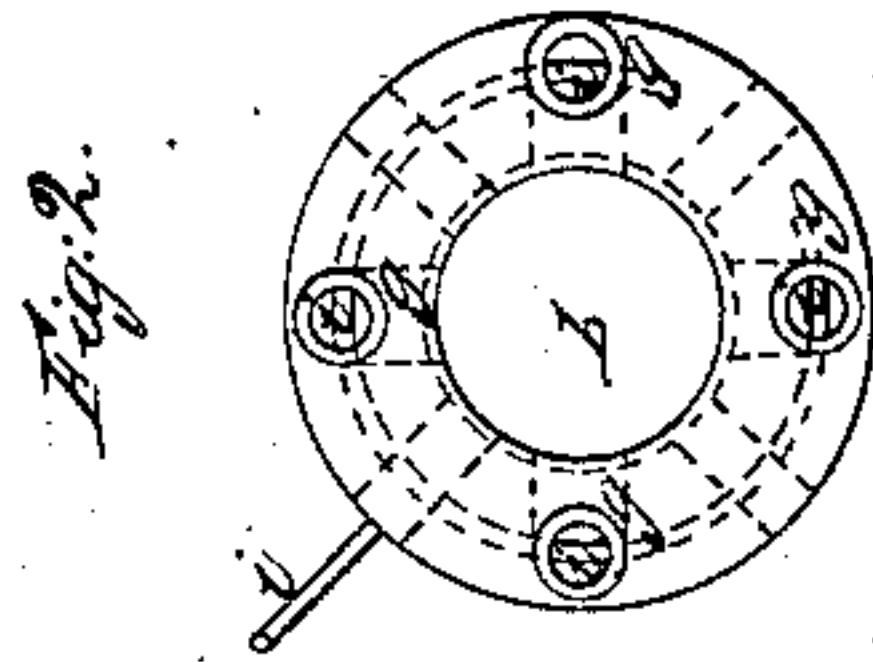
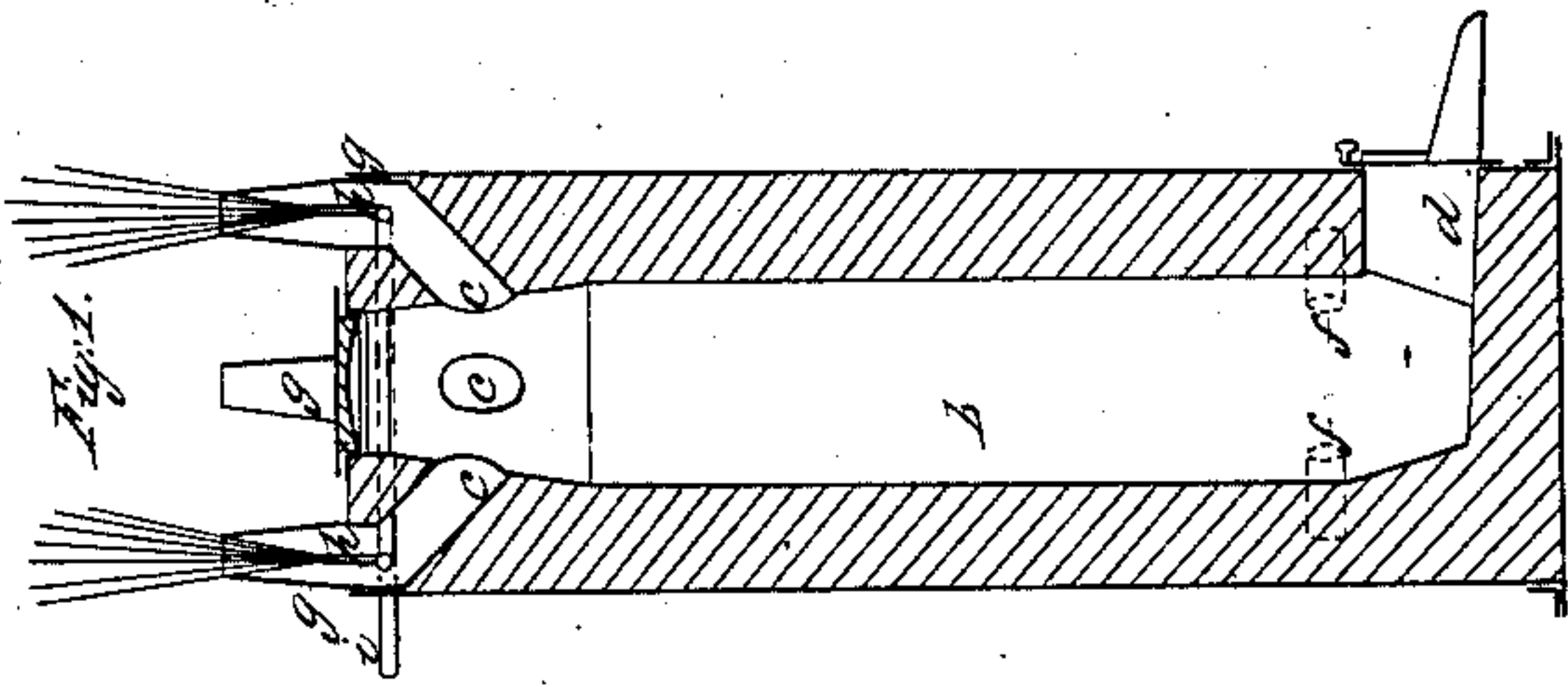
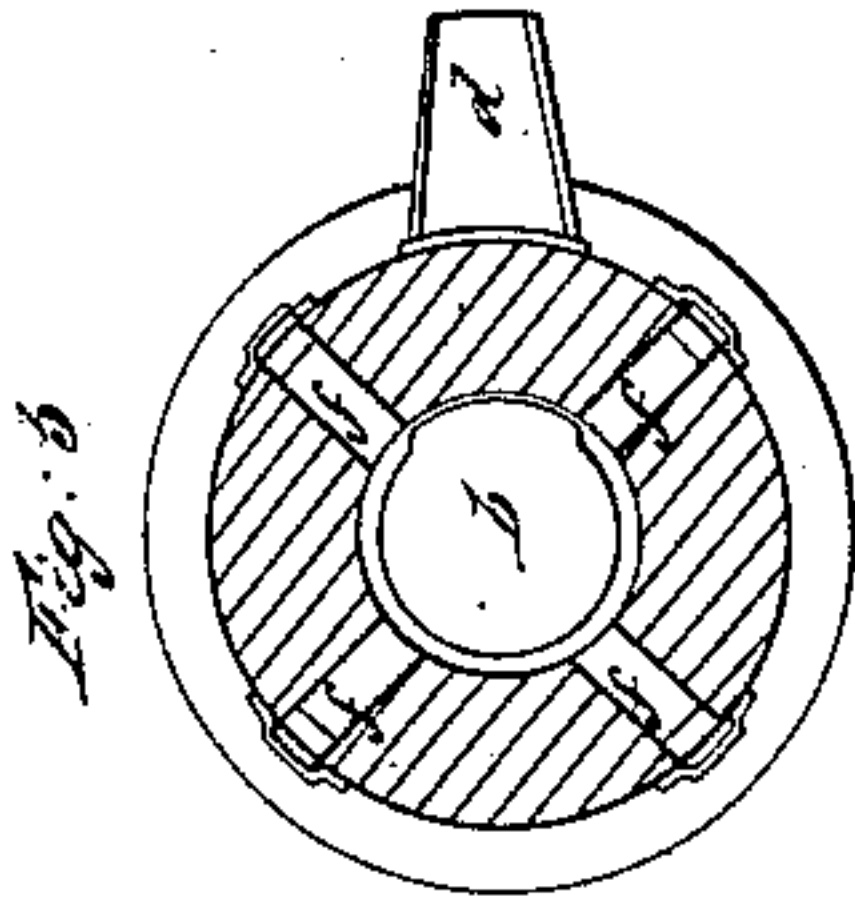
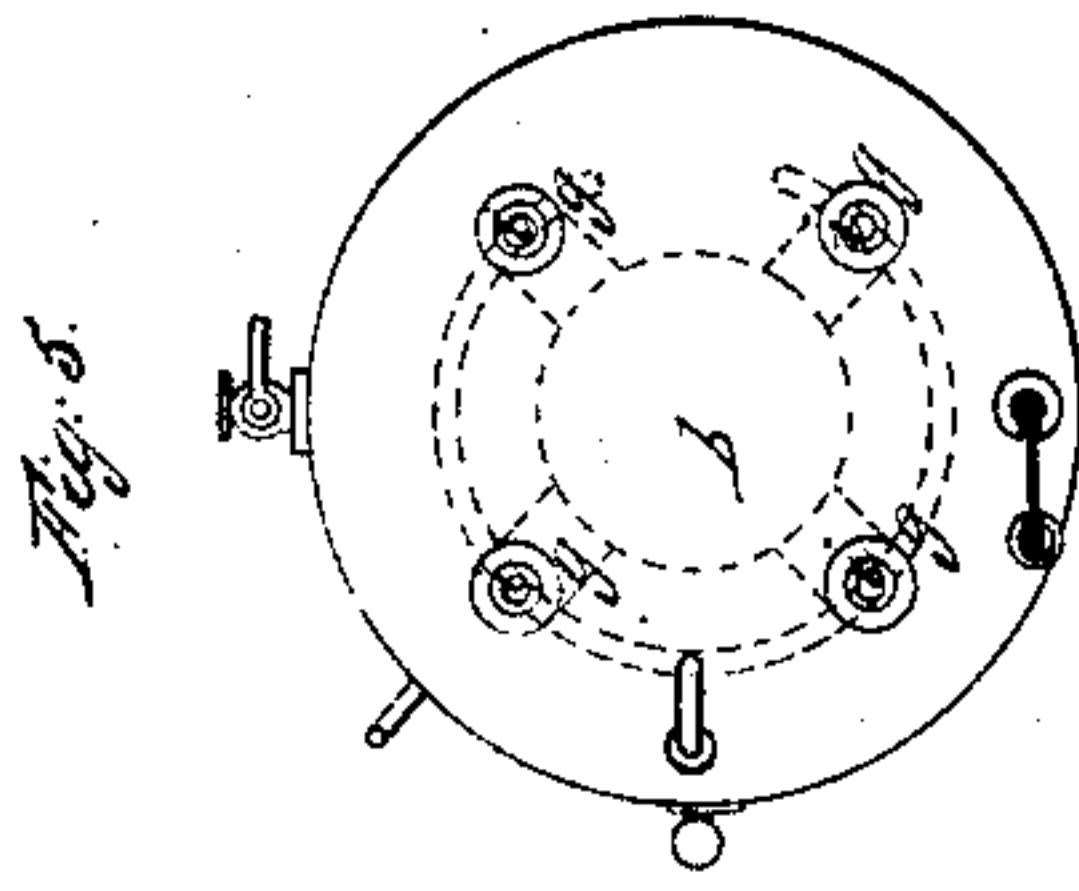
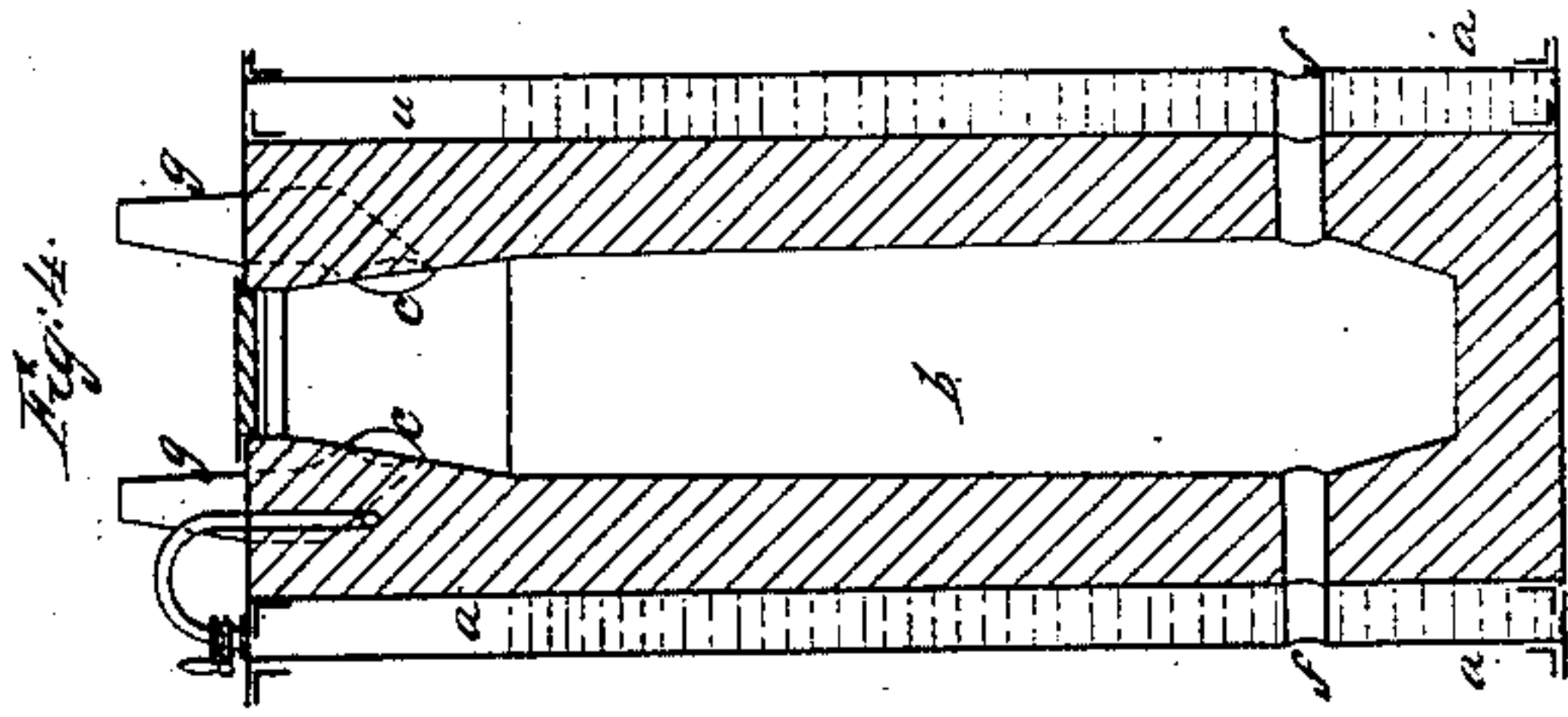


*F. A. T. De Beaugregard.*

*Cupola Furnace.*

*N<sup>o</sup> 61,323.*

*Patented Jan. 22, 1867.*



*Witnesses:*

Ch Bailey  
Jas L Coombs

Inventor:  
T. A. T. SeBeauvoir  
by J. Pollock his atty.

# United States Patent Office.

FELIX A. T. DE BEAUREGARD, OF PARIS, FRANCE.

Letters Patent No. 61,323, dated January 22, 1867.

## IMPROVED BLAST FOR IRON AND OTHER FURNACES.

The Schedule referred to in these Letters Patent and making part of the same.

### TO ALL WHOM IT MAY CONCERN:

Be it known that I, FELIX ALEXANDER TESTUD DE BEAUREGARD, of Paris, in the empire of France, have invented a certain new and useful Method of Applying Suction and Blast, and improvements in the apparatus employed therein; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawing.

My invention is based substantially upon the employment of a suction agent for producing a vacuum and blast, and acting from the top upon the lower part of the furnace or other apparatus, instead of operating from the lower part of the furnace, as is the case with ordinary blast engines. I employ preferably steam as the suction agent; my apparatus is surmounted by as many tuyeres as are needed, and the steam is directed to the top of the furnace, and is then discharged through pipes placed in the centre of the tuyeres, the size of the pipes being proportionate to the intensity of blast required. The number of these pipes or jets and tuyeres should be in direct proportion to the maximum consumption of air by the apparatus. The steam is discharged from the interior (*du sein*) of the tuyeres, driving before it the air, in order to produce a vacuum behind it, which may vary from one millimetre to thirty centimetres of mercury. When this vacuum is created in the interior of the apparatus, the air rushes in from the outside to the interior of the furnace through suitable conduits, with a power or force proportionate to the size and number of the orifices by which it enters, similar to the blast produced by ventilators or blast engines of great power. By this simple method of producing blast by suction, I am enabled to dispense entirely with the use of any engine for supplying air. The steam, instead of operating upon the furnace through the medium of a blast engine, acts upon it alone and directly. The gaseous products of combustion pass up through the tuyeres, and are discharged therefrom with all the power of which the steam is capable. They may be collected and utilized, as is ordinarily done, and their purity will be the greater in proportion to the intimacy of their mixture with the steam. By this method of blast there is no longer need to have the tuyeres at the bottom of the furnace, as heretofore, and the force of the blast may be regulated so that the combustion may be either general or partial. Hot air may be as easily applied by my method as by the old process, as it is only necessary to put the inlet for the air in communication with the superheating apparatus.

In order that the nature of my invention may be more fully comprehended, I will describe it by reference to the accompanying drawings, in which is represented the manner in which my invention may be applied.

Figure 1 is a vertical section of a smelting furnace, constructed as above described.

Figure 2 is a plan view from above; and

Figure 3 is a horizontal section of the same.

Figures 4 and 5 represent in vertical section and in plan, a smelting furnace provided with its steam generator.

This furnace is surrounded by a double metallic sheet or casing, *a*, which contains between its sides a certain quantity of water, and it thus performs the office of a boiler or steam generator. The cone or body, *b*, is intended to receive the fuel and the metal to be smelted. The products of combustion escape through the flues *c*. The fused or liquid metal is received in the receptacles or crucibles *d*. The air enters by the conduits *f*, which may vary in number. Conical metallic tubes or tuyeres, *g*, are placed on top of the furnace, their size at their upper ends being regulated by the force of blast desired. A blower, *h*, or equivalent apparatus, discharges the gases, steam, or liquids, in the centre of the tuyeres *g*, in order to communicate to the air a part of the velocity or quickness with which they are animated. The caloric radiated is collected so as to produce the vaporization of the water, the outer partition being heated by the products of combustion in the apparatus. The steam, which, as above described, is employed for working the apparatus, is superheated in a tube, *i*, (fig. 5,) passing through the centre of the flues *c*. The same results may be effected with this same apparatus by means of hydraulic agents, and the pressure of the liquid may be caused either by the aid of the caloric generated in the apparatus, or by natural or artificial weight.

Having described my invention, and the manner in which the same is or may be carried into effect, what I claim, and desire to secure by Letters Patent, is—

Surrounding the furnace by a tank, the water within which is converted into steam by the heat of the said furnace, and then discharged through suitable pipes or conduits, arranged substantially as herein described, so that the discharge of the said steam shall induce a blast within and through the furnace as set forth.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

F. A. TESTUD DE BEAUREGARD.

Witnesses:

A. GRANSTRAY,

E. SHERMAN GOU.