(No Model.) 2 Sheets—Sheet 1.

J. ARMSTRONG.

MANUFACTURE OF TANKS OR BOXES OF GLASS.

No. 499,082. Patented June 6, 1893.

FIG. 2

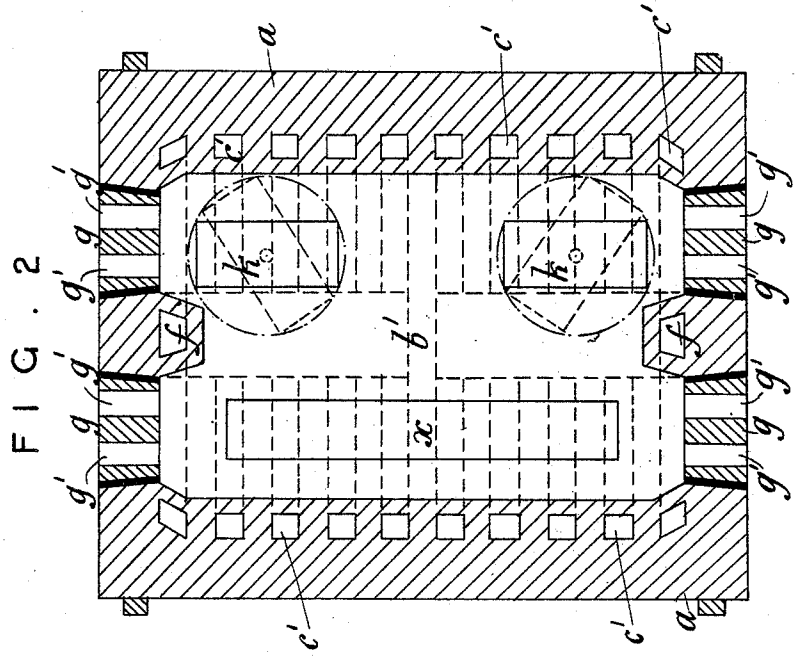
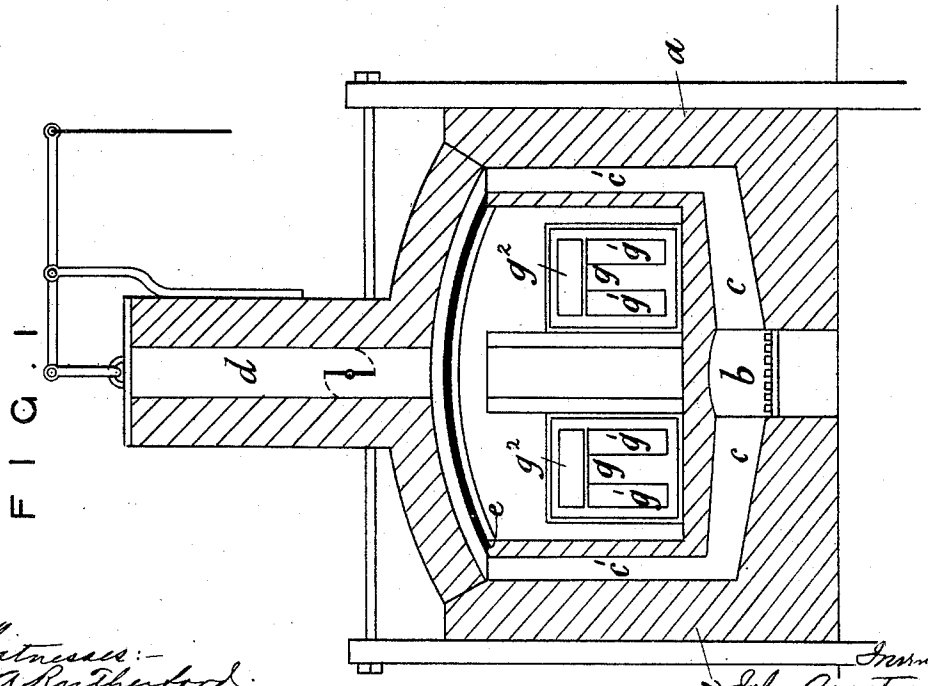


FIG. 1



Witnesses:-
J. A. Rutherford
Robert Pratt

Inventor.
John Armstrong
By Baxter & Norris
Attys.

(No Model.) 2 Sheets—Sheet 2.

J. ARMSTRONG.

MANUFACTURE OF TANKS OR BOXES OF GLASS.

No. 499,082. Patented June 6, 1893.

FIG. 3

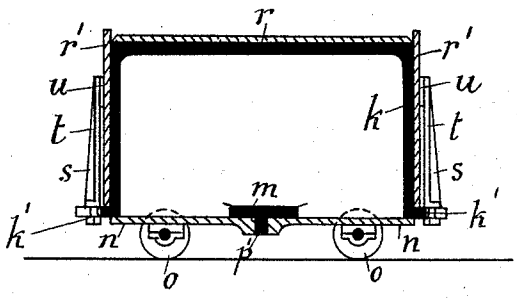


FIG. 4

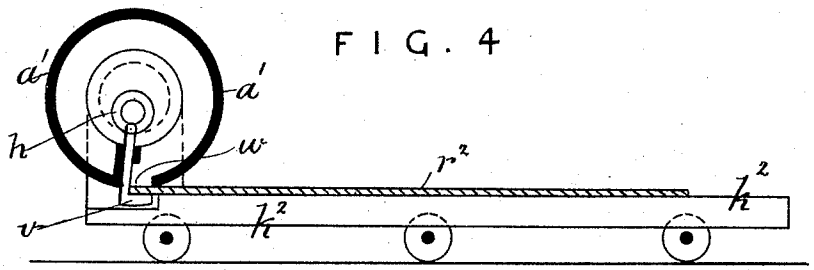


FIG. 5

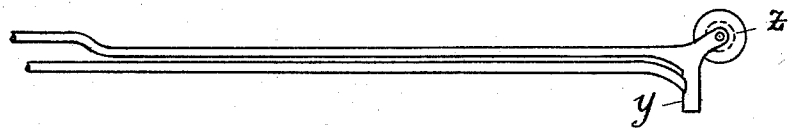
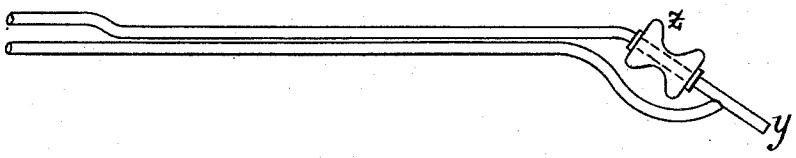


FIG. 6



Witnesses:
J. A. Rutherford.
Robt. Errett.

Inventor:
John Armstrong.
By James L. Norris.
Attorney.

UNITED STATES PATENT OFFICE.

JOHN ARMSTRONG, OF WEST BROMWICH, ENGLAND.

MANUFACTURE OF TANKS OR BOXES OF GLASS.

SPECIFICATION forming part of Letters Patent No. 499,082, dated June 6, 1893.

Application filed February 1, 1892. Serial No. 419,916. (No model.) Patented in England May 2, 1889, No. 7,346, and June 19, 1891, No. 10,454.

To all whom it may concern:

Be it known that I, JOHN ARMSTRONG, civil engineer, a subject of the Queen of Great Britain, residing at Phœnix Works, Albion, West Bromwich, in the county of Stafford, England, have invented certain new and useful improvements in the manufacture of tanks or boxes and other articles of glass and in mechanism or appliances to be used in the said manufacture, (for which I have obtained patents in Great Britain, No. 7,346, bearing date May 2, 1889, and No. 10,454, bearing date June 19, 1891,) of which the following is a specification.

The object of my invention is to effect improvements in the manufacture of glass tanks or boxes, and analogous articles of glass, by means of improved mechanism and appliances for effecting the same.

In order that my said invention may be particularly described and ascertained, reference is hereby made to the accompanying drawings, in which similar letters of reference indicate corresponding parts.

Figure 1 is a sectional elevation of my improved oven. Fig. 2 is a horizontal section of the same. Fig. 3 is a vertical section of my improved mold for small articles. Fig. 4 is a section illustrating my improved method of molding cylindrical vessels. Figs. 5 and 6 illustrate two forms of oxy-hydrogen blow pipes, with wheels or rollers attached.

Referring to Figs. 1 and 2, *a a* are the walls of the oven.

b (Fig. 1) is one of the furnaces; there being a furnace at each end, extending as far as the wall *b'* (Fig 2). From the combustion chambers of the furnaces, lateral flues *c c* extending to the right and left, and leading to vertical flues *c'*, carry the products of combustion under the floor of the oven, through the walls, and over the baffle plate *e*, inside the oven, to the chimney *d*.

f f are flues formed in the end walls, to assist in equalizing the heat. The baffle plate *e* consists of a cast iron roof, and is provided to protect the objects in the oven from the extreme heat of the flames, which sometimes cause the goods to crack before they are sufficiently heated.

For the sake of economizing fuel, the plate *e* may sometimes be dispensed with, but when great care is required, especially for making large articles, it is essential to use the plate.

g g are perforated iron-framed doors, provided for the insertion and removal of the molds and goods. They are slightly tapered so as to be readily inserted and removed when necessary. Suitable fasteners are fitted for securing the doors *g g*.

g' g' are vertical passages in the doors *g g*, and g^2 g^2 are horizontal passages in the same doors, for the passage of the blow pipe and roller, when operating upon the goods. At other times these passages are blocked up with dry bricks; or they may be fitted with swing doors or equivalent shutters. The vertical passages *g'* permit the introduction and application of the blow pipe to the vertical edges of the glass vessels in the oven; and the horizontal passages g^2 permit the introduction of the blow pipe to the horizontal edges.

The block or mold *k k* for small articles, is preferably formed of cast iron, of any suitable dimensions, as shown in section in Fig. 3. It is cast hollow having a cross-bar *m* and projecting pivot *p*. This pivot works in a central hole in the traveling carriage *n*, mounted on wheels *o o*.

Upon the top of the mold *k* the bottom plate *r* of the glass tank is placed, the edges being beveled, as shown. On each of the sides the four vertical pieces of glass *r' r'* are placed, resting on the flange *k'* of the mold. The vertical sides *r'* extend slightly beyond the bevel of the bottom plate *r*, to form the joint.

s s are upright supports bolted to the flange *k'* for holding clamps *t t* in position; between which clamps and the glass plates *r'*, asbestus packing *u* is placed for steadying the plates. The position of these molds, when placed in the oven, is shown at *k k* in Fig. 2. They are so placed that they may be turned about upon their pivots, as shown by dotted lines in Fig. 2. The wheels *o o* may be flanged to run on rails, or plain to run on the floor of the oven without rails. When making large tanks or boxes, I dispense with the pivot *p*, and place the mold in the oven, as shown at *x x* in Fig. 2.

In making cylindrical or tubular articles,

the mold shown in Fig. 4 is used, consisting of a cylinder a' a', having a slot w and a reciprocating gripper v, which is worked by eccentrics h at each end of the cylindrical mold. The cylinder a' is made to revolve upon its axis on spindles fitted in bearings, which communicate with a handle outside the furnace. The sheet of glass r^2 is placed upon a table k^2, one end of the glass being held against the cylinder by the gripper v. After the sheet has been heated to a bending heat and rendered quite soft, the drum is made to revolve once; the gripper being then released and drawn inward by the eccentrics h, the two ends of the glass are brought together and joined in a similar manner to that hereinafter described with respect to rectangular tanks.

The oven illustrated by Figs. 1 and 2 is constructed to make four small or two large boxes or tanks, or two small and one large, as shown.

The small tanks are constructed as follows:—The cast iron mold k is coated with plaster of paris, asbestus, or other heat resisting material. The glass is placed in position and clamped, as herein before described, and the whole placed in the oven, which is then closed up. The oven is gradually heated until the glass loses its extreme sensitiveness to sudden heat or cold. The operator then opens one of the apertures g' or g^2, and inserts an oxy-hydrogen blow pipe, and superheats the adjacent sheets of glass to an incipient state of fusion. He then draws the grooved wheel or roller z, shown in Figs. 5 and 6, several times along the meeting edges of the glass, whereby the sheets are fused into one solid piece. The vertical sheets r' are sufficiently long to fold over the sheet r and thus bend down so as to make a perfect joint. The boxes or tanks are turned about upon their pivots, while in the oven, to enable the operator to get at all the joints.

In making the larger tanks x, the operator works upon the joints from each end in a similar manner, but without pivoting the molds. Hexagon, cylindrical, and other forms of tanks may be similarly constructed.

Two forms of oxy-hydrogen blow-pipes, with grooved rollers, are shown in Figs. 5 and 6, y being the nozzle from which the flame issues, and z the roller for pressing and perfecting the joints. I find it advantageous to mix air with the oxygen before combustion to prevent the glass being burned. In some cases I use the electric arc in forming the joints, instead of the oxy-hydrogen blow pipe.

I claim—

1. The herein described method of manufacturing glass tanks or boxes, which consists in placing sheets of glass upon a mold, heating the glass to render it pliable, then superheating the joints and finally pressing the joints together, substantially as set forth.

2. In the manufacture of glass articles, the combination with a furnace provided with an oven, of a mold having flanged surfaces to support the glass plates to be joined together and clamps to secure the glass plates on the mold, substantially as described.

3. In the manufacture of glass articles from glass plates, the combination with a furnace having an oven, of a mold for supporting the glass plates and a combined superheating and compressing tool for joining the superheated edges of the glass plates, substantially as described.

Dated this 9th day of January, 1892.

JOHN ARMSTRONG.

Witnesses:

GEORGE C. DOWNING,
8 *Quality Court, London, W. C.*

T. J. OSMAN,
17 *Gracechurch St., London, E. C.*