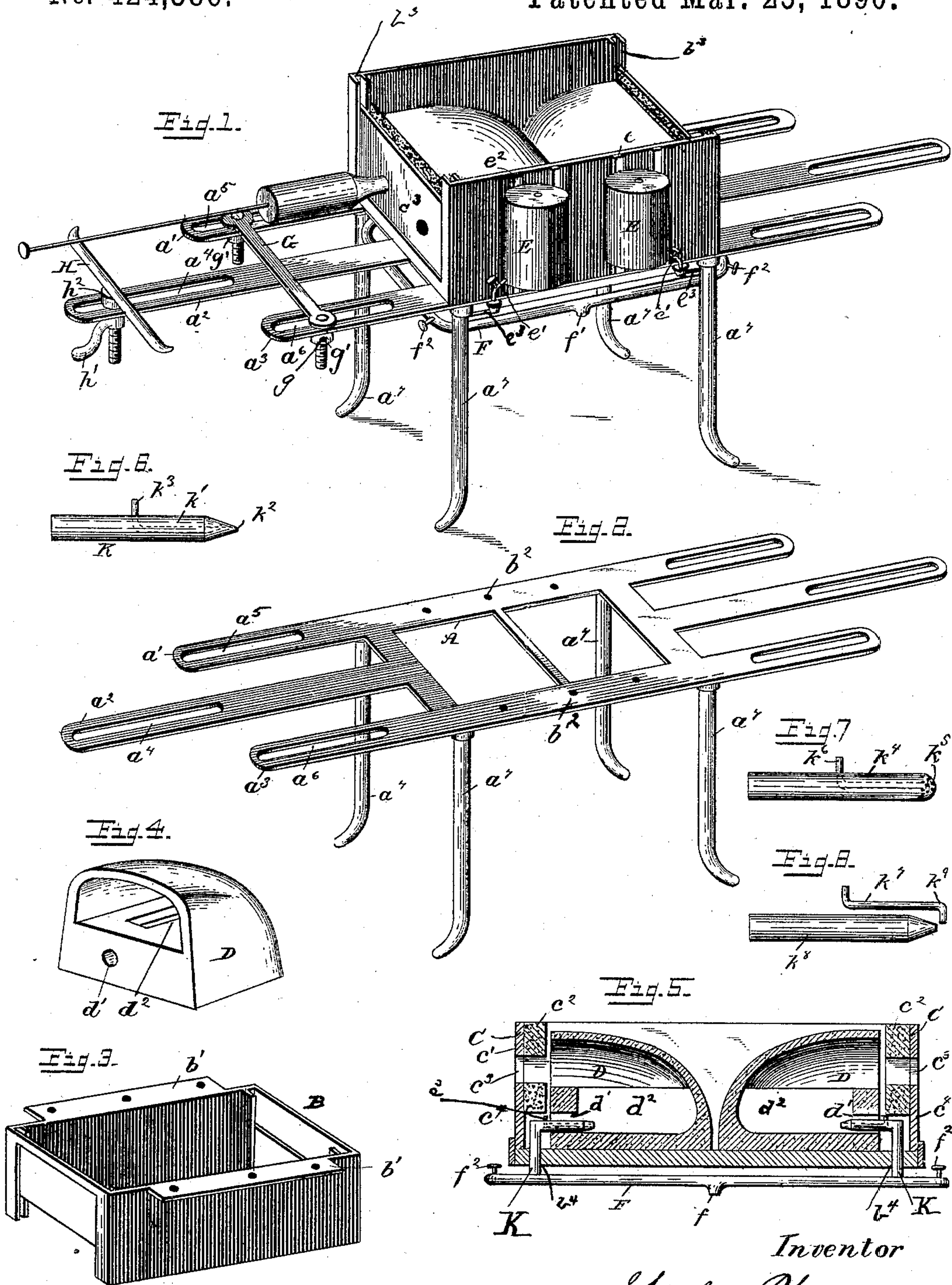


(No Model.)

G. WARNER.
GLORY HOLE FURNACE.

No. 424,386.

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Witnesses:
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UNITED STATES PATENT OFFICE.

GOTTLIEB WARNER, OF GLASSBOROUGH, NEW JERSEY.

GLORY-HOLE FURNACE.

SPECIFICATION forming part of Letters Patent No. 424,386, dated March 25, 1890.

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To all whom it may concern:

Be it known that I, GOTTLIEB WARNER, a citizen of the United States, residing at Glassborough, in the county of Gloucester and State of New Jersey, have invented certain new and useful Improvements in Glory-Hole Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to the art of making glass bottles, and more particularly to the construction of furnaces, or what are technically called "glory-holes," used in the finishing of bottles.

The object of my invention is to supply means for overcoming certain disadvantages inherent in the coal-furnace—such as the inability to regulate easily the temperature at the glory-holes, dust, cinders, and smoke—and to produce a portable furnace which shall be simple in construction, durable, and effective and cheap in operation, and which shall have glory-holes capable of affording a degree of heat fully under the control of the workman.

To these ends my invention consists in the general and specific combination, construction, and arrangement of parts, as hereinafter described and claimed.

In the accompanying drawings, forming part of this specification, and in which like letters of reference designate corresponding parts, Figure 1 is a perspective view of my invention, showing a metal frame having legs of convenient height and supporting a box made of metal and lined with refractory material and bolted to the frame, also showing two reverberatory fire-chambers placed in the box back to back and face-plates situated in front of said fire-chambers, having apertures serving as glory-holes, also showing the oil tanks and pipes leading the oil and compressed air to the burners, (not shown,) also showing the slotted extensions of the frame provided with adjustable sliding rests adapted to support the pontil-rods, and showing a bottle attached to its pontil-rod and having its neck inserted in the glory-hole. Fig. 2 is a perspective view of the frame and legs, showing the extensions provided with slots for the reception of the bolts of the adjust-

able sliding rests, also showing the holes in the flange enabling the fire-chamber box to be bolted to the frame. Fig. 3 is a perspective view of the fire-chamber box inverted, showing flanges adapting it to be bolted to the frame. Fig. 4 is a perspective view of one of the fire-chambers, showing the aperture for the reception of the burner leading into a recess in the interior of the chamber where the oil is ignited. Fig. 5 is a side view, in section, of the furnace, showing the fire-chambers in position in the box, the face-plates, and the disposition of the burners and air and oil pipes, (the latter being broken off.) Fig. 6 is a view of a burner consisting of an air-tube having a tapering point through which passes the end of an inner tube carrying the oil and projecting slightly from it. Fig. 7 is a view of a burner constructed differently from the one shown in Fig. 6, the air-tube being rounded at the end and perforated with small apertures, and an inner tube carrying the oil brought to within a small distance of the perforated end of the inclosing-tube. Fig. 8 shows a burner differing in construction from the other two and in which the air-tube tapers slightly at the end, the oil-tube being placed outside and bent so as to present a line of current at right angles to that of the air.

In the art of making glass bottles the method usually adopted is to heat the glass until it acquires the necessarily-plastic condition, after which a suitably-sized portion of it is taken on the end of a long tube, rolled on a smooth surface to give it approximately the desired shape, and then placed between the two halves of a heated mold and expanded by means of the breath blown into the tube until the glass conforms to the shape of the mold, the mouth of the bottle adhering to the end of the tube. It is then withdrawn from the mold, the bottom part is attached to a rod called a "pontil," and the neck is cut from the tube. The last process before annealing the bottle is to round off the sharp edges of the mouth. For this purpose the mouth of the bottle is placed in a furnace through an aperture called a "glory-hole," where it is finished, and as this now requires practice and careful manipulation to prevent blackening and burning, the means now commonly at the disposal of the workman

being found ineffective, I have invented the furnace illustrated in the figures above described to provide a more effective and more easily-operated device that will prevent the loss to the manufacturer which accompanies the deterioration of the bottles above mentioned.

Different qualities of glass requiring different degrees of heat, it is found very difficult in practice to prevent the bottles blackening and burning while in the glory-holes, there being no means of regulating the heat at the glory-holes of the furnaces now in use.

In the drawings, A designates the supporting-frame, having the extensions a' a^2 a^3 on one side and the slots a^4 a^5 a^6 in them and similar slotted extensions on the other side of the frame.

The letter a^7 designates the legs.

B represents the fire-chamber box, which may be made of metal lined with clay, and has the flanges b' for the purpose of bolting it down to the frame A through the bolt-holes b^2 , the guides b^3 for holding in place the face-plates, and the apertures b^4 in the floor of the box for the reception of the burner-tubes.

C represents the face-plates, the front being of sheet-iron c' and lined with fire-clay c^2 .

c^3 represents the glory-hole; c^4 , the recesses covering the elbows of the burner-tubes.

D represents a fire-box, which is made of fire-clay and shaped as shown in Figs. 4 and 5. The floor of the chamber is flat and has the recess d^2 cut in it, extending from the back of the interior of the chamber, where the recess slopes upward, to within a short distance of the front, at which point it communicates with the outside by an orifice d' . The fire-chamber is open in front, and the interior at the back gradually slopes downward, presenting in vertical section the appearance shown in Fig. 5.

It is intended that the burner be introduced in the orifice d' , so that ignition may take place in the recess d^2 , and, as the latter is sloped upward, the flames, driven by the compressed air behind them, will naturally take the same direction and follow the slope of the back and roof of the crucible until they impinge upon the face-plate C, which covers the mouth, and issue by the glory-holes c^3 c^3 . It will be noticed that there are two glory-holes to each fire-chamber, and that there are two such fire-chambers in the box, placed back to back. This arrangement is for the convenience of the finisher, who stands beside his glory-hole, and who may operate two pontil-rods at the same time.

E represents the oil-cans, of which there may be any number.

e' is a spigot to regulate the amount of oil issuing from the tanks.

e^2 represents the catches, by means of which the can is hung on the box; but any other manner of holding the oil-cans in position may be adopted in practice.

e^3 is the oil-pipe leading to the burner and provided at the other end with a funnel into

which the oil may run. Should it be found in practice that the heat is too great for the safety of the oil, the cans may be placed at a distance and the oil-pipes be elongated accordingly; but it is evident that they must be placed at a sufficient height for the oil to run to the burners.

F represents the air-pipe leading from the main, which may supply a number of furnaces constructed according to my invention.

f' is a branching pipe to lead the air from the large pipe F to each of the burners in the particular furnace being described. It is provided with stop-cocks f^2 , enabling the workman to reduce or increase the amount of air to his burner, and which, together with the spigot on the oil-can, will provide for an even and effective regulation of temperature at the glory-holes.

G represents the adjustable pontil-rest placed nearest the glory-holes. It is provided with downwardly-projecting arms at each end, adapted to travel in the slots of the extensions a^5 and a^6 , and each arm has two jam-nuts g' . The apertures g^2 in the jam-nuts permit the use of a key for the purpose of setting the rest at any desired position.

H is a second pontil-rest placed farther back from the glory-holes and set upon a threaded post adapted to slide in the slot a^4 of the extension a' , and provided with a key h' below the extension and a jam-nut h^2 above, permitting the rest to be adjustable both vertically and horizontally.

K represents one of the burners, which consists of an outer tube k' , having a tapering point k^2 , and an inner tube k^3 , entering it at a convenient point, the joint being made airtight and extending to the end of and a short distance beyond the outer tube. The air passes through the larger outer tube k' , and the oil through the inner tube k^3 . The oil being ignited at the end k^2 and the air turned on, the latter will cause a thorough combustion and produce a flame of great intensity.

Another form of burner is shown in Fig. 7, in which the outer tube k^4 has a closed rounded end k^5 , perforated with small apertures. The oil-tube k^6 , introduced in the larger tube, extends to within a short distance of the said apertures. This construction causes the air which is admitted through the outer tube to combine with the oil before ignition and may produce a more perfect combustion.

In Fig. 8 the oil-tube k^7 does not enter the air-pipe k^8 , but is extended alongside of it until it reaches the end, where at k^9 it makes an abrupt turn at right angles to the path of the current of air.

The assembling of the different parts of the furnace is as follows: The frame being set up on its legs, the fire-chamber box is bolted to it and the cans filled with oil attached to it. The fire-boxes are placed in position, back to back, in the box, and the face-plates in the guides, with the thin fire-clay lining toward the mouths of the crucibles, the burners ad-

justed in the apertures in the crucibles, and the pipe-connections made up. The sliding rests are placed in their respective slots and the jam-nuts screwed tight. The furnace is
 5 now ready for operation. The finishers stand beside the pontil-rests, each taking care of one or two glory-holes, and proceed to finish the mouths of the bottles that have been blown.

I do not restrict myself to the specific construction of the furnace as hereinbefore described, for it is evident that many changes may be made therein. Instead of two fire-chambers, one or any number may be used, and the form of the furnace may be round
 15 instead of square, and the fire-chambers arranged in a circle. The chamber and face-plate being separate, it will be found easier to clean and to adjust the points of the burner at the proper place in the channel.

20 Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a glory-hole furnace, the combination of one or more reverberatory fire-chambers,
 25 burners placed therein provided with oil and air pipes, and a series of interchangeable removable face-plates severally provided with apertures of different sizes to serve as glory-holes and adapted to be severally placed in
 30 front of said fire-chamber, substantially as described.

2. In a glory-hole furnace, the combination of one or more reverberatory fire-chambers, burners located therein provided with oil and
 35 air pipes having means of regulating the supply of oil and of air to each burner, a series of interchangeable removable face-plates severally provided with apertures of different sizes to serve as glory-holes and adapted to
 40 be severally placed in front of said fire-chamber, and adjustable pontil-rests, substantially as described.

3. In a glory-hole furnace, the combination of a reverberatory fire-chamber having an
 45 upper and a lower aperture, said upper aperture acting as a mouth and the lower aperture communicating with the interior in the form of a recess, a burner located therein, oil and air pipes connected with said burner,
 50 having means to regulate the supply of both oil and air, a removable face-plate constructed of refractory material, situated in front of the mouth of said air-chamber, provided with glory-holes, and one or more ad-
 55 justable pontil-rests, substantially as described and set forth.

4. In a glory-hole furnace, the combination of a reverberatory fire-chamber having an upper and a lower aperture situated in its face,
 60 said upper aperture acting as a mouth and the

lower aperture communicating with the interior in the form of a recess sloping upward, a burner located therein constructed with an outer tube carrying air and an inner tube carrying oil, said inner tube projecting farther
 65 than the said outer tube, oil and air pipes connecting with said burner, having means to regulate the supply of both oil and air, a removable face-plate situated in front of the fire-chamber, constructed of refractory ma-
 70 terial, provided with glory-holes, and adjustable pontil-rests, substantially as described.

5. In a glory-hole furnace, the combination of a reverberatory fire-chamber having an upper aperture serving as a mouth and a
 75 lower aperture communicating with the interior in the form of a recess, a burner located therein constructed with an outer tube carrying air, having a closed-end perforated tube with small apertures, and an inner tube
 80 carrying oil, said inner tube extending to within a small distance of the perforated end, oil and air pipes connecting with said burner, having means to regulate the influx of oil and air, a removable face-plate situated in
 85 front of the mouth of the said fire-chamber, constructed of refractory material, provided with glory-holes, and one or more adjustable pontil-rests, substantially as described.

6. In a glory-hole furnace, the combination
 90 of a reverberatory fire-chamber having an upper aperture serving as a mouth and a lower aperture communicating with the interior in the form of a recess, a burner located therein constructed of an air-tube and of a sec-
 95 ond tube carrying oil and adapted to direct a stream of oil in front of and at right angles to the path of the air, oil and air pipes connected with the said burner, provided with means to regulate both the supply of oil
 100 and air, a removable face-plate situated in front of the mouth of the fire-chamber, constructed of refractory material, provided with glory-holes, and one or more adjustable pontil-rests, substantially as described.
 105

7. In a glory-hole furnace, the combination of a reverberatory fire-chamber, a burner located therein provided with oil and air pipes, a removable face-plate situated in front of the
 110 said fire-chamber, having apertures to serve as glory-holes, a frame provided with legs, and a box adapted to support the fire-chamber and constructed with guides for the reception of the face-plate, substantially as described.

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

GOTTLIEB WARNER.

Witnesses:

THOS. M. FERRELL,
 HENRY ROWEN.