No. 667,750. Patented Feb. 12, 1901.

H. UNTIEDT.

APPARATUS FOR CONSUMING SMOKE IN FURNACES.

(Application filed Sept. 8, 1900.)

(No Model.)

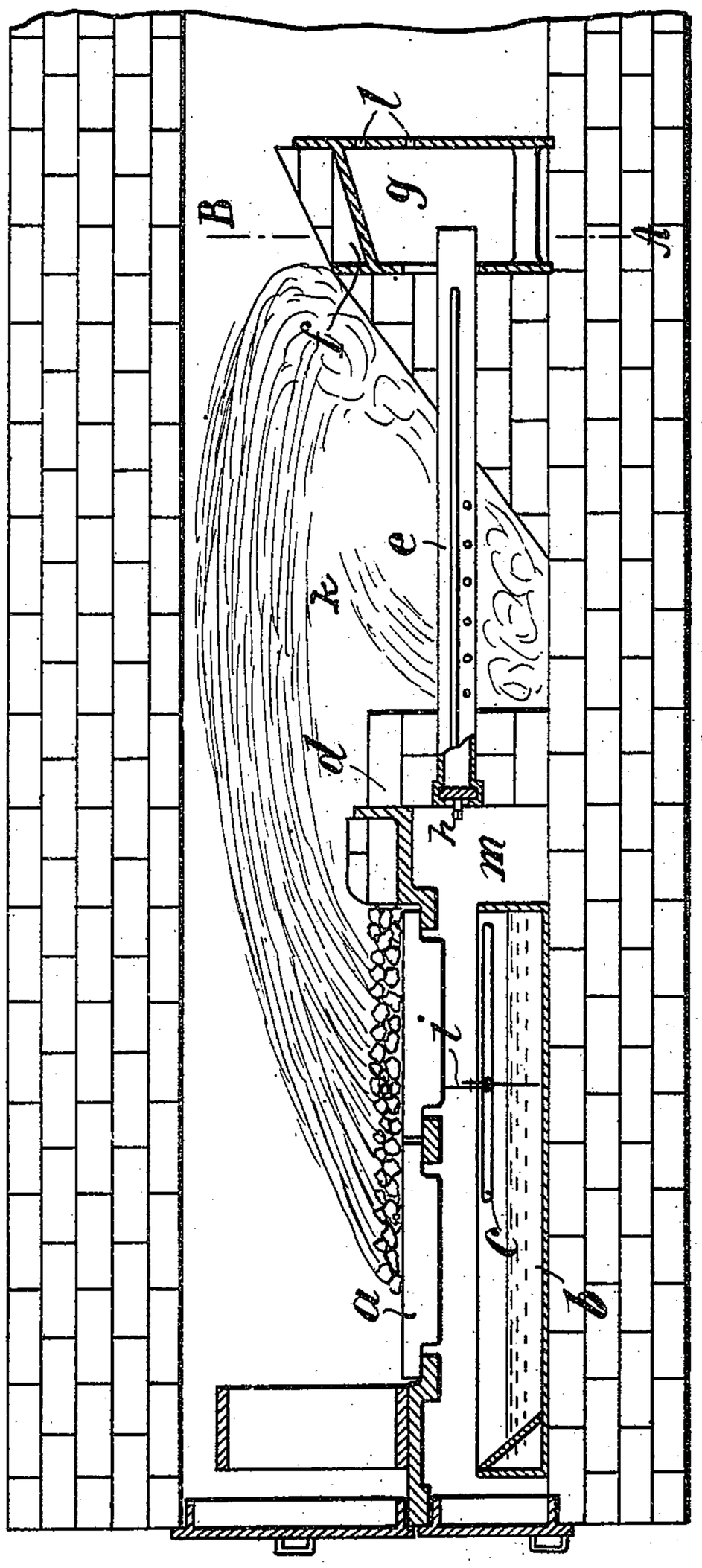

Fig. 1.

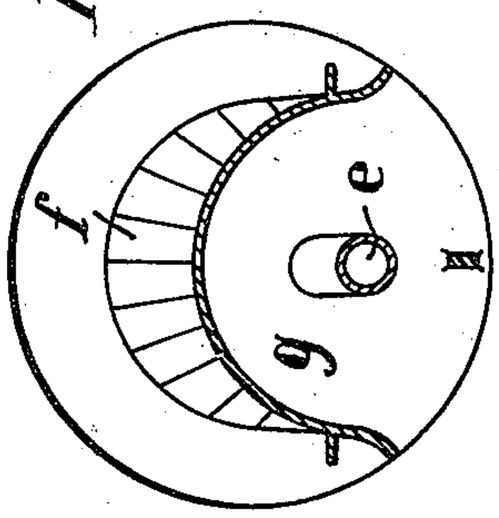

Fig. 3.

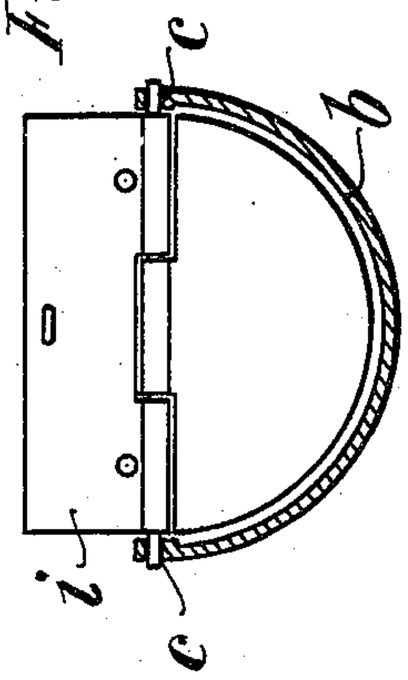

Fig. 2.

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APPARATUS FOR CONSUMING SMOKE IN FURNACES.

SPECIFICATION forming part of Letters Patent No. 667,750, dated February 12, 1901.

Application filed September 8, 1900. Serial No. 29,427. (No model.)

To all whom it may concern:

Be it known that I, HEINRICH UNTIEDT, civil engineer, a subject of the Emperor of Germany, residing at Schweinfurt-on-the-Main, Bavaria, in the Empire of Germany, have invented certain new and useful Improvements in and Relating to Apparatus for Consuming Smoke in Furnaces, of which the following is a specification.

My invention relates to apparatus for consuming smoke in flue-boiler furnaces having plane or saddle grates and in underneath furnaces of cylindrical and tubular boilers, boiling-pans, kilns, and the like in which an accurately-regulated quantity of air mingled with water-vapor or with hydrogen gas is admitted to the products of combustion behind the fire-bridge.

In the accompanying drawings, hereinafter referred to, Figure 1 represents a longitudinal section of a steam-boiler furnace provided with my improved apparatus. Fig. 2 is a transverse section of the water-basin, showing a front view of the regulating-flap. Fig. 3 is a transverse section of the apparatus on the line A B of Fig. 1.

In carrying my invention into practice I arrange below the grate *a* a water-receptacle *b* in the well-known manner. Through the fire-bridge *d* passes a tube *e*, which terminates in front in the ash-pit either directly or through a chamber *m* and at the rear in a second wall or fire-bridge *f*. In the rear fire-bridge I form the air-chamber *g*, wherein the mixture of air and steam admitted through the pipe *e* is further heated. The chamber *g* has, preferably, in its rear wall one or more openings *l*, according to the diameter of the furnace, for the purpose of conducting to the escaping products of combustion again a mixture of highly-heated air and hydrogen for completely consuming the same.

The tube *e*, which is preferably made of cast-iron and furnished with ribs and which, if desired, is rendered adjustable in height, is perforated in that portion which occupies the interior of the smoke-consuming chamber *k*, formed by the fire-bridge *d* and the wall or fire-bridge *f*, and in the front part of the tube is arranged a device for regulating its sectional area—for instance, a damper or throttle-valve *h*.

At the upper edge of the water-basin *b* I provide a regulating-flap *i*, preferably made in two parts and adapted to be turned and displaced. For facilitating the displacement in the longitudinal direction of the furnace the axis of the flap *i* may be held in a slot *c* in the wall of the basin *b*, Fig. 2.

By the heat radiating from the grate and by the falling particles of ashes and cinders a very active evaporation of the water in the basin *b* takes place. Part of the water-vapor passes directly through the grate into the fire. Another part, the amount of which may be varied by adjustment of the flap *i*, passes to the tube *e*, mixed with air heated by the grate and with hydrogen gas generated by decomposition of the water-vapor, and thence partly into the chamber *k*, serving as a mixing and smoke-consuming chamber, and partly into the chamber *g*. The velocity of the draft in the tube *e* can be regulated by the damper *h*. In the mixing or smoke-consuming chamber *k*, between the two fire-bridges, the gases—that is to say, air, water-vapor, and in some cases hydrogen gas—become intimately mingled with each other and with the products of combustion. This mixture becomes ignited and, owing to the high temperature of the hydrogen gas, all the particles of smoke carried away by the principal flame are burned. Any imperfectly-burned products which may still exist are completely consumed in consequence of the second introduction of a mixture of highly-heated air, water-vapor, and hydrogen from the chamber *g* on their passage over the wall or bridge *f*.

By means of its upper part the regulating-flap *i* enables the access of air to the parts situated in front of the fire-bridge *d* to be diminished or to be increased, so that the development of heat in the longitudinal direction of the grate may be regulated and that, according to requirements, a more or less intense heat may be produced in front of the fire-bridge and at certain points of the grate. The lower part of the flap serves for preventing the direct passage of air from the front to the tube *e* when the water in the basin is at a low level, and for this purpose its dimensions correspond almost exactly to the interior area of the basin.

The arrangement hereinbefore set forth

may be employed for flue-boiler furnaces having plane or saddle-grates and also for underneath furnaces in cylindrical and tubular boilers, boiling-pans, kilns, and the like.

In the case of boilers whose furnaces are made of brick walls it is expedient to give the water-basin a quadrangular cross-section.

The rear wall or bridge *f* may present any desired form, according to the construction of the boiler.

What I claim is—

1. In an apparatus for consuming smoke in furnaces, the combination with a fire-box, a grate, an ash-box, a smoke-consuming chamber in the rear of the fire-box and ash-pit, and a fire-bridge separating the fire-box and ash-pit from said chamber, of a water-basin in the ash-pit below the grate and a tube leading from the ash-pit through the fire-bridge into the smoke-consuming chamber, that part of the tube in said chamber being perforated, substantially as and for the purposes set forth.

2. In an apparatus for consuming smoke in furnaces, the combination with a fire-box, a grate, an ash-pit, a fire-bridge in the rear of these parts, and a smoke-consuming chamber in the rear of the fire-bridge, of a water-basin in the ash-pit below the grate, a tube extending through the fire-bridge into the smoke-consuming chamber, and a movable flap in the water-basin adjustable therein to regulate the passage of air and gases to said tube, substantially as described.

3. In an apparatus for consuming smoke in furnaces, the combination with the fire-box, the grate, the ash-pit, the fire-bridge in the rear of these parts, and a smoke-consuming chamber in the rear of the fire-bridge, of a second chamber in the rear of the smoke-consuming chamber communicating with the smoke-consuming chamber and with the flue, and a tube leading from the ash-pit through the smoke-consuming chamber into said second chamber, substantially as described.

In testimony whereof I have hereunto set my hand, in presence of two subscribing witnesses, this 22d day of August, 1900.

HEINRICH UNTIEDT.

Witnesses:
B. STÄTTERMANN,
JOHANN SIMON.