

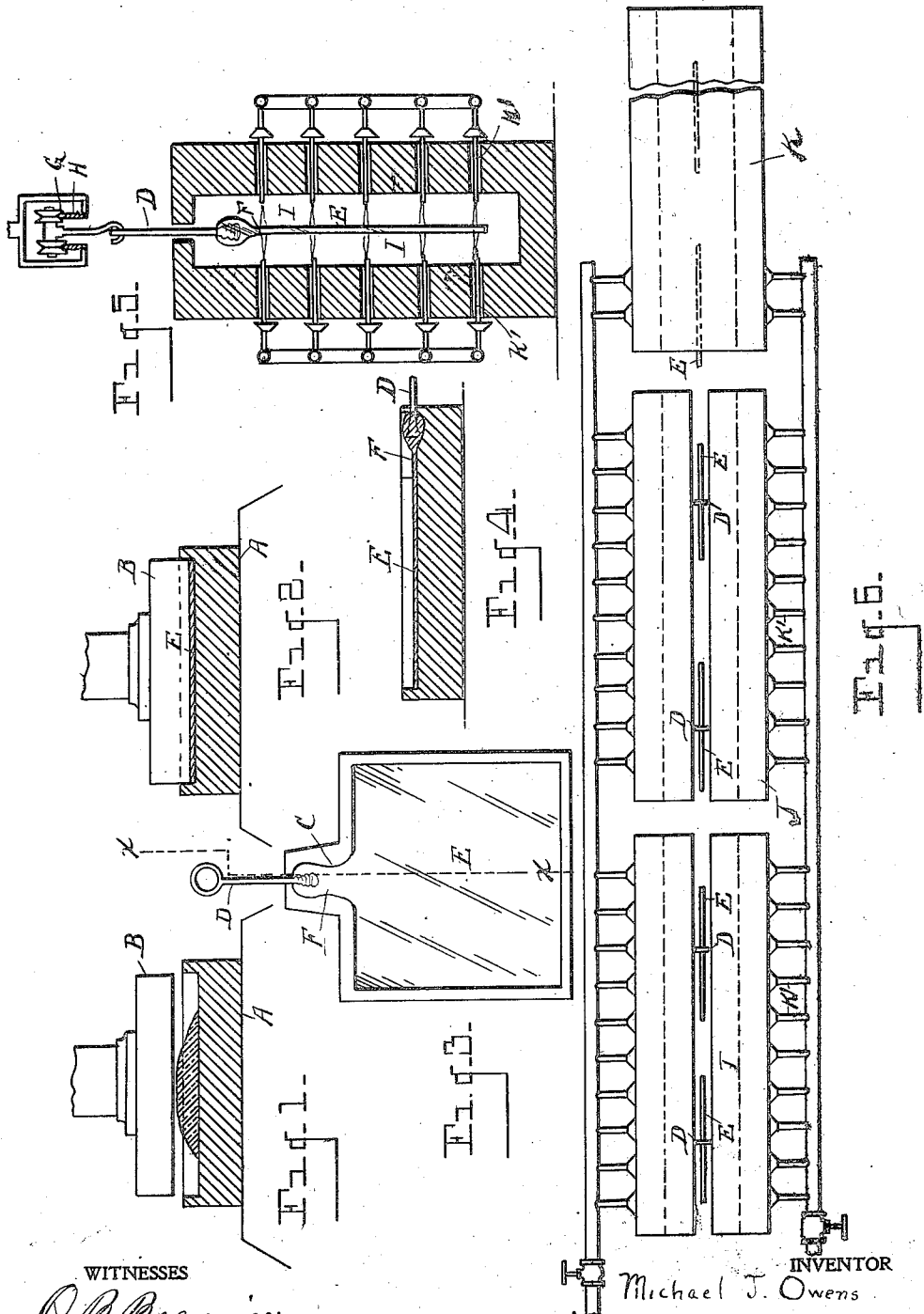
No. 877,729.

PATENTED JAN. 28, 1908.

M. J. OWENS.
PROCESS OF MAKING SHEET GLASS.

APPLICATION FILED JAN. 26, 1907.

2 SHEETS—SHEET 1.



WITNESSES

O. P. Baumgarter
Meles H. Meaus

INVENTOR

Michael J. Owens

By

William Hulbert
Whitney
Attorneys.

No. 877,729.

PATENTED JAN. 28, 1908.

M. J. OWENS.
PROCESS OF MAKING SHEET GLASS.

APPLICATION FILED JAN. 26, 1907.

2 SHEETS—SHEET 2.

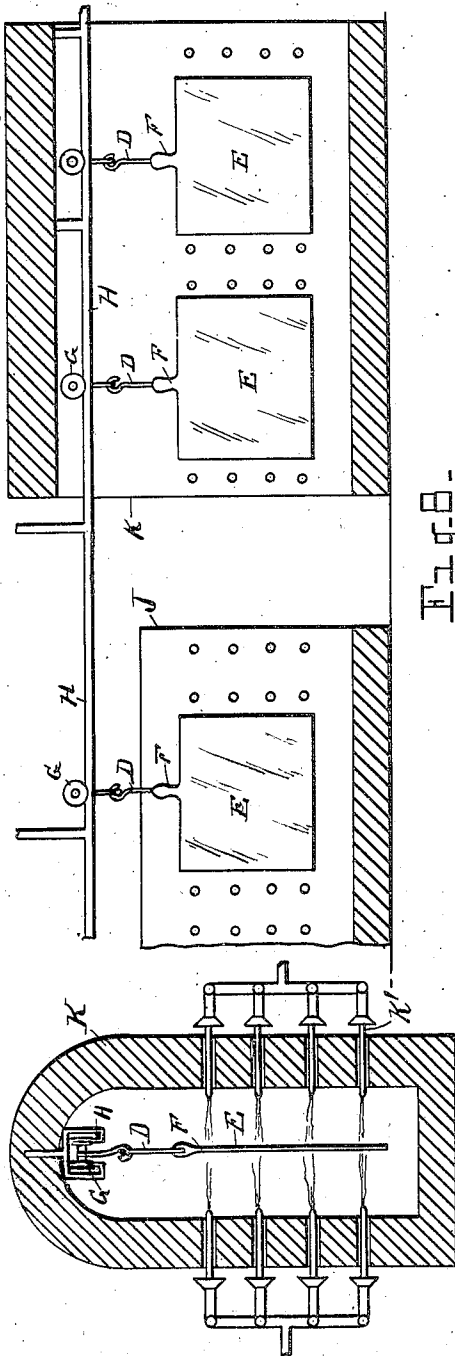


Fig. 8-

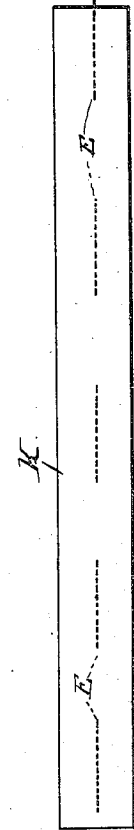
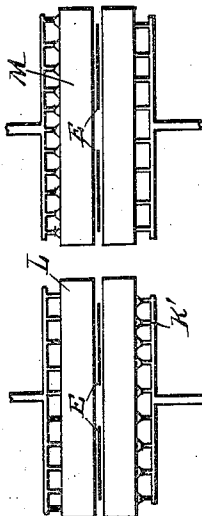


Fig. 9-

Fig. 7-



WITNESSES

O. B. Penzinger
Melia Williams

INVENTOR

Michael J. Owens
By *Whitmore Hubert Whitmore*
Attorneys

UNITED STATES PATENT OFFICE.

MICHAEL J. OWENS, OF TOLEDO, OHIO, ASSIGNOR TO THE TOLEDO GLASS COMPANY, OF TOLEDO, OHIO, A CORPORATION OF OHIO.

PROCESS OF MAKING SHEET-GLASS.

No. 877,729.

Specification of Letters Patent.

Patented Jan. 23, 1908.

Application filed January 26, 1907. Serial No. 354,260.

To all whom it may concern:

Be it known that I, MICHAEL J. OWENS, a citizen of the United States of America, residing at Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Processes of Making Sheet-Glass, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to new and useful improvements in process of manufacturing sheet glass, and consists in first pressing a sheet, and next in fire-polishing the surfaces thereof while suspended in a vertical position.

The invention further consists in pressing the glass, with a supporting or carrying means attached, by the pressing operation, and then fire-polishing in the manner described; and, further, in pressing the glass into a sheet, and then fire-polishing with a smoky flame, and subsequently with a clear or non-smoky flame; and, finally, annealing, as more fully hereinafter described.

In the drawings, Figure 1 is a section through a simple form of press which might be used in pressing the sheet to its sheet form; Fig. 2 is a section through the mold, showing the parts in the molding position; Fig. 3 is a section of the sheet, with the bail or handle attached as pressed and in the mold; Fig. 4 is a longitudinal section on line $x-x$ of Fig. 3; Fig. 5 is a section through the fire-polishing furnace; Fig. 6 is a plan view of the fire-polishing furnaces and the leer, showing how the same may be arranged in a plant for carrying out my process; Fig. 7 is a section through the leer; Fig. 8 is a longitudinal section of the fire-polishing furnaces of Fig. 6; and Fig. 9 is a plan view of a slightly modified apparatus for carrying out my process.

A represents a mold in which molten glass is put, and B the plunger or press for pressing the mold into sheet shape in the mold A. At one or more points in the side of the mold B, I provide a groove or recess C, enlarging at its end, and with an aperture at the end, so that a bail or handle D may be inserted therein. The handle may be roughened, or provided with a head, or with a screw, or any other means, so as to firmly attach the glass to the handle.

The molten glass having been put into the mold A, the press B being of complementary shape and being lowered therein will form a plate E of a desired form, with an extension

F, the outer end of which extension will inclose and be firmly secured thereto, as plainly shown in Fig. 4. After being molded, the glass is allowed to remain in the mold until it is sufficiently chilled, so that it may be handled by grasping the handle or bail D. It may be desirable to have the sides of the mold A movable to more readily lift out the formed sheet, but as this is an obvious expedient and is well known in mold making of all kinds I do not deem it necessary to illustrate it. The sheet thus formed, with its attached handle or bail, is then placed upon a carrier G running in a track H, and is fed by any suitable means into the fire-polishing furnace I. I preferably first fire-polish the surface of the glass with a smoky flame, such smoky flame being well known to glass workers, and this I accomplish in the furnace I. I may, if desired, however, immediately fire-polish it with a clear or non-smoky flame, but I think better results are, and a better surface is, obtained by fire-polishing first with a smoky flame. In case I employ both the smoky flame and the non-smoky flame,—the furnace I is the non-smoky flame furnace,—I next pass the sheet through a furnace J having a clear or non-smoky flame, and finish the fire-polishing. Both of these furnaces have burners K K' entering from opposite sides, so that both sides of the glass will be simultaneously fire-polished. The carrier which supports and carries the glass during this fire-polishing operation may continue beyond the fire-polishing furnace, and through the leer,—which I have shown in diagram at K,—so that after leaving the fire-polishing furnace it will enter the leer, and travel therethrough in the well known manner of operating leers in glass establishments.

In handling large sheets,—and possibly even in handling small sheets,—I may provide two, or even more, of the extensions F and handles D to a single sheet, so that there will be no tendency to sag in portions of the glass during the fire-polishing operation.

By maintaining the glass in a vertical position throughout the fire-polishing and annealing process, all tendency to warp or bend is prevented.

By this process the glass may be given a plate-glass surface, notwithstanding the fact that it starts out with a pressed surface having the mold marks thereon. In addition to

this, the process is extremely simple, and the plant required is equally simple and quite economical of space.

Instead of applying the heat to both sides of the glass during the fire-polishing operation,—which may possibly tend to cause it to sag at certain points that may be overheated,—I may, as shown in the diagram in Fig. 9, apply the heat through the burners K upon one side, and upon the opposite side, through nozzles L, I may direct jets of air. This will insure only the melting of the surface and prevent any possibility of overheating the plate so that it will sag. In this process, of course, I only fire-finish but one side, and apply the air jets to the other, and then have another furnace, indicated at M, with the burners and jets reversed, so that before entering the leer both sides will be fire-polished.

What I claim as my invention is,—

1. The process of making glass sheets, consisting in first pressing a glass sheet, with an attached carrying means at the edge thereof, and then in fire-polishing the surface of said sheet while suspended by said supporting means in a vertical position.

2. The process of making glass sheets, consisting in pressing the molten glass into sheet form, and then in fire-polishing one side thereof while cooling the opposite side by air, next in fire-polishing the opposite side and

applying the cooling means to the side already fire-polished.

3. The process of making glass sheets, consisting in first pressing the molten glass into sheet form, with an attached supporting means, next fire-polishing one side and applying cooling air jets to the opposite side, and finally fire-polishing the opposite side and applying cooling air jets to the fire-polished side, the fire-polishing operations being carried on while the glass is suspended in a vertical position by said supporting means.

4. The process of making glass sheets, consisting first in pressing the molten glass into sheet form, next in fire-polishing the surface thereof with the smoky flame, and next in fire-polishing the surface thereof with a clear or non-smoky flame.

5. The process of making glass sheets, consisting in pressing the molten glass to sheet form, next in suspending the glass in a vertical position, next in fire-polishing the glass with a smoky flame, and then fire-polishing the said sheet with a clear or non-smoky flame while thus suspended.

In testimony whereof I affix my signature in presence of two witnesses.

MICHAEL J. OWENS.

Witnesses:

WILLIAM EMIL BOCK,
HUGH C. ROSS.