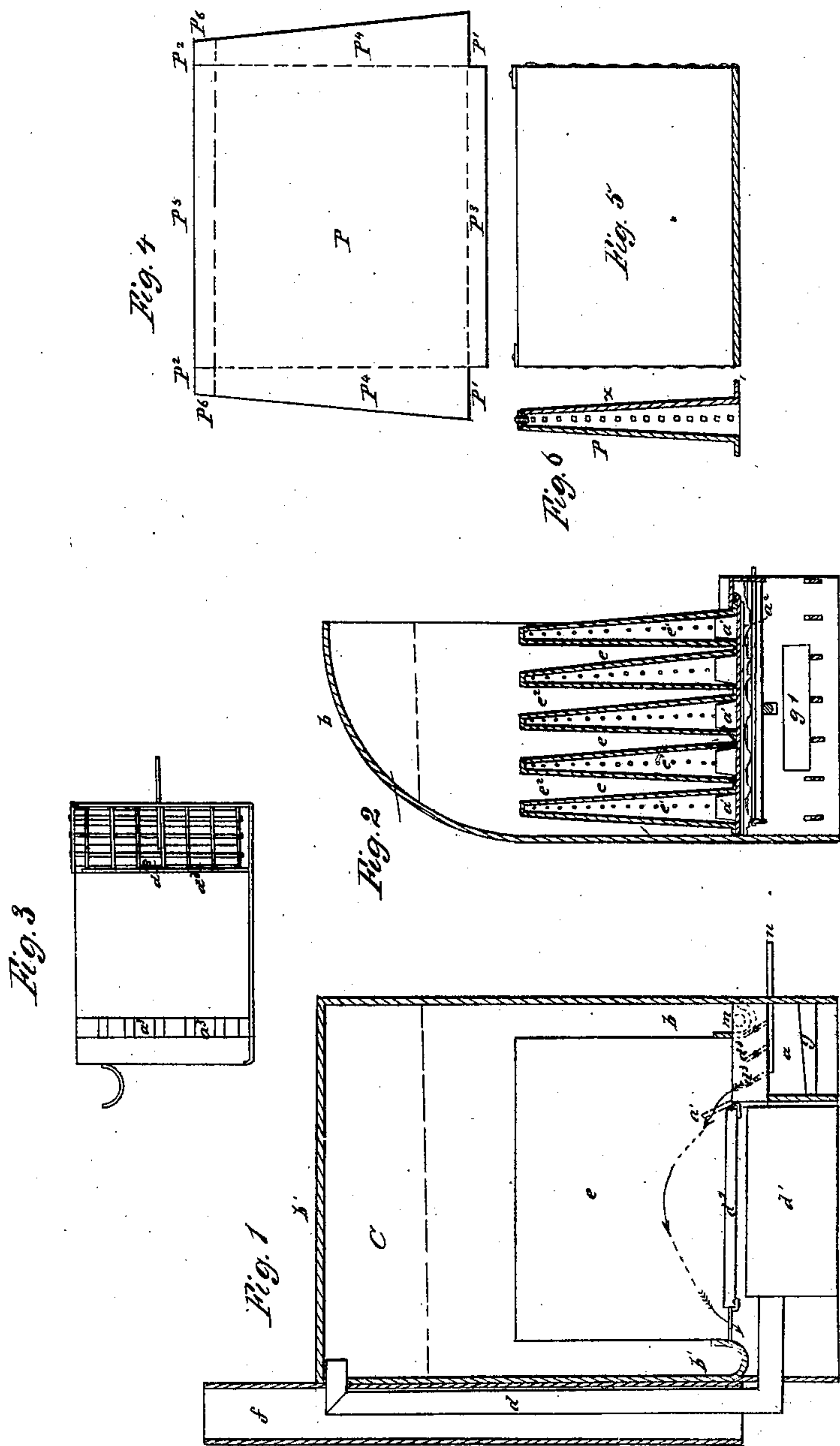


C. F. SIBALD.
CONSTRUCTION OF STEAM BOILERS.

No. 10,353.

Patented Dec. 20, 1853.



UNITED STATES PATENT OFFICE.

CHARLES F. SIBBALD, OF PHILADELPHIA, PENNSYLVANIA.

STEAM-BOILER.

Specification of Letters Patent No. 10,353, dated December 20, 1853.

To all whom it may concern:

Be it known that I, CHARLES FRASER SIBBALD, of Philadelphia, State of Pennsylvania, have invented certain Improvements in the Construction of Steam-Boilers, and that the following is a full, clear, and exact description of the principle or the character which distinguishes it from all other things before known and of the usual manner of making and using the same, reference being had to the inclosed drawings, of which—

Figure 1, is a sectional view from front to rear of the boiler. Fig. 2, is a cross section of the same showing the flue and water spaces of one half of the boiler. Fig. 3, is a plan of the floor of the flue, and water spaces embracing the damper. Fig. 4, represents one of the plates forming one side of the flue spaces. Fig. 5, represents this in connection with the other plate completing the flue. Fig. 6, is a vertical section through the connected plates showing the manner of lapping them.

My improvement consists in a certain arrangement of flue and water spaces of a certain form, in connection with the arrangement of the fire chamber, so as to obtain a great surface for the rapid development of steam, and a great saving of fuel, by this arrangement I also attain great facility in reaching the boiler flues to remove sediment and incrustation.

I have also invented a mode of putting together the plates composing a boiler of such form and arrangement, so as to make a very tight and strong boiler. And I have also invented in connection with the flue and water spaces an arrangement for circulation. The boiler I intend to call the condensed plate boiler, and it is obvious that the arrangement of the flue and water spaces is applicable to the purposes of a surface condenser.

The advantages of economizing room, and weight and other advantages incident thereto (which latter will be readily comprehended and appreciated by all who are familiar with the subject) I claim to belong to my arrangement which I will now proceed to describe.

In Fig. 1 (*b*) is the shell of the boiler, (*d*) the fire chamber (*g*) the grate bars (*g'*) the furnace door (*b'*) the circulating space in the boiler (*e*), the walls of the flue and water spaces the flue space being represented by (*e'*) and the water spaces by (*e²*). *c* is

the steam chamber (*d*) a pipe leading to the extra steam chamber (*d'*). *f* is the smoke stack, and the course of the draft reverberating in the flues is shown by the arrows in Fig. 1 (*d²*) (*a'*).

In Figs. 1 and 2 are the fire bridges in each flue for deflecting the draft upward in the flues, (*d²*) shows the floor of the furnace flues, which is entire across the furnace, with the exception of the spaces for the draft front and rear, for each flue, which are represented at (*d³*) (*d³*) in Fig. 3. The vanes (*a³*) (*a³*) of the register or damper are operated in the usual way for regulating the draft. The circulating flue space (*b*) surrounds the plate flues, so as to afford ample circulation, to meet the rapid and extensive action from the great fire surface in this boiler. It will be seen that the heat is applied in a reverberatory manner to the flues, there being a short fire bridge or deflecting plate to give an upward direction to the draft.

The mode of putting together the plates forming the flues and water spaces in my condensed plate boiler is as follows. I take a plate (*p*) Fig. 4, and cut it as shown in the drawing, the portion at the lower corners (*p'*, *p'*) I cut out, and I cut into or divide the upper corners in the line (*p²* *p²*) this plate is to form one half the wall of the flue, and water space. The plate X forming the other half is to be cut in the same manner with the exception that it is somewhat smaller in order that its laps may be embraced within the overlaps of plate (*p*). The lap (*p³*) is bent backward at right angles to the plate, and side laps (*p⁴*) are bent forward also at right angles to the plate. Lap (*p⁵*) is bent forward and downward at right angles to the plate and the projecting lip or ear (*p⁶*) is bent over and close down upon lap (*p⁵*) and thus one half of the flue structure is prepared before putting together. The plate X forming the other half is prepared in the same way, and then connected with plate (*p*) as shown in Figs. 5 and 6 and the two are riveted together on the tops and ends, and the laps (*p³*) of each series being riveted together, forms the bottom of the water spaces. The series of plate flues thus put together are fixed to the floor plate (*d²*), and other attachments to the boiler shell, and other parts are made after well known modes.

In order to adapt this arrangement of flues to a locomotive the shell of the boiler might be oval instead of round. It will be seen that from the arrangement of the circulating space (b) entirely around, and dropping below the water spaces, that it will be the deposit for sediment, from which it can be readily removed. The flues are made three feet deep or high, two and three quarters inches at their widest, and one and a half inches at their narrowest parts, or these dimensions may be varied; the flues form a continuous or attached range, and being closed at their tops and bottoms, and at the ends of the fire flues as set forth, there is a complete water chamber formed affording ample circulation, and also a somewhat confined heating chamber with a large surface

resulting in a great economy of fuel, the great feature of my invention.

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Having thus described my invention, what I claim therein as new and original and desire to secure by Letters Patent is.

1. The fire box, deflecting plates, fire surface and water surface as constructed, and the whole arranged as herein set forth.

2. The additional steam chamber placed below the water surface, and behind the fire box, and connected to the main steam chamber by a pipe passing through the smoke stack as herein set forth.

CHAS. F. SIBBALD.

Witnesses:

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J. O. WEEKS.