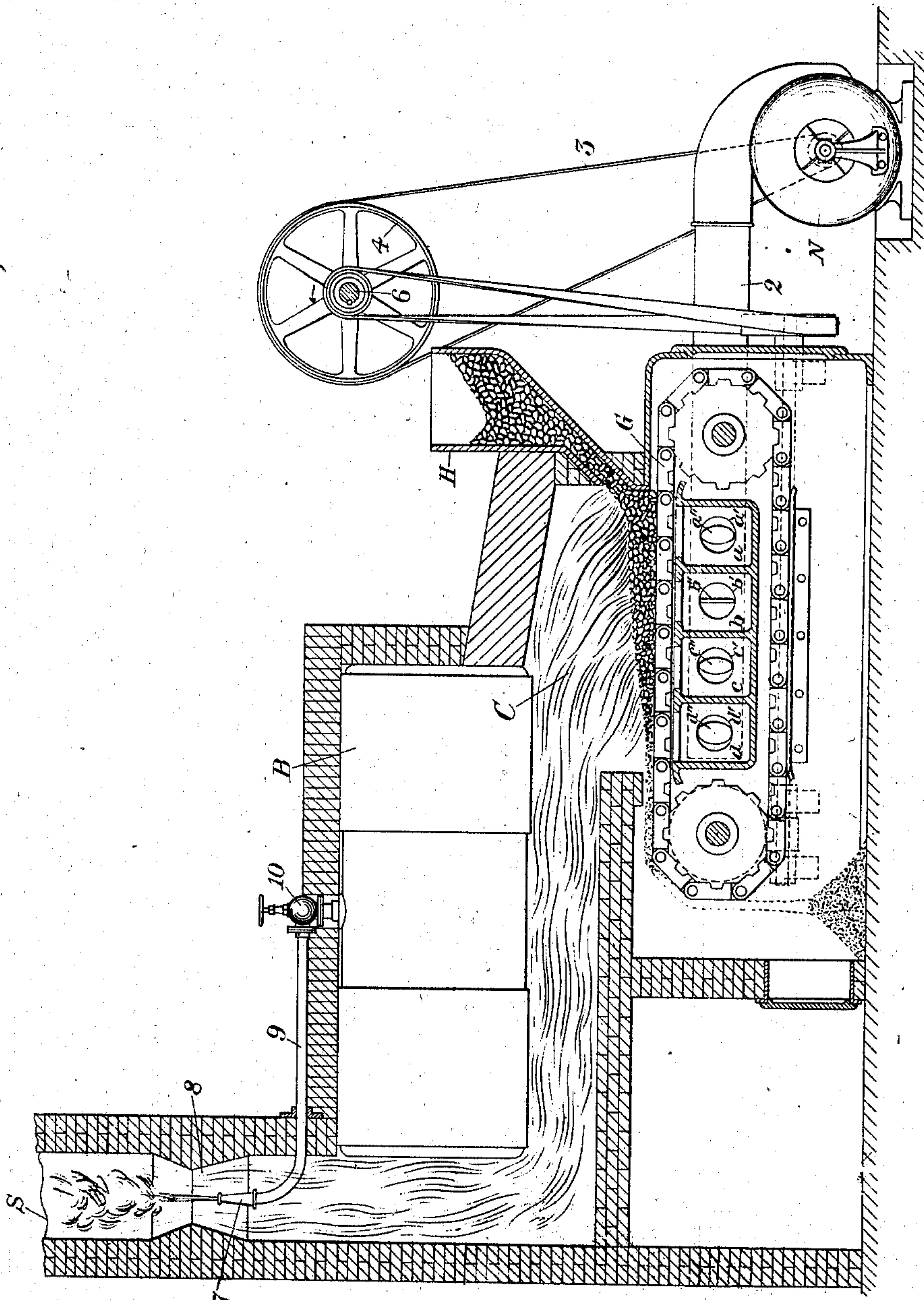


(No Model.)

E. B. COXE.
FURNACE.

No. 518,578.

Patented Apr. 17, 1894.



Witnesses:
John L. Edwards Jr.
Fred. J. Dole.

Inventor:
Eckley B. Coxé,
By his Attorney,
F. H. Richards

UNITED STATES PATENT OFFICE.

ECKLEY B. COXE, OF DRIFTON, PENNSYLVANIA.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 518,578, dated April 17, 1894.

Application filed November 27, 1893. Serial No. 492,083. (No model.)

To all whom it may concern:

Be it known that I, ECKLEY B. COXE, a citizen of the United States, residing at Drifton, in the county of Luzerne and State of Pennsylvania, have invented certain new and useful Improvements in Furnaces, of which the following is a specification.

This invention relates to furnaces, and is in the nature of an improvement on the invention described and claimed in Letters Patent of the United States No. 499,716, granted to me June 20, 1893; and my present improvements are herein shown in connection with the multi-blast traveling-grate furnace described in said patent.

The object of my present invention is to provide an organization of mechanism or apparatus whereby, in a furnace-plant of the class described, the plenum of air in the furnace-chamber normally due to the high-pressure air-blast may be controlled to prevent the re-action thereof upon the successive low-pressure air-blast or blasts, for the purpose of making more uniform the operation of the steam-plant and permitting the use of a lower pressure air-blast with more uniform results during the later stages of the combustion period; also to provide means for obtaining the required variable air-supplies without the use of a pressure-blast apparatus.

In the drawing is shown, in sectional side elevation, a furnace-plant embodying my present improvements.

The furnace shown in the drawing is or may be the same as the furnace described in my aforesaid prior Letters Patent, and which consists of the usual walls inclosing the furnace-chamber C; a fuel-conveying grate, G, provided with means (substantially as described in said patent) for actuating the grate; means, as, for instance, the hopper H, for supplying fuel to the upper run of said conveyer-grate; a series of variable-pressure air-supply apparatuses, designated by *a*, *b*, *c*, *d*, respectively, and located underneath the fuel-conveying furnace-floor, as indicated in the drawing; and, means for supplying said air-supply apparatuses or chambers *a*, *b*, *c*, *d*, respectively, with air at the required pressures. The means for controlling the successive air-supplies consists or may consist of the regulating valves *a'*, *b'*, *c'*, *d'*, in the pipes

a', *b'*, *c'*, *d'*, respectively, from the air-supply conduit or air-pipe, 2; which conduit, when used, is in communication with some suitable pressure-blast mechanism or apparatus, as, for instance, the fan-blower, N; this blower may be actuated by connection with some suitable source of power, as, for instance, by the connecting driving-belt, 3, running over the driving-pulley, 4, on a revolving line-shaft, 6. Said air-supply mechanism, or blower, being in operation at the proper speed for supplying the highest-pressure air-blast required, the other air-blasts are reduced to the required pressures, respectively, by means of the several air-valves described. In practice, only a moderate air-pressure is used in the first air-blast apparatus *a*, the pressure here being made suitable for ignition of the fuel when this first enters the furnace-chamber at the forward end thereof, which is at the right-hand in the drawing. The second air-blast apparatus *b* is usually the one which is supplied with air at the maximum pressure; in practice and especially when burning small-size anthracite, this pressure is usually equal to one-inch or one and one-half inches of water. In the next air-chamber *c*, the pressure is reduced to about two-thirds, or even to one-half, of the pressure in the chamber *b*; while in the last chamber of the series it is reduced to a much lower point, frequently not exceeding the pressure of one-fourth of an inch of water. It will be understood that, in any case, by "pressure" as applied to an air-supply, is meant the pressure of the same in comparison with pressure within the furnace-chamber; and that whether this pressure be above or below that of the atmosphere is not material.

The tendency of the high-pressure air in the air-blast from the chamber *b* naturally tends to create a surplus or over-pressure in the nearly-closed furnace-chamber, thus causing a reacting back-pressure of sufficient magnitude to overcome the influx of the lower pressure air-blasts, and thereby destroy their efficiency; that action also makes the lowest-pressure air-blasts variable in effect. To overcome this objection I have provided, in connection with the discharge-end of the furnace-chamber, an exhaust apparatus adapted for reduc-

ing the air within the furnace-chamber to a pressure which shall be less than the normal pressure of the lowest-pressure air-blast.

In the drawing, the furnace is shown set for heating a steam-boiler B, beyond which is the usual stack or flue S for discharging the gases after these have been used. The exhaust apparatus, in the form thereof herein shown consists of a blast-nozzle, 7, (which will usually be a steam blast nozzle) located in the stack or flue at some suitable point in or beyond the outlet of the furnace-chamber. This blast-nozzle 7 is supplied with steam from a suitable steam supply, as, for instance, the steam-boiler which is shown in connection with the furnace. In the drawing, the steam nozzle 7 is shown centrally disposed within and somewhat below the contracting-ring 8 of the stack. - The nozzle is supplied through the pipe 9 in which is a valve, 10, for regulating the supply of steam to said nozzle. In practice, this valve will require regulation in connection with the regulating air-valves a'' , b'' , c'' , d'' , so as to properly adjust the exhaust-blast to one or more of the several air-blasts.

In operation, the ejection of steam from the blast-nozzle 7 creates a suction in the furnace-chamber sufficient to carry off the surplus air and secure the requisite result in the reduction of air-pressure therein, thus obviating reacting back-pressure.

By the construction and organization of apparatus as herein described, the fuel, in a layer upon the furnace-floor, is subjected from below to the action of successive air-blasts of varying pressures, and the resultant air-pressure created in the furnace-chamber by the higher pressure blast of the successive air-blasts is reduced by suction so as to have no counter-acting effect upon the lower-pressure air-blast which would otherwise destroy the efficiency.

Having thus described my invention, I claim—

In a furnace of the class specified, the combination with the furnace-chamber and its inclosing walls, and with the furnace-floor located undersaid chamber, of high-pressure and low-pressure air-blast apparatus located below and in communication with the furnace-floor, and a blast-apparatus located near the discharge-end of the furnace-chamber and adapted for reducing the absolute air-pressure in said chamber to a pressure below that of the lowest-pressure air-blast apparatus, to prevent re-acting back-pressure, substantially as described and for the purpose set forth.

ECKLEY B. COXE.

Witnesses:

LOUIS ORTNER,
STEWART F. MACFARLANE.