

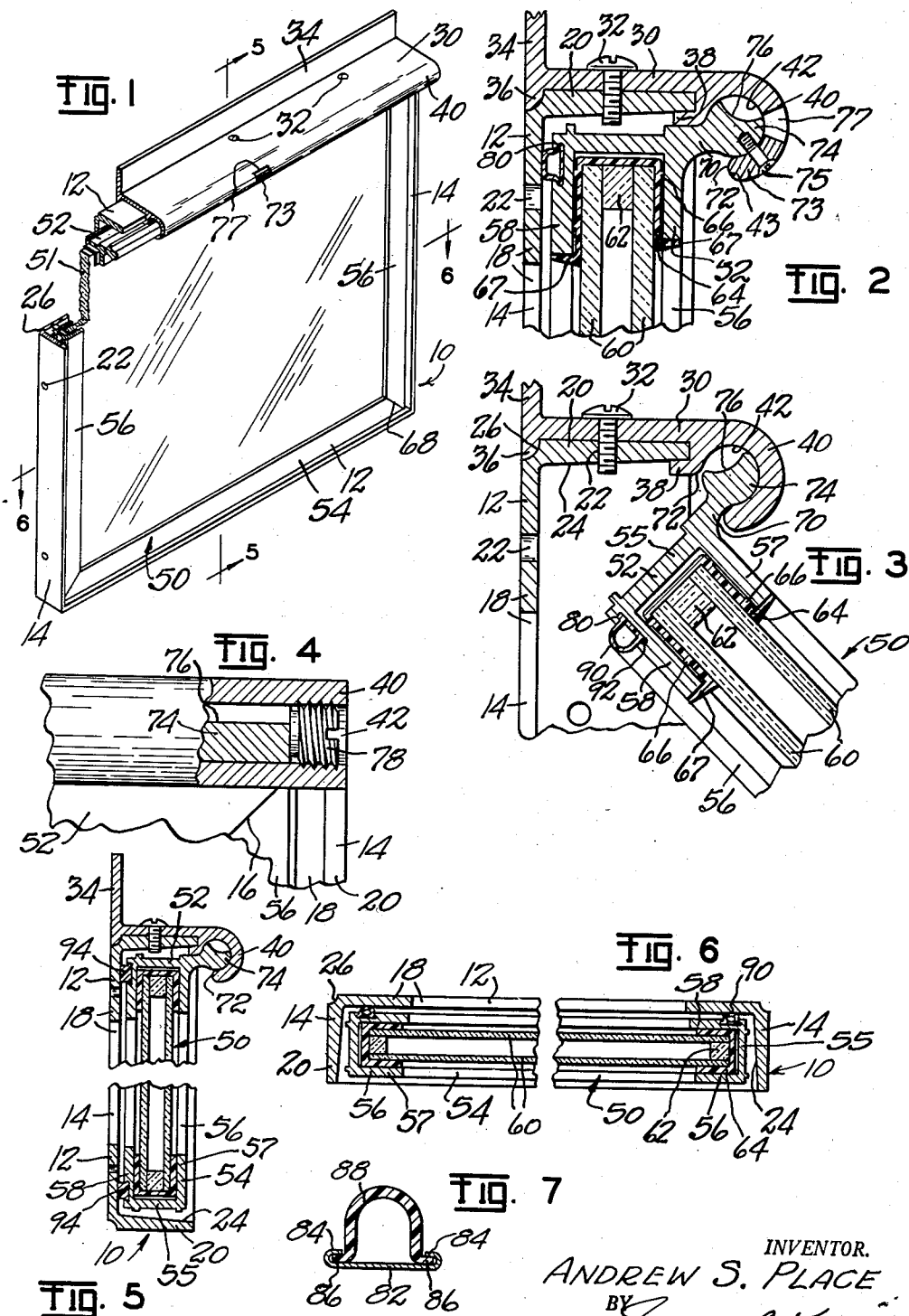
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WINDOW STRUCTURE

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2 Claims. (Cl. 20—53)

This invention relates to improvements in window structures, and more particularly to improvements in hinged window structures.

The primary object of the invention is to provide a construction of this character which provides a positive and continuous weather seal around the entire margin of the window, which seal is effected by uniform pressure and is uniformly effective.

A further object is to provide a novel hinge construction which conceals the hinge and assures uniformity of hinging at all times, is protected so as to exclude dirt and ice, to insure free and easy operation, and to avoid damage due to wracking of the sash as commonly caused in prior structures upon release from a "stuck" condition of the sash.

A further object is to provide a window structure of this character having a novel hinge construction accommodating release of the window sash from the window frame without requiring the use of tools when the sash is open and resisting release when the sash is in closed position.

A further object is to provide a window structure of this character, wherein the window frame has integrally formed therein parts constituting flashing, a drip cap, decorative trim, and a concealed hinge socket which accommodates uniform hinging action of a sash therein and eliminates problems of assembly of parts.

Other objects will be apparent from the following specification.

In the drawing:

Fig. 1 is a perspective view of the window structure assembly with parts broken away;

Fig. 2 is an enlarged fragmentary detail sectional view taken on line 5—5 of Fig. 1, and illustrating the structure in closed position;

Fig. 3 is a fragmentary detail sectional view similar to Fig. 2 and illustrating the window in open position and in condition for disassembly;

Fig. 4 is a fragmentary enlarged detail view of a modified embodiment, with parts broken away;

Fig. 5 is a sectional view taken on line 5—5 of Fig. 1;

Fig. 6 is a horizontal sectional view taken on line 6—6 of Fig. 1; and

Fig. 7 is an enlarged detail sectional view illustrating a construction of a sealing element employed in the window structure.

Referring to the drawing which illustrates the preferred embodiment of the invention, the numeral 10 designates a window frame which is formed of top and bottom rails 12 and upright stiles 14. The rails and stiles 12 and 14 are preferably formed of substantially the same cross-sectional shape or configuration and preferably are formed in the shape of metal angles, as illustrated. The ends of the rails and stiles are mitered or beveled and are suitably secured together, as by welding along said beveled edges 16, as seen in Fig. 4. In the preferred cross-sectional configuration of the parts 12 and 14, webs 18 project inwardly of the frame in substantially coplanar

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relation, and flanges 20 project perpendicularly from the webs 18 at the outer margin of the frame. The frame parts are preferably molded, cast or extruded from metal, are of uniform cross-section throughout, and are preferably formed of aluminum or other metal not subject to rust or corrosion. Apertures 22 may be formed in the frame webs 18 for anchoring the frame to a building structure (not shown). Similar openings 22 may also be formed in flanges 20 of the frame members. In the preferred form, each of the angle members forming the frame has inner face 24 of the flange 20 thereof extending in an obtuse angle to the adjacent web 18 and at a slight angle to the outer surface of the flange 20. Also, the corner defined by the junction of the webs 18 and flanges 20 of the frame members is preferably cut away at 26.

The frame is completed by a cap member 30 extending across the top of the frame and secured thereto, as by means of securing screws 32 screw-threaded in the apertures 22 in the top rail 20 of the frame. The cap 30 has a flashing flange 34 extending perpendicularly therefrom formed integrally therewith and adapted to extend flush with the webs 18 of the frame. For this purpose a projection 36 is formed at the juncture of the cap 30 and the flashing flange 34 in the plane of the flashing flange to seat in the recess 26 of the frame. A hook member 38 is preferably formed integrally with the cap 30 to fit around the free margin of the flange 20 of the top rail. The hook 38, the projection 36 and the securing members 32 cooperate to positively and fixedly anchor the cap 30 to the frame. The cap 30 terminates in a downwardly extending arcuate or tubular portion 40 preferably extending full length of the cap which in turn preferably extends full length of the top rail of the window frame. The front projecting terminal portion 40 defines a longitudinal tubular bore 42 of substantially 270 deg. in extent, having a mouth or slot 72 opening downwardly and inwardly, as best seen in Figs. 2, 3 and 5.

Window sash 50 fits within the window frame with clearance insofar as spacing of the various parts thereof from the frame flanges 20 is concerned. The sash has a frame consisting of an upper rail portion 52, a lower rail portion 54, and side rail portions 56. Each of the sash frame parts is substantially of U-shape in cross-section, preferably being formed as a metal extrusion or casting, although there is a slight addition to the top sash rail 52 which will be described. Each of the sash frame parts includes a channel web portion 55 and spaced parallel integral outer flange 57 and inner flange 58. The spacing of the flanges 57 and 58 is determined by the thickness of the window pane to be mounted therein. Thus, a single thickness window pane 51 is shown in Fig. 1, and a double pane unit of the thermally sealed type is shown in Figs. 2, 3, 5 and 6. The double pane unit consists of spaced panes 60 and a continuous marginal spacer 62 between said panes and bonded thereto to provide a dead air space between the panes. A U-shaped gasket 64 fits snugly and sealingly around the margin of the pane and preferably has one or more continuous marginal ribs 66 projecting outwardly from each side thereof to sealingly engage the inner surfaces of the adjacent flanges 57 and 58. Ribs 66 are of a depth to hold the window pane in the sash without stressing the pane and for the further purpose of providing an effective weather tight seal between the pane and the window sill. Flanges 67 preferably project from seal 64 to lap the edges of the sash. The various sash parts 52, 54 and 56 are preferably formed separately and have mitered or beveled edges 68 at which the sash elements are welded or otherwise secured together. The overall dimension of the sash will be such as to provide clearance in the window frame, as illustrated in Figs. 5 and 6.

The upper sash rail 52 has a neck or web portion

70 projecting longitudinally forwardly or outwardly therefrom, the same being of a thickness substantially less than the width of the groove or slot 72 formed in the tubular hinge socket portion 40, 42 of the cap 30. An enlarged elongated knuckle portion or hinge part 74 projects from the outer part of the neck 70, the same being of substantially circular cross-sectional shape for an extent preferably greater than 180 deg. and less than 270 deg., and being interrupted by a longitudinal concave surface 76.

The maximum transverse dimension of the hinge part 74 as measured between its convex surface and the opposed concave surface 76 will be slightly less than the width of the groove or slot 72 of the hinge socket 40 to accommodate passage of the hinge part 74 through the mouth 72 when the sash is held at a predetermined angle to the frame, approximately as illustrated in Fig. 3. Such withdrawal or disassembly of the parts and reassembly can be accomplished rapidly by manual manipulation. It will be apparent that the termination of the curved socket portion 40 at 43 substantially vertically aligned with the axis of socket 42 permits it to support the hinge knuckle 74 in an open position without danger of dislodgment unless manipulated in predetermined manner. The knuckle 74 preferably is shorter in length than the cap member 30, as seen in Fig. 4, and terminates spaced from the ends of the hinge socket-forming portion 40. Any suitable means may be provided to center the sash 50 relative to the frame 10. For this purpose I prefer to employ a stop 73 secured to knuckle 74 by securing means 75, such as a machine screw, and received loosely in a notch or slot 77 formed in the hinge socket 40. Stop 73 also serves to limit pivoting of the sash to an angular extent less than necessary to permit withdrawal of knuckle 74 through slot 72 as shown in Fig. 3. However, the stop is readily removed to permit the swing of the sash to release position. An alternative means to prevent end play of knuckle 74 constitutes self-tapping screws 78 screw-threaded in the ends of the socket bore 42 to engage the ends of the knuckle 74 within the socket 42, as seen in Fig. 4.

The inner flange 58 of each of parts 52, 54 and 56 of the sash has a groove 80 formed in its face confronting the frame web 18. Groove 80 is preferably a dovetail groove or a groove of any desired shape wider at its bottom or inner part than at its mouth. A seal extends lengthwise of each member of the sash, being anchored by the groove 80. The seal may be of any construction desired. One form of the seal is illustrated in Fig. 7, wherein a sheet metal base 82 has return bent side portions 84 adapted to clamp marginal parts 86 of a flexible sealing member 88, preferably of substantially U-shape. Member 88 is preferably formed of a resilient material, such as rubber, synthetic rubber, or a synthetic resin such as a vinyl chloride copolymer or polyethylene. Another form of seal is illustrated in Figs. 2 and 3, wherein a tubular rubber or synthetic resin seal 90 has flanges or ribs 92 formed integrally therewith and adapted to anchor in undercut inner portions of the groove 80. In Fig. 5 another type of seal element 94 is shown, which is a solid member and is formed of soft and yielding material, such as mohair or other piled fibrous material, or rubber which is readily compressible. In each construction the seal is anchored in the dovetail or undercut groove 80. In each type, the seal is pressed uniformly and continuously against the web 18 of the frame throughout its full extent around the entire margin of the window sash when the sash is in closed position spaced from said web 18.

Any suitable means (not shown) may be provided for locking the window in its closed position and for supporting the same in different angular adjustments when open.

In the assembled closed position of the window illus-

trated in Figs. 1, 2 and 5, the sealing strip carried by the outer marginal portion of the inner flanges 58 of the window sash extends continuously therearound and continuously engages with substantially uniform pressure the surface of the web portions 18 of the window frame, thereby providing a positive weathertight seal between the sash and the frame. The upper portion of the window is protected by the overhanging arcuate marginal portion 40 of the cap 30, so that moisture, snow and dirt is substantially excluded from the clearance space between the top rails of the frame and the sash, best seen in Figs. 2 and 5. The clearance space between the sash and frame at the sides thereof as illustrated in Fig. 6, and at the bottom as illustrated in Fig. 5, are not detrimental because they drain readily. Thus any collection of snow or ice at those spaces is exterior of the seal 88, or 90 or 94 in each case and is subject to drainage or release by gravity at the sides and to easy manual removal at the bottom. Removal of ice and dirt at the bottom is facilitated by the inclination of the upper surface of the web 20 of the bottom rail 12 of the window frame. The sash and the frame are spaced in their closed position so that no difficulties due to inaccurate fit or shape of contacting parts are encountered.

The weight of the sash is supported by the cap 30 at the outer portion 40 thereof, and this weight is easily sustained by reason of the mechanical interlock of the cap 30 with the frame 10 at the hook portion 38 and the projection 36 and the mechanical anchorage thereof by securing members 32. It is also interesting to observe that no leakage can occur as a result of the formation of apertures 22 in the flanges 20 of the frame parts because the same are located exteriorly of the seal. Insofar as openings 22 in the web portions 18 are concerned, they are preferably formed inwardly of the seal, as best illustrated in Fig. 2.

Upon swinging of the sash to open position, the weight of the sash continues to be transmitted to the frame 10 through the hinge parts 40 and 74. The hinge construction is so sealed and protected as to insure against sticking because foreign material is excluded from the hinge socket 42. In this connection, the screw members 78, when employed, close the ends of the sockets 42, and the slot 72 in the tubular cap part 40 is positioned lowermost so that dirt, snow and ice which might be expected to obstruct or clog an opening in the hinge socket will fall therefrom by gravity. This provides a protected hinge construction with a longitudinally uniform hinge bearing which is substantially free from sticking caused by dirt, ice or snow. In cases using the stop 73, the ends of the hinge socket are open to drain rain, etc. entering the socket 40 at notch 27. Consequently, opening movement of the window is always free, and it is never necessary to wrack the sash or otherwise risk breakage of the glass in order to open the window.

One of the important characteristics of the device resides in the integral formation of the flashing, the drip cap, and the concealed hinge at the outer portion of the drip cap. This formation is effective to prevent leakage and simplifies construction, assembly and installation. Also, the unitary formation of the frame and the hinge socket, the integral formation of the window sash and the hinge knuckle, and the flexible projecting nature of the seal strips, assure uniformity of fit and seal of windows and eliminate the necessity for special fitting of a window sash to a window frame incident to assembly.

While the preferred embodiment of the invention has been illustrated and described, it will be understood that changes in the construction may be made within the scope of the appended claims without departing from the spirit of the invention.

I claim:

1. A window frame unit adapted to dependently and hingedly support a window frame, comprising a frame having top and bottom rails and upright stiles, said rails

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and stiles being angle members and having coplanar connected webs and connected flanges projecting perpendicularly from the outer marginal portions of said webs, the top rail being cut away at the corner between said web and flange, a cap member extending substantially full length of said top rail, a flashing flange extending upwardly from said cap in substantially coplanar relation to said frame webs, a projection on said cap member seating in said frame cut out, said cap projecting beyond the flange of the top rail and terminating in a sash mounting hinge socket, and means securing said cap to said top frame rail flange.

2. The construction defined in claim 1, and hook carried by said cap and engaging the free edge of the flange of said top frame rail.

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