Sept. 10, 1963 A. W. AHLGREN 3,103,351

CASEMENT HINGE

Filed Aug. 31, 1961 2 Sheets-Sheet 1

Fig. 1

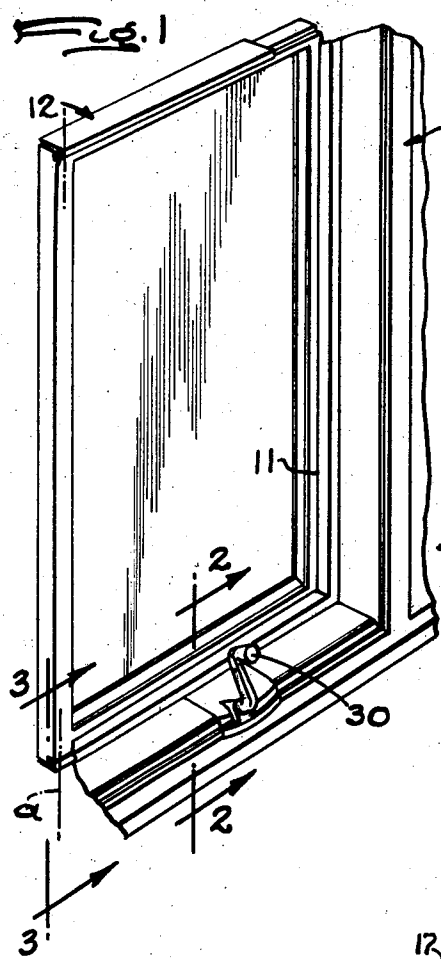


Fig. 2

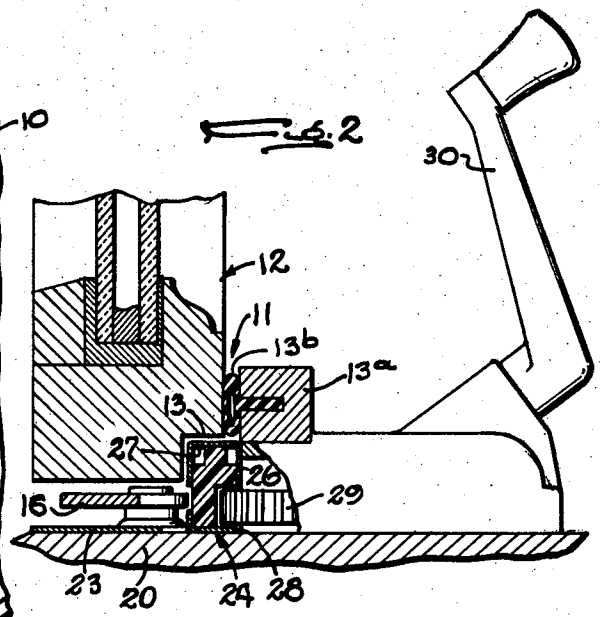


Fig. 3

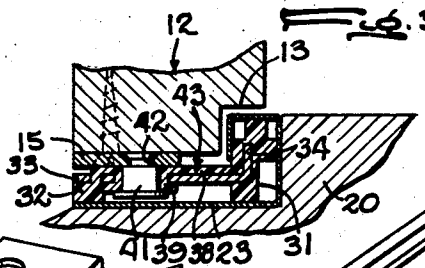
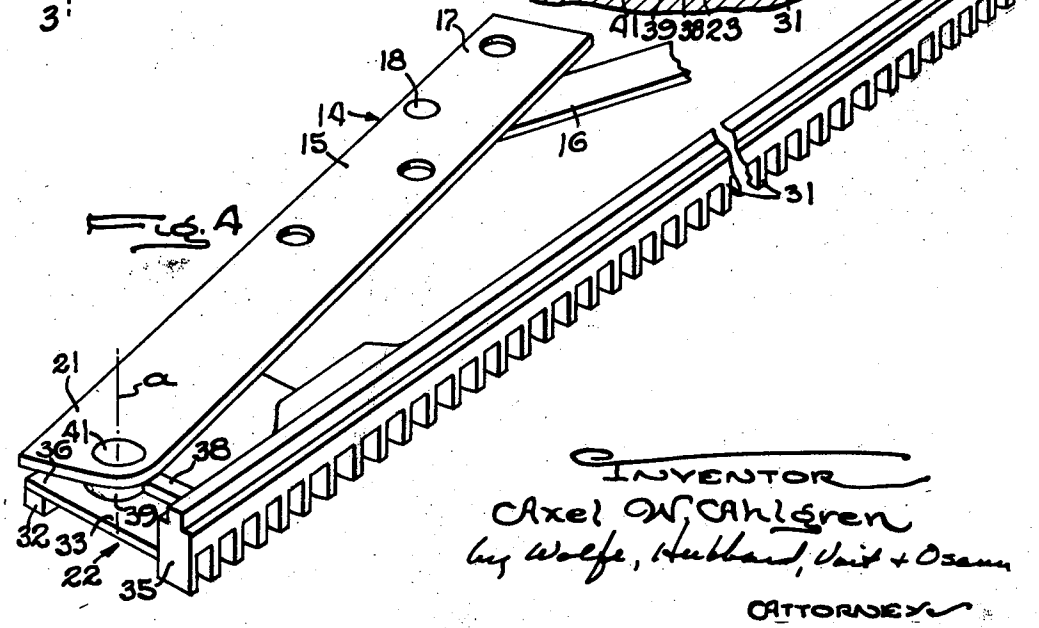


Fig. 4



INVENTOR

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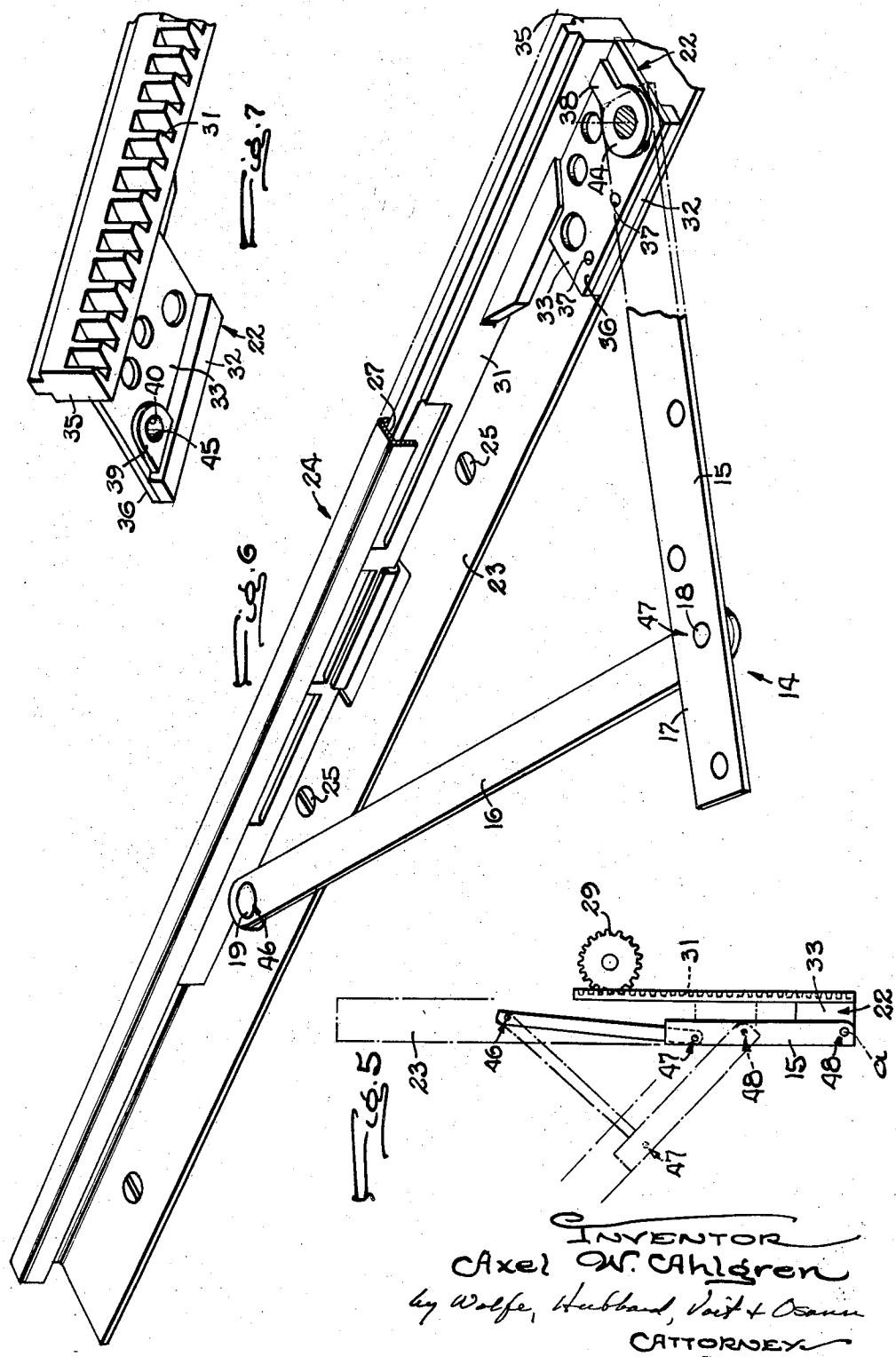
by Wolfe, Hubbard, Voit + Osann

ATTORNEYS

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CASEMENT HINGE

Filed Aug. 31, 1961 2 Sheets-Sheet 2



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3,103,351

CASEMENT HINGE

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7 Claims. (Cl. 268—117)

This invention relates to a hinge such as may be used to mount the sash of a casement window to swing about a vertical axis when a manually operated gear coacts with the hinge and, more particularly, to hinges of the type in which a slide assembly moves the axis back and forth along the sill of the window frame as the sash swings open and closed.

The general object of the invention is to provide a hinge of the above character with a new and improved slide assembly which is durable in service use, which is comparatively simple in construction and easy to manufacture and which slides freely and easily along the sill of the frame and smoothly swings the sash open and closed.

A more detailed object is to form the assembly with an elongated rack to be driven by the gear for laterally moving the vertical axis of the sash away from the side edge of the frame toward the center of the window thereby opening the window and positioning the sash with an open space on both sides thereof.

A further object is to arrange the manually operated gear and the rack so that fixed, tightly fitted pivotal connections can be used on the sash to eliminate a rattling of the sash by the wind when the window is in the open position.

The invention also resides in the novel manner in which the rack is integrally molded with a shoe, a strip and a plate of the slide assembly to minimize the number of parts and hence the amount of time necessary to install the hinge.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings, in which

FIGURE 1 is a fragmentary perspective view of a window supported by the novel slide assembly of the present invention.

FIG. 2 is an enlarged fragmentary sectional view taken along the line 2—2 in FIG. 1.

FIG. 3 is an enlarged fragmentary sectional view taken along the line 3—3 in FIG. 1.

FIG. 4 is a fragmentary perspective view of the hinge.

FIG. 5 is a fragmentary plan view of the hinge in closed and partially open positions.

FIG. 6 is an enlarged perspective view in the partially open position of the hinge shown in FIG. 5.

FIG. 7 is a fragmentary perspective view of a portion of the slide assembly.

As shown in the drawings for purposes of illustration, the invention is embodied in a casement window construction including a window frame **10** having a sash seat **11** in each of the four sides thereof. A rectangular window sash **12** with rabbeted top and bottom edges **13** is mounted in the window opening to swing about a laterally movable vertical axis *a* by means of a hinge mechanism **14**. If desired, the window construction may include a horizontally disposed back stop strip, such as shown at **13a** in FIG. 2, carrying a tubular weather strip **13b** which abuts against the four sides of the sash **12** when the window is closed.

The hinge mechanism **14** for swinging the sash about the vertical axis includes a sash link **15** extending along and fastened to the bottom edge of the sash and a swivel link **16** pivotally connected at one end to an end **17** of the sash link **15** by a pin **18** and pivotally mounted at the other end on a pin **19** fixed on the sill **20** of the frame.

For lateral movement of the axis in conjunction with the swinging movement, the fulcrum end **21** of the sash link **15** is pivotally connected to one end of a slide assembly **22** which is disposed for edgewise sliding on a horizontal track **23**, the track being part of an L-shaped bar **24** fastened by wood screws **25** to the sill.

The vertical side **26** of the L-shaped bar **24** extends along the bottom sash seat **11** and forms a channel **27**. With the sash in the closed position, the rabbeted edges **13** receive the channel **27** and allow the sash to close flush against the sash seats on the sides of the frame. A rectangular hole **28** is formed in the lower half of the vertical side **26** and is of a sufficient size to receive a portion of the outer periphery of a manually operated gear **29** mounted adjacent the channel on the opposite side of the horizontal track **23**, the gear being turned by a crank **30** connected thereto.

The present invention contemplates the provision of a novel slide assembly **22** which is comparatively simple in construction and which is not only durable in service use but also opens and closes the sash **12** with a smooth and easy action. To these ends, the slide assembly includes an elongated rack **31**, which meshes with the gear **29** and slides endwise along the sill **20** and a pivot **41** which connects the sash and the rack, the axis of the pivot defining the axis *a* of the sash. With this arrangement, the pivot **41** moves toward and away from the pivot **19** as the gear **29** slides the rack **31** back and forth and thus swings the sash open and closed. Preferably, the pivot **41** is adjacent one end of the rack and is connected to the sash through the medium of the link **15**.

In the present instance, the assembly **22** comprises a generally rectangular plate **33** with one end formed with an upturned flange **34** which is embedded in one end **35** of the rack **31**. At the opposite edge **36** of the plate is a shoe **32** which is shorter than the rack and rides on the outer edge portion of the track **23**, the shoe **32** being molded into holes **37** in the plate to secure the latter to the shoe. Thus, the shoe moves bodily with the rack and provides additional sliding support for the sash. To complete the assembly, a connecting strip **38** bridges the lateral distance between the rack and the shoe and is connected thereto, the strip **38** lying adjacent the plate **33** in spanning this distance. The gear **29** projects through the hole **28** in the channel **27** to mesh with the rack contained therein and to move the slide assembly **22** endwise along the track **23**.

A cylindrical bushing **39** makes up part of the strip and outlines a hole **40** formed in the plate, the inner periphery of the bushing encircling the outer periphery of the hole at the top and bottom of the plate. In order to pivotally connect the bushing **39** to the fulcrum end **21** of the sash link **15**, the pivot **41** is in the form of a pin journaled in a hole **42** in the link and in the hole **40**. In this manner, the hinge mechanism **14** is pivotally connected to the slide assembly **22** to complete the hinge on the sill of the frame. To mount the sash at the top of the frame, a hinge is used which is identical in construction except for its disposition in the frame.

According to another aspect, the invention contemplates the construction of the slide assembly **22** in a novel manner whereby a portion of its parts is combined in a single member to reduce the number of pieces, to facilitate quick and easy assembly and to still be rugged and durable in service use. For these purposes, the shoe **32**, the strip **38** and the rack **31** are simply and inexpensively molded as a single piece **43** from a suitable plastic material, such as Delrin, the plate **33** being embedded in the plastic material for additional support. As part of the single piece, the upper face **44** and the inner periphery **45** of the bushing **39** form a plastic bearing surface for the fulcrum end **21** of the sash link **15** and the pin **41** journaled

therein. Advantage is taken of these plastic surfaces to minimize friction as the sash swings open and closed.

In operation, the sash, as it swings from the closed position to the open position, is supported in the frame by sash links **15** extending along the top and bottom edges of the sash and is pivotally connected to the slide assembly **22** mounted on the track **23**. As illustrated by FIG. 5, the gear **29** in conjunction with the crank **30** and with the cooperation of the rack **31** drives the slide assembly **22** towards the fixed pivotal connection **46** and coacts with the sash links **15** and swivel links **16** to swing the sash on the pivotal connections **47** and **48** (FIG. 5) outward from the frame to a position approximately perpendicular to the frame and with substantial openings on both sides thereof. These movements are reversed on swinging the sash towards the closed position.

I claim as my invention:

1. For use with a window having a frame and a sash mounted in said frame to swing about an axis normal to the sill of the frame and a manually operated gear on the sill, the combination of, a generally rectangular plate lying in a horizontal plane adjacent said sill, an elongated rack adapted to mesh with said gear and extending along one edge of said plate, an elongated shoe disposed adjacent the opposite edge of said plate and paralleling said rack, a strip extending across said plate and connecting said rack and said shoe, said rack, said shoe and said strip being formed of a single piece of molded plastic material with at least a portion of said plate embedded in said piece, and means on said strip for pivotally connecting the strip to said sash.

2. For use with a window having a frame and a sash mounted in said frame to swing about an axis normal to the sill of the frame and a manually operated gear on the sill, the combination of, a generally rectangular plate lying in a horizontal plane adjacent said sill, an elongated rack adapted to mesh with said gear and extending along one side of said plate with the adjacent edge portion of the plate embedded in the rack, an elongated shoe disposed adjacent the opposite edge of said plate and paralleling said rack, a portion of said plate being embedded in said shoe, a strip extending across said plate and connecting said rack and said shoe, said rack, said shoe and said strip being formed of a single piece of molded plastic material, and means on said strip for pivotally connecting the strip to said sash.

3. For use with a window having a frame and a sash mounted in said frame to swing about an axis normal to the sill of the frame and a manually operated gear on the sill, the combination of, a generally rectangular plate lying in a horizontal plane adjacent said sill, an elongated shoe extending along one side of said plate, an elongated rack adapted to mesh with said gear and disposed adjacent the opposite edge of said plate and parallel to said shoe, a cylindrical bushing disposed around a hole in said plate with the inner periphery of the bushing encircling the outer periphery of the hole, a strip connecting said rack to said bushing and said shoe, said rack, said shoe, said bushing and said strip being formed of a single piece of molded plastic material with at least a portion of said plate embedded in said piece, means for pivotally connecting said sash adajcent said plate, a hinge mechanism having two elongated links, one of said links adapted to be secured to and extending along the bottom edge of said sash, the upper end and the inner periphery of said bushing having a bearing surface thereon providing a bearing area engageable with an end portion of said link to reduce friction as said portion of the link pivots at the bushing, and the other of said links adapted to be pivotally connected to said frame.

4. For use with a window having a frame and a sash mounted in said frame to swing about an axis normal to the sill of the frame and a manually operated gear on the sill, the combination of, a generally rectangular plate lying in a horizontal plane adjacent said sill, an elongated shoe disposed adjacent the opposite edge of said plate and paralleling said rack, a cylindrical bushing disposed around a hole in said plate with the inner periphery of said bushing encircling the outer periphery of said hole, a strip connecting said rack to said bushing and said shoe, said rack, said shoe, said bushing and said strip being formed of a single piece of molded plastic material with at least a portion of said plate embedded in said piece, an elongated sash link adapted to be secured to and extending along the bottom edge of said sash, an end portion of said link having a circular hole therein, pivotal means journaled in said hole and in said bushing, the upper end and the inner periphery of said bushing having a bearing surface thereon and providing a bearing area at said pivotal surface thereon and providing a bearing area at said pivotal connection to reduce friction as said link pivots at the bushing, and an elongated swivel link having one end pivotally connected to said sash link and the other adapted to be pivotally connected to said frame.

5. For use with a window having a frame and a sash mounted in said frame to swing about an axis normal to the sill of the frame axis and a manually operated gear on the sill, the combination of, a generally rectangular plate lying in a horizontal plane adjacent said sill, an elongated rack adapted to mesh with said gear and extending along one side of said plate with the adjacent edge portion of the plate embedded in the rack, an elongated shoe disposed adjacent the opposite edge of said plate and paralleling said rack, a portion of said plate being embedded in said shoe, a cylindrical bushing disposed around a hole in said plate with the inner periphery of the bushing encircling the outer periphery on the hole, a strip connecting said rack to said bushing and said shoe, said bushing and said strip being formed of a single piece of molded plastic material, an elongated sash link adapted to be secured to and extending along the bottom edge of said sash, an end portion of said link having a circular hole therein, pivotal means journaled in said hole and in said bushing, and an elongated swivel link having one end pivotally connected to said sash link and the other end adapted to be pivotally connected to said frame.

6. For use with a window having a frame, a sash mounted in said frame to swing about a first axis normal to the sill of the frame and a manually operated gear on the sill, the combination of, an elongated track adapted to be mounted on and extend along said sill, an elongated rack shorter than and extending along the inner edge of said track for meshing with said gear, an elongated shoe shorter than and parallel with said rack and disposed at one end thereof adjacent the outer edge of said track, a strip forming a laterally connecting link between said rack and said shoe to enable a unitary construction of the rack, the shoe and the strip from a piece of molded plastic material, a generally rectangular plate having one edge fastened to said rack and the opposite edge fastened to said shoe and disposed adjacent said strip for support to said unitary piece, a sash link adapted to extend and be rigidly connected to the bottom of said sash, means pivotally connecting one end of said link to said strip to support the link for turning about said axis whereby the axis shifts laterally upon sliding of said rack and said shoe on said track, a swivel link having one end of said swivel link to said sill, the pivotal axis of said link being parallel to said first axis.

7. For use with a window having a frame and a sash mounted in said frame to swing between open and closed positions about a first axis extending along one side edge of the sash, the combination of, an elongated rack mountable on the sill of said frame to slide back and forth thereon along a horizontal path perpendicular to said axis, a shoe fast on one end of said rack for movement therewith, a sash link fulcrumed at one end to said shoe to swing about said first axis and projecting horizontally from the shoe and supporting said sash on said

shoe, a second link pivoted at one end on the free end portion of said sash link to swing about a second axis, and pivoted at the other end on said sill to swing about a third axis spaced along said path from said first axis, said axes all being parallel, and means for moving said rack and said shoe alternately toward and away from

said third axis thereby to swing said sash link and said sash back and forth between said positions.

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