

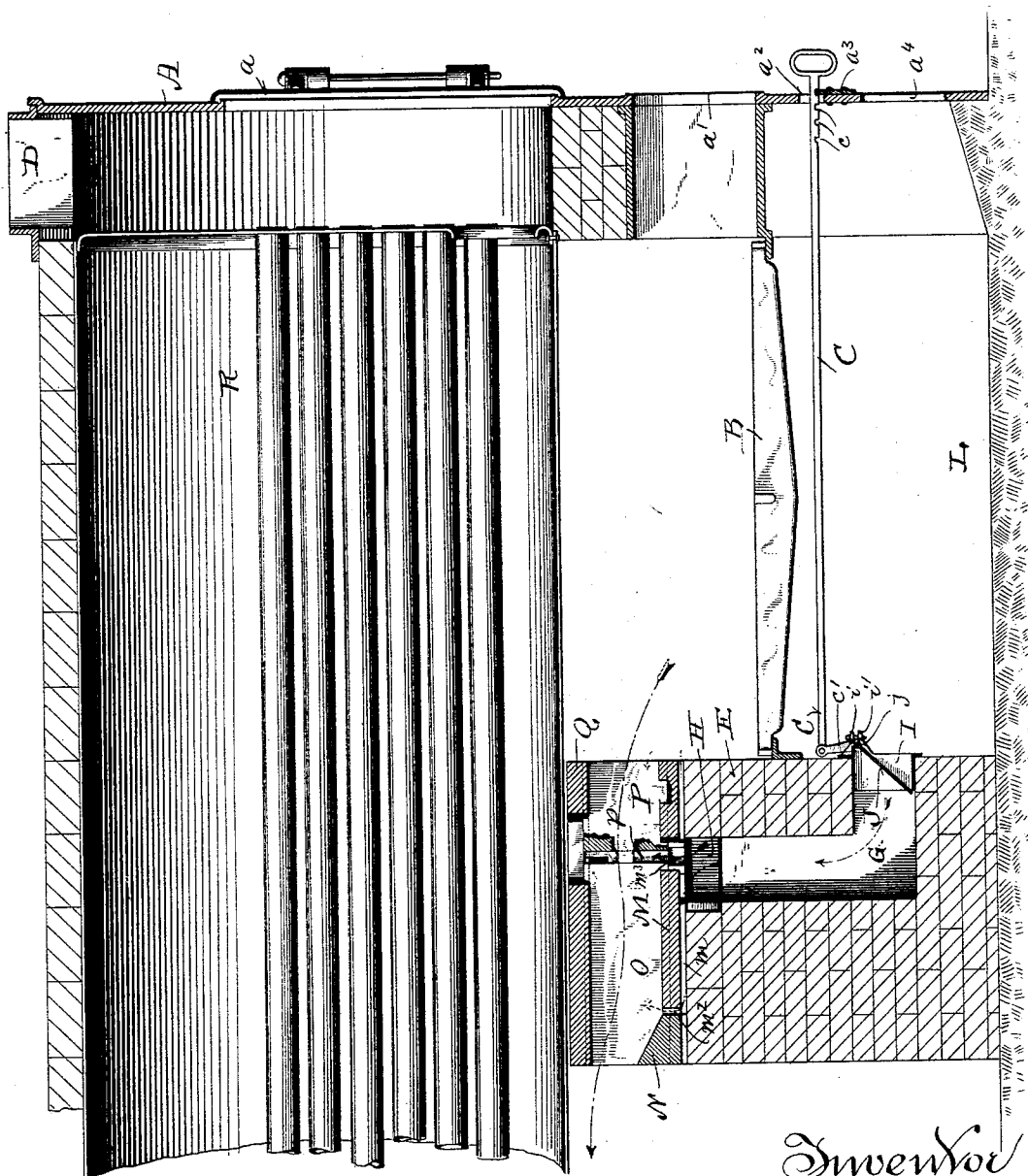
(No Model.)

3 Sheets—Sheet 1.

G. M. CONWAY.  
FURNACE.

No. 520,035.

Patented May 22, 1894.



Witnesses  
Geo. W. Young  
Henry Dunkert

Fig. 1.

Inventor  
George M. Conway  
By H. G. Underwood  
Attorney

G. M. CONWAY.  
FURNACE.

No. 520,035.

Patented May 22, 1894.

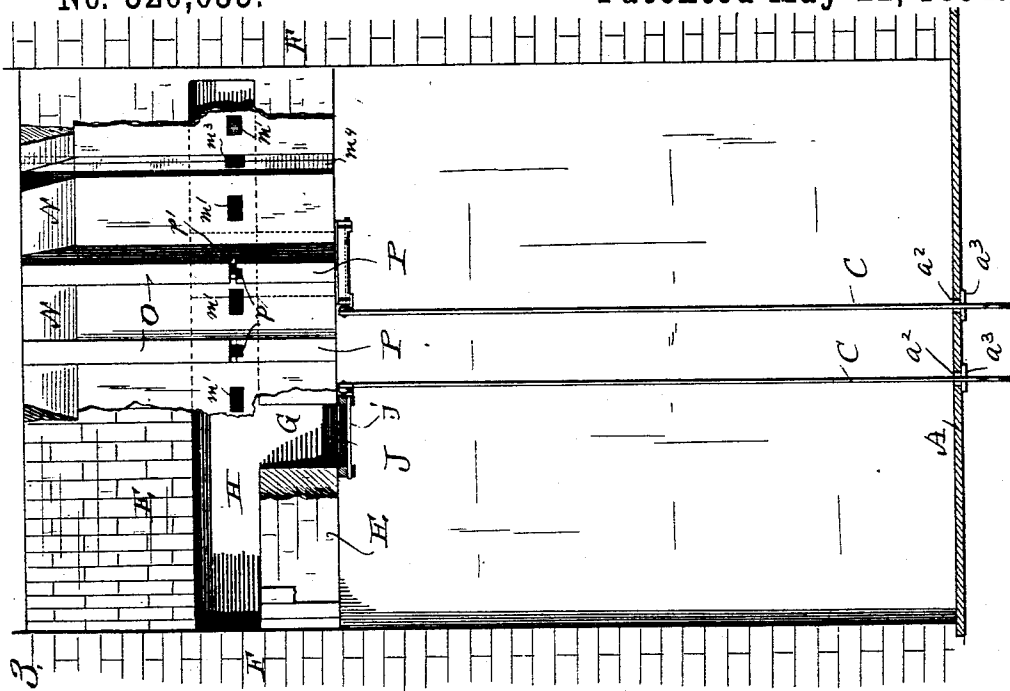
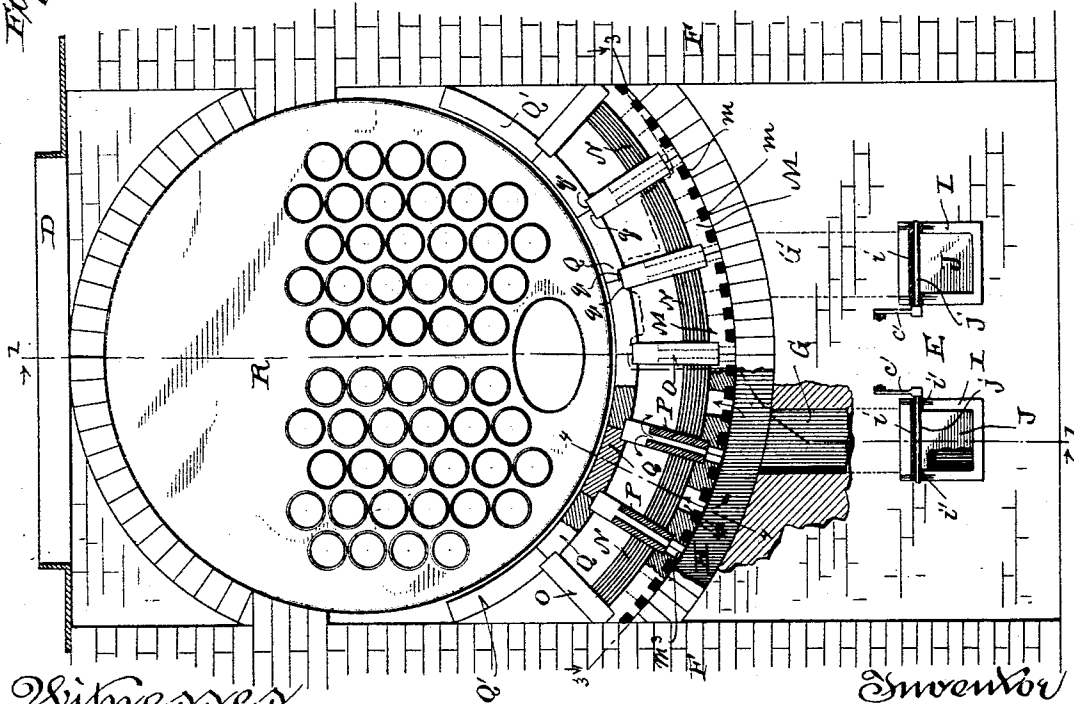


Fig. 3.



Witnesses  
Geo. W. Young  
Henry Kankeert

Fig. 2.

Inventor  
George M. Conway  
By H. G. Underwood  
Attorney

(No Model.)

3 Sheets—Sheet 3.

G. M. CONWAY.  
FURNACE.

No. 520,035.

Patented May 22, 1894.

Fig. 6.

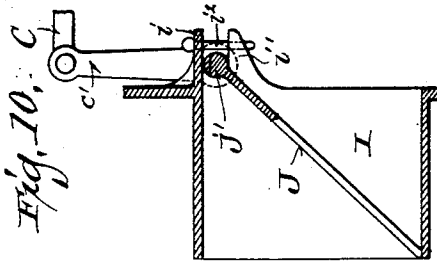


Fig. 4.

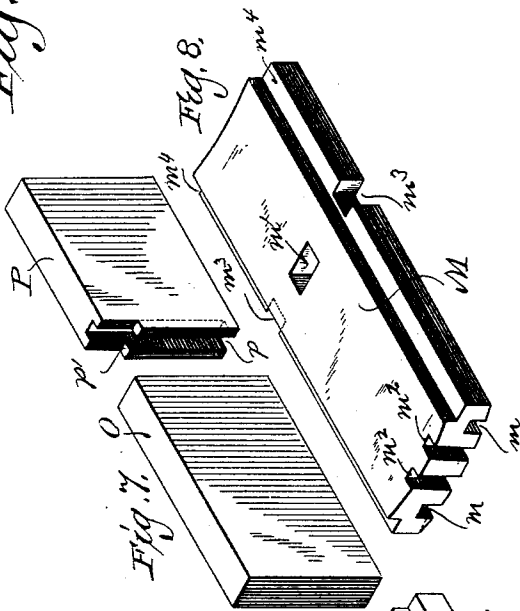
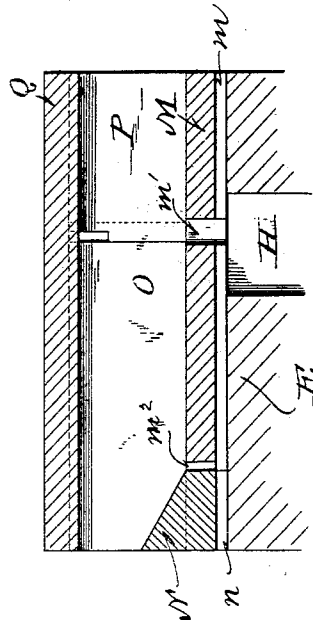
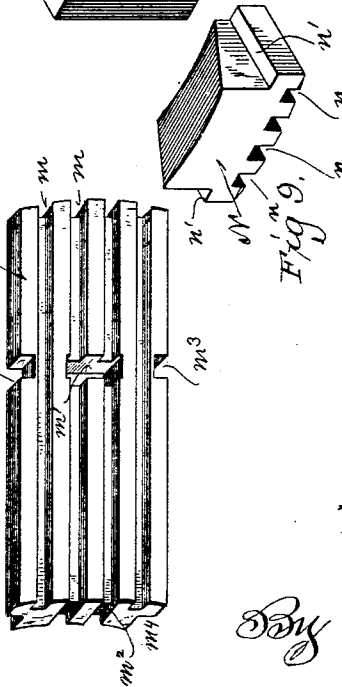


Fig. 5.



Witnesses  
Geo W. Young,  
Henry Rankert

Inventor  
George M. Conway  
By H. G. Underwood  
Attorney

# UNITED STATES PATENT OFFICE.

GEORGE M. CONWAY, OF MILWAUKEE, WISCONSIN.

## FURNACE.

SPECIFICATION forming part of Letters Patent No. 520,035, dated May 22, 1894.

Application filed June 10, 1893. Serial No. 477,209. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE M. CONWAY, a citizen of the United States, and a resident of Milwaukee, in the county of Milwaukee, and in the State of Wisconsin, have invented certain new and useful Improvements in Furnaces; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to furnaces and consists in certain peculiarities of construction, as will be fully set forth hereinafter, and subsequently claimed.

In the drawings: Figure 1 is a vertical longitudinal section through my improved furnace, on the line 1—1 of Fig. 2. Fig. 2 is a front elevation of the same with boiler front, front wall, and grate removed, and with parts broken away, or in section, to show details of construction. Fig. 3 is a plan view of the parts shown below the line 3—3 in Fig. 1, with portions broken away. Fig. 4 is a detail sectional view on the line 4—4 of Fig. 2. Figs. 5 to 9, inclusive, are detail views of tiles or bricks employed in said furnace. Fig. 10 is a detail view illustrating the construction of the air-flue casing and damper.

A, Fig. 1, represents the boiler front with suitable smoke arch door  $a$ , and below this at  $a'$  the opening for the furnace door leading to the grate B, and still lower down, an opening  $a^2$  for the passage of the damper rod C, said rod being notched as at  $c$ , adjacent to its handle end, for adjustable engagement with a latch-plate  $a^3$  at this point, and below is the door  $a^4$  of the ash-pit L.

D is the throat of the chimney-pipe.

E is the bridge-wall at the rear of the grate, between the side walls F F of the structure. This bridge-wall has a rounded top on the arc of a circle struck from the center of the boiler above, as shown in Fig. 2, and, in the present illustrations there are shown two air-flues G G (though the number may be more or less, as desired) communicating at top with the transverse arc-shaped air-space H extending between the said side-walls F F. The lower mouths of the described air-flues G are fitted with damper-casings I to which the dampers are attached, as best illustrated in Fig. 10. From the upper part of each casing, there projects an ash-shield  $i$ , below which at each side, are lugs  $i'$ , and between

these parts is located the damper-shaft  $j$  cast solidly with the damper J, and secured in place by pins  $i^2$ , as shown, and having one end outside of its bearings, squared off as shown at  $j'$  to fit within a corresponding opening in one end of the crank-arm  $c'$  whose other end is pivotally attached to the inner end of the damper-rod C. By these means, a movement of the handle of the said rod C, in or out, will vary the position of the said damper J, which can thus partially or wholly close, or open, the mouth of the air-flue G, and keep the said damper in the desired position by dropping one of the notches  $c$  over the latch-plate  $a^3$ .

If ashes and other refuse matter accumulate in the air-flue G, these can be readily removed by raising up and fastening the damper J at its highest point, and introducing a long handled hoe through the ash-pit door  $a^4$ , and this is a great convenience in construction over the flue-dampers in common use.

Resting on the arc-shaped top of the bridge-wall E, are a series of the tiles or bricks M, N, of peculiar construction, illustrated by the detail views Figs. 5, 8 and 9. These tiles are transversely rounded on their upper and lower surfaces, (to conform to the described shape of the bridge-wall top) and are provided on their under sides with longitudinal grooves or air-channels,  $m$  and  $n$ , respectively, and the tiles M have vertical openings  $m'$  there-through, communicating with the described longitudinal grooves  $m$  on their under sides, and vertical side openings  $m^3$ ; these tiles M are formed with right-angled shoulders  $m^4$  at each side on their upper surfaces, and hence these side openings  $m^3$  extend to a lower plane than the central openings  $m'$ . The tiles N fit snugly against the adjacent ends of the tiles M, as shown in Figs. 1 and 4, and converge upward from this point of contact to their outer ends, and are furthermore formed with right-angled shoulders  $n'$ , in their sides, coinciding with the described shoulders  $m^4$  of the tiles M.

O P represent other tiles (shown in Figs. 7 and 6, respectively) which fit in the described shoulders  $m^4$   $n'$  of each of the adjacent pairs of tiles M M and N N when the latter are adjusted to place on top of the bridge-wall as best shown in Fig. 2. The tile O is shown as

a plain rectangle, but the tile P has a vertical inner end passage  $p$  and above this a right-angled shoulder  $p'$ , the said passage  $p$  communicating with the described openings  $m^3$  in the tiles M M. When desired, the tiles M N may be made in one piece, as may the tiles O P, but for convenience of manufacture and application, I prefer to make them separately; as shown, in which shape, further, they are more convenient for storage and transportation.

Q Q represent the top tiles and these are made with right-angled shoulders  $q q$  in their side edges to interlock with the top edges of the tiles O P, as best shown in Fig. 2, these tiles Q being rounded on the upper and under surfaces, so that, when put together in use, they may conform to the arc of a circle struck from the common center of the boiler above, from which the arc line of the tiles M N was struck, the radially disposed tiles O P being held firmly in place between said upper and lower series of tiles. These tiles Q are of uniform width and size, but at each end of the radius the end tiles (marked Q' Q') are of proper width to impinge against the side-walls F F and need only the described shoulders  $q q$  on their inner sides.

R represents a horizontal tubular boiler of ordinary construction, supported in the usual manner, by brackets (not shown) resting upon the side walls, and independent of the described radial line of tiling below.

The operation of my described furnace is as follows: The fuel is placed upon the grate B, and when properly ignited the gases liberated therefrom pass into the chambers formed by the tiles M N O P Q, and on their passage therethrough they are supplied with air, which enters the damper-controlled mouths of the air-flues G, passes into the arch-shaped air-space H, and from thence along through the grooves  $m n$ , and up through the openings  $m'$  and  $m^2$  into the bottom of the described chambers, and up through the openings  $m^3$ , passage  $p$ , and shouldered openings  $p'$ , into the upper part of said chambers, as shown by the arrows, in Figs. 1 and 2. The tiles forming the said chambers become heated, in the operation of the furnace, and the air from the air-flues G is heated in its described passage through the said grooves, passages and openings and when coming into contact with the gases liberated from the fire-bed, is forced to mingle therewith by the contraction of the chambers caused by the described convergence of the tiles N, forming a practically perfect combustion of said mingled gases and heated air as they pass out of the contracted throats of the chambers, thereby reducing the smoke nuisance to a minimum, and by this process of elimination of smoke, the heating properties of the fuel are increased, instead of being decreased by such elimination as is the case with the old methods commonly employed. The gases, now practically free from smoke, pass along

the bottom of the boiler, returning through the tubes thereof and up and out through the chimney. By the nearly perfect combustion and elimination of smoke described there is practically no deposit of soot upon the heating surfaces, and they are therefore always in proper condition for absorbing the heat of the passing gases.

My described damper plays an important part in effecting the desired result, as it is necessary, in order to obtain perfect combustion that the carbonaceous matter in the liberated gases should mingle with air of a proper temperature, and if there is any excess of air admitted, the temperature will at once be lowered, as only a certain quantity of air can be properly heated in a given time by its passage against and into the heated tile chambers described, and hence the need of regulating the admission of air at the air-flue mouth.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a furnace, the combination with a bridge-wall, provided with damper-controlled air-flues and a transverse air-space communicating therewith, of a series of gas and air mingling and combustion chambers communicating with said air-space, and with each other, said chambers being open at each end, the inlet opening of each chamber being of full height, and the outlet opening converging to a contracted throat.

2. In a furnace, the combination with a bridge-wall, provided with damper-controlled air-flues, and a transverse air-space communicating therewith, of a boiler, and a series of gas and air mingling and combustion chambers, radially disposed about said boiler, and interposed between it and said air-space, said chambers communicating with said air-space, and with each other, and being open at each end, the inlet opening of each chamber being of full height, and the outlet opening converging to a contracted throat.

3. In a furnace the combination with a boiler, of a series of gas and air mingling and combustion chambers, composed of sections of tiles, the bottom tiles being rounded and grooved on their under surfaces, and the top tiles rounded on their upper surfaces in conformity with the shape of said boiler, and radially disposed about the same, the upper and lower tiling being separated by a series of partition plates forming therewith the said chambers, and there being air passages through the bottom tiles and partitions for the admission of air within said chambers.

In testimony that I claim the foregoing I have hereunto set my hand, at Milwaukee, in the county of Milwaukee and State of Wisconsin, in the presence of two witnesses.

GEORGE M. CONWAY.

Witnesses:

H. G. UNDERWOOD,  
HENRY DANHERT.