

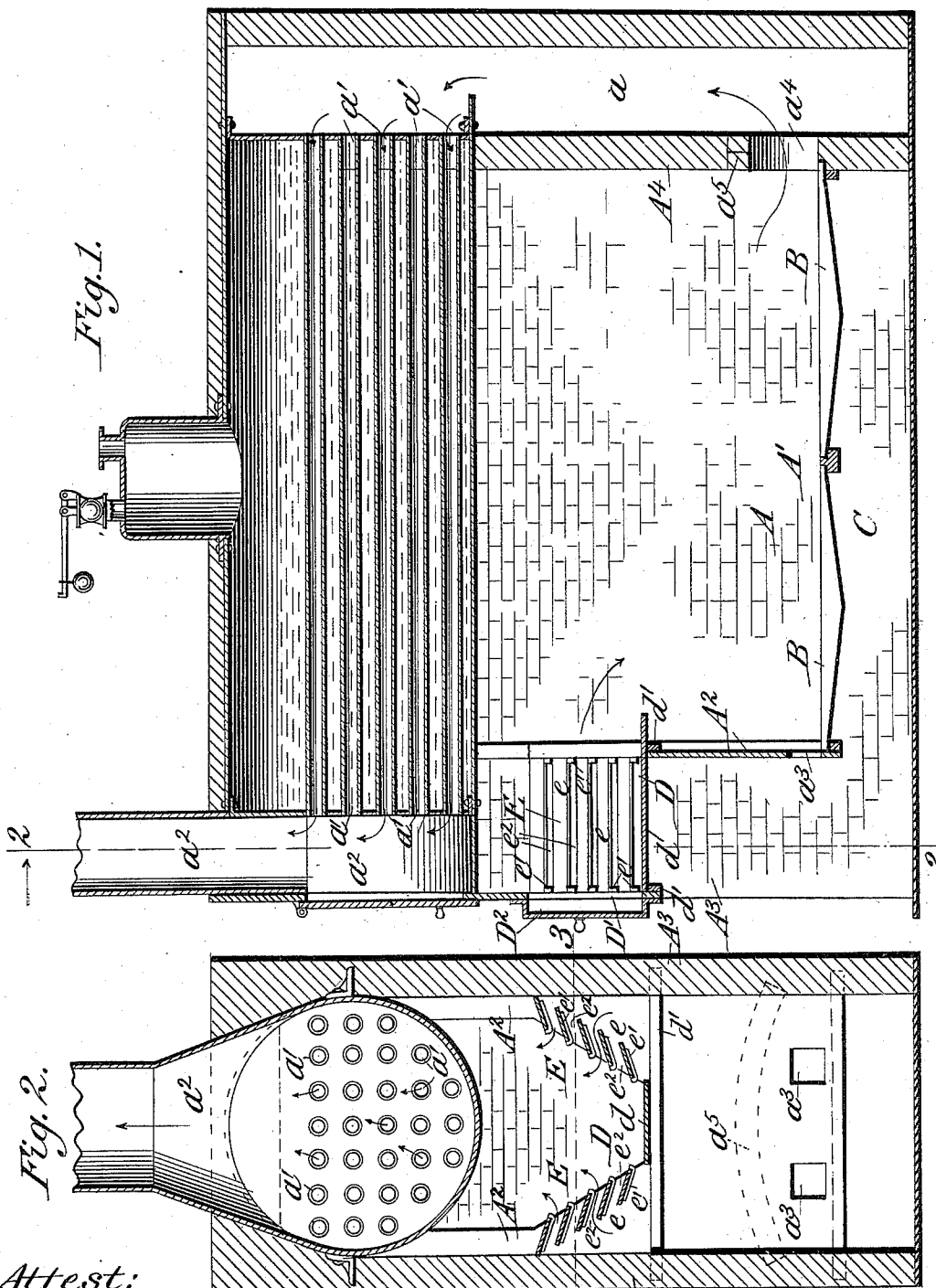
(No Model.)

2 Sheets—Sheet 1.

T. C. HARRIS.
BOILER FURNACE.

No. 579,233.

Patented Mar. 23, 1897.



Attest:

J. H. Schott
Notary Public

Inventor:

Thomas C. Harris
By White & Kleiner
his attorneys

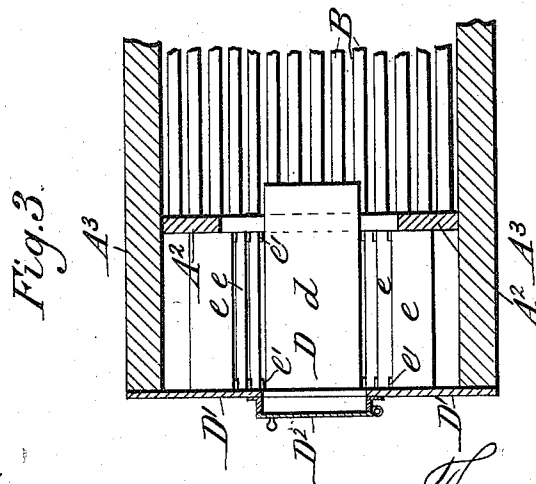
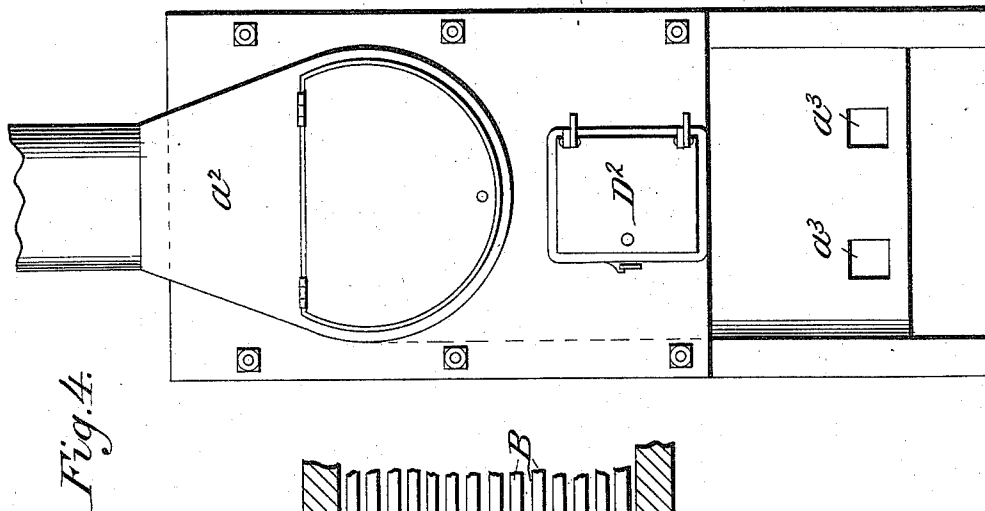
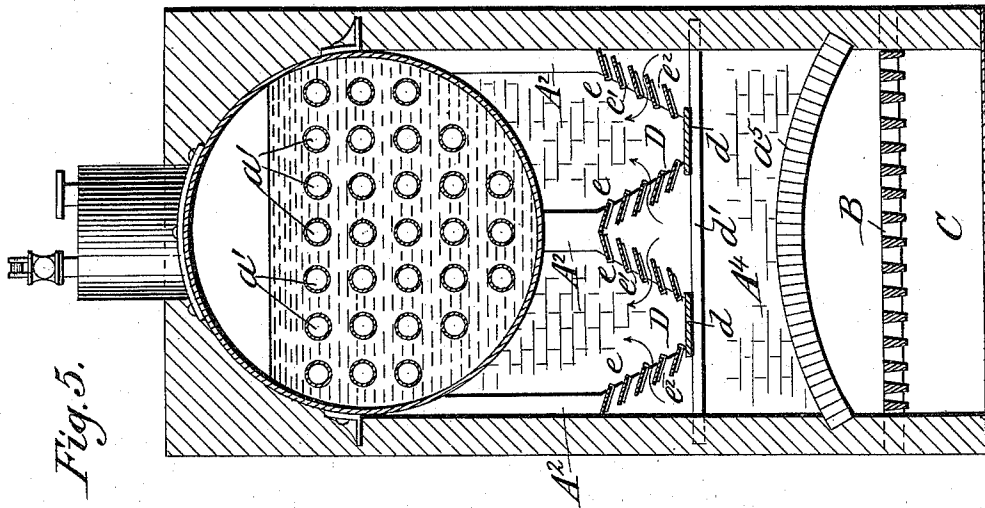
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UNITED STATES PATENT OFFICE.

THOMAS CORNFIELD HARRIS, OF PIERRE, SOUTH DAKOTA.

BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 579,233, dated March 23, 1897.

Application filed February 23, 1893. Serial No. 463,354. (No model.)

To all whom it may concern:

Be it known that I, THOMAS CORNFIELD HARRIS, a citizen of the United States, residing at Pierre, in the county of Hughes and State of South Dakota, have invented certain new and useful Improvements in Boiler-Furnaces, of which the following is a specification.

My invention, as its title indicates, relates to furnaces for heating steam-boilers, which may be of any form or description and applied to any of the purposes to which steam-boilers are applied, such as providing steam for stationary or locomotive or marine engines, or for steam-heating systems for domestic and industrial purposes.

The furnace involved in my invention may also be applied to other purposes besides heating steam-boilers, and may be used in connection with air-heating and metallurgical plants, &c.

The object of my invention is to provide means whereby the smoke or unconsumed carbon evolved from the fuel, such as bituminous coal, at the beginning of the combustion, when the furnace is freshly stoked, and which is due to imperfect combustion, will be completely consumed or converted into carbon dioxide before it leaves the furnace. For this purpose a furnace embodying my invention consists of a supplemental hearth or fireplace arranged in advance of the main grate of the furnace, preferably projecting from and overhanging the usual or single front wall of the furnace, in which supplemental hearth or fireplace the fuel undergoes a preliminary combustion until the same ceases to evolve free carbon or smoke, when the said fuel is pushed forward, so as to drop into the main grate.

A furnace embodying my invention also comprises, in connection with the above, a rear wall extending from the top of the furnace-chamber down to and within a short distance of the main grate, where a sufficient opening or outlet for the products of combustion into the smoke-flue or chimney is left. By this means the incompletely-consumed products of combustion and smoke from the supplemental hearth are compelled to pass into close proximity with the intense fire in

the main grate, where they are completely consumed.

My invention, moreover, consists of such features, details, and combinations of parts as will be described hereinafter and pointed out in the claims.

In the drawings annexed to this specification, Figure 1 represents a longitudinal vertical central section of a boiler-furnace embodying my invention in its preferred form. Fig. 2 is a vertical transverse section thereof on line 2 2, Fig. 1; Fig. 3, a sectional plan taken on line 3 3, Fig. 2; Fig. 4, a front elevation of the furnace, and Fig. 5 a vertical transverse section of a somewhat modified form of furnace.

The furnace illustrating my invention is shown in connection with what is known as a "horizontal-flue boiler," the products of combustion from the main hearth A of the furnace passing by way of a vertical flue *a* through the horizontal boiler-flues *a'* from rear to front of boiler to the chimney-flue *a''* in a well-known manner. As already stated, any other suitable or desired form of boiler and furnace may be employed instead. The furnace-chamber A' is provided at its bottom with a grate B of any suitable or desired form and construction and forming the main hearth of the furnace. Below the grate B is located the ordinary ash-pit C.

One feature of my invention consists in providing the furnace with a supplemental hearth D, preferably overhanging the front wall A² of the furnace, so as to be entirely outside of the furnace-chamber A'. This hearth may be of various constructions and arrangements, but is preferably located directly below the chimney-flue *a''*, so as to further heat the products of combustion as they enter said flue, and hence to accelerate the draft.

I preferably construct and arrange the supplemental hearths as follows: A bottom plate *d*, of iron or other suitable material, is supported by the front wall A² of the furnace-chamber and upon a supporting rail or beam *d'*, extending across the furnace in advance of the front wall A² and supported by the side walls A³ of the furnace, which for this purpose are continued beyond the front wall A², as shown best in Fig. 1. On both sides

of the bottom plate *d* I arrange an inclined grate E, which preferably consists of a terraced series of grate bars or gills *e*, each of which is inclined inwardly toward the center of the hearth, as shown in Fig. 2. These grate-bars forming the terraced grates are supported in any suitable way, preferably by lugs *e'*, arranged on the wings rising from the front wall A² and on the front wall D' of the supplemental hearth. It will be observed that this construction results in a recess or open chamber below the supplemental hearth, in front of the front wall A² and between the side walls A³ A³, from which chambers the air to support the combustion passes over the outer edges of and downwardly between the slotted openings *e*², between the grate-bars *e*, as indicated by the arrows in Fig. 2. The front wall A², above the base-plate *d*, is broken away, so as to carry the smoke and products of combustion into the furnace-chamber A'.

A door D² for firing is arranged, as usual, in the front wall of the supplemental hearth D', and stoke-holes *a*³ *a*³ are formed in the front wall A² substantially on a line with the grate-bars B.

The rear wall A⁴ of the furnace, which may be constructed of fire-brick or other refractory material, extends down to near the bottom of the furnace-chamber A', where it is formed with an opening *a*⁴ of sufficient size to permit the products of combustion to escape into the flue *a*. This opening is best constructed by forming an arch *a*⁵ at the bottom of the rear wall A⁴ close to the grate-bars B. (See Figs. 2 and 5.)

The object of making the rear wall extend down into proximity with the grate is to compel the smoke and free carbon evolved from the supplemental hearth D to descend and pass into close contact with the intense fire on the main hearth, where they are completely consumed.

In Fig. 5 I have represented a slightly-modified form of boiler-furnace which differs from that already described only in that two supplemental hearths D D are here employed. In all other respects the construction is precisely the same.

The operation of my furnace is as follows, it being assumed that the fire in the main hearth is in the proper condition and it is nec-

essary to add fuel: The supplemental hearth is charged with fuel, such as bituminous coal or the like. This fuel at first slowly evolves a considerable amount of free carbon and gas in consequence of incomplete combustion. This smoke or free carbon in its passage to flue *a* is supplied or mixed with a sufficient quantity of oxygen through the supplemental grate to render it highly inflammable, and in this condition is deflected downwardly by rear wall A⁴ and so brought into contact with the intense fire on the main hearth B, where it is completely consumed. When the fuel on the supplemental hearth ceases to evolve free carbon, the stoker pushes it off from the bottom plate *d*, causing it to fall upon the main grate B', where it is arranged and spread in the proper manner, the stoke-holes *a*³ *a*³ permitting ready access to the stoking implements employed for this purpose.

From the foregoing it is shown that a furnace embodying my invention may be greatly and variously modified without departing from my invention and that the same is not confined to any particular form of furnace.

I do not, therefore, desire to be confined to the details of construction and arrangement set forth; but

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a furnace, a main grate in combination with a supplemental hearth consisting of a base-plate and an inclined grate arranged on each side of the base-plate, substantially as set forth.

2. In a supplemental hearth for furnaces, the combination, with a base-plate, of a terraced series of grate-bars, each of which is inclined toward the center of the hearth, substantially as set forth.

3. In a furnace, the combination with a main hearth of a supplemental hearth, overhanging the front wall of the furnace and consisting of a base-plate and a terraced series of grate-bars, arranged on each side of the base-plate, substantially as set forth.

In testimony whereof I affix my signature in the presence of two witnesses.

THOMAS CORNFIELD HARRIS.

Witnesses:

FRANK A. KEYS,

C. N. LUKES.