Sept. 10, 1968 S. C. HART-STILL 3,400,505

WINDOW FRAMES

Filed Sept. 29, 1965 2 Sheets-Sheet 1

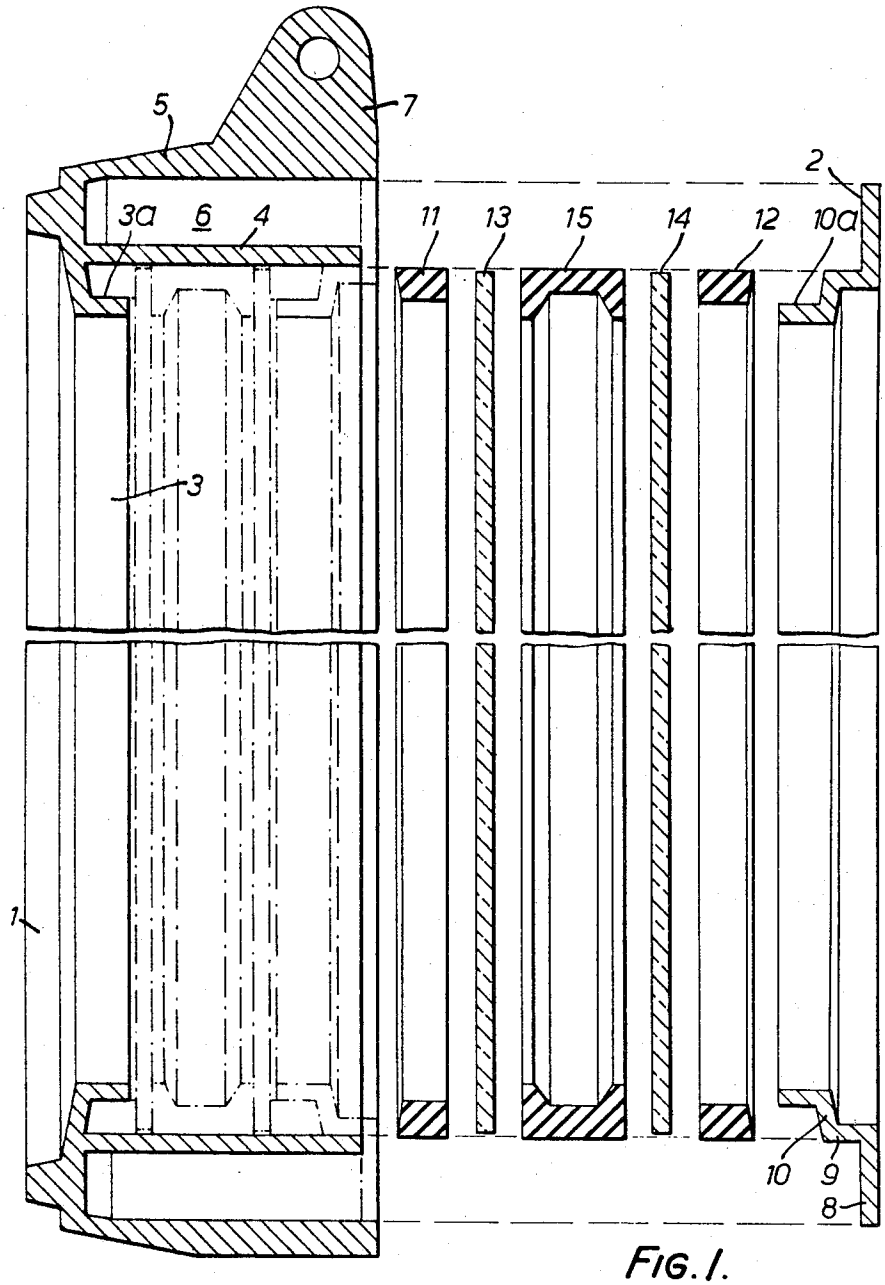


FIG. 1.

INVENTOR
SYDNEY CHARLES HART-STILL
BY
Holcombe, Wetherill & Brisebois
ATTORNEYS

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Filed Sept. 29, 1965 2 Sheets-Sheet 2

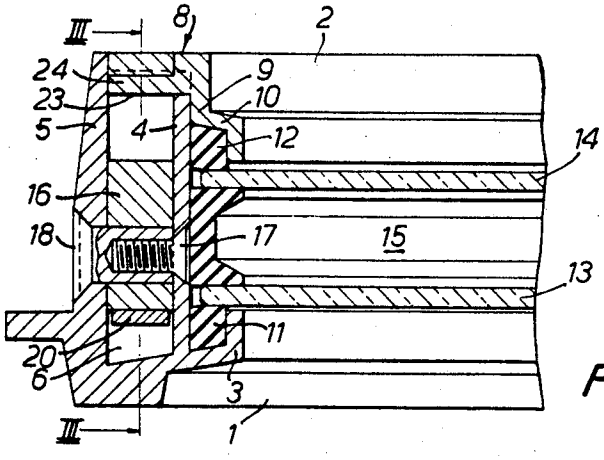


FIG. 2.

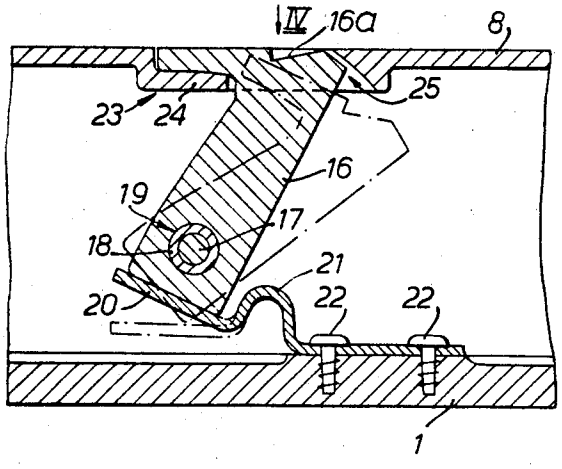


FIG. 3.

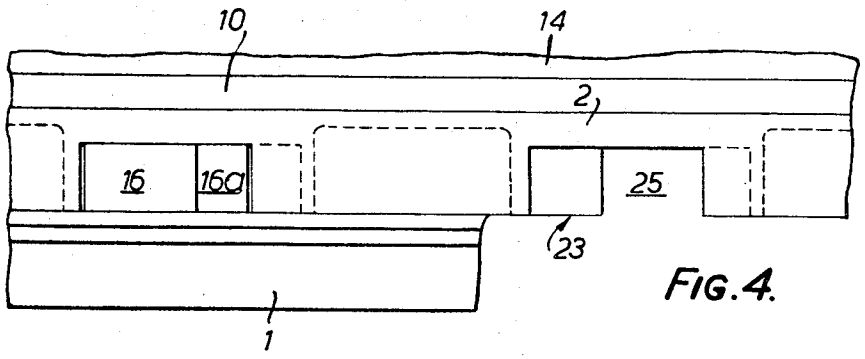


FIG. 4.

INVENTOR
SYDNEY CHARLES HART-STILL
BY
Holcombe, Wetherill & Brisebois
ATTORNEYS

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WINDOW FRAMES

Sydney Charles Hart-Still, 79A St. Marks Road, Bush Hill Park, Enfield, Middlesex, England

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6 Claims. (Cl. 52—476)

ABSTRACT OF THE DISCLOSURE

A thermoplastic window frame, which may be injection molded, having two one piece members having pane retaining flanges, the first of which is formed with a pair of spaced upstanding circumferential walls defining a non-reentrant peripheral slot, the second of which seats on the free edges of the walls to seal off the slot, and clamping clips pivotally mounted in the slot.

A double-glazing window frame assembly includes a first generally planar frame member having an inwardly projecting flange and a pair of spaced-apart upstanding peripheral walls defining a slot therebetween, and a second generally planar frame member constructed to seat on the exposed edges of the upstanding peripheral walls to seal off the slot and to provide an inwardly directed flange. Preferably the frame members are fabricated from thermoplastics material.

The invention also includes a double-glazed window frame comprising operatively assembled first and second frame members as set forth above, two panes of glass located within the frame and separated from each other and from the flanges by peripheral resilient sealing members, and clamping means whereby the first and second frame members are releasably held together to retain the panes of glass and sealing members firmly in assembled relationship.

The clamping means conveniently comprises a plurality of resiliently biassed clips mounted at intervals around one of the frame members and a corresponding set of catch engaging members in the other of the frame members.

The invention will now be described with reference to the accompanying drawings of which:

FIG. 1 is a transverse cross-sectional view of the component parts of a double-glazed window frame according to the invention shown in exploded form for the sake of clarity,

FIG. 2 is a fragmentary transverse cross-section of a frame similar to that illustrated in FIG. 1 shown in assembled relation and including in section the preferred clamping means of the invention.

FIG. 3 is a sectional view taken on the line III—III in FIG. 2, and,

FIG. 4 is an elevation of a portion of the second frame member of FIGS. 2 and 3, viewed along the direction of IV indicated in FIG. 3.

As shown in FIG. 1, a double-glazing window frame constructed in accordance with the present invention comprises two generally planar frame members. In the embodiment shown, the front and rear frame members, **1**, **2** respectively, are injection mouldings of thermoplastics material. The first or main, frame member **1** has an inwardly directed flange **3** for retention of the glazing assembly, and a pair of spaced-apart upstanding peripheral walls **4** and **5**. The two walls define a peripheral slot **6**, and the outer wall **5** is higher than the inner wall **4**. Fittings such as hinges **7**, are moulded integrally with the frame. The second frame member **2** has an outwardly extending peripheral flange **8** which, when the frame **2** is

assembled with the main frame, seats on the wall **4** and abuts the wall **5** thus sealing off the slot **6**. A peripheral wall portion **9** of the frame member **2** in use makes a sliding fit within the wall **4** of the main frame, and carries an internally extending flange **10** for retention of the glazing assembly.

Both the flange **3** and the flange **10** are provided with a peripheral cavity, **3***a*, **10***a*, respectively to accommodate peripheral resilient rubber sealing gaskets **11** and **12**. When the window is assembled, the two panes of glass **13**, **14** are separated from the flanges **3** and **10** by the gaskets **11** and **12** respectively, and from each other by a further peripheral resilient rubber gasket **15**. The panes **13** and **14** are inserted into the main frame in the order shown and described, and the second frame member **2** is then placed in position in the frame member **1** and secured to the latter by suitable clamping means.

The cavity **6**, in addition to saving weight, adding strength and providing additional thermal insulation, may also be used as a housing for the clamping means, one form of which is shown in FIGS. 2 and 4.

Basically the fastening means consists of a number of spring loaded catches pivotally mounted in the cavity **6** at spaced intervals around the frame member **1**, which engage in corresponding apertures in the frame member **2**. Each catch consists of an approximately L-shaped member **16**, which is pivotally mounted between the walls **4** and **5** by interengaging complementarily screw threaded elements **17**, **18** which have countersink heads engaging in conical bores in the walls **4**, **5** respectively. The spindle formed by the members **17** and **18** passes through a bore **19**, through the free end of the shank of the member **16**, and the foot portion of the latter in use engages with the frame member **2**. A leaf spring **20**, having a bight **21** to aid its flexibility, is secured to the base of the cavity **6** by two self-tapping screws **22** and bears against the flat end of the shank of the member **16** when the latter is in its operative position.

In order that the foot of the member **16** may lie flush with the surface of the frame member **2**, the apertures in the latter are recessed. The frame member **2** illustrated in FIGS. 2 to 4 is moulded with a number of sunken portions **23** each of which includes a web portion **24** adjacent which is a slot **25**. The depth to which the web **24** is recessed below the main surface corresponds to the thickness of the foot portion of the member **16**. The positions taken up by the member **16** are most clearly shown in FIG. 3. During use, the member **16** is held in position shown in full lines in FIG. 3, by means of the leaf spring **20**. To fit the two frame members together after assembling the panes and gaskets in the main frame member **2**, each of the members **16** is depressed into the position shown in broken lines in FIG. 3. This position is stable since the corner of member **16** contacting the spring **20** has travelled to an overcentre position relative to the spring, while the bight **21** acts as a stop to prevent excessive downward movement of the member **16**. When all the members **16** have been depressed, the frame member **2** is located in position and the members **16** are pivoted into gripping engagement with the corresponding webs **24**. The assembly of panes and gaskets are then held securely in the frame, the relative dimensions of the component parts being such that the gaskets are held in compression to provide an air, dust and moisture seal between the frame members **1**, **2** and the panes **13**, **14**. If at any time it becomes necessary to dismantle the window for cleaning or replacement of one or both panes the members **16** may be depressed simply by the application of pressure on the angled face **16***a*, into the lower position.

It will be noted that by making the overall dimensions of the panes less than the dimensions of the area bounded

by the wall **4**, and by making the axial thickness of the gaskets **11** and **12** greater than the depth of the recesses **3***a*, **10***a* respectively, the panes are supported resiliently and do not touch the frame members at any point.

The invention is particularly applicable to window frames of thermoplastics material which may conveniently be injection moulded. Materials which are suitable for this purpose may be found in the range of acetal polymers, and vinyl polymers, and will have the following properties:

	Polyacetal	Rigid polyvinyl-chloride
Specific gravity	1.410–1.425	1.38–1.40
Tensile strength (at 23° C.) (lbs./sq. in.)	8,800–10,000	8,500–9,000
Elongation (at 23° C.) percent	15–60	5–40
Flexural yield strength (lbs./sq. in.)	13,000–14,000	13,500
Flexural modulus (at 23° C.) (lbs./sq. in.)	375,000–400,000	350,000
Compressive strength (lbs./sq. in.)	4,500–5,000	8,000–8,500
Water absorption (at 23° C. equilibrium 50% R.H.), percent	0.16–0.20	0.05–0.08
Heat distortion temp. (at 66 lbs./sq. in.) °C.	170	74
Deformation under load (2,000 lbs./sq. in. at 50° C.) percent	0.5–1.0	----

A suitable acetal copolymer is that marketed by Imperial Chemicals Industries under the registered trademark "Alkon." A suitable vinyl polymer is that marketed by Bakelite Limited under the registered trademark "Vybak."

Windows as illustrated have the following advantageous properties:

(1) They can be produced by injection moulding as finished one piece components, and require no further fabrication in the nature of a major assembly operation.

(2) They are of greater dimensional accuracy than can be produced by fabricating by normal production methodsf rom wood, steel or aluminium alloy.

(3) They require no additional protective treatment either initially or in later use.

(4) They may incorporate double glazing as standard practice and can be easily dismantled to replace broken glass, renew moisture absorbing material (if found to be required) or internal cleaning.

(5) They are dry-glazed, i.e., do not require putty.

Although the specific embodiment described above is a double glazed unit, it is also possible to use window frames according to the invention for single glazing purposes.

I claim:

1. A window frame assembly comprising in combination:

(a) a first one-piece injection folded frame member made of thermoplastic material and having a continuous glass retaining flange extending inwardly of said first frame in a direction parallel to the plane of the latter, and a pair of spaced-apart peripheral walls upstanding perpendicular to the plane of the frame and defining therebetween a transversely unobstructed slot having an open end, and

(b) a corresponding second one-piece injection-molded frame member made of thermoplastic material having a continuous flange portion extending inwardly of said second frame in a direction generally parallel to the plane of the latter,

said second frame member being retained in superposed abutting relation on the upstanding walls of said first frame member thereby sealing off said slot and providing by the cooperation of its continuous flange portion a second glass retaining flange which cooperates with said continuous glass retaining flange of said first frame member to retain glass panes within the frame assembly, and

(c) fastening means positioned in said slot and cooperating means on said second frame member, positioned to be engaged by said fastening means to hold said second frame member in said superimposed abutting relation.

2. The window frame of claim **1**, wherein said glass retaining flanges of said first and second frame members have internally extending flanges to accommodate and retain resilient rubber sealing gaskets.

3. A window frame assembly comprising in combination:

(a) A first one piece injection molded frame member made of thermoplastic material and having a continuous glass retaining flange extending inwardly of said first frame in a direction parallel to the plane of the latter, and a pair of spaced-apart peripheral walls upstanding perpendicular to the plane of the frame and defining therebetween a transversely unobstructed slot having an open end, and

(b) a corresponding second one-piece injection molded frame member made of thermoplastic material having a continuous flange portion extending inwardly of said second frame in a direction generally parallel to the plane of the latter.

said second frame member being retained in superposed abutting relation on the upstanding walls of said first frame member thereby sealing off said slot and providing by the cooperation of its continuous flange portion a second glass retaining flange which cooperates with said continuous glass retaining flange of said first frame member to retain glass panes within the frame assembly, and

said assembly being provided with clamping means comprising a plurality of resiliently biased clips located at intervals around the perimeter of said assembly, each clip being pivotally mounted on a corresponding pivot fixed between said spaced-apart peripheral walls to extend transversely across said slot defined therebetween and a corresponding set of clip-engaging members in said second frame member.

4. The window frame assembly of claim **3** in which each of said resiliently biased clips is of approximately L shape, and the "foot" of the L engages in a corresponding recessed aperture in the second frame member to lie flush with the surface of the latter.

5. The window frame assembly of claim **4** in which each clip is provided with resilient bias means in the form of a leaf spring secured to the base of the slot and adapted also to hold the clip in a disengaged position during an assembly operation on the component parts of the frame.

6. A thermoplastic window frame assembly comprising in combination

(a) a first one-piece injection-molded frame member having a continuous glass-retaining flange extending inwardly of said first frame in a direction parallel to the plane of the latter, and a pair of spaced-apart peripheral walls upstanding perpendicular to the plane of the frame and defining therebetween a transversely unobstructed slot having an open end lying in a plane transverse to that of said frame, and

(b) a corresponding second one-piece injection-molded frame member having a continuous flange portion extending inwardly of said second frame in a direction generally parallel to the plane of the latter,

said second frame member being retained in superposed abutting relation on the upstanding walls of said first frame member thereby sealing off said slot and providing by the cooperation of its continuous flange portion with said continuous flange of said first frame member

a pane-retaining construction, the assembly being provided with a clamping means comprising a plurality of resiliently biased clips located at intervals around the perimeter of said assembly, each clip being of approximately L shape and pivotally mounted on a corresponding pivot fixed between said spaced-apart peripheral walls of said first frame member to extend transversely across said slot defined therebetween the "foot" of the L engaging in a corresponding recessed aperture in said second frame member to lie flush with the surface of the latter.

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KENNETH DOWNEY, *Primary Examiner.*