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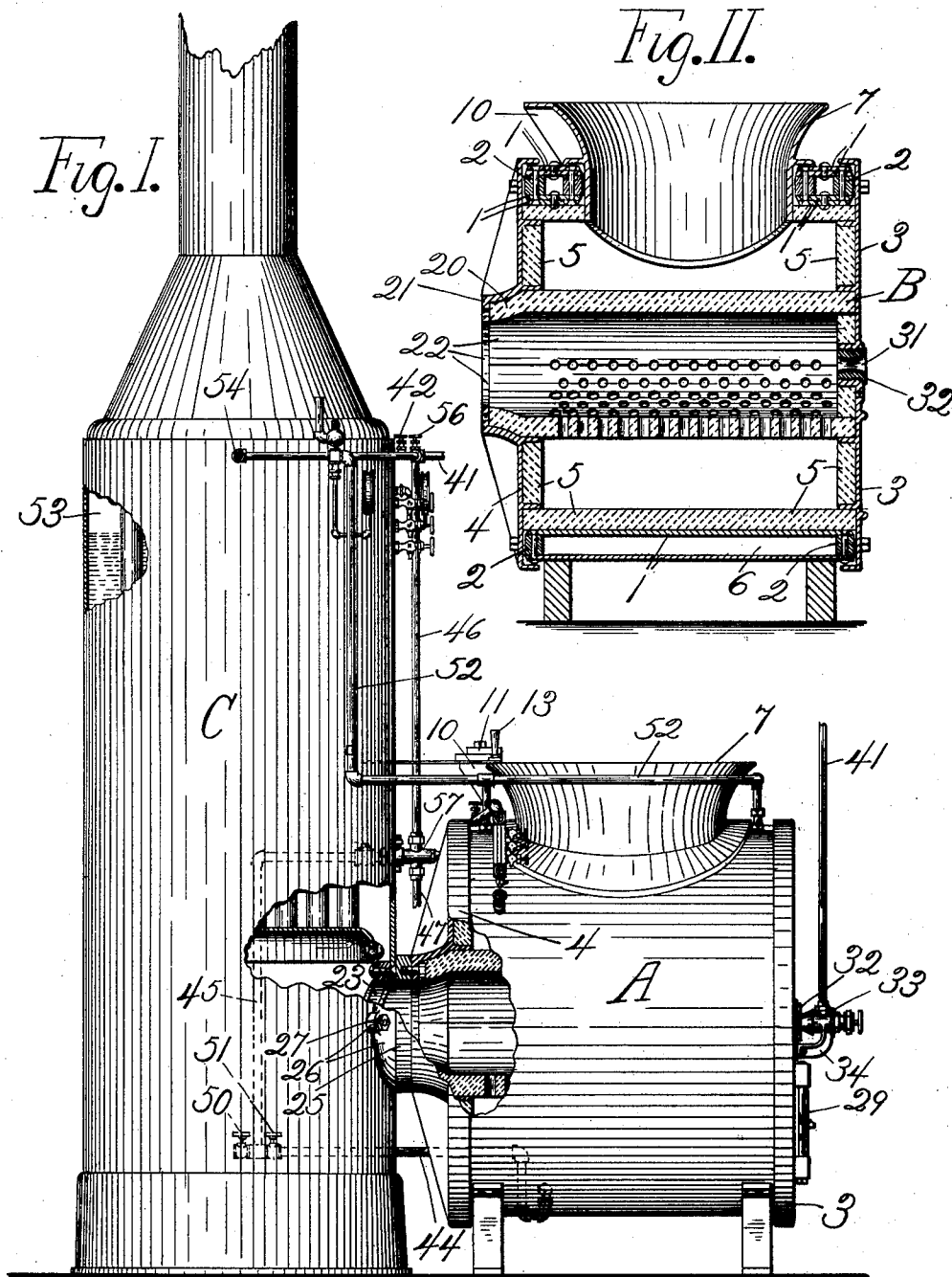
PATENTED APR. 19, 1904.

A. H. MYLIN & L. B. WHITE.
FURNACE.

APPLICATION FILED DEC. 3, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES:

Ch. Schorneck
McEagon.

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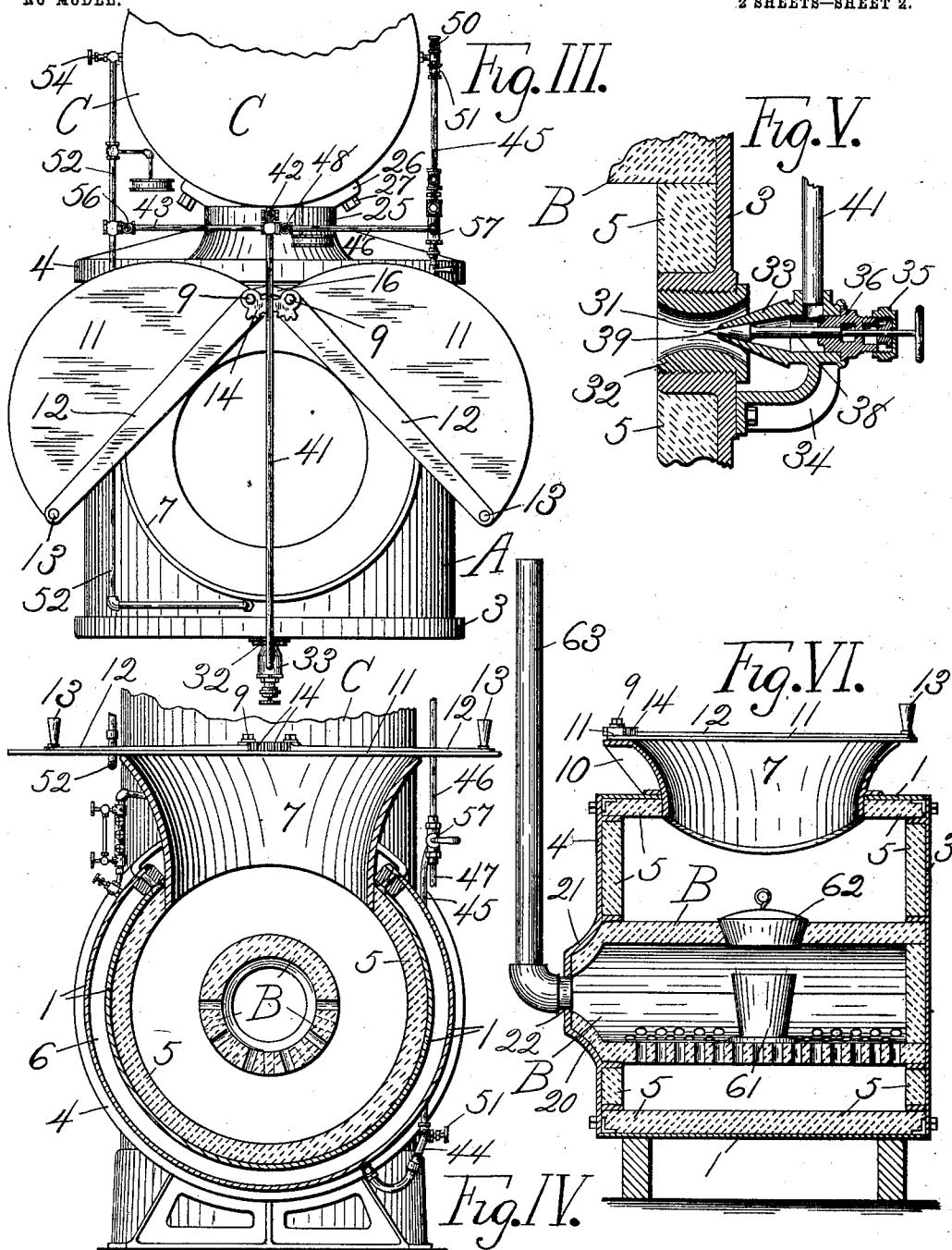
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UNITED STATES PATENT OFFICE.

AMOS H. MYLIN, OF LANCASTER, PENNSYLVANIA, AND LEWIS B. WHITE, OF JERSEY CITY, NEW JERSEY, ASSIGNORS TO CALORIC KING FURNACE COMPANY, OF BROOKLYN, NEW YORK, A CORPORATION OF NEW JERSEY.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 757,949, dated April 19, 1904.

Application filed December 3, 1903. Serial No. 183,608. (No model.)

To all whom it may concern:

Be it known that we, AMOS H. MYLIN, residing at Lancaster, Lancaster county, Pennsylvania, and LEWIS B. WHITE, residing at Jersey City, Hudson county, New Jersey, citizens of the United States, have invented certain new and useful Improvements in Furnaces; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to a furnace for generating a high degree of heat and effecting practically perfect combustion of the fuel and consumption of the smoke.

The important features of the invention are an outer casing or fuel-receptacle of any suitable shape forming an outer combustion-chamber and a shell of refractory material arranged within the outer chamber and forming an inner combustion-chamber, the latter chamber being in communication by openings in its lower portion with the outer chamber, said outer chamber being provided with an opening at the top for supplying fuel and air down and around the inner chamber and the inner chamber with a draft-outlet the size of which may be increased if the heat is to be delivered and utilized outside of the furnace and smaller, merely to conduct away the incombustible gases, if the heat is to be used inside. Except for this shell the interior of the receptacle is entirely open and without grate or other obstruction, so that it may be filled with coal, entirely surrounding the shell, which should be of refractory material to resist the intense heat. Means must be provided to insure a draft down through the top opening and out through the shell and means to regulate the amount of air to be admitted through the top opening to insure a sufficient supply for the combustion, but without a substantial surplus of air. The air passes down from the top opening through the coal from the coldest to the hottest part of the furnace while the gases are being progressively generated until intimately mixed together and

gradually raised in temperature the air and gases are delivered into the inner combustion-chamber, where the heat is highest and most of the combustion takes place. This shell is not clogged with coal or ashes, so that the inner chamber is maintained at a high and uniform heat and all the combustible gases are there consumed without waste and with a high efficiency of fuel.

Our invention is fully explained by reference to the drawings herewith, in which the reference letters and numerals of the specification indicate the same parts in all the figures.

Figure I is a side elevation of our furnace used with an ordinary upright boiler. Fig. II is a longitudinal section of the furnace detached. Figs. III and IV are respectively top plan and cross-section of our furnace. Fig. V is a sectional view of a desirable form of jet for injecting steam or air into the combustion-chamber to produce a draft. Fig. VI is a longitudinal section of another application of the furnace.

In Figs. I to V our invention is shown embodied in a suitable form to be used as auxiliary furnace, with boilers of ordinary construction for the generation of steam; but we do not wish to limit ourselves to this form, arrangement, or use.

In the figures, A indicates the outer casing, forming the outer combustion-chamber of the furnace of any suitable form. As here shown, it is composed of two concentric cylindrical portions 1 1, having rings 2 2 riveted between their ends, forming a water-jacket or auxiliary boiler 6, to which are secured the outer and inner heads 3 4, flanged on their interior to support the fire-brick lining 5, and the shell or inner combustion-chamber B, also of fire-brick or other suitable refractory material, and provided, preferably in its lower portion, with holes or small apertures of such size as to exclude the fuel from the combustion-chamber, but to admit thereto the air and the gases generated from the fuel. These gases are drawn into the combustion-chamber by the air entering through the hopper 7 or other

suitable opening at or near the top of the furnace and preferably provided with a swinging two-piece cover or lid of thin sheet metal. This cover may desirably be composed of two substantially semicircular halves 11 11, journaled at 9 9 on the bracket 10 on the main shell, provided with heavy edge strips 12 12 on their straight edges, handles 13 13, and at their bearings meshing racks 14 14, so that both may be swung by either handle to close the opening uniformly from each side. 16 16 are stops to limit the backswing of the cover-halves.

The inner combustion-chamber shell may be made in one or more pieces (here shown in two halves) and of a shape and size suitable to the particular use to which it is to be put. Here it is shown cylindrical and is provided on its inner end with nose 20, supported in extension 21 on inner head 4, through which is opening 22 for outflow of heat, here connected to main fire-box opening 23 of the upright boiler C, in connection with which our furnace may be utilized. Connection may be made between the extension and the main boiler-shell by an expansion-ring 25, bolted to the extension and provided with lips 26 and bolts 27 for securing it tightly to the boiler. In Fig. I is shown a clean-out door 29, which may be added, though commonly the ashes are so fine and so small in quantity that they may be blown out through the shell.

Our furnace may be used, as shown in Figs. I to V, in connection with an upright boiler C or boiler of other suitable construction, and when so used the water-jacket forms an auxiliary boiler with suitable connections to the main boiler. The downdraft through the shell may be produced by a stack connected to the external opening of the shell or by other suitable means. A desirable form for use with a steam-boiler is to provide the outer head of the furnace with jet-hole 31, which may be formed with tapering sides in a finishing-ring 32, having an angular head for the wrench, so that it may be adjusted from or toward the jet-nozzle 33 to regulate the air-supply entering with the steam into the combustion-chamber. The draft thus supplied to the interior of the shell through a suitable jet-nozzle might be compressed air; but we have shown steam connections thereto.

33 is the jet-nozzle carried on an arm 34, bolted to the outer head and having usual nut 35 and packing-box 36 for stem 38 of the tapering valve 39, arranged to close the jet-nozzle more or less, as may be desired. To the jet-nozzle is connected the steam-supply pipe 41, having valve 42, by which the steam for the draft is supplied from the main boiler or from the auxiliary boiler.

The main and auxiliary boilers are connected below by water-pipe 44, to which is connected injector-pipe 45 from injector 57.

47 is water-supply pipe, and 50 and 51 valves

controlling water-supply to main boiler and auxiliary boiler, respectively.

52 is steam-pipe connecting top of auxiliary boiler with steam space or dome 53 of main boiler and provided with valve 54, and 56 is valve in connecting-pipe 43 between steam-pipe and steam-supply pipe. 46 is steam-pipe to injector; 48, the valve therein. In this particular arrangement the valves may be closed to cut off the auxiliary from the main boiler and valve 56 opened, connecting the water-jacket to the jet. Then by a small fire in the furnace sufficient steam may be generated in the auxiliary boiler to produce a sufficient draft through the jet-nozzle. Valve 56 may then be closed and the other valves be opened to operate the jet-nozzle by steam from the main boiler and to connect the two boilers with a circulation between. The furnace is then filled up with coal.

In Fig. VI is shown another application of our invention in which the heat is not utilized outside of the furnace, but retained so far as possible, with the escape of comparatively little, to be utilized within for any desired purpose, as for melting metal in a crucible 61, introduced through an opening in the top of the shell, closed by a tapering plug or cover 62 of fire-brick. Here the outer casing is made single without a water-jacket, the jet-hole is closed, the external opening through the shell-nose made smaller, and the draft created by a suitable stack, as 63, which may be of comparatively small size.

Our furnace may be made of various forms and sizes and adapted for the production of heat for various purposes. For instance, it may be made in a limited number of standard sizes to be applied to various types of boilers now in use, or it may be made integral with the boiler. In either case the usual grate under the boiler may be omitted or in case of an old boiler may be left in place and preferably bricked up underneath.

The position of the inner combustion-chamber in the outer combustion chamber or receptacle may be varied for different fuels; but it must be sufficiently near the bottom of the receptacle to consume all the coal below. The holes in the shell are preferably in the bottom, so that the downdraft of air will pass through substantially all the coal, also so that the coal will not sift into the combustion-chamber.

As the gases are generated in the lower portion of the receptacle or outer combustion-chamber and the coal above left comparatively cold, the receptacle is preferably filled, so that often a fresh supply is not necessary for a considerable time.

As the supply of air and the speed of generation of the gases are controllable, the air and the amount of gases generated may be proportioned easily, so that the smoke and practically everything combustible is con-

sumed with the least loss and the highest efficiency of fuel.

By our new invention and arrangement of parts a simple and economical furnace is produced in which, the parts being properly proportioned, the fuel is burned under uniform conditions and a new principle of combustion and mode of operation is involved, so far as we know. It is particularly adapted for soft coal, but may be used with hard coal or other fuel. When the heat is retained in the furnace, an extreme degree of heat is obtained.

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

1. In a downdraft-furnace, the combination with an outer combustion-chamber, of an inner combustion-chamber in communication with the outer chamber, through the bottom wall of the inner chamber, said inner chamber being provided with an outlet, and means for furnishing a supply of fuel and air down and around the inner chamber.

2. In a downdraft-furnace, the combination with an outer combustion-chamber, of an inner combustion-chamber in communication with the outer chamber, through the bottom wall of the inner chamber, said inner chamber being provided with an outlet, means for furnishing a supply of fuel and air down and around the inner chamber, and means for controlling the supply of air.

3. In a downdraft-furnace, the combination with an outer combustion-chamber, of an inner combustion-chamber in communication with the outer chamber, through the bottom wall of the inner chamber, said inner chamber being provided with an outlet, means for furnishing a supply of fuel and air down and around the inner chamber, means controlling the supply of air, and means creating a forced draft.

4. In a downdraft-furnace, the combination with an outer combustion-chamber, of an inner combustion-chamber having an imperforate upper portion and a perforated lower portion through which communication is had with the outer chamber, said inner chamber being provided with an outlet, means furnishing a supply of fuel and air down and around the inner chamber, and means controlling the supply of air.

5. In a downdraft-furnace, the combination with an outer combustion-chamber, of an inner combustion-chamber having an imperforate upper portion and a perforated lower portion, said inner chamber being provided with a draft-outlet, the outer chamber being provided with an opening through which fuel and air are fed down and around the inner chamber, a damper for controlling the supply of air, and means creating a forced draft.

6. In a downdraft-furnace, the combination with a metallic casing forming an outer combustion-chamber, of a shell of refractory ma-

terial arranged within the casing and forming an inner combustion-chamber, said shell having openings in its lower portion through which communication is had with the outer combustion-chamber and being provided with an outlet, the outer chamber being provided with a top opening for the supply of fuel and air down and around the inner chamber.

7. In a downdraft-furnace, the combination with a metallic casing forming an outer combustion-chamber, of a shell of refractory material arranged within the casing and forming an inner combustion-chamber, said shell being provided with openings in its lower portion, by means of which communication is had with the outer chamber, and with an outlet, the outer chamber being provided with an opening at the top for the supply of fuel and air down and around the inner chamber, and means controlling the supply of air.

8. In a downdraft-furnace, the combination with an outer combustion-chamber, provided with an opening at the top through which a supply of fuel and air is fed down and around an inner chamber, the lower portion of said outer chamber being approximately semicylindrical in cross-section, of an inner combustion-chamber having an imperforate upper portion and having a draft-outlet, said inner combustion-chamber being in communication with said outer chamber.

9. In a downdraft-furnace, the combination with a casing forming an outer combustion-chamber having its lower portion substantially semicylindrical in cross-section, of a substantially cylindrical shell of refractory material arranged with its long axis substantially horizontal in the lower portion of the outer combustion-chamber, said shell having an imperforate upper portion and a perforated lower portion through which communication is had with the outer chamber, said outer chamber being provided with a top opening for the furnishing of a supply of air and fuel down and around the inner chamber, an outlet from one end of the inner combustion-chamber, a damper to regulate the supply of air through the top opening and means to produce a draft down through the top opening and out through the outlet.

10. In a downdraft-furnace, the combination with an outer combustion-chamber, a water-jacket around said chamber and a lining of refractory material to said chamber, of an inner combustion-chamber arranged within the outer chamber and communicating therewith through openings in the lower portion of the inner chamber, an upper opening in the outer combustion-chamber for furnishing a supply of fuel and air down and around the inner chamber, means controlling the supply of air, an outlet from the inner chamber, and means to create a draft in through the upper opening and out through the outlet.

11. In a furnace, the combination with an

outer casing having an air-opening in its top, of a fuel-hopper on the casing communicating with the opening, a bracket on the casing, semi-circular cover-halves pivotally supported on the bracket and adapted to close the opening, reinforcing-strips on the straight edges of the cover-halves, handles on the front ends of the reinforcing-strips, stops on the rear ends of the reinforcing-strips to engage when the cover-halves are swung back, meshing racks on both halves adjacent to the pivotal supports, a shell of refractory material within the casing having an external opening and holes for the admission of gas and air, and means to create an indraft through the air-opening and out through the shell.

12. In a furnace, the combination with a casing or fuel-receptacle composed of two concentric cylindrical boiler-shells, rings secured between the edges of said boiler-shells forming a water-space therebetween, and opposite circular heads secured to the respective ends of the rings, of a lining of refractory material within the casing, a fuel-hopper in the top of the casing communicating with the interior thereof through a suitable opening, a swinging cover on the hopper to regulate the admission of air through the opening, a cylindrical shell of refractory material supported between the heads and having a contracted nose arranged in an extension of one of said heads, said shell being provided with small holes for the entrance of the gas and air and with an external opening through said nose, and of means to produce an indraft through the hopper and out through the shell.

13. The combination in a main steam-generator and an auxiliary furnace therefor, of two concentrically-arranged cylindrical portions, rings secured between the edges of said portions forming a water-space or auxiliary boiler, inner and outer, circular heads secured to the respective ends of said auxiliary boiler having flanges on their inner faces and forming with the auxiliary boiler a fuel-receptacle, a fuel-hopper on the top of the receptacle communicating with a corresponding air and fuel opening, a swinging cover pivotally supported on the receptacle adjacent to the hopper to regulate the admission of the air through said opening, a cylindrical shell or combustion-chamber of refractory material centrally arranged in the receptacle between the heads and having small gas and air inlet holes on its lower portion, said shell having an external opening through said inner head to communicate with the fire-door of the main steam-generator and an opposite jet-hole through the outer head, a finishing-ring threaded to be adjustably fitted to the outer head and having the jet-hole, with a tapering interior, and an angular outer head to permit adjustment of the ring in the head, an arm bolted on the outer head adjacent to the jet-hole, a jet-nozzle supported on said arm

and arranged partially within the jet-hole, a tapering valve in the nozzle, a steam-supply pipe to the nozzle, pipes connecting the auxiliary boiler and the boiler of the main generator both above and below, a water-supply pipe, and suitable valves in said pipes.

14. The combination in a main steam-generator and an auxiliary furnace therefor, of two concentrically-arranged cylindrical portions, rings secured between the edges of said portions forming a water-space or auxiliary boiler, inner and outer circular heads secured to the respective ends of said auxiliary boiler having flanges on their inner faces and forming with the auxiliary boiler a fuel-receptacle, a fuel-hopper on the top of the receptacle communicating with a corresponding air and fuel opening, a swinging cover pivotally supported on the receptacle adjacent to the hopper to regulate the admission of the air through said opening, a cylindrical shell or combustion-chamber of refractory material centrally arranged in the receptacle between the heads and having small gas and air inlet holes on its lower portion, said shell having an external opening through the inner head to communicate with the fire-door of the main steam-generator and an opposite jet-hole through the outer head, a finishing-ring threaded to be adjustably fitted to the outer head and having the jet-hole with a tapering interior and an angular outer head to permit adjustment of the ring in the head, an arm bolted on the outer head adjacent to the jet-hole, a jet-nozzle supported on said arm and arranged partially within the jet-hole, a tapering valve in the nozzle, a steam-supply pipe to the nozzle from the main steam-generator, a steam-pipe connecting the tops of the auxiliary boiler and the boiler of the main generator, a connection-pipe between the steam-pipe and the steam-supply pipe, a water-pipe connecting the lower portions of the two boilers, a water-supply pipe to the water-pipe and suitable valves in said steam and water pipes.

15. The combination in a main steam-generator and an auxiliary furnace therefor, of two concentrically-arranged cylindrical portions, rings secured between the edges of said portions forming a water-space or auxiliary boiler, inner and outer, circular heads secured to the respective ends of said auxiliary boiler having flanges on their inner faces and forming with the auxiliary boiler a fuel-receptacle, a fuel-hopper on the top of the receptacle communicating with a corresponding air and fuel opening, a swinging cover pivotally supported on the receptacle adjacent to the hopper to regulate the admission of the air through said opening, a cylindrical shell or combustion-chamber of refractory material centrally arranged in the receptacle between the heads and having small gas and air inlet holes on its lower portion, said shell having a contracted nose arranged in an extension in

the inner head, and being provided with an external opening through said nose and inner head to communicate with the fire-door of the main steam-generator and with an opposite
5 jet-hole through the outer head, a packing-ring on the inner-head extension, flanges on the inner packing-ring to be bolted to the main steam-generator making a tight joint therewith, a jet-nozzle arranged partially
10 within the jet-hole, a steam-supply pipe to the nozzle, pipes connecting the auxiliary boiler

and the boiler of the main generator both above and below, a water-supply pipe, and suitable valves in said steam and water pipes.

In testimony whereof we affix our signatures 15
in presence of two witnesses.

AMOS H. MYLIN.
LEWIS B. WHITE.

Witnesses:

SEABROOK WADDELL,
LESTER W. BARBIER.