

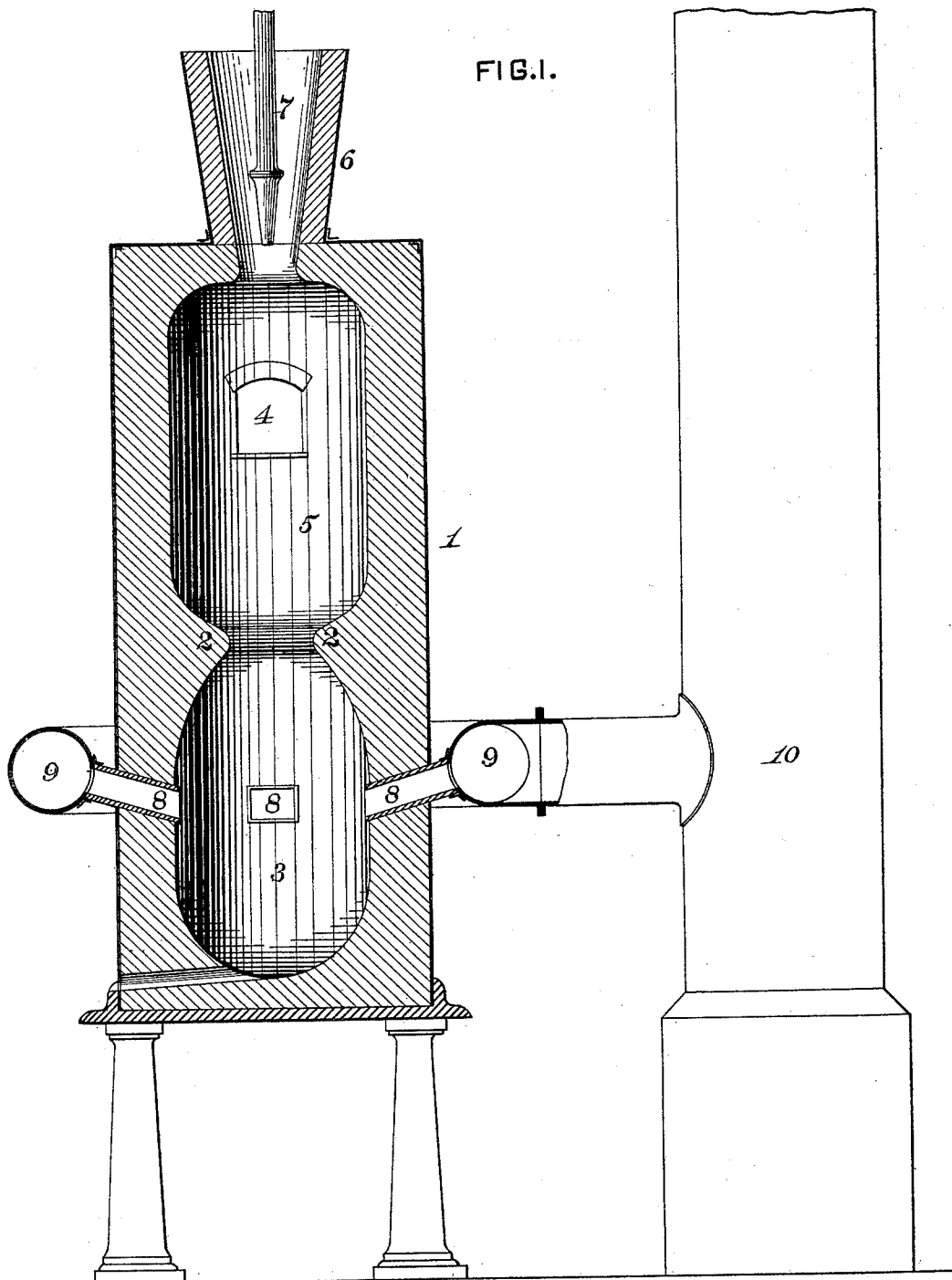
(No Model.)

2 Sheets—Sheet 1.

E. KERR.
FURNACE.

No. 462,877.

Patented Nov. 10, 1891.



WITNESSES:

Daniel S. Wolcott
F. C. Gaither.

INVENTOR,

Edward Kerr,
by George H. Christy

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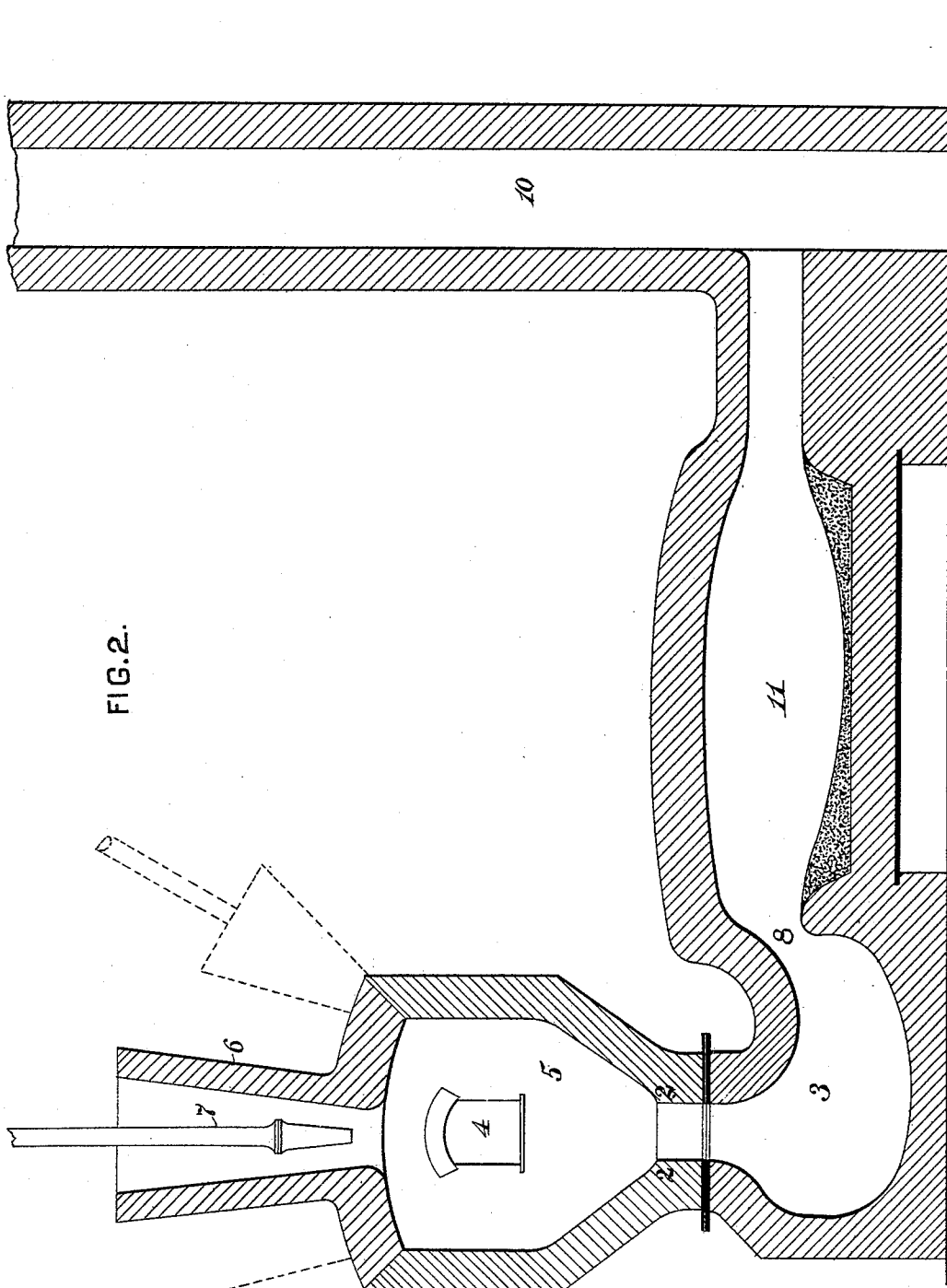


FIG. 2.

WITNESSES

Samuel S. Wolcott
F. C. Gaither.

INVENTOR,

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by George H. Christy,
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UNITED STATES PATENT OFFICE.

EDWARD KERR, OF PITTSBURG, PENNSYLVANIA.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 462,877, dated November 10, 1891.

Application filed May 1, 1890. Renewed July 22, 1891. Serial No. 400,284. (No model.)

To all whom it may concern:

Be it known that I, EDWARD KERR, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered a certain new and useful Improvement in Furnaces, of which improvement the following is a specification.

The invention described herein relates to certain improvements in furnaces for melting metal and other metallurgical processes. Many attempts have heretofore been made to effect the melting of metals in furnaces of the cupola type by means of a gaseous fuel—as natural gas. In these furnaces the gas is introduced into the crucible portion of the furnace and passes thence upward through the furnace, many different forms of devices being employed to support the charge until melted. These attempts have been unsuccessful, as the metal becomes soft and settles down into a compact mass and prevents the passage of the heat and products of combustion, thereby effectually stopping any further melting of the metal.

The object of the invention herein is to provide for the application of the heat on top of the charge and causing the heat and products of combustion to pass down through the charge into the crucible and thence into the stack.

The invention consists in the construction and arrangement as hereinafter more fully described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a sectional elevation of a cupola-furnace constructed in accordance with my invention, and Fig. 2 is a similar view of a modified form of furnace.

The furnace 1 (shown in Fig. 1) is constructed as regards its external shape similarly to the ordinary cupola-furnace. Within the furnace, at a suitable distance from the bottom thereof, is formed an inward-projecting shelf or abutment 2, separating the crucible 3 from the upper portion of the furnace and forming a contracted throat for the passage of the molten metal. The metal to be melted is charged into the furnace through the opening 4 in the upper portion or melting-chamber 5 of the furnace and is supported until melted by the annular shelf or abutment 2. On the top of the cupola is formed a funnel-shaped nozzle 6, and centrally within said nozzle is arranged the gas-supply pipe 7. The end of this pipe 7 is so arranged within the nozzle that the gas entering through said pipe and the air either drawn or forced through the nozzle will be so thoroughly commingled that combustion will occur just below the point of entrance of the nozzle within the melting-chamber. The heat and products of combustion pass down through the charge resting upon the shelf or abutment 2, then through the crucible 3 and thence by the ports 8 and pipe 9 into the stack 10. As shown in Fig. 1, the ports 8 correspond approximately with the openings for the tuyeres of the ordinary cupola and are connected to the pipe 9 surrounding the furnace, said pipe having a branch leading to the stack. Any number of ports 8 may be employed, and, if desired, may have an independent connection to the stack.

The construction shown in Fig. 2 is similar as regards all essential particulars to the construction shown in Fig. 1, except that only one port 8 for the escape of the products of combustion is employed, and that said port is connected to one end of a heating-chamber 11, which is connected at its opposite end to the stack. This form of furnace—i. e., that shown in Fig. 2—is somewhat smaller as regards the dimensions of the melting-chamber and crucible, and is more especially adapted for melting brass and in such metallurgical operations as the reduction of metals from their ores. If desired, two or more nozzles, each provided with a gas-pipe, may be employed, as indicated in dotted lines in Fig. 2.

By properly proportioning the length of the melting-chamber and so adjusting the gas-supply pipe that combustion will at least commence at or near the point of entrance of the gas and air into said chamber, the melting of the charge will commence on top thereof and gradually progress, the hottest point being somewhat above the throat of the furnace. As the metal above is softened by the heat it will gradually settle down toward the throat, being subjected to a constantly-increasing heat, and before it can coalesce it will be entirely melted and flow down through the part of the charge below and gradually heat and eat it away, thus preserving a clear passage for itself into the crucible. The heat and

products of combustion will maintain the molten metal in the crucible in a hot condition, and, further, as the products of combustion are wholly non-oxidizing in their character the molten metal in the crucible will be entirely protected from any oxidation. The heating-chamber 11 affords opportunity for raising the metal to a high temperature before charging it into the melting-chamber, thereby facilitating the melting operation.

I claim herein as my invention—

1. A furnace having in combination a melting-chamber, a crucible arranged below the melting-chamber, an opening between the melting-chamber and crucible for the passage of the products of combustion into the crucible, and a burner arranged to introduce the gas into the melting-chamber at one or more points above the charge resting therein, the crucible being connected to the stack, whereby

the products of the combustion in the melting-chamber are caused to pass through the crucible, substantially as set forth.

2. A furnace having in combination a melting-chamber, a crucible arranged below the melting-chamber and connected to the stack, a burner arranged to introduce gas into the melting-chamber at a point above the charge, and an annular abutment or shelf interposed between the crucible and melting-chamber, whereby a central opening is formed between the two for the passage of the products of combustion and molten metal into the crucible, substantially as set forth.

In testimony whereof I have hereunto set my hand.

EDWARD KERR.

Witnesses:

W. B. CORWIN,

DARWIN S. WOLCOTT.