

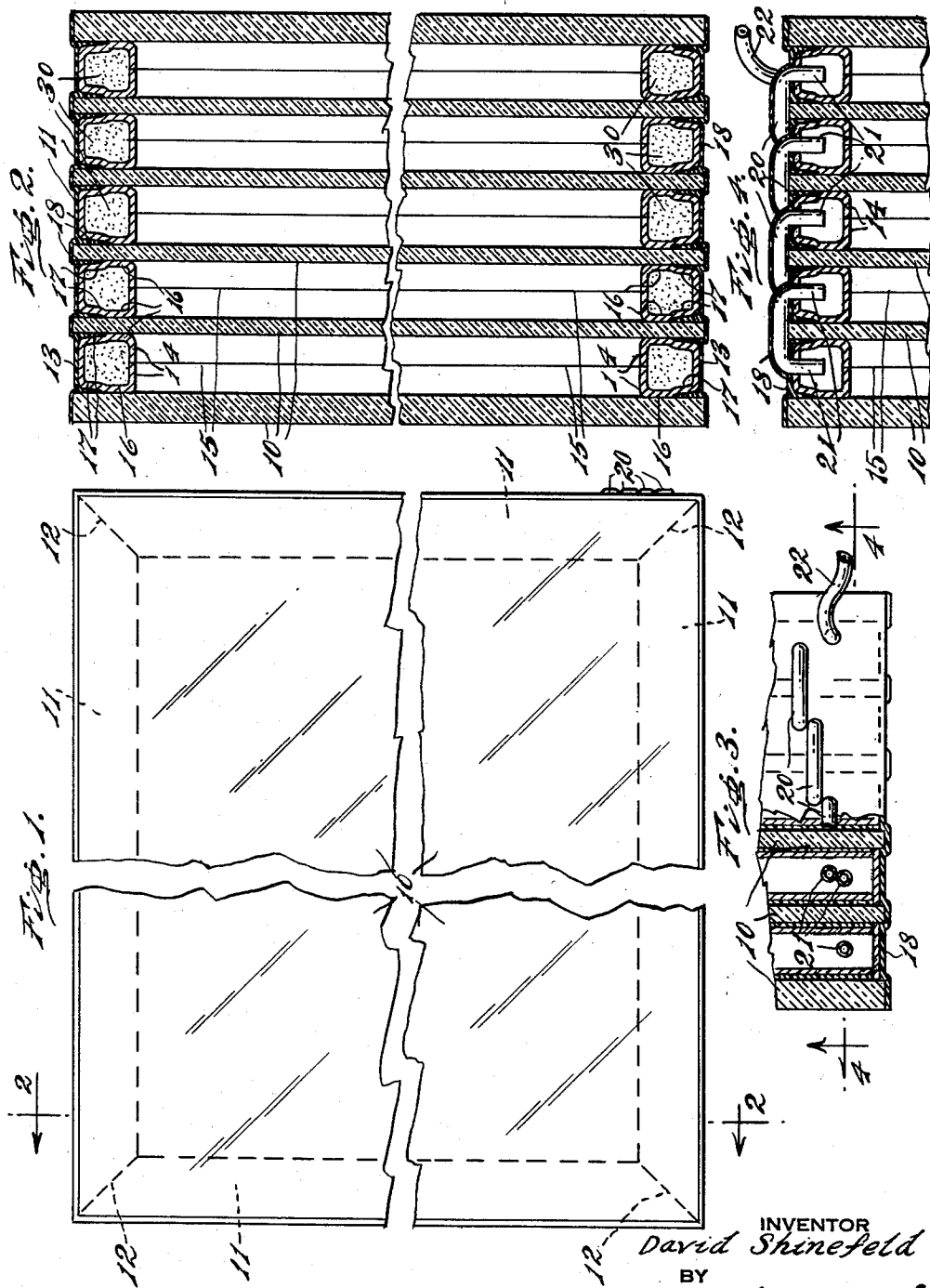
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MULTIPLE PANE WINDOW UNITS

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MULTIPLE PANE WINDOW UNITS

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3 Claims. (Cl. 20—56.5)

This invention relates to multiple pane window units, that is, to heat insulating window units composed of a plurality of sheets of glass, separated from each other by suitable spacers at their edges, and provided with means for removing the moisture from the air in the spaces between the glass sheets, whereby there will be no clouding on the internal surfaces of the glass through condensation, fungus growth, or the like, which are induced by the presence of the moisture naturally in the air which has been entrapped in the spaces between the sheets of glass.

This invention relates primarily to novel means for spacing the sheets of glass, and for holding the desiccant employed for the removal of moisture from the entrapped air in the spaces between the glass sheets in multiple pane window units.

This invention also relates to certain improvements in the means for sealing the window units at their edges to prevent improper ingress and egress of air into and from the spaces between the glass sheets.

This invention further relates to improved means for permitting the "breathing" which is necessary to equalize the pressures on the glass sheets caused by the differences in atmospheric pressure when the sealed window units are transported through regions of different atmospheric pressures.

The principal object of the present invention is to provide, in a multiple pane window unit, improved devices for spacing the sheets of glass at their edges, which spacing devices are so constructed and arranged as to properly support the edge portions of the glass sheets and also to provide containers for the desiccant used for removing the natural moisture in the entrapped air in the spaces provided between the glass sheets.

A further object of the invention is to provide in a structure of the character aforesaid, improved means for sealing the units at the edges thereof which will prevent leakage of air either inwardly or outwardly.

A further object of the invention is to provide improved breathing means, so constructed and arranged as to permit the ingress and egress of air whenever it becomes necessary to transport the sealed units through regions of different atmospheric pressures, which would otherwise cause the units to be broken, even though the pressure differences may be relatively small, as under such conditions the pressure over the total area of the glass sheets is often sufficient to cause breakage.

The nature and characteristic features of the present invention will be more readily understood from the following description, taken in connection with the accompanying drawing forming part hereof, in which:

Figure 1 is a front elevation of a multiple pane window unit embodying the main features of the present invention;

Fig. 2 is a vertical section thereof taken on the line 2—2 of Fig. 1;

Fig. 3 is a view, partly in elevation, and partly in section, of an edge portion of the structure, showing the preferred arrangement for permitting the breathing of the air inwards or outwards, in the event the unit has to be

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transported through regions of different atmospheric pressures which might cause the sheets of glass to be broken by the overall pressures on the same; and

Fig. 4 is a transverse section taken approximately on the line 4—4 of Fig. 3.

It should, of course, be understood that the description and drawing herein are illustrative merely, and that various modifications and changes may be made in the structure disclosed without departing from the spirit of the invention.

The multiple pane window units made in accordance with the present invention comprise a plurality of sheets of glass 10 maintained in spaced relationship by means of suitable spacers 11, hereinafter more specifically described.

When more than two sheets of glass are employed, the intermediate sheets may be and usually are thinner than the external sheets.

The spacers 11 are preferably made of sheet metal, pressed and formed in a peculiar shape in cross-section as shown more particularly in Fig. 2 of the drawing. These spacers 11 are made initially in suitable lengths and cut angularly at the ends of the pieces to form miter joints at the corners as shown more particularly at 12 in Fig. 1 of the drawing.

Each of the spacer members 11 is of an approximately rectangular shape in cross-section having its outside wall 13 flat and its inner wall comprising abutting internal lips 14 whereby a slit 15 is provided between the lip portions 14, which slit 15 is disposed internally in the assembly of the unit.

The sidewalls of the spacers have their inner portions 16 flat to provide bearing faces against which the surfaces of the edge portions of the glass sheets abut and are thus supported.

The sidewalls of the spacers, toward the outside walls 13, are indented as at 17 to provide relatively small spaces between the side surfaces of the portions 17 of the sidewalls of the spacers and the edge portions of the glass sheets, for a purpose to be presently set forth.

After the unit is assembled, with the desired number of glass sheets separated by the spacers arranged as above described, the edge portions are sealed by a suitable initially liquefiable plastic 18, which will provide an effective air and moisture seal, not only by coating the external walls of the spacers and the edges of the glass sheets, but also by passing into the spaces between the inset portions 17 of the sidewalls of the spacers and the edge portions of the glass sheets, by capillary action while the sealing material is still in a sufficiently liquid state to enable it to do so. Any suitable plastic sealer may be used, but one which has been found to be satisfactory comprises a rubber compound having a thiokol base.

The hollow interiors of the spacers 11 provide suitable containers for placing therein a suitable desiccant 30 having moisture absorbing properties, and the slit 15 between the abutting lip portions 14 of each of the spacers 11 provides a sufficiently open means of communication from the sealed spaces between the sheets of glass to the hollow interiors of the spacers within which the desiccant 30 is placed.

When it is necessary to ship the units through or to areas of different atmospheric pressure such, for example, as when the unit must be shipped from the Eastern seaboard to the Western seaboard, in passing through the mountainous regions, the atmospheric pressure differences are sometimes sufficient to cause the air sealed within the unit to expand and thereby break the glass. This phenomenon has, of course been noted, and various means have heretofore been provided to overcome the same, but most of such devices used or suggested have been unneces-

sarily complicated and, in some instances, not entirely practical.

For this purpose there is provided, in connection with the present invention, a plurality of U-shaped tubes 20 of small diameter, the end portions 21 of which each extend into adjacent spacing devices, providing a communication from each space to the next adjacent space. Extending from within one of the spacers to the exterior there is provided a small pipe 22 initially open to the atmosphere.

By the foregoing arrangement there is provided an effective means in the nature of a "breather" which will serve to permit the pressure within the spaces between the glass sheets to be equalized with each other and with the external atmosphere whenever the unit is transported through or to a place having a different atmospheric pressure.

When the unit arrives at the place where it is to be used, the pipe 22, which extends to the external atmosphere from one of the spacing devices, may be closed or sealed off in any suitable manner to prevent any further breathing at the place of use.

It should be understood that the foregoing pressure equalizer is not required when the unit is to be installed at or near the place of its initial assembly.

By the foregoing there is provided a novel and inexpensive multiple pane window unit which may be readily and easily assembled, which is provided with means whereby any moisture in the air in the spaces between the sheets of glass will be taken up by the desiccant contained within the interiors of the spacers provided at the edges of the sheets, and in which a simple and effective breathing device may be incorporated if desired.

In some instances it will be advisable to utilize the U-shaped tubes 20 without the externally extending tube 22. With such an arrangement, in the event of large temperature differentials on the inner and outer faces of the multiple pane window units, any inequalities in the pressure in the several spaces between the glass sheets caused by such temperature differences will be equalized by a small amount of the air being permitted to flow from one space to another through the tubes 20. Such an arrangement will be found to be desirable in regions subject to very low winter temperatures.

I claim:

1. A multiple pane window unit comprising a plurality of sheets of glass, means for spacing said glass sheets and for sealing the spaces between said glass sheets, said spacing and sealing means consisting of members extend-

ing adjacent and between the edge portions of the glass sheets and comprising strips of sheet metal longitudinally bent and formed to provide an outer wall, and a wall on each side the inner portions of which side walls provide bearing surfaces for the edge portions of the glass sheets and the outer portions of which side walls are inset to provide narrow spaces between said outer portions of the side walls and the edge portions of the glass sheets, and initially liquefiable plastic material covering the outer walls of the spacing members and the edges of the glass, and extending into the spaces between the inset portions of the side walls of the spacer members and the surfaces of the edge portions of the glass sheets.

2. A multiple pane window unit as defined in claim 1 in which the spacing members each have an inner wall formed by lips extending from the side walls of the spacer member toward each other with their innermost terminal edges abutting and having a longitudinal slit therebetween.

3. A multiple pane window unit comprising a plurality of sheets of glass, means for spacing said glass sheets and for sealing the spaces between said glass sheets, said spacing and sealing means consisting of hollow members extending adjacent and between the edge portions of the glass sheets, said hollow members being of approximately rectangular shape in cross section having a closed outer wall and a wall on each side, the inner portions of said side walls providing bearing surfaces for the edge portions of the glass sheets, and the outer portions of said side walls being inset to provide narrow spaces between said outer portions of the side walls and the edge portions of the glass sheets, and an initially liquifiable plastic material covering the outer walls of the spacing members and the edges of the glass, and extending into the spaces between the inset portion of the side walls of the spacer members and the surfaces of the edge portions of the glass sheets.

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