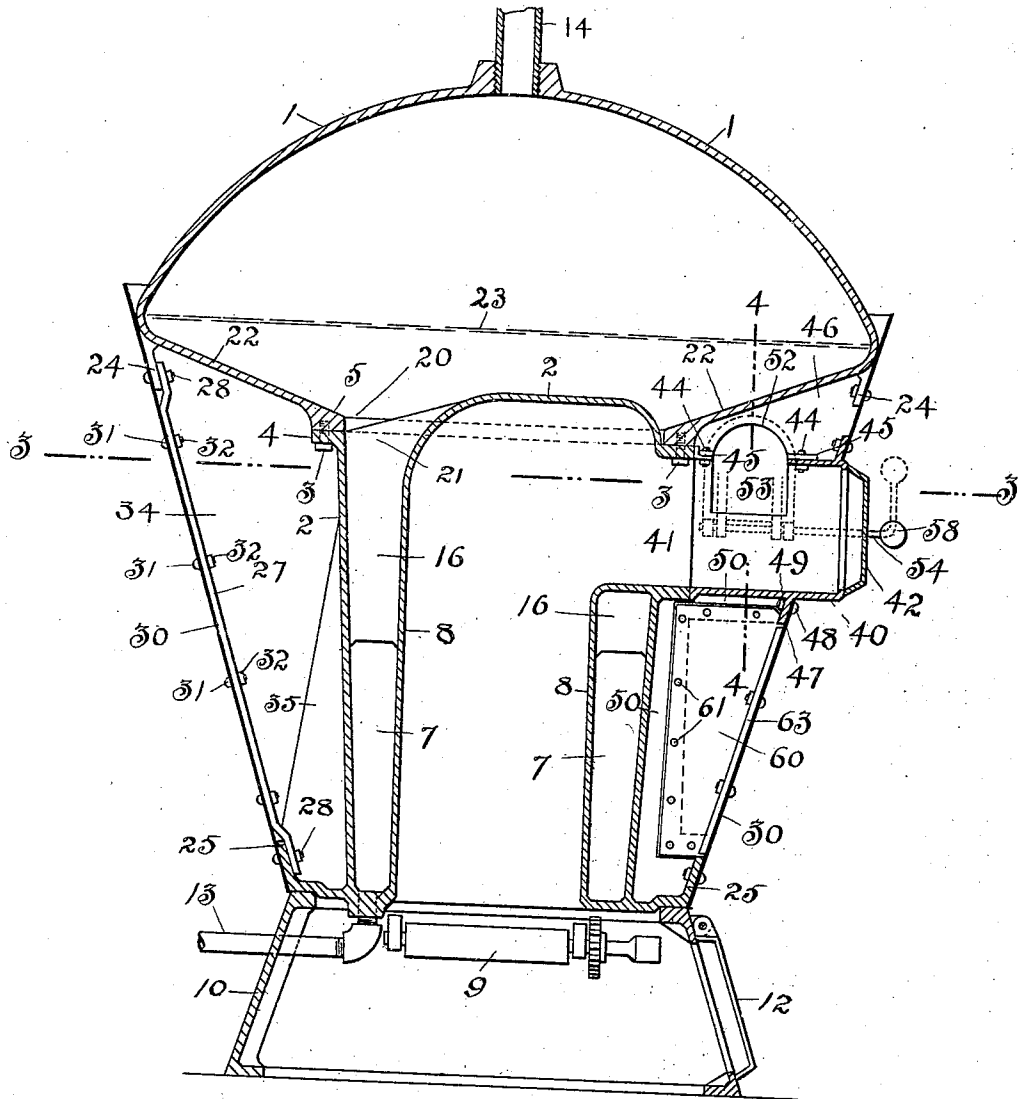


G. P. CAMPBELL.
STEAM HEATING APPARATUS.
APPLICATION FILED JAN. 21, 1909.

946,333.

Patented Jan. 11, 1910.
3 SHEETS—SHEET 1.



WITNESSES
L. C. Kennedy
G. V. Manning

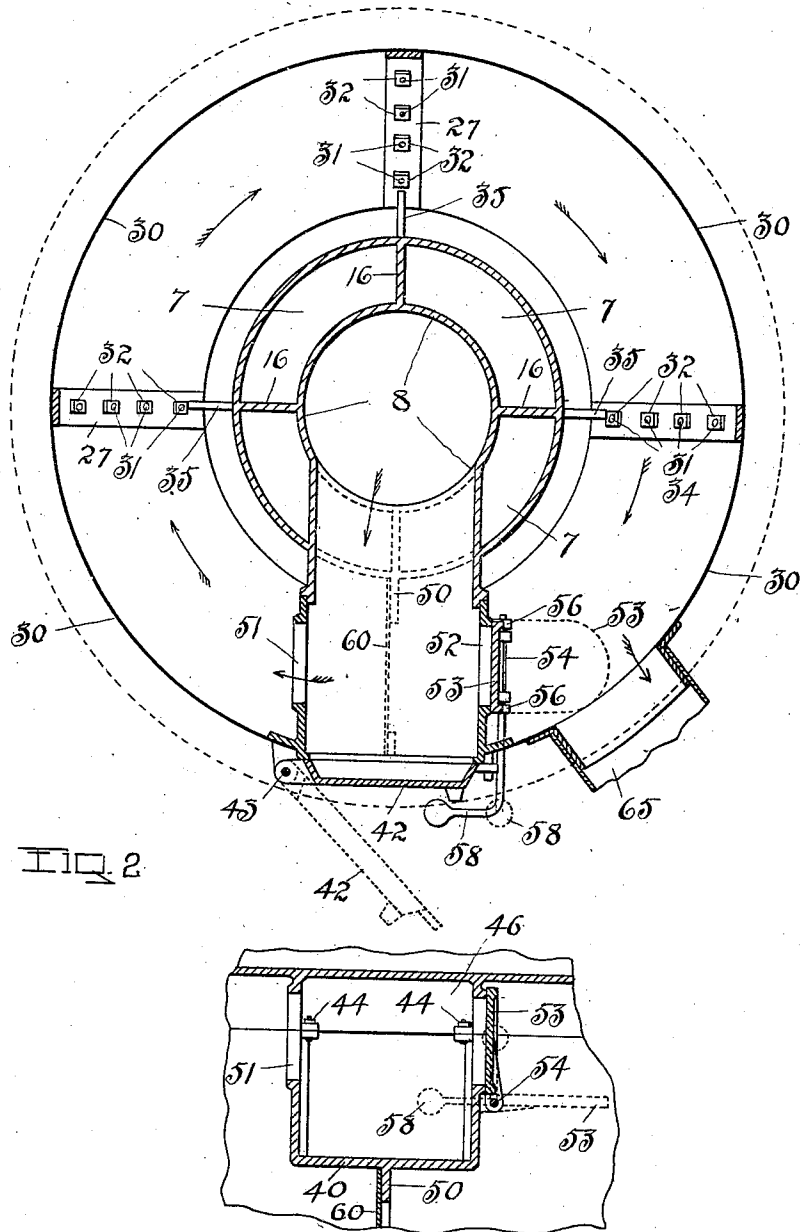
FIG. 1

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FIG. 3

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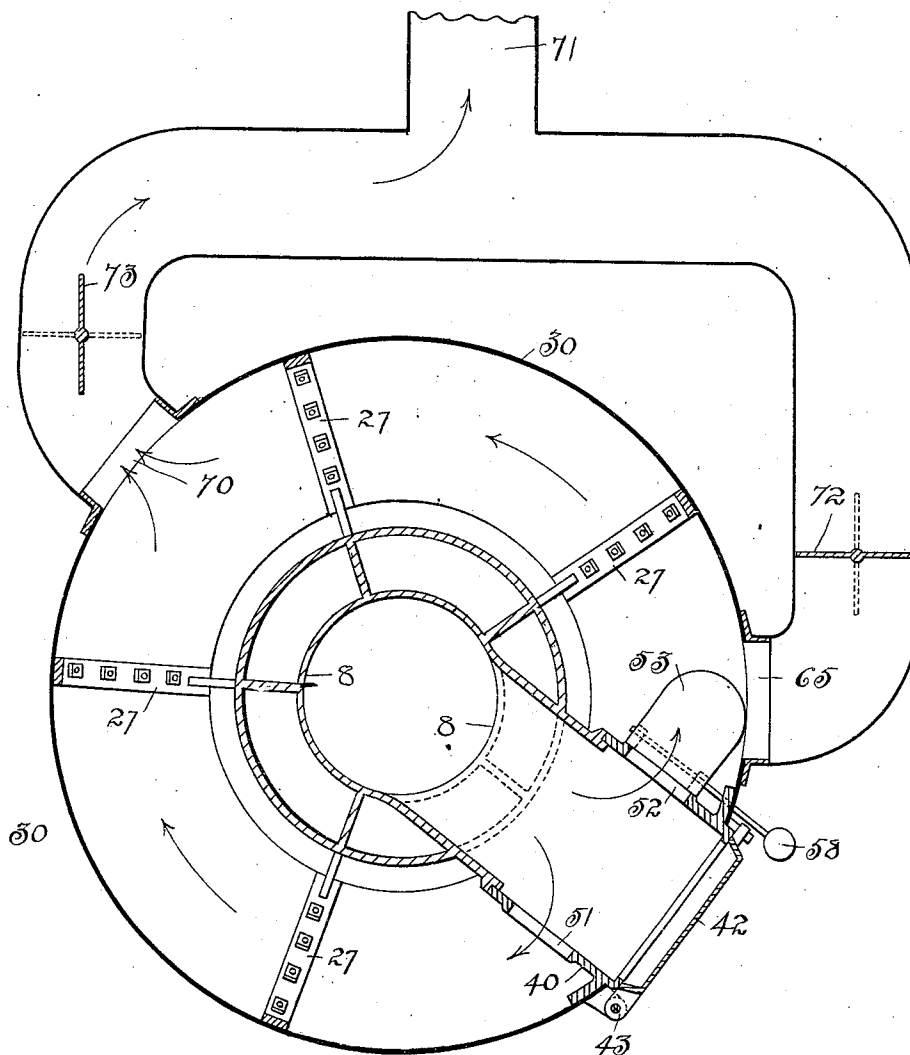


FIG. 4

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UNITED STATES PATENT OFFICE.

GEORGE P. CAMPBELL, OF SCHENECTADY, NEW YORK.

STEAM-HEATING APPARATUS.

946,333.

Specification of Letters Patent.

Patented Jan. 11, 1910.

Application filed January 21, 1909. Serial No. 473,550.

To all whom it may concern:

Be it known that I, GEORGE P. CAMPBELL, a citizen of the United States, residing at Schenectady, county of Schenectady and State of New York, have invented certain new and useful Improvements in Steam-Heating Apparatus, of which the following is a specification.

The invention relates to such improvements and consists of the novel construction and combination of parts hereinafter described and subsequently claimed.

Reference may be had to the accompanying drawings, and the reference characters marked thereon, which form a part of this specification. Similar characters refer to similar parts in the several figures therein.

The principal objects of the invention are to secure in a heating apparatus comprising an upright fire-pot and a superposed steam-boiler, a relatively large heating area for the boiler; to secure a comparatively long travel of the heated products of combustion in contact with the water-table of the boiler; to construct the boiler in sections which can be separately passed through comparatively narrow door-openings; and utilize the feed-chute of the fire-pot as a part of a comparatively long gas-flue.

The invention is disclosed in the drawings and will be hereinafter fully described and subsequently pointed out in the claims.

Figure 1 is a central, vertical section of the improved heating apparatus. Fig. 2 is a horizontal section taken on the broken line 3—3 in Fig. 1. Fig. 3 is a vertical section of a portion of the apparatus taken on the broken line 4—4 in Fig. 1. Fig. 4 is a horizontal section similar to that seen in Fig. 2, showing a modified form of construction.

The boiler is made of two sections, 1 and 2, adapted to be secured together by means of the screw-bolts, 3, inserted through a flange, 4, in the lower section, and into screw-threaded apertures in the thickened portion, 5, of the upper section. The lower section is provided with the annular water-leg chamber, 7, the inner wall of which, 8, forms the vertical wall of the fire-pot. Situated at the lower end of the fire-pot is the grate, 9, which may be made of any known form. The pot and boiler are mounted upon an ash-pit frame 10, provided with a door, 12, in the usual manner, and a water-supply pipe, 13, enters the boiler at the lower end of

the annular chamber, as shown, and the steam-pipe, 14, is inserted in the upper part of the upper section of the boiler, as shown, adapted to convey steam to radiators not shown. The water-leg of the boiler may be provided with any desired number of strengthening plates 16. The upper section of the boiler is provided with a central opening, 20, adapted to register with the opening, 21, in the upper end of the water-leg section. The bottom wall of the upper section extends outwardly and upwardly from the opening, 20, to form an annular water-table, 22, the boiler being preferably filled with water approximately to the broken line, 23, known as the water-line.

Depending from the peripheral portion of the upper section is a series of lugs, 24, and projecting upwardly from the peripheral portion of the lower end of the water-leg section is a corresponding series of lugs 25. Affixed to these lugs arranged at such intervals as may be desired are the slats or bars, 27, secured by bolts 28. A casing, 30, preferably of galvanized sheet-metal, is made to inclose the fire-pot and the water-table of the upper section, as shown, the case-wall being secured to the bars, 27, by screw-threaded bolts, 31, and nuts, 32, to form a tight gas-chamber, 34, within the casing. The water-leg of the lower section may be still further strengthened, when desired, by flanges 35. There is projected laterally from the fire-pot a combined feed-chute and gas-flue, consisting of the rectangular conduit, 40, communicating with the fire-pot through the lateral opening, 41, therein, the outer end of the conduit being closed by means of the door, 42, hinged thereon at 43. The conduit-frame is secured in position on its upper side by means of the screw-bolts, 44, which unite the same with lugs, 45, projecting from the web, 46, cast integral with the upper boiler-section. On the lower side the flange, 47, is secured by bolt, 48, to the lug, 49, projecting from the web, 50, cast integral with the lower boiler-section. The side walls of the conduit forming the combined feed-chute and gas-flue are provided with oppositely disposed gas-outlets 51 and 52. The outlet, 52, is opened and closed by means of the valve, 53, fixed upon the pintle, 54, rotary in suitable bearings 56. The pintle projects out beyond the casing, and is provided with a crank-handle 58. When the valve, 53, is closed, as shown by the solid

lines in the drawing, the crank of the handle occupies the position directly in front of the door, 42, indicated by the solid lines, which locks the door in a closed position.

5 To open the door and swing it from the position shown by solid lines to that shown by dotted lines in Fig. 2, it will be necessary to open the valve, 53, to the position shown by dotted lines in Figs. 2 and 3, the handle
10 then occupying the position shown by the circular dotted line in Fig. 2, which permits the door to be swung open to the position shown by the dotted lines in Fig. 2. The gas-chamber formed by the casing, 30, is
15 divided above the feed-chute by the partition, 46, which is a web cast integral with the upper section of the boiler. Below the feed-chute the chamber is divided by the partition-plate, 60, secured by rivets, 61, to
20 the flange, 50, cast integral with the lower section of the boiler. The flange, 63, is formed integral with the plate, 60, and performs the same function as the bars, 27, in supporting the casing. The casing is provided
25 with the outlet-thimble, 65, leading from the gas-chamber, 34, to take off the products of combustion after they have passed from the fire-pot into the feed-chute, through opening, 51, and around the chamber
30 beneath the water-table in the direction of the arrows in Fig. 2, to such outlet. Such gases are taken through such outlet to a smoke-stack or chimney, not shown. When
35 desired, a smoke-outlet leading from the gas-chamber may be provided on the side of the apparatus opposite the door-opening of the feed-chute, as shown in Fig. 4, in which the
40 gas-outlet, 70, is located opposite the feed-chute. Each of the gas-outlets, 70 and 65, are provided with a branch-pipe leading to the smoke-pipe, 71, which in turn leads to a chimney or smoke-stack, not shown. The
45 branch-pipes are each provided with a valve or damper by which such pipes can be closed, the pipe leading from the outlet, 65, having the damper, 72, and the pipe leading from the outlet, 70, having the damper 73. When it is desired to use the outlet, 70, it is
50 only necessary to close the damper, 72, and open the valve, 53, the damper, 73, being open.

The products of combustion coming from the fire-pot after entering the feed-chute will divide, part passing through the opening, 52, and part through the opening, 51,
55 in the direction of the arrows shown in Fig. 4, passing thence along the gas-chamber directly beneath the water-table to the outlet, 70, thence through such outlet to the smoke-pipe leading to the chimney. It will thus
60 be seen that the products of combustion do not travel the whole length of the gas-flue in the gas-chamber, but travel half such distance, one-half the products of combustion
65 going through opening, 51, in one direction,

and the other half through opening, 52, in the opposite direction. Such a construction, by reducing the travel of the products of combustion one-half, tends to favor the
70 draft through the fire-pot, and every part of the overhanging water-table is reached by such heated products of combustion on their way from the feed-chute to the gas-outlet 70. Where the natural draft is weak, such a
75 form of construction will be preferable to the form shown in Fig. 2. When the draft is sufficient, then the heated products of combustion may be made to travel throughout the entire length of the water-table by
80 closing the damper, 73, and valve, 53, and opening damper 72. When the valve and dampers are arranged to divide the current and allow it to escape through outlet, 70, as
85 seen in Fig. 4, it is obvious that no dividing partition, 60, is required to close the gas-flue in the plane of the feed-chute.

The operation of the apparatus is as follows: When it is desired to replenish the fire-pot with coal by feeding the same
90 through the feed-chute, the valve, 53, is first opened by means of the crank-handle, 58, thereby unlocking the door of the feed-chute, which is then opened and the coal or other fuel inserted therein, after which the
95 door is closed. By opening the valve, 53, before the door, 42, is opened, the gases are taken by the natural draft out through the gas-outlet, 52, directly to the opening, 65, passing thence to the chimney, such draft
100 wholly preventing the escape of any gases out through the end-opening of the chute, when the door, 42, is opened. When the door, 42, is closed, the valve, 53, can be opened without opening the door, when it
105 is desired to increase the draft through the fire-pot, as, for example, when fresh fuel is added, and closed again when it is desired to take the heated products of combustion out through the gas-outlet, 51, and around the
110 gas-chamber beneath the water-table of the boiler to utilize the heat in the products of combustion.

By having the water-table, 22, inclined upwardly and outwardly, the heated gases which naturally rise are distributed along
115 the water-table and carried to the extreme outer portion thereof, which affords an exceedingly large heating area for transmitting heat to the water in the boiler, and the extended table also provides an exceedingly
120 large area of water-surface from which evaporation can take place.

By having the boiler-sections separable, and shaped substantially as described, an
125 exceedingly large boiler can be transported through ordinary doorways, which renders their introduction, into ordinary dwellings, feasible. When the sections are separated, the upper section can be taken through a
130 doorway by tipping the same over on edge.

And the casing being removed, the lower section of the boiler will easily pass through an ordinary doorway, whereby the diameter of the upper section can be made much greater than the width of ordinary doorways.

What I claim as new and desire to secure by Letters Patent is—

1. In a steam-heating apparatus, the combination with an upright fire-pot provided at its upper end with a laterally projecting feed-chute having a lateral gas-outlet; and a superposed steam-boiler having a water-table overhanging the fire-pot on all sides; of a case inclosing the fire-pot on all sides, coextensive, at its upper end, with and connected to the periphery of the water-table, with its lower end closed around the lower portion of the fire-pot, forming an annular chamber around the fire-pot; vertical partitions for dividing such chamber both above and below the feed-chute, whereby a gas-flue is formed leading from the lateral opening in one side of the feed-chute around the fire-pot, immediately under the overhanging portion of the water-table, to the opposite side of the feed-chute; and means, located at the end of such flue, for carrying off the products of combustion.

2. In a steam-heating apparatus, the combination with an upright fire-pot provided at its upper end with a laterally projecting feed-chute having in each of its opposite sides a lateral gas-outlet; and a superposed steam-boiler having a water-table overhanging the fire-pot on all sides; of a case inclosing the fire-pot on all sides, forming an annular chamber beneath the overhanging portion of the water-table, extending around the fire-pot; vertical partitions for dividing such chamber both above and below the feed-chute; a valve for closing one of the gas-outlets in the side walls of the feed-chute; and means for carrying off the products of combustion from such flue, located on that side of the feed-chute having the valved gas-outlet.

3. In a steam-heating apparatus of the class described, a steam-boiler composed of two separable sections, one section comprising an annular water-leg, the inner wall of which forms the fire-pot and is provided with a laterally projecting feed-chute, the other section being superposed upon the water-leg section and detachably secured thereto, and provided with an annular upwardly flaring water-table overhanging the water-leg section; and means for directing the products of combustion from the projecting part of the feed-chute horizontally along the under surface of the overhanging water-table and around the water-leg.

4. In a steam-heating apparatus of the class described, the combination with a steam-boiler composed of two detachable sections, the lower section consisting of a water-

leg surrounding the combustion-chamber, with its inner wall forming the fire-pot, and provided with a laterally extended feed-chute and gas-flue combined, having a gas-outlet in one of its side walls, the other boiler-section being superposed upon the water-leg section and provided with an outwardly and upwardly flaring water-table which overhangs the water-leg section; of a detachable case inclosing the water-leg section and the water-table of the upper section, forming a flue-chamber beneath the water-table surrounding the water-leg section, with which the combustion-chamber is in communication through the feed-chute and the gas-outlet in the chute-wall; upright partitions extending transversely of the flue-chamber, in line with the feed-chute; and means for taking off the products of combustion from the flue-chamber, on the closed side of the feed-chute.

5. In a steam-heating apparatus, the combination with an upright fire-pot provided with a laterally projecting feed-chute and gas-flue combined, having oppositely disposed gas-outlets in its side walls; of a superposed steam-boiler having an outwardly and upwardly projecting water-table overhanging the upper end of the fire-pot on all sides; a casing inclosing the fire-pot and water-table of the boiler, thereby forming an inclosed chamber surrounding the fire-pot and directly beneath the water-table of the boiler; means for dividing the chamber along an upright plane passing through the feed-chute; means for opening and closing the outer end of the feed-chute; means for opening and closing one of the gas-outlets in the side walls of the feed-chute, the other gas-outlet opening from the feed-chute into the gas-chamber surrounding the fire-pot; and means for taking gas from the gas-chamber through the casing on the valved side of the feed-chute.

6. In a steam-heating apparatus comprising an upright fire-pot provided with a laterally extended feed-chute and gas-flue combined, a superposed steam-boiler having an outwardly extended water-table overhanging the fire-pot, and a chamber-inclosing case-wall surrounding the fire-pot and the water-table, and forming a gas-chamber divided by upright partitions in the plane of the feed-chute, the side walls of the feed-chute having oppositely disposed gas-outlets leading into the gas-chamber on opposite sides of the upright partitions, and means for taking off gas from the gas-chamber through an outlet located on one side of the dividing partitions; the combination with a valve for opening and closing the gas-outlet in the feed-chute wall, on the side of the upright partitions neighboring the outlet from the gas-chamber; of a door for opening and closing the outer end of the feed-

chute; and means for operating the valve controlling the gas-outlet of the feed-chute, projecting exteriorly of the case and movable across the path of the door, outside of the same, when the valve is closed, and movable beyond the path of the door when such valve is open, whereby the door cannot be opened when the valve is closed.

7. In a steam-heating apparatus, the combination with an upright fire-pot provided with a laterally projecting feed-chute and gas-flue combined, having oppositely disposed gas-outlets in its side walls; of a superposed steam-boiler supported by the fire-pot and having an outwardly and upwardly projecting water-table overhanging the upper end of the fire-pot on all sides; a casing inclosing the fire-pot, water-table and gas-outlets in the sides of the feed-chute, thereby forming a gas-flue chamber surrounding the fire-pot and directly beneath the overhanging portion of the water-table of the boiler; means for opening and closing the outer end of the feed-chute; and means for taking the gas from the feed-chute horizontally around the fire-pot, along the upwardly-flaring under surface of the water-table, and out through the casing.

8. In a steam-heating apparatus, the combination with a steam-boiler made in two separable sections, one section being superposed upon, supported by and overhanging the other section, the overhanging portion having an upwardly and outwardly-flaring

under surface; of a fire-pot subjacent to the boiler; and means for circulating the products of combustion along the flaring under surface of the overhanging portion of the upper boiler-section, and horizontally around the lower boiler-section.

9. In a steam-heating apparatus, the combination with a steam-boiler composed of two separable sections, one section being superposed upon, supported by and overhanging the other section on all sides; of a fire-pot inclosed by the lower section and provided with a laterally projected feed-chute and gas-flue combined, having gas-outlets in its projecting side-walls; and means for horizontally circulating the heated gases escaping from such gas-outlets along the under surface of the overhanging portion of the upper boiler-section, and around the lower boiler-section.

10. In a steam-heating apparatus, the combination with a fire-pot; of a steam-boiler having a water-table overhanging the fire-pot on all sides; and means for horizontally circulating the products of combustion along the under surface of the overhanging portion of the boiler, and around the fire-pot.

In testimony whereof, I have hereunto set my hand this 19th day of January, 1909.

GEO. P. CAMPBELL.

Witnesses:

L. C. KENNEDY,
GEO. A. MOSHER.