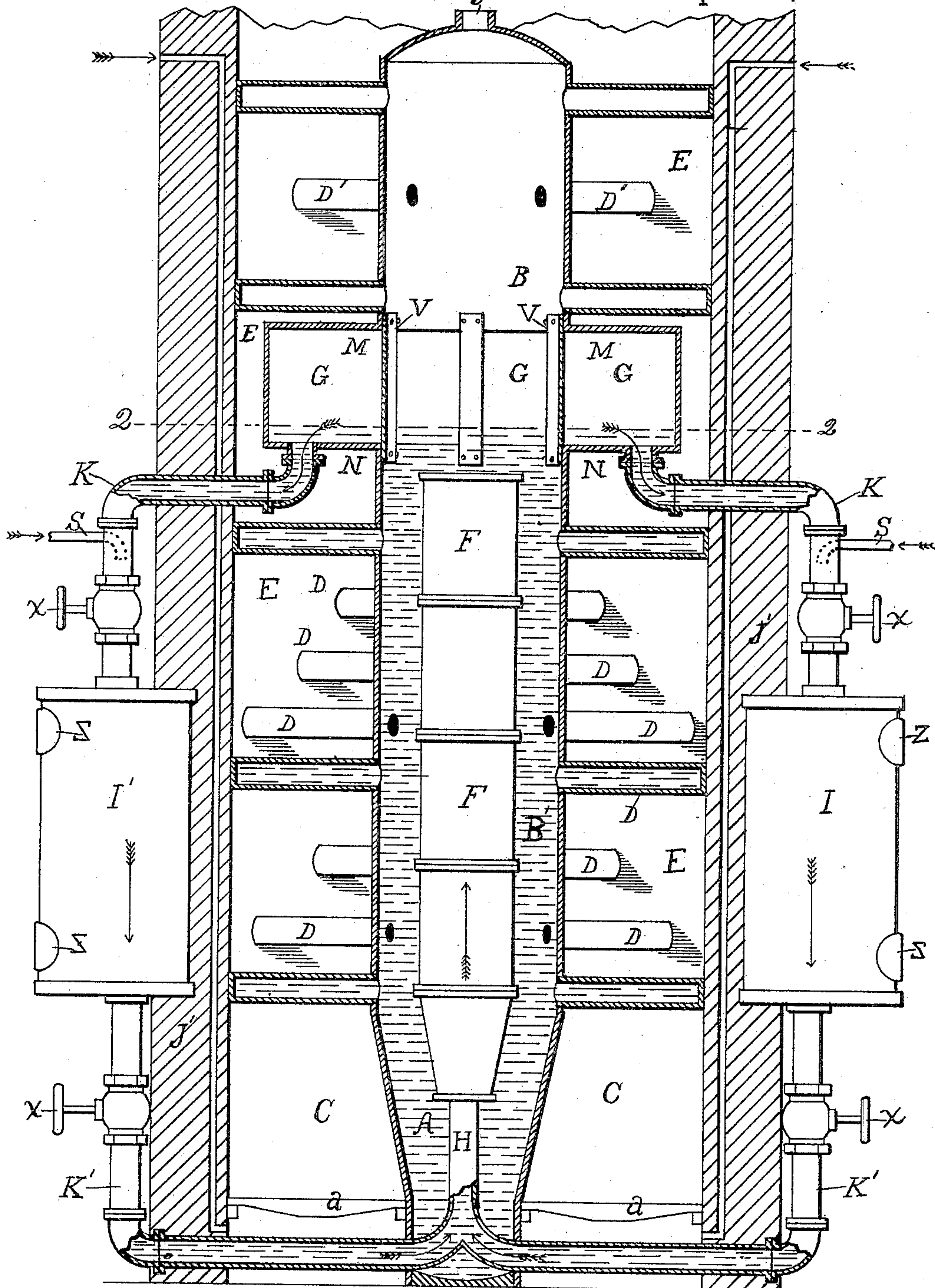


(No Model.)

A. GRANT.
STEAM BOILER.

No. 411,434.

Patented Sept. 24, 1889.



Witnesses
William K. Kelley
A. C. Carter

Inventor
Alexander Grant

UNITED STATES PATENT OFFICE.

ALEXANDER GRANT, OF LOS ANGELES, CALIFORNIA, ASSIGNOR OF ONE-HALF TO MICHAEL M. MILLER, OF SAME PLACE.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 411,434, dated September 24, 1889.

Application filed May 6, 1889. Serial No. 309,697. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER GRANT, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Improvement in Steam - Boilers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, forming part of this specification.

The figure of the drawing represents a vertical central section of an upright steam-boiler embracing my improvements and exhibiting the external cylindrical water-purifiers and their connecting-pipes and feed-water pipes in side elevation.

The leading characteristic feature of my invention consists in the combination of exterior and interior water conduits or purifiers and double feed - water - supplying conduits arranged to produce a positive circulation of the commingled hot and cold water to cause the same to pass through the purifiers before entering the body of the boiler, as herein-after more fully set forth.

The boiler B B' with which my improvements are combined in the present instance is upright, and its bottom A is surrounded with the fire-box C and grate-bars *a*. The radiating-tubes D, which are located within the direct combustion-flues E, are closed at their outer ends, but are open at their inner ends where they are united with the upright cylinder or the boiler B B'. Said tubes constitute part of the water capacity of the boiler and are subjected to the direct ascending heat from the furnace, which heat and rising products of combustion pass by the chimney-draft among them. The enlarged portion G of the boiler B B' is connected with the top of the lower section at N N, the opening in its bottom being of the proper size to admit the top of the section B', and the central opening in its top at M M is also of the size to correspond with the lower end of upper section B of the boiler, and these two sections or portions of the boiler are connected at N N and M M to the cylindrical central enlarged part or portion G, thereby furnishing an enlarged area or capacity for water and steam. The radiating-tubes D, above the central cylinder G, being above the water-line Q Q, are

in the combustion-chamber and serve to superheat the steam which may be taken out for use through a pipe connected at the opening J.

The pipes K', cylinders I', and pipes K and H connect the bottom of enlarged division G with the interior purifying-cylinder F. Induction water-pipes S S connect with said pipes K, and, having elbow terminations pointing downward, the inflowing water will cause the heated water at the highest temperature in division G of the boiler to be drawn downward with the inflowing feed-water, which will pass into the cylinders I' I', and thence it will pass down through pipes K' at the respective sides of the furnace and enter the bottom of purifying-cylinder F. A cylindrical circulating and purifying tank F, having ingress and egress openings and formed in sections for removal, is centrally arranged in the lower section of the boiler, and its lower end is connected with the vertical intermediate pipe H, into which the extension-conduits K' K' extend and discharge the inflowing mixed hot and cold water. These extension-pipes receive and discharge water from near the center of the boiler and from the feed-water pipes S S, whereby circulation is assured. The arrangement of the connected water-conduits will cause the mixed hot and cold water to pass through purifying-cylinders I' I' before reaching the lower section of the boiler, thereby cleansing it from impurities. The upper curved ends of pipes K and the enlarged division G of the boiler are subjected to a high degree of heat, and consequently the draft produced by the feed-water entering through elbow-pipes S will cause mixing of the hot and cold water and promote rapid separation of the impure elements which it may contain, and these impurities will lodge within the purifying-cylinders through which the water must pass to reach the boiler. Vertical ribs V are secured at the openings through the enlargement G to it to give strength and support where it connects with divisions B B' of the boiler. The enlarged division G serves not only to increase the capacity of the boiler, but it also furnishes a more extended water-service for the emission of steam and a larger area for superheating the steam as it arises among

the drying-tubes D', which extend into the combustion-chamber. The entire perimeter of the two sections B B' of the boiler will be provided with tubes D D', extending to near
5 the walls of the combustion-chamber E. The pipes K K' and cylinders I' may be inclosed by a wall or casing having doors for access to the faucets α and man-holes Z to admit of their being cleaned out.

10 My invention is adapted to either horizontal or vertical boilers.

Having described my invention, I claim and desire to secure by Letters Patent—

15 1. A steam-boiler consisting of the sections or divisions B B' and enlarged division G, in combination with conduits or pipes K, communicating with the bottom of division G, cylinders I', and pipes K', extending later-
20 ally under the grate-bars α of the furnace to the bottom section B' of the boiler, as specified.

2. In a steam-boiler, the central enlarged

division G and sections B B' of the boiler communicating with each other, in combination with pipes or conduits K K' and H, feed-
25 water pipes S S, and water-purifying cylinders I' and F, as and for the purpose specified.

3. In a steam-boiler, the continuous water-conduits outside of the boiler, into which feed-
30 water pipes S S discharge, in combination with the cylinder F, which receives the mixed hot and cold water from said conduits for circulating and purifying the same.

4. In a steam-boiler, exterior water-circulating conduits, connecting the central part
35 of the boiler with the lower part of the same, in combination with the downwardly-discharging feed-water pipes S S, which communicate with said exterior conduits, as specified.

ALEXANDER GRANT.

Witnesses:

H. P. K. PECK,
M. C. GALER.

It is hereby certified that Letters Patent No. 411,434, granted September 24, 1889, upon the application of Alexander Grant, of Los Angeles, California, for an improvement in "Steam-Boilers," was erroneously issued to said "Grant and Michael M. Miller," jointly, said Miller appearing as owner of one-half interest in the patent; that said Letters Patent should have been issued to said *Alexander Grant* as sole owner of said patent; and that said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned and sealed this 21st day of January, A. D. 1890.

[SEAL.]

CYRUS BUSSEY,
Assistant Secretary of the Interior.

Countersigned:

C. E. MITCHELL,
Commissioner of Patents.