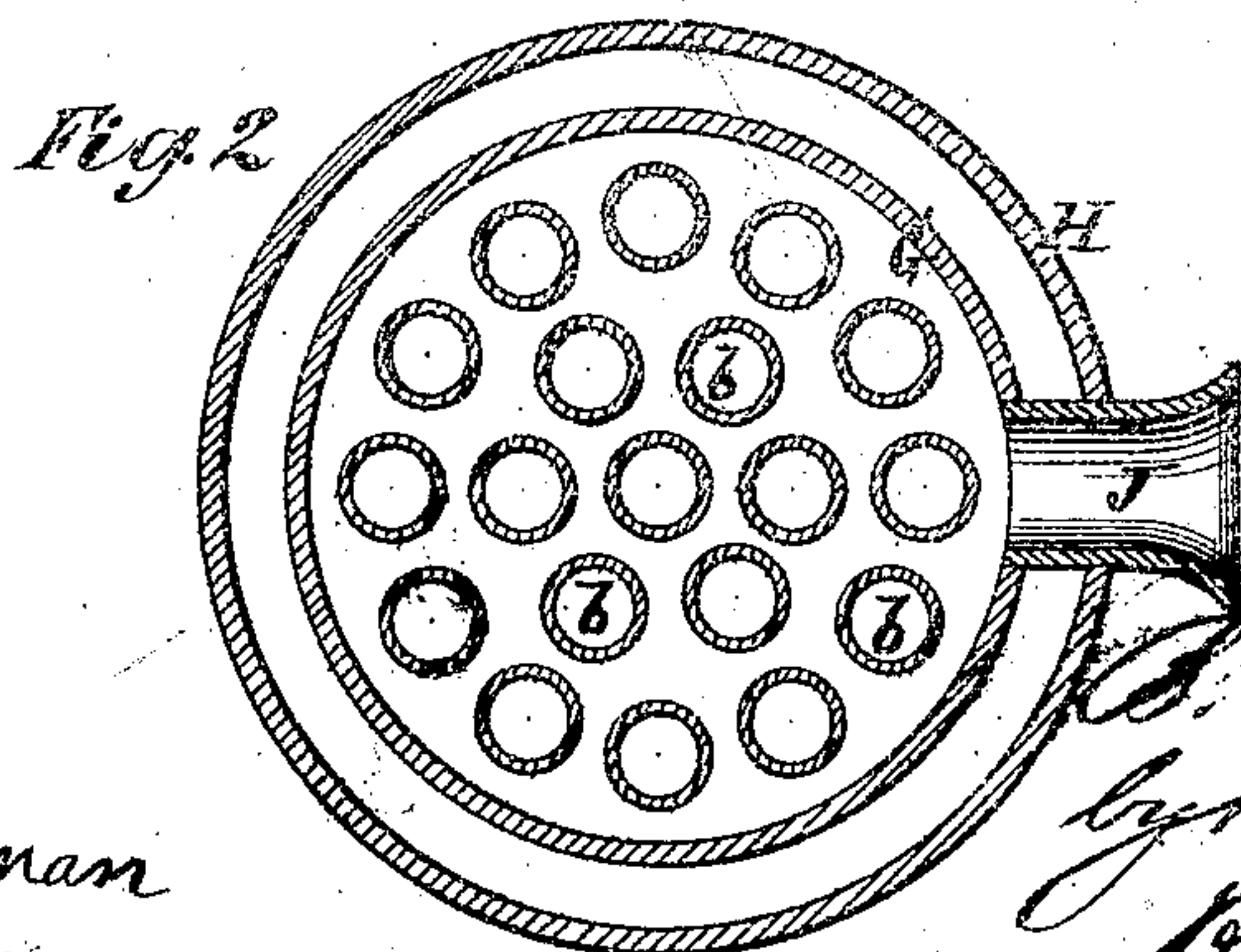
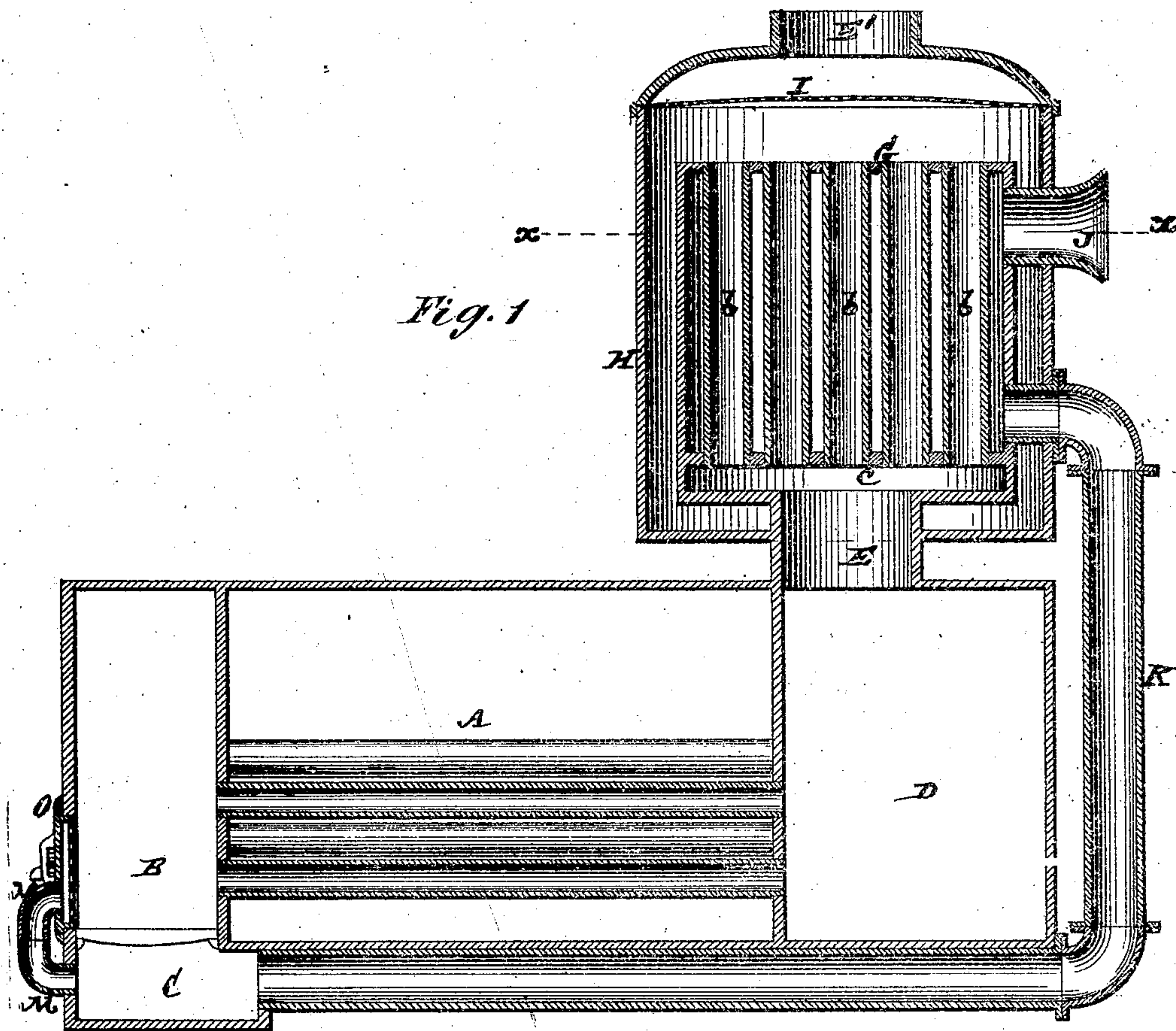


**B. T. BABBITT.**

# AIR-HEATER FOR LOCOMOTIVE ENGINES.

No. 172,368.

Patented Jan. 18, 1876.



*Witnesses:*

Benjamin N. Hoffman  
Per Hayes

J. T. Pabbitt  
by his Attorneys  
Brown & Allen.



# UNITED STATES PATENT OFFICE.

BENJAMIN T. BABBITT, OF NEW YORK, N. Y.

## IMPROVEMENT IN AIR-HEATERS FOR LOCOMOTIVE-ENGINES.

Specification forming part of Letters Patent No. 172,363, dated January 13, 1876; application filed October 6, 1875.

*To all whom it may concern:*

Be it known that I, BENJAMIN T. BABBITT, of the city, county, and State of New York, have invented certain new and useful Improvements in Air-Heaters for Locomotive-Engines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, which forms part of this specification.

This invention consists in certain novel combinations of means for heating, by the escaping products of combustion, an incoming current or currents of air in locomotive-engines, and for supplying such heated air to the furnace of the engine, whereby fuel is economized and a more perfect or better combustion effected; and, in case of soft coal being used as fuel, the smoke is consumed.

Figure 1 represents a vertical longitudinal section of a locomotive-engine boiler, with my invention applied. Fig. 2 is a horizontal section through the heater on the line *xx*.

A is the steam-generating portion or body of the boiler; B, its fire-box; C, the ash-pit; D, the smoke-box, and E the smoke-stack or outlet for the escaping products of combustion. Mounted on the boiler, or smoke-outlet E thereof, is a tubular air-heating structure, G, consisting of a cylindrical or other-shaped body, having smoke-tubes *b* passing up through it, in communication below with a smoke-receiving space, *c*, with which the smoke-outlet E connects. Surrounding or inclosing this air-heater G is a case, H, of larger area in its transverse section than said heater, and into the upper portion of which the escaping products of combustion from the tubes *b* pass, and within which and around the heater G said products, or such portion of them as do not directly pass out to the atmosphere through an upper perforated diaphragm spark-arresting plate, I, and outlet E', are free to circulate. This case H serves to receive any heated solid products of combustion, including cinders and sparks, passing off up through the tubes *b*, and checked by the spark-arrester I from escaping into the atmosphere.

Doors may be provided at the bottom of said case for the removal, from time to time, of such collecting products of combustion.

An air-heating structure, G, thus incased, in nowise impedes the draft, while the escape of cinders and sparks to the atmosphere is effectually prevented, and the escaping products of combustion utilized in a most advantageous manner, to the heating of air for supplying the furnace with highly-heated air, thereby promoting combustion, economizing fuel, and, in case of the fuel being soft coal, consuming the smoke.

The air is supplied to said heater G by a trumpet or other suitably-shaped air-receiving nozzle or inlet-pipe, J, arranged to face, outside of the case H, in a forward direction relatively to the engine's travel, and to connect at its inner end with the air space of the heater G, preferably near the top of the latter.

This arrangement of the air-inlet J insures a natural, forced, and copious supply of air when the engine is in motion, and establishes a hot-blast to the furnace.

The air thus admitted to the heater G circulates freely among or around the smoke-tubes *b*, and after becoming highly heated in said structure, passes off by a pipe, K, to the ash-pit C of the furnace, for supplying the latter with hot air below the grate. A portion of such highly-heated air, however, is or may be supplied to the furnace above the grate, to further promote combustion and consume smoke, by means of a branch or turned-up elbow, M, projecting from the front of the ash-pit and communicating, when the furnace-door O is closed, with a corresponding branch or turned-down elbow, N, attached to said door. This branch or elbow N either communicates with the fire-box in a direct manner through the furnace-door, or in an indirect manner through a perforated distributor on the inside of the door, which is made hollow for the purpose.

The meeting ends of the elbows M and N, of which latter there may be any number, in nowise interfere with the opening of the door, and any hot air escaping when the furnace



door is open, by the elbow M, will be drawn by the natural draft into the fire, and thus be prevented from burning the fireman in charge.

I claim—

1. The combination of a tubular air-heater G, with the outer case H, and smoke-stack or outlet E, essentially as described.

2. The combination of the outer case H, the air-heater G, the spark-arrester I, and the smoke-stack or outlet E, substantially as specified.

3. The hot-air ducts or branches M N, applied to the front of the ash-pit and door of the furnace, in combination with the hot-air pipe or duct K leading from the air-heater to the ash-pit, substantially as specified.

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Witnesses:

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