Aug. 30, 1955 J. H. OSWALD 2,716,262

HINGED WINDOW SASH STRUCTURE WITH PIVOTED BOLT FASTENER

Original Filed April 5, 1952 4 Sheets-Sheet 1

FIG. 1

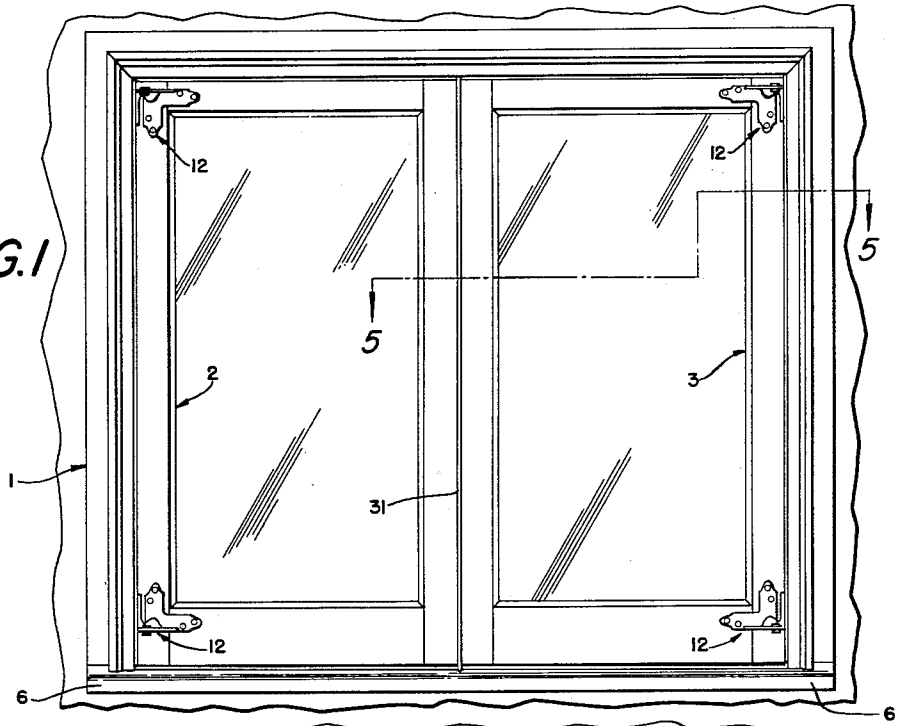
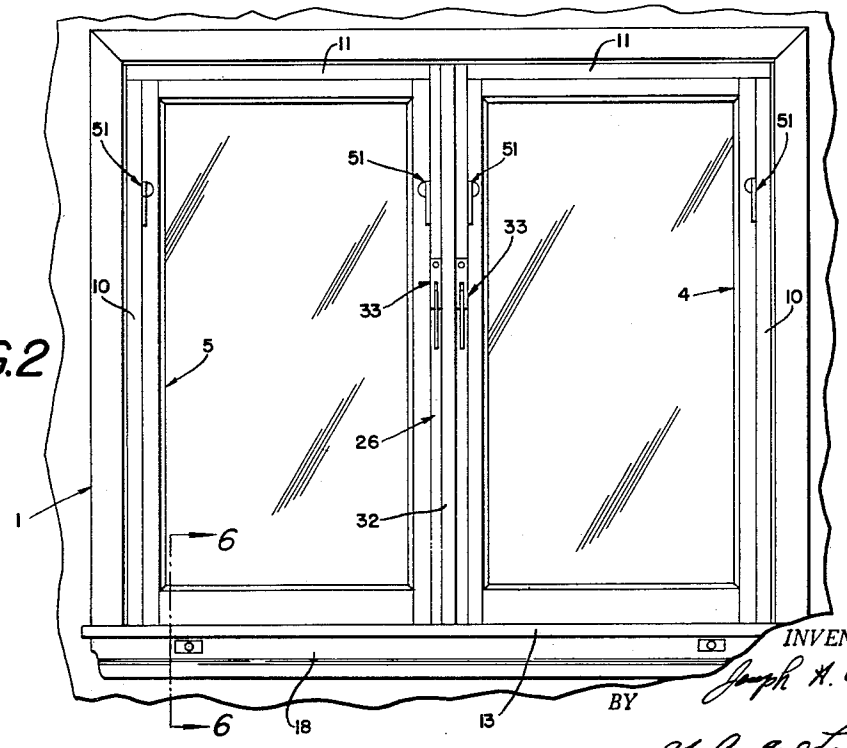



FIG. 2




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FIG. 3

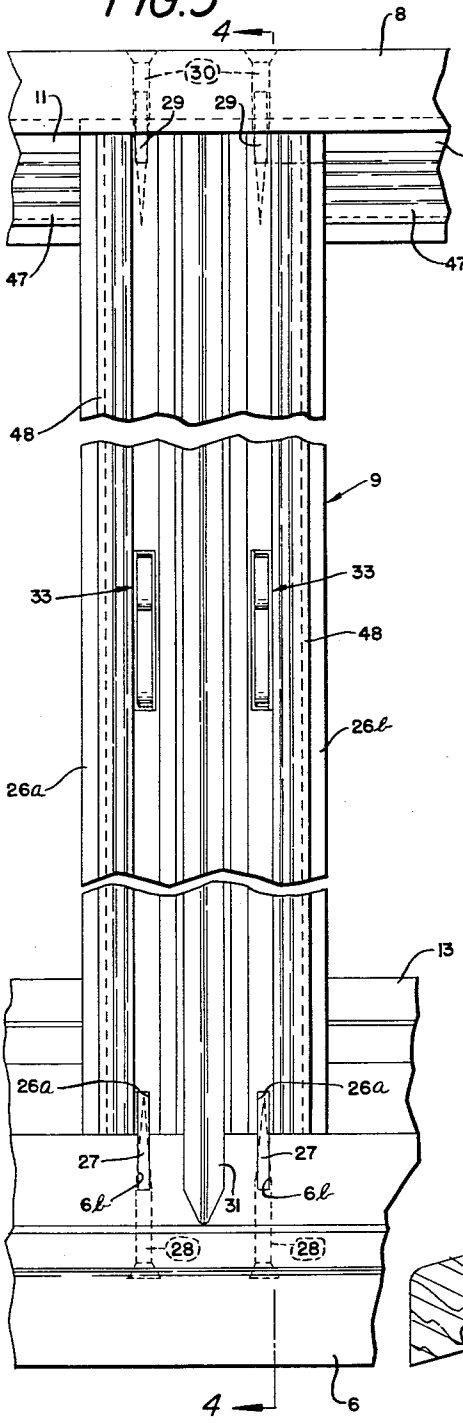
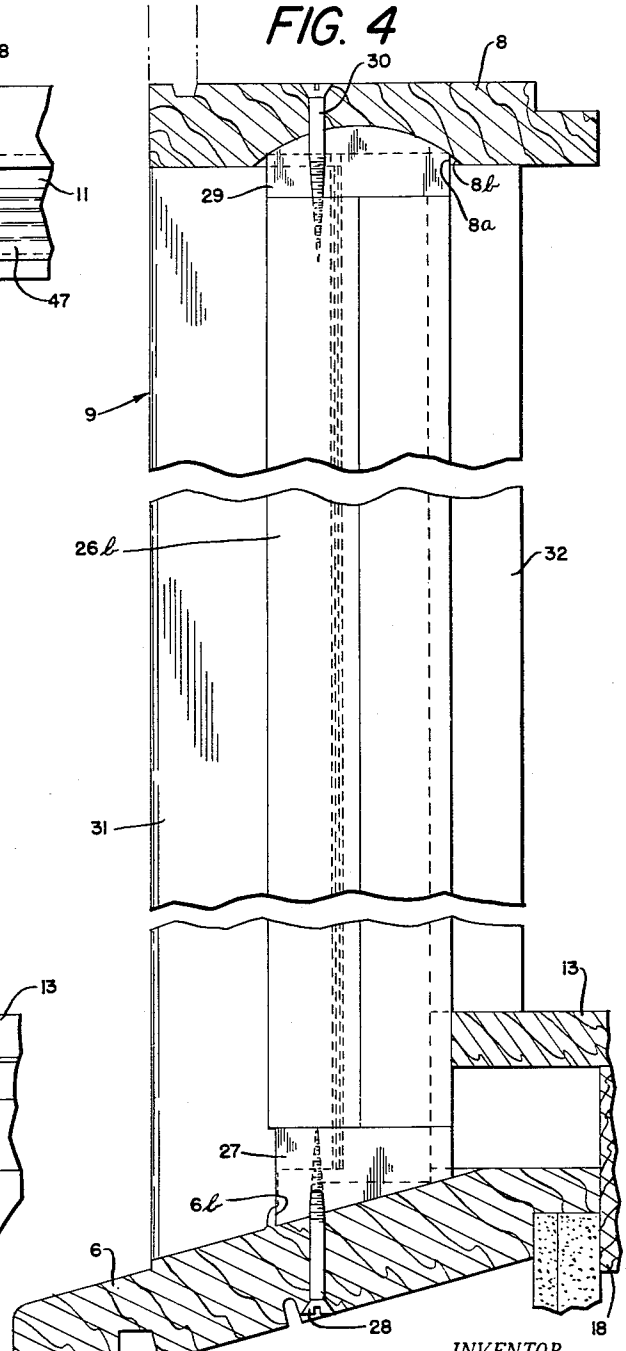



FIG. 4




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FIG. 5

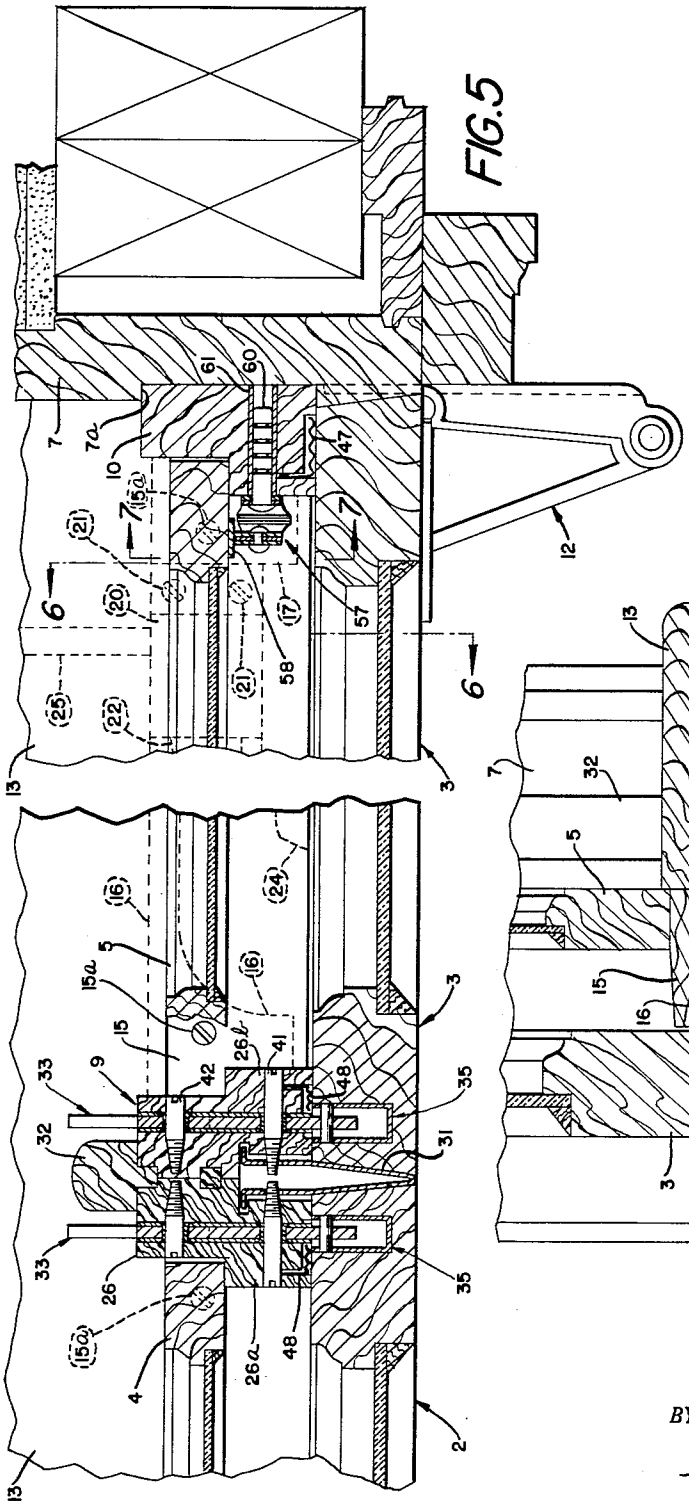
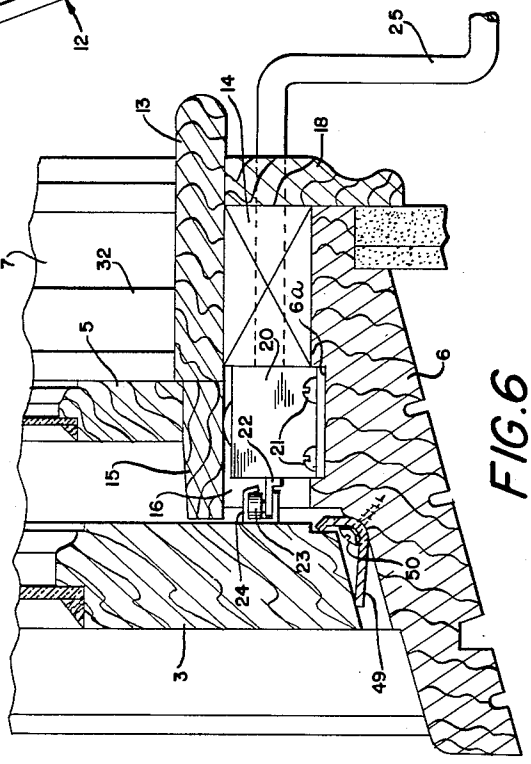


FIG. 6



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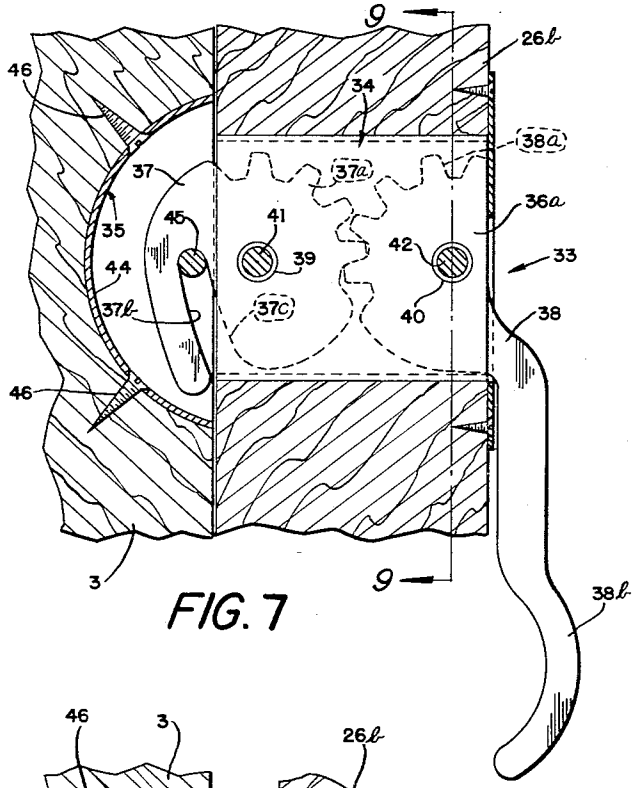



FIG. 7

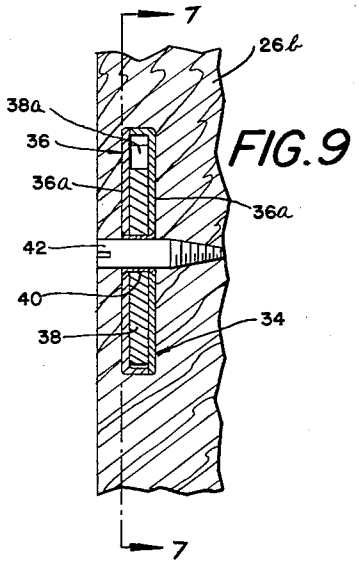



FIG. 9

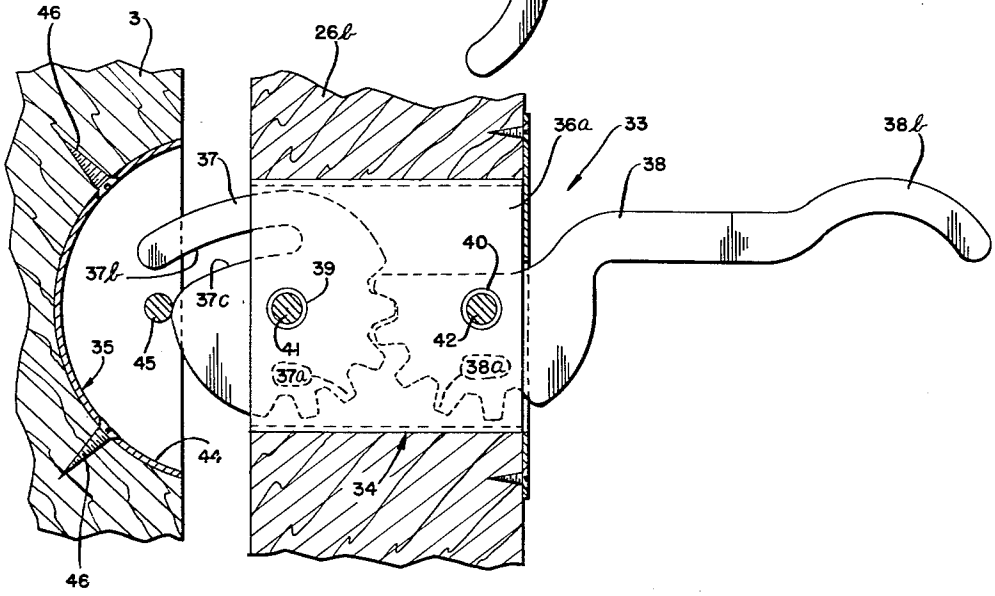



FIG. 8

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2,716,262

# HINGED WINDOW SASH STRUCTURE WITH PIVOTED BOLT FASTENER

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Original application April 5, 1952, Serial No. 280,710. Divided and this application May 17, 1954, Serial No. 430,134

7 Claims. (Cl. 20—53)

The invention relates to hinged windows, such for example as casement windows having frame and sash parts formed chiefly of wood. The present application is a division of my copending application Serial No. 288,710, filed April 5, 1952.

It is an object of the invention to provide an improved sash fastener for hinged windows operationally characterized by powerful closing action against the resistance of resilient weather strips, effective locking, powerful opening action to break sticking paint and ease of manual operation and structurally characterized by great simplicity, low manufacturing and installation costs, pleasing appearance and freedom from damage during building construction.

It is also an object of the invention to provide an improved hinged window structure especially constructed to cooperate with the improved fastener.

For the attainment of the foregoing objects and other incidental objects, the invention consists in certain forms, arrangements and combinations of parts which will be exemplified and explained by reference to the accompanying drawings of a specific preferred construction and thereafter defined in the appended claims.

In the drawings,

Fig. 1 is an outside elevation of a double sash casement window embodying the present invention.

Fig. 2 is an inside elevation of the same window.

Fig. 3 is an enlarged outside elevation of the improved mullion structure and adjacent parts of the window frame, major portions of the frame structure being broken away to permit illustration on the enlarged scale.

Fig. 4 is a vertical sectional view on the broken line 4—4 of Fig. 3.

Fig. 5 is a fragmentary horizontal section on an enlarged scale taken on the broken line 5—5 of Fig. 1.

Fig. 6 is a vertical section through the sill and other adjacent parts of the window, the section being taken on the broken line 6—6 of Fig. 5.

Fig. 7 is an enlarged fragmentary vertical section taken on the line 7—7 of Fig. 9 and showing the improved sash fastener mechanism, the operating parts being shown in the positions which they occupy when the sash is closed and locked.

Fig. 8 is a vertical section corresponding to Fig. 7 and showing the various parts in the positions occupied when the sash has been moved to a partially opened position.

Fig. 9 is a vertical section on the line 9—9 of Fig. 7.

Referring in detail to the construction shown in the drawings, numeral 1 designates generally the frame part of a window structure, 2 and 3 designate generally a pair of sashes hingedly mounted in the frame and the numerals 4 and 5 designate generally a pair of demountable storm sashes.

The frame structure 1 comprises a sill 6, jambs 7, 7, head 8, and a mullion structure generally designated by the numeral 9. The jambs 7, 7 are morticed at 7*a* to receive stops 10, 10 which may be rigidly secured to the



jambs by screws or nails (not shown). Similarly the head 8 is formed with a mortice 8*a* to receive stops 11, 11. The sashes 2, 3 are pivotally connected to the jambs of the frame structure by conventional casement hinges 12, 12.

The sill structure also includes a stool 13 which is permanently secured to suitably spaced blocks 14 which in turn are permanently secured to sill 6 and thus support the stool at a substantially higher level than the sill (Fig. 6). Between the stool and the adjacent main sashes are arranged secondary stools 15, 15. The latter are detachably secured by screws 15*a*, 15*a* to spacing blocks 16, 17 which are attached to the sill 6. The secondary stools 15, 15 which serve to support the demountable sashes 4, 5 are thinner than the stool 13 so that the latter forms a shoulder to engage the demountable sashes with the result that the latter at their lower ends are positioned between the outer edge of the stool 13 and inner surfaces of the upright window stops. That part of each secondary stool 15 between the main sash and the demountable sash may have its top surface inclined outward and downward to provide drainage (Fig. 6). The usual trim molding 18 is attached to the inner edge of sill 6.

The sill 6 is formed on its upper surface with a mortise 6*a* which extends from end to end of the sill. In the space between the sill 6 and each secondary stool 15 is mounted the sash operator which, as shown, is of a conventional construction and comprises a housing 20 which is rigidly secured by screws 21 to sill 6, the rectangular base of the housing fitting in the mortise 6*a* which thus serves to position the housing and supplement the holding action of the screws. The operator is of the worm and wheel type having its operating arm 22 fitted with an anti-friction slide 23 that engages in the channel of a track 24 rigidly secured to the bottom rail of the sash 3 (or 2). The operator is actuated in well known manner by a detachable crank 25 which passes through an aperture in the trim molding 18 to engage a socket in the worm of the operator gearing.

The mullion structure 9 comprises a wood post 26 which, for convenience of manufacture, is formed of two similar halves 26*a*, 26*b* which are keyed and glued together to form a rigid unitary structure. This post structure 26 is formed at its bottom to fit the mortise 6*a* of the sill and is rigidly anchored in position by a pair of splines 27, 27 (Figs. 3 and 4) which are formed of tough multiple layer plywood and fit slots 26*a*, 26*a* in the bottom of the mullion post and slots 6*b*, 6*b* formed in the top surface of the sill 6. The splines are permanently glued to the mullion post and, in the assembly of the frame, are secured to the sill by means of long screws 28, 28 which pass upward through the sill to enter and powerfully expand the tough plywood of the splines.

The upper end of the mullion post is attached to the head 8 of the frame in substantially the same manner as its lower end is attached to the sill. That is, the post 26 is formed at its upper end to fit the mortise 8*a* of the head and plywood splines 29, 29 glued in slots formed in post 26, engage slots 8*b* formed in the lower side of the head 8. Screws 30, 30 serve to mechanically secure the head and mullion structures rigidly together.

The two halves of the mullion post 26 are shaped so that the post on its outer side is formed throughout its length with a recess having lateral grooves or slots. In the recess is arranged a mullion and weather seal member 31 which is formed of resilient sheet material by longitudinally folding an elongated strip of the material to approximately V form (Fig. 5) with its free edges turned laterally to engage the lateral slots in the

recess of the post **26**. This engagement serves to secure the member **31** to the post **26** with a loose or floating attachment. The two oppositely facing sides of the member **31** are inclined to engage the correspondingly beveled upright edges of the window sashes **2, 3**. Member **31** is preferably made of stainless steel or other corrosion resistant material having considerable resilience so that the member is subject to some compression when the window is closed, as in Fig. 5, to form an effective weather seal between the adjacent edges of the sashes. It will be seen that the relatively thin form of the mullion member **31** permits close spacing of the adjacent edges of the sashes and secures a pleasing slender appearance of the mullion section of the window.

At its inner side the mullion post is fitted with a trim cap **32** which may be glued or otherwise rigidly secured to the post.

The post **26** of the mullion structure is fitted with a pair of fasteners for the two sashes **2** and **3**. Each fastener, generally designated by the numeral **33**, comprises a bolt mechanism of the pivoted cam type generally designated by the numeral **34** and a keeper device generally designated by the numeral **35**.

The bolt mechanism comprises a housing **36** formed of two like halves **36***a* which are formed of flat sheet strip material bent to form a flange along one edge, the halves being combined as shown in Fig. 9. Thus combined the halves form a flat open-ended housing which is mounted in a correspondingly-shaped mortise which perforates the mullion post from the inner face to the outer face thereof. Within the housing **36** are mounted a rotary cam type bolt member **37** and an actuator **38**, both of which are pivotally mounted on tubular rivets **39** and **40**, respectively, these rivets serving also to rigidly join together the halves of the housing. The bolt mechanism **34** of the fastener is anchored in the mullion post by a pair of specially formed wood screws **41** and **42** which are inserted in holes bored in the post and pass through the rivets **39** and **40**, respectively, of the housing structure **36**. The screws **41** and **42** have taper ends which, in the case of screws **41**, engage in apertures in the mullion member **31** and constitute supplementary means for loosely securing said member. Also the screws **41** serve as adjustable means for limiting the spread of the sides of member **31**.

The peripheries of the cam bolt **37** and the actuator **38** are formed with intermeshing spur gear teeth **37***a*, **38***a*, respectively, so that rotation of the actuator effects rotation of the bolt member. The actuator **38** is formed with an elongated handle **38***b* to make the actuation of the bolt suitably powerful.

The side of the bolt member **37** of the fastener, opposite the teeth **37***a* thereof, is formed with an elongated cam slot which provides an inwardly facing cam surface **37***b* and an outwardly facing cam surface **37***c*, these surfaces being designed to cooperate with the keeper of the fastener mechanism.

To provide a suitable dress or finish for the inner side of the fastener mechanism, an escutcheon plate is attached to the post **26**, the escutcheon being formed with a slot to accommodate the handle of the actuator **38**.

The keeper **35** of the fastener comprises a shell **44** which is preferably drawn or die-formed from sheet metal, the shell being of circular segmental form which will be apparent from Figs. 5 and 7. Extending between and riveted to the flat sides of the shell **44** is a keeper pin **45** designed to cooperate with the cam surfaces **37***b* and **37***c* of the bolt member **37**. The shell **44** of the keeper device is mounted in a mortise formed in the inner side of the sash as shown in Fig. 5, the shell being anchored by screws **46, 46**. Fig. 7 shows the parts of the fastener in their closed and locked positions while Fig. 8 shows them in the positions occupied when the sash is moved to a partially open position by means of the fastener. It will be apparent that as the handle **38***b* of the fastener is raised the cam surface **37***c* of the bolt member **37**, by its engagement with the keeper pin **45**, will act to positively force the sash open to the position shown in Fig. 8, and, on the other hand, when the open sash is moved to the nearly closed position shown in Fig. 8, the keeper pin **45** engages the end of the cam surface **37***c* and is in position to be engaged by the cam surface **37***b* and drawn forcibly to a fully closed position as the actuator handle **38***b* is swung downward. Cam surface **37***b* is designed and positioned in relation to the cam pivot to effectively lock the sash in closed position.

The outer faces of the jamb stops **10** and the head stops **11** are fitted with conventional weather strips **47** and the outer face of the mullion is similarly fitted with weather strips **48** which supplement sealing action of the mullion member **31**. The weather seal strips **47** and **48** are engaged by the inner faces of the sashes **2** and **3** and function in well-known manner. At the bottom of each of the sashes **2** and **3** is mounted a weather seal consisting of a rocker bar **49** which is loosely secured to the sill **6** by screws **50** which pass loosely through holes in the bar (Fig. 6). Each rocker bar is in the form of a metal angle strip with the two arms of the angle connected by a curved zone adapted to roll or rock on the sill support. When the sash is closed the upright arm of the bar is engaged by the inner face of the sash so that the other arm is tipped up into forcible engagement with the bottom edge of the sash to form an effective seal. This rocker bar seal is fully shown and described in United States Patent No. 2,583,439, granted January 22, 1952, and may be referred to for a disclosure thereof in complete detail. However it may be noted that the screw holes of the bars **49** form drainage passages for any moisture that may condense on the inner side of the sashes **2, 3**. It will also be noted that the use of the rocker bar type of seal provides a substantial space between the bottom edge of the sashes and the sill so that troublesome ice formation and sticking of the sash is avoided in winter and the holding of moisture between the sash and the sill with resultant rotting is obviated. Furthermore, the action of the rocker bar has special advantages in connection with casement type window sashes since the upward pressure on the sash exerted by the outwardly extending arm of the bar when the sash is closed resists any downward pull of the fasteners **33** on the sashes; and, generally, the rocker bar reduces the loading of the sash hinges when the sashes are closed.

Mention has already been made of the effective manner in which the cam of the main sash fastener, in the closing of the sash, reaches out to engage the keeper before the weather strips are materially compressed. This is of considerable importance because the aggregate resistance which the weather strips offer to complete closing of the sash is more than the sash operator can readily overcome. The long reach of the fastener cam and its powerful cam action make this weakness of the operator unimportant. In its fully closed position the fastener cam, of course, effectively locks the sash. On the other hand, in the opening of the sash the powerful kick-out action of the fastener cam is effective to loosen a sash stuck by varnish or paint, where the sash operator alone would be ineffective.

The simplicity and ease of manufacture and installation of the sash fastener **33** are exceptional. The cam and cam operator parts are stamped from plate metal stock, all working surfaces (cam, gear teeth and pivot aperture) being formed in the one operation. The housing is formed of two identical flanged sheet metal pieces which can be made easily and cheaply. Permanent assembly of the cam, operator, rivet and housing parts is quickly and easily effected by simultaneous swaging operations on the ends of the tubular rivets. The resulting assembly is easily slipped into the mortise through the mullion and effectively anchored by the screws inserted through the

tubular rivets. The mortise to receive the housing is readily cut by a single operation with a chain-type mortiser. In the case of the keeper structure of the fastener the shell can be formed of sheet metal by a stamping and die operation and the circular segmental form of the shell makes possible easy formation of the mortise to receive it.

While preferred forms of construction of the various features of the invention have been shown and described, the various features of the invention may be embodied in other equivalent forms within the bounds of the appended claims.

What is claimed is:

1. An outwardly opening hinged window comprising a wood sash, a wood frame to which one edge of the sash is hinged, said frame at a point remote from its hinged side having a part formed with a slat-shaped perforation extending through it from the inner side to the outer side of the frame; and fastening means for the sash comprising a housing disposed in the perforation between the open ends thereof and having openings in its opposite ends in line with the open ends of the perforation, means for securing the housing in the perforation, a fastener bolt turnably mounted in the outer part of the housing with a portion of it projecting more or less from the outer face of the frame and the outer end of the housing, said fastener bolt having its part which projects from the outer face of the frame and the outer end of the housing formed with push and pull cam surfaces, an actuating lever operatively mounted in the inner part of the housing, the said lever projecting from the inner end of the housing and the inner face of the frame, means forming a drive connection between the actuating lever and the bolt constructed to effect a wide-range turning movement of the bolt, and a keeper secured to the sash in position to cooperate with the push and pull cam surfaces of the fastener bolt, whereby angular movement of the lever causes strong pulling and pushing forces on the sash in the sash-closing and opening directions, respectively.

2. A window as claimed in claim 1 in which the keeper is fully embedded in the sash to permit adequate space for the operative mounting of the fastening bolt and actuating lever between the inner and outer sides of the window frame.

3. A window as claimed in claim 1 in which the inner side of the sash is formed with a circular segmental recess disposed opposite the fastener bolt when the sash is in closed position and the keeper comprises a flat-sided housing in the form of a circular segment with its chordal side open and a transverse pin having its ends rigidly secured to the flat sides of the housing near its chordal side, the keeper housing being formed to fit the arcuate surface of the recess in the sash with its open side exposed to permit entry into it of the fastener bolt.

4. A window as claimed in claim 3 in which the embedded keeper is secured in the recess of the sash by screws extending through the arcuate wall of the keeper housing at acute angles to the face of the sash.

5. A window as claimed in claim 1 in which the driving connection between the actuating lever and the bolt of the fastener consists of intermeshing spur gear teeth formed on the lever and the bolt.

6. A fastener device for windows comprising a housing formed of a pair of like plates each having a lateral flange along one side and the pair being assembled together with the edge of each plate flange engaging the face of the other plate to make a flat tubular structure with openings in its opposite ends and a pair of rivets rigidly connecting the two plates adjacent their respective ends with the rivets extending across the passage through the housing from one flat plate to the other flat plate of the housing; a swinging fastener bolt formed to pivotally engage one of the rivets and having oppositely facing pull and push cam surfaces arranged to project through one of the end-openings of the housing; an actuating lever for the cam bolt pivotally engaging the other rivet of the housing and extending through the other end opening of the housing; and means forming an operating connection between the actuating lever and the bolt.

7. A fastener as claimed in claim 6 in which the driving connection between the actuating lever and the bolt consists of intermeshing spur gear teeth formed on the lever and the bolt respectively.

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