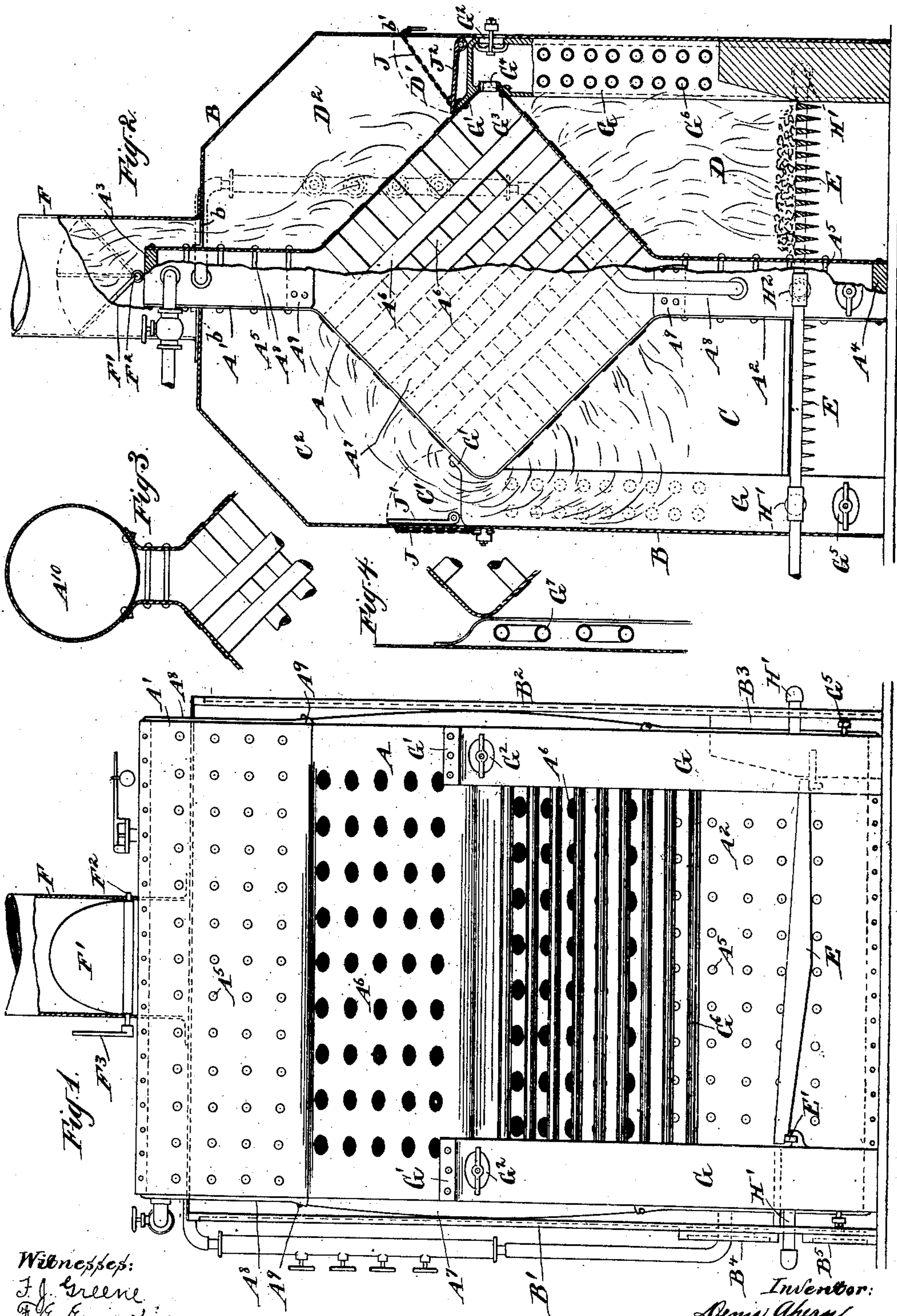


No. 826,820

PATENTED JULY 24, 1906.

D. AHERN.
STEAM BOILER.

APPLICATION FILED APR. 10, 1906.



Witnesses:
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UNITED STATES PATENT OFFICE.

DENIS AHERN, OF NEW YORK, N. Y.

STEAM-BOILER.

No. 826,820.

Specification of Letters Patent.

Patented July 24, 1906.

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To all whom it may concern:

Be it known that I, DENIS AHERN, a citizen of the United States, residing in the city of New York, borough of Manhattan, in the county and State of New York, have invented a certain new and useful Improvement in Steam-Boilers, of which the following is a specification.

The invention relates to boilers of the type shown in United States Letters Patent to me, dated June 19, 1894, No. 521,532, in which the body of the boiler is rectangular in cross-section, set with its diagonals in horizontal and vertical lines, and filled with tubes extending in diagonal lines between opposite plane faces.

The object of the present invention is to simplify the construction, lessen the cost of manufacture, and increase the efficiency of the boiler.

The invention consists in certain novel features, details of construction, and arrangements of parts, by which the above objects are attained.

The accompanying drawings form a part of this specification and show the invention as it has been carried out.

Figure 1 is a side view with a portion of the casing removed to show the boiler and one of the furnaces. Fig. 2 is a corresponding front view with the boiler-front removed, partly in vertical section. Fig. 3 is a vertical section showing a modification of the steam-chamber, and Fig. 4 is a vertical section showing a modified form of the feed-heating portion of the apparatus.

Similar letters of reference indicate like parts in all the figures.

Referring to Figs. 1 and 2, A is the main rectangular portion or body of the boiler, A' is an upward extension from the upper angle, serving as a steam drum or chamber, and A² is a similar, but preferably longer, downward extension or water-leg from the lower angle. B is an inclosing casing for the sides of the boiler and furnaces extending horizontally above to the steam-chamber, and B' B² are respectively the boiler-front and corresponding casing for the rear. The former is equipped with fire-doors and ash-pit doors B⁴ and B⁵, as usual. There are two furnaces each the counterpart of the other, one on each side of the water-leg, forming one wall thereof. The grate-bars E extend nearly the full length of the boiler and are supported at the rear on a masonry wall B³ or otherwise and at the front

on a bearing-bar E', carried at one end by the water-leg and at the other by a water-pillar G, to be described. The sides of the boiler, steam-chamber, and water-leg are each a single plate of steel or boiler-iron, joined at the upper edge to a strip or separating-piece A³, forming the top of the steam-chamber, and to a similar strip A⁴ at the lower edge, forming the bottom of the water-leg. The faces of the steam-chamber and water-leg are vertical and parallel and sustained by stay-bolts A⁵. The opposite faces of the body A are diagonal and parallel and are joined by diagonally-extending tubes A⁶, secured to the shell by expanding as usual, arranged in vertical rows, each row crossing the next adjacent at an angle. A⁷ A⁷ are heads for the body, each a single plate slightly "dished" and set with the convex face outward. The heads of the steam-chamber and water-leg are narrow plates A⁸ A⁸, lapped upon and riveted at the ends to slight extensions of the main heads A⁷, as at A⁹. As before stated, the casing B joins the steam-chamber A' near the top, and it is provided on each side thereof with an opening b, surrounded by the base of a stack F, straddling the upper part of the steam-chamber and permitting the escape of the products of combustion from the furnaces. F' is a flue-damper mounted in the stack on a shaft F² close to the upper face of the steam-chamber, operated by a lever F³ and arranged to swing from side to side or to assume a central vertical position, by which either or both openings b may offer free passage for the gases from the furnaces to the stack.

The angles at the sides of the body are rounded, as shown, and attached thereto at the front and rear on each side are water-pillars G, each preferably a hollow steel casting set vertically and serving with the water-leg to support the boiler. Each pillar is shaped to match the rounded angle of the boiler and is provided with an exterior flange G', lapped upon and riveted to the upper inclined face of the body and with a hand-hole G², through which the interior rivets G³ are set in joining the pillar to the lower inclined face. Opposite the hand-hole G² an opening is drilled and tapped through the inner wall of the pillar and the angle of the boiler, in which is screwed a thimble G⁴, through which water may circulate between the interior of the boiler and the pillar. At the front faces of the forward pillars and the back faces of the rear pillars near the lower ends are hand-

holes G^5 for cleaning purposes, and at any convenient points on such faces are connections H' to feed-water pipes H , also connected, as at H^2 , to the water-leg, so that circulation of water between the pillars and water-leg may take place. The pillars on each side of the boiler are joined by horizontal pipes G^6 , each series extending from near the top to a masonry wall forming the outer side of each fire-space C and D . Lugs on the forward pillars support the outer ends of the bearing-bars E' . Water entering through the feed-pipes H is forced into the pillars near the bottom, a portion also entering the water-leg at H^2 and flows upward, circulating through the pipes G^6 , exposed to the heat of the furnace, and enters the body of the boiler at a high temperature through the thimbles G^4 . The pillars also serve as corner-supports for the casing B and boiler-front.

J' J^2 are long horizontal gates pivotally connected to the casing B on the interior and arranged when lowered to lie upon the upper faces of the body and close the long openings or passages C' D' between the boiler and the casing on each side and when raised to afford free passage for the gases therethrough from the fire-spaces C D to the heat-chambers C^2 D^2 above. The gates are operated by chains J , extending through openings b' in the casing and serve with the flue-damper F' in directing the hot gases from the furnaces through the tubes and around the body of the boiler. As shown in Fig. 2, the furnace D alone is in operation, the gate J^2 is closed, the gate J' is open, and the damper F' is thrown to the left. Thus the gases from the furnace D pass diagonally upward from right to left through the tubes A^6 into the heat-chamber C^2 , thence downward through the open gate J' and passage C' into the fire-space C above the idle grate, diagonally upward through the oppositely-inclined tubes into the heat-chamber D^2 and through the opening b to the stack, bathing the body of the boiler on four sides and making two complete traverses therethrough, besides bathing both faces of the water-leg. By reversing the positions of the gates and damper the furnace C may be fired in like manner. By closing both gates and setting the flue-damper in the vertical position both furnaces may be operated when extremely rapid steaming is necessary, the gases in such case passing through the boiler-tubes and escaping to the stack on opposite sides.

Water and steam gages, blow-off connections, safety-valve, water-column, and other usual boiler equipments will be understood to be supplied, and these, with other parts and accessories omitted or not fully shown, may be of any ordinary or approved types. By making the sides of the boiler-body, steam-chamber, and water-leg of two single rectangular plates the cost of construction

and the liability to leakage is lessened. By the arrangement of gates and damper with double furnaces the consumption of fuel may be closely proportioned to the steam requirements, resulting in fuel economy. The water-pillars serve to support the boiler, and by their water-tube connections the heating-surface and steam-producing qualities are increased.

Modifications may be made in the forms and proportions without departing from the spirit of the invention, and parts may be used without the whole.

A cylindrical steam-drum, as at A^{10} in Fig. 3, may be set upon the steam-chamber, if preferred, and the water-pillars with their tubes omitted, or simple coils G^7 , as in Fig. 4, or pipes having return bends may be substituted therefor and connected to the body and water-leg at convenient points. I prefer the whole as shown.

I claim—

1. In a boiler having a body of rectangular cross-section set with its diagonals vertical and horizontal, and a steam-chamber and water-leg extending respectively upward and downward from the upper and lower angles thereof, water-pillars each comprising a hollow casting secured to the horizontal angles of such body on each side thereof at the front and rear, thimbles extending from the interior of said pillars at their upper ends to the interior of said body, horizontal tubes between the water-pillars of each side, and pipe connections from the lower ends of said pillars to said water-leg.

2. In a boiler having a body of rectangular cross-section set with its diagonal vertical and horizontal, and a steam-chamber and water-leg extending respectively upward and downward from the upper and lower angles thereof, a grate on each side of said water-leg, a casing inclosing said body, grates, and water-leg and extending to said steam-chamber to form two furnaces one for each side of the boiler, a stack communicating with each of said furnaces through openings in said casing, boiler-tubes extending from the lower angular faces of said body to the upper opposite faces thereof, and means for controlling said openings whereby said furnaces may be fired independently or together, substantially as and for the purposes specified.

3. In a boiler having a body and a steam-chamber and water-leg extending respectively upwardly and downwardly therefrom, a fire-space on each side of said water-leg, a casing inclosing said body, fire-spaces and water-leg and extending to said steam-chamber to form two furnaces one for each side of the boiler, each having a fire-space below and heat-chamber above connected by a passage between said body and casing, openings in said casing on each side of said steam-chamber and leading from said heat-chambers to a stack,

boiler-tubes extending from the fire-space of each furnace through said body to the heat-chamber of the other, means for controlling said stack-openings, and means for controlling said passages, whereby said furnaces may be fired independently or together, substantially as and for the purposes specified.

4. In a boiler having a body of rectangular cross-section set with its diagonals vertical and horizontal, and a steam-chamber and water-leg extending respectively upward and downward from the upper and lower angles thereof, a fire-space on each side of said water-leg, a casing inclosing said body, fire-spaces and water-leg and extending to said steam-chamber to form two furnaces one on each side of the boiler, each having a fire-space below and heat-chamber above connected by a passage between the side angle of said body and said casing, a stack communicating with the heat-chamber of each furnace through openings in said casing, boiler-tubes extending from the fire-space of each furnace through said body to the heat-chamber of the other, means for controlling said stack-openings, and means for controlling said passages, whereby said furnaces may be fired independently or together, substantially as and for the purposes specified.

5. In a boiler having a body of rectangular cross-section set with its diagonals vertical

and horizontal, and a steam-chamber and water-leg extending respectively upward and downward from the upper and lower angles thereof, a fire-space on each side of said water-leg, a casing inclosing said body, fire-spaces, and water-leg and extending to said steam-chamber to form two furnaces one on each side of the boiler, each having a fire-space below and a heat-chamber above connected by a passage between the side angle of said body and said casing, a stack above said steam-chamber communicating with the heat-chamber of each furnace through openings in said casing on each side of said steam-chamber, boiler-tubes extending from the fire-space of each furnace to the heat-chamber of the other, a swinging flue-damper in said stack constructed to open either of said openings and close the other or to open both together, and pivoted gates controlling said passages, and operating means therefor, whereby said furnaces may be fired independently or together substantially as and for the purposes specified.

In testimony that I claim the invention above set forth I affix my signature in presence of two witnesses.

DENIS AHERN.

Witnesses:

CHAS. A. HAUCK,
CHARLES R. SEARLE.