

W. J. F. LIDDELL.

FURNACES FOR PORTABLE-BOILERS.

No. 174,139.

Patented Feb. 29, 1876.

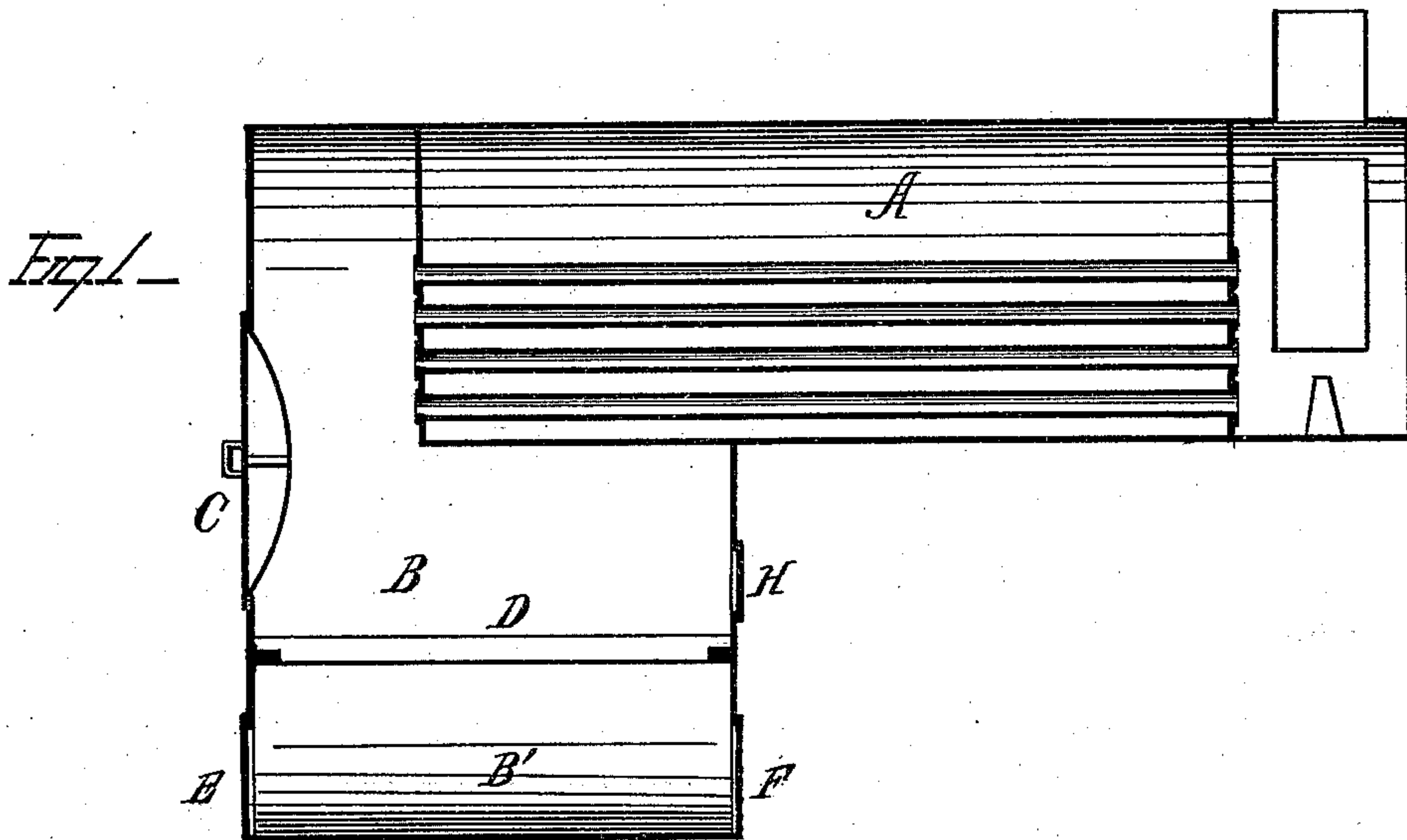


Fig 2—

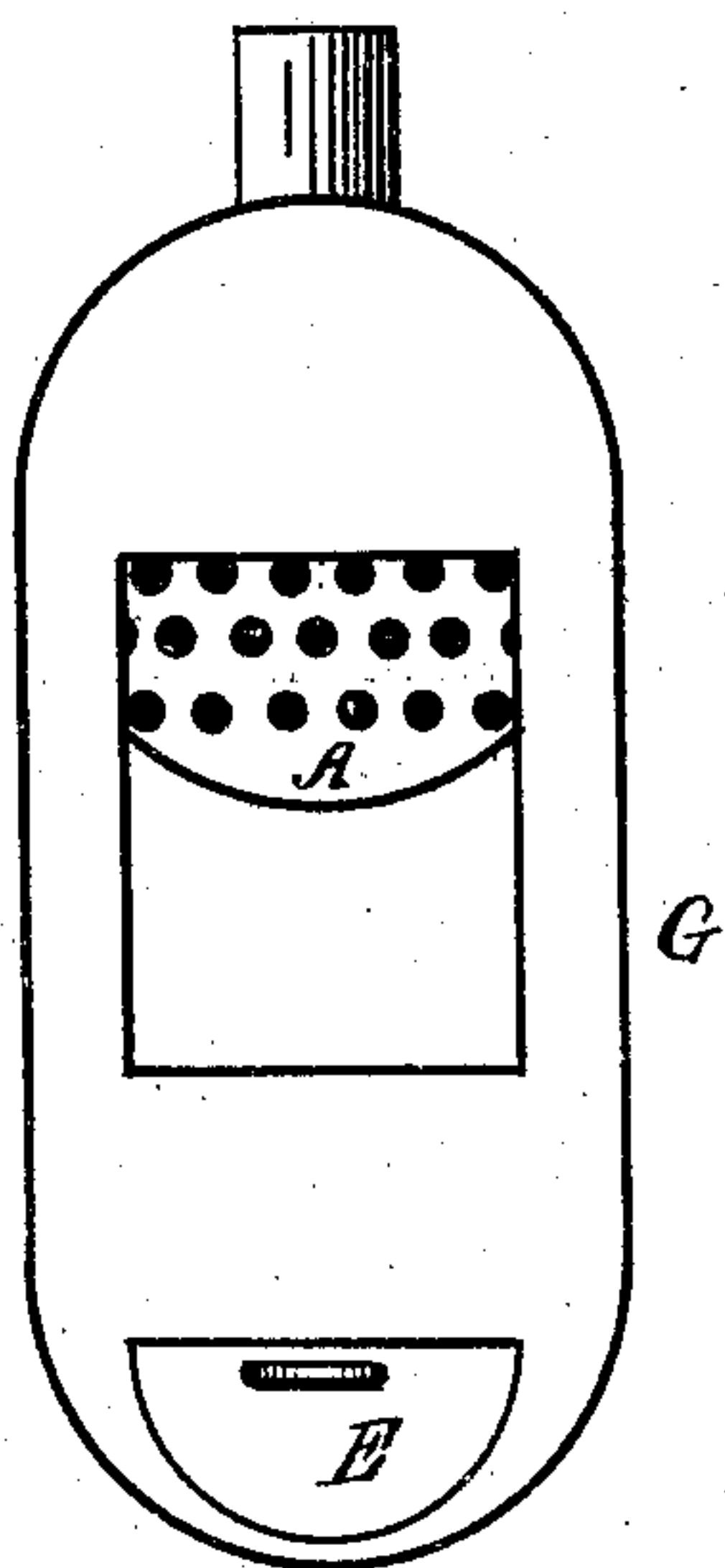
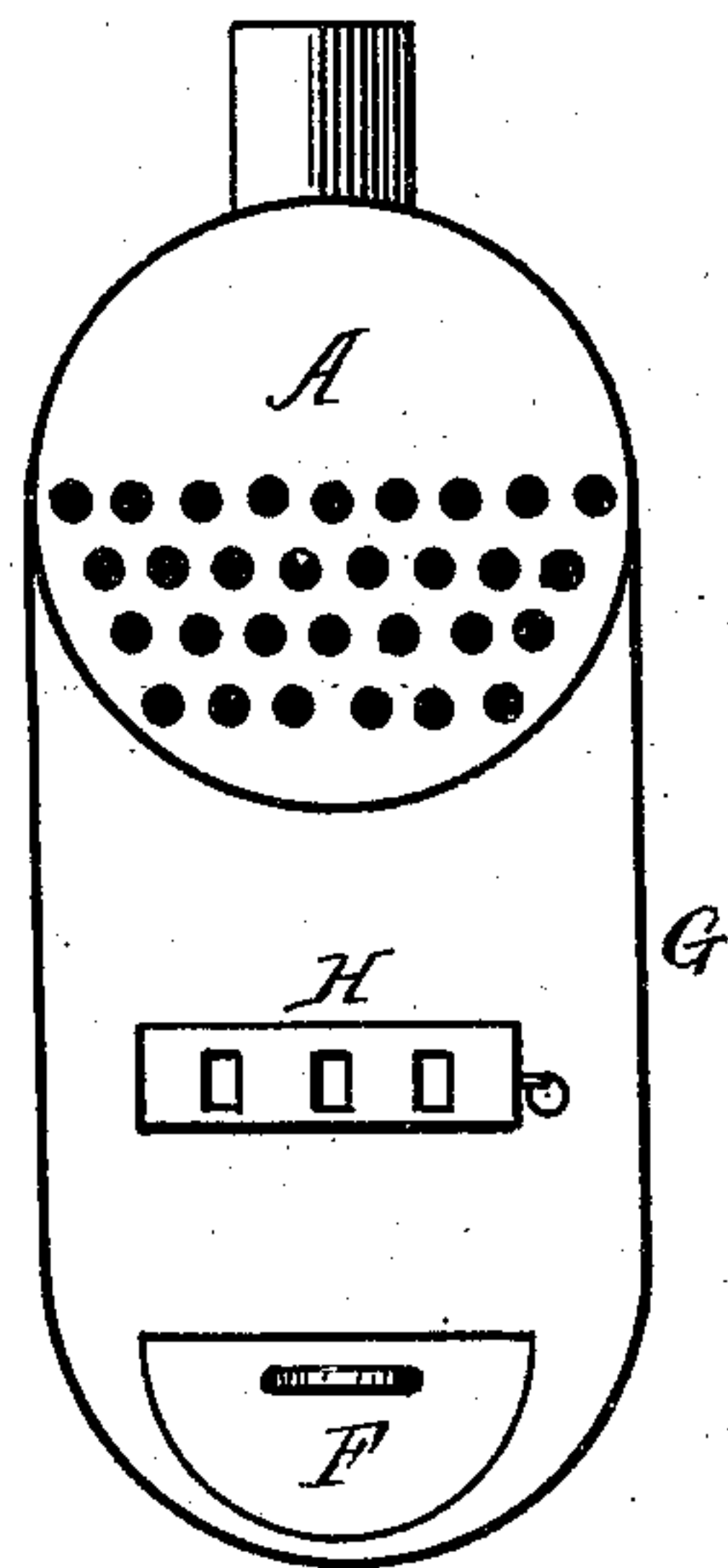


Fig 3—



WITNESSES

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By

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UNITED STATES PATENT OFFICE.

WALTER J. F. LIDDELL, OF MILWAUKEE, WISCONSIN.

IMPROVEMENT IN FURNACES FOR PORTABLE BOILERS.

Specification forming part of Letters Patent No. **174,139**, dated February 29, 1876; application filed January 3, 1876.

To all whom it may concern:

Be it known that I, W. J. F. LIDDELL, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Portable Boilers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to certain improvements in tubular steam-boilers and their fire-box attachments.

It has as its object, first, the doing away with of the crown-sheet, which is both expensive in its own construction and that of adjacent parts, and is liable to be the initiative cause of injury or damage; and, second, the economizing of the first cost of producing steam-power, by the employment of the several features herein described, which insures a better draft and a more thorough combustion along the entire length of the furnace.

My invention consists in combining a boiler, the shell of which extends well out into the fire-box, with the latter constructed without a crown-sheet, and provided with the several advantages of draft and equipment, all as at large hereinafter appears.

Heretofore, all boilers of the class in reference have necessitated the common crown-sheet, which is objectionable, both on account of its expense and other attendant disadvantages; also, accumulations of fuel at the back of the fire-box have been inaccessible to circulations of air, and have thus prevented an equal distribution of combustion throughout its length.

Referring to the drawings, Figure 1 is a vertical longitudinal section of my improvement, while Figs. 2 and 3 are front and rear end elevations, respectively, of same.

A is the ordinary tubular boiler-shell, with its tubes, water and steam spaces, &c., but prolonged or carried forward well out into the fire-box. This places an extensive horizontal body surface of the boiler directly in the heart of the furnace-fire, and causes the full effect of the latter to be spent at once upon it.

This extension of the boiler adds the im-

portant result of causing all such impurities of the flame, as sparks, &c., to be arrested in their course and prevented from making their usual exit. Also, it insures a more thorough combustion of the gaseous products, and thus combines many excellencies.

B is the fire-box, constructed without a crown-sheet, which is its distinguishing characteristic, and is, by its peculiar form, freed from need of same. The strong impact of the flame in its first heat is directed immediately against the lower horizontal casing of the shell, and the top casing of the fire-box is thus relieved from such direct influence of the flame, only the spent and cooler force of the fire reaching it. The furnace-door C is situated on a plane of level lower than that of the boiler, thus protecting the upright casing of the latter from any injury which might be occasioned by the haste or carelessness of the stoker in feeding the fire, and also shielding the said casing from drafts of air consequent upon swinging open the door when hung on a higher line of level.

This fire-box may be lined and protected from the heat, as is agreeable; either the well-known water-lining, fire-tile, or any suitable casing may be used. The grate D is supported sufficiently above the bottom of the fire-box, so that space may intervene for the ash-pan B', and also afford ventilation through one or both of the two door-openings E F, placed, respectively, at the front and rear end of the ash-pan, which doors also come into play in cleaning out the ash-pan, &c.

It is observed that the fire-box is constructed with its bottom serving the purpose of an ash-pan of itself, and that the said bottom and sides of the fire-box are of one single piece of metal, G.

A damper, H, is placed at the back of the fire-box, and just above the level of the grate-bars to admit air to the surface of the fuel, since accumulations of the latter at the rear of the fire-box not infrequently clog and choke the progress of combustion, and are unable to be thoroughly ignited, on account of their being inaccessible to currents of air. This latter feature of mine effects a perfect and equal distribution of combustion the entire length of the grate.

This damper H may be connected by suitable intervening mechanism with the cab of the engine, so that it shall be under the control of the fireman, and any desired air admitted to the fire-box while the locomotive is in motion.

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

1. The combination, with tubular boiler A, the same having its tube-sheet entirely covering its rear end, of the fire-box B, formed to present the full area of the rear tube-sheet to the action of the flames, substantially as and for the purpose set forth.

2. The fire-box B, having the ash-pan B' formed as a part of the same, in combination with the front and rear doors E F, substantially as and for the purposes described.

3. The combination, with the boiler A, of the single metal plate G which forms the sides of the fire-box B, and the bottom of the ash-pan B', substantially as and for the purpose specified.

In testimony that I claim the foregoing I have hereunto set my hand.

WALTER JAMES FORBES LIDDELL.

Witnesses:

W. W. BELL,

W. H. G. SCOTT.