

J. E. WOOTTEN
STEAM-BOILER FURNACE.

No. 173,432.

Patented Feb. 15, 1876.

Fig. 1

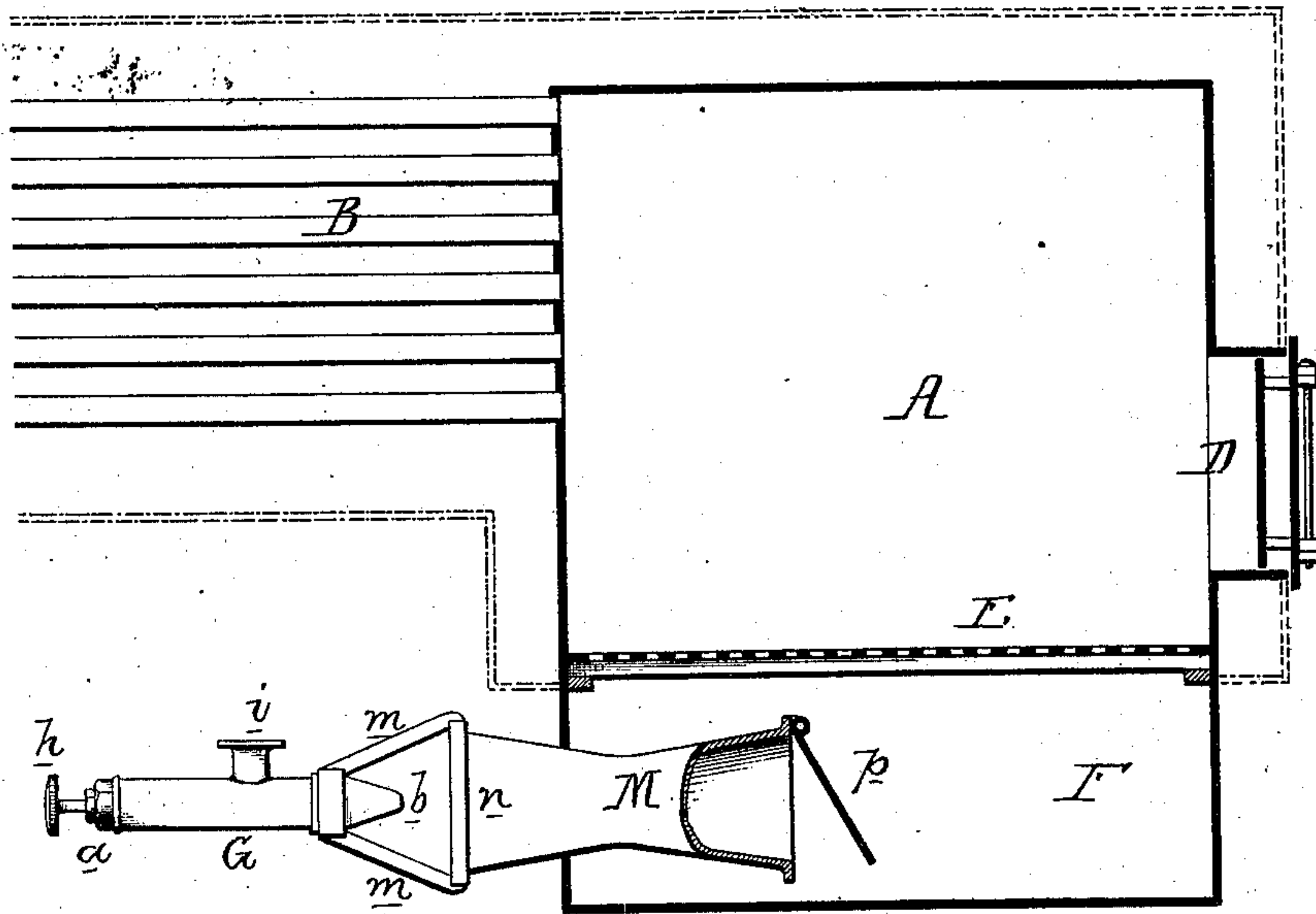


Fig. 3.

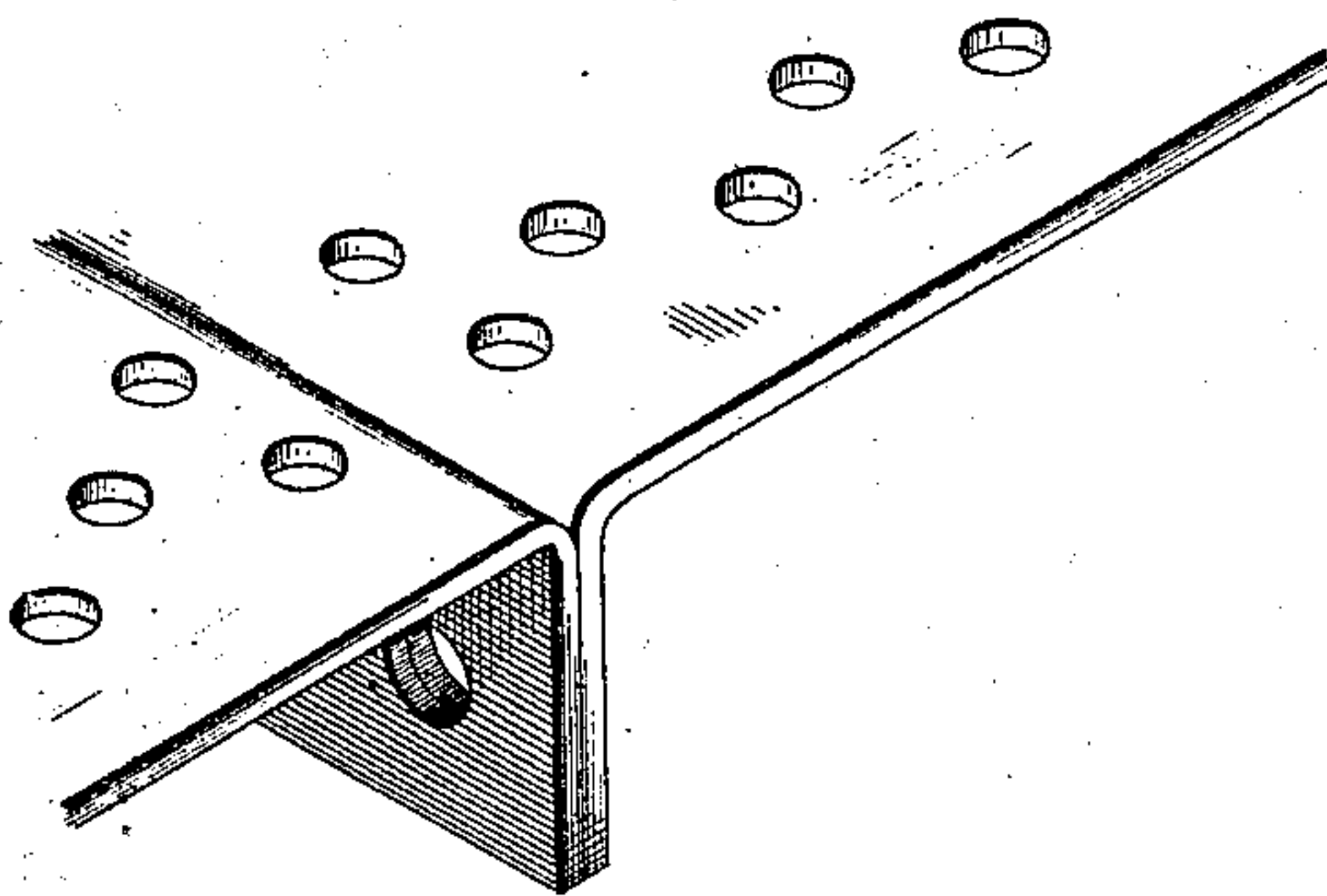
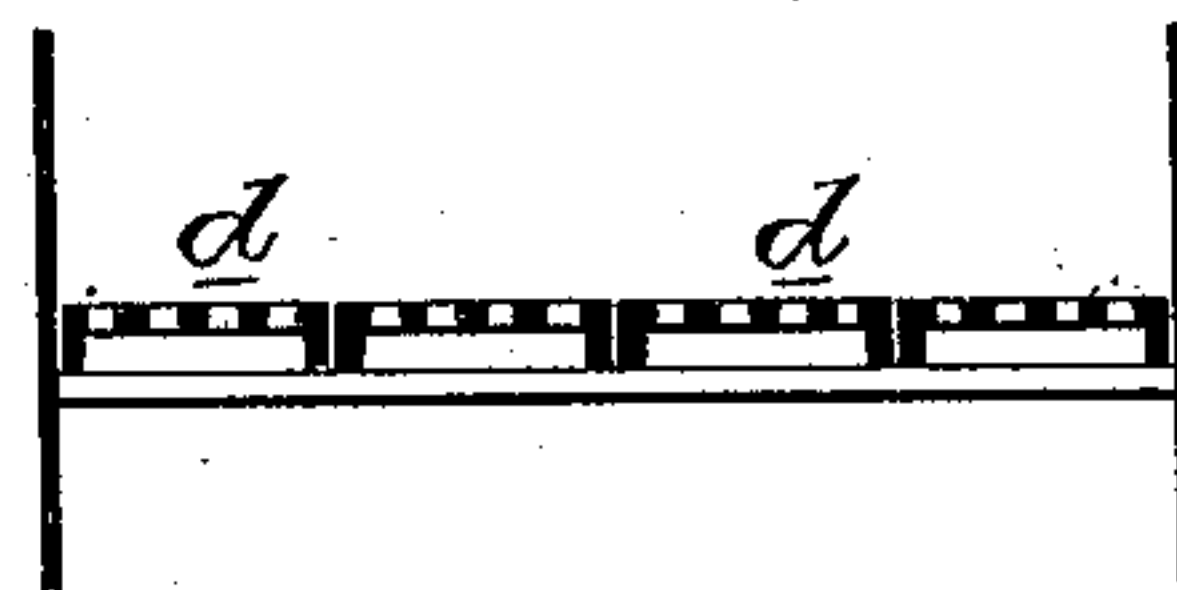


Fig. 2.



Witnesses
Harry Howson Jr
Harry Smith

John E. Wootten
by his Attorneys
Howson and Son

UNITED STATES PATENT OFFICE.

JOHN E. WOOTTEN, OF READING, PENNSYLVANIA.

IMPROVEMENT IN STEAM-BOILER FURNACES.

Specification forming part of Letters Patent No. **173,432**, dated February 15, 1876; application filed January 6, 1876.

To all whom it may concern:

Be it known that I, JOHN E. WOOTTEN, of Reading, Pennsylvania, have invented certain Improvements in Steam-Boiler Furnaces, of which the following is a specification:

The main object of my invention is to utilize as an available fuel for generating steam in steam-boilers the waste or refuse anthracite coal which remains after masses have been broken to the proper size for the market, and which has hitherto been discarded as useless. This object I attain in the manner which I will now proceed to describe, reference being had to the accompanying drawing, in which—

Figure 1 is a vertical section of the fire-box end of a boiler of a locomotive type, illustrating the mode of carrying my invention into effect; Fig. 2, a transverse section of part of the fire-box and perforated fuel-bed; Fig. 3, a perspective view of the fuel-bed drawn to an enlarged scale.

A is the fire-box of the boiler; B, the usual system of tubes; D, the fuel-door, and E the fuel-bed, which is, in the present instance, composed of perforated and flanged plates or channel bars *d* of wrought-iron, the flanges of one bar being secured to those of the adjoining bar, and the whole forming a continuous perforated bed strengthened by the flanges and resting on suitable ledges in the interior of the fire-box. Beneath the fuel-bed E, and to the lower edge of the fire-box, is secured an ash-pan, F, closed at the bottom and on all four sides, excepting where air is introduced under pressure, the doorway through which ashes are removed being closed while the furnace is in operation.

In burning anthracite coal composed of lumps of the usual sizes in the ordinary furnaces of steam-boilers, the practice is never to disturb the mass of fuel excepting by raking from below, in order to clear the grate; for if the mass of coal be stirred from above it will cease to burn freely.

In carrying out my invention, however, I have found that the contrary rule must be observed, for the finely-granulated refuse anthracite, placed in a comparatively thin layer on the perforated fuel-bed, and subjected to the action of numerous small jets of air

under pressure, becomes incrustated or coked; hence the fuel must be stirred or broken up from time to time, so that there may be free access to and through the fuel by the jets of air.

By this treatment the waste anthracite hitherto considered valueless will burn with an intense heat, and will be so thoroughly consumed that nothing remains but ashes so fine that in boilers of the locomotive type they will be carried through the tubes to the smoke-box.

I prefer the mode shown in the drawing of introducing air under pressure to the closed ash-pan, into the rear of which projects a pipe, M, the inner end of the latter being furnished with a valve, *p*, and a steam-nozzle, G, communicating with the steam-space of the boiler being presented to the outer open end of the said pipe. The jet of steam will not only induce the air to rush through the pipe M, but, by heating the air, will make it more available for performing the desired duty.

It should be understood that, although I have shown, in connection with the ash-pan, but one air-pipe, M, and one steam-nozzle, the number of pipes and nozzles may be increased in accordance with the dimensions of the fire-box. There should be, in connection with each nozzle or with the steam-pipe communicating therewith, a suitable cock, by manipulating which the engineer may cut off the steam, and the valve *p* of each air-pipe should be so hung or so weighted that it will be self-closing when the operation of the steam-jet ceases, thereby excluding the air from the ash-pan. The importance of this self-closing valve, however, becomes most prominent where several air-pipes and steam-nozzles are used; for should the access of steam to one or more of the nozzles be cut off, the valves of the air-pipes appertaining to these nozzles will be closed, thereby preventing the return of the air introduced through the medium of steam-jets by the other nozzles through their air-pipes into the ash-pan.

A fire-bed presenting a number of perforations may be constructed in different ways; but I prefer to make it of comparatively thin plate-iron in sections or bars flanged at the edges, these flanges being made either by

bending the edges of the plates or during the rolling of the same, and serving the twofold purpose of preventing the fuel-bed from warping, and of affording the means of securing the plates together.

In practice, I have used plate-iron of about a quarter of an inch thick, with perforations about three-eighths of an inch in diameter, arranged substantially as shown in Fig. 3; and I prefer this use of plate-iron, for it may be so thin that the perforations cannot be easily choked by the ashes.

I claim as my invention—

The combination, in a steam-boiler furnace, of a perforated fuel-bed, E, the ash-pan F, pipe or pipes M, each having a valve, *p*, and steam nozzle or nozzles G, all as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN E. WOOTTEN.

Witnesses:

HARRY HOWSON, Jr.,
HARRY SMITH.