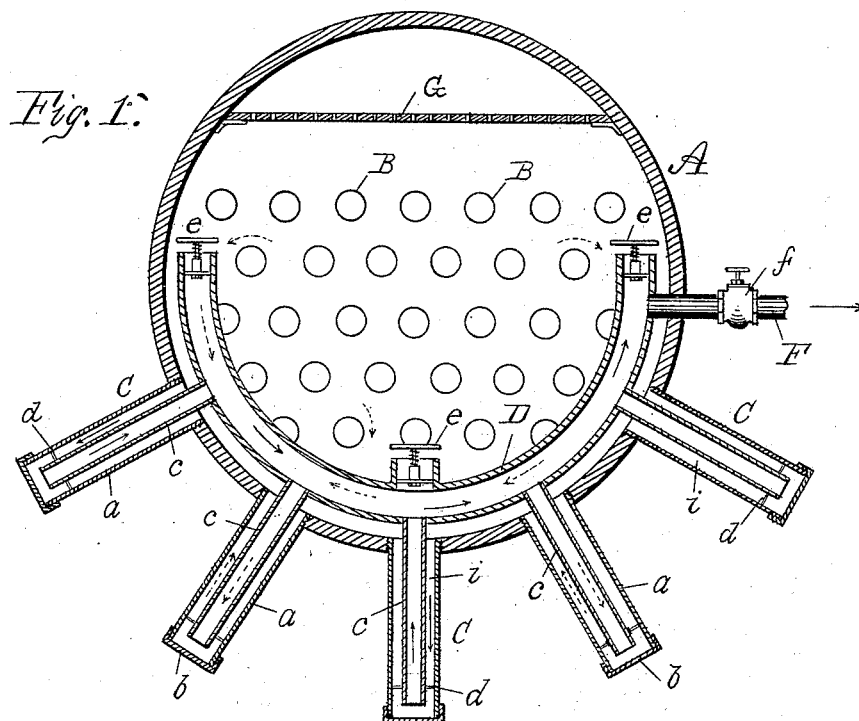


(No Model.)

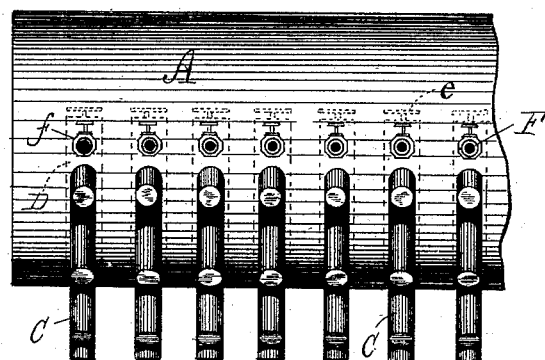
T. L. STURTEVANT.  
BOILER.

No. 422,994.

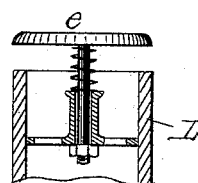
Patented Mar. 11, 1890.



*Fig. 2.*



*Fig. 3.*



Witnesses.

*Francis C. Hayward*  
*John A. Dougherty*

Inventor.

*Thos. L. Sturtevant.*  
*by H. C. Lodge Atty.*

# UNITED STATES PATENT OFFICE.

THOMAS L. STURTEVANT, OF FRAMINGHAM, MASSACHUSETTS.

## BOILER.

SPECIFICATION forming part of Letters Patent No. 422,994, dated March 11, 1890.

Application filed October 28, 1889. Serial No. 328,483. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS L. STURTEVANT, a citizen of the United States, residing at Framingham, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Boilers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

15 This invention relates to improvements in boilers for steam-generating purposes, particularly that class termed "porcupine," in which a series of water-legs are disposed exteriorly of the boiler-shell; and it consists of 20 apparatus by which said water-legs, closed at one end, can be easily and instantaneously blown out or cleansed from any sediment or foreign bodies which may collect in the extremities thereof.

25 The drawings represent in Figure 1 a sectional end elevation of a boiler containing my improvements. Fig. 2 is a side view of the same. Fig. 3 is an enlarged section of one of the valves in the blow-off tube.

30 In boilers of the class above premised, generally styled "porcupine," the water-legs closed at one end (the outer) have a defective circulation; but in the class herein shown the water-legs or projecting water-chambers 35 proper contain a second tube termed a "Field" tube. My invention is particularly adapted to the blowing out or cleansing of said water-legs without the removal of the end closing cap or plug.

40 In the accompanying drawings, A represents a boiler-shell circular in cross-section and provided with the customary longitudinal flues B, and further exteriorly furnished upon the lower half of its periphery with a series 45 of radially-disposed pendent water-legs C C. These water-legs are furnished with an inner tube, often termed a "Field" tube; hence the water-legs proper are composed of an outer tube *a*, open at the end leading into the 50 boiler and closed at the outer end with a plug or cap *b*, while a second tube *c*, axially within the tube *a*, but open at both ends, is supported

by posts *d*, to permit a free circulation throughout the water-leg proper C. The inner tube *c*, less exposed to the fire, is maintained at a 55 lower temperature; hence a natural circulation occurs, the water entering the water-leg centrally through the tube *c*, and returning to the boiler by the way of the annular passage *d*, created by the two tubes non-contigu- 60 ous. Necessarily, from the position of such water-legs, the sediment and deposits of all kinds tend to accumulate at the closed end of said water-legs, and usually it is customary to remove the end caps to free them from 65 such material. My invention is to obviate this mode of proceeding, and I propose to blow out said water-legs simply by opening a valve common to a series and employing the steam within the boiler to accomplish this result 70 without removing the end caps. To this end I proceed as follows, it being understood that said water-legs are arranged in rows or series, generally extending nearly the entire length of the boiler upon its under portion; further, 75 the water-legs of each row or series are connected and communicate with a common blow-off tube D, the inner ends of said tube *c* terminating in the said tube D. This latter is to be supplied with one or more auto- 80 matic valves *e*, which normally are open to permit the water-legs to effect the same circulation as has heretofore been produced. This tube D connects with a blow-off pipe F, which is controlled by a valve *f*. 85

The operation of the several parts above enumerated is readily understood, as I shall now explain. The circulation within the boiler—the latter suitably provided with a heat-generating agency and after being subjected to its action—is as indicated by the 90 arrows in broken lines, the cooler water within the tube D passing downward through the inner tube *c*, returning to the boiler by way of the outer tube *a*, thereby becoming heated 95 and, as a consequence, rising upward to produce steam. As a result of the above action, a flow of water is now induced from the boiler; such water entering the tube D through the valve or valves *e*, now open. This 100 circulation continues until it becomes desirable to clean the water-legs. To accomplish this result the valve *f* in the blow-off pipe F is opened. Immediately the valves *e* close,

due to the boiler-pressure, and consequently the circulation in the water-legs is reversed, as shown by the arrows in full lines, the pressure from the now outwardly-escaping steam 5 being exerted to force water through the outer tube, thence into the inner tube *c*, along the connecting blow-off tube D, and finally into the blow-off pipe F. The action of the water and steam at the outer end of the closed tube 10 *a*, as it passes into the inner tube *c*, effectually removes all sediment or deposits of foreign matter, which pass out with the escaping steam and water. By such an arrangement the water-legs can be completely 15 cleansed at any moment, and the difficulty and labor of removing the closing-caps is overcome.

In connection with this style of boiler, which is peculiarly adapted for marine purposes, I propose to employ a perforated or 20 foraminated plate G. The latter is intended to prevent the water from rushing from one end of the boiler to the other, while at the same time steam or water can readily pass, 25 but in slower movement, therethrough. Said plate is preferably to be located horizontally in the plane of normal water-level, or thereabout, and is to extend the entire length of the boiler.

30 What I desire to claim is—

1. The improvements in steam-boilers consisting of a boiler-shell having a water-supply

and steam-discharge, a water-leg or projecting water-chamber composed of two tubes, one within the other, and a blow-off tube, the 35 latter interconnecting the inner tubes and adapted to discharge exteriorly of the boiler, but provided with an automatically-operating stop-valve within said boiler, the circulation in the water-legs being reversed upon 40 opening of the blow-off tube, substantially as herein specified.

2. The combination, with a boiler, its fire-flues and ordinary operating parts, of a series of projecting water-chambers, a blow-off tube 45 provided with a series of automatic stop-valves, and a pipe from said blow-off tube exteriorly of the boiler, all co-operating as herein stated.

3. The combination, with a boiler, of a series of tubes closed at one end, a series of 50 tubes, one in each closed tube, but open at both ends, and a blow-off tube connecting with a blow-off pipe, said blow-off tube having a curvature corresponding to the shape 55 of the lower half of the boiler and being provided with an automatic stop valve or valves, substantially as herein described.

In testimony whereof I affix my signature in presence of two witnesses.

THOS. L. STURTEVANT.

Witnesses:

H. E. LODGE,

FRANCIS C. STANWOOD.