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MULTIPLE GLAZED UNIT

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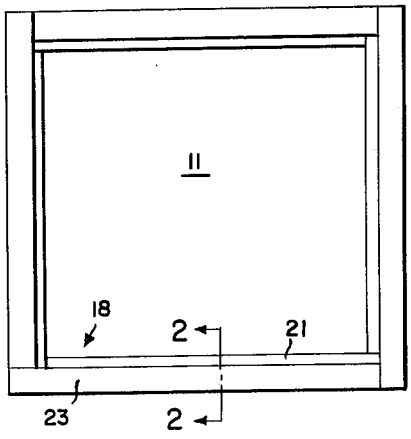


FIG. 1.

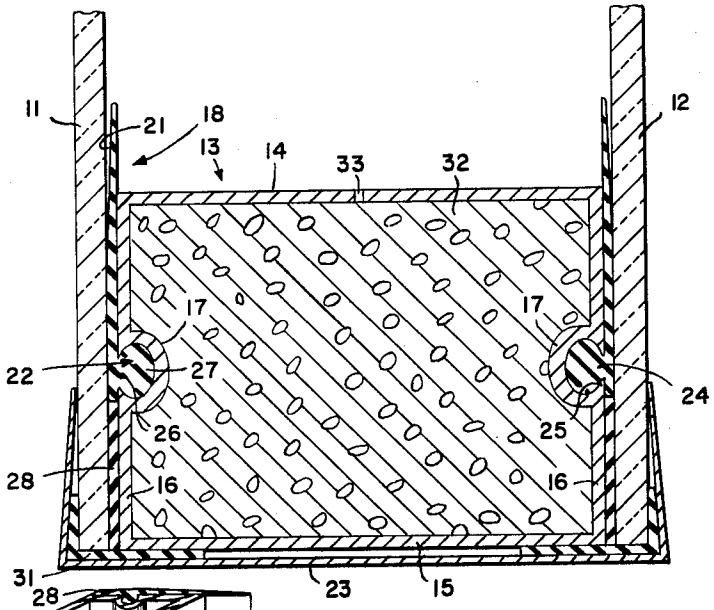


FIG. 2.

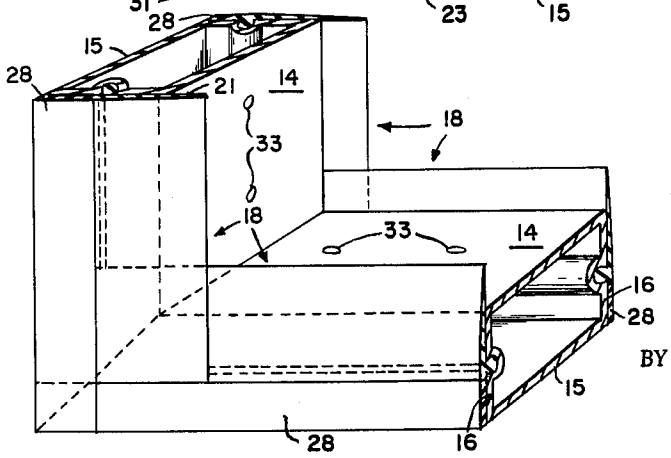


FIG. 3.

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MULTIPLE GLAZED UNIT

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This invention relates to improvements in multiple glazed units, and more particularly concerns such units which are utilized as insulating windows for the building and refrigeration industries.

Multiple glazed units include two or more glass sheets which are spaced apart from one another by a spacer element which provides a dead air space between the sheets of glass. The dead air space acts as an insulator against heat and cold.

It has been a problem to effectively seal multiple glazed units hermetically so as to provide a barrier against air, dust, water and vapor. For one thing, the surfaces of the glass sheets are not perfectly smooth. Further, the outside of the insulating unit is subjected to atmospheric pressure, and this pressure does not remain constant. Accordingly, when the atmospheric pressure is high, it presses inwardly against the glass panes. On the other hand, when the atmospheric pressure is low, the pressure of the dead air inside the window unit presses outwardly against the glass sheets.

Accordingly, it is an object of this invention to provide an improved multiple glazed unit having an effective hermetical seal.

Other objects and advantages of this invention, including its simplicity and economy, will further become apparent hereinafter and in the drawings, in which:

FIG. 1 is a view in front elevation of a multiple glazed unit constructed in accordance with this invention;

FIG. 2 is an enlarged view in section taken as indicated by the lines and arrows 2—2 which appear in FIG. 1; and

FIG. 3 is an enlarged view in perspective of a corner of the unit shown in FIG. 1, and illustrates the overlapping of the resilient tape and the adhesive tape elements of the invention.

Although specific terms are used in the following description for clarity, these terms are intended to refer only to the structure shown in the drawings and are not intended to define, or limit the scope of the invention.

Turning now to the specific embodiment of the invention selected for illustration in the drawings, there is shown a multiple glazed unit which includes a pair of spaced-apart glass sheets **11** and **12**, and a spacer element **13** separating the glass sheets at their marginal edges to form a dead air space therebetween.

Spacer element **13** includes an inner wall **14** and an outer wall **15** which are connected together by sidewalls **16**. Longitudinal groove **17** is formed in each sidewall **16**.

A resilient tape **18** is provided and has a flat portion **21** which is positioned between sidewalls **16** and glass sheets **11**, **12** to give a resilient seal. Resilient tape **18** is keyed to groove **17** by a key member **22** which extends from flat portion **21** and is seated in the groove. A U-shaped channel member **23** surrounds the edges of the glazed unit.

Each groove **17** is provided with an entrance slot **24** which is formed by opposed entrance shoulders **25** and is narrower than the diameter of groove **17**. Key member **22** of tape **18** includes a neck portion **26** and a head portion **27**. Head portion **27** is seated in groove **17** and is larger than the entrance slot **24** so that entrance shoulders **25** oppose movement of head portion **27** through slot **24**.

The resilient tapes **18** are overlapped at the corners of the glazed unit and are compressed together so that the corner seal is the same thickness as the seal in the region between corners. The key members **22** are removed from the overlapped portions of the tapes **18** so as to lessen the bulk of material to be compressed.

Flat portion **21** of tape **18** extends inwardly past inner wall **14** of spacer element **13** and thereby prevents light transmission, from the outside of the glass sheet into the space between the glass sheets, through the portion of the glass sheet covered by flat portion **21**. This is especially advantageous in multiple glazed units which contain rotatable slats that may be rotated to various positions to control the amount of sunlight passing through the unit. The flat portion **21** prevents passage of sunlight through any cracks between the ends of the slats and the spacer elements in which the slats are mounted. The inner edge of flat portion **21** is straight, and is kept even and parallel to the inner and outer walls **14**, **15**, of spacer element **13** by key member **22** which is seated in the longitudinal groove **17**.

A tape **28** of adhesive is positioned between sidewall **16** of spacer element **13** and the glass sheets **11**, **12**, and it provides an adhesive shield, whereas resilient tape **18** provides a pressure seal. Tapes **28** are overlapped and compressed together at the corners of the glazed units.

A bead **31** of adhesive mastic is applied to each side of bottom wall **15** and contacts the edges of the glass sheets, the adhesive tapes **28**, the outer wall **15** of spacer element **13** and the inner surface of U-shaped channel member **23**. Channel member **23** holds the glass sheets, the seals, and the spacer element **13** together.

The interior of spacer element **12** contains a desiccant **32**, and inner wall **14** of spacer element **13** is provided with a series of openings **33** so as to afford access between the interior of spacer element **13** and the dead air space between the glass sheets. In multiple glazed units having rotatable slate mounted in the dead air space between opposed spacer elements, the holes in the spacer elements which support the pivot pins at the end of the slats are satisfactory for this purpose of affording access between the desiccant within the spacer elements and the dead air space between the glass sheets. In other glazed units, the spacer element may be a rolled member and may have a butt joint down the center of inner wall **14**. The butt joint is not hermetically sealed and provides for passage of air between the interior of the spacer element and the dead air space.

In practice, highly satisfactory results have been obtained in units wherein resilient tape **18** is made of closed-cell neoprene extruded tape, tape **28** is made of butyl rubber, and bead **31** is made of butyl rubber mastic which is extruded from a caulking gun, the mastic being approximately 70% solids.

Tape **18**, in addition to preventing light transmission and thereby providing a sun shield, has other advantages.

In conventional multiple glazed units, the spacer has a pair of shoulders which are in direct contact with the glass sheets. This glass to metal contact provides a thermally conductive path, and heat may be transferred from the inside of the outside of the window unit and condensation may form. Tape **18** solves this condensation problem by eliminating the spacer shoulders and metal-to-glass contact and by providing a thermal barrier between the glass and the metal.

Tape **18** also acts as a cushion so that the adhesive of tape **28** is not squeezed out from between the glass sheet and the spacer during the working of the unit, i.e. during the expanding and contracting of the window unit caused by variation in pressure and temperature during continuous day and night operation. If the adhesive of the tape **28** were squeezed out, without the pres-

ence of tape **18** there would be a break in the hermetical seal and failure of the window unit. Tape **18** presents a barrier to tape **28** and prevents the adhesive from working past it. This is especially important when a butyl rubber adhesive is used which does not take a permanent set and remains without memory, so as to flow under heat or pressure to maintain a tight seal under variations in heat and pressure.

Tape **18** provides a step, in effect, in the sidewall **16** of spacer element **13** and thereby provides a space for the reception of tape **28**.

It is to be understood that the form of the invention herewith shown and described is to be taken as a presently preferred embodiment. Various changes may be made in the shape, size and arrangement of parts. For example, equivalent elements may be substituted for those illustrated and described herein, parts may be reversed, and certain features of the invention may be utilized independently of the use of other features, all without departing from the spirit or scope of the invention as defined in the subjoined claims.

The claimed invention:

1. A multiple glazed unit comprising a plurality of spaced-apart glass sheets, a spacer element separating the glass sheets at their marginal edges to form a dead air space between the glass sheets, said spacer element having an inner wall and outer wall connected together by sidewalls, said spacer element having a longitudinal groove formed in each of its sidewalls, a resilient tape having a flat portion positioned between the sidewall and the glass sheet to provide a resilient seal, said resilient tape being keyed to said groove by a key member extending from said flat portion and seated in said groove, and a U-shaped channel member surrounding the edges of said glazed unit, each groove being provided with an entrance slot formed by opposed entrance shoulders, said slot being narrower than the diameter of the groove, and said key member including a neck portion and a head portion, said head portion being seated in said groove and being larger than the entrance slot of said groove so that said entrance shoulders oppose movement of said head portion through said slot.

2. A multiple glazed unit comprising a plurality of spaced-apart glass sheets, a spacer element separating the glass sheets at their marginal edges to form a dead air space between the glass sheets, said spacer element having an inner wall and outer wall connected together by sidewalls, said spacer element having a longitudinal groove formed in each of its sidewalls, a resilient tape having a flat portion positoned between the sidewall and the glass sheet to provide a resilient seal, said resilient tape being keyed to said groove by a key member extending from said flat portion and seated in said groove, and a U-shaped channel member surrounding the edges of said glazed unit, each groove being provided with an entrance slot formed by opposed entrance shoulders, said slot being narrower than the diameter of the groove, and said key member including a neck portion and a head portion, said head portion being seated in said groove and being larger than the entrance slot of said groove so that said entrance shoulders oppose movement of said head portion through said slot, said flat portion extending inwardly past said inner wall so as to prevent light transmission through a portion of the glass sheet into the space between said glass sheets.

3. The multiple glazed unit defined in claim **1**, wherein an adhesive tape is positioned between the sidewall of the spacer element and the glass sheet and between the resilient seal and the channel member to provide an adhesive shield.

4. The multiple glazed unit defined in claim **3**, wherein a bead of adhesive mastic contacts the edges of the glass sheet, the adhesive tape, the outer wall of the spacer element, and the inner surface of the U-shaped channel member.

5. A multiple glazed unit comprising a pair of spaced-apart glass sheets, a spacer element having an inner wall and an outer wall connected together by sidewalls, said spacer element separating the glass sheets at their marginal edges to form a dead air space between the glass sheets, said spacer element having a longitudinal groove formed in each of its sidewalls, each groove having an entrance slot formed by opposed shoulders, said slot being narrower than the diameter of the groove, a resilient tape made of closed-cell neoprene, said resilient tape having a flat portion positioned between the sidewall of the spacer element and the glass sheet to provide a resilient seal and having a key member extending therefrom with a neck portion and an enlarged head portion which is seated in said groove, a butyl rubber tape positioned between the sidewall of the spacer element and the glass sheet to provide an adhesive seal, a U-shaped channel member mounted around the edges of the glass sheets to hold the glass sheets, seals and spacer element together, and a bead of butyl rubber mastic contacting the edge of the glass sheet, the butyl rubber tape, the outer wall of the spacer element, and the inner surface of the U-shaped channel, said resilient tape being overlapped and compressed together at the corners of the unit, said overlapping portions of the resilient tape having the key members removed, said butyl rubber tape being overlapped and compressed together at the corner of the unit, said flat portion extending inwardly past said inner wall so as to prevent light transmission through a portion of the glass sheet into the space between said glass sheets.

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