W. P. BARCLAY.

STEAM BOILER FURNACE.

APPLICATION FILED JULY 1, 1908.

1,126,685.

Patented Feb. 2, 1915.

4 SHEETS—SHEET 1.

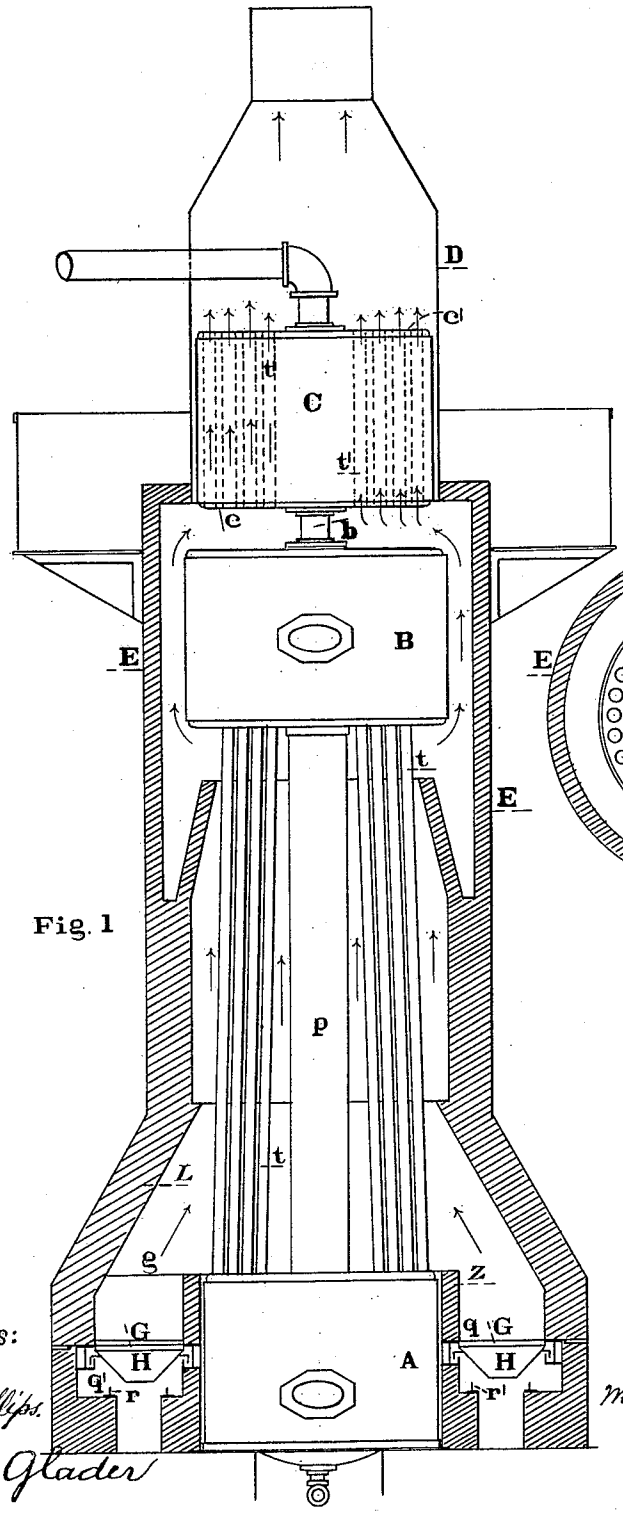


Fig. 1

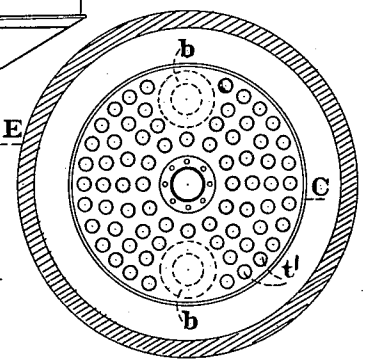


Fig. 6

WITNESSES:

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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4 SHEETS—SHEET 2.

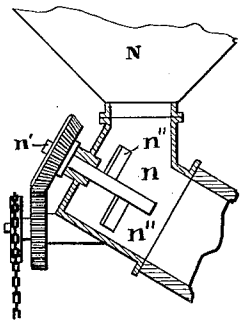


Fig. 7.

Fig. 2

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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4 SHEETS—SHEET 3.

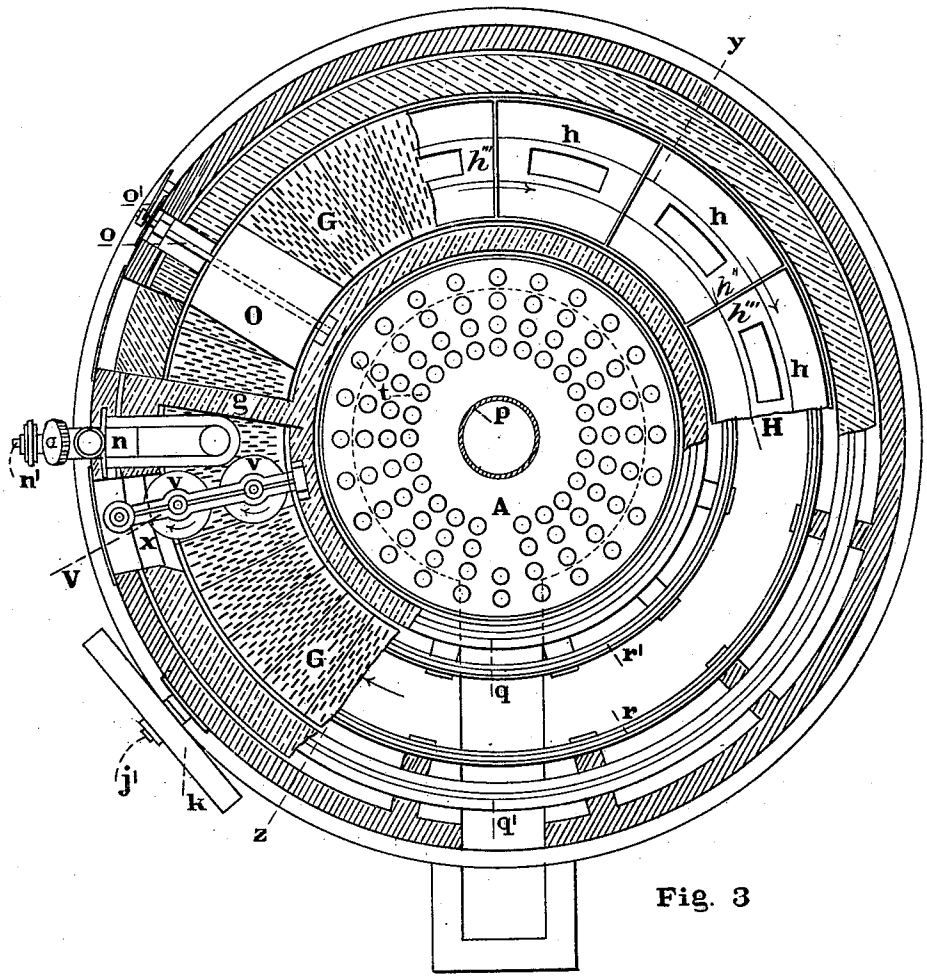


Fig. 3

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4 SHEETS—SHEET 4.

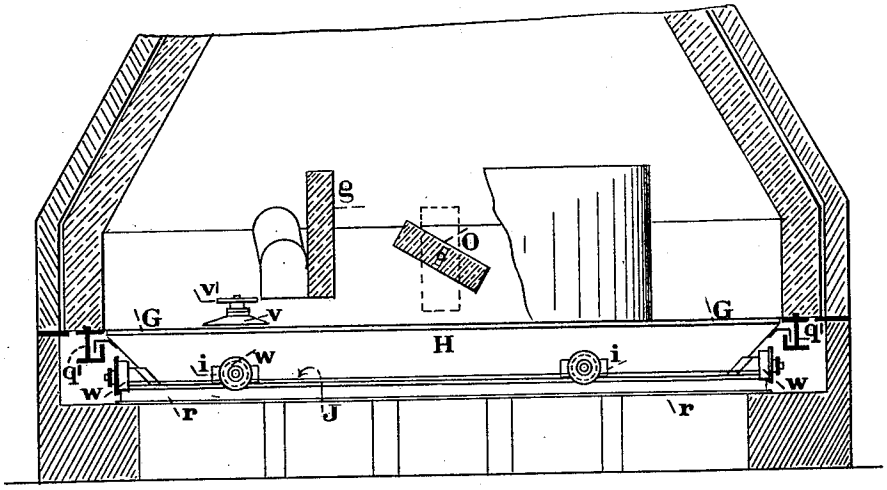


Fig. 4

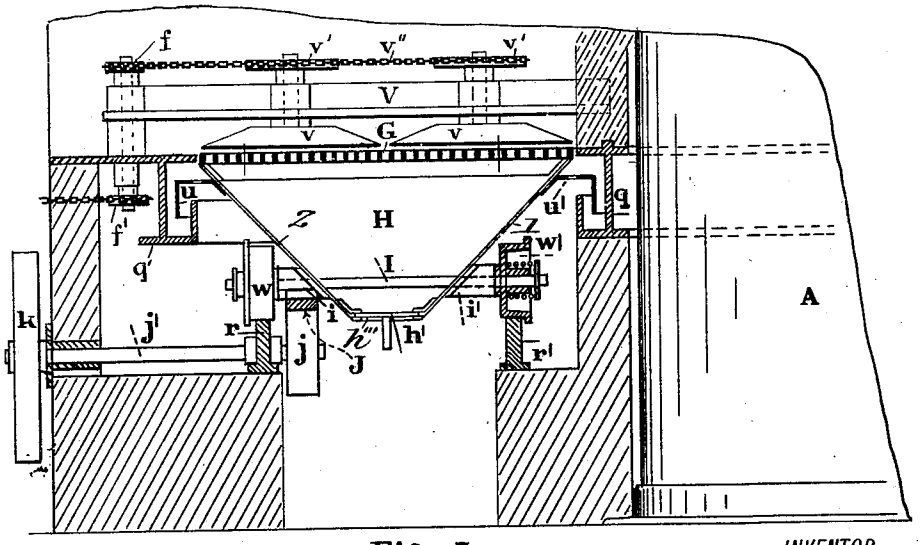


Fig. 5

WITNESSES:

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UNITED STATES PATENT OFFICE.

WILLIAM PARIS BARCLAY, OF CHICAGO, ILLINOIS.

STEAM-BOILER FURNACE.

1,126,685. Specification of Letters Patent. Patented Feb. 2, 1915.

Application filed July 1, 1903. Serial No. 441,318.

To all whom it may concern:

Be it known that I, WILLIAM PARIS BARCLAY, 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-Boiler Furnaces, of which the following is a specification; and I do hereby declare the following to be a full, clear, and exact description of my invention, such as will enable others skilled in the art to which said invention appertains to make and use the same.

My invention relates to improvements in steam boiler furnaces, and has for its object improved means for carrying and rotating an annular and hubless grate; to provide improved means for delivering fuel upon the grate, and improved means for removing the ashes from the revolving grate: to provide improved means for deflecting heated gases upon the unignited fuel to assist rapid ignition thereof; and to provide a furnace structure of improved construction in general and in detail.

More particular objects of my invention will become apparent from the following description taken in conjunction with the accompanying drawings.

Figure 1, shows a sectional elevation of a vertical boiler furnace and centrally located therewith a vertical boiler. Fig. 2, shows an enlarged sectional elevation of a boiler furnace with appurtenances as parts thereof, and located relatively to a vertical boiler. Fig. 3, is a plan view partly sectional showing approximately the relative positions of several parts of the furnace with each other, and to the lower drum of the boiler. Fig. 4, shows a sectional elevation through the walls of the lower portion of the furnace, and an exterior view of the ash-pan with the exterior wing thereof projecting into the pocket of a lintel, in proximity thereto. Fig. 5, shows partly in section a view through the trough of the ash-pan, and means for carrying and revolving the ash-pan, and a side view of means for removing the ashes from the revolving grate of the ash-pan. Fig. 6, shows a sectional plan view of the upper part of the furnace wall, and an exterior plan view of the superheater drum of a boiler. Fig. 7, is an enlarged view, partly sectional showing the lower portion of the coal hopper and its adjoining pipe provided with a gear operated spindle.

Similar letters refer to similar parts throughout the several figures.

The boiler furnace as shown, is particularly adapted for steam boilers of the vertical type, in which a lower drum A and an upper drum B are connected together by water tubes t, and a central water pipe p.

The walls L and Z of the furnace are circular and concentric with each other, and the inner wall Z is of a size to surround the lower drum of a vertical boiler.

The inner portion of the wall L of the furnace, is supported by a circular lintel q', that is formed with a circular pocket or recess. The inner wall Z of the furnace, is supported by a circular lintel q, and the said lintel is also formed with a circular pocket or recess. The pockets provided in the lintels q' and q, entirely surround the said lintels, so that the projecting wings of a revolving ash-pan will reach therein, and be the means of forming an air seal, between the said ash-pan and the lintels q' and q in proximity thereto.

The furnace casing E, reaches above the steam drum B a short distance and forms a chamber for the smoke and heated gases to enter the tubes t', located within the superheater drum C.

The furnace ash-pan H is annular and of a trough-shape, and is formed of two conical shells 1 and 2 of sheet metal joined together by an annular bottom h''', and several vertical division plates h'', so that the said annular ash-pan is divided into several chambers h. In the annular bottom h''' and centrally located to each chamber h, is an opening or port that is provided with a sheet metal slide valve h', so that the said ports formed in the annular bottom h''' of the ash-pan can be partly or entirely closed, by their respective sheet metal slide valves h'. The furnace ash-pan H, is provided with axles I, secured to the ash-pan by bearing boxes i, i', attached to the conical shells 1 and 2 of the ash-pan H.

The axles I, are provided with pivoted wheels w, w', that revolve upon circular and stationary rails r, r', concentrically situated with each other, and to the walls of the furnace.

The friction wheel J, surrounds the exterior circumference of the conical shell 2 of the ash-pan H, and is rigidly attached thereto.

The friction pinion j, is mounted on a

spindle j', provided with a driving pulley or wheel k, and the pinion j meshes with the wheel J, and is a means of causing the ash-pan H to rotate when said pulley or wheel k, is caused to revolve.

The furnace ash-pan H, is provided with an annular and hubless fuel grate G, that covers and spans the annular trough between the conical shells 1 and 2 of the furnace ash-pan, and the said grate is carried and revolves with the said ash-pan.

The furnace ash-pan H, is further provided with circular projecting wings u, u', that surround the conical shells 1 and 2, of the ash-pan, and the said wings project into the pockets or recesses formed upon and around the lintels q, q'.

The heat deflector plate O, of the furnace, is centrally suspended by a spindle o, pivoted from the walls L, and Z; and attached to one end of said spindle is a lever o', that is firmly secured to the spindle o, of the heat deflector plate, so that the said deflector plate can be held at different angles to the plane of the revolving fuel grate G, and be a means of deflecting the ignited gases back and upon the unignited fuel upon the revolving grate that is traveling toward the heat deflector plate O.

The centrally suspended heat deflector plate O, is also serviceable as an adjustable fuel spreader, to the fresh fuel upon the revolving grate G traveling toward the centrally suspended and pivoted deflector plate, by increasing or decreasing the height of the lower edge of the said heat deflector plate O relative to the surface of the revolving grate G, by changing the angle at which said deflector plate O occupies, to the plane of the revolving grate.

Situated above and close to the surface of the revolving grate G, are two revolving cone-disks v formed with spindles taking through and suspended from the frame V; and attached to the spindle part of the cone-disks are small chain wheels v', that are caused to revolve by a link chain v'' taking over a pulley or wheel f, secured to spindle part of the link chain wheel f'. The arrows shown on the cone-disks in Fig. 3, indicating the direction of rotation of the cone-disks to the direction of revolution as shown by arrows of the furnace ash-pan H, that carries the fuel grate G.

Between the heat deflector plate O and the cone-disks v, is a projecting inclined pipe n, that takes through the wall L of the furnace, and secured to the upper part of said pipe n, is an incline-hopper N, that is entirely free from the furnace wall, so that the heat of the furnace does not ignite the fuel within the hopper N. The incline-pipe n, is provided with a gear operated pivoted spindle n' provided with propeller blades n'' within the branch n, so as to force the fuel down and out from the pipe n onto the revolving grate G, of the furnace ash-pan H.

Having described the several parts relative to my improvements in boiler furnaces, the operation of the same is as follows: The annular and trough-shaped ash-pan H, is caused to revolve by suitable belt connection with the driving pulley k, acting through the spindle j', and the friction wheel j meshing with the friction wheel J rigidly secured to the side of the ash-pan. The carrying wheels w, w', of the furnace ash-pan, are pivoted in pairs to the axles I and revolve upon circular rails r, r', concentrically situated with each other, so as to form a double rail track to support the furnace ash-pan H.

The grate G of the furnace ash-pan H, is a plain grate and devoid of dead sections at the ends of the sections of the grate, so as to permit air to pass through the full length of each section of grate, so that the grate will be less liable to warp or twist from the heat of the fuel thereon.

The sheet metal slide valves h', of the furnace ash-pan permits of a regulated minimum and maximum amount of air to pass through the ports in the annular bottom of the ash-pan that are regulated in size by the said valves h'; and permits also a free discharge of ash that falls into the ash-pan from the grate G of the ash-pan.

The sheet metal wings u, u', of the furnace ash-pan H, in conjunction with the lintels q, q', is a means of forming an air seal between the said lintels, and the conical shells 1 and 2 of the said ash-pan, so that an influx of air to the furnace is prevented between the said lintels and the said shells of the furnace ash-pan.

The fuel supplied to the grate G of the furnace ash-pan H, is first disposed in the hopper N, and subsequently falls into the incline-pipe n, and is mechanically forced therefrom by a gear operated spindle provided with propeller blades within the incline pipe n.

The centrally suspended heat deflector plate O, is also used to bear upon and spread the fuel across the grate G, as it passes underneath thereof, and thereby cause an even distribution of the fuel across the grate G.

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

1. In a boiler furnace, the combination of an annular and hubless ash-pan comprising spaced inner and outer downwardly converging conical shells, connected by sheet metal vertical division plates, and an annular ported bottom, slide valves mounted on the said annular bottom, so that a free exit for ashes and a supply of air is permitted through the annular bottom of the ash-pan, a grate mounted upon and spanning the annular trough of the ash-pan, bearing

boxes attached to the conical shells of the ash-pan provided with axles, pivoted wheels mounted on the said axles and circular rails beneath the pivoted wheels supporting the ash-pan through the said wheels and axles, so that the ash-pan with its grate can be rotated in a circular path between the walls of the furnace.

2. In a boiler furnace, the combination of an annular ash-pan, a grate mounted thereon for fuel purposes revolving with the ash-pan, a frame extending across the revolving grate provided at its outer end with pivoted chain wheels, revolving cone-disks in close proximity to the revolving grate pivoted from the said frame, chain wheels pivoted to the spindles of the cone-disks, and link chains connecting the said chain wheels, so that a revolving motion is given to the cone-disks so that the refuse upon the revolving grate will be removed by the revolving action of the cone-disks, as the revolving grate passes underneath the revolving cone-disks.

3. In a boiler furnace, the combination of an annular and hubless revolving ash-pan, a grate mounted thereon for fuel purposes, a centrally suspended heat deflector plate above the revolving grate provided with a pivoted spindle supporting the deflector plate, a lever secured to the said spindle for adjusting the said heat deflector plate at different angles to the plane of revolution of the face of the grate, so that the said deflector plate will be of service in spreading the fresh fuel upon the revolving grate, and also act as a means of deflecting heat upon the fresh and unignited fuel.

4. In a boiler furnace an annular ash-pan comprising spaced inner and outer downwardly converging conical shells connected by sheet metal division plates and an annular ported bottom, slide valves mounted on said annular bottom, that a free exit for ashes and a supply of air is permitted through the ports of the ash-pan bottom, a grate mounted upon and spanning the annular trough of the ash-pan, bearing boxes attached to the conical shells of the ash-pan, and axles attached to said bearing boxes provided with pivoted wheels, bearing upon circular stationary rails.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM PARIS BARCLAY.

Witnesses:
D. J. PHILLIPS,
W. E. GLADER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."