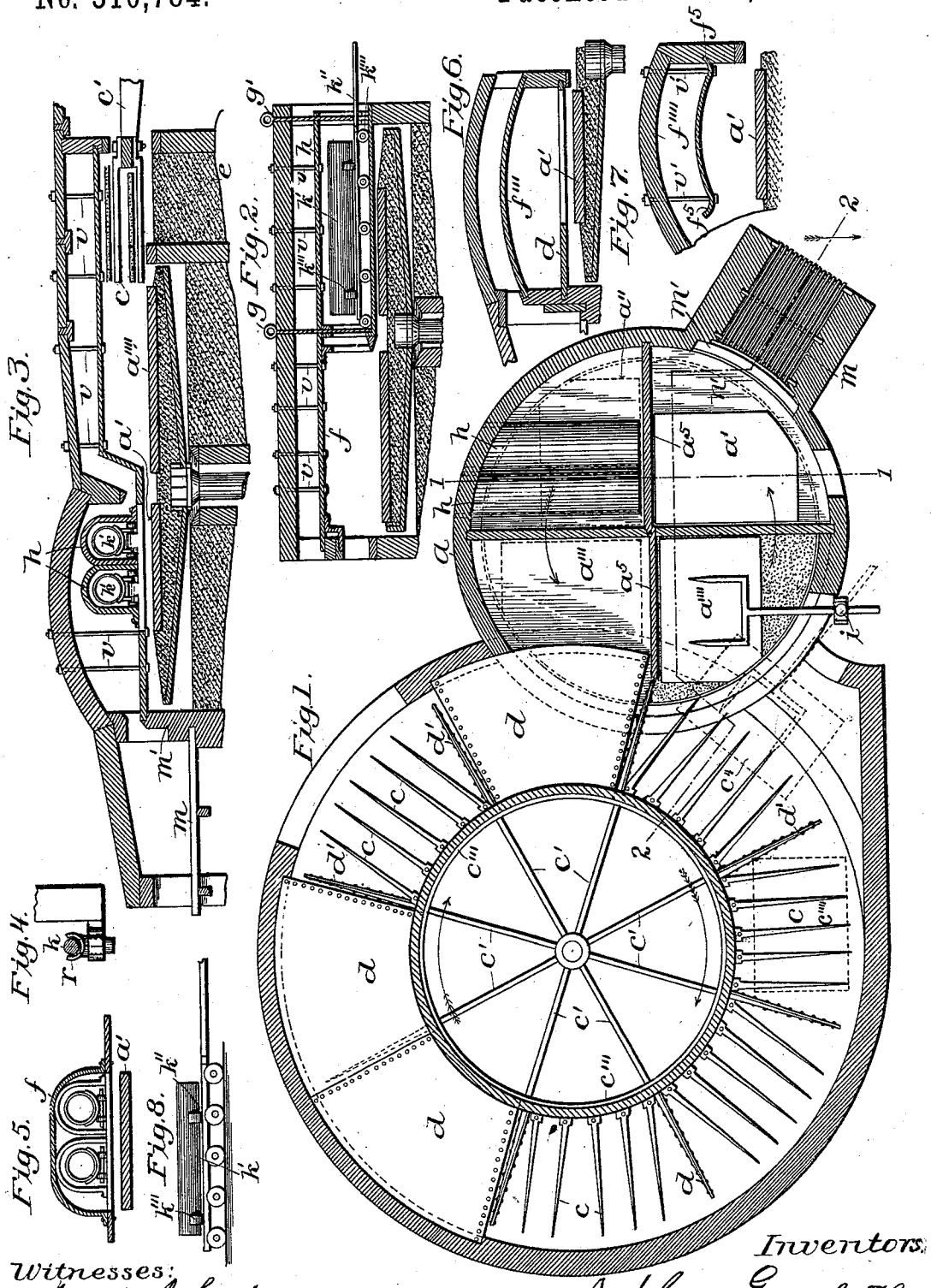
(No Model.)

J. GEORGE & C. M. SHORTLE.

FURNACE FOR ANNEALING AND FLATTENING GLASS.

No. 510,784. Patented Dec. 12, 1893.



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JAPHUS GEORGE AND CHRISTOPHER MICHAEL SHORTLE, OF ITHACA, NEW YORK.

FURNACE FOR ANNEALING AND FLATTENING GLASS.

SPECIFICATION forming part of Letters Patent No. 510,784, dated December 12, 1893.

Application filed April 15, 1893. Serial No. 470,502. (No model.)

To all whom it may concern:

Be it known that we, JAPHUS GEORGE and CHRISTOPHER MICHAEL SHORTLE, citizens of the United States of America, and residents of Ithaca, Tompkins county, New York, have invented an Improved Flattening and Annealing Furnace for Glass, of which the following is a specification, reference being had to the accompanying drawings.

Our principal object is to prevent injury to the glass by excluding from the glass, while being flattened and annealed, dust, and the products of the combustion of the fuel, which heats our furnace; and we do this by the construction of a division-septum or covering over the flattening and annealing wheels. To aid this, we use other minor devices, which with our invention, will be apparent as we describe them.

Figure 1, is a horizontal section of our furnace, just above our dust excluding septum. Fig. 2 is a vertical perpendicular section of our furnace across the flattening wheel on the line 1. Fig. 3 is a vertical section of the flattening wheel and its chamber and of a part of the annealing wheel and its chamber; the sectional elevation of our "push-holes" being shown at *h*. Fig. 4 is an elevation of our removal fork-swivel. Fig. 5 is a perpendicular section of our "muffler" over the stone, and stone space *a'*, where the "rollers" or cylinders of glass are flattened. Fig. 6 is a sectional view of a thin arch stone used when desirable over the stone space *a'*. Fig. 7 is a dust catching shelf over the stone space *a'*, and Fig. 8 is a view of our improved cylinder cradle.

Fig. 1 has the annealing wheel to the left of the flattening wheel. In the other figures the annealing wheel is indicated to the right of the flattening wheel; it being common to arrange the annealing wheel on either side of the flattening wheel.

In the figures *a* is the flattening wheel in its encircling walls; and *b* the annealing wheel, constructed as in a former application filed by us February 26, 1892, Serial No. 422,944, in its inclosing walls, and with its set of radiating bars *c*, on which the sheets of glass are annealed. The spokes *c'* extend outwardly beyond the rim *c'''* to which the bars *c* are attached, and have fast to their extensions *d'* perpendicular metallic plates, whose height reaches from the division roof above the spokes to the filling *e* which comes up close to the annealing wheel (as indicated of the flattening wheel in Figs. 2 and 3) the better to keep the heat about the wheel.

Over the bars of the annealing wheel, that hold the sheets of glass, are fixed plates *d;* preferably sheet steel boiler plates, which cover the whole wheel, though omitted over some of the bars in Fig. 1 to show the sets of bars *c*, and the edges of the perpendicular division plates fast to the extensions of the spokes. By the septum sheets *d*, we exclude dust and the products of combustion from the sheets of glass on the annealing wheel. Similar metallic sheets, constructed over movable longitudinal reciprocating bars, of an annealing ear, exclude dust and fuel products, since they pass the products of fuel, in a separate flue above the reciprocating bars.

The flattening wheel has over it spaces *a'*, *a''*, *a'''*, *a''''*, indicated by dotted lines, at which each stone arrives successively, and is stopped. These spaces except the one *a'*, are covered by flat horizontal metallic plates *d* for the purpose of excluding dust, and the products of combustion of fuel, from the glass while on the flattening stones; but the space *a'*, needs to have its covering septum higher than the other spaces, that the "rollers" or cylinders of glass, may be flattened; and hence we put what we call a "muffler" or hollow cover over that space, large enough to allow the flattener to flatten the glass in; which cover is closely connected at its edges, to the side walls of the flattening chamber; or to the covering over the other stone spaces; or as in Fig. 6 we make our muffler of an arched stone *f'''* of gas-retort-clay, or of porcelain, or the glass pot-clay, or of aluminum or other metals that endure high heat, and place it over the space *a'*, and thus exclude dust and fuel products from the flattening space *a'*.

Over the stone space *a''*, we make our two "push holes" *h*, as indicated by dotted lines over the stone space *a''*, Fig. 1; and through and beyond the section of the "muffler," in Fig. 5, we indicate, the push holes, with cylinders of glass in them. At the spaces over

a'''', the division septum, is elevated as seen in Fig. 3, to allow the sheets of glass to be transferred to either of the two sets of bars c of the annealing wheel. The wheels revolve as indicated by arrows. On the stones when at a' the cylinders are received and flattened; and off of them at a'''' they are taken by a fork k, and transferred by a lateral motion to the sets of bars, when at the position c^4. To make this transfer easily, we place at i' a swivel crotch, in which the handle of the fork rests, and by the turn indicated in Fig. 1 to the left, the sheet of glass is transferred to the position c^4 indicated by dotted lines; when, a push, of a short distance, in on the sets of bars, places the sheets on the bars, as indicated by the broken line dots, over the sets of bars when at the position c''''; and thus the flattening and transfer of the sheets to the annealing wheel goes on as long as desired; the sheets being removed from the annealing wheel and chamber at the aperture j.

The "push poles" h will be noticed to be over the stone space a'' and are above the septum at that place; and they have sliding doors g, g' which are raised and lowered by cords or levers, attached to the rings at their tops. When the door g' is open, a cylinder is put in, and that door closed. When the door g is open, the cradle k' is run, with a cylinder on it, into the space beneath the muffler; and the flattener takes it on his lifting rod; and the cradle is drawn back, and that door shut. The cradle is not made as usual; but is constructed of two longitudinal bars k'', with the cross hollow bar k''' indicated in Fig. 8. Thus made, the cradle runs on the grooved rollers k'''', and thus is easily operated.

The division wall m' between the furnace m and the flattening chamber, is made of the usual artificial stone, used in glass furnaces; and the septum at n' between this division wall and the stone space a', is also preferably made of the same material.

Fig. 4 shows the removal-fork crotch r, that is fast at the usual flattener's opening, in a frame about his opening.

When desirable we use as indicated in Fig. 7 a dust pan f'''', which is a part of our muffler, as indicated. It is arched to give room for the cylinders of glass to go upon the stone a', and has lips f^5 on its edges to hold the dust, and fuel products, but being with open spaces about its edges, it is not dust tight. It is held by rods v' to the flattening wheel roof. In Figs. 2 and 3 rods v are indicated, to hold the septum plates of both wheels to the wheel-roofs to keep them from sagging by the heat. When the artificial stone f''' is used in place of the muffler f, the furnace m is made with tight fitting doors, and a regulated draft, that the heat may be kept at an even, high temperature; and the transverse mantle wall a^5 across and over the flattening wheel is made tight to the stone f''', so that stone is kept at a heat sufficient to flatten the cylinders into sheets of glass beneath the stone f''''. The letter a' is used, both for one of the stones, and for the stone position; since the stones are movable, while the position is not movable. By the inclosing doors g g' of our "push holes" much "bursting of rollers," or fractures of glass cylinders is prevented. The sets of bars c'''' of Fig. 1 have sheets of glass on the bars as placed by the fork k;—which sheets are indicated on the bars by dotted lines at the right hand of Fig. 3. Everything else is believed to be apparent.

What we claim is—

1. In the described flattening furnace chamber; containing flattening stones on its flattening wheel; the construction of a metallic horizontal septum or division, between the chamber roof, over its annealing parts; and with an elevated septum or muffler structure, over the flattening space of the wheel as set forth.

2. In the described flattening furnace, with a flattening wheel in its roofed chamber, and provided with the described horizontal septum between the wheel and the chamber roof; the elevated part of the septum or muffler, constructed over the stone space, where the cylinders of glass are flattened, as and for the purposes set forth.

3. In the described glass flattening furnace, with its wheel in its roofed chamber; the elevated portion of the septum, constructed over the flattening space a' of the chamber, provided with a "push-hole" opening or openings made in one of the sides of the muffler, by which the "rollers" or cylinders of glass to be flattened, are admitted into the muffler, without contact with the fuel products, as set forth.

4. In the described flattening and annealing furnace, provided with a flattening wheel the septum or division constructed over the flattening wheel, between it and its roof; in combination with the septum or division constructed over the annealing wheel, between it and its roof; there being an opening between the chamber of the flattening and annealing wheels; whereby the products of fuel combustion pass from the flattening chamber to the annealing chamber, substantially as set forth.

5. In the described furnace chamber, the construction of one or more push-holes, over the quadrant or space of the chamber, next beyond the flattening space, these push-holes penetrating the outside wall of the chamber, extending over the second stone space, of the revolution of the wheel, and having outlets over, and convenient to the flattening space, substantially as shown and set forth.

6. In the described flattening furnace; provided with a flattening wheel, the push-hole, or holes constructed as separate chambers, located over the septum, between the wheel and its roof, above the stone space a'' in

combination with the gates g, g, whereby the rollers or cylinders, are inclosed in the push-hole chambers, while being heated, as set forth.

7. In the described flattening furnace, provided with a flattening wheel the elevated portion of the septum or "muffler" over the flattening space a'; in combination with the mantel wall a^5, which extends across the flattening wheel; whereby the draft heat, and products of fuel combustion, are confined by the septum, and delivered beyond the walls of the flattening chamber, as set forth.

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