2 Sheets—Sheet 1.

A. PIAT.

Reversible Melting Furnace.

No. 210,707. **Patented Dec. 10, 1878.**

Fig. 1

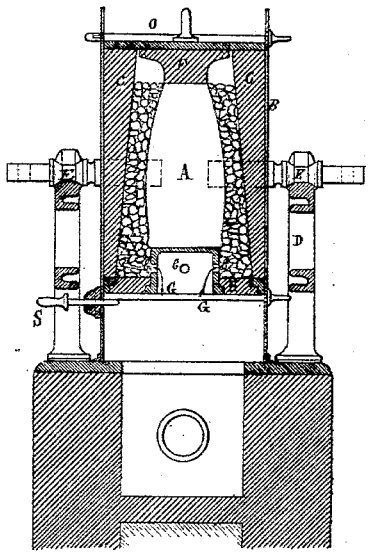


Fig. 2

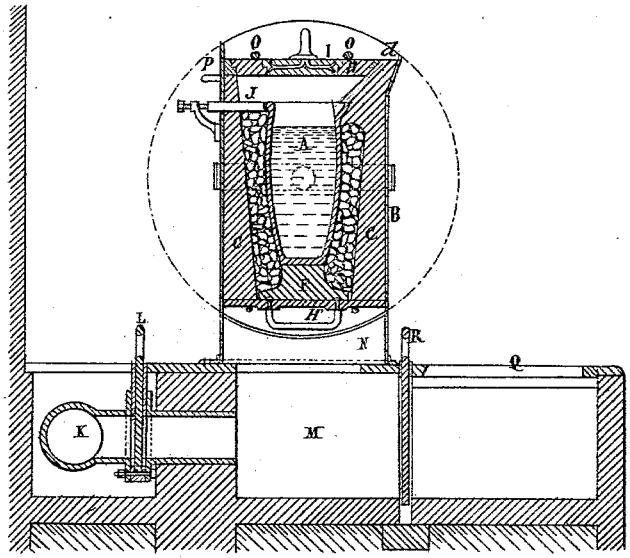


Fig. 3

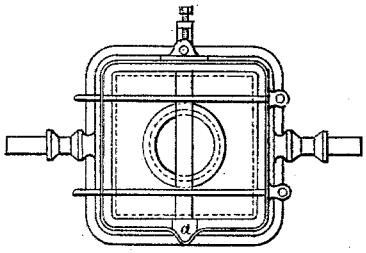
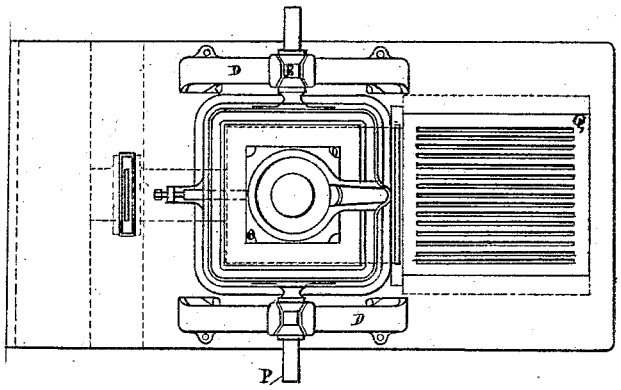


Fig. 4



WITNESSES.

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2 Sheets—Sheet 2.

A. PIAT.

Reversible Melting Furnace.

No. 210,707. **Patented Dec. 10, 1878.**

Fig. 5

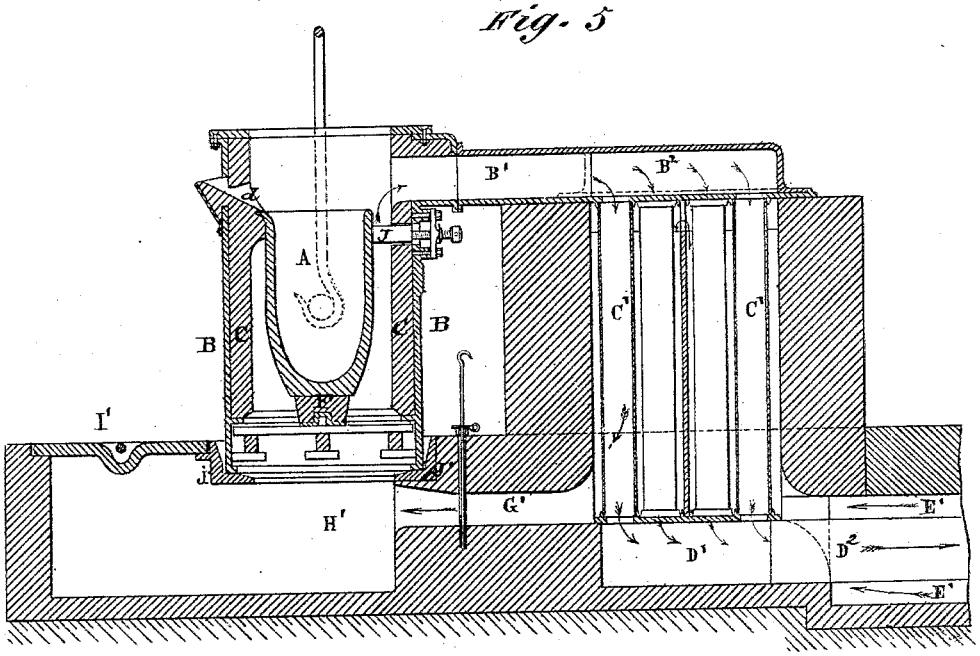
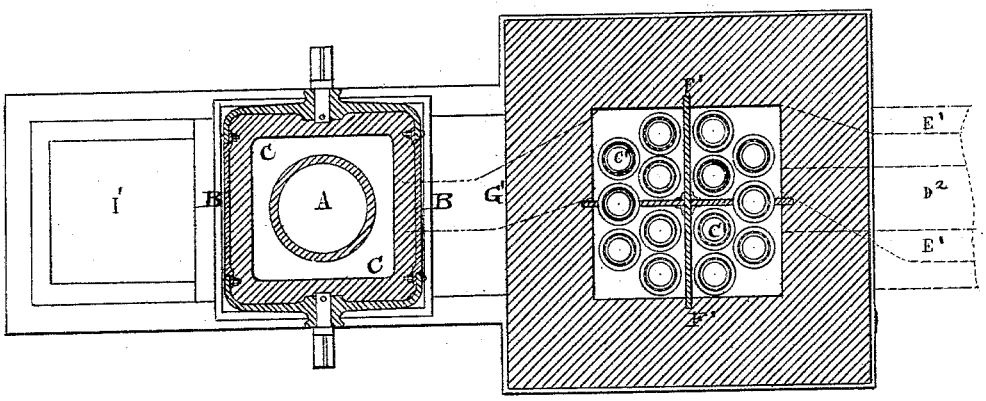


Fig. 6



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UNITED STATES PATENT OFFICE.

ALBERT PIAT, OF PARIS, FRANCE.

IMPROVEMENT IN REVERSIBLE MELTING-FURNACES.

Specification forming part of Letters Patent No. **210,707**, dated December 10, 1878; application filed July 25, 1878; patented in England, January 5, 1877.

To all whom it may concern:

Be it known that I, ALBERT PIAT, of Paris, in France, have invented a new and Improved Reversible Melting-Furnace, of which the following is a specification:

In the accompanying drawings, Figure 1 represents a vertical central section of my improved oscillating melting-furnace, shown in inverted position for starting the fire. Fig. 2 is also a vertical central section of the furnace in normal position, but taken at a plane at right angles to the former section. Fig. 3 is a bottom view of the furnace when inverted, as in Fig. 1. Fig. 4 is a plan view of the same, as shown in Fig. 2, with lid removed; and Figs. 5 and 6 are, respectively, a vertical longitudinal section and a section top view of a slightly-modified form of the melting-furnace in connection with an air-heating attachment.

Similar letters of reference indicate corresponding parts.

This invention has reference to such improvements in portable and oscillating furnaces for melting metals of all kinds, glass, and other articles that not only the crucibles are protected against injury from sudden changes of temperature, so as to be more durable, but that the furnaces may also be handled with greater ease and operated at a considerable saving of fuel; and the invention consists of a crucible or melting-pot that is supported in an inclosing-furnace having detachable base portion and covers with air-supply and exit holes.

The furnace is supported by gudgeons on side standards, to be oscillated and tilted into inverted position. The furnace connects by arc-shaped top and bottom flanges in air-tight manner with a bottom casing, through which the air is forced up and through the bottom holes of the furnace into the combustion-chamber around the crucible. The hot escaping gases of the furnace may also be employed to heat up the air in its way to the furnace.

Referring to the drawings, A represents a crucible or melting-pot, of any suitable size and material, either graphite or fire-clay, and B a metallic casing of a furnace, that incloses or envelops the crucible, and is made either of round or, by preference, of square shape, with rounded-off corners.

The interior of the casing B is covered with a layer, C, of refractory material and of suitable thickness.

The furnace is supported by pivots or gudgeons E on side standards D in open bearings, so as to be readily removed therefrom by hand or other power.

The furnace is provided with a base-piece, F, as shown in Fig. 2 of the drawing, of refractory material, like the lining or covering of the casing, said base supporting the crucible when the same is placed into its normal position in the center of the inclosing casing or furnace.

The crucible is closed by a cup-shaped cover, G, of metal or refractory material, which is provided with side holes *b* for admitting the air to the interior of the furnace. The top H of the furnace is covered at the inside with refractory material, while a bottom, H′, of similar material, closes the furnace at the lower part.

A detachable cover, I, of refractory material, or metal faced with the same, closes interchangeably with the cup-shaped cover G, the opening in the top H of the furnace being put in when the crucible has been heated up sufficiently and turned from its inverted position, as in Fig. 1, to the position shown in Fig. 2, in which position it is placed for the purpose of heating the upper as well as the lower part, and insuring an equable temperature for receiving the metal or other material to be melted.

A suitable abutment or stop, J, that is adjustable by a set-screw, bears on the crucible and presses it firmly by its spout on the interior lining of the furnace, so as to be firmly retained thereby in position at the interior of the furnace.

The spout connects with an exit-channel, *d*, in the top of the furnace for discharging the melted metal when tilting the furnace.

The required quantity of air is conducted to the furnace by a tube, K, from which the air is distributed by branch pipes with registers L to chambers M below the furnaces, of which any number may be arranged in connection with an air-supply main, K. The air passes from the chamber M to a fixed base, N, with arc-shaped sides, that correspond with the

side flanges of the furnace. The arc-shaped flanges of the furnace are fitted accurately thereto and closed in air-tight manner by a luting of fire-clay or other suitable material.

The top and bottom of the furnace are provided with air-holes O in the angles of the covers, by which the fire is kept up in the interior space, encircling the crucible, the melting of the metal observed, and the melted metal allowed to escape in case of breakage of the pot. The gases from the pot are also passed off through these holes. The gudgeons are square at the ends, to apply the sockets of forked levers, by which the entire furnace may be raised, oscillated, or tilted.

A grate, Q, and register R serve to supply atmospheric air to the chamber M in case the furnace is not desired to be worked with a force-blast. A stop-pin, S, of the lower base portion, N, serves to lock the furnace in inverted position.

The space around the crucible in the furnace is filled by suitable fuel, that is slowly consumed by the action of the air forced through. The apparatus may also be supported on a square base and tilted, after being hoisted by suitable mechanism, by levers applied to the square ends of the gudgeons.

For working the furnace with hot air it is connected with an escape-tube, B^1, for the hot gases, and with a top chamber, B^2, of a heating attachment, C^1, that is formed of a number of vertical tubes, which communicate with the bottom chamber D^1.

The gases of combustion pass from the furnace A through the heating attachment C′ to the lower part of the same, from which they are finally conducted by an exit-tube, D^2, to the chimney. The exit-tube D^2 is surrounded by a tube, E′, through which the air is forced in, so as to pass up around the tubes of the heating attachment C′. The heating attachment C′ is divided by partitions F′ into different compartments or spaces, with recesses or openings at the top, so that the air is compelled to pass first up and then down along the partitions being heated up by the contact with the tubes C. The heated air passes from the heating attachment C′ through a conduit, G′, to a hot-air chamber, H′, below the furnace, which has a man-hole that is closed by a cover, I′, for getting into the hot-air chamber.

The casing of the furnace rests on a base-plate, J′, with which a hermetical joint is formed by suitable luting.

The arrows in Fig. 5 indicate the passage of the gases of combustion through the heating attachment, and also the passage of the air in opposite direction through the same to the furnace. When the furnace is to be lifted for being tilted, the connection with the heating attachment is interrupted.

The furnace is operated as follows: The furnace is first placed in its normal position, as in Fig. 2, and the interior space between the crucible and lining of the casing filled with fuel. The top of the fuel is covered with small pieces of wood and shavings, which are then ignited. The cup-shaped cover is then placed in position and the apparatus turned upside down into the position shown in Fig. 1, in which it is retained by the stop-pin S.

The air is forced to the fuel through the holes *b* of the cover G, and passed out at the holes O of the bottom, which are then at the top. As soon as the smoke issues through the holes O and the fire is fairly started, so that the crucible is heated up thoroughly, the stop-pin S is withdrawn and the furnace tilted back into its former position, as in Fig. 2. The cup-shaped cover is then removed, the top of the crucible covered by an inverted funnel, and the space around the top of the crucible filled up with new fuel. When the combustion is advanced far enough to impart to the crucible the desired temperature, the metal or other material to be melted is placed into the crucible, and then the cover I placed firmly in position. In this manner crucibles of the most fragile material are fully protected against injury by contact with cold air or sudden changes of temperature, so as to last longer and effect also a considerable saving in fuel.

When the metal is melted, the furnace is either raised by hand-power or by hoisting machinery, and then tilted, so as to empty the contents of the crucible through the discharge-orifice of the top cover. The melted material is not liable to sudden changes of temperature, as the crucible is always fully inclosed by the jacket-shaped furnace. The furnace may, therefore, be placed on a carriage and moved by suitable mechanism to any desired point where the melted material is required for use.

The heating up of the air that is forced in the furnace produces a higher temperature and accelerates the melting process, though for some purposes it may be dispensed with.

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

1. The combination, in a melting-furnace, of the base F, the abutment J, and the layer C, of refractory material, to support the crucible, as shown and described.

2. The combination, with crucible A and furnace B C H, of the cup-shaped cover G, having holes *b*, as and for the purpose set forth.

ALBERT PIAT.

Witnesses:
DOMINIQUE CASALONGA,
EMILE PITEOT.