(No Model.)

H. M. PIERCE.

APPARATUS FOR UTILIZING WOOD GASES.

No. 326,451. Patented Sept. 15, 1885.

Fig. 1.

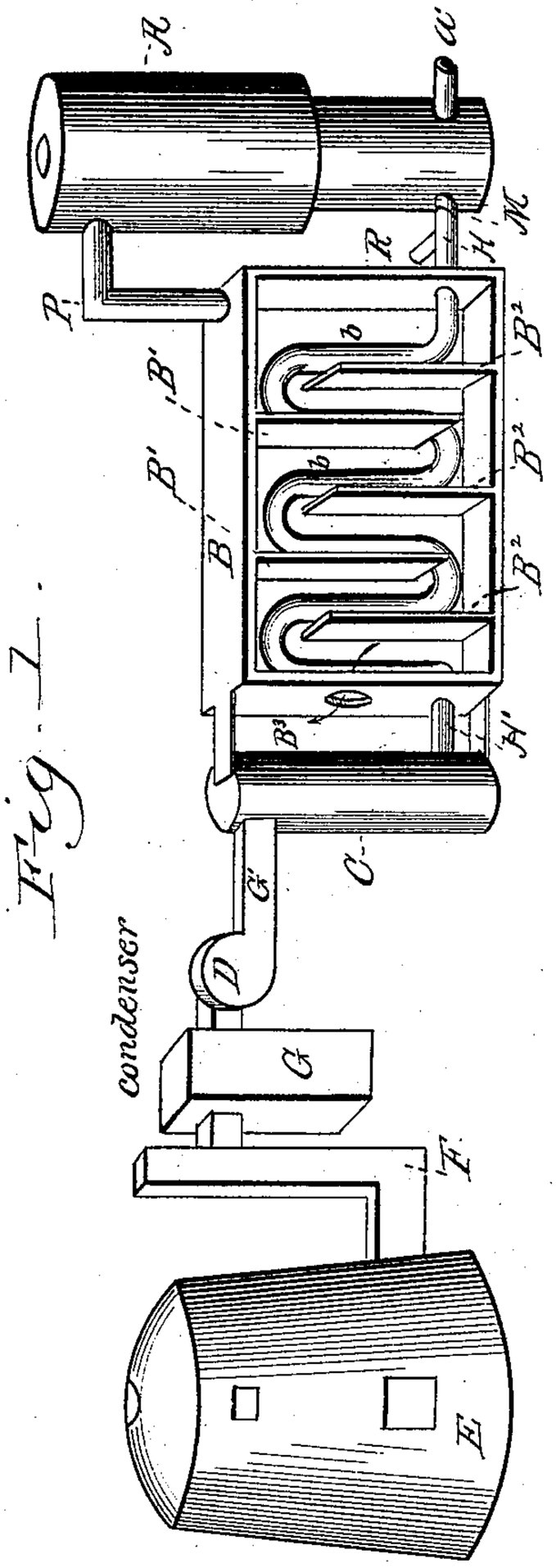


Fig. 3.

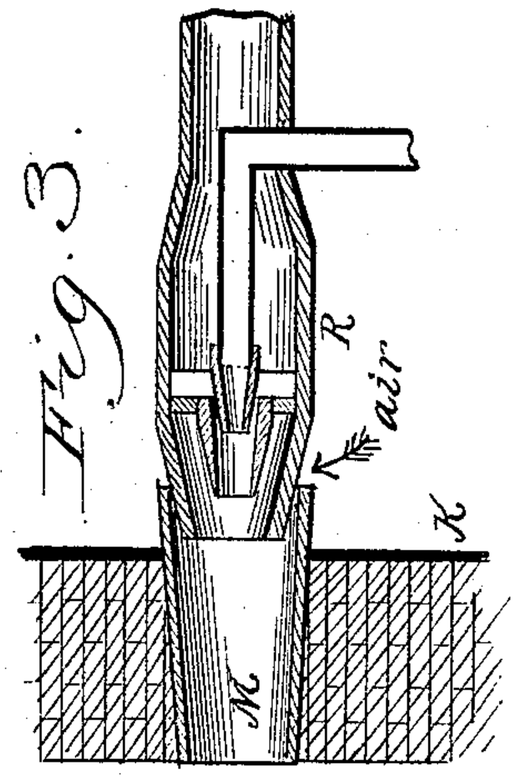
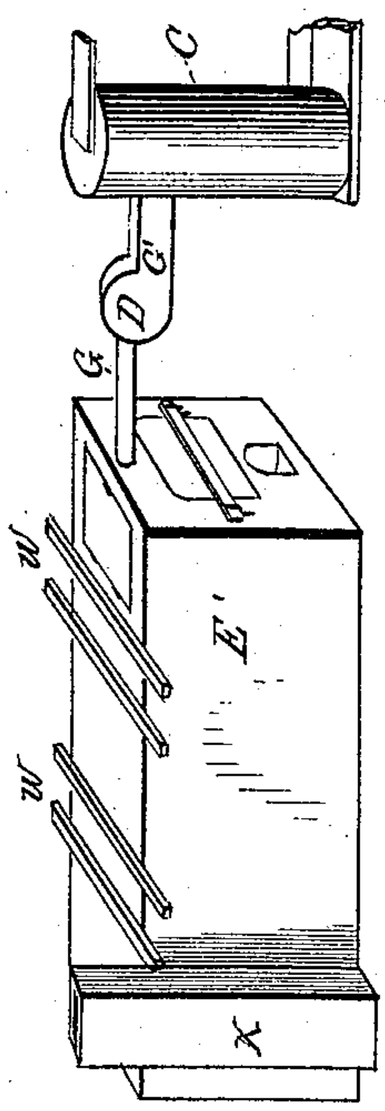


Fig. 2.



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APPARATUS FOR UTILIZING WOOD-GASES.

SPECIFICATION forming part of Letters Patent No. 326,451, dated September 15, 1885.

Application filed November 3, 1884. (No model.)

To all whom it may concern:

Be it known that I, HENRY M. PIERCE, of Nashville, in the county of Davidson and State of Tennessee, have invented certain new and useful Improvements in Apparatus for Utilizing Wood-Gases; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

Figure 1 is a perspective view of my improved apparatus. Fig. 2 is a similar view, using a coke-oven instead of a charcoal-kiln. Fig. 3 is a detail sectional view showing the tuyere and injector.

Like letters of reference mark the same parts in all the figures.

The object of this invention is to provide means, in combination with a blast-furnace, whereby the gases evolved in the destructive distillation of wood, together with some fixed fuel—such as charcoal, coke, or coal—may be utilized for the reduction of ores.

Referring to the drawings by letters, A designates an ordinary charcoal pig-iron blast-furnace provided with suitable gas and air inlets *a a*.

B designates a heating-chamber, provided with baffle-plates B′ B², connected, respectively, to and projecting inward from the top and bottom of the chamber, alternating with each other, and extending nearly to the opposite portions of the chamber.

C designates a chamber for receiving and equalizing the pressure of the gases.

D designates a fan or other suitable blast-producer or gas-propeller.

E designates a charcoal-kiln provided with a flue or chimney, F, projecting from near the bottom thereof. This flue has leading from it a pipe, G, which may be, if desired, provided with a condenser to remove the watery diluent from the gases, if desirable, and this pipe G ends and communicates with the fan D. From the opposite or exit side of the fan leads a gas-main, G′, which serves to convey the gases to the equalizing-chamber C. After leaving the equalizing-chamber C the gases are passed through a pipe, *b*, either bent or coiled, within the heating-chamber B, and thence through the pipe H and injector L into the blast-furnace A, the injector serving to mix atmospheric air with the gas, if desired. Fig. 3 shows the details of the injector, R being the air-inlet pipe.

From the upper portion of the blast-furnace A is projected a pipe, P, which conducts the spent gases and products of combustion into the heating-chamber, where it serves to heat the pipe *b* and its contained gas, and finally makes its exit at a suitable outlet, B³. The baffle-plates serve to cause these spent gases to take a sinuous course through the heating-chamber, thus thoroughly heating it.

Fig. 2 shows a coke-oven, E, which may be substituted for the charcoal-kiln E. (Seen in Fig. 1.) The coke-oven is provided with a chimney, *x*. The pipe G, as will be seen in this figure, leads directly from the oven and not from the flue or chimney, as in Fig. 1. In Fig. 3, K is the wall of the blast-furnace, and M an ordinary tuyere.

In ordinary practice the blast-furnace is supplied at regular intervals with charcoal, ore, and flux in proper proportions. I employ a furnace similar in general construction to the ordinary blast-furnace, and charge the same in the usual manner, with the same proportionate amounts of ore and flux as would be used were charcoal the sole fuel. The amount of charcoal, however, charged at the same time with the ore and flux is graduated to supplement the fuel furnished in the wood-gases. These gases are injected into the furnace in or above the air-tuyere zone. In the furnace they mix with the hot or cold air blast and are consumed. The combustion of these gases and of the charcoal distributed throughout the charge furnishes heat sufficient to carry on the ore-reducing process.

The process connected herewith forms no part of the present case, but will form the subject of a separate and distinct application.

What I claim is—

1. In an apparatus for utilizing wood-gases for metallurgical purposes, the combination of a charcoal-kiln, pipes leading therefrom, a heat-

ing-chamber through which said pipes pass, a blast-furnace to which said pipes lead, and a second pipe leading from the blast-furnace to the heating-chamber, whereby the spent gases from the furnace are utilized to heat the heating-chamber and wood-gases, as set forth.

2. In an apparatus for utilizing wood-gases for metallurgical purposes, the combination of a charcoal-kiln, heating-chamber, conducting-pipes, a fan or other forcing apparatus, an equalizing-chamber, and a blast-furnace, as and for the purposes set forth.

3. In an apparatus for utilizing wood-gases for metallurgical purposes, the combination, with the charcoal-oven, of a blast-furnace, and intermediate devices by which the gases are drawn from the charcoal-oven, then heated in a chamber which receives its heat from the blast furnace, and then mixed with atmospheric air, as described.

4. The combination of a forcing apparatus, a heating-chamber provided with baffle-plates, an equalizer, and a gas-conduit passing between said baffle-plates, as set forth.

5. The combination of the blast-furnace, the heating-chamber having baffle-plates, a gas-conduit leading through it and between said plates, and a pipe for conducting the waste products of combustion to the heating-chamber, as set forth.

6. In an apparatus for utilizing wood-gases for metallurgical purposes, the combination of a charcoal-kiln, pipes leading therefrom, a heating-chamber through which said pipes pass, and a blast-furnace to which said pipes lead, substantially as described.

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

HENRY M. PIERCE.

Witnesses:
E. EVERETT ELLIS,
O. E. DUFFY.