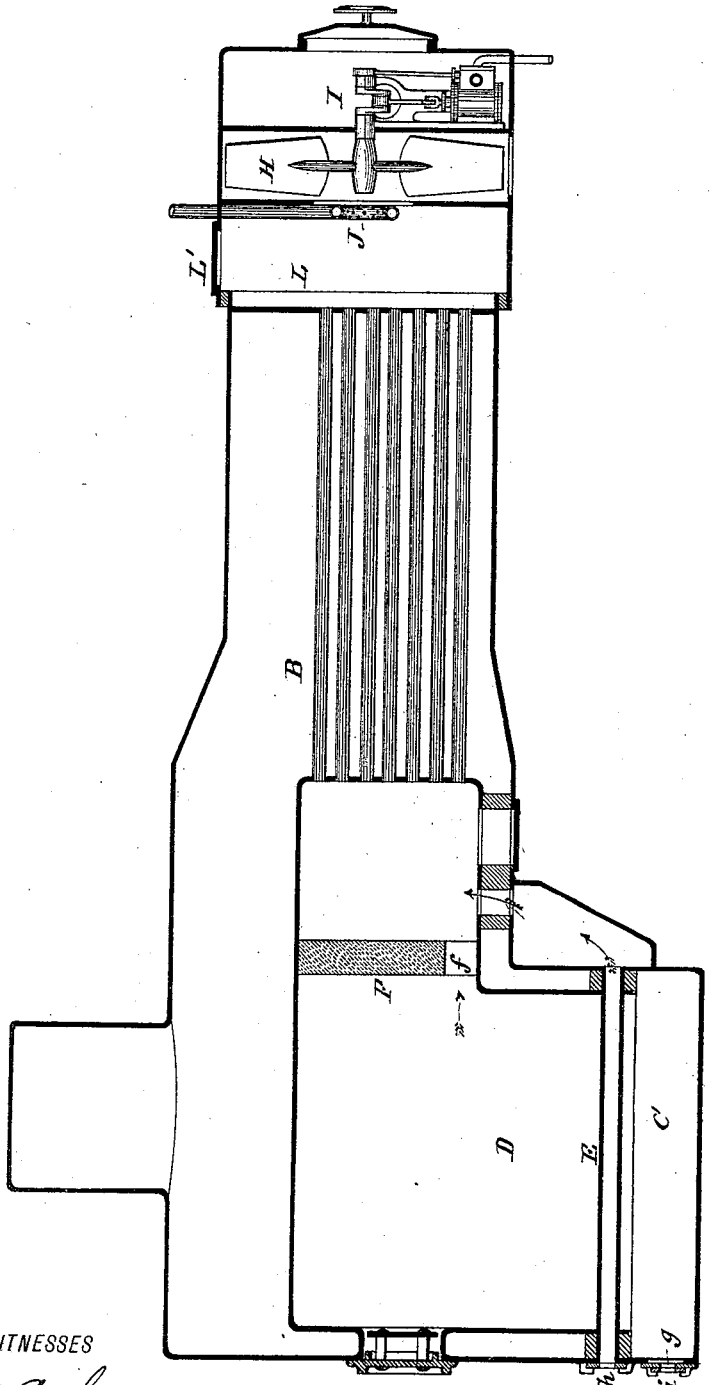
(No Model.)

E. J. MALLETT, Jr.

LOCOMOTIVE FURNACE.

No. 262,071. Patented Aug. 1, 1882.



WITNESSES

Wm A. Skinkle.

Geo W. Brick.

INVENTOR

Edward J. Mallett Jr.

By his Attorney

Marcellus Bailey

N. PETERS. Photo-Lithographer. Washington, D. C.

UNITED STATES PATENT OFFICE.

EDWARD J. MALLETT, JR., OF NEW YORK, N. Y.

LOCOMOTIVE-FURNACE.

SPECIFICATION forming part of Letters Patent No. 262,071, dated August 1, 1882.

Application filed May 17, 1882. (No model.)

To all whom it may concern:

Be it known that I, EDWARD J. MALLETT, Jr., of the city, county, and State of New York, have invented certain new and useful Improvements in Locomotive and other Boiler Furnaces, of which the following is a specification.

My present invention has relation to the improvements in promoting combustion of fuel in boiler and other furnaces, and to the improvement in boiler and other furnaces, for which Letters Patent of the United States will issue to me on the 23d day of May, 1882. It is designed with more particular reference to boiler-furnaces in which the draft is usually produced by exhausting steam into the smoke-funnel or chimney, and especially with reference to the needs of a locomotive-boiler.

It is my object to adapt a suction-fan or equivalent mechanical air-exhauster to locomotive and like boilers in such manner as to obviate the use of steam for producing draft. Draft produced by exhausting steam into smoke-funnels is known to be productive of considerable loss of fuel energy. To thus produce draft it is essential that the steam escape through one or more nozzles into the smoke-funnel. Inasmuch as, in order to obtain the maximum efficiency of a steam-engine, it is essential to provide free escape for the steam through unobstructed orifices, all attempts to produce draft by forcing exhaust-steam through nozzles cause what is known as "back-pressure" on the engine-cylinders, which necessarily reduces the efficiency of the engine. Furthermore, in all boilers having steam-draft the heat contained in the steam voided from the smoke-funnel is lost. The substitution of mechanical for steam draft not only obviates the loss of engine energy, but permits of the utilization of the heat contained in the exhaust-steam. To produce the mechanical draft for locomotive-boilers, I apply a suction-fan directly to the end of the boiler, the periphery of the fan-case being coincident with or forming part of the casing of the boiler. The fan, without an intervening flue, thus draws air from the furnace directly through the boiler-tubes, and occupying a space which is merely an extension of the boiler-casing does not detract from the symmetry of the locomotive. It also permits the chimney or smoke-stack to be entirely dispensed with. The casing of the fan may be merely an extension of the usual smoke-box casing; or the fan-casing may form the front head of the boiler-casing, and, if desired, may be so hung as to be capable of swinging open or to one side, so as to expose the boiler-tubes; or it may rest on the pilot of the engine. As the products of combustion leave the boiler in highly-heated condition, it becomes necessary to cool them down to such a degree that they will not injure the fan, and will be reduced in volume sufficiently to permit them to be carried off by a fan of moderate size and capacity. A convenient way of effecting this result is to admit a small spray of water to the fan or to the passage leading into the fan, the quantity of water being so regulated that it shall by its vaporization be just sufficient to cool the air in the fan without any water accumulating therein.

The manner in which my invention is or may be carried into effect will be readily understood by reference to the accompanying drawing, which represents in longitudinal vertical section so much of a locomotive-boiler as needed for the purpose of explanation.

In the drawing, B represents the boiler, provided with the usual longitudinal flues or tubes; C, the ash-pit; D, the fire-box; E, hollow grate-bars, open from end to end; F, septum or division wall, provided with openings or passages *f* for escape of the fuel-gases; *h*, a sliding register applied to and controlling the inlet ends of the hollow grate-bars; *g*, air-inlet openings in the ash-pit; *i*, register controlling said openings *g*, the registers *h i* being usually connected to and operated by a single lever-handle, so as to move simultaneously in opposite directions in such manner that in proportion as the one closes the other opens; H, the suction-fan, and J the condensing or cooling appliance.

When the fan is in motion air is drawn through the inlets *g* up through the fire, and the products of combustion pass through the openings or flame-passage *f* in the septum-wall F, meeting as they issue from the wall the heated air, which, drawn through and issuing from the hollow grate-bars, passes up through the openings *a* to mingle with the heated fuel-gases. These parts in their general arrangement and mode

of operation are substantially the same as those shown and described fully in the Letters Patent which will issue to me on the 23d day of May, 1882, as aforesaid, and they therefore require no further description here.

The invention to which my present specification is directed resides in the arrangement of the fan and the condensing or cooling appliance, and in the combination of the same with the other parts of the furnace. The fan is shown as applied directly to the front end of the boiler or of the smoke-box, the fan-casing virtually constituting the head or a prolongation of the boiler-casing. The fan thus takes up but little room and does not detract from the symmetry of the locomotive, and the chimney or smoke-funnel is dispensed with. The gases drawn in by the fan through its inlet-opening o' are discharged through suitable openings, o^2, in the periphery of the fan-casing.

Any suitable means may be employed for driving the fan. In case a small engine be employed for the purpose it can be mounted in front of the fan within a suitable jacket or case, as indicated at I.

I have above indicated that the fan-casing may be made movable in various ways, if desired. In the present instance, however, provision is made for obtaining access to the head of the boiler and the boiler-tubes by providing a space, L, between the fan and the head of the boiler and forming in the top of the inclosing casing a man-hole, L'.

The condenser J consists simply of an annular water-jet or perforated pipe supplied with water from some convenient source—for instance, from the locomotive tender or boiler—and placed at or in the inlet-opening of the fan-case through which the highly-heated furnace-gases are drawn into the fan. The spray from the pipe is at once vaporized by contact with the gases which it moistens and cools. The quantity of water discharged from the pipe should, by a suitable valve or cock arrangement, be so regulated and graduated that all of it will vaporize and pass off from the fan with the gases. This form of condenser is simple, effective, and occupies but little room, and is therefore peculiarly adapted for use in the above-described connection. Other forms of condenser, however, may, if desired, be employed.

Having described my improvements, what I claim, and desire to secure by Letters Patent, is—

1. The combination, substantially as hereinbefore set forth, of the furnace provided with distinct and separate valve or register controlled inlets, which introduce air into the furnace both at a point where it will pass through the fuel and also at a point where it will meet and mingle with the fuel-gases, the boiler, the suction-fan applied directly to the head of the boiler or smoke-box, and a condenser or cooling appliance for cooling the gases drawn into the fan.

2. The combination of the furnace provided with distinct and separate valve or register controlled inlets, which introduce air into the furnace both at a point where it will pass through the fuel and also at a point where it will meet the fuel-gases, the boiler, and the suction-fan applied directly to the head of the boiler or smoke box, substantially as hereinbefore set forth.

3. The combination, with the boiler of a locomotive, of a suction-fan applied directly to the front of the boiler or smoke-box casing, so as to constitute in effect the head of said casing, and a water-spraying appliance intermediate between the flue-head of the boiler and the fan.

In testimony whereof I have hereunto set my hand this 16th day of May, 1882.

EDWARD J. MALLETT, JR.

Witnesses:
P. O'CONNER,
JAS. H. COX.