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DOUBLE PANE WINDOW STRUCTURE

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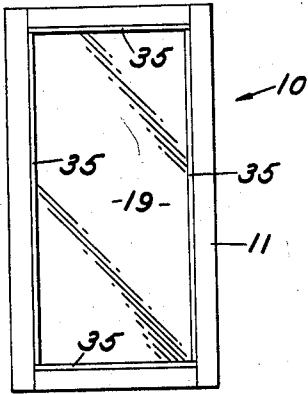


FIG. 1

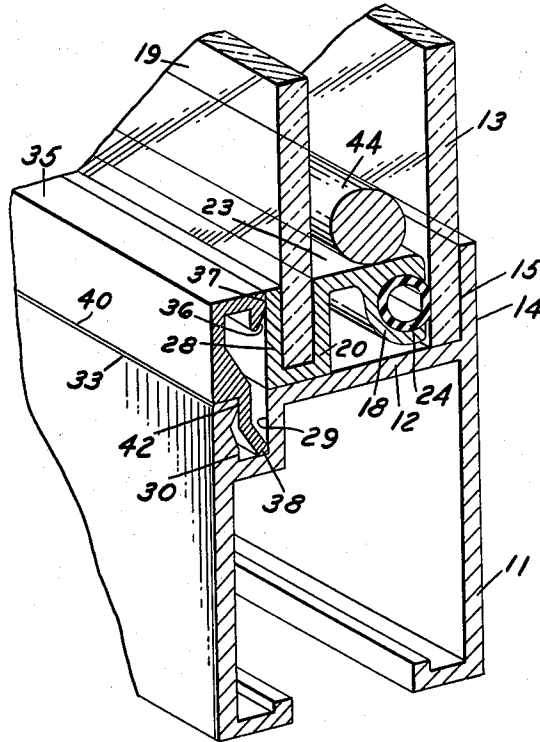


FIG. 2

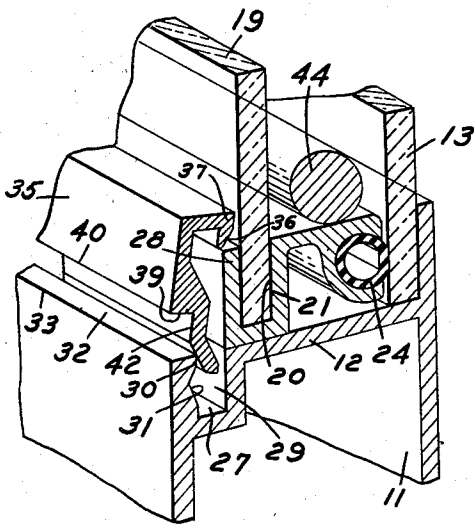


FIG. 3

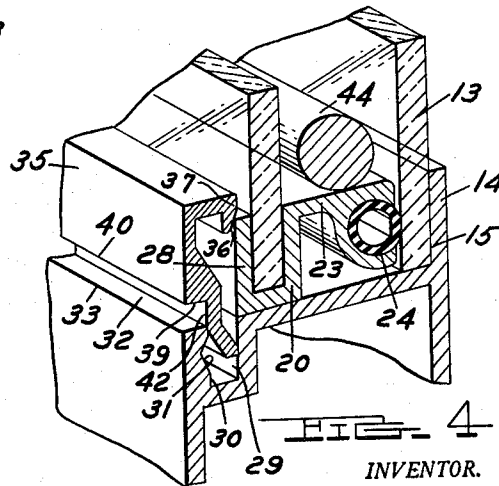


FIG. 4

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DOUBLE PANE WINDOW STRUCTURE

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3 Claims. (Cl. 20—56.4)

This invention relates to windows and especially windows having a plurality of panes.

The window has a wide variety of uses such as in the walls, doors or ceilings of stationary or mobile structures. A typical use is in dwellings or in other buildings used for housing people.

Generally the purpose of a plural pane window is to provide insulation. Heretofore plural pane windows have been provided by mounting ordinary storm windows adjacent conventional single pane windows. Storm windows must usually be put up and taken down seasonally, and this usually necessitates considerable strenuous and time-consuming effort.

Heretofore various types of double pane window structures have been provided to eliminate the necessity for the conventional storm window. One general type requires a hermetic seal between the panes for retaining an atmosphere of dried gas such as nitrogen to prevent condensation on the pane interiors. This type window is relatively expensive. In another general type the frame is provided with holes so that the space between the panes can breathe. This structure is unsatisfactory because it does not prevent condensation on the pane interiors in all situations and at the same time insects and dirt get in between the panes so that the window must frequently be dismantled for cleaning purposes.

An object of this invention is to provide a simple, inexpensive double pane window structure which is sealed tightly enough to eliminate the necessity for frequent internal cleaning and which is free from internal condensation. Another object of the invention is to provide a structure which can be quickly and simply dismantled and reassembled should internal cleaning or pane replacement be necessary.

The invention generally contemplates mounting two panes on a frame with an ordinarily air-tight seal between the panes and providing a desiccant in the space between the frames to absorb moisture for preventing condensation. The panes are secured to the frame by frictionally resiliently fixed glazing clips. The glazing clips and frame have apposed shoulders extending generally perpendicular to the planes of the panes and having exposed edges so that the clips can be detached by simply inserting a tool between the shoulders and spreading them apart. One form of the invention is shown in the accompanying drawings.

Fig. 1 is an elevational view of a window embodying this invention.

Fig. 2 is an enlarged sectional perspective view illustrating structure of the window.

Fig. 3 is similar to Fig. 2 except that a glazing clip is shown in a different position.

Fig. 4 is similar to Fig. 3 except that the glazing clip is shown in a different position.

The window 10 shown in the drawings has a frame 11 adapted to be movably or fixedly mounted in a window opening such as in a wall, door, ceiling or other part of a supporting structure not shown. Frame 11 has an axially

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extending portion 12 within which a preferably transparent window pane 13 fits. A flange 14 projects inwardly of axial portion 12 for engaging peripheral portions of the outer face of pane 13. A glazing compound 15 is preferably provided between flange 14 and pane 13.

A second frame 18 supports a second pane 19, also preferably transparent, within axial portion 12 of frame 11 and in spaced relation from pane 13. Frame 18 preferably comprises a plurality of glazing strips each having a U-shaped channel 20 receiving an edge portion of pane 19. A glazing compound 21 is preferably provided between pane 19 and channel 20. Pane 19 is somewhat smaller than pane 13 so that when glazing strips 20 are fitted around it, the glazing strips will fit within axial portion 12 of frame 11. Each glazing strip 18 has a portion 23 extending laterally of U-shaped channel 20 toward pane 13. Extension 23 is provided with a preferably tubular sealing element 24 which engages against the interior face of pane 13. Seal 24 is formed of a resiliently distortable material such as a natural or synthetic rubber or a plastic.

Frame 11 has a recess 27 adjacent outer leg 28 of channel 20 and extending generally transversely of axial portion 12. Recess 27 has an inner wall 29 and an outer wall 30 which may be of re-entrant form as shown at 31. Frame 11 has a shoulder 32 adjacent outer recess wall 30 extending transversely of the general plane of the window and having an exposed outer edge 33.

Inner frame 18 and panes 13 and 19 are secured on outer frame 11 by a plurality of elongate glazing clips 35. Each clip has a preferably cammed finger 36 adjacent its upper edge portion 37 (as Figs. 2-4 are viewed) and has a downwardly projecting edge portion 38. Clip 35 has an intermediate shouldered portion 39 with an outer edge 40.

In assembled relation of the parts (Fig. 2), upper edge 37 of the glazing clip engages outer leg 28 of U-shaped channel 20, and lower edge portion 38 of clip 35 engages against inner wall 29 of recess 27. Shoulder 39 on the clip is engaged against shoulder 32 on frame 11, and an intermediate portion 42 of the clip adjacent shoulder 39 is engaged against outer wall 30 of the recess. Edges 33 and 40 of shoulders 32 and 39 respectively are exposed at one face of the window. Edge portions 37 and 38 of clip 35 are stressed outwardly or to the left as Fig. 2 is viewed so that the clip is frictionally engaged with inner frame 18 and outer frame 11.

Clip 35 forces frame or strip elements 18 inwardly or to the right as Fig. 2 is viewed so that tube 24 is sealingly engaged against the inner face of pane 13 as shown. The seal provided by tube 24 is adequate to prevent any appreciable movement of air into and out of the dead space formed by the panes and frame members. A desiccant is provided in the dead air space to absorb moisture from the air and prevent condensation on the inner surfaces of the panes upon external changes of temperature. The desiccant preferably comprises a cartridge 44 of a form-retaining material which has substantially the same size in moist and dry conditions. An example of a suitable material is an amorphous, porous silica gel of the type which changes color to indicate moisture content.

In use it may be assumed that window 10 has been assembled in a window opening. The glazing compound at 15 and 21 provides generally permanent air-tight joints between pane 13 and frame 11 and between pane 19 and inner frame 18. Tube 24 provides a detachable seal against pane 13. While these seals provide a generally air-tight space between the panes, they do not provide a hermetic seal in the ordinary sense of the word. A certain amount of air leakage may occur around the seals because of thermal expansion and contraction of air in the dead space, barometric pressure changes, and the like.

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Desiccant cartridge 44 is adequate to keep the air in the dead space dry over a relatively long period of time to prevent moisture condensation on the interior surfaces of the panes. However, in the course of time the desiccant may become saturated due to slight leakage of moist air into the dead space. Also leakage may carry a small amount of dirt into the dead air space so that the interiors of the panes in the course of time may become dirty. Consequently it may be desirable to remove pane 19 for cleaning purposes or for drying or replacing cartridge 44.

To remove pane 19 a tool such as a screw driver is inserted in the juncture between edges 33 and 40 of shoulders 32 and 39. The shoulders are forced apart, shifting clip 35 upwardly as Figs. 2-4 are viewed relatively to frame 11 to disengage upper edge 37 of the clip from outer leg 28 of inner frame member 18. The clip is then lifted upwardly to withdraw its lower edge 38 from recess 30 thereby exposing inner frame 18. Inner frame 18 and pane 19 are withdrawn from outer frame 11 to facilitate cleaning the interior surfaces of the panes or replacement or drying of desiccant cartridge 44.

To reassemble the window, inner frame 18 with its pane 19 and desiccant cartridge 44 are slidably inserted within frame 11. Lower edge 38 of clip 35 is inserted in recess 29, and upper edge 37 of the clip is positioned against outer element 28 of frame 18 so that the parts are generally in the position shown in Fig. 3. Clip 18 is then forced downwardly as Figs. 2-4 are viewed. Wedge element 36 forces upper edge 37 of the clip outwardly so that intermediate portion 42 of the clip bears against outer wall 30 of the recess and so that lower edge 38 of the clip is levered against inner wall 29 of the recess.

This position of the parts is illustrated in Fig. 4. The clip is under stressed condition with its edges frictionally engaging inwardly against frame members 11 and 18 and with its central portion frictionally engaging outwardly against frame member 11. Frame 18 is forced inwardly so that tube 24 again seals against pane 13. Clip 35 is then forced downwardly to engage shoulder 39 against shoulder 32 on outer frame member 11 as illustrated in Fig. 2.

It is important to note that the juncture between shoulders 39 and 32 is in exposed position and that a tool may be inserted between the shoulders in a direction transverse to the general planes of panes 13 and 19. This structure facilitates simple, rapid breaking of the joint for removal of the outer pane 19. In the event that corrosion occurs at the joint such as through the action of water, cleaning materials, and the like, the corroded joint can be quickly and easily broken apart by running a relatively thin blade such as a knife blade along the joint. Clip 35 may then be removed in the manner described.

The window can be quickly and conveniently dismantled and reassembled by an unskilled person and without special tools.

I claim:

1. Window structure comprising, a window pane, a window frame, means providing a glazing element removably mounting said pane on said frame, a clip for detachably securing said glazing element in pane mounting relation on said frame, said glazing element having a face portion, said frame having a shoulder which is spaced from said face portion and which extends generally in a plane transverse to the plane of the window pane, said clip having a shoulder extending generally in the same direction as the frame shoulder, said shoulders being in interfacial engagement, said clip having a surface engaging a surface of said frame adjacent the interfacing

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shoulders, said clip having a face portion engaging said face portion of said glazing element, said clip being stressed between its said surface and face portion so that said surfaces and face portions frictionally resist movement of said clip relative to said glazing element and frame, said surface of said clip and said face portion of said glazing element lying in generally parallel planes so that said interengaged surfaces and said interengaged face portions are generally rectilinearly slidably relative to each other for detaching said clip from said frame and glazing element, said interfacing shoulders defining a crack exposed at an outer face of said window structure into which a tool can be inserted to produce generally rectilinear relative movements of said surfaces and face portions.

2. The combination defined in claim 1 wherein said surface on said clip has generally flat planar form, the plane of which extends generally parallel to the plane of said window pane.

3. Window structure comprising, a window pane, a window frame, means providing a glazing element removably mounting said pane on said frame, a clip for detachably securing said glazing element in pane mounting relation on said frame, said glazing element having a face portion, said frame having a shoulder which is spaced from said face portion and which extends generally in a plane transverse to the plane of the window pane, said clip having a shoulder extending generally in the same direction as the frame shoulder, said shoulders being in interfacial engagement, said clip having a surface engaging a surface of said frame adjacent the interfacing shoulders, said clip having a face portion engaging said face portion of said glazing element, said clip being stressed between its said surface and face portion so that said surfaces and face portions frictionally resist movement of said clip relative to said glazing element and frame, said surface of said clip and said face portion of said glazing element lying in generally parallel planes so that said interengaged surfaces and said interengaged face portions are generally rectilinearly slidable relative to each other for detaching said clip from said frame and glazing element, said interfacing shoulders defining a crack exposed at an outer face of said window structure into which a tool can be inserted to produce generally rectilinear relative movements of said surfaces and face portions, said face portion of said clip including a portion disposed at an angle to said face portion of said glazing element and another portion which engages said portion of said glazing element in assembled relation of the parts, said angled portion providing a wedge engaging said face portion of said glazing element and urging said clip toward its said stressed condition upon assembly of the parts.

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