

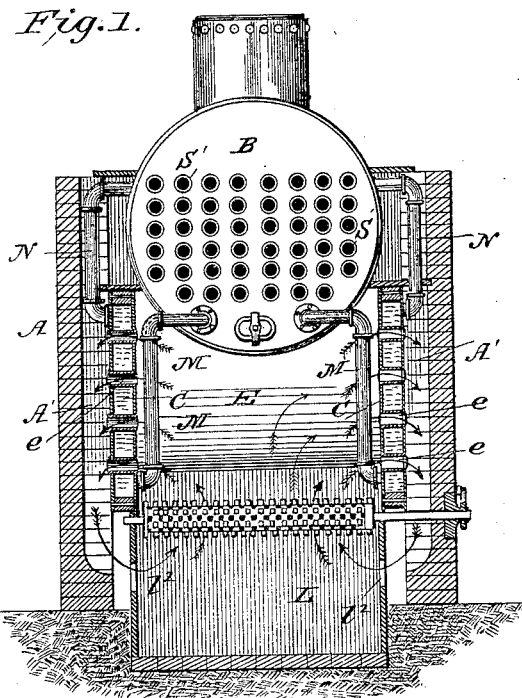
(No Model.)

2 Sheets—Sheet 1.

M. E. HERBERT.
STEAM BOILER FURNACE.

No. 454,350.

Patented June 16, 1891.



WITNESSES:
Fred G. Dieterich
H. J. Robinson

INVENTOR:
Michael E. Herbert
BY *Wm. L. C.*
ATTORNEYS

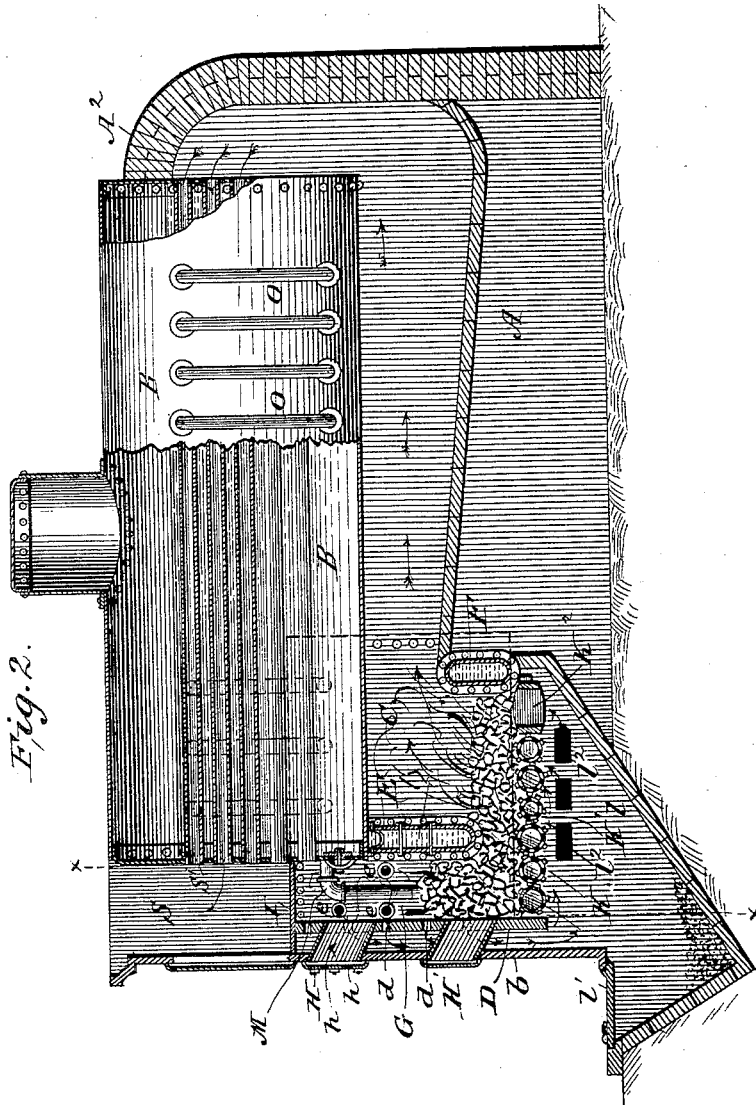
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UNITED STATES PATENT OFFICE.

MICHAEL E. HERBERT, OF ST. JOSEPH, MISSOURI.

STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 454,350, dated June 16, 1891.

Application filed September 11, 1890. Serial No. 364,697. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL E. HERBERT, of St. Joseph, in the county of Buchanan and State of Missouri, have invented a new and useful Improvement in Steam-Boiler Furnaces, of which the following is a specification.

My invention relates, generally, to steam-boiler furnaces, and more particularly to certain improvements upon Patent No. 421,863, granted me February 18, 1890.

The objects of my invention are, first, to provide a steam-boiler furnace that shall give great heat capacity and shall insure an economy in the consumption of fuel by burning the smoke and gases arising from the fuel; second, to provide an improved boiler-furnace which may be used in connection with an ordinary tubular boiler or any other type of boiler, and, third, to provide a furnace that shall be easy of operation and substantial in construction.

With these objects in view my invention consists of a fire-box divided into two compartments by a water-leg, water-legs forming the sides of said fire-box, a feeding-grate adapted to carry the fuel from one compartment to the other, and passages surrounding the fire-box for conducting the smoke and gases to be consumed.

My invention consists, further, in the peculiar constructions of various parts and their novel combination or arrangement, whereby the various objects are accomplished, all of which will be more fully hereinafter described, and designated in the claims.

In the drawings forming a part of this specification, and in which the same letters of reference indicate the same parts, Figure 1 is a transverse vertical section of my improved boiler-furnace on the line *xx*, Fig. 2. Fig. 2 is a longitudinal vertical section.

In the practical application of my invention I employ a flue-boiler B of any preferred pattern, which is set in the casing or brick-work A and provided with a front *b*. The forward end of the boiler does not extend to the furnace front. Water legs or chambers C are arranged on each side of the boiler at the forward end of the same, said water-legs being independent of and extending some

distance below the boiler and forming the sides of the fire-box of the furnace.

A wall D, of fire-brick or other suitable material, is arranged between the boiler-head and furnace front adjacent to the front, or, if desired, a water leg or chamber may be employed instead of a solid refractory wall. A water-leg E depends from the forward end of the boiler, extending into the fire-box a considerable distance, said water-leg being connected with the side legs C intermediate their ends, thus dividing the fire-box transversely into two compartments—a forward and rear one. The side legs extend only as far forward as the wall D, but extend rearward beyond the combined water-drum and bridgewall F, which is also connected with said side legs or chambers. The depending leg E is connected with the legs C forward of their vertical centers, thus forming a narrow magazine and feed-chute G between the front wall and said leg.

The furnace front is provided with the upper and lower doors H and H', respectively, said doors communicating with the fire-box, the purposes of which will appear farther on. The upper door is also provided with perforations *h*. A plate I is arranged over the forward compartment of the fire-box, said plate forming the base of the smoke stack or flue S.

A compound grate K is arranged in the bottom of the fire-box, said grate comprising a feeding portion K' and a dumping portion K². The boiler B and side legs or chambers C are connected with each other by the tubes M, which pass through the forward compartment of the fire-box. The side legs or chambers rest upon the upper edges of the ash-receptacle, said receptacle having a downwardly and forwardly inclined bottom *l*, and is provided with a door *l'* forward of the furnace front, whereby the ashes may be removed. The casing or brick-work is of course closed at the top either by plates or other means, and at the rear is provided with an arch A². Flues or passages A' are formed between the side legs and casing and the front wall D and furnace front. The wall D is provided with a series of perforations *d*, and the portions of the side legs C forward of the leg E are provided with a series of tu-

bular stay-bolts *e*, thus forming a communication between the chute and passages *A'*. The flues or chambers *A'* extend down below the grate, and the sides of the ash-receptacle
5 are also perforated, as shown at *B*. The boiler and side legs are also connected by means of the tubes *N*, and a series of circulation-tubes *O* are connected with the rear end of the boiler, whereby a thorough circulation of water is maintained.

The method of operating my improved furnace is as follows: Fuel is introduced through the upper door *H* and passes into the chute *G* and forward compartment. Any desired
15 quantity of fuel can be fed into the rear compartment. Air is admitted through the perforations *h* in the door *H*, and, mingling with the fresh fuel, produces gases and smoke, which pass through the perforations *d* and *e*,
20 down the flues *A'*, through the perforations *B* beneath the grate, thence up through the grate-bars covered with live coals, when the gases and smoke are consumed, the products of combustion passing over the bridge-wall
25 and water-drum, under the arch *A*, through the flue or tubes *S'*, and out through the stack *S*. When it is desired to remove ashes, clinkers, &c., the dumping-grate is rotated, discharging the ashes into the receptacle *L*,
30 and live coals are fed to the rear compartment to take the place of those discharged, and when it is necessary to use a poker the lower door *H'* is thrown open and the poker inserted and raked backward and forward.

35 By means of the feeding-grate the fire-box is uniformly supplied with live coals, and by perforating the forward wall, side legs, and ash-receptacle and arranging the passages as described the gases and smoke of the magazine are returned and consumed. The water-
40 leg *E* exposes a great deal of surface to the heat and also divides the fire-box.

Having thus described my invention, what I claim as new is—

45 1. In a steam-boiler furnace, the combination, with the perforated side water-legs of the fire-box connected with the boiler, of the depending water-leg communicating with the side water-legs intermediate their ends and
50 the forward fire-box wall independent of the furnace front, substantially as shown and described.

2. In a steam-boiler furnace, the combination, with the side water-legs of the fire-box,
55 of a refractile forward fire-box wall, and the depending leg portion communicating with

the side legs intermediate their ends and dividing the fire-box transversely into two compartments, substantially as shown and described.

3. In a steam-boiler furnace, the combination, with the perforated side water-legs, the perforated forward fire-box wall, and the imperforate depending water-leg communicating with the side water-legs intermediate their
60 ends and dividing the fire-box into two compartments, substantially as shown and described.

4. In a steam-boiler furnace, the combination, with the side legs, of the depending legs
70 connecting the same, the feeding-grate, the perforated forward wall, flues or passages between the casing and forward wall, and the ash-receptacles having perforated sides, substantially as shown and described.

5. In a steam-boiler furnace, the combination, with the side water-legs, the depending water-leg connecting said side legs with the
75 forward wall of the fire-box, the feeding-grate, the door leading into the fire-box, the portions of the side legs between the forward wall and depending leg being perforated, the flues arranged adjacent to said portions, and the ash-receptacle having perforations in its sides beneath the grate, substantially as shown and
85 described.

6. In a steam-boiler furnace, the combination, with the side water legs or chambers, the depending water-leg connecting said side legs, the perforated forward fire-box wall, the side
90 legs having perforations between the forward wall and depending leg, the feed-door communicating with the fire-box and having perforations for the admission of air, the combined feeding and dumping grate, the flues
95 between the side legs and front wall and casing, and the ash-receptacle having perforations below the grate, substantially as and for the purpose described.

7. In a steam-boiler furnace, the combination, with a fire-box, of a depending water-
100 leg dividing said box into two compartments, one of which is a perforated magazine-chute, compartment, flues, or chambers surrounding the fire-box, and communication with the
105 perforated magazine-chute, substantially as shown and described.

MICHAEL E. HERBERT.

Witnesses:

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E. L. WARREN.