(No Model.)

J. F. & J. H. ALLEN.

SECTIONAL BOILER.

No. 347,859. Patented Aug. 24, 1886.

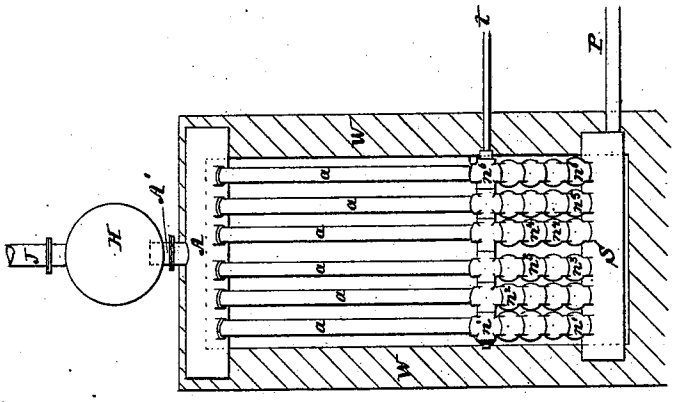

Fig. 2.

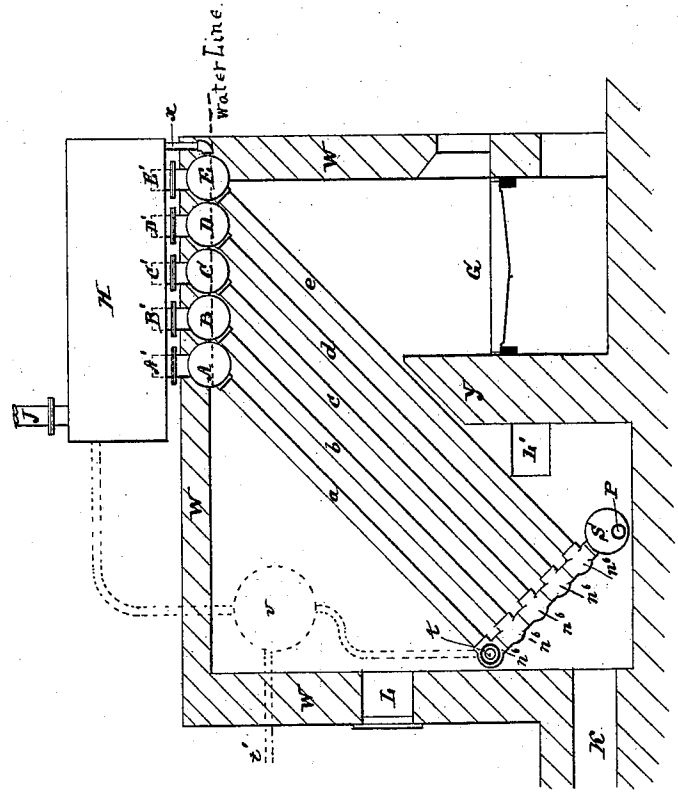

Fig. 1.

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SECTIONAL BOILER.

SPECIFICATION forming part of Letters Patent No. 347,859, dated August 24, 1886.

Application filed May 5, 1886. Serial No. 201,142. (No model.)

To all whom it may concern:

Be it known that we, JOHN F. ALLEN and JOHN H. ALLEN, both of the city of New York, county and State of New York, have invented a new and Improved Sectional Boiler, of which the following specification is a full, clear, and exact description.

Our invention relates to sectional-tube boilers in which the violent circulation of water among the tubes is prevented; and the invention consists in the various elements of improvement hereinafter more fully pointed out.

In the accompanying drawings, Figure 1 is a side view of our improved boiler with the mason-work removed. Fig. 2 is an end view of the same.

The letters *a a*, &c., *b b*, &c., *c c*, &c., *d d*, &c., *e e*, &c., represent five superposed series of tubes, the tubes of each series being placed side by side and above the tubes forming the next series. All the tubes of each superposed series are connected at their upper ends by transverse drums A B C D E, as shown. Every vertical set of tubes *a b c d e*—that is, every set formed from one tube of each superposed series and placed above or below the tubes of the next series—are connected at their lower ends by communicating chambers n' n^2 n^3 n^4 n^5 n^6, as shown. These chambers form a series of vertical rows or headers, and all the upper chambers are again connected with each other by nipples, and the lower chambers are connected to a drum, *s*, and in this way each chamber is in either direct or indirect communication with each of the other chambers, thus establishing communication between the lower ends of all the tubes.

t is a feed-pipe connected to one of the outer chambers of the top row, and *s* is a drum connected to the chambers of the bottom row, and provided with blow-off pipe P. The transverse drums A B C D E are connected through pipes A′ B′ C′ D′ E′ with a steam-drum, H, the ends of said pipes projecting some distance into said steam-drum to obtain some space in the lower part of the steam-drum for the collection of accumulated water.

x is a pipe connecting the lower part of steam-drum H with one of the transverse drums E, to allow the accumulated water to return.

J is the steam-outlet pipe to conduct the generated steam to any part desired.

The whole plant of pipes, drums, and chambers, with the exception of the steam-drum H, is placed in mason-work W, in which the fire-grate bars G are built. The gases and smoke escape at the rear end, as shown at K.

L L′ are openings closed by suitable doors, and located in the back and sides of the walls, to gain admittance to the interior.

Instead of connecting feed-pipe *t* to the upper row of chambers, a drum, *v*, may be placed into the inside of the mason-work, as shown by dotted lines in Fig. 1. In this case the pipe *t′* from the feed-pump is connected to the drum, and the drum is connected to the upper row of chambers. A suitable connection is in this case made between the top of the drum *v* and the steam-drum H. The steam generated in the several tubes *a b c d e* will escape from the upper ends of said tubes into their respective transverse drums A B C D E, and from there into the steam-drum H. The water is supplied to the tubes at their lower ends only through their chambers. At the upper ends of the tubes water-connections exist only between the tubes of each of the superposed rows, but no water-connections exist between the vertical rows, and thus the several superposed rows will be perfectly independent from the vertical rows. At the same time, as each row is supplied only from the lower end, the temperature of water at the lower ends of all the tubes below and at the back of the bridge-wall *y* will only be equal to the temperature of water as supplied by the feed-pump or feed-drum *v*, while at the upper end of the tubes the temperature may rise to about 300° to 400° Fahrenheit. The water fed into the tubes is in the exact proportion as it is converted into steam, and is gradually heated as it rises. Thus, as the water in the uppermost row of tubes is least affected by the heat, it will generate the least amount of steam, and consequently the least quantity of water will be supplied to it. The other rows will evaporate and receive water in proportion to their greater or less vicinity to the fire. The water-level is supposed to be about in the center line of the pipes or drums A B C D E.

I claim as my invention—

1. The combination, in a boiler, of the tubes arranged in a series of superposed rows, with chambers that establish a communication be-

tween all the tubes at their lower ends, and with drums that connect separately all the tubes of each superposed row at their upper ends, while the several superposed rows are disconnected at such upper ends, substantially as specified.

2. The combination of tubes *a a*, *b b*, *c c* with chambers $n' n^2$, connecting lower ends of the tubes *a b c*, and with drums A B C, connecting, respectively, upper ends of tubes *a a*, *b b*, *c c*, and with the pipes A′ B′ C′, drum H, feed-pipe *t*, drum *s*, blow-off pipe P, outlet-pipe J, and grate-bar G, substantially as specified.

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