

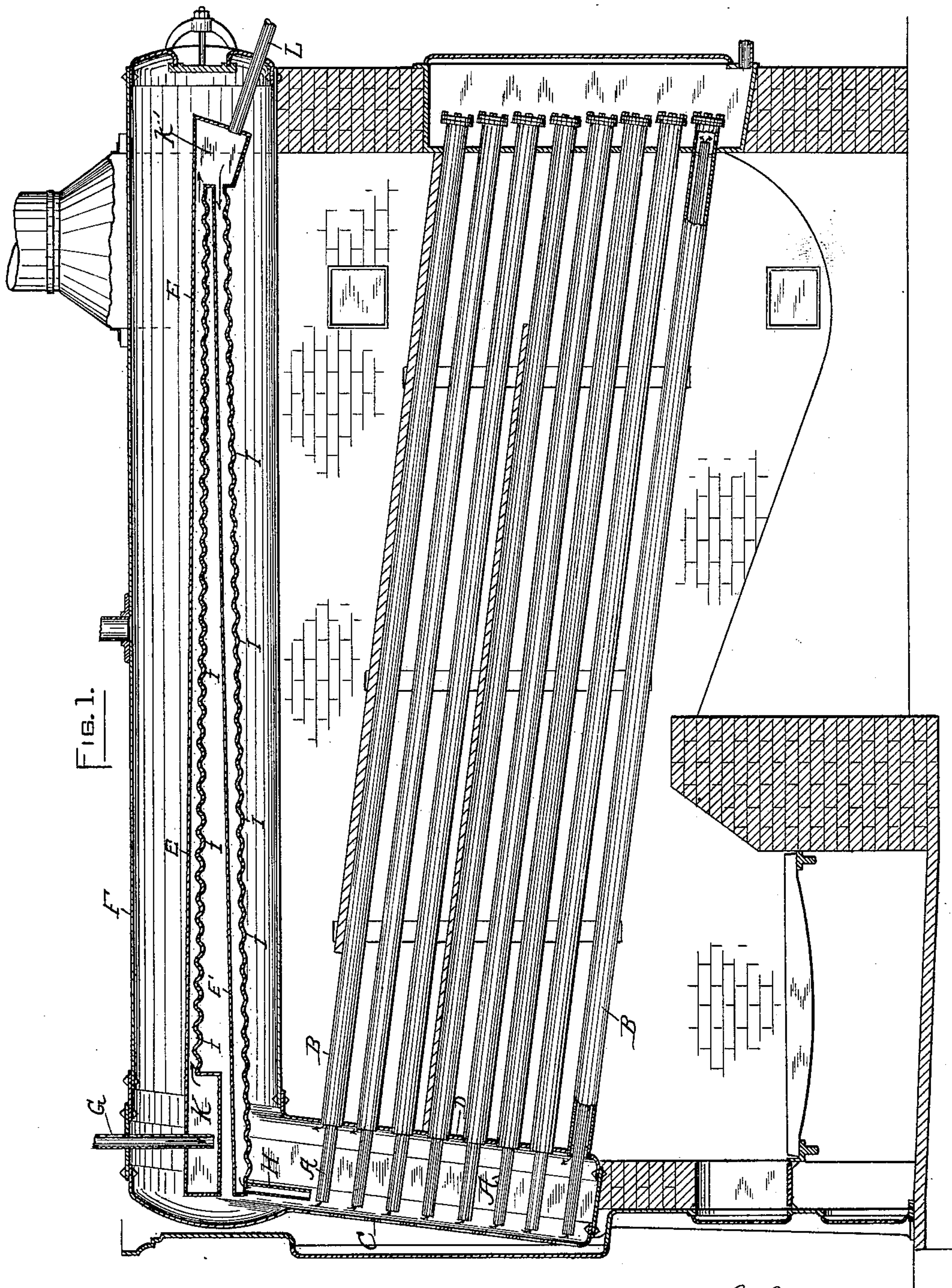
No. 636,627.

Patented Nov. 7, 1899.

J. R. BROWNELL.
WATER TUBE BOILER.

(Application filed May 8, 1899.)

(No Model.)



WITNESSES,

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WATER-TUBE BOILER.

SPECIFICATION forming part of Letters Patent No. 636,627, dated November 7, 1899.

Application filed May 8, 1899. Serial No. 715,926. (No model.)

To all whom it may concern:

Be it known that I, JOHN R. BROWNELL, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Water-Tube Boilers; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing, and to the letters of reference marked thereon, which forms a part of this specification.

This invention relates to improvements in water-tube boilers, with particular reference to the class of boilers which have inner and outer tubes.

The objects of the invention are, first, to provide means whereby the two currents of water—to wit, the descending and ascending currents—will not interfere with each other in the head, and, secondly, to provide means for separating from the water mineral substances—such as lime, magnesia, &c.—before it enters the head. Owing to the greatly-impregnated condition of the water with the aforesaid mineral substances in this and other sections of the country, the scale or incrustation formed in the boiler and tubes is a constant source of annoyance and expense. The invention hereinafter described obviates these difficulties.

Referring to the accompanying drawing, the figure is a sectional elevation of a tubular boiler made in accordance with my invention.

In the specification similar reference characters indicate corresponding parts.

One essential feature of my invention is in placing the open ends of the inner circulating-tubes A and the open ends of the outer tubes B a substantial distance apart. From the drawing it will be noticed that the distance from the front ends of the tubes A and B is considerable as compared to the boilers now commonly in use. In the arrangement of the inner tubes A their open ends are brought as close as possible to the front header-wall C, while the corresponding ends of the outer tubes B lie just inside of the in-

ner wall D. This arrangement enables both currents of water to pass without commingling or interfering with the passage of each other, and thus the necessity of separating the space in the head into two different compartments by means of a partition-wall or diaphragm is obviated. The front ends of the inner circulating-tubes may be brought close to the outer wall, as is shown in the drawing, without fear of obstructing the passage of the water to said tubes, as the suction due to the circulation of the water and steam draws the colder water into these tubes.

From the foregoing description it will be apparent that both sets of tubes—to wit, the inner and outer tubes—may be easily removed through the hand-holes usually provided in the outer wall of the header, there being no troublesome partition-wall or diaphragm to interfere with their removal.

E and E' designate a double or return trough which is located in the steam-separating drum F and through which the water entering through the feed-pipe G is made to travel a distance equal to double the length of the said drum before said water enters the header. The bottoms of this double trough are corrugated throughout to provide a series of transverse pockets I, over which the water passes and which interrupts the passage of the water constantly in its flow, and thereby causes more or less precipitation into said pockets of the mineral substances contained in said water. The two sections of the trough are inclosed throughout by a flat cover. The water enters the first settling-pan K and rising therein passes over the upper section E of the trough to a second settling-pan K'. The water rising in this last-named settling-pan passes down through the lower or return section E' of the trough and discharges into the header through the second feed-pipe I. This pipe is arranged to pass the water into the head close to the front wall and above the receiving ends of the inner circulating-tubes.

L is a blow-off pipe connected with the settling-pan K' for cleansing it of the accumulations of sediment.

Having described my invention, I claim—
1. In a water-tube boiler, the combination with a head having outer and inner walls, of

outer tubes having their open ends supported in the inner wall of said head and terminated flush with said inner wall, and inner circulating-tubes having their open ends projected beyond the vertical center of the head and occupying positions adjacent to the front wall of the head, and a feed-pipe projected into the head adjacent to the front wall and above the ends of said inner tubes, the feed-water entering said pipe after traversing substantially twice the length of the steam-separating drum, substantially as shown and described.

2. In a water-tube boiler, the combination with a steam-separating drum, of a water-purifier consisting of a double or return trough in two sections, E and E', one above the other with their bottoms corrugated throughout, an initial settling-pan K with which the upper section alone communicates and is supplied, a supplementary settling-pan K' at the opposite end and with which both sections of said trough communicate, the said supplementary settling-pan being a receiver from the upper section and a feeder for the lower section of said trough, and means for relieving said supplementary settling-pan of sediment, as shown and described.

3. In a water-tube boiler, the combination with a steam-separating drum and a head communicating therewith, of a water-purifier located within said drum and consisting of a trough in two sections, each section being substantially the length of the drum and having its bottom corrugated throughout, an initial settling-pan from which one of said sections is fed, a supplementary settling-pan

communicating with both of said sections and feeding the lower section, a series of outer tubes having ends supported in the inner wall of the head and terminating flush with said wall, a series of inner circulating-tubes having ends projected beyond the vertical center of the head and occupying positions adjacent to the outer wall of the head, and a feed-pipe communicating with the lower section of the water-purifier and discharging close to the front wall of the head, substantially as shown and described.

4. In a water-tube boiler, the combination with a head, of outer circulating-tubes having their open ends supported in the inner wall of said head and terminating flush with said inner wall, and inner circulating-tubes having their open ends projected beyond the vertical center of the head and occupying positions adjacent to the front wall and a feed-pipe above the ends of said inner tubes, whereby the feed-water is introduced to the inner circulating-tubes adjacent to the front wall, and passing through said tubes, is discharged from the outer circulating-tubes adjacent to the inner wall, thereby preventing any interference between the descending and ascending currents of water, and dispensing with the use of a diaphragm in the head.

In testimony that I claim the foregoing as my own I hereto affix my signature in presence of two witnesses.

JOHN R. BROWNELL.

Witnesses:

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CARL H. NOE.