

(No Model.)

2 Sheets—Sheet 1.

J. F. BENNETT.

APPARATUS FOR CHARGING HEATED AIR TO BLAST FURNACES.

No. 303,204.

Patented Aug. 5, 1884.

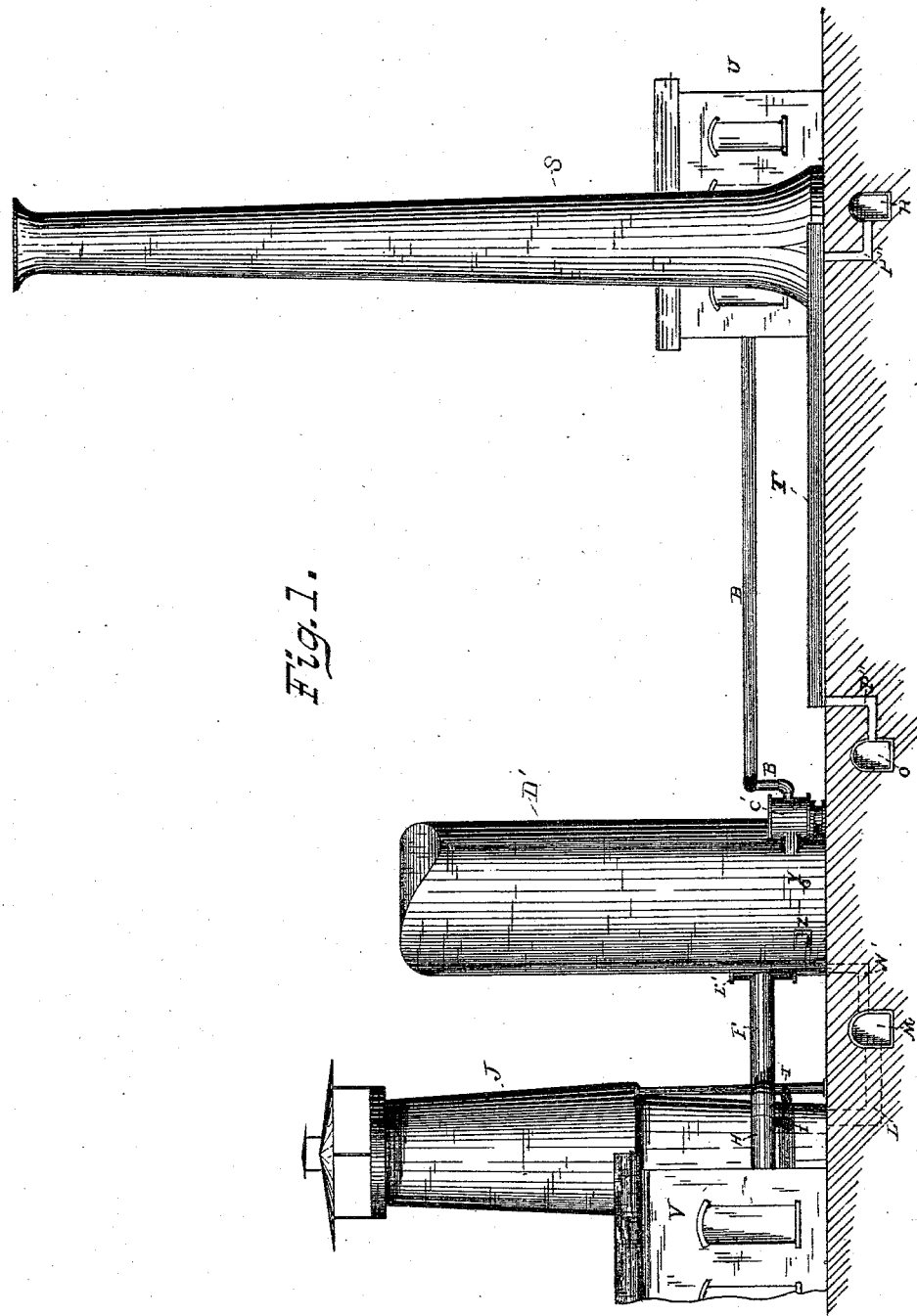


Fig. 1.

Witnesses.
E. F. Murdock
H. T. Bussey

Inventor.
Jno. F. Bennett
by J. H. Adams.
Atty.

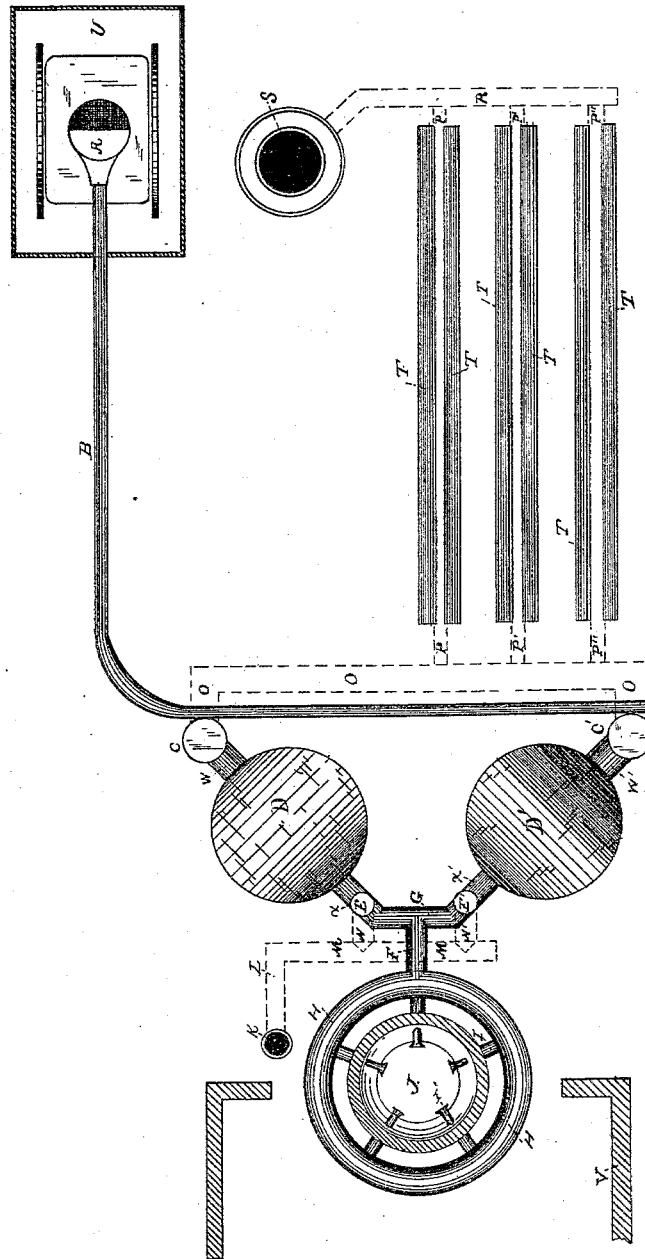
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Fig. 2.



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UNITED STATES PATENT OFFICE.

JOHN F. BENNETT, OF PITTSBURG, PENNSYLVANIA.

APPARATUS FOR CHARGING HEATED AIR TO BLAST-FURNACES.

SPECIFICATION forming part of Letters Patent No. 303,204, dated August 5, 1884.

Application filed September 21, 1883. (No model.)

To all whom it may concern:

Be it known that I, JOHN FRANCIS BENNETT, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Charging Heated-Air Blasts to Blast-Furnaces; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

My invention relates to apparatus for charging a heated-air blast to blast-furnaces; and it consists of the methods hereinafter described, and the means shown, whereby atmospheric air forced into the furnace by a blower is heated previously to its entrance to the furnace by the waste gases evolved at the top of the blast-furnace; and the objects of my improvements are to utilize the waste-blast furnace gases economically to approximately their entire heating capacity. I attain these objects by the methods hereinafter described, and the means illustrated in the accompanying drawings, in which—

Figure 1 represents an elevation, partly in section, of the plant essential to the successful operation of my invention, and Fig. 2 is a plan view of the same.

Similar letters refer to corresponding parts in both views.

A represents a suitable blower, located in a house, U, and operated by steam derived from the boilers T.

B is a curved pipe conducting the blast from the blower to the stoves D D'.

CC' are valves in the pipes W W', which control the passage of the hot gases and cold air to and from the stoves.

D D' are stoves located intermediately between the blast-furnace J and the blower A. They serve as storage-reservoirs of the waste heat held by the hot gases, and given up to the cold air subsequently passing through in transit to the furnace.

E E' are valves in the pipes X X', which control the passage of the hot gases and heated air into and out of the stoves.

F is a pipe connecting pipe G with bustle-pipe H.

I I are drop-pipes from the bustle-pipe H to the tuyeres I'.

J is the blast-furnace.

K is the downcomer.

L is an underground pipe conducting the hot gases from the downcomer alternately into stoves D D' through pipes M N X and valve E, or pipes M N' X' and valve E'.

O is an underground pipe by which the waste gases alternately received from the stoves D D' are conveyed into flues P P' P'' under the boilers T.

R is an underground pipe conducting the gases incapable of further utilization to the shaft S.

T are a series of boilers generating the steam requisite to drive the blower, and for other purpose incident to the operation of the plant.

The operation is as follows: The hot gases evolved at the top of the furnace J are conducted by downcomer K, pipes L M N X and valve E into the stove D, where, meeting with atmospheric air, admitted through valves Y Z, placed near the bottom of stoves D D', they combine and give out great heat; thence, having deposited the greater portion of their heat, by pipe W, valve C, pipe O, flues P P' P'', under the boilers into the shaft S by means of flue R. Then the valves E and C are closed, respectively, to the pipes N and O, and the valves E' and C' opened to them. The cold air from the blower will now, in passage to the furnace, traverse the pipe B, valve C, pipe W, stove D, pipe X, valve E, pipes G F H I, and into the base of the furnaces by tuyeres I'.

Each of the boilers may be connected with the points where the steam is utilized by suitable pipes, and may have pressure-gages, safety-valves, and other desired apparatus affixed thereto.

It will be understood that the furnace's gases are conducted alternately into the stoves D D', where, combining with atmospheric air, the intense heat due to combustion is stored until the cold air from the blower takes it up in passage to the furnace, and that the gases, relieved of the greater portion of their heat, are then conducted under the boilers T.

I do not restrict myself to two stoves, as three may sometimes be more beneficial, and where two blast-furnaces are operated adjoin-

ing each other it may be found economical to employ five stoves for their conjoint use.

The invention covered by this patent differs from that embodied in Patent No. 294,003, granted to me February 26, 1884, in four important particulars; First, the waste gases, in their passage from the smelting-furnace to the shaft, are so retarded in their transit through the stoves and under the boilers as to retain little, if any, effective heat when they reach the latter; second, the plant employed is different, by dispensing with the preheating-tank and its accessories; third, the atmospheric air receives its entire heating in the stoves, and not a preliminary warming in the hot-water tank; and fourth, the steam generated in the boilers is used solely to supply motive power to the machinery, while in the patent mentioned above a portion is utilized to heat the water and pipes in the hot-water tank.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

The combination, with a blast-furnace, J, having a downcomer, K, of pipes L M N N', two-way valves E E', pipes X X', stoves D D', valves Y Z, pipes W W', two-way valves C C', pipe O, boilers T, flues P P' P'' R, shaft S, blower A, pipe B, pipes G F H I, and tuyeres I', for the purposes herein fully described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

JOHN F. BENNETT.

Witnesses:

M. E. HARRISON,
ALEX. RANDOL.