

P. W. MACKENZIE.

Improvement in Boiler Furnaces.

No. 122,841.

Patented Jan. 16, 1872.

Fig. 1.

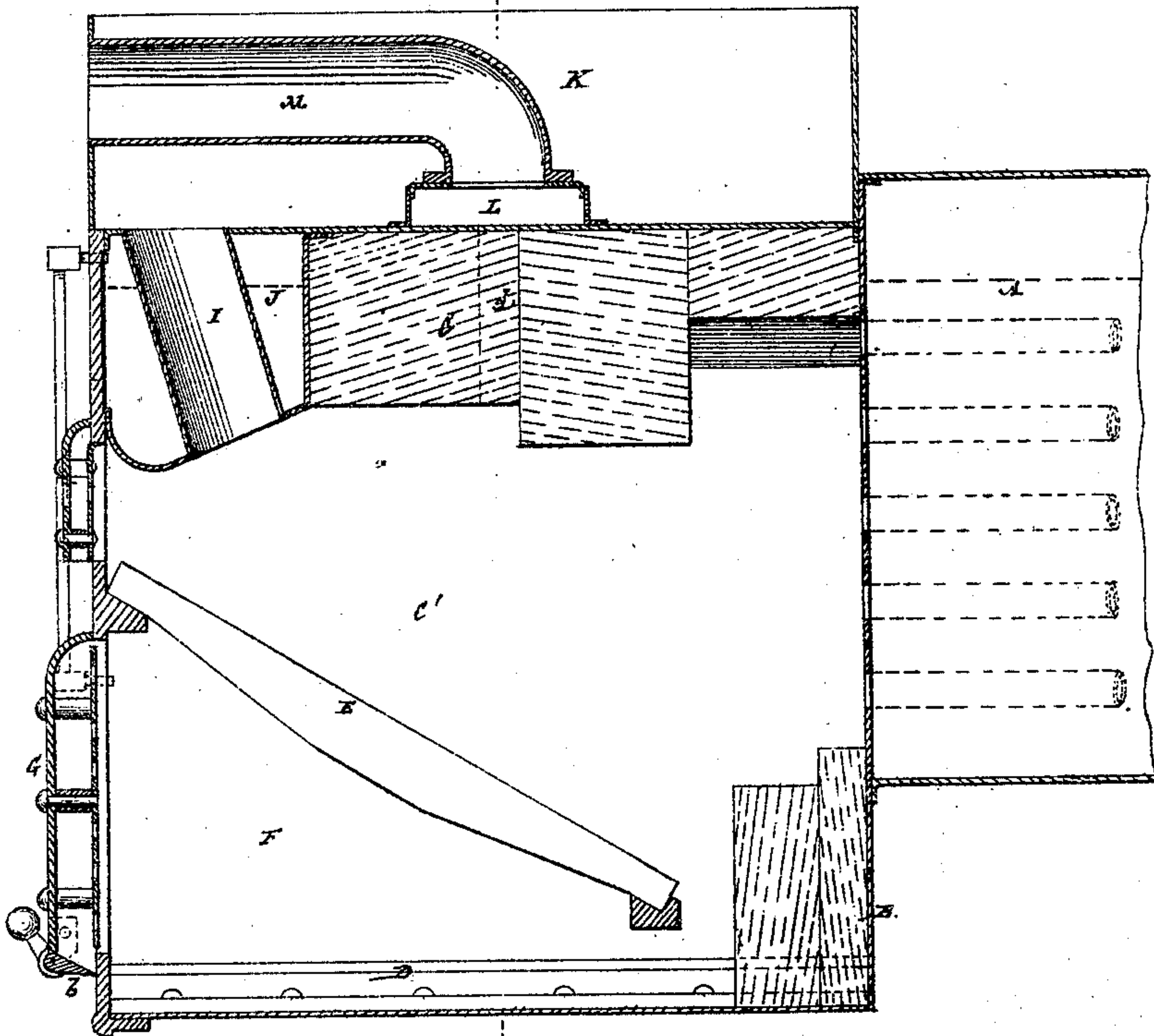
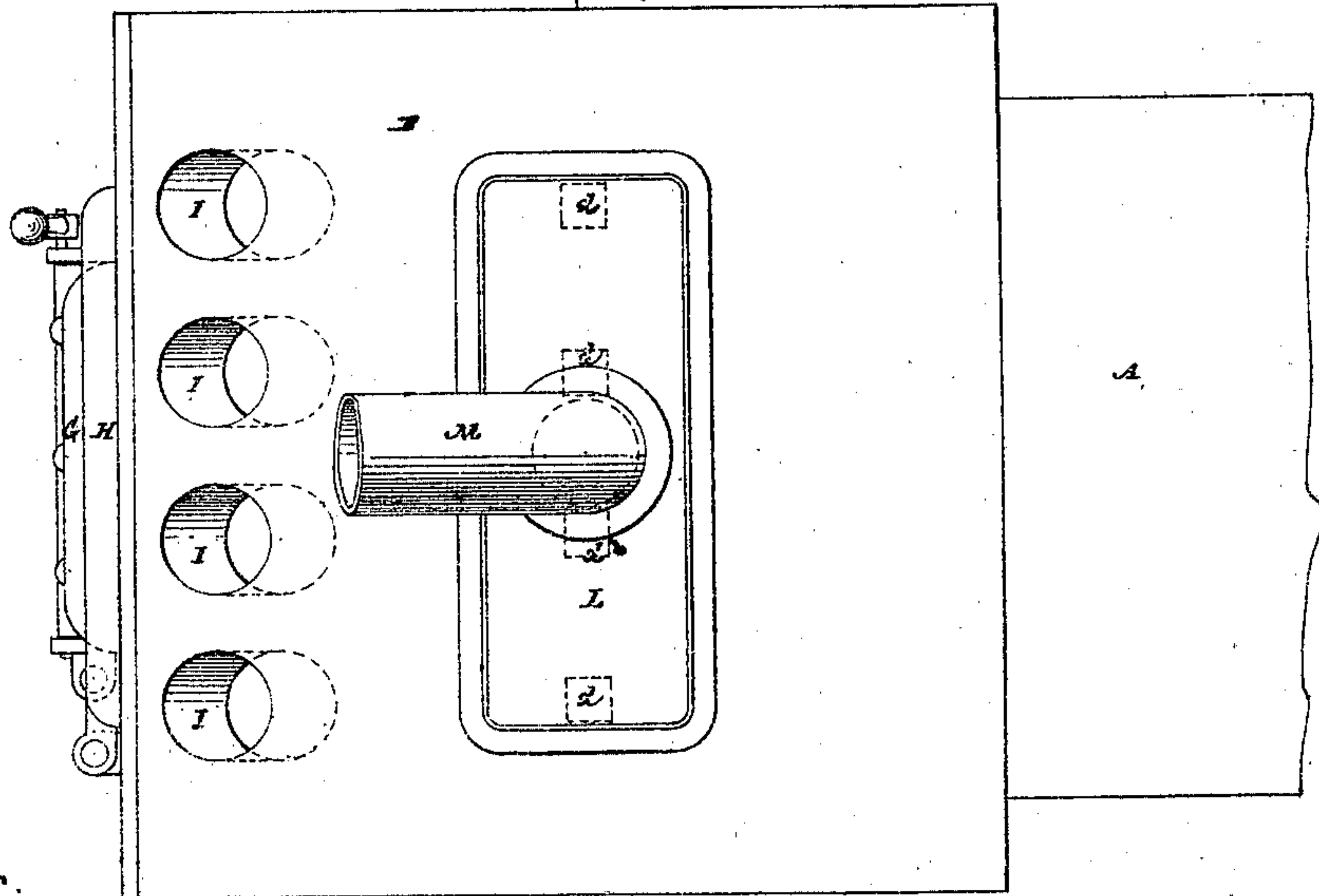


Fig. 2.



Witnesses:

Jno. Harmer
R. R. Rabear

P. W. Mackenzie

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Fig. 3.

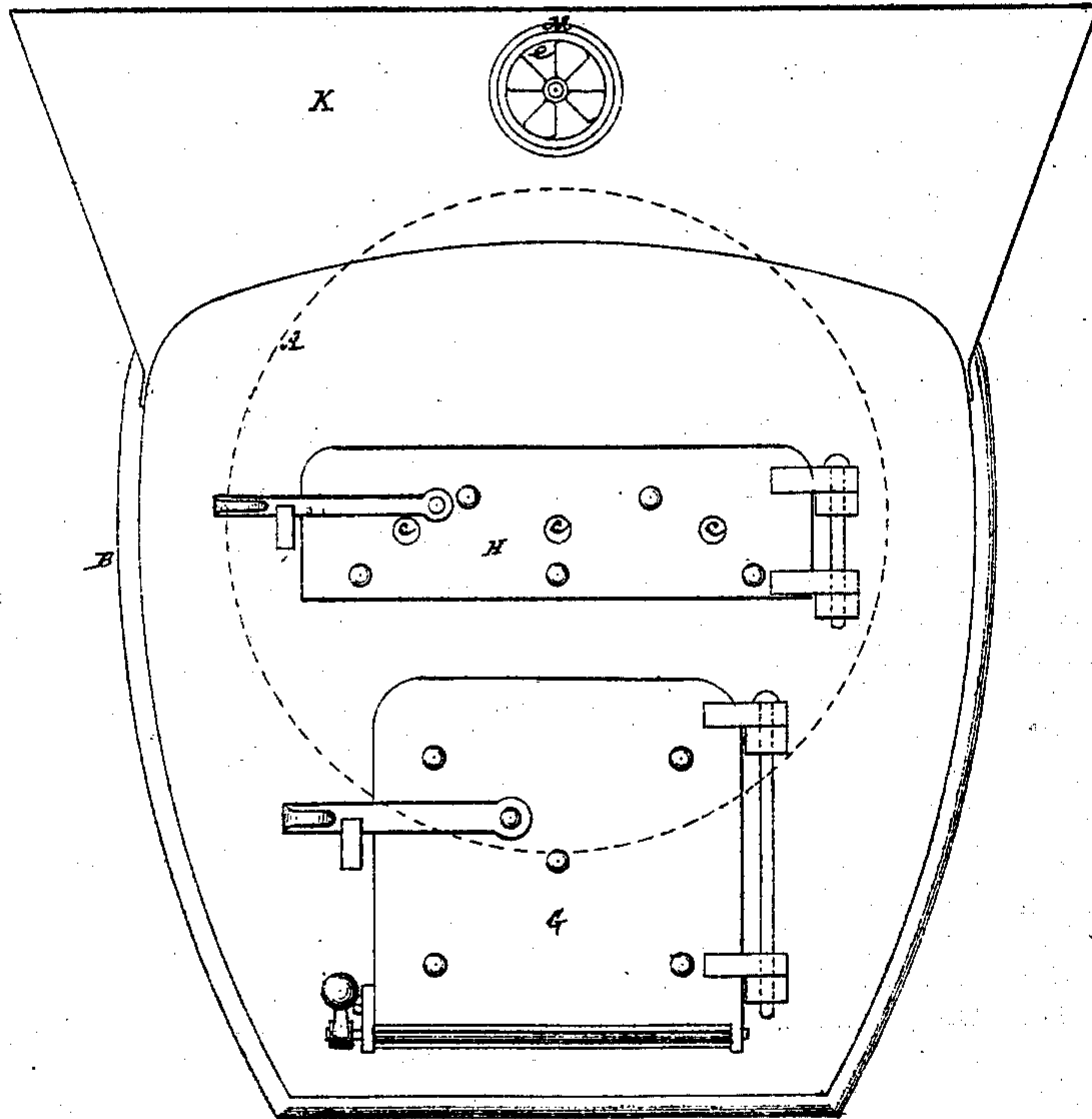
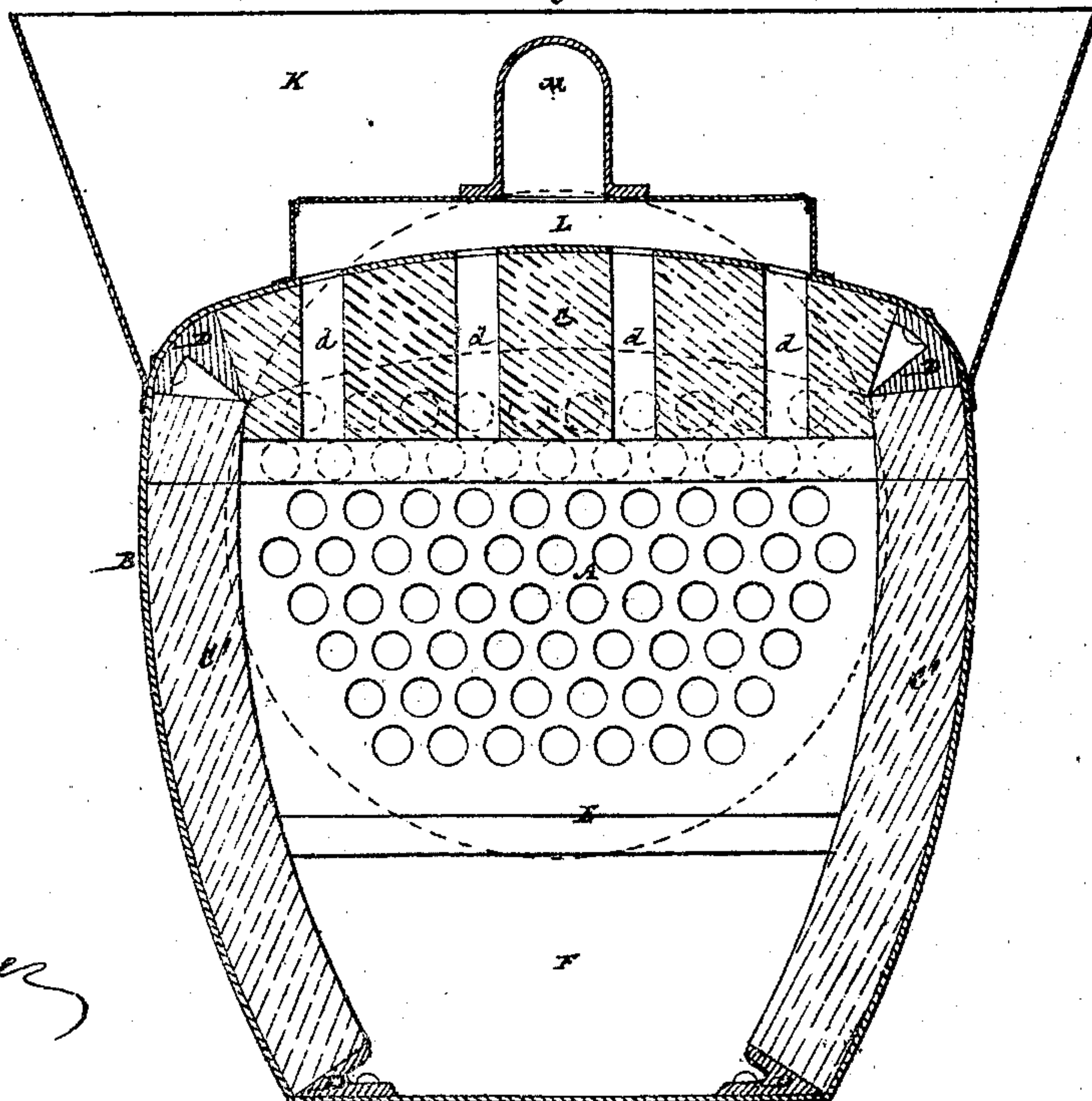


Fig. 4.



Witnesses:
Thos. Hume
R. H. Hume

P. W. Mackenzie

UNITED STATES PATENT OFFICE.

PHILIP W. MACKENZIE, OF BLAUVELTVILLE, NEW YORK.

IMPROVEMENT IN LOCOMOTIVE-BOILER FURNACES.

Specification forming part of Letters Patent No. 122,841, dated January 16, 1872.

To all whom it may concern:

Be it known that I, PHILIP W. MACKENZIE, of Blauveltville, in the county of Rockland and State of New York, have invented a new and useful Improvement in Boilers of 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 forming part of this specification, and in which—

Figure 1 represents a longitudinal sectional elevation of the fire-box end of a locomotive-engine boiler constructed in accordance with my invention; Fig. 2, a plan of the same with a coal-bunker arranged on top of the fire-box removed; Fig. 3, a front elevation; and Fig. 4, a transverse section at the line *x x* in Figs. 1 and 2.

Similar letters of reference indicate corresponding parts throughout the several figures of the drawing.

My invention consists in a combination, with the body of a locomotive-engine boiler, of a fire-box constructed of a metallic shell lined with fire-brick, fire-clay, or other like refractory material, whereby increased strength and durability is given to the boiler. It also consists in a peculiar arched construction of the sides as well as the roof of the fire-box, in combination with metallic angle pieces or stays for supporting the fire-brick or refractory lining in separate arches, whereby increased strength and greater facility of repair are obtained and a convenient space is afforded for the driving-wheels of the locomotive-engine on either side of the fire-box. The invention also comprises a novel arrangement, relatively with the furnace, of a pipe for supplying air to the latter over the fire, for the purpose of promoting the combustion of the gases in the furnace, said pipe being projected through a coal-hopper on top of the fire-box and being provided at its forward end with a valve or damper for regulating the admission of air over the fire.

Referring to the accompanying drawing, A represents the tubular cylindrical body of a locomotive-boiler, and B its fire-box, which, instead of being constructed with a water-casing so as to form an integral portion of the water-space of the boiler, is a separate metallic structure firmly secured to the front end of the body

A, and formed of a metal shell, with a lining, C C', of fire-brick, fire-clay, or other like refractory and non-conducting material. This combination provides for a much stronger construction of locomotive-engine boilers, inasmuch as all the strain due to the pressure of the steam is confined to the cylindrical body A, and is taken off the fire-box B and its crown-sheet, which, or the stays binding the same, are ordinarily the parts first to give out, while by only slightly lengthening the body A the steam and water space of the boiler is in no wise reduced. Said fire-box B is arched not only at its roof but also at its sides, and the latter arranged to approach each other toward the lower portion of the fire-box, whereby the side linings C' are better stayed or supported against falling and room is provided outside of the fire-box, on either side of it, for the driving-wheels of the locomotive, without altering the present construction of engine-frame. The arched side linings C' and roof lining C are each made separate the one from the other, and are supported at their ends, and the shell of the fire-box stiffened, by metallic angle-pieces D firmly riveted or secured to the shell. This construction protects the fire-brick lining as a whole from breaking or working loose, and provides for the ready replacement of any one of the interior arches or linings C C'—as, for instance, the crown-lining C—without interfering with or destroying the others.

The fire-box B is here represented as more particularly adapted, by its interior shape and size relatively with the boiler or outlet to the smoke-tubes thereof, to the burning of bituminous or partly-bituminous coal; but it may be proportioned for burning other coal or fuel. The grate E is set inclining downward in a backward direction; but it may be horizontal.

F is the ash-pit, the door G of which is fitted with a damper, *b*. There is also a door, H, above the grate for inserting kindling and for adjusting the fuel on the grate if necessary; but the supply of coal to the furnace after the fire has been fairly started it is preferred to make automatic by means of a series of front feed-tubes, I, surrounded by a water-box, J, connected with the body A of the boiler, said feed-tubes projecting downward in an inclined

direction backwardly, and opening at their upper ends into an extended hopper or bunker, K, arranged over the top of the fire-box.

The door H may be provided with apertures *c* for introducing air in front and over the grate, in close proximity to the fuel feed-tubes I for supplying oxygen for the combustion of the hydrocarbon gases as soon as developed, and to combine with the carbonic oxide that may be produced from the incandescent fuel on the grate.

Instead of these air-openings *c*, or in addition to them, the furnace may also be, and is here represented as, provided with a series of apertures, *d*, in its roof for admitting air for the same purpose. These openings *d*, which should be shaped to admit the air in sheets or jets over the fire, open into a box or bonnet, L, within the bunker K, and said bonnet is provided with a pipe or duct, M, arranged to pass through the coal in the bunker out to the front thereof, and fitted with a valve or damper, *e*, at its outer exposed end, whereby the admission of air may be established and shut off or regulated at pleasure by the engineer or his assistant from the front of the fire-box.

What is here claimed, and desired to be secured by Letters Patent, is—

1. The combination, with the cylindrical tubular body A of a locomotive-engine boiler, of a fire-box, B, constructed of a metallic shell lined with fire-brick, fire-clay, or other like refractory material, and arranged in relation with the body of the boiler, substantially as specified.

2. The fire-box B, constructed of a metallic shell arched on its roofs and sides, and with the latter arranged to approximate each other in a downward direction, in combination with the independent linings C C' of refractory material, as described, and angle-pieces or stays D, essentially as herein set forth.

3. The combination, with the fuel-hopper K and openings *d* through the roof of the fire-box, of the bonnet L and air-pipe or duct M provided with a valve for operation from the front of the fire-box, substantially as specified.

P. W. MACKENZIE.

Witnesses:

FRED HAYNES,
FERD TUSCH.

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