(No Model.)

# J. N. WEAVER.

## FEEDING AIR TO LOCOMOTIVE FURNACES.

No. 299,705. Patented June 3, 1884.

Fig. 1

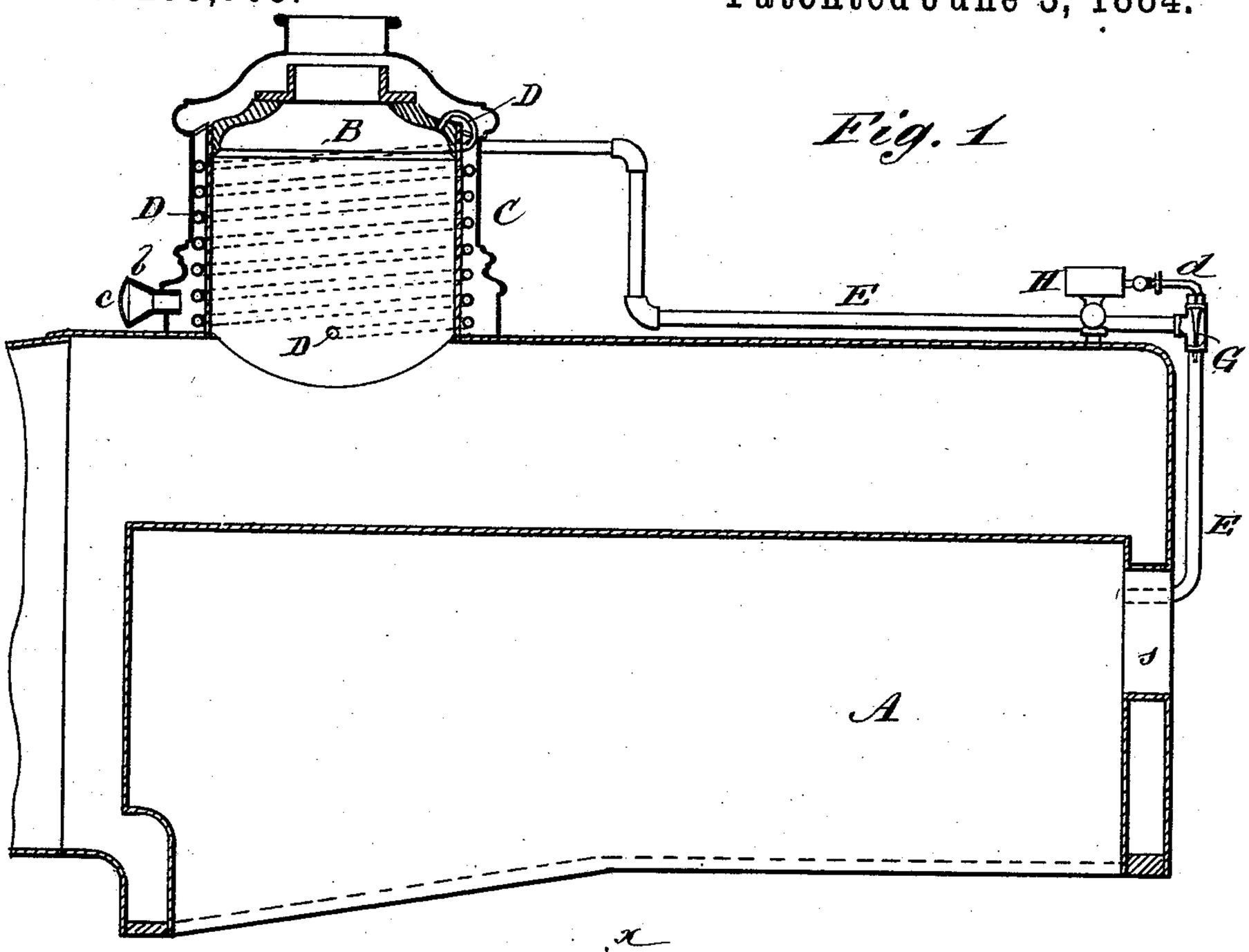
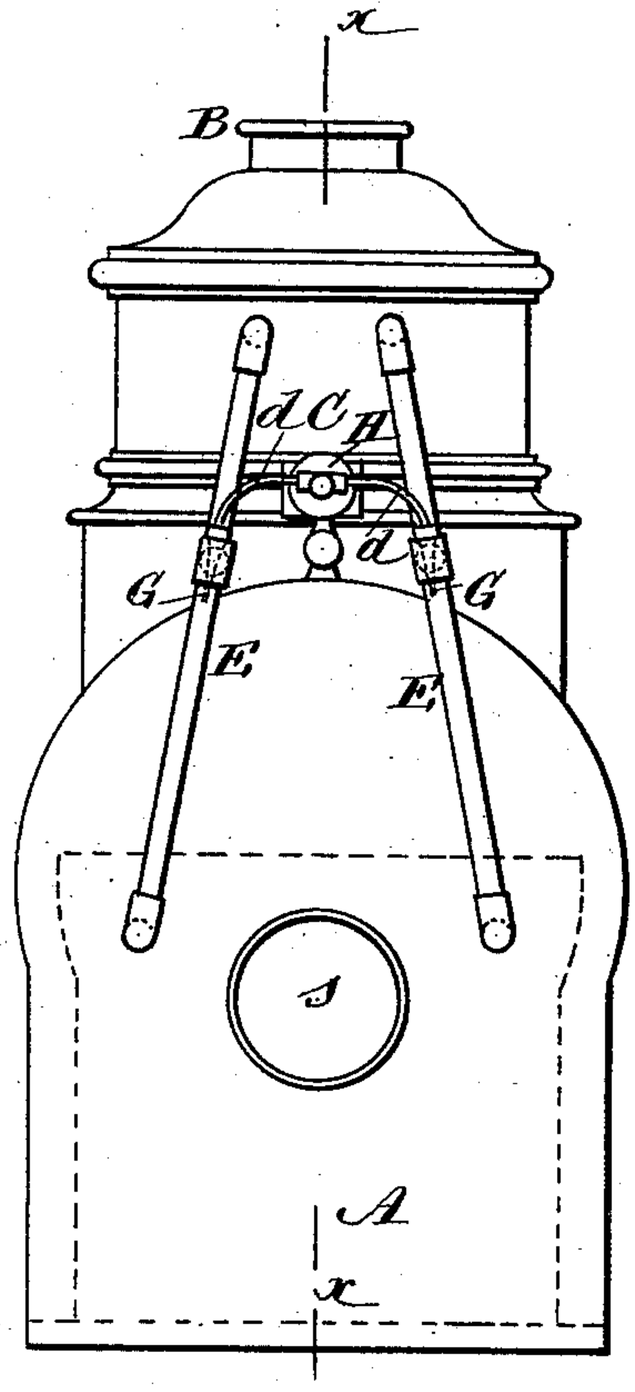



Fig. 2

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# UNITED STATES PATENT OFFICE.

JAMES N. WEAVER, OF SAYRE, PENNSYLVANIA.

## FEEDING AIR TO LOCOMOTIVE-FURNACES.

SPECIFICATION forming part of Letters Patent No. 299,705, dated June 3, 1884.

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

*To all whom it may concern:*

Be it known that I, JAMES N. WEAVER, of Sayre, in the county of Bradford and State of Pennsylvania, have invented certain new and useful Improvements in Means for Promoting Combustion in the Furnaces of Locomotive-Engines and other Boilers, of which the following is a full, clear, and exact description.

This invention is more particularly adapted to the furnaces and boilers of locomotive-engines.

The object of the invention is to improve and economize the combustion of the fuel and gaseous products of combustion; and it relates to apparatus for the purpose in which air, heated by the escaping products of the furnace or steam generated in the boiler thereof, is introduced over the fire; also, in which a steam-blast is used to quicken the draft and improve the combustion.

It is well known that in furnaces imperfectly supplied with air the waste of fuel is very great, owing to the imperfect combustion which takes place; and in locomotive boiler-furnaces, for instance, the ordinary methods of supplying the air to the furnace are inadequate to its necessities, so far as perfect combustion is concerned, and carbonic-oxide gas is generated in the furnace. By the introduction of hot air over the fire, however, the carbon is burned and carbonic-acid gas is formed, which makes perfect combustion.

My invention consists in certain simple means for accomplishing this result, and for promoting the draft, substantially as hereinafter described.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in both the figures.

Figure 1 represents a vertical longitudinal section on the line *x x* in Fig. 2 of a locomotive-engine boiler and furnace in part with my improvement applied, and Fig. 2 a rear end view of the same.

A is the furnace, *s* its door or feed-opening, and B the steam-dome of the boiler.

In front of the dome B, near its bottom, is a bell-shaped tube or opening, *b*, which may have a perforated face-cover, *c*, for the admission of cold or external air to the interior of a jacket, C, surrounding the dome. Within this jacket C is a coil of pipe, D, arranged to encircle the dome, and one end of which pipe is connected with the interior of the dome near its top, while its other end is connected with the interior of the dome near its bottom, thus establishing a circulation of steam through the coil, which adds greatly to the heating capacity of the dome, and causes the air entering the jacket C by the inlet *b*, and circulating around the coil D, to become highly heated. This forms a very simple and efficient means of heating the air to be supplied to the furnace. The air thus heated is passed from the upper portion of the rear side of the dome, or rather its jacket C, into the furnace A from the rear end of the boiler and over the fire by a pipe or pipes, E, the lower upright legs of which may each be fitted with a steam-jet pipe or nozzle, G, arranged to project below the junctions of said legs with the horizontal portions of the pipes E, or otherwise suitably arranged, and whereby a current is created when the engine is running with its steam shut off, as in going down a grade or when standing still, said nozzles G being connected by small steam-pipes *d* with a double valve, H, which supplies the steam to the nozzles when required. When the engine is running and using steam, the draft of the boiler will ordinarily produce a sufficient current without having recourse to the steam injectors or nozzles. In this way or by these means are the results sought to be attained most perfectly secured.

The steam nozzle or nozzles G in the pipe or pipes which conduct the heated air to the furnace may be combined with any other air-heating apparatus than that here described— as, for instance, with an air-heating coil in the smoke-box, or with any heating device on the outside of the boiler.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In apparatus for heating air and supplying the same to the furnaces of steam-boilers, the combination, with the boiler and its furnace, of a jacketed air-space and spaced

steam-circulating pipes therein, which pipes are connected at both ends with the interior of the boiler, and a pipe or pipes for conducting the heated air from the jacketed space to the furnace and over the fire, substantially as set forth.

2. The combination, with the steam-dome B of a locomotive-boiler and its furnace A, of the air-jacket C, having a front inlet at or near its one extremity, a coil of steam-circulating pipes around the dome, with an air-circulating space between them, and a pipe or pipes connected with the opposite end portion of the jacket to that at which the air is received, and arranged to conduct the heated air to or over the fire, essentially as described.

3. The combination, with the steam-dome B of the boiler, furnace A, and the air-jacket C, having a front inlet, of the coiled steam-pipes D, pipes E, leading from the outlet of jacket C to the furnace over the fire, and the steam-injecting nozzles G within the said hot-air pipes, substantially as set forth.

4. The combination, with the steam-dome B and its boiler and furnace, of the air-jacket C, having a front inlet-passage, a coil of spaced steam-circulating pipes, D, connected to the upper and lower ends of the said dome, pipes E, leading from the outlet of the jacket to the rear end of the furnace, and nozzles G, passing within the pipes E, as shown, and connected to the boiler by pipes *d*, provided with valves H, substantially as set forth.

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Witnesses:
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