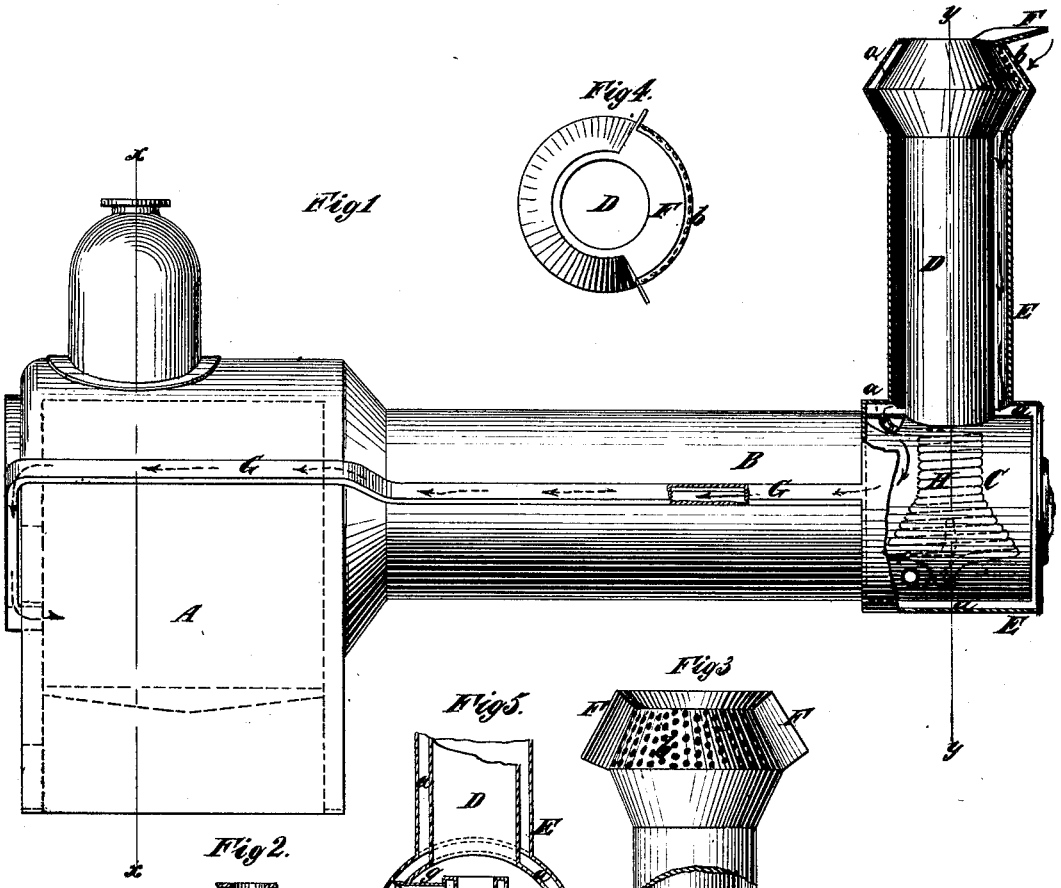
J. V. MOTTER.

Feeding Air to Furnaces.

No. 214,176. Patented April 8, 1879.



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UNITED STATES PATENT OFFICE.

JACOB V. MOTTER, OF NEW YORK, ASSIGNOR OF ONE-HALF HIS RIGHT TO ROBERT H. BURNS, OF BROOKLYN, N. Y.

IMPROVEMENT IN FEEDING AIR TO FURNACES.

Specification forming part of Letters Patent No. **214,176**, dated April 8, 1879; application filed January 30, 1879.

To all whom it may concern:

Be it known that I, JACOB V. MOTTER, of New York, in the county and State of New York, have invented certain new and useful Improvements in Feeding Hot Air to Furnaces, of which the following is a description.

My improvements are intended for use in connection with steam-boilers of the locomotive type, and especially with the boilers of locomotive-engines.

These improvements consist in novel means whereby the heat escaping with the smoke and gases from the furnace of a boiler may be effectively utilized for the purpose of heating air, the air so heated being conducted to the furnace of the boiler, and by their commingling with the gases produced by the combustion of fuel in the furnace it enables the latter to be more thoroughly consumed than heretofore, and thereby effects a saving of fuel.

In the accompanying drawings, Figure 1 represents a side elevation of a steam-boiler embodying my improvements, parts being broken away to more clearly show my invention. Fig. 2 represents a transverse section taken on the dotted line *x x*, Fig. 1. Fig. 3 represents a transverse section on the dotted line *y y*, Fig. 1, the upper part of the smoke-pipe being unsectioned. Fig. 4 represents a plan view of the top of the smoke-stack, and Fig. 5 represents a transverse section of the shell of the boiler, having a modification of my invention applied thereto.

Similar letters of reference designate corresponding parts in all the figures.

A designates the furnace or fire-box, and B the shell of a boiler, similar to the boiler of a locomotive-engine. C designates the smoke-box, and D the smoke-stack, through which the products of combustion pass into the air. I surround the smoke-box or smoke-stack, and preferably both, with an exterior air-jacket or covering, E, leaving a space, *a*, between it and the walls of the smoke-box and smoke-stack proper, through which air may circulate. The air absorbs by radiation a large portion of the heat which would otherwise pass out the smoke-stack and be wasted.

At the top of the smoke-stack I have shown a series of perforations, *b*, forming a screen, through which air enters the air-space *a*, and which prevents the entrance of cinders. In order to properly direct currents of air through this screen, I have represented the smoke-stack as surmounted with a cowl or hood, F, which extends around a portion of its circumference, and by which the drafts or currents of air created by the rapid passage of a locomotive are deflected inward upon the screen. I may, if desirable, secure this cowl or hood to the smoke-stack in such manner that it will revolve, so as to serve its purpose equally well whether the locomotive is going ahead or backward. To conduct the heated air from the air-space *a* to the furnace of the boiler, I have represented ducts or passages G, arranged upon each side of the boiler, and preferably so as to be inclosed by the felting and lagging with which the boiler is covered. Any number of these ducts or passages may be employed, and of any size, as long as they are sufficient in area to conduct a proper amount of air to the furnace. They terminate in a distributer, L, extending across the furnace, and provided with openings *l* for the escape of air.

For the purpose of still further utilizing the waste heat, I may arrange within the smoke-box C a "petticoat," H, of funnel shape, through which the exhaust-steam escaping from the nozzle *c* passes, as clearly represented in Fig. 3. I may make this petticoat of a coil of pipe, provided with an inlet, *d*, for air, and an outlet, *e*, through which heated air passes into the duct or passage G, as represented in Fig. 3, so as to produce a proper circulation of air through the petticoat; or, if desirable, I may construct it of sheet metal, (as represented in Fig. 5,) having inside and outside walls, between which is an air-space, *f*, connected with the air-space *a* by means of an inlet-pipe, *g*, and outlet-pipe *h*. In some cases the jacket E may be dispensed with, and in such cases the inlet and outlet pipes *g h* would communicate directly with the furnace through the ducts or passages G.

As the combustion is usually very rapid in the boilers of locomotive-engines, a large amount of heat escapes with the products of combustion. By my invention I enable a large proportion of this heat to be absorbed by the

air, and as the heated air will unite more quickly with the smoke and gases in the furnace of the boiler than will cold air, I am enabled to produce a more thorough combustion, and thereby effect a saving in the amount of fuel burned by a locomotive-engine, which is a very important consideration.

With slight modifications some or all of my improvements might be applied to other descriptions of boilers than that represented in the accompanying drawings with good results.

What I claim as my invention, and desire to secure by Letters Patent, is—

The combination, with the boiler of a locomotive-engine, of a petticoat arranged within the smoke-box, surrounded by an air-jacket, nozzles for discharging steam through the said petticoat, an air-inlet pipe or passage to the said jacket, and a duct or passage for conveying heated air therefrom to the fire-box of the boiler, substantially as specified.

JACOB V. MOTTER.

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