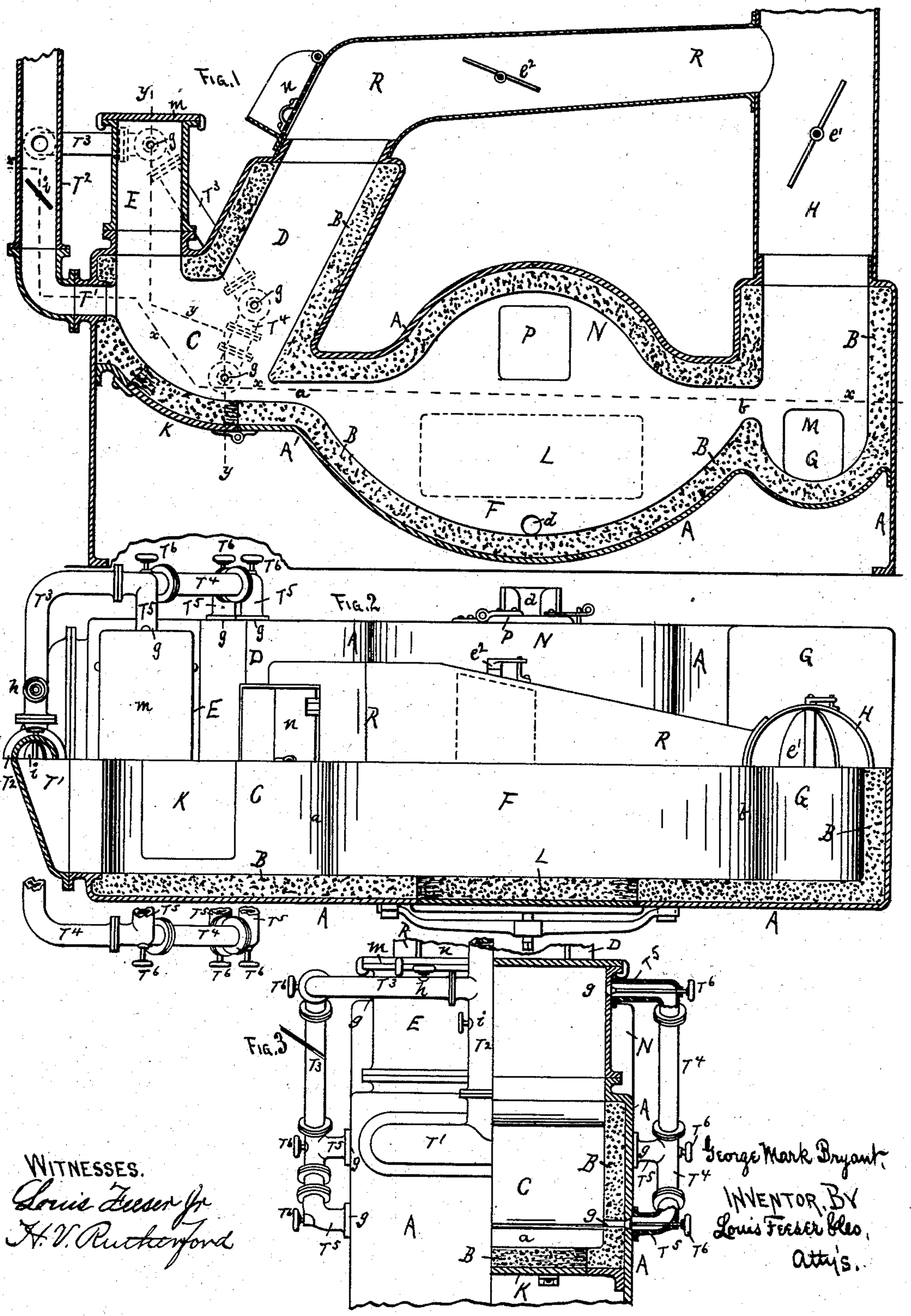
(No Model.)

# G. M. BRYANT.

## METAL MELTING FURNACE.

No. 282,265. Patented July 31, 1883.

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# UNITED STATES PATENT OFFICE.

GEORGE M. BRYANT, OF MINNEAPOLIS, MINNESOTA.

## METAL-MELTING FURNACE.

SPECIFICATION forming part of Letters Patent No. 282,265, dated July 31, 1883.

Application filed August 4, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE MARK BRYANT, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have made new and useful Improvements in Metal-Melting Furnaces, of which the following is a specification.

This invention relates to metal-melting furnaces; and it consists in the construction and arrangement of parts substantially as hereinafter specifically described and claimed.

Figure 1 is a longitudinal sectional view. Fig. 2 is a semi-sectional plan view, the lower half in section on the line *x x* of Fig. 1 and the upper half an outside view. Fig. 3 is a semi-sectional end view, the right-hand half being a section on the line *y' y'* of Fig. 1, and the left-hand half being an outside view from the front end.

A is the outer casing or frame, having a "fire-brick" or other fire-proof lining, B, and is constructed with a furnace or melting-chamber, C, hopper D, for supplying the metal to be melted, a coal or other fuel feed hopper, E, a large gathering-reservoir, F, for the melted metal, and a smaller slag-gathering trough or chamber, G, and smoke-stack H, all arranged and constructed as shown.

The coal-hopper E is situated above the front part of the melting-chamber, and the hopper for supplying the metal to be melted is situated above the rear part of the same chamber, while the gathering-reservoir F is below the level of the melting-chamber, with a narrow throat, *a*, connecting them.

The rear side of the curved reservoir F at *b* does not rise quite as high up as the front side at *a*, so that the slag, as it rises up to the surface of the melted metal, will run over the edge *b* into the slag-chamber G, and not back into the melting-chamber C. The melting-chamber C is provided with a drop-door, K, in its bottom, by which it may be cleaned out after use, and the reservoir F is also provided with a large door or "man-hole," L, in its side, through which its interior may be reached for repairs or cleaning of obstructions. A small door, M, in the end of the slag-chamber G enables the slag to be removed when the trough is filled.

The gathering-chamber F may have a curved top, N, if desired, with a door, P, in its side or top, through which the melted metal may be dipped up with a ladle; or it may be drawn off in the ordinary manner through a "tap-hole," *d*, in the side of the reservoir F.

Leading from the top of the metal-charging hopper D is a pipe, R, connecting the hopper with the smoke-stack H, to convey any gases or smoke which may arise to the chimney. Dampers $e'$ $e^2$ are placed in the pipe R and stack H, to regulate the draft and direction of the smoke, as hereinafter described.

T' is the blast-nozzle, opening into the chamber C just below the coal-hopper E, and supplied with a blast of cold or hot air through a pipe, $T^2$, connected with a suitable blast-creating apparatus.

$T^3$ $T^4$ are two smaller blast-pipes branching from either side of the main blast-pipe $T^2$, and running around outside the casing A to a point opposite the upper end of the coal-hopper E, and thence down to a point opposite the lower part of the melting-chamber C upon either side. At opposite points in the ends of the coal-hopper E, and also at two points in the ends of the lower part of the melting-chamber C and metal-hopper D, small blast-nozzles *g* are arranged, and connected to the blast-pipes $T^3$ $T^4$ by branches $T^5$, and each nozzle provided with a valve, $T^6$, by which the blast may be shut off or admitted at pleasure, as hereinafter described. Dampers or valves *h* should be arranged in the pipes $T^3$ $T^4$, so that the whole blast may be turned through the main nozzle T', or a portion through one or more of the small nozzles *g*, as the case demands, as hereinafter described. Another damper, *i*, may be arranged in the main blast-pipe $T^2$ below the pipes $T^3$ $T^4$, if desired, so that the whole blast may be run through the small pipes $T^3$ $T^4$ and the force of the blast regulated at will.

In operating the furnace the fire is started in the chamber C by removing the cover *m* of the coal-hopper, and when a sufficient amount of burning coal is contained in the chamber a supply of broken iron (or whatever metal it is desired to melt) is fed through the door *n* above the metal-hopper D, and the supply of fuel and metal continued as it is required. In the

meantime the blast from the pipe $T^2$ is turned on as it is required, and also through the nozzles *g*, the blast thus being under the complete control of the operator, and by the arrangement shown a supply of air can be fed to the fire at any required part or with any required power. When the fire is first started, the smoke and gas will find a more ready exit through the pipe R than through the chambers F and G and stack H; hence the damper *e'* will be closed and the damper $e^2$ opened. But as soon as the metal begins to melt and run down into the chamber F it is very essential that all the flame and heat should pass through the throat *a* and down over the melted metal to keep it from cooling; hence as soon as the melting begins the damper $e^2$ must be closed and the damper *e'* opened. Any cinders or other refuse that may be carried into the chamber F with the melted iron will be either burned up or carried off as gas or smoke, or float upon top of the metal and run over into the trough G when the metal in the reservoir rises above the point *b*. By this arrangement the melting is conducted with the expenditure of a comparatively small amount of fuel, and the heat therefrom utilized not only to melt the metal in the first place in the chamber C, but also to keep it from cooling in the reservoir F by passing over it on its way to the stack H. Another advantage by this arrangement is, that the melting may be continued indefinitely by simply supplying the necessary fuel and metal to the hoppers E and D. If the coal runs out of the hopper E, and some metal still remains in the chamber C not quite melted, by turning on the blast by the nozzles *g* in the upper part of the coal-hopper, the remaining metal will be melted and run into the chamber F and be drawn off, and thus prevent any metal remaining in the chamber.

I am aware that furnaces have been constructed with a fuel-hopper above the front of the melting-chamber, a metal-supply hopper above the rear of the melting-chamber, and provided with blast-tuyeres, and a gathering-chamber below and connected with the melting-chamber by a narrow throat, and such I do not broadly claim.

What I claim as new is—

1. A metal-melting furnace having a melting-chamber, C, provided with a drop-door, K, in its bottom, a fuel-hopper, E, above the front of the melting-chamber, a metal-supply hopper, D, above the rear of the melting-chamber and adapted to discharge into said melting-chamber, blast nozzle or tuyere $T'$ $T^2$, gathering-chamber F, connected to said melting-chamber by a narrow throat, *a*, and being below the level of said melting-chamber, and having its rear edge, *b*, lower than its front edge, *a*, and means, substantially as described, for removing the metal therefrom.

2. The combination of melting-chamber C, fuel-hopper E, metal-supply hopper D, blast-tuyeres $T'$ and *g*, with blast-supply pipes $T^2$ $T^3$ $T^4$ $T^5$, valve $T^6$, and dampers *h* and *i*, substantially as and for the purpose set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

GEORGE MARK BRYANT.

Witnesses:
C. N. WOODWARD,
LOUIS FEESER, Sr.