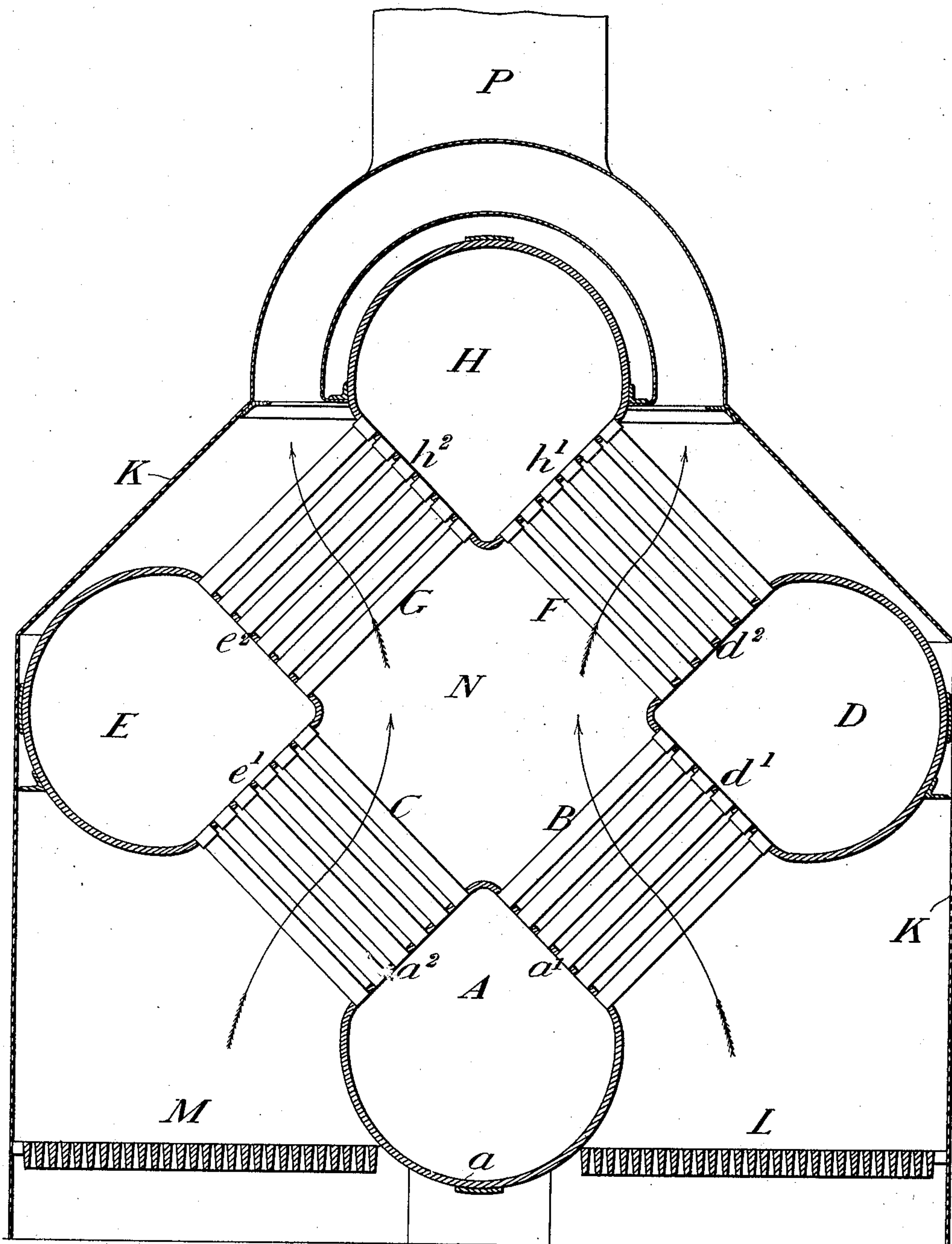


(No Model.)

J. H. HOPWOOD.
WATER TUBE BOILER.

No. 603,565.

Patented May 3, 1898.



Witnesses:
James R. Mansfield
Wm. Sullivan

Inventor:
John Henry Hopwood
by his attorneys
Alexander & Lowell

UNITED STATES PATENT OFFICE.

JOHN HENRY HOPWOOD, OF HULL, ENGLAND, ASSIGNOR OF ONE-HALF TO
ROSE, DOWNS & THOMPSON, LIMITED, OF SAME PLACE.

WATER-TUBE BOILER.

SPECIFICATION forming part of Letters Patent No. 603,565, dated May 3, 1898.

Application filed December 20, 1897. Serial No. 662,690. (No model.)

To all whom it may concern:

Be it known that I, JOHN HENRY HOPWOOD, a citizen of England, residing at 12 Middleton street, Hull, in the county of York, England, have invented a new and useful Improvement in Water-Tube Boilers, of which the following is a specification.

This invention relates to a construction of water-tube boiler such as is shown in the accompanying drawing, representing a transverse section.

From a central water-drum A, having a transverse section consisting of a semicircle a below and two upper flat sides a' a^2 inclined to the vertical at an angle and forming tube-plates, two sets of inclined tubes B C extend, the one set, B, to the right and the other, C, to the left, to corresponding inclined sides d' e' , forming tube-plates in two side water-drums D E, which are of the same shape as the water-drum A, laid on its side. From the other inclined sides d^2 e^2 of the drums D E inclined tubes F G extend to corresponding inclined sides h' h^2 of a central steam and water drum H at the top, the drum being, like the water-drum A, inverted. Thus there are four drums A, D, E, and H of similar shape, and four sets of inclined water-tubes B, C, F, and G, connecting them, all inclosed within a suitable casing K, along with two fire-chambers L M, one on each side of the central water-drum A. The flames and products of combustion ascend on each side in a direction inclined inward between the two lower sets of tubes B and C into a space N in the middle, and thence they ascend in a direction inclined outward between the upper sets of tubes F and G and then pass to a chimney P.

From the foregoing description it will be seen that the drum A forms one side wall of each fire-chamber and the drums E D, respectively, form the tops of said chambers, also that there is a smoke-outlet above each fire-chamber, the two outlets being separated by the drum H, both outlets communicating, however, with the common escape-pipe P. It will be further observed that the tubes C, B, and F are all enlarged at one end, and this enables a damaged tube to be withdrawn into that water-drum which its large end engages, and thus facilitates repairs.

The proportions of the parts, the number of tubes, and the form of the casing may be varied to suit the space for the boiler and other conditions.

The construction described is such as to give large heating-surface over the fires and to accommodate a large volume of water, and thereby insure steady working and economy of fuel. Free access is also given for cleaning and repairs, and, when necessary, any defective tube can be withdrawn into the drum and a fresh tube put in its place.

Having thus described the nature of this invention and the best means I know for carrying the same into practical effect, I claim—

1. The combination in a boiler-furnace of the opposite fire-chambers, a smoke-outlet above each fire-chamber communicating with a common take-off; and a series of four similar water-drums, each having a rounded portion and two opposite flattened sides standing substantially at right angles to each other, the drums being arranged equidistant with the apexes of their inclined sides pointing to a common center, one drum being at the bottom and interposed between the fire-chambers, another drum at top and between the smoke-outlets; with four series of tubes each series connecting the opposite flattened sides of adjoining drums, and a casing inclosing the drums, tubes and fire-chambers, all substantially as and for the purpose described.

2. The combination in a boiler-furnace of the opposite fire-chambers M, L, a smoke-outlet above each fire-chamber communicating with a common take-off; and a series of similar water-drums A, E, D, H, each having a round portion and two opposite flattened sides standing substantially at right angles to each other, the drums being arranged equidistant with the apexes of their inclined sides pointing to a common center, and the bottom drum A being interposed between the chambers M, L, and drum H being at top and interposed between the smoke-outlets; with a series of tubes C connecting the opposite flattened sides of drums A, E; as a series of tubes F connecting the opposite flattened sides of drums D, H; and a series of inclined tubes G connecting the opposite flattened sides of drums D and H, all of said tubes having one

end enlarged at its point of connection with
one of the drums so that the tubes can be
withdrawn into the drums when necessary to
repair the same, substantially as and for the
5 purpose described.

In testimony whereof I have signed my
name to this specification, in the presence of

two subscribing witnesses, this 7th day of De-
cember, A. D. 1897.

JOHN HENRY HOPWOOD.

Witnesses:

HERBERT EXINGTON,
FRANK SNOWDON.