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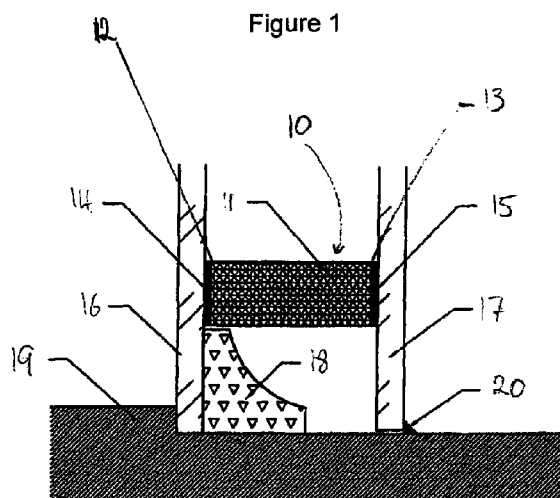
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- (54) Title: A SPACER FOR DOUBLE-GLAZING A SINGLE-GLAZED WINDOW OR DOOR AND A METHOD THEREOF



- (57) Abstract: A spacer assembly (10) for double-glazing a single-glazed window or door having at least one glass pane therein is provided. The spacer assembly (10) includes a spacer (11) having first and second surfaces (12, 13) on opposed sides thereof, the spacer (11) having a thickness defined between the first and second surfaces (12, 13). The spacer assembly (10) further includes a first adhesive tape (14) on the first surface (12) and a second adhesive tape (15) on the second surface (13). The spacer (11) is mountable around the perimeter of an existing single-glazed glass pane (16) of the window or door to form a volume therein, and the first and second adhesive tapes (14, 15) are of sufficient strength to mount a further glass pane (17) to the at least one glass pane (16) with the spacer (11) there between and substantially seal said volume.



# **A SPACER FOR DOUBLE-GLAZING A SINGLE-GLAZED WINDOW OR DOOR AND A METHOD THEREOF**

## **Field**

[0001] The present invention relates to double-glazed windows or doors and more particularly to a spacer assembly for double-glazing a single-glazed window or door as well as a related method and system.

## **Background**

[0002] Double-glazed windows or doors are known and generally comprise two spaced apart glass panes with a sealed gaseous volume there between. The gaseous volume functions as an insulator.

[0003] Known double-glazed windows or doors are usually installed at the outset of construction as a single unit including the window, window sill and frame seals. Converting an existing single-glazed window to double-glazed requires significant demolition and reconstruction of the existing window or door frame and is thus time consuming and expensive.

[0004] A retrofittable double-glazing system is known which includes a moulded channel that holds a double-glazed sheet and which has an outer peripheral flange which can be fastened to a window frame. The disadvantage of this system is it requires the existing glass pane to be removed prior to installation.

[0005] Another retrofittable double-glazing system is known which involves mounting a second Perspex sheet to the existing window or door frame by magnetic strips to create the effect of double-glazing. The gap between the sheet and the glass pane is unsealed. A disadvantage of this system is it provides no means to reduce humidity within the gap and results in visual obstructions due to ordinary accumulation of foreign material entering the gap. Another disadvantage is the sheet must be removed to open the window.

## Object of the Invention

[0006] It is an object of the present invention to substantially overcome or at least ameliorate one or more of the above disadvantages.

## Summary of the Invention

[0007] A first aspect of the present invention provides a spacer assembly for double-glazing a single-glazed window or door having at least one glass pane therein, the spacer assembly including:

- a spacer having first and second surfaces on opposed sides thereof, the spacer having a thickness defined between the first and second surfaces;

- a first adhesive tape on the first surface; and

- a second adhesive tape on the second surface,

- wherein the spacer is mountable around the perimeter of an existing single-glazed glass pane of the window or door to form a volume therein, and

- the first and second adhesive tapes are of sufficient strength to mount a further glass pane to said at least one glass pane with the spacer there between and substantially seal said volume.

[0008] Preferably, the spacer has a thickness ranging from 2 mm to 100 mm.

[0009] Preferably, the spacer is formed of an ultra-violet light stable, rubber-like material, which may include a metallic filler section.

[0010] Preferably, the first and second adhesive tapes are formed of substantially the same material, which is preferably in the form of strong, flexible, ultra-violet light stable, double-sided adhesive strips.

[0011] Preferably, the spacer comprises up to three adjacent spacer portions, the three adjacent spacer portions having a centre spacer portion located between first and second spacer portions.

[0012] Preferably, the centre spacer portion is metallic and has a hollow core. Preferably, the first and second spacer portions are formed of an ultra-violet light stable, rubber-like material.

[0013] A second aspect of the present invention provides a method of double-glazing a single-glazed window or door having at least one glass pane therein, the method comprising the steps of:

positioning a spacer, having a thickness defined between first and second opposed surfaces, substantially around the perimeter of said at least one glass pane;

adhering the first surface of the spacer to said at least one glass pane; and

adhering a further glass pane to the second surface of the spacer to form a substantially sealed volume between said at least one glass pane, the further glass pane and the interior face surface of the spacer,

wherein the spacer is adhered to the said at least one glass pane and to the further glass pane with one or more adhesive tapes of sufficient strength to support the further glass pane relative to said at least one glass pane.

[0014] A third aspect of the present invention provides a double-glazing system for a single-glazed window or door having at least one glass pane therein, the system comprising:

a spacer mountable around the perimeter of the said at least one glass pane, the spacer having a first side and a spaced apart and opposed second side;

a further glass pane;

a first adhesive tape on the first side of the spacer to adhere the spacer to the existing glass pane; and

a second adhesive tape on the second side of the spacer to adhere the spacer to a further glass pane,

wherein the adherence of the spacer to said at least one glass pane and to the further glass pane forms a substantially air-tight volume there between, and

the first and second adhesive tapes are of sufficient strength to support the further glass pane relative to said at least one glass pane.

## **Brief Description of the Drawings**

[0015] Preferred embodiments of the invention will be described hereinafter, by way of examples only, with reference to the accompanying drawings, in which:

[0016] Figure 1 is a cross-sectional side view of an embodiment of a spacer assembly mounted in a double-glazing assembly;

[0017] Figure 2 is a cross-sectional side view of another embodiment of a spacer assembly mounted in another double-glazing assembly;

[0018] Figure 3 is a cross-sectional side view of the spacer assembly of Figure 2 mounted in another double-glazing assembly;

[0019] Figure 4 is a cross-sectional side view of the spacer assembly of Figure 1 mounted in another double-glazing assembly; and

[0020] Figure 5 is a cross-sectional side view of the spacer assembly of Figure 3 mounted in another double-glazing assembly.

### **Description of Embodiments**

[0021] Figure 1 shows a single-glazed window, comprising an existing glass pane 16, a window frame 19 and a glass pane support 18 after conversion to double-glazed. The conversion is achieved with an embodiment of a double-glazing system that includes a spacer assembly 10. The spacer assembly 10 includes a spacer 11 having first and second surfaces 12, 13 on opposed sides thereof. The spacer 11 is made from an ultra-violet light stable, rubber-like material and has a thickness ranging from 2 mm to 20 mm that is defined between the first and second surfaces 12, 13 and has a solid core. First and second adhesive tapes 14, 15 are mounted to the first and second surfaces 12, 13.

[0022] The spacer 11 is positioned around the entire perimeter of the inside face of the glass pane 16, adjacent to the existing glass pane support 18 of the window. The spacer 11 is adhered to the glass pane 16 on the first surface 12 by the first adhesive tape 14. A further glass pane 17 is then adhered to the second surface 13 by the second adhesive tape 15 to form a substantially sealed gaseous volume between the existing glass pane 16, the further glass pane 17 and the interior face of the spacer 11, thereby double glazing the window. The adhesive tapes 14, 15 are ultra-violet light stable, double-sided adhesive strips and provide both a substantially air tight seal and of sufficient strength to support the further glass pane 17 relative to the existing glass pane 16.

[0023] As illustrated in Figure 1, the fixing of the further glass pane 17 to the window frame 19 can be enhanced by adding a filler bead 20 located along the edges of the further glass pane 17.

[0024] Figure 2 shows another embodiment of a double-glazing system employing a spacer assembly 22. The double-glazing system is similar to that shown in Figure 1 and like features have been indicated with like reference numerals. The spacer assembly 22 is suitable when the distance between the existing glass pane 16 and the further glass pane 17 has a thickness in the range of 20 mm to 100 mm. In such a system, a single spacer 11 similar to that in Figure 1 is too flexible unless it is substantially thickened. Accordingly, a spacer 23 composed of three adjacent spacer portions is utilised. The spacer 23 includes first and second spacer portions 11 located on opposed sides of a centre spacer portion 30. The first and second spacer portions 11 are made from an ultra-violet light stable, rubber-like material. The centre spacer portion 30 has a hollow core, has a thickness of about 2 mm, and is made from a metallic material. The fixing of the further glass pane 17 to the window frame 19 is also enhanced by a moulding 21 located along the edges of the further glass pane 17.

[0025] Figure 3 shows another embodiment of a double-glazed system. The double-glazing system is similar to that shown in Figure 2 and like features have been indicated with like reference numerals. However, the window frame 24 has a recessed portion 26 and the further glass pane 17 abuts one side of the recessed portion 26. A filler bead 25 is located along the edges of the further glass pane 17, enhancing fixation of the further glass pane 17 to the recessed portion 26 of the window frame 24.

[0026] Figure 4 shows another embodiment of a double-glazing system. The double-glazing system is similar to that shown in Figure 1 and like features have been indicated with like reference numerals. However, in this system, the spacer assembly 10 is mounted on the outside face of the glass pane 16. A further glass pane 27 is also mounted to the spacer 11 to provide bullet proof functionality and enhanced security protection. This system is suitable when the distance between the existing glass pane 16 and the further glass pane 27 is in the range of 5 mm to 20 mm.

[0027] Figure 5 shows a further embodiment of a double-glazing system similar to that shown in Figure 3, and like features have been indicated with like reference numerals. However, the existing window frame 28 terminates at the second surface of the spacer 23. The spacer 23 is metallic and has a hollow core. The further glass pane 17 is supported by the second adhesive tape 15 attached to a moulding 29 mounted around the perimeter of the further glass pane 17.

[0028] The embodiments described above have numerous advantages. Firstly, they allow retrofittable conversion of a single-glazed window or door to double-glazed in a quick, relatively simple and cost effective manner which, importantly, does not require demolition and reconstruction of the existing glass pane or window or door frame. Secondly, they do not allow moisture or other foreign material to enter the gap between the glass panes. Thirdly, they do not adversely affect the normal window or door opening or closing. The addition of a metallic central portion to the spacer also provides added stiffness to the spacer when the space between the glass panes is at a greater distance.

[0029] Although the invention has been described with reference to preferred embodiments, it will be appreciated by persons skilled in the art that the invention may be embodied in many other forms.

## CLAIMS

1. A spacer assembly for double-glazing a single-glazed window or door having at least one glass pane therein, the spacer assembly including:
  - a spacer having first and second surfaces on opposed sides thereof, the spacer having a thickness defined between the first and second surfaces;
  - a first adhesive tape on the first surface; and
  - a second adhesive tape on the second surface,wherein the spacer is mountable around the perimeter of an existing single-glazed glass pane of the window or door to form a volume therein, and
  - the first and second adhesive tapes are of sufficient strength to mount a further glass pane to said at least one glass pane with the spacer there between and substantially seal said volume.
2. The spacer assembly according to claim 1, wherein the spacer has a thickness ranging from 2 mm to 100 mm.
3. The spacer assembly according to claim 1 or 2, wherein the spacer is formed of an ultra-violet light stable, rubber-like material.
4. The spacer assembly according to any one of the preceding claims, wherein the first and second adhesive tapes are formed of substantially the same material.
5. The spacer assembly according to claim 4, wherein the first and second adhesive tapes are formed of strong, flexible, ultra-violet light stable, double-sided adhesive strips.
6. The spacer assembly according to claim 1, wherein the spacer comprises three adjacent spacer portions, the three adjacent spacer portions having a centre spacer portion located between first and second spacer portions.
7. The spacer assembly according to claim 6, wherein the centre spacer portion is metallic and has a hollow core, and the first and second spacer portions are formed of an ultra-violet light stable, rubber-like material.

8. A method of double-glazing a single-glazed window or door having at least one glass pane therein, the method comprising the steps of:

positioning a spacer, having a thickness defined between first and second opposed surfaces, substantially around the perimeter of said at least one glass pane;

adhering the first surface of the spacer to said at least one glass pane; and

adhering a further glass pane to the second surface of the spacer to form a substantially sealed volume between said at least one glass pane, the further glass pane and the interior face surface of the spacer,

wherein the spacer is adhered to the said at least one glass pane and to the further glass pane with one or more adhesive tapes of sufficient strength to support the further glass pane relative to said at least one glass pane.

9. The method according to claim 7, wherein the spacer has a thickness ranging from 2 mm to 100 mm.

10. The method according to claim 8 or 9, wherein the spacer is formed of an ultra-violet light stable, rubber-like material.

11. The method according to any one of claims 8 to 10, wherein the spacer is adhered to the said at least one glass pane and to the further glass pane using adhesive tapes that are formed of substantially the same material.

12. The method according to claim 11, wherein the adhesive tapes are formed of strong, flexible, ultra-violet light stable, double-sided adhesive strips.

13. The method according to claim 8, wherein the spacer comprises three adjacent spacer portions, the three adjacent spacer portions having a centre spacer portion located between first and second spacer portions.

14. The method according to claim 13, wherein the centre spacer portion is metallic and has a hollow core, and the first and second spacer portions are formed of an ultra-violet light stable, rubber-like material.

15. A double-glazing system for a single-glazed window or door having at least one glass pane therein, the system comprising:

a spacer mountable around the perimeter of the said at least one glass pane, the spacer having a first side and a spaced apart and opposed second side;

a further glass pane;

a first adhesive tape on the first side of the spacer to adhere the spacer to the existing glass pane; and

a second adhesive tape on the second side of the spacer to adhere the spacer to a further glass pane,

wherein the adherence of the spacer to said at least one glass pane and to the further glass pane forms a substantially air-tight volume there between, and

the first and second adhesive tapes are of sufficient strength to support the further glass pane relative to said at least one glass pane.

16. The double-glazing system according to claim 15, wherein the spacer has a thickness ranging from 2 mm to 100 mm.

17. The double-glazing system according claim 15 or 16, wherein the spacer is formed of an ultra-violet light stable, rubber-like material.

18. The double-glazing system according to any one claims 15 to 17, wherein the first and second adhesive tapes are formed of substantially the same material.

19. The double-glazing system according to claim 18, wherein the first and second adhesive tapes are formed of strong, flexible, ultra-violet light stable, double-sided adhesive strips.

20. The double-glazing system according to claim 15, wherein the spacer comprises three adjacent spacer portions, the three adjacent spacer portions having a centre spacer portion located between first and second spacer portions.

21. The double-glazing system according to claim 20, wherein the centre spacer portion is metallic and has a hollow core, and the first and second spacer portions are formed of an ultra-violet light stable, rubber-like material.

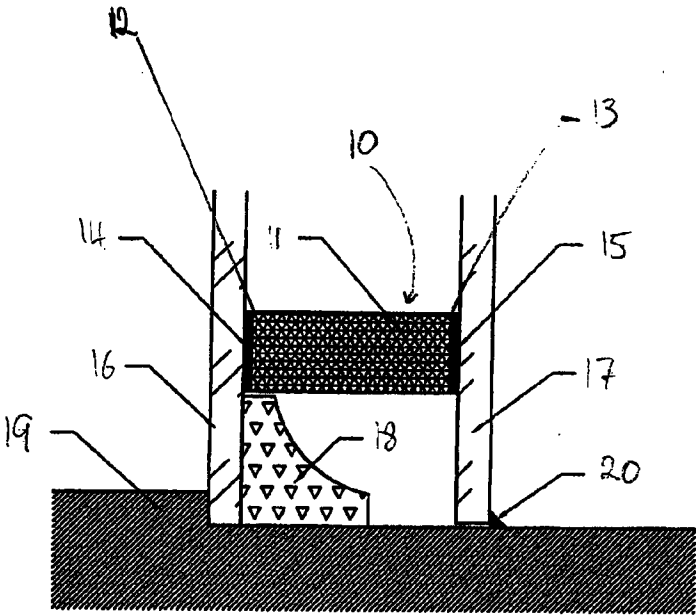


Figure 1

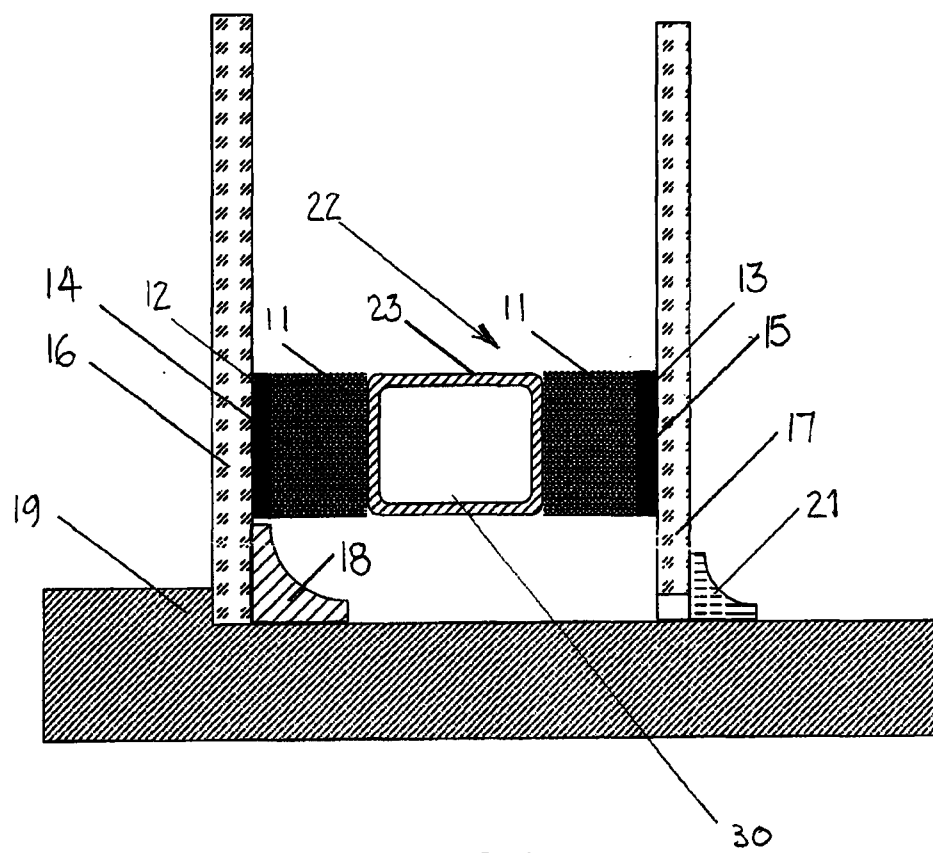


FIGURE 2

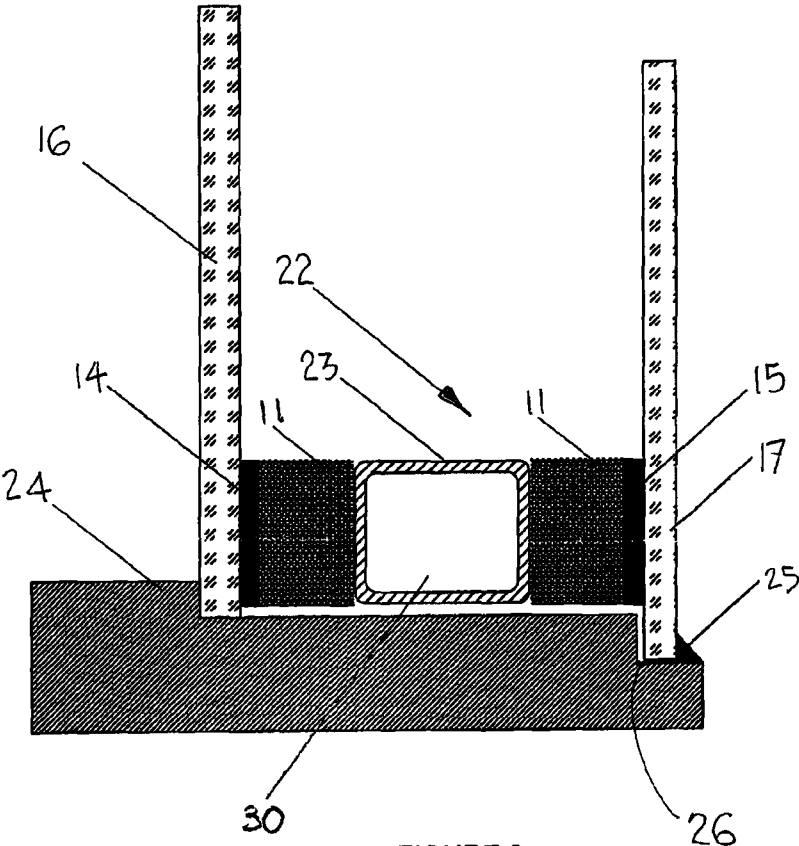


FIGURE 3

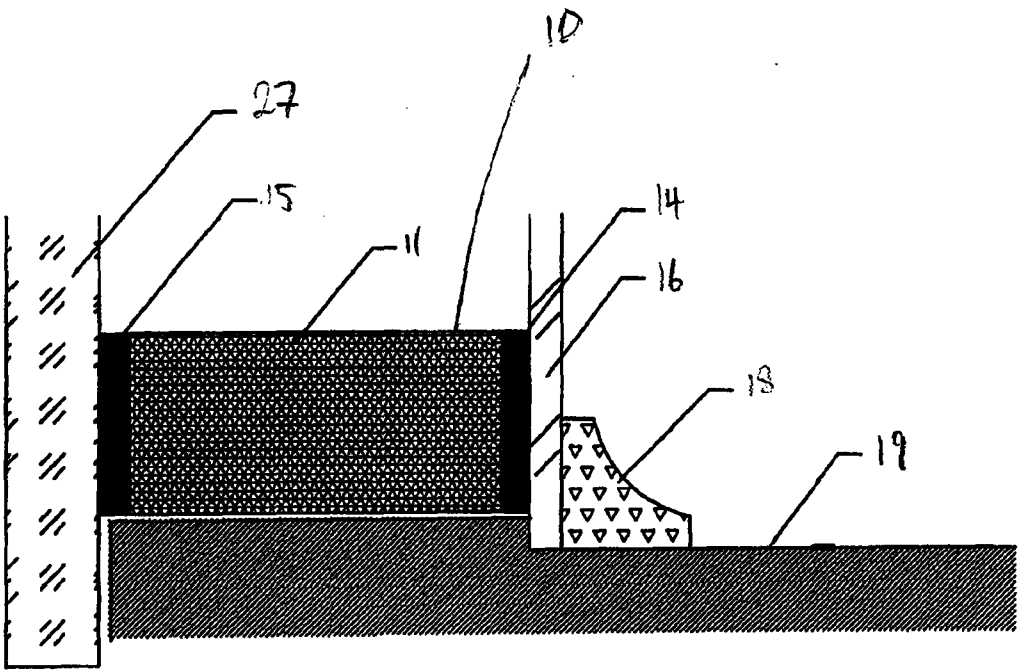


Figure 4

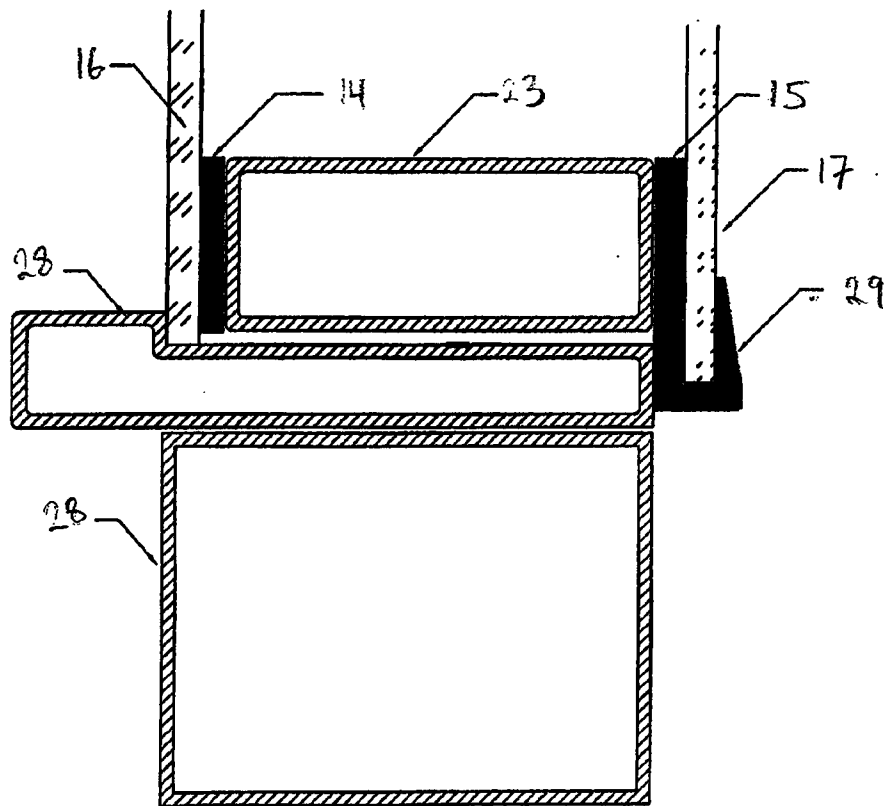


Figure 5

## INTERNATIONAL SEARCH REPORT

International application No.  
**PCT/AU2014/000557**

## A. CLASSIFICATION OF SUBJECT MATTER

**E06B 3/663 (2006.01) E06B 3/54 (2006.01)**

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Databases: EPODOC, WPI, ESPACENET

CPC/IPC Marks: E06B3/663, E06B3/54, E06B5/20

Keywords: spacer, spacing, separate, gap, double, twin, two, dual, glaze, glass, pane, retro, convert, change, modify, tape, double\_side, rubber, EPDM, polyethylene, plastic, polyvinyl, metal, seal, air, gas, glass and the like.

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|------------------------------------------------------------------------------------|-----------------------|
|           | Documents are listed in the continuation of Box C                                  |                       |



Further documents are listed in the continuation of Box C



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| INTERNATIONAL SEARCH REPORT                           |                                                                                                                                                                                                                                | International application No. |
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| Information on patent family members                                                                                                                                                                                                                                  |                  | PCT/AU2014/000557             |                  |
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| End of Annex                                                                                                                                                                                                                                                          |                  |                               |                  |
| Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.                                                                                                                                             |                  |                               |                  |