

(No Model.)

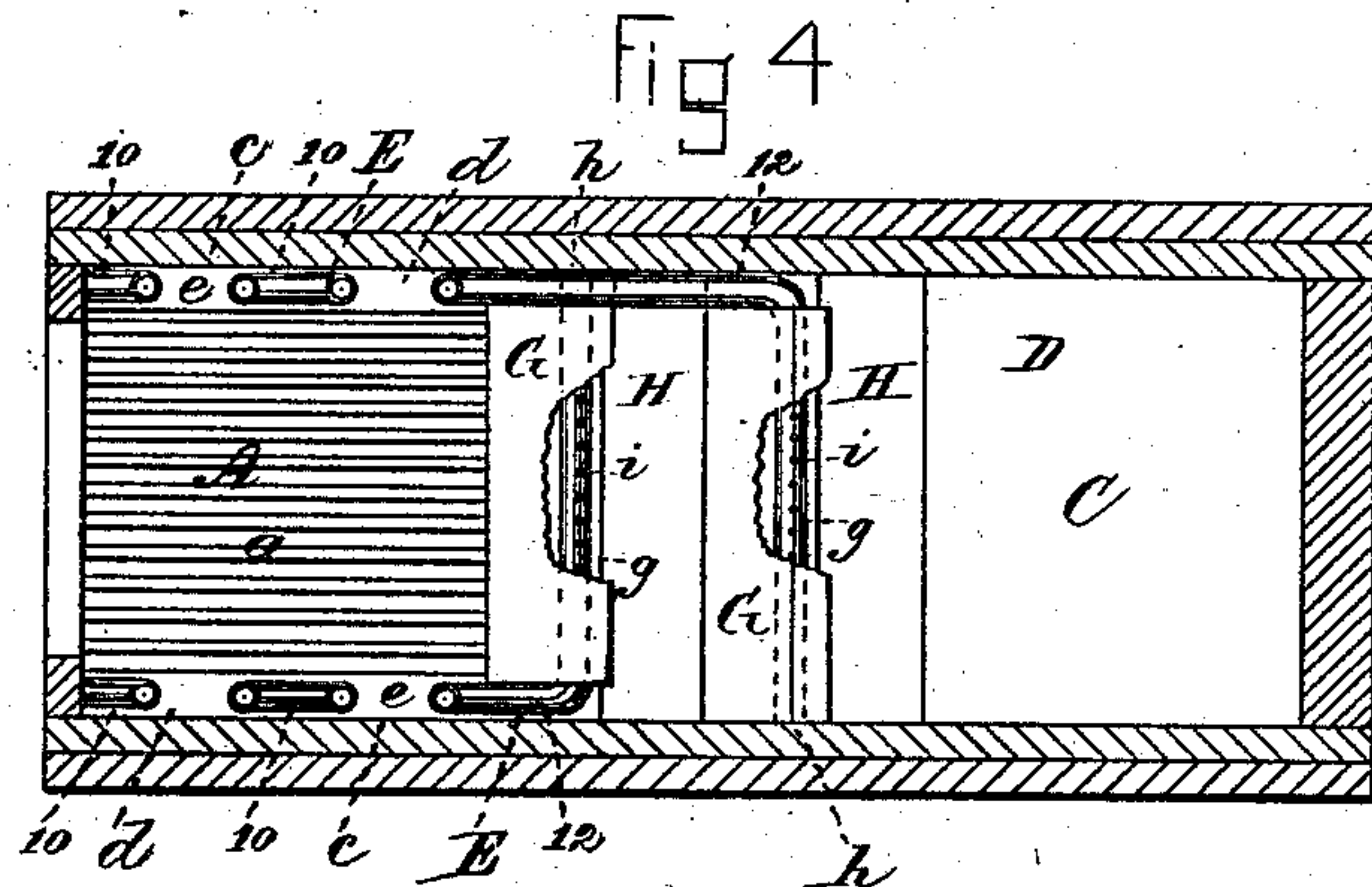
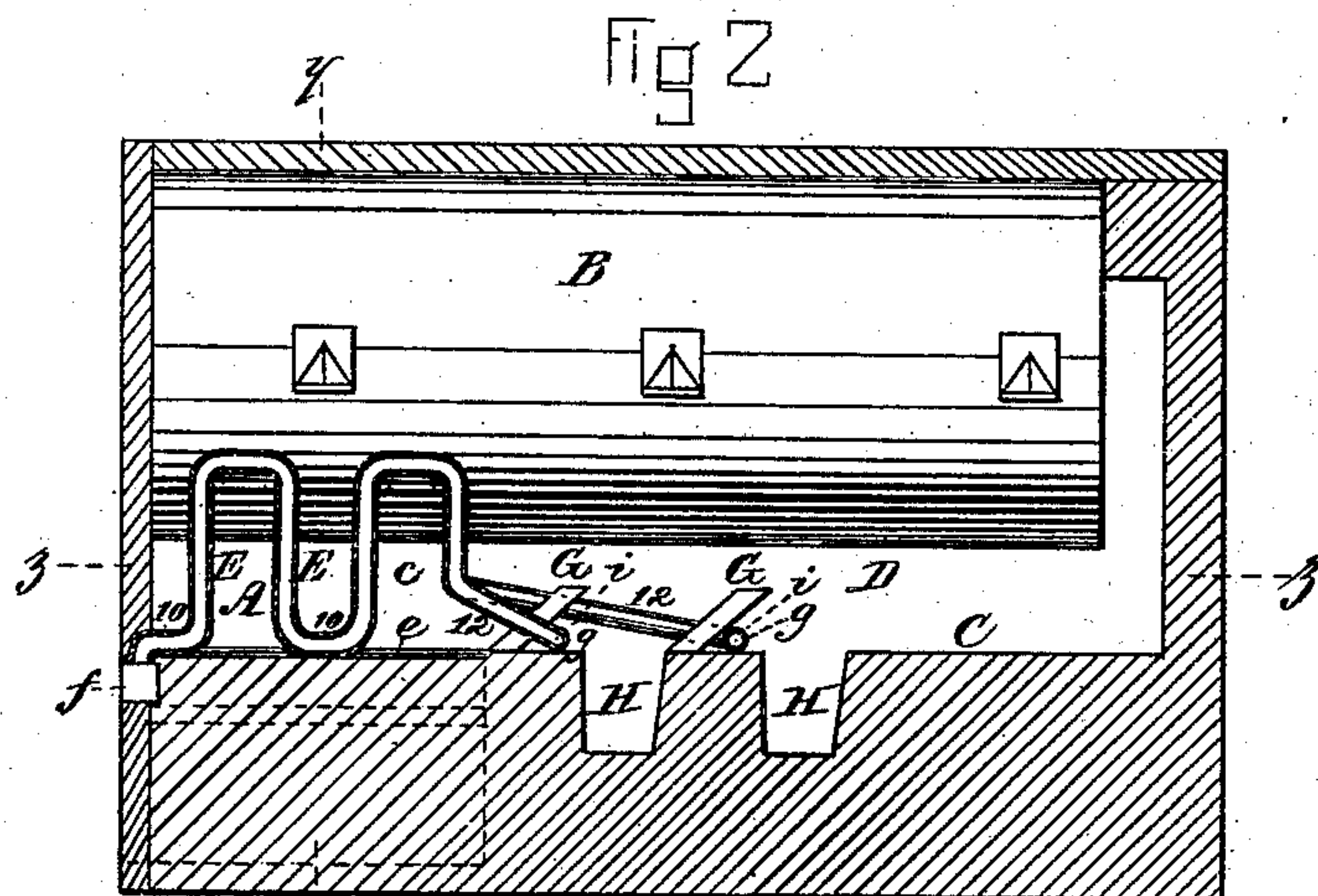
2 Sheets—Sheet 2.

P. KILROY & J. A. FLICK.

SMOKE AND GAS CONSUMING FURNACE.

No. 259,169.

Patented June 6, 1882.



WITNESSES

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PETER KILROY AND JULIUS A. FLICK, OF BOSTON, MASSACHUSETTS.

SMOKE AND GAS CONSUMING FURNACE.

SPECIFICATION forming part of Letters Patent No. 259,169, dated June 6, 1882.

Application filed December 23, 1881. (No model.)

To all whom it may concern:

Be it known that we, PETER KILROY and JULIUS A. FLICK, citizens of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Smoke and Gas Consuming Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a perspective view of a steam-boiler and its furnace having our improvements applied thereto, a portion of one of the side walls of the furnace being broken away to show the interior thereof. Fig. 2 is a longitudinal vertical section through the same on the line *x x* of Fig. 3. Fig. 3 is a transverse section on the line *y y* of Fig. 2. Fig. 4 is a horizontal section on the line *z z* of Fig. 2.

Our invention relates to certain improvements on the smoke and gas consuming furnace for which Letters Patent of the United States were granted to us on the 21st December, 1880. In the furnace described in the said patent a series of air-superheating pipes were employed, communicating with the atmospheric air and extending crosswise within the furnace directly over the fire, and then backward in the rear thereof, and provided with transverse portions extending across the flame-bed, and having outlets or discharge-orifices through which the superheated air in fine streams escaped and commingled with the smoke and gaseous products of combustion. This construction, while it causes the smoke and gases to be almost entirely consumed, thus accomplishing the purpose for which it was intended, is nevertheless open to the objection that those portions of the pipes in which the air is superheated, being located directly over the fire, are liable to be soon destroyed by the intense heat to which they are subjected; and our present invention has for its object to overcome this difficulty and at the same time retain all the advantages due to locating the air-pipes within the furnace in a convenient and accessible position for repairs, instead of embedding them in the brick-work or setting of the furnace, as heretofore, thus enabling us to apply our improvements to a furnace without any altera-

tion of or tearing down of the brick-work, which was one of the great advantages of the construction described in our aforesaid patent of 1880.

To this end our present invention consists in the combination, with the furnace, of air-superheating pipes communicating with the atmospheric air, and arranged in a serpentine form on each side of the furnace in close proximity with the walls thereof, the air-pipes also extending backward in the rear of the fire, and being provided with transverse portions having perforations, through which the air, after being superheated in those portions of the pipes located on each side of the fire, is emitted in fine jets or streams, which impinge upon and become thoroughly commingled with the smoke and gaseous products of combustion as they pass over the flame-bed, whereby their perfect ignition and consumption are insured.

Our invention also consists in the combination, with the transverse perforated pipe through which the superheated air is discharged, of a guard which projects rearwardly thereover in such a manner as to protect it in a great measure from the dust and cinders and prevent its apertures from becoming clogged thereby; and, also, in the combination, with the said perforated pipe, of a pit or chamber located immediately in the rear thereof for the reception of the dust and cinders, which are thereby effectually prevented from being deposited against the pipe and covering up or obstructing its apertures, as might otherwise occur.

In the said drawings, A represents the furnace; B, the boiler; *a*, the grate-bars; *b*, the ash-pit; C, the flame-bed, and D the combustion-chamber.

Within the furnace A, on each side thereof, and in close proximity with the inner side, *c*, of the walls, are arranged a pair of superheating-pipes, E E, which are each bent in a serpentine form, as seen in Figs. 1 and 2, in order that those portions exposed to the action of the heat may be of the greatest possible length for the purpose of increasing their air-heating capacity. These pipes, which may be composed of iron or other suitable material best adapted to resist the action of heat, rest

upon projecting ledges or shoulders *d*, forming a portion of the walls of the furnace, each ledge having a groove or recess, *e*, for the reception of the lower portions, 10, of the bends of the pipes, which are thus steadied and held firmly in place. Each of the pipes *E* enters a chamber, *f*, formed in the furnace-wall, which is open in front to allow of the inward flow of the atmospheric air, which then passes into the bent portions of the pipes *E* within the furnace, where it becomes thoroughly superheated by contact therewith, after which it passes through the longitudinal portions 12 of these pipes, which extend backward to the rear of the furnace, and thence into the transverse portions *g*, which extend across the flame-bed *C* in close proximity therewith. The ends *h* of the pipes are closed, and the transverse portions *g* are provided on their upper sides with a series of perforations or discharge-orifices, *i*, through which the highly-heated air is emitted in fine streams or jets, which impinge upon and become thoroughly commingled with the smoke and volatile gases as they flow over from the furnace *A* into the combustion-chamber *D*, whereby their instantaneous ignition and combustion are produced, causing them to be almost entirely consumed within the combustion-chamber, thus intensifying the heat and effecting a great saving in the consumption of fuel. By thus arranging the superheating-pipes *E E* along the inner sides of the furnace-walls, instead of directly over the fire, they are prevented from becoming unduly heated and quickly destroyed, which is an important consideration, as it avoids the frequent removal and replacing of these pipes, while by placing them within the furnace, instead of embedding them within the furnace-walls, they can be easily and economically applied to new or old furnaces, conveniently reached for repairs, and will cause the air passing through them to be rapidly and intensely heated, as required, thus retaining all of the advantages incident to the construction described in our aforesaid Letters Patent of 1880, and at the same time avoiding its defects. Furthermore, the intense heat generated is all retained and utilized, and may be brought to bear at any desired point or points by varying the positions of the perforated portions *g* of the pipes, while all of the smoke, noxious gases, and sparks are consumed, thus obviating the necessity of building chimneys of great height to carry off these products of combustion. The portions *g* of the pipes *E* may, if desired, be provided with a series of discharge-nipples instead of the perforations *i*.

G G are guards composed of fire-brick or other suitable heat-resisting material, which project rearwardly at an angle over the transverse perforated portions *g* of the pipes *E*, as seen in Figs. 1 and 2, and serve to protect them from the dust and cinders and prevent their air-apertures *i* from becoming clogged thereby; and in order to prevent the dust and cinders

from being deposited against the exposed sides of these transverse portions *g* of the pipes and accumulating to such a degree as to cover them up, and thus obstruct their air-apertures *i*, the flame-bed *C* is provided immediately in the rear of each portion *g* of the pipes with a pit, *H*, which extends transversely across it, parallel with the portion *g* of the pipe, a receptacle or chamber being thus formed, in which the dust and cinders are collected and by which they are caused to drop below the level of the pipe, leaving its air-apertures *i* perfectly free and unobstructed. When the pits or chambers *H* become filled their contents are removed through suitable doors or openings, *k*, in the side of the brick-work, provided for the purpose.

Our improvements can be easily and cheaply applied to furnaces for stationary boilers, steam-boats, and locomotives, and also to ranges, stoves, fire-places, &c., or wherever a fire is required, without any alteration or tearing away of the original parts or setting of the furnace, stove, or fire-place, thus rendering our invention especially applicable to furnaces, &c., already in use.

In addition to the above advantages, a furnace having our improvements applied thereto is capable of burning with the best results tan, sawdust, green wood, wet peat or hops, and screenings of all kinds without the employment of a blower.

We are aware that there is a variety of constructions of furnaces wherein heated air is conducted by pipes through the furnace to the combustion-chamber. Hence we make no broad claim to such invention, but confine ourselves to the construction and arrangement herein shown and described.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination, with the furnace *A* and combustion-chamber *D*, of the air-heating pipes *E E*, communicating with the atmospheric air and arranged in a serpentine form within the furnace, and arranged on each side only thereof and in close proximity with its walls, and then extending backward in the rear thereof, and provided with transverse portions *g*, extending across the flame-bed *C*, and having outlets or discharge-orifices *i*, through which the highly-heated air is emitted in jets or fine streams, so as to impinge upon and commingle with the smoke and gaseous products of combustion within the chamber *D*, all constructed and arranged to operate substantially in the manner and for the purpose set forth.

2. In a smoke and gas consuming furnace, the combination, with the removable air-superheating pipes *E E*, arranged as described, of the ledges *d*, projecting from the inner walls of the furnace *A*, and provided with grooves or recesses *e* for receiving and supporting the bends of the pipes *E*, substantially as set forth.

3. In a smoke and gas consuming furnace, the combination, with the transverse perforated

portions *g* of the pipes E, through which the
superheated air is discharged into the com-
bustion-chamber D, of the angular guards G,
projecting rearwardly over the portions *g* of
5 the pipes for the purpose of protecting them
from the dust and cinders, and thereby pre-
venting their air-apertures *i* from becoming
clogged or obstructed, substantially as de-
scribed.

Witness our hands this 17th day of Decem- 10
ber, A. D. 1881.

PETER KILROY.
JULIUS A. FLICK.

In presence of—
P. E. TESCHEMACHER,
W. J. CAMBRIDGE.