

G. A. COPP.
STEAM HEATING FURNACE AND BOILER.

APPLICATION FILED AUG. 23, 1902.

NO MODEL.

3 SHEETS—SHEET 1.

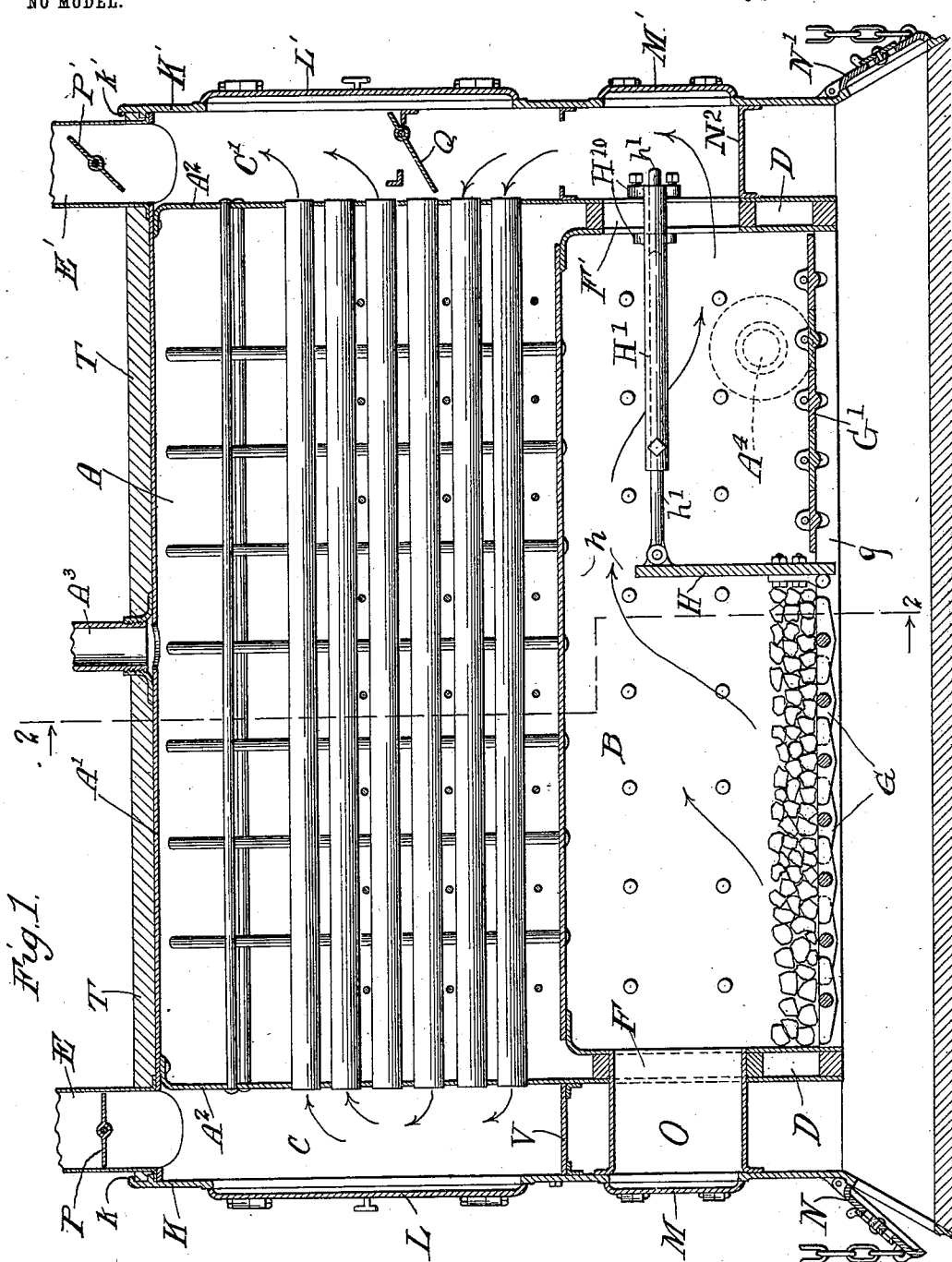


Fig. 1.

Witnesses:
Edward T. Wray.
Edgar L. Conant

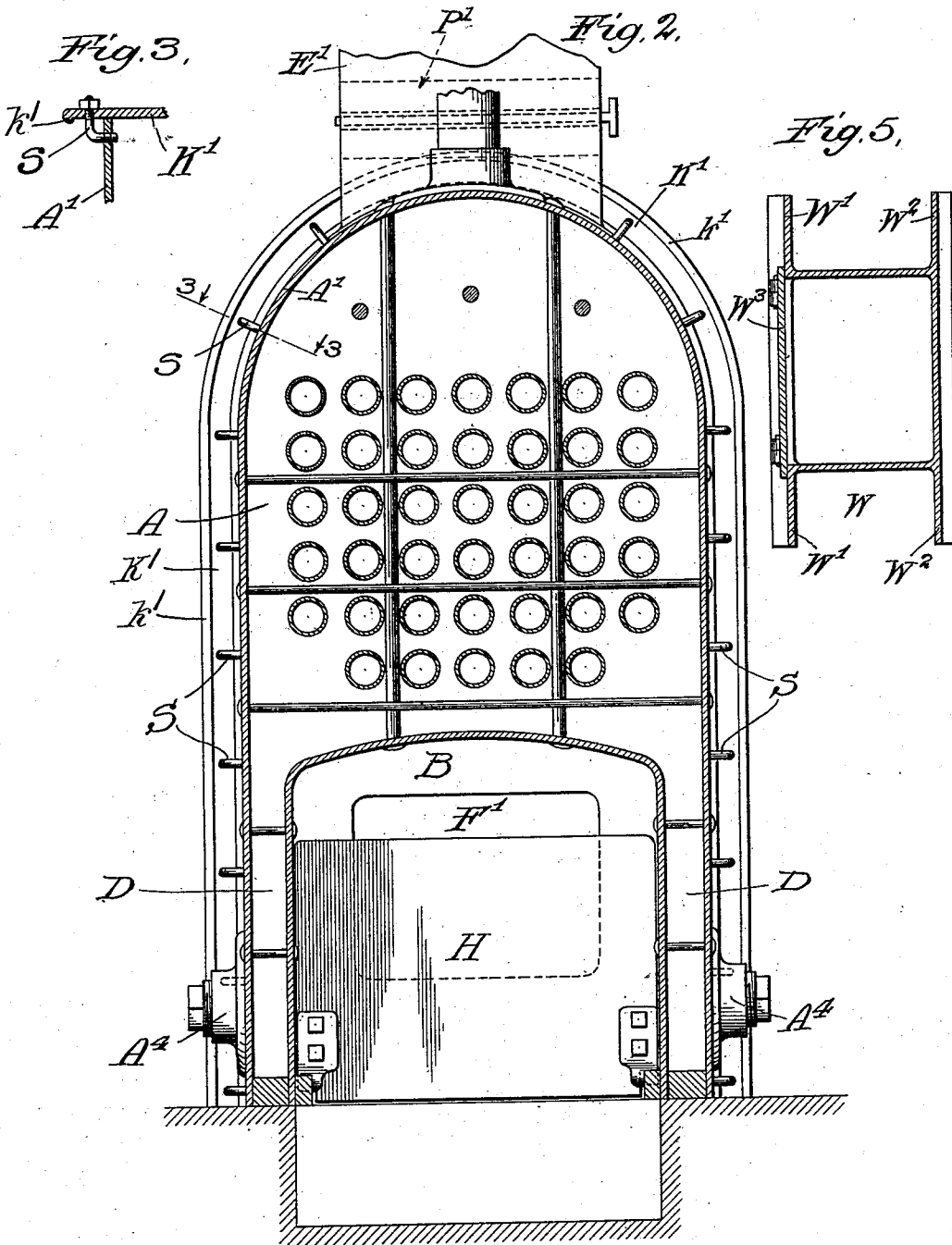
Inventor:
Gideon A. Copp
By Burton Burton
His Atty's.

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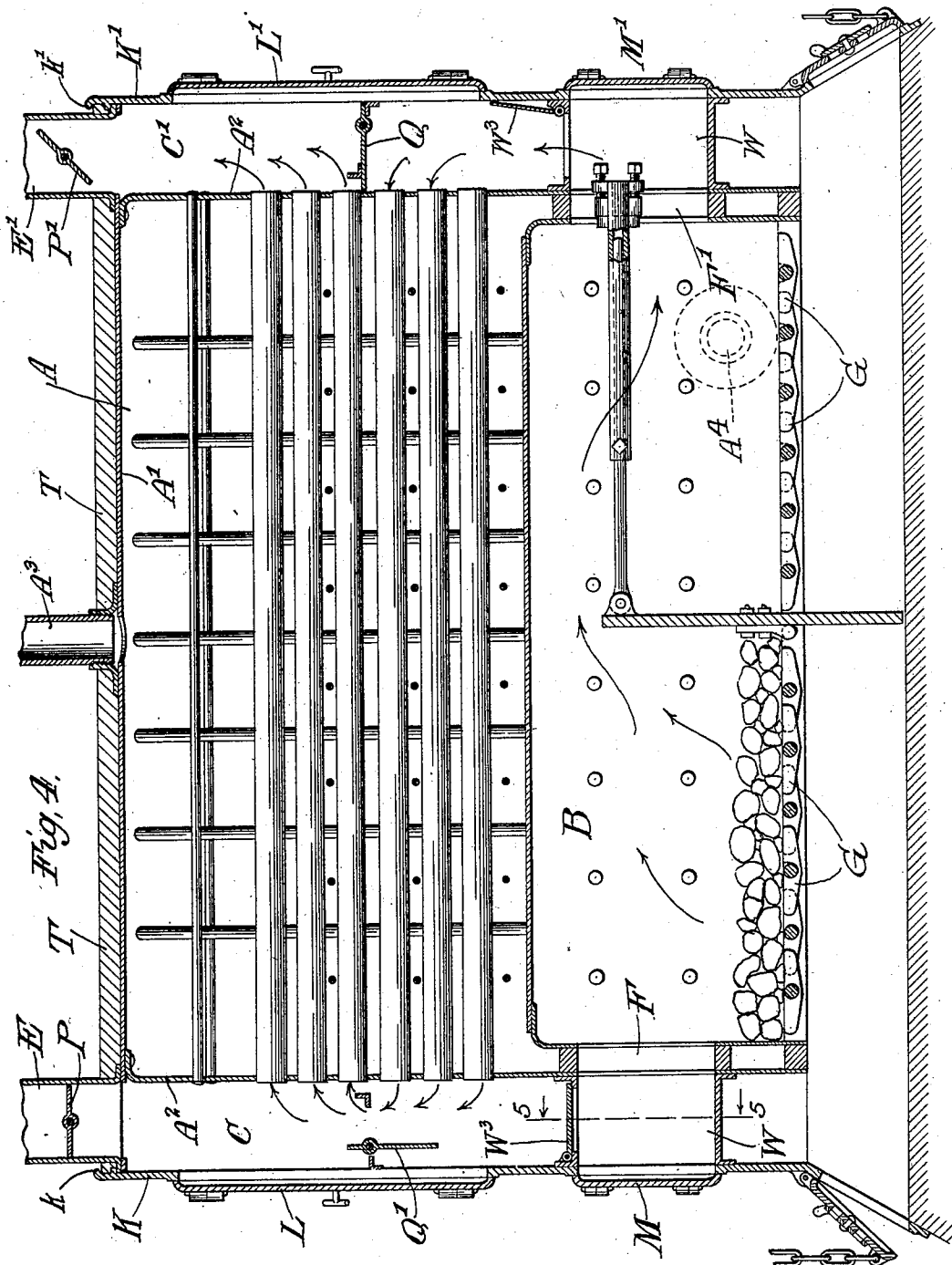
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UNITED STATES PATENT OFFICE.

GIDEON A. COPP, OF CHICAGO, ILLINOIS.

STEAM-HEATING FURNACE AND BOILER.

SPECIFICATION forming part of Letters Patent No. 722,493, dated March 10, 1903.

Application filed August 23, 1902. Serial No. 120,764. (No model.)

To all whom it may concern:

Be it known that I, GIDEON A. COPP, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Steam-Heating Furnaces and Boilers, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

The purpose of this invention is to provide an improvement in furnaces and boilers particularly designed for house-heating, with a view to adapting them more perfectly to varieties of fuel requiring different degrees of draft and also for the purpose of making it possible to clean the flues or give other interior attention to the boiler without withdrawing the fire and in other respects to make such heaters adaptable to varying circumstances and conditions with respect to the draft, convenience of firing, &c., according to the particular situations in which they are located and the character and extent of the draft which may be found obtainable through the chimneys to which they may be necessarily connected.

It consists in the features of construction which are set out in the claims.

In the drawings, Figure 1 is a longitudinal section furnace and boiler. Fig. 2 is a section at the line 2 2 on Fig. 1. Fig. 3 is a detail section at the line 3 3 on Fig. 2. Fig. 4 is a view similar to Fig. 1, showing a modification. Fig. 5 is a section at the line 5 5 on Fig. 4.

My improved furnace and boiler comprises the tubular boiler A, having underneath it, extending the entire length, the fire-box B, which, except as to the end openings F and F', one for fuel-door and the other for smoke-exit, is inclosed in a water-jacket formed by the lower portion of the boiler, the water-spaces in such jacket being indicated at several points where they appear in the figures by the letter D. I provide smoke-boxes C C' at both ends of the furnace, the chambers which constitute such passages being in the initial construction made to extend the whole height of the furnace, but being stopped off, as hereinafter explained, at proper points to produce the circulation or course of the

smoke-currents desired, as hereinafter explained. I provide independent stacks E E', connected with the smoke-boxes C and C', respectively.

Grate-supporting bars *g* are provided, extending the whole length of the fire-box underneath the boiler, so that the whole or any desired portion of the space may be employed and occupied by the grate-bars *G*, and a bridge-wall *H* is provided, adapted to be erected in the position of an omitted grate-bar at any point in the length of the grate to stop off the excess of space in the fire-box beyond what is found necessary, the remainder of the space above the grate, from the opening *h* over the bridge-wall to the smoke-exit, becoming a part of the discharge-passage for the smoke from the fire to the smoke box. The bridge-wall *H* is held at the desired point in the length of the grate for the purpose aforesaid by the telescoping rod *h'*, which passes through and is adapted to be fastened in the sleeve *H'*, the latter being attached to the fire-box by means of flanges *H''*. The grate-bars beyond the bridge-wall are substituted by plates *G'*, closing off that portion of the grate area from the ash-pit and so preventing draft through that course into the smoke-box and discharge-pipes. In the original construction of the parts the furnace and boiler is precisely alike at both ends, and in erection or installation it may be completed so as to be fed from one end or the other, as found most convenient in each situation, and, as will be seen from the further description, the construction in this respect may be reversed by slight changes or transposition of the parts, so as to change the end at which the fuel is supplied. The outer shell *A'* of the boiler extends beyond the heads *A² A²* at both ends a distance corresponding to the desired width of the smoke-boxes and is joined to the head-plates *K K'* at the opposite ends, such head-plates extending the entire height of the furnace and boiler and having the doors hereinafter described for access to the various chambers and passages. Preferably the two head-plates are precisely alike in construction and have their openings closed by doors *L L'*, *M M'*, and *N N'*, the doors *L L'* being opposite the ends of the tubular portion of the boiler,

so as to give access to the ends of the tubes, the doors M M' being at the opposite ends of the fire-box and the doors N N' being at the opposite ends of the ash-pit.

At whichever end is selected for the feeding end of the fire-box the fuel-throat O is interposed between the opening at that end of the fire-box and the opening in the head-plate which is closed by the door M, and above the opening N' into the ash-pit at the opposite end a cut-off plate N² is secured. The doors N and N' are provided with the usual draft-openings and controlling-dampers therein, the door N' thus serving as a check-damper by affording direct draft to the chimney without passing through the fire. Between the smoke-boxes and their respective stacks are interposed dampers P P', and in the smoke-box C', at an intermediate point in the height of the portion of the boiler containing the horizontal plates, there is located a damper Q.

When the fire is being kindled in the furnace, the damper P will be closed and the dampers P' and Q will be open, thus affording a direct draft from the fire-box to the stack E' without causing the smoke-current to pass through any of the boiler-flues. When soft fuel, as wood or soft coal, is being burned in the furnace, requiring a relatively strong draft and large cross-section of passage-way to the stack, the damper P' will be closed and the dampers P and Q will be open, thus causing the products of combustion to pass through the smoke-box C and thence out by the stack E. When hard coal or coke or any fuel not requiring so strong a draft nor so large a cross-section of passage through the flues is burned, the dampers P and Q will be closed and the damper P' opened, thus compelling the products of combustion to pass from the smoke-box C' forward through the lower portion of the boiler-flues, up through the forward smoke-box C, and then back through the upper portion of the smoke-box above the damper Q and out through the rear stack E'.

When it is desired to clean the flues, all the draft-openings at the feeding end of the fire-box will be closed, the damper P will be closed, and the dampers P and Q will be opened. The attendant may then open the door L, which will cause a strong draft to enter the forward end of the flues and find exit through the smoke-box C' and stack E', so that all dust and soot which may be cleared from the flues and from the forward smoke-box C will be carried away from the operator and out into the stack. Whenever it is necessary to reach the rear end of the flues for cleaning the same or the smoke-box at that end, the draft-openings of the fire-box being closed, the dampers P and Q being opened, and the damper P closed, the attendant may open the door L', which will cause a strong draft to pass in through the

flues toward the smoke-box C, carrying all products of combustion which tend to pass from the fire-box, notwithstanding there is no draft there now, away from the open door through the flues to the forward smoke-box and out at the forward stack E.

Certain minor details of construction shown in the drawings may require mention. The end plates are secured to the boiler-shell by hook-bolts S S S, the said end plates having beads k, encompassing the ends of the boiler-shell and forming an angle in which packing to make the junction smoke-tight may be lodged when the hook-bolts are drawn up. The end plates, it will be noticed, extend flangewise beyond the boiler-shell and have inturned beads k at the outer edge, thus affording end guards for the insulating or heat-retaining covering T, which may be applied outside the boiler-shell. At the top of the boiler I have shown a connection A³ for steam-dome or steam-offtake and at A⁴ A⁴ blow-off connections from the water-space.

The smoke-box at the end selected for the forward or feeding end, it will be understood, is stopped off at a point above the fuel-throat and below or not above the level of the lowest boiler-flue, so as to prevent any interference with the draft from the lower end of that space. The plate V for stopping off this flue may be employed at will at either end, proper ledges being formed on the boiler-head plates and on the end plates K K for supporting and retaining it.

The fuel-throat may be constructed so as to constitute this stop-off plate by merely extending its upper wall at the sides in lips or flanges to the full width of the smoke-box. By constructing this fuel-throat with such flanges at both top and bottom and providing swing-doors in the upper side both ends of the furnace may be constructed precisely alike, each being provided with such a fuel-throat, and the furnace may then be adapted to be fed alternatively at either end by merely shifting the openings. Such construction I have shown in Figs. 4 and 5, the form of fuel-chute required being indicated by the letter W and having upper and lower flanges W' W², a trap-door W³ at the upper side adapted to be swung up from horizontal or closed position to a position against the vertical wall of the smoke-passage, so as to leave the throatway open. Whichever end is to be used as the feeding end, will have this trap-door W³ closed, the other end having it open. This modification requires, in order to carry out the plan of operation above described as to smoke circulation, that the damper Q should be duplicated in the forward smoke-box, and in the figure showing this modification a damper Q' is provided in position in the forward box corresponding to that of the damper Q in the rear smoke-box. In this form I have shown the bridge-wall extending down below the

grate to cut off the portion of the ash-pit under the cut-off portion of the fire-box, thus dispensing with the plates G' on the grate-bars. This construction may also be used in the other form.

I claim—

1. A hot-water or steam heater comprising a horizontal tubular flue-boiler; a furnace extending underneath the boiler longitudinally; smoke-boxes at both ends of the boiler; independent smoke-pipes receiving the discharge from the smoke-boxes respectively; independent dampers controlling exit from the smoke-boxes through the smoke-pipes respectively, one of the smoke-boxes being in communication with the fire-box so as to receive the discharge therefrom, such communication being independent of both said dampers, whereby, said communication being unchanged, the products of combustion may be caused to pass out by either of the smoke-pipes at will, according to the adjustment of the dampers.

2. A hot-water or steam heater, comprising a horizontal tubular flue-boiler; a furnace extending underneath the boiler longitudinally; smoke-boxes at both ends of the boiler, communicating with both ends of the tubular flues of the latter; independent smoke-pipes receiving the discharge from the smoke-boxes respectively, one of the smoke-boxes receiving the discharge from the fire-box; dampers controlling exit through the smoke-pipes respectively; and a damper in the last-mentioned smoke-box located at an intermediate point in the height of the boiler.

3. A hot-water or steam heater comprising a horizontal tubular flue-boiler; a fire-box extending underneath the same; smoke-boxes at both ends of the boiler; independent smoke-pipes connected with the smoke-boxes respectively; valves or dampers for controlling the course of the smoke from the smoke-boxes to cause it to pass out through one or the other of the smoke-pipes at will, one of the smoke-boxes being in communication with the fire-box so as to receive the discharge therefrom, such communication being independent of both dampers, the heads or outer walls of the smoke-boxes having doors opposite the boiler ends for access thereto.

4. A hot-water or steam heater comprising a horizontal tubular boiler; a fire-box extending under substantially the whole length of the same, said fire-box having substantially similar openings at both ends; smoke-boxes at both ends of the boiler extending down past the ends of the fire-box; smoke-pipes receiving the discharge from the smoke-boxes respectively; independent dampers controlling exit from the smoke-boxes through the smoke-pipes respectively, one of the smoke-boxes being stopped off above the level of the fire-box and the other being in communication with the fire-box so as to receive the discharge therefrom, such stoppage and commu-

nication being independent of both said dampers, whereby, said communication being unchanged, the products of combustion may be caused to pass out by either of the smoke-pipes at will, according to the adjustment of the dampers.

5. A steam and hot-water heater, comprising a horizontal tubular flue-boiler; a fire-box extending longitudinally substantially under the entire length of the boiler, and except as to fuel and smoke openings at the ends, inclosed by water-spaces of the boiler, the longitudinal shell of the boiler being extended at both ends beyond the boiler-head plates, and outer head-plates joined to said extended ends of the shell inclosing smoke-boxes at both ends of the boiler and fire-box, one of said smoke-boxes being stopped off above the level of the fire-box and below the tubular portion of the boiler, and having a fuel-throat extending through it into the fire-box; valves or dampers controlling exits through the smoke-pipes respectively, the outer head-plates of the heater forming the outer walls of the smoke-boxes, having doors affording access to the latter opposite the ends of the boiler-flues; and means for controlling draft-entrance to the fire-box.

6. A steam or hot-water heater comprising a horizontal tubular flue-boiler; a fire-box jacketed by the water-spaces of the boiler and having its fuel-grate extending substantially under the entire length of the latter, the boiler-shell being extended at both ends beyond the boiler-head plates, and outer end plates for the heater joined to the extended ends of the boiler-shell, whereby there are formed between the boiler-head plates and said outer end plates, smoke-boxes, one at each end of the tubular portion of the boiler; a fuel-receiving throat leading across the smoke-box at one end into the fire-box; a smoke-discharge aperture from the fire-box leading across the water-jacket at the opposite end into the smoke-box at that end; and dampers controlling exit from the smoke-boxes respectively.

7. A steam or hot-water heater, comprising a horizontal tubular boiler; a fire-box which extends substantially under the entire length of the tubular portion of the boiler; smoke-boxes at both ends of the boiler and fire-box, and independent smoke-pipes leading from such smoke-boxes respectively; dampers controlling exit through the smoke-pipes respectively; and dampers in the smoke-boxes at intermediate points in the height of the tubular portion of the boiler; fuel throats or sleeves extending across the smoke-boxes into the opposite ends of the fire-box, and fuel-doors closing the outer ends of such sleeves, said sleeves having each at the upper side a trap-door or valve controlling communication from the sleeve into the smoke-box; whereby the furnace may be arranged to be fed at

either end at will, by closing the valve in the
fuel-throat at such end and opening the cor-
responding valve at the opposite end, and
suitably adjusting the remaining dampers to
5 direct the smoke-currents to either stack.

In testimony whereof I have hereunto set
my hand, in the presence of two witnesses, at

Chicago, Illinois, this 31st day of July, A. D.
1902.

G. A. COPP.

In presence of—

EDGAR L. CONANT,
JULIA S. ABBOTT.