March 3, 1953 W. P. KESSLER ET AL 2,629,905

WINDOW

Filed Dec. 29, 1951 2 SHEETS—SHEET 1

Fig. 1

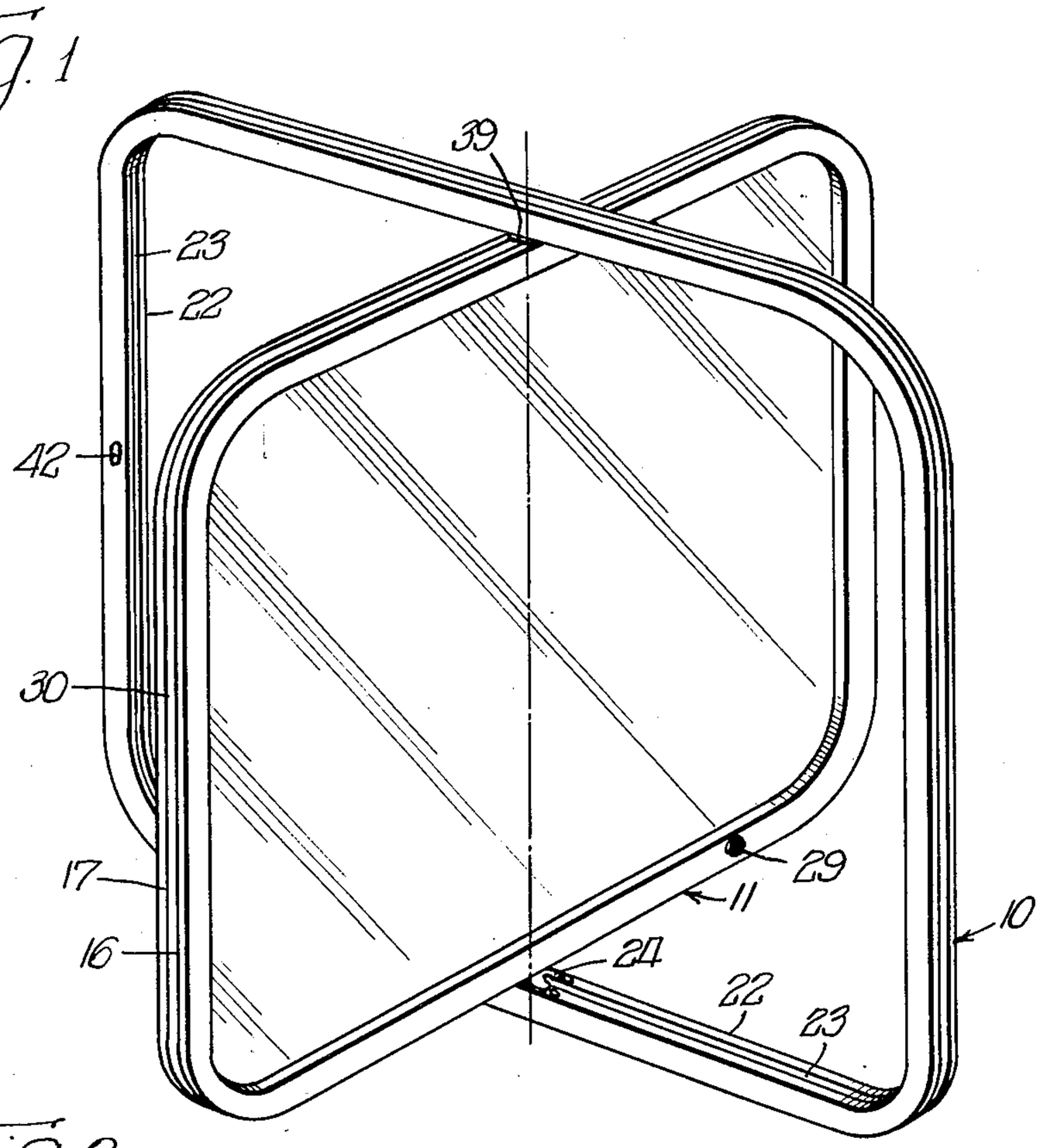

Fig. 2.

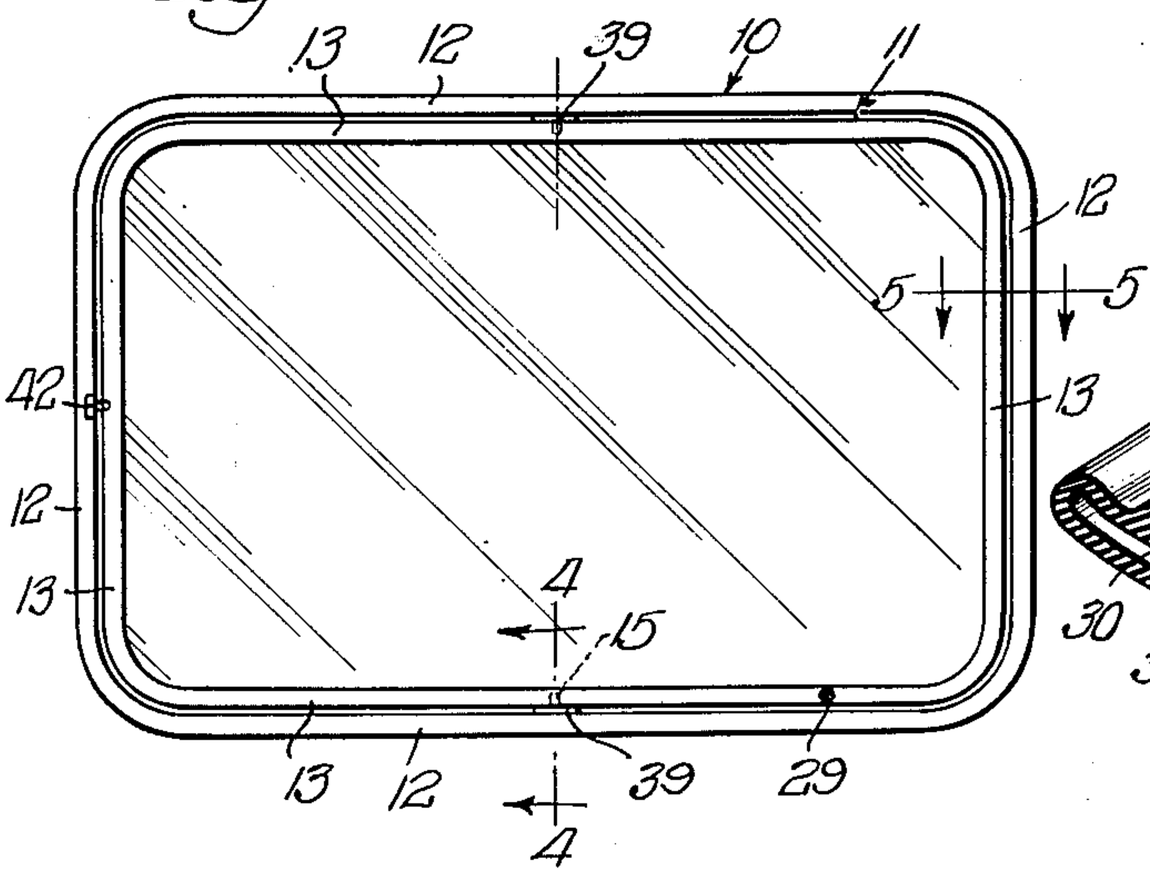

Fig. 3.

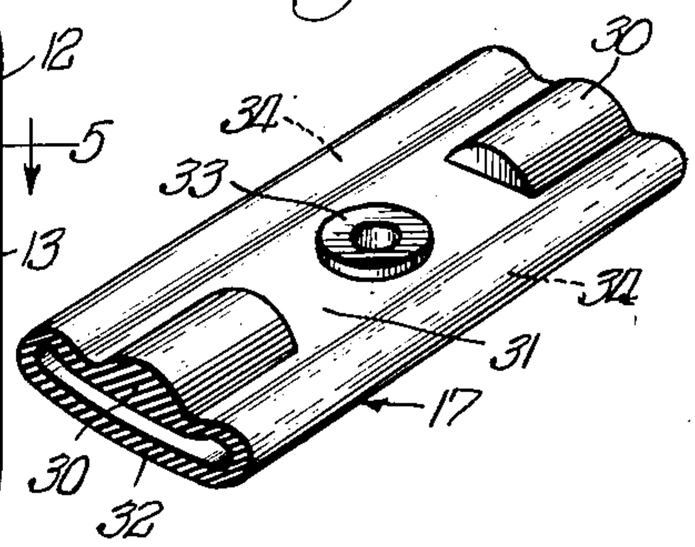

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Fig. 4

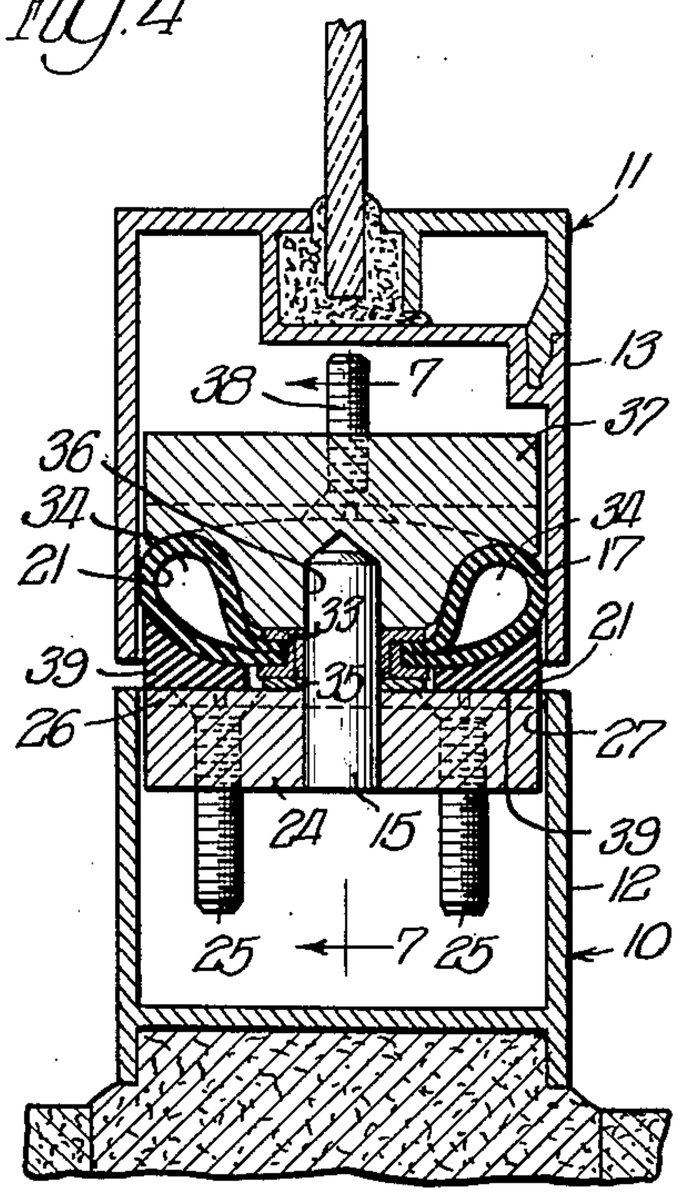


Fig. 5

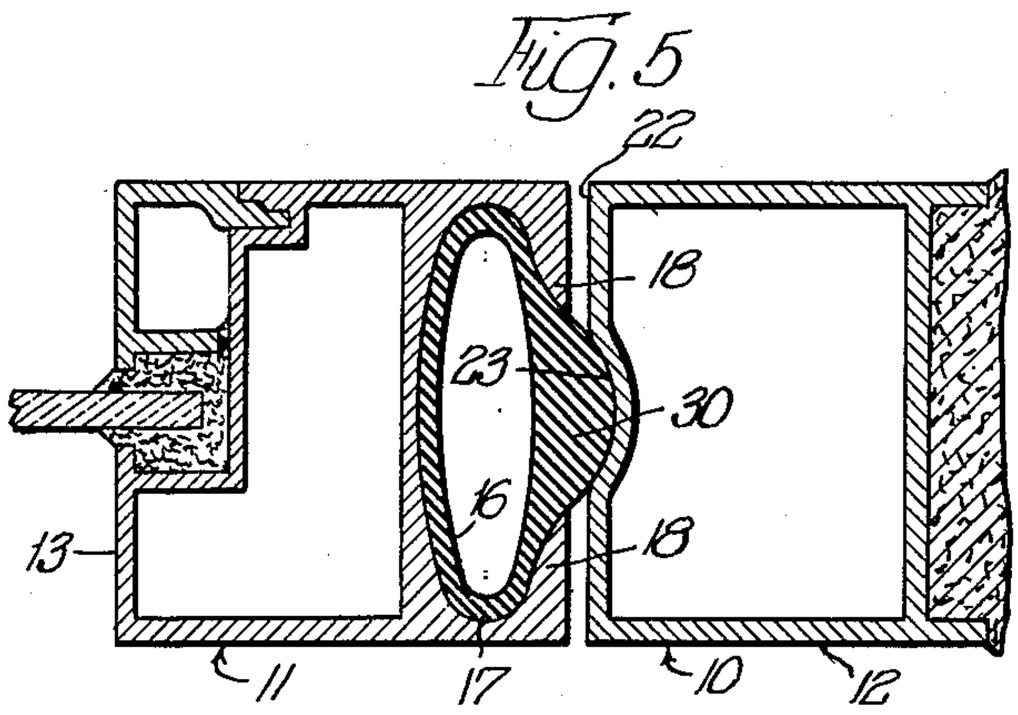


Fig. 6.

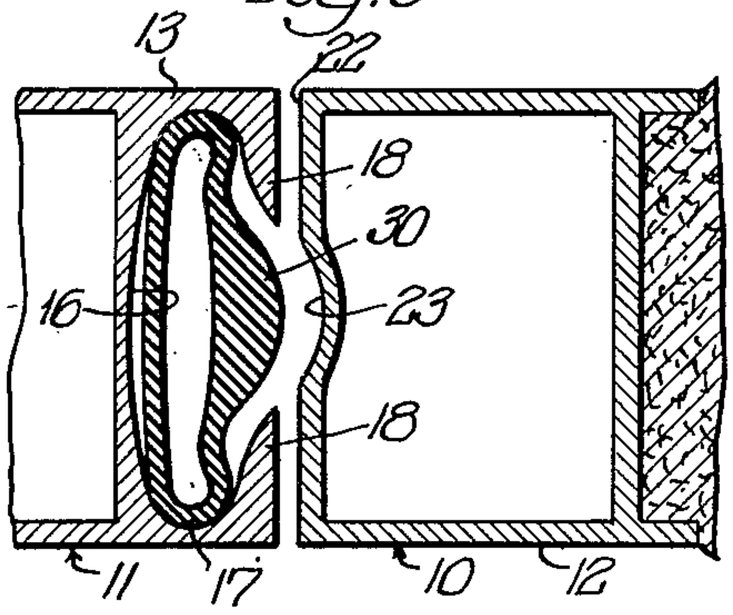
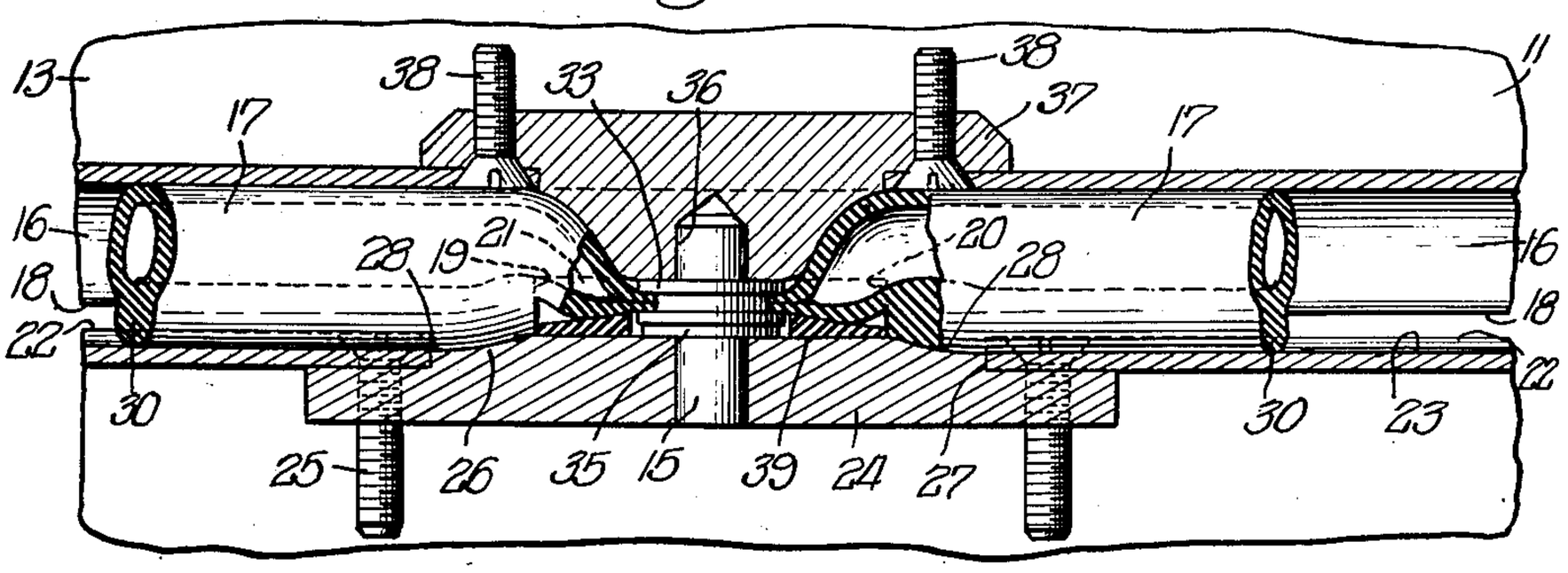


Fig. 7



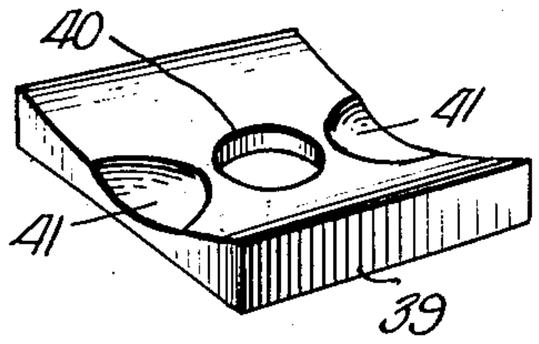


Fig. 8.

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Patented Mar. 3, 1953

2,629,905

UNITED STATES PATENT OFFICE

2,629,905

WINDOW

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Application December 29, 1951, Serial No. 264,132

5 Claims. (Cl. 20—69)

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The purpose of the present invention is to provide a window of new and improved construction which while capable of many applications is particularly well suited for air conditioned buildings, where the sash is maintained closed at all times except when being cleaned and where it must be absolutely weather-tight and secure in its closed position.

In windows for buildings, and particularly those for high buildings, the washing of the outer sides of the glass in the sash has always been a problem. The risks to the window washers are considerable, the pay rates are correspondingly high, much additional time is required in connecting and disconnecting the necessary harnesses, and the insurance which the building owners are usually required to carry on the men amounts to a substantial item.

For these reasons it has always been desirable to have windows which could be reversed so that both sides of the glass in the sash could be washed from inside the building. However, very few if any windows of the reversible type are found in buildings, apparently due to the problems involved in working out a reversible construction which will be sufficiently weather-tight when closed and at the same time be securely held against opening and protected against tampering.

One of the objects of the invention, generally stated, is to provide a window of the reversible sash type in which the sash is pneumatically locked and sealed in its closed position by a novel tamper-proof connection between the sash and the frame.

Another object is to provide a window of the type described in which the sash may be easily opened and closed, and in which the pneumatically actuated locking and sealing means may be readily disengaged from the sash for repair or replacement should occasion require.

The window of the present invention when closed is both effectively locked against opening and effectively sealed against the entrance of rain, air, dirt and other foreign matter. Yet it can be easily released, reversed, washed in its reversed position, returned to its original position, and again locked and sealed. The new window is of simple inexpensive construction, releases and locks easily, and can be opened and closed quickly and without difficulty by unskilled workers.

While the foregoing statements are indicative in a general way of the nature of the invention other more specific objects and advantages will

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be apparent to those skilled in the art upon a full understanding of the construction, arrangement and operation of the improved mounting, sealing and locking means.

A preferred embodiment of the invention is presented herein by way of exemplification but it will be appreciated that the invention is capable of being embodied in other structurally modified forms coming equally within the spirit of the invention and the scope of the appended claims.

In the accompanying drawings,

Fig. 1 is a perspective view of the improved window, showing the sash swung into an open or half reversed position;

Fig. 2 is a front view of the window, showing the sash closed;

Fig. 3 is a fragmentary perspective view of the pneumatic tube employed between the outer periphery of the sash and the inner periphery of the frame for both locking and sealing the sash with respect to the frame in the closed position of the sash;

Fig. 4 is a vertical transverse section through the bottom of the window at the location of the pivotal connection between the sash and the frame, taken on the line 4—4 of Fig. 2;

Fig. 5 is a horizontal transverse section through one of the sides of the window, taken on the line 5—5 of Fig. 2;

Fig. 6 is a view similar to Fig. 5, showing the pneumatic tube deflated preparatory to opening the sash;

Fig. 7 is a fragmentary vertical longitudinal section through the bottom of the window at the location of the lower pivot, taken on the line 7—7 of Fig. 4; and

Fig. 8 is a perspective view of one of the rubber closure blocks which conform with short sections of the pneumatic tube at the locations of the pivots to seal the sash and frame at those points.

As will be observed in the drawings, the window includes an outer stationary frame 10 of generally rectangular form, with preferably rounded corners, which frame is adapted to be anchored and sealed in any suitable manner in an opening in the wall of the building. The frame 10 surrounds and fits closely about a glazed sash 11 of the same general rounded corner form. The rail members 12 of the frame 10 and the rail members 13 of the sash 11 are both preferably constructed of extruded aluminum but either or both may be constructed of any other suitable material.

The sash 11 is pivotally connected, preferably midway between its sides, to the frame 10, the pivotal connection being effected by aligned top and bottom pivot pins 14 and 15. The sash 11 is provided about its outer periphery with a continuous partially closed channel 16, preferably of shallow C-shaped cross section, in which an inflatable rubber tube 17 is partially housed, the tube 17 being more or less completely housed in the channel 16 in the non-inflated condition of the tube (see Fig. 6).

The channel 16 in the outer periphery of the sash 11 preferably intersects the pivotal connections between the sash and frame provided by the pins 14 and 15, and is provided along its sides with inturned tube-retaining flanges 18 (see Figs. 5 and 6). At the locations of the pins 14 and 15 and for a short distance to either side thereof the flanges 18 are interrupted by being cut away, from 19 to 20 (see Fig. 7), leaving rectangular openings 21 in the outer periphery of the sash 11 through which short sections of the tube 17 are exposed for the full width of the latter (see Fig. 4).

Directly opposite the center of the channel 16 the confronting periphery 22 of the frame 10 is provided with a continuous groove 23 of narrow shallow cross section, into which a portion of the tube 17 is adapted to project when the tube is inflated to effect the desired interlock and seal (see Fig. 5).

At the locations of the pivot pins 14 and 15, and for a short distance to either side thereof (corresponding generally to the length of the rectangular openings 21 in the outer periphery of the sash), the groove 23 in the frame 10 is interrupted by the introduction of rectangular metal plates 24 to which the pins 14 and 15 are secured. The plates 24 are secured against the inner surface of the inner periphery 22 of the frame 10 by screws 25 and are provided with flat rectangular raised portions 26 which project inwardly through rectangular openings 27 provided in the inner periphery of the frame, the raised portions 26 extending into positions substantially flush with the inner periphery of the frame. The raised portions 26 of the plates 24 are preferably provided with short groove formations 28 in registration with the interrupted ends of the groove 23, which groove formations merge gradually into the planes of the raised portions 26.

The inflatable tube 17, which may be made of natural or synthetic rubber or of any other suitable material, tends to assume the partially collapsed position shown in Fig. 3 when not inflated. The tube, which is preferably stretched lengthwise slightly in its uninflated position in the channel 16 and in consequence nests snugly against the bottom of the same, is adapted to be inflated with air or other suitable gas through a valve 29, preferably of the type commonly used with the inner tubes of automobile tires. The valve 29 is located at one point in the tube and is rendered accessible from the inside of the window through a small inconspicuous aperture in the inside face of one of the rail members 13 of the sash.

The tube 17 is provided with a relatively narrow solid bead-like portion 30 of considerably greater thickness than the side and rear walls of the tube, which bead-like portion extends continuously lengthwise of the tube section except at the locations of the pivot pins 14 and 15. At those locations the bead-like portion 30 of the tube is abruptly interrupted (see Fig. 3) for a distance corresponding to the length of the rectangular openings 21 in the outer periphery of the sash 11, thereby leaving plain tube sections which are exposed through such openings.

It will be observed in Fig. 5 that the solid bead-like portion 30, which provides a positive but resiliently conformable key-like connection between the sash and the frame, is of somewhat greater thickness than both the clearance space present between the sash and frame and the depth of the groove 23 in the frame, with the result that any force acting against the sash to swing the same open will not tend to pinch off and possibly puncture any of the hollow portion of the tube but will merely subject the solid and therefore invulnerable portion to shearing stress.

It will be observed that the outer periphery of the sash and the inner periphery of the frame at opposite sides of the sealing means are spaced only far enough apart to afford sufficient swinging clearance and that they extend more or less parallel to each other in closely confronting relation for a substantial distance away from the sealing means, with the result that the sealing means, and particularly the inflated portion thereof, is effectively protected against being punctured by the insertion in such slip-like clearance space of any sort of sharp pointed instrument.

Midway and centrally of such plain tube sections the front and rear walls 31 and 32 of the tube 17 are secured solidly together by metal grommets 33, which grommets are so disposed as to leave air passages 34 in the tube along the sides thereof at opposite sides of the grommets (see Figs. 3 and 4).

The pivot pins 14 and 15 project from the plates 24 through the holes in the grommets 33, and also through bearing washers 35 positioned between the plates and the grommets, and are journalled at their ends in bearing apertures 36 in plates 37 set into the sash 11 (see Figs. 4 and 7). The plates 37 are secured by screws 38 to the sash behind the base of the channel 16 and the journaling portions thereof project into the channel 16 at the center of the rectangular opening 21, terminating just short of the outer periphery of the sash.

At the locations of the pivot pins 14 and 15 solid rubber closure blocks 39 are interposed between the plain sections of the tube 17 and the raised portions 26 of the plates 24 from which the pins project (see Figs. 4 and 7). The blocks 39 are generally flat and rectangular in shape and fit closely within the rectangular openings 21 in the outer periphery of the sash, in positions in which they protrude slightly with respect to the outer periphery of the sash. The blocks 39 (see Fig. 8) are provided with holes 40 for the reception of the pins, are preferably relatively thin from end to end in line with the holes 40, are preferably relatively thick from end to end along their sides, and are preferably provided at the ends of their thin center zones with shallow recesses 41 to better conform with the plain outer wall sections of the tube 17 between the ends of the interruptions in the bead-like portion 30 of the tube.

A simple mechanical lock 42 of any suitable construction is preferably provided at a convenient location on the frame 10 or sash 11 for positively locking such members together after they have been closed, to insure against acciden-

tal opening in the event the tube 17 should for any reason become unintentionally deflated.

From the foregoing it will be understood that to open the sash 11 and reverse the same for washing it is merely necessary to relieve the pressure of the air in the tube 17 by tripping the valve 29, whereupon the tube 17 will collapse to a point where the solid bead-like portion 30 of the tube is clear of the groove 23 in the frame 10, leaving the sash free to be swung open. To thereafter return the sash to its locked and sealed condition the sash is swung back into its closed position and the tube 17 is inflated by the application of a source of compressed air to the valve 29, the source preferably being either a small readily handled cylinder of compressed air, or a small hand pump, either of which can be easily carried about by the washer.

When the tube 17 is thus inflated in the closed position of the sash the solid bead-like portion 30 of the tube will be projected across the joint between the sash and the frame into the groove 23, the projection being uniform throughout the entire length of the groove and at all sides of the sash, in which projected position the portion 30 will not only afford a continuous weather-tight connection between the sash and the frame but will provide in effect a continuous solid locking key across the joint capable of withstanding in shear stress any and all forces tending to swing the sash in either direction. At the locations of the pivot pins 14 and 15, where the bead-like portions 30 on the tube 17 are temporarily interrupted, the inflated side air passages 34 in the plain sections of the tube 17 will press the sides of the tube snugly against the closure blocks 39 and the latter will in turn press snugly against the mounting plates 24 for the pins, producing bridging weather-tight connections at those locations.

The sides of the solid portion 30 of the tube 17 are both preferably disposed in the inflated condition of the tube at more than the critical angle of friction with respect to the direction of swing of the sash and the retaining edges of the inturned flanges 18 between which the tube is held, with the result that a frictional interlock is affected transversely of the sash between the latter and the projecting portion of the tube, which interlock will be maintained with but a comparatively small amount of pressure in the tube. In other words, the transverse locking effect of the projecting portion of the tube 17 is not dependent upon the maintenance of any particular degree of pressure in the tube—only enough pressure being required to inflate the tube to a point where the projecting portion thereof will be pressed into snugly sealed conformity with the groove 23 in the frame.

While the sash 11 is shown as pivoted on a vertical axis midway between its sides it will of course be appreciated that it might instead be pivoted nearer one side than the other, also that it might be pivoted on a horizontal rather than a vertical axis.

We claim:

1. In a window of the character described, a sash, a frame surrounding the sash, a pivotal connection between the sash and frame for permitting the sash to be swung from a position in the plane of the frame into an angular position relative thereto, a channel about the outer periphery of the sash opening toward the inner periphery of the frame, said channel being provided at the outer periphery of the sash with narrowly spaced

apart inturned flanges, a groove in the inner periphery of the frame opposite the channel, and an inflatable rubber tube housed in the channel and provided with a solid integral bead-like wall portion of materially increased thickness and of outwardly convex shape at the outer side only thereof, which solid portion upon inflation of the tube is adapted to be partially projected from the channel between the inturned flange into the groove to form a solid locking and sealing key between the sash and frame.

2. In a window of the character described, a sash, a frame surrounding the sash, a pivotal connection between the sash and frame for permitting the sash to be swung from a position in the plane of the frame into an angular position relative thereto, a channel about the outer periphery of the sash opening toward the inner periphery of the frame, a groove in the inner periphery of the frame opposite the channel, and an endless inflatable rubber tube housed in the channel, which tube upon being inflated is adapted to project from the channel into the groove to form a seal between the sash and frame about all sides of the latter, said pivotal connection between the sash and frame consisting of aligned pivot pins, which pins are arranged in the median plane of the tube in intersecting relation to the latter, and said tube at the location of the pins being apertured for the passage of the pins and sealed off about the edges of such apertures to leave inflatable side portions in the tube at opposite sides of the apertures, which side portions when the tube is inflated are adapted to seal against the frame about said pivotal connections.

3. In a window of the character described, a sash, a frame surrounding the sash, a pivotal connection between the sash and frame for permitting the sash to be swung from a position in the plane of the frame into an angular position relative thereto, a channel about the outer periphery of the sash opening toward the inner periphery of the frame, a groove in the inner periphery of the frame opposite the channel, said channel being of C-shaped cross section and being provided along its margins with narrowly spaced apart inturned flanges, and a substantially flat but inflatable rubber tube housed in the channel with the sides of the tube retained in the channel by said flanges, which tube upon being inflated is adapted to project at its center portion only from the channel between the flanges into the groove to form a seal between the sash and frame.

4. In a window of the character described, a rectangular sash having rounded corners, a frame of the same shape surrounding the sash, a pivotal connection between the center of the sash and the center of the frame for permitting the sash to be reversed in position in the frame, a channel about the outer periphery of the sash in the plane of said pivotal connection, which channel opens toward the inner periphery of the frame, a groove in the inner periphery of the frame opposite the channel, an endless inflatable rubber tube housed in the channel, which tube upon being inflated is adapted to project from the channel into the groove to form a seal between the sash and frame about all sides of the same, said pivotal connection between the sash and frame consisting of aligned pivot pins, which pins are arranged in the median plane of the tube in intersecting relation to the latter, said tube at the location of the pins being apertured for the passage of the pins and sealed off about

the edges of such apertures to leave inflatable side portions in the tube at opposite sides of the apertures, and apertured rubber closure blocks fitted over the pins against the inner periphery of the frame in confronting relation to said inflatable side portions, said inflatable side portions being adapted to bear against and conform to said blocks when the tube is inflated, whereby to provide a seal at the locations of the pins.

5. In a window of the character described, a glazed metal sash of generally rectangular form provided with straight side sections and rounded corner sections, a stationary metal frame of the same shape surrounding the sash, pivotal connections at opposite sides of the sash between the sash and the frame for pivotally mounting the sash in the frame and permitting the sash to be swung open about said connections from a position in the plane of the frame into an angular position relative thereto, a substantially continuous outwardly opening channel about the outer periphery of the sash in both the straight and rounded sections of the latter, which channel opens toward the inner periphery of the frame and is materially reduced in width adjacent the outer edge of the sash by inturned flanges on said edge which confront each other in spaced relation and form therebetween a relative narrow slot in communication with said channel, a groove about the inner periphery of the frame, which groove is of substantially less width than the frame and is of approximately the same width as the narrow slot between the inturned flanges on the sash, which slot the groove directly confronts in the closed position of the sash, and an inflatable rubber tube housed in the channel and provided with a solid integral bead-like wall portion of materially increased thickness and of outwardly convex shape at the outer side only thereof, which solid portion upon inflation of the tube is adapted to be partially projected from the channel between the inturned flanges into the groove to form a solid locking and sealing key between the sash and frame.

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