration and description of one will suffice for both, the one located at the righthand side (as viewed from the interior) being shown. To actuate these mechanisms a manual operating handle shown as a crank 30 (Figs. 2 and 3) is provided, the same having a squared shank 30a which is removably insertable into a complemental axial opening in a shaft 31. The ends of these shafts 31 are flush with the surface of the interior framing of the window at opposite sides of the same and the handle shank 30a can be inserted into either shaft, as desired, for operating the window.

In the illustrated operating mechanism 29 the shaft 31 is journaled within a sheet metal housing or casing 32 (Figs. 2 and 6) and has rigid with it a collar 31a (Fig. 3) engaged by suitable thrust members (not shown) within the casing to prevent axial displacement of the shaft. Also rigid with the shaft 31 is a worm 33 meshing within a worm wheel 34 fixed on a shaft 35. The latter shaft also carries a pinion 37 for a purpose appearing below. The pinions 37 of the operating mechanisms 29 at opposite sides of the window are interconnected by the shaft 35 so that the two mechanisms are operated in unison. For such interconnection the shaft 35 extends across the window, being hidden behind the rail 15 of the stationary upper sash 10 and partially enclosed by a sheet metal strip 36 fixed to such rail.

Each operating mechanism 29 includes the pinion 37, rigid with the shaft 35 as noted above, and adapted to mesh with corresponding racks 38 (Figs. 1, 3, 6 and 7) after the lower sash 11 has been shifted from its closed position of Fig. 2 to the laterally displaced position of Fig. 7. These racks are fixed to the sash 11, being located in grooves extending vertically along the side edges of the outer face of such sash. During the time that the racks 38 are in mesh with the pinions 37, the sash 11 has a simple vertical motion, being raised and lowered by turning of the handle 30 to run the racks and attached sash up and down. During such vertical motion the sash is pressed forward to hold the racks in engagement with the pinions 37 by rollers 39 (Figs. 2 and 6) bearing against the inner faces of the side stiles of the lower sash. These rollers are mounted on inner stops 12d (see also Fig. 6) fixed to the jambs 12a. The principal difficulty lies in embodying in the operating mechanism an arrangement for shifting the lower sash 11 from its closed position laterally and upwardly into position suitable for engagement of the rack and pinion drive and for restoration of the movable sash to its closed position, all in response to a simple and uninterrupted rotation of the hand crank 30. The provision

made in the operating mechanism for solution of that problem will next be described.

Shift of the lower sash between the full and dotted line positions shown in Fig. 2 is, in this instance, accomplished by a disengageable pin and slot type connection between the sash and a coacting pivoted eccentric pin actuated by the crank 30. In the illustrative construction (see Figs. 2, 3 and 4) the mechanism is constituted by a sector or mutilated gear 40 journaled on a shaft 41 extending transversely through the housing 32. On the outer portion of the sector 40 is a laterally projecting pin 42 carrying a roller 43. This roller is received within a slot in the sash, in this instance a slot 44 (Fig. 4) defined by a metal housing member 45 fixed to the inner side of the sash. An arcuate series of teeth 46 (Fig. 3) are provided on the sector or mutilated gear 40 and adapted to mesh with a second pinion 47 which in turn meshes with the pinion 37, being revolved by the latter. The pin 42 and its roller 43 project laterally from the mechanism housing 32 through an arcuate slot 47 in the latter (Fig. 2), this slot serving to limit the length of the path of travel for the pin.

With the movable sash 11 in its closed position shown in Fig. 2, opening of the same is accomplished by turning the operating handle 30 in a clockwise direction. This turns the worm wheel 34 counterclockwise in the direction of the arrow in Fig. 3 so that the first pinion 37 turns in that same direction, while the second pinion 47 turns in an opposite or clockwise direction. In consequence the sector 40 turns counterclockwise as indicated by the accompanying arrow in Fig. 3. During this initial action the turning of the pinion 37 serves only as part of the drive to the sector since the pinion is still out of mesh with the rack 38. Turning of the sector 40, however, serves to tilt the sash 11 inward about its lower pivot rollers 28 until it reaches substantially the dotted line position shown in Fig. 2. Continued motion of the sector 40 in the same direction raises the sash 11 substantially to the position of Fig. 7, the rollers 28 on its lower end riding along the trackways 27 so that the lower end of the sash is moved inwardly until the sash as a whole is substantially upright again, but now in a plane offset laterally from that of the upper sash 10. During the final upward motion of the sash 11 imparted to it by the sector 40, the racks 38 on the sash are brought into mesh with the sides of the pinions 37 remote from the upper sash 10.

Once the racks 38 have been brought into mesh with the pinions 37 as described above, the sash 11 is thereafter moved upward by the action of the pinions 37 during continued turning of the operating handle 30. Just after the racks 38 are meshed with the pinions 37 the sectors 40 complete a sufficient turning movement of the same that the end of the row of teeth 46 thereon is reached. Thereafter a slight additional angular turning movement is imparted to the sectors by torsion springs 48 (Fig. 3) so that the sectors will remain out of mesh with the pinions 47 and there will be no annoying clicking as the latter continue to revolve. The torsion springs 48 loosely encircle the shafts 41, having one end anchored to the sectors 40 and the other stationarily fixed to the casings 32. Since the lower ends of the housings 45 are open, the same are free to move upward without interference from the rollers 43 as the sash 11 continues to rise.

The movable sash 11 is securely locked in any position of rest which it may occupy whether opened, closed, or partially open. This is for the reason that the worm 33 is of the low efficiency or non-reversible drive type so that any turning movement imparted to the worm wheel 34 through an effort to move the sash 11 by grasping it and pulling at it directly will not turn the worm. In this same connection, it is to be observed that since the frictional engagement of compression type weather stripping is not used to hold the movable sash in partially open position, there is no resistance afforded by such weather stripping to the normal free and easy motion of the sash by the operating handle 30. Upon reference to Figs. 5 and 6 it will be seen that compression type weather stripping, as at 49, is provided for all four edges of the sash 11 but engages with it only when the sash is closed. Obviously the sealing value of the stripping is of no value whenever the sash is open or partially open so that there is no purpose in having contact during the latter conditions. As indicated, the stripping 49 is fixed to the exterior casing 50 which is dimensioned to overlie the edge portions of the face of the sash 11, the stripping being interposed between such face and the casing 50.

To lower the sash 11 to closed position it is necessary merely to turn the operating handle 30 in a reverse or counterclockwise direction. As the racks 38 approach their point of disengagement with the pinions 37 during the vertical descent of the sash the housings 45 re-engage the rollers 43, pulling the same downward slightly so that the teeth 46 of the sectors 40 are re-engaged with the pinions 47. Thereafter the rotation of the pinions 47 turns the sectors 40 so that the rollers 43 on the latter thrust the sash 11 downwardly and forwardly into fully closed position.

Effective protection against the entry of insects when the sash 11 is open or partially open is provided by a roller type flexible screen 51 (Figs. 2 and 7). This screen is mounted within a sheet metal housing 52 fixed in place between the sill 12c and stool 50b. The screen is wrapped about a rewind roller or reel 55 having a torsion spring 56 which normally biases the roller to turn in a direction to reel in the screen. The side edges of the screen overlie the outer edges of the stops 12d. In order to avoid distortion and possible harm to the screen 51 which would result from bending of the same incident to the lateral motion of the lower end of the sash 11, should the screen be fixedly attached to the latter, provision is made for automatically engaging and disengaging the screen from the sash. For that purpose a metal strip 57 is fixed to the edge of the screen and having a downturned flange 57a. A second metal strip 58 having a complementally shaped upturned flange 58a is screwed to the lower rail of the sash 11. When the sash 11 is in its closed position shown in Fig. 2, the mating flanges 57a, 58a are completely disengaged as shown. Shift of the lower edge of the sash into its laterally offset position as it moves upwardly brings the flange 58a beneath the flange 57a as shown in Fig. 7 so that in the subsequent upward movement of the sash the flanges will engage and the screen 51 be unreeled. The pull of the underlying flange 58a on the overlying flange 57a tends to thrust the latter toward the stops 12b, so that the edges of the screen are retained in tight sealing engagement with the latter (see Fig. 5). As the sash descends the spring 56 reels the screen 51 in until the metal strip 57 lodges frictionally

in the opening in the sheet metal housing **52** through which the screen passes, thereby arresting further reeling-in of the screen. The continued descent and lateral shift of the lower edge of the sash thereupon disengages the flange **58***a* from the mating flange **57***a*. A tongue **52***a* struck out from the housing **52** along the edge of the opening in the latter through which the screen **51** emerges serves to form an effective frictional engagement surface for arresting the downward movement of the edge strip **57** on the screen.

Provision is also made in the disclosed window unit for effecting indirect ventilation when it is desired as, for example, during extremely cold weather when it is inexpedient to open the sash **11**. For that purpose a louver **59** (Fig. 8) is provided in the header or top member of the exterior casing. Outside air entering the louver **59** passes into the space **60** and thence down through a controlled opening **61** in the yoke **12***b* into the room, that is, to the inner side of the window.

To control the amount of air permitted to enter through the opening **61** an adjustable closure **62** is provided for the same. This closure is of wood and has a rounded bead **62***a* extending longitudinally of its outer edge and received in a complemental groove in the top rail of the upper sash **10**, thereby pivoting the closure for vertical movement. One or more contractile springs **63**, anchored to the yoke and to the free edge of the closure, urge the closure upward toward closed position. An operator consisting of a reenforced disk **64** fixed adjacent its edge to a shaft **65** having a crank **66** on its other end serves as an adjustable stop for forcing the closure **62** to open position. Turning the disk **64** either right or left from the position shown frees the closure **62** to move towards completely closed position.

From the foregoing it will be perceived that a simple and highly effectual window construction has been afforded. Movement of the sash for opening or closing entails merely rotation of a shaft, as for example by the simple hand crank **30** here shown, although that simple rotation eventuates in a compound lateral and vertical motion of the sash. The superior appearance of a window in which the sash are coplanar when closed is combined with the convenience of ventilation afforded by ordinary double hung sash and with the use of an operating mechanism which in no way interferes with ordinary decorative curtain treatment. Double glazing and screen protection are always available without making seasonal installation and removal of storm sash or screens. Yet when not in use the reeled-in screen is fully housed and protected from the weather, while the double glazing, although always available, can be readily removed for cleaning should any dust or dirt sift into the space between the panes.

We claim as our invention:

1. In a window unit, the combination of a frame having an upper sash fixed therein and a lower movable sash disposed when closed in substantially coplanar relation with the upper sash, a pinion revolubly mounted adjacent the lower edge of said upper sash, the lower sash having a rack thereon adapted to mesh with said pinion to move the lower sash in a vertical direction in response to turning of the pinion when the lower sash is displaced rearwardly and upwardly from its closed position to bring said rack into mesh with said pinion, and means including an oscillatable arm having a pin and slot type of connection with the lower sash for tilting the latter rearwardly and imparting an initial elevating movement to the same to bring the rack on said lower sash into mesh with said pinion.

2. In a window unit, the combination of a frame having an upper sash fixed therein and a lower movable sash disposed when closed in substantially coplanar relation with the upper sash, a pinion revolubly mounted adjacent the lower edge of said upper sash, the lower sash having a rack thereon adapted to mesh with said pinion to move the lower sash in a vertical direction in response to turning of the pinion when the lower sash is displaced rearwardly and upwardly from its closed position to bring said rack into mesh with said pinion, said frame having a guideway on its side portion having its lower end substantially in the plane of the upper sash and extending angularly upward and inward from such lower portion to a plane displaced inward of such upper sash and thence vertically upward, said lower sash having a lateral projection on its lower corner received in said guideway, and means including an oscillatable arm having a projection thereon and received in a slot presented by a housing member fixed to the lower sash for tilting the latter rearwardly about said projection as a pivot and thereafter imparting an initial elevating movement to such lower sash to bring the rack on the latter into mesh with said pinion.

3. In a window unit, the combination of a frame having an upper sash fixed therein and a lower movable sash disposed when closed in substantially coplanar relation with the upper sash, a pair of pinions revolubly mounted on opposite sides of said frame adjacent the lower edge of said upper sash, the lower sash having a pair of vertically extending racks fixed thereto at opposite sides of its outer face and adapted to mesh with respective ones of said pinions to move the lower sash in a vertical direction in response to turning of the pinions when the lower sash is displaced rearwardly and upwardly from its closed position to bring said rack into mesh with said pinion, and means including an oscillatable arm having a pin and slot type of connection with the lower sash for tilting the latter rearwardly and imparting an initial elevating movement to the same to bring the racks on said lower sash into mesh with said pinion.

4. In a window construction, the combination of a movable sash having a vertically extending rack fixed thereto, means for guiding the lower end of said sash for movement in a fixed path between upper and lower limits laterally offset from each other, said path extending upwardly and laterally from the lower limit and thence in a substantially straight line vertically upward to the upper limit, a pinion disposed to mesh with said rack when the sash is positioned vertically with its lower end in said straight line portion of said path, and means including a pivoted operating member having a disengageable pin and slot connection with said sash for swinging said sash laterally about its lower end to bring the upper end of said sash into and out of position for engagement of said rack and pinion.

5. In a window construction, the combination of a movable sash having a vertically extending rack fixed thereto, means for guiding the lower end of said sash for movement in a fixed path between upper and lower limits laterally offset from each other, said path extending upwardly and laterally from the lower limit and thence in a substantially straight line vertically upward to the upper limit, a first pinion disposed to mesh

with said rack when the sash is positioned vertically with its lower end in said straight line portion of said path, a pivotally mounted mutilated gear having an eccentric pin thereon, means including a second pinion meshed with said first pinion and said gear for turning the latter intermittently in response to rotation of said first pinion, and means on said sash defining a vertical slot positioned to receive said pin to effect lateral tilting of the sash by movement of said pin when the latter is engaged with said slot, and said slot having an open lower end to permit disengagement of the pin as the sash moves upward.

6. In a window construction, the combination of a movable sash, means including a rack carried by the sash and a revoluble drive pinion mounted adjacent the sash for moving the latter vertically in a predetermined straight line path, means on said sash defining a slot having an open lower end, a pin adapted to enter said slot upon descent of the sash in said straight line path, and means intermittently actuated in timed relation with the rotation of said pinion for shifting said pin generally laterally when the latter is disposed within said slot.

7. In a window construction, the combination of a movable sash, means including a rack carried by the sash and a revoluble drive pinion mounted adjacent the sash for moving the latter vertically in a predetermined straight line path, means on said sash defining a slot having an open lower end, a mutilated gear having an eccentric pin thereon adapted to enter said slot upon descent of the sash, means supporting said mutilated gear for turning movement about an axis such as to effect movement of the pin thereon in a direction generally lateral of the straight line path of motion for the sash, and means including a second pinion meshed with the first-mentioned pinion and said mutilated gear for turning the latter in response to rotation of the first-mentioned pinion whereby to effect intermittent movement of said pin in timed relation with the movement of said sash in its straight line path by said rack and first-mentioned pinion.

8. In a window construction, the combination of a movable sash, means including a rack carried by the sash and a revoluble drive pinion mounted adjacent the sash for moving the latter vertically in a predetermined straight line path, means on said sash defining a slot having an open lower end, a mutilated gear having an eccentric pin thereon adapted to enter said slot upon descent of the sash, means supporting said mutilated gear for turning movement about an axis such as to effect movement of the pin thereon in a direction generally lateral of the straight line path of motion for the sash, means including a second pinion meshed with the first-mentioned pinion and said mutilated gear for turning the latter in response to rotation of the first-mentioned pinion whereby to effect intermittent movement of said pin in timed relation with the movement of said sash in its straight line path by said rack and first-mentioned pinion, and spring means for yieldably urging said mutilated gear to turn in a direction to effect complete disengagement of the same from said second pinion.

9. In a window construction the subcombination of an operating mechanism for a removable sash having a vertically extending rack thereon, which comprises, a first drive pinion adapted to mesh with said rack, an idler pinion meshed with said drive pinion, a mutilated gear meshed with said idler pinion and having an eccentric pin projecting laterally therefrom, a torsion spring arranged to yieldably urge said mutilated gear constantly in the direction of rotation for the same corresponding to the direction of rotation of the drive pinion for elevating a rack meshed therewith, and means for limiting the turning of said mutilated gear to a predetermined arc.

10. In a window construction the combination of a frame having upper and lower sash therein, said upper sash being fixed and said lower sash being movable, said sash being disposed in substantially coplanar relation with respect to each other when the movable sash is closed, actuating means for imparting a compound motion to said movable lower sash in which such lower sash is moved generally laterally inward from its closed position and thereafter vertically upward in opening the same, a housing in the lower portion of said frame having a spring actuated take-up reel therein, a flexible insect screen wrapped about said reel with a free end portion withdrawable from said housing, disengageable mating abutments fixed, respectively, to the lower edge of said movable sash and to the free end of said screen, and means for automatically freeing said abutments from each other during closing of said lower sash by arresting downward movement of the abutment on said screen as the movable sash approaches the lower limit of its downward movement in closing.

11. In a window construction the combination of a frame having upper and lower sash therein, said upper sash being fixed and said lower sash being movable, said sash being disposed in substantially coplanar relation with respect to each other when the movable sash is closed, actuating means for imparting a compound motion to said movable lower sash in which such lower sash is moved generally laterally inward from its closed position and thereafter vertically upward in opening the same, vertical stops on the side portions of said frame presenting outwardly disposed faces at the inner side of said movable sash, a housing in the lower portion of said frame having a spring actuated take-up reel therein, a flexible insect screen wrapped about said reel with a free end portion withdrawable from said housing and dimensioned for its lateral edges to overlie said stop faces in sealing engagement therewith, disengageable mating abutments fixed, respectively, to the lower edge of said movable sash and to the free end of said screen, and means for automatically freeing said abutments from each other during closing of said lower sash by arresting downward movement of the abutment on said screen as the movable sash approaches the lower limit of its downward movement in closing.

RUSSELL L. GEER.
LEONARD A. MELKUS.