

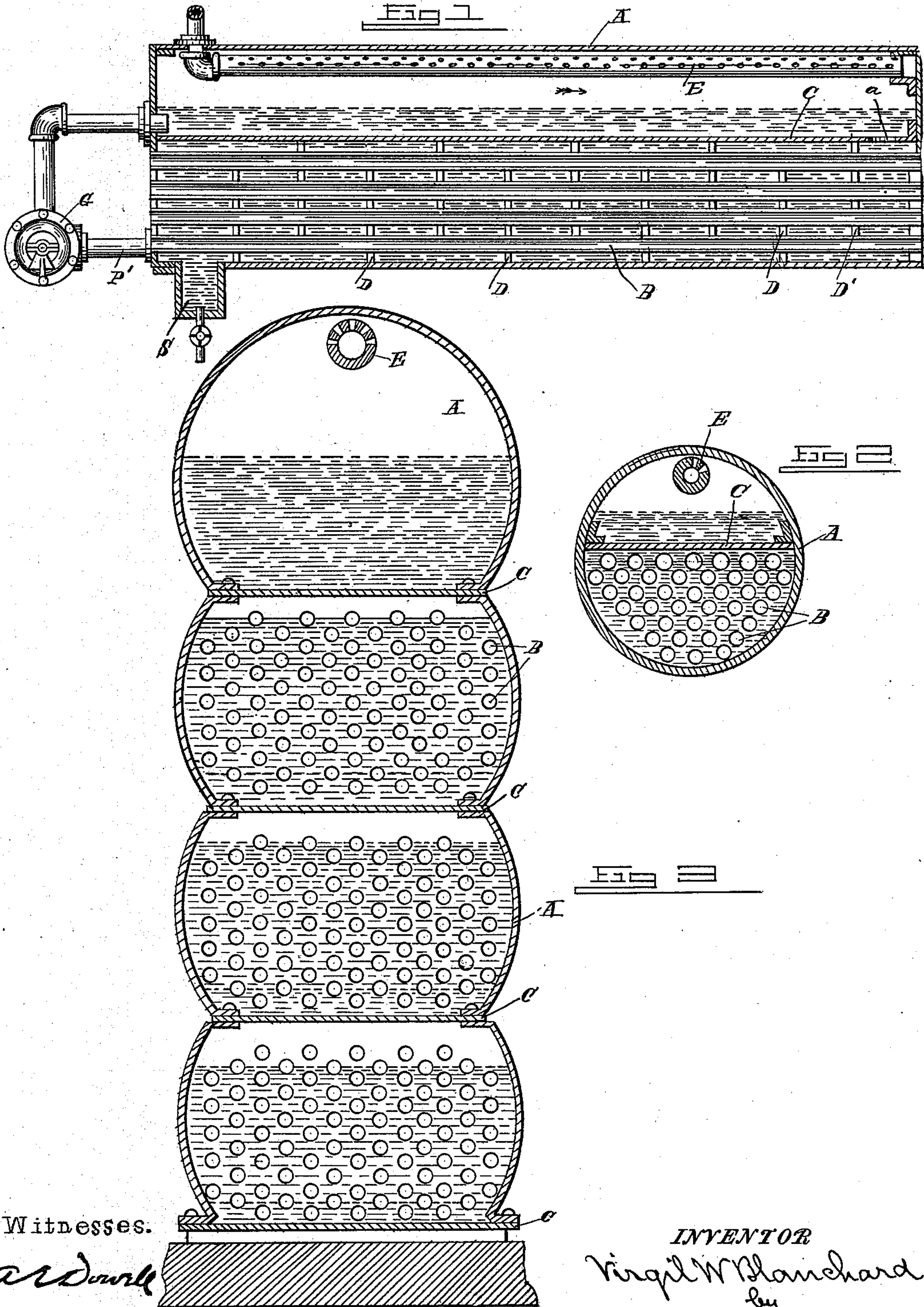
(No Model.)

2 Sheets—Sheet 1.

V. W. BLANCHARD.
STEAM BOILER.

No. 413,924.

Patented Oct. 29, 1889.



Witnesses.

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O. W. Seville,

INVENTOR

Virgil W. Blanchard

by

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Attorney

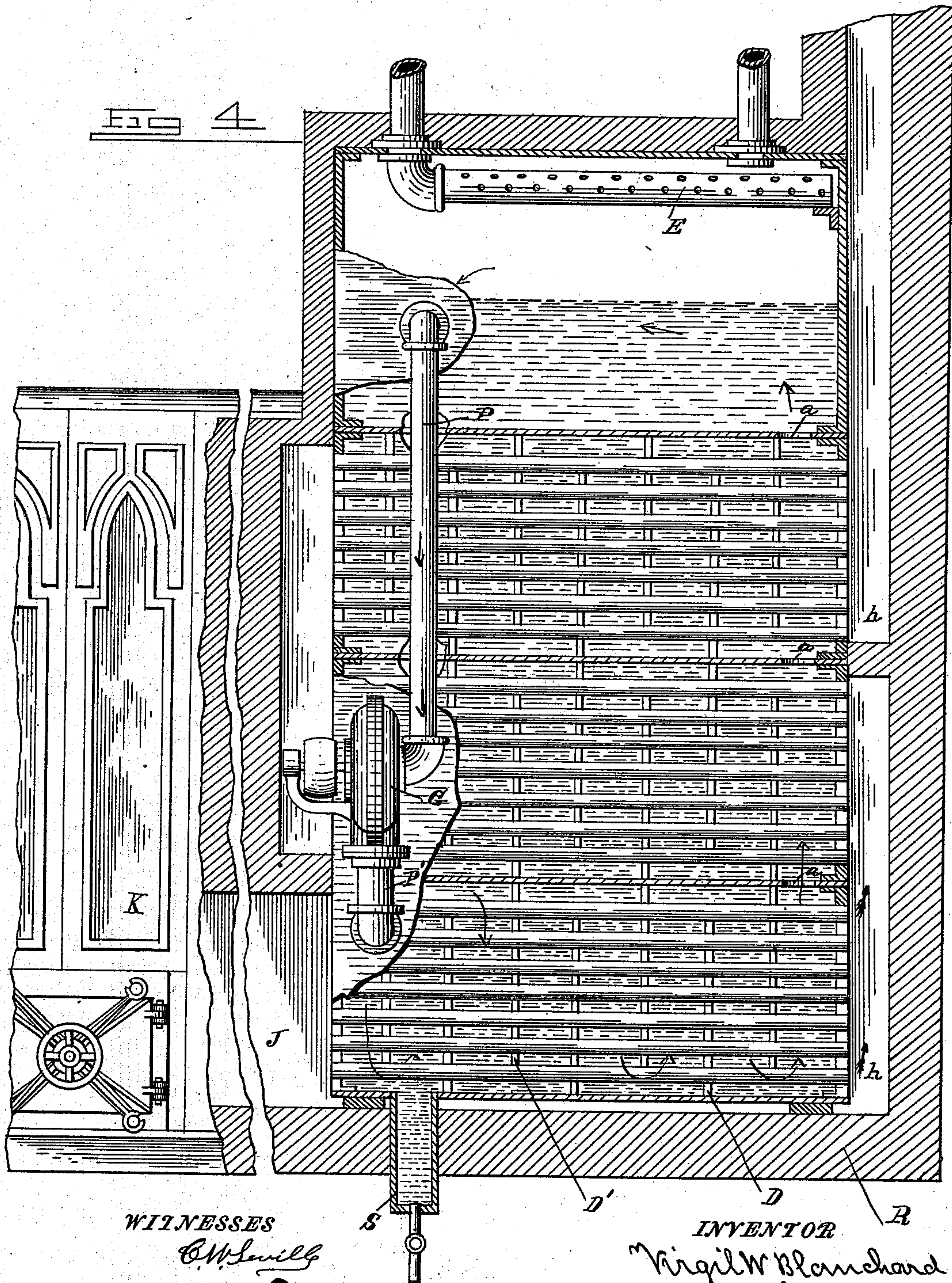
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WITNESSES

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UNITED STATES PATENT OFFICE.

VIRGIL W. BLANCHARD, OF NEW YORK, N. Y., ASSIGNOR TO JOSEPH A. DAVIS, OF SAME PLACE.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 413,924, dated October 29, 1889.

Application filed April 17, 1889. Serial No. 307,610. (No model.)

To all whom it may concern:

Be it known that I, VIRGIL W. BLANCHARD, of New York, in the county and State of New York, have invented certain new and useful
5 Improvements in Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which
10 form part of this specification, in which—

Figure 1 is a diametrical section through a tubular steam-boiler having my improvement applied to it. Fig. 2 is a vertical cross-section through the same. Fig. 3 is a vertical cross-
15 section through the compound boiler of Fig. 4; and Fig. 4 is a vertical section and part side elevation of the compound boiler and a detail of a furnace.

This invention relates to horizontal-flue steam-boilers; and my object is to effectually prevent the formation of scale and deposit of sediment on the interior of a boiler-shell, or on the flues thereof, by mechanically causing
20 a rapid forced circulation of the water surrounding the flues in the boiler, and thereby sweeping the metal surfaces and keeping them clean.

My object is also to increase the heating-surfaces in a tubular steam-boiler by combining in a novel manner a series of flue-boilers, the shells of which are all strongly united by diaphragms which have apertures that allow
30 a common circulation of water through the series of boilers or boiler-sections, as will be fully understood from the following description when taken in connection with the annexed drawings.

I will first refer to a single tubular boiler represented by Figs. 1 and 2 of the annexed
40 drawings.

A designates the shell of the boiler, which may be constructed in the usual well-known manner and of any desired shape. The boiler-shell represented in the above figures is cylindrical and provided with heads, to which the
45 flue-tubes B are secured. At a suitable point below the level of the water-line I secure inside of the boiler-shell a horizontal diaphragm C, which extends from end to end and from
50 one side to the other of the boiler, and is pro-

vided at *a* with a passage for water. This diaphragm or horizontal partition C is located above the flues B, and it has depending from it at suitable intervals vertical partitions D', through which all of the flues B tightly
55 pass. These partitions do not extend entirely to the bottom of the boiler. Between these partitions D', and rising from the bottom of the boiler-shell, are similar vertical partitions D, which extend up nearly to the horizontal
60 diaphragm C, and through which the flues B tightly pass. It will thus be seen that I have a vertical communication *a* between the space above the diaphragm C, and that I have a zig-
zag passage in the flue-space below said dia-
65 phragm, through which water is caused to rapidly circulate.

G designates a water-forcing pump arranged outside of the boiler at the end opposite the vertical passage *a* through the dia-
70 phragm C. This pump may be driven by a belt from an engine which receives steam from the boiler. The exhausting-port of the pump communicates with the water-space outside of the flues B by means of a pipe P',
75 and the opposite or forcing port of the pump communicates with the water-space above the diaphragm C and below the water-line, as shown in Fig. 1.

It will be seen from the above description
80 that when the boiler is properly charged with water and the pump put in operation there will be a rapid forced circulation of the water in the boiler, the direction of the current being indicated by the arrows on Fig. 1.
85 The water will be drawn from the flue-space below the diaphragm C, through the pump, and forced back into the boiler above the diaphragm. By these means a deposit of sediment or scale is effectually prevented and
90 a realization of the full benefit of the heating capacity of the boiler obtained.

In practice I shall provide the boiler with a mud-well S, having a cock for drawing off the sediment from time to time.
95

Figs. 3 and 4 show a compound boiler composed of a number of boiler-shells having bulging sides and united by diaphragms C, riv-
100 eted to the shells. These diaphragms are arranged horizontally and provided with pas-

sages α , and the vertical partitions DD' and flues are arranged precisely as described for the single tubular boiler of Fig. 1. The highest section of this compound boiler is without
5 flues and forms a water and a steam space or dome from which steam is carried off to the engine by means of a perforated pipe E, fully described in my application for Letters Patent filed June 30, 1884, Serial No. 136,341, and
10 not herein claimed. This compound boiler is arranged in furnace-walls R, the inclosing space communicating at its end with a furnace K by means of a passage J. The interior of the walls R is constructed with passages $h h h$ leading in a tortuous course to a chimney. The lowest section of the compound boiler above described communicates with a pump G by means of a pipe P', and
15 the highest section communicates with this pump by means of a pipe P. It will be observed that the circulation of water in this compound boiler when the pump is in operation will take the course indicated by the arrows on Fig. 4.

25 Having described my invention, I claim as new—

1. The combination, with a tubular steam-

boiler having a diaphragm C, a series of tubes below said diaphragm, and a steam-space above the same, of an exhausting and forcing
30 pump communicating with the spaces above and below said diaphragm, substantially in the manner and for the purposes described.

2. The combination, with a steam-boiler, of the diaphragm having an aperture at one end,
35 the flues below this diaphragm, the vertical partitions in the flue-space, a pump, and its pipe-connections with the spaces above and below said diaphragm, substantially as described.

3. A compound steam-boiler consisting of a series of boiler-sections arranged one above the other and united by diaphragms, each perforated at one end, in combination with
40 flues, the partitions arranged as described, and a pump, substantially as described.

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

VIRGIL W. BLANCHARD.

Witnesses:

ALEX. S. STEUART,
A. E. DOWELL.