Mar. 13, 1923. 1,448,351.

I. M. KIRLIN.

PROCESS OF MAKING HOLLOW PANES OF GLASS.

FILED SEPT. 29, 1921.

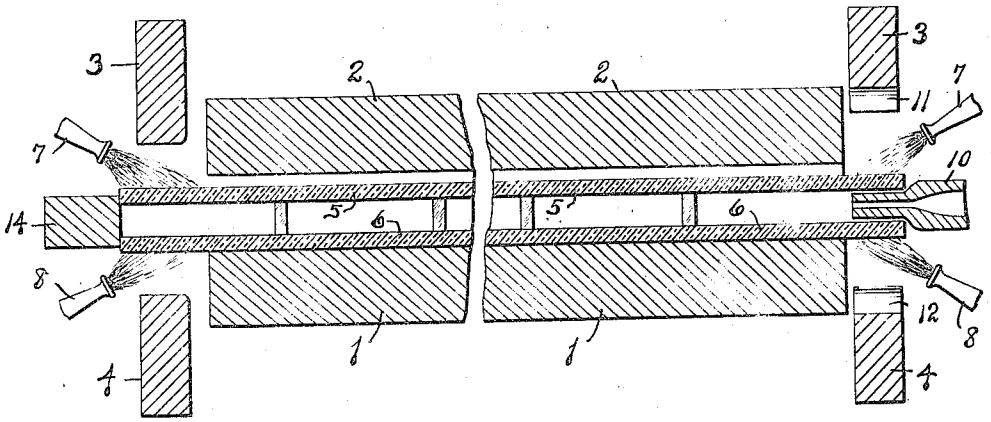


Fig. 1.

Fig. 2.

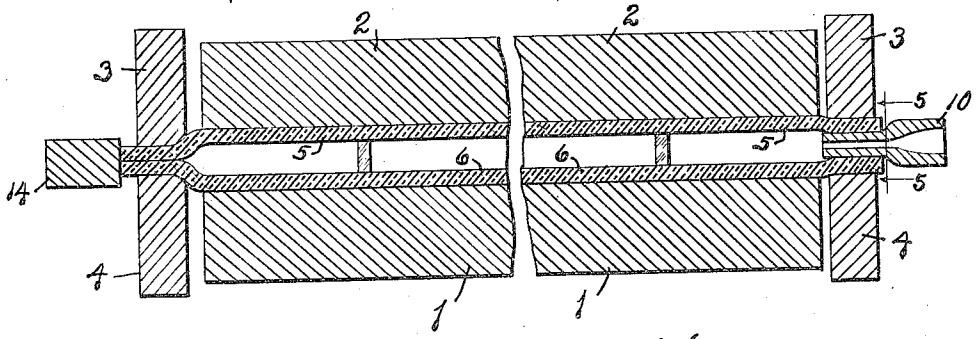


Fig. 3.

Fig. 4.

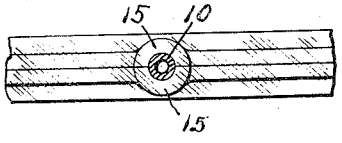


Fig. 5.

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UNITED STATES PATENT OFFICE.

IVAN M. KIRLIN, OF DETROIT, MICHIGAN.

PROCESS OF MAKING HOLLOW PANES OF GLASS.

Application filed September 29, 1921. Serial No. 504,157.

To all whom it may concern:

Be it known that I, IVAN M. KIRLIN, a citizen of the United States, and residing at Detroit, in the county of Wayne and State of Michigan, have invented a new and Improved Process for Making Hollow Panes of Glass, of which the following is a specification.

This invention relates to the manufacture of panes of glass composed of a plurality of sheets integrally united at their edges and spaced apart excepting at these united edges, and consists in a novel process for producing such panes with flat outer faces.

It also consists in a novel process for forming such panes with a rarefied atmosphere between the sheets.

It further consists in a process employing the details illustrated in the accompanying drawing and specially set forth in the hereto annexed claims.

In the drawing, Fig. 1 is a vertical section of two sheets of glass and the apparatus for causing adjacent edges to unite. Fig. 2 is a similar section through the tube for maintaining an air pressure. Figs. 3 and 4 are sections of the sheets and devices shown in Figs. 1 and 2 respectively after the pressure bars have been brought together. Fig. 5 is an elevation of a portion of the edge of a finished pane showing the tube through which air under pressure was introduced between the sheets.

Similar reference characters refer to like parts throughout the several views.

The drawing shows two retaining plates in the form of a base 1 and a platen 2 movable relative to each other and adapted to be mounted in a heating furnace whose general temperature is sufficiently high to render glass malleable. Along the edges of these main members are two vertically movable frames consisting of bars 3 and 4. Any desired means may be employed to move these retaining plates and frames and they may be of any desired material which will withstand the temperatures employed.

Adjacent these frame bars 3 and 4, as indicated at 7 and 8, are gas burners which direct proper flames onto the edges of sheets 5 and 6 of glass which rest on the base 1, and the heat of these burners is sufficient to fuse the edges of the sheets. After the edges are thus fused the frame bars 3 and 4 are brought against these sheets and continued movement of these bars carries the edges into contact with each other, as indicated in Figs. 3 and 4. A bar 14 may be provided to position the sheets within the furnace and to assist in preventing air from escaping between the edges of the sheets while these edges are being united by heat and pressure. Means may be provided to press this bar against the edges of the sheets.

The two sheets are spaced apart by small posts 9 of steel or other heat resistant material. When the sheets become malleable, pressure thereon by the base 1 and platen 2 causes these posts to indent the sheets so that after the sheets have been united and cooled, these posts are held stationary. In Figs. 2 and 4 I have shown a small tube 10 extending between the edges of the sheets. One of the bars 14 may be apertured or broken to admit the tube 10. This tube may be of glass or of a metal having the same expansion as glass, so that when the fused edges of the sheets are bent around the tube, as shown in Figs. 4 and 5, no harm will result from unequal expansions. The bars 3 and 4 are shown in Fig. 2 to be formed with semi-circular notches 11 and 12 adapted to fold or bend the edges of the sheets around this tube 10 at 15 to hermetically seal it in position.

The tube 10 has two functions. After the sheets have been heated and their edges fused and brought together and the posts 9 pressed into the sheets, air under pressure is forced into the space between the sheets and serves to press the sheets against the base 1 and platen 2, resulting in smooth, flat, and, if desired, parallel surfaces. It is to be understood that the sheets are forced to conform to the surfaces of the retaining plates and any irregularities therein will be followed by the malleable sheets.

The entire mechanism may now be taken from the furnace and permitted to cool or the temperature of the furnace may be reduced until the glass is no longer sufficiently malleable to sag down between the posts 9. The pane thus produced is then annealed or tempered, after which the air between the sheets is exhausted and the tube 10 sealed in any desired manner.

The details of the mechanism used may all be changed by those skilled in the art without departing from the spirit of my invention as set forth in the following claims.

I claim:—

1. The process of forming hollow panes of glass which consists in heating two spaced sheets until malleable, additionally heating the edges of the two sheets to fusing point and pressing these edges together while at the same time maintaining a pressure between the sheets.

2. The process of forming hollow panes of glass which consists in heating spaced sheets until they are malleable, additionally heating the edges of the two sheets until they are fusible, pressing the edges together to unite them while air presure is maintained between the sheets, maintaining a pressure of air between the sheets until they are no longer malleable, and then exhausting the air between the sheets.

3. The process of forming hollow panes of glass which consists in heating two sheets of similar area between retaining plates until the sheets are malleable, fusing the edges of the sheets and pressing them together, and forcing the sheets against the retaining plates by pressure between the sheets.

4. The process of forming hollow panes of glass which consists in placing spaced sheets between retaining plates, said sheets being spaced by means of short posts, heating the sheets until they are malleable, forcing the retaining plates toward each other to cause the posts to indent the sheets, fusing the edges of the sheets and pressing them together, forcing the sheets against the retaining plates by means of pressure between the sheets, and then permitting the sheets to harden.

5. The process of forming hollow panes of glass which consists in heating two similar sheets of glass between flat retaining plates, introducing a tube between the edges of the sheets at one point, heating the edges to fusing point and forcing them together and around the tube to hermetically seal the edges together and the tube in position and at the same time forcing air through the tube into the space between the sheets to hold them against the retaining plates.

6. The process of forming hollow panes of glass which consists in heating two similar sheets of glass betwen flat retaining plates, introducing a tube between the edges of the sheets at one point, heating the edges to fusing point and forcing them together and around the tube to hermetically seal the edges together and the tube in position and at the same time forcing air through the tube into the space between the sheets to hold them against the retaining plates, cooling the pane until no longer malleable, and then exhausting the air from its interior.

7. The process of forming hollow panes of glass which consists in heating two spaced sheets of similar area between retaining plates, introducing a glass pipe between the edges of the sheets, fusing the edges of the sheets and pressing them together and around the tube, introducing air pressure between the sheets to press them against the retaining plates, tempering the finished pane, exhausting the air through said tube, and sealing the tube.

IVAN M. KIRLIN.