March 3, 1959 W. E. SCHMERTZ 2,875,794

MULTIPLE SHEET GLAZING UNITS

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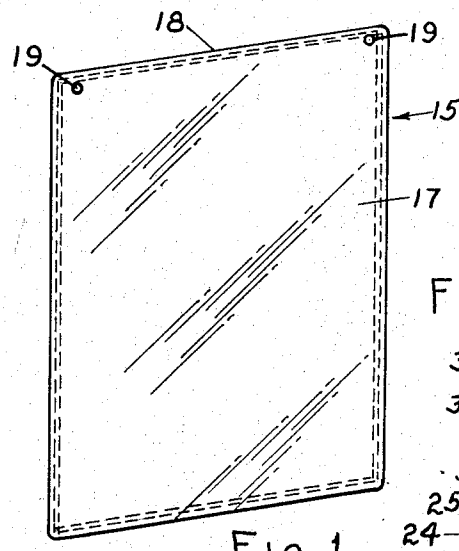


Fig. 1

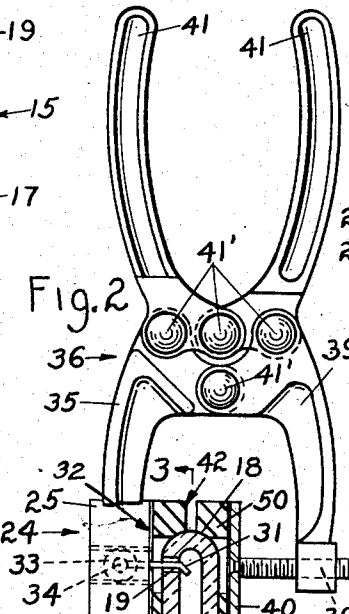
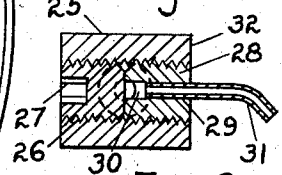


Fig. 2

Fig. 4



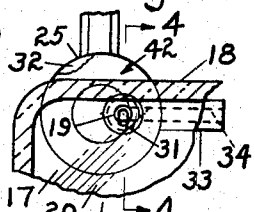


Fig. 3

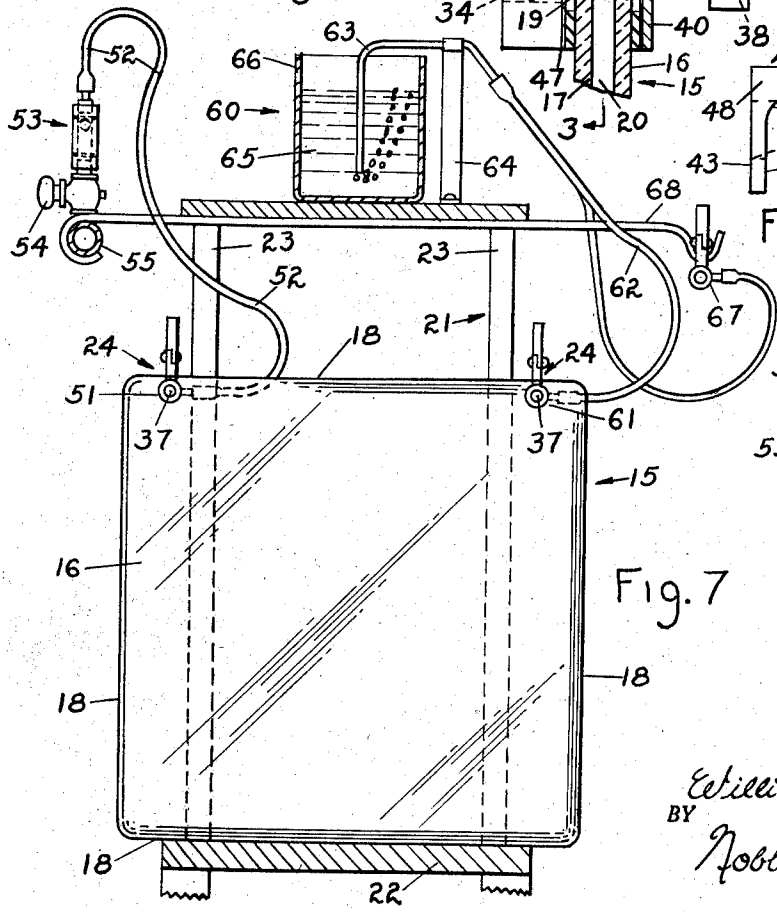


Fig. 7

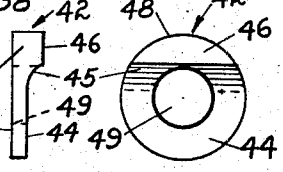


Fig. 6 Fig. 5

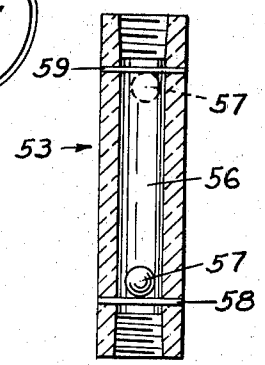


Fig. 8

INVENTOR.
William E. Schmertz
BY
Hobbe & Swope
ATTORNEYS

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MULTIPLE SHEET GLAZING UNITS

William E. Schmertz, Toledo, Ohio, assignor to Libbey-Owens-Ford Glass Company, Toledo, Ohio, a corporation of Ohio

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6 Claims. (Cl. 141—346)

This invention relates broadly to multiple sheet glazing units, and more particularly to a novel apparatus for dehydrating and testing such units.

Multiple sheet glazing units may be described generally as comprising two or more sheets of glass which are sealed entirely around their edge portions in spaced relation to provide a hermetically sealed dead-air space therebetween. Due principally to their insulating and condensation preventing qualities, such units have become well established in the building trades and have found wide usage as windows for buildings, show cases, vehicles, refrigerators, and the like.

In the production of such units it is customary to remove the humid or moisture-laden air from the space between the sheets and replace it with dry air or gas which acts as an insulating medium between the respective sheets of the unit. This process is generally carried out under sea level conditions and after the dry air or gas has replaced the moisture-laden air from the space between the respective sheets, the space is permanently, hermetically sealed to retain the dry insulating medium. However, when the glazing units of this type are used at high altitudes, the external pressure on the respective sheets is reduced as compared to the pressure of the insulating medium sealed within the unit under sea level conditions. Consequently, the relatively greater internal pressure of the confined gas subjects the unit to abnormal stresses resulting, in some cases, in breakage of the unit.

It is therefore a primary object of this invention to provide novel apparatus for replacing humid or moisture-laden air within the space between the respective sheets of multiple sheet glazing units.

A further object of the invention is to provide novel apparatus for introducing a dehydrated medium into the insulating space of multiple sheet glazing units which is particularly adapted for use with such glazing units where their contours are not flat.

A further object of the invention is to provide a novel method of regulating the internal pressures to which multiple sheet glazing units are subjected during strength testing of the units.

Other objects and advantages of the invention will become more apparent during the course of the following description when taken in connection with the accompanying drawings.

In the drawings, wherein like numerals are employed to designate like parts throughout the same:

Fig. 1 is a perspective view of an all-glass multiple sheet glazing unit with which this invention is concerned;

Fig. 2 is a side view of apparatus of the invention for introducing dehydrated air or gas into the enclosed space provided in multiple sheet glazing units;

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is an enlarged sectional view of the apparatus shown in Fig. 3, taken substantially on the line 4—4 thereof;

Fig. 5 is an elevation of the sealing washer;

Fig. 6 is an elevation of the sealing washer taken from the left of Fig. 5;

Fig. 7 shows the apparatus for introducing dehydrated air or gas into the space provided in a multiple sheet glazing unit and for simutlaneously testing the unit for strength; and

Fig. 8 is a sectional view of the flow indicator used with the invention.

With reference now to the drawings, there is shown in Figs. 1, 2 and 7 a multiple sheet glazing unit **15** which comprises sheets of glass **16** and **17** spaced from one another as by a radially formed edge wall portion **18**. Dehydration holes **19** are provided through at least one of the respective sheets, and as shown herein, are provided in the sheet **17**. It is through these dehydration or breather holes that dehydrated air or gas is forced into the space **20** between the sheets to displace humid or moisture-laden air that may be contained therein.

Prior to testing and replacing the moisture-laden air within the multiple sheet glazing units, the units are placed on a support rack **21** (Fig. 7) which comprises a bottom support arm **22** and back support legs **23**. While in position on the rack **21**, dehydrated air or gas is brought to the units by means of novel nozzles **24** shown in Fig. 2.

More particularly, each of the nozzles **24** comprises a cylindrical body **25** drilled and tapped as at **26** (Fig. 4) to receive set screws **27** and **28**, the latter screw having a hole **29** drilled therethrough longitudinally and communicating with a transverse slot **30** milled across the head or blind portion. A tube **31** is sweat or otherwise secured in the hole **29** and extends outwardly from the face **32** of the body and is bent downwardly. The purpose of this tube will be disclosed hereinafter. A boss **33** is brazed or otherwise fastened to the side of the body and a hole **34** is drilled through the boss and the body into the tapped hole **26** and in communication with the slot **30** and the tube **31**.

The body **25** is brazed to one leg **35** of a toggle type compound leverage clamp **36**. A thumb screw **37** passes through a tapped hole **38** in the other leg **39** of the clamp **36**. A back up plate **40** is loosely riveted to the end of the thumb screw **37** projecting inside the leg **39** to permit rotation and slight angular movement of the plate with respect to the axis of the thumb screw.

A pair of handles **41** form the upper portion of the clamp **36** and are pivotally connected to the legs at points **41'**, as shown in Fig. 2. This construction provides a quick clamping and release arrangement with the motion of the handles **41** limited in both directions. This is of particular importance in this instance since the gap between the face **32** of the body **25** and the face of the back-up plate **40**, in clamping position, remains constant after repeated clampings and releases. Variation in the gap distance may be made by rotating the thumb screw **37**.

An annular gasket **42** is molded of a soft rubber or other resilient material in the shape shown in Figs. 5 and 6 having a flat surface **43** on one side and an opposed flat surface **44** parallel to the surface **43** and extending upward from the bottom to a point past the horizontal center line where it blends into an outwardly directed radius **45** which joins a third flat surface **46** lying in a plane parallel to the surfaces **43** and **44**. Referring to Fig. 2, the gasket **42** is cemented to the body **25** with the faces **43** and **32** bonded by the cement **47** and with the thick portion **48** of the gasket at the top of the body **25**. The tube **31** extends through the hole **49** in the gasket **42**, one of the holes **19** in the sheet **17** and into the space **20**. The flat surface **44** and the radial portion **45**

of the gasket **42** are designed to follow the contour of the glazing unit **15** adjacent the dehydration holes **19**, specifically, the outer surface of sheet **17** as it blends into the radius of wall **18**.

A second gasket **50** is cemented to the face of the back-up plate **40**, and may be a duplicate of gasket **42** or a flat sheet gasket to act as a cushion between the plate and the glass sheet **16**. Thus by virtue of the clamp **36** and the gasket **42**, the nozzles **24** are held in firm, air-tight engagement with the glazing unit in the area surrounding a dehydration hole **19**. In other words, the gasket **42** is compressed along the area around the dehydration hole **19** with the thicker portion **48** at the top, following the edge wall **18** to seal the hole **19** against the introduction of atmospheric, moisture-laden air into the space **20**.

Before introducing dehydrated air or gas into a glazing unit **15** one or more of such units are placed in position on the rack **21** and a nozzle **24** is connected to one of the dehydration holes **19** therein as indicated by the number **51** in Fig. 7. The nozzle indicated at **51** is connected by a flexible tube **52** to a flow indicator **53** which in turn is connected through a valve **54** to a dehydrated air or gas supply pipe **55**.

More particularly, as shown in Fig. 8 the flow indicator **53** is formed of plastic or glass and has a cylindical passageway **56** therethrough in which is carried an indicator ball **57**, which is adapted to move upwardly in the passageway **56** when air or gas is flowing. Thus, the ball **57** is adapted to indicate a minimum amount of flow when moved out of engagement with a lower pin **58**.

In its inoperative position the ball **57** rests upon the lower pin **58**, and when in operation it is restrained at the upper end of the passageway **56** by a pin **59**.

To introduce dehydrated gas or air into a glazing unit, the valve **54** from the supply pipe **55** is opened causing dehydrated air to flow through the flexible tube **52**, through the nozzle indicated at **51** which is attached to **34** and into the space **20** between the respective sheets **16** and **17**. This flow of dehydrated air causes the humid or moisture-laden air contained within the space **20** to be forced out through the second dehydration opening.

In order to test the unit for its strength properties while the moisture-laden air is being replaced there is provided a method of simulating altitude conditions by increasing the internal pressure of the dehydrated air within the space **20** with respect to the atmospheric pressure existing on the outside of the glazing unit.

More particularly, the method includes the restricting or setting up of a resistance to the flow of the exhausted air or gas from the second dehydration hole. To accomplish this, there is provided a variable pressure device **60** which is connected to the second dehydration hole by means of a second nozzle **61** similar to the nozzle indicated above. The nozzle **61** is connected by a flexible hose **62** to one end of a tube **63** which forms part of the variable pressure device **60**, the tube **63** being adjustably mounted by an arm **64**. The other end of the tube **63** is submerged in a liquid bath of water **65** or the like contained in a tank **66**. Also shown in Fig. 7 are an extra leverage clamp **67** carried by support **68**.

By regulating the height of the bath **65** with respect to the end of tube **63** the amount of back pressure set up within the tube and transmitted through the flexible hose to the second nozzle **61** and to the space **20** between the sheets **16** and **17** of the glazing unit **15** can be regulated. Consequently, pressures are set up within the space **20** similar to those which are encountered when the unit is used at altitudes where the internal and external pressures are unequal. Of course, when the internal pressure exceeds that set up by the column of water or

other liquid **65**, bubbles will release excess pressures and maintain the pressure within the space **20** of the glazing unit substantially constant. It will be evident that the column of liquid may be either increased or decreased to regulate the desired pressure within the space **20** or, the end tube **63** may be moved with respect to the column of liquid to regulate the pressure within the said space.

It is of course to be understood that the form of the invention disclosed herein is to be taken as the preferred embodiment thereof, and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the following claims.

I claim:

1. Apparatus for treating a multiple sheet glazing unit having a curved edge contour and an opening communicating with the space provided in said unit, comprising clamping means having at least a pair of legs and means, including a fluid inlet connected to a fluid medium source, carried by one of said legs, adapted so that upon said clamping means being placed in embracing relationship with the sides of said unit, with said fluid inlet on said clamping means in registry with the opening in said unit, said fluid medium is introduced into said unit from said fluid medium source.

2. Apparatus for treating a multiple sheet glazing unit as claimed in claim 1, wherein said clamping means are shaped to fit to the curved edge contour of said unit.

3. Apparatus for treating multiple sheet glazing units as claimed in claim 1, wherein said clamping means are movable to accommodate changes in width of the unit.

4. Apparatus for treating a multiple sheet glazing unit as claimed in claim 1, wherein said clamping means are adapted to assume an open position out of contact with said unit and a closed position in engagement with said unit, said clamping means including locking means for locking said clamping means in the closed position.

5. Apparatus for treating multiple sheet glazing units having a curved edge contour and an enclosed space therein and an opening communicating with said enclosed space, comprising a clamp including handle portions and leg portions, said handle and leg portions being connected for movement to open and closed positions, means, including a fluid inlet connected to a fluid medium source, carried by one of said legs adapted to register with said opening in the unit when said clamping means clampingly engages the sides of the unit for introducing said fluid medium into the unit, means shaped to substantially the contour of said sheet adjacent said opening and maintained in position on the unit by a gripping action of said leg portions to seal the area around said opening from the introduction of atmospheric air into the space provided in the unit, and means to hold said shaped means in gripping contact with the contour of said sheet adjacent said opening.

6. Apparatus for treating a multiple sheet glazing unit as claimed in claim 1, wherein said clamping means includes, a body carried by one leg, a back plate carried by the other leg, and means mounted on said other leg for adjusting the position of said back plate relative to said body portion.

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