

(No Model.)

R. GARSTANG.  
STEAM BOILER.

No. 281,051.

Patented July 10, 1883.

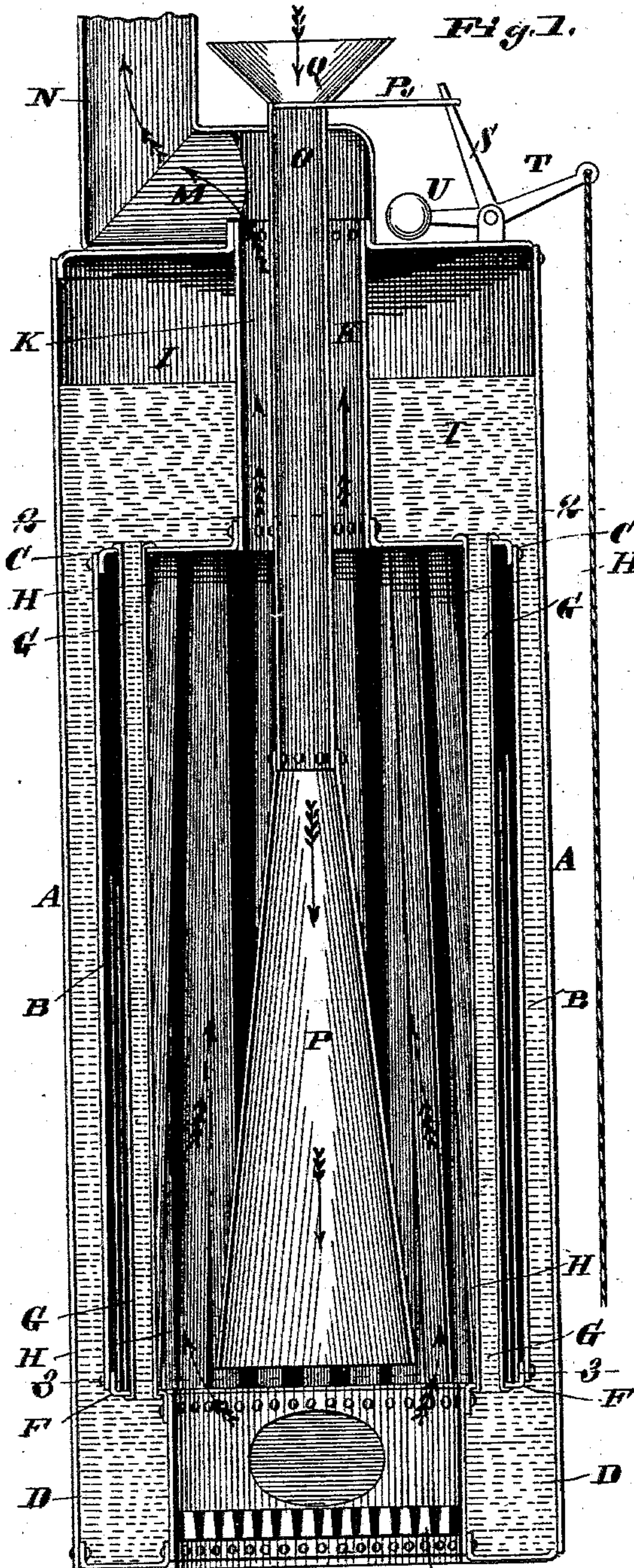


Fig. 1.

Fig. 2.

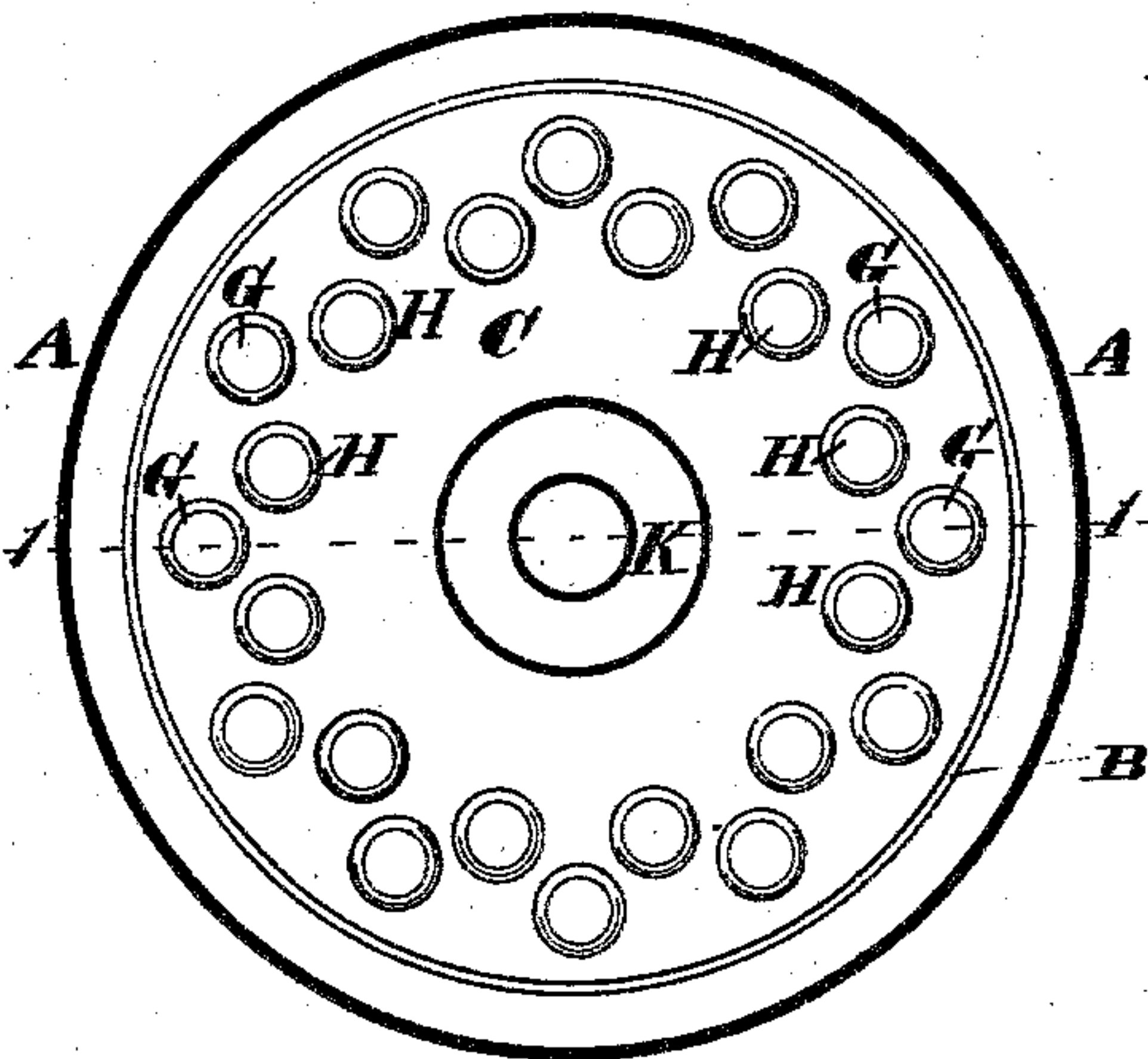
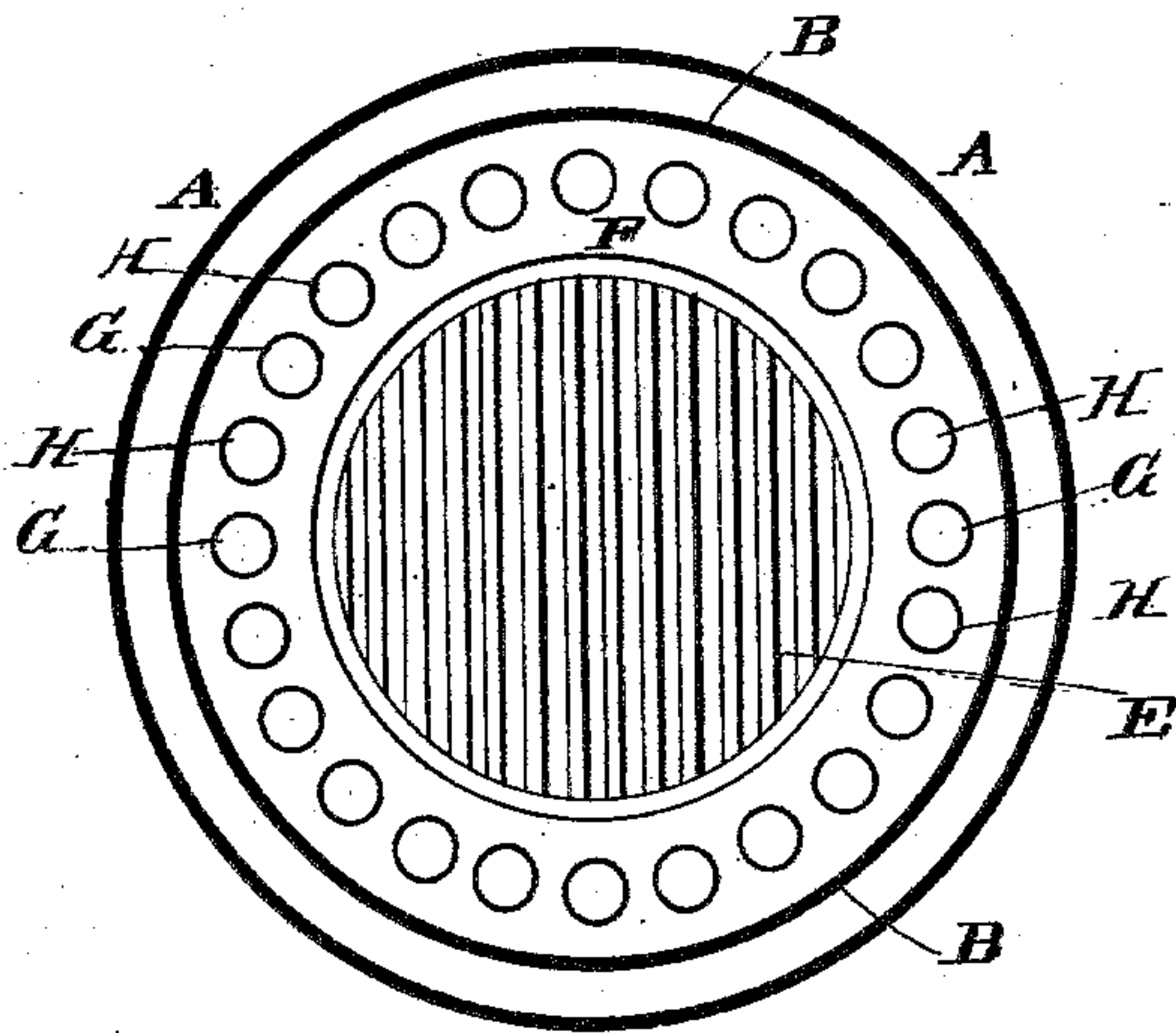


Fig. 3.



Attest;  
Jm S. Sayers.  
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# UNITED STATES PATENT OFFICE.

RICHARD GARSTANG, OF ST. LOUIS, MISSOURI.

## STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 281,051, dated July 10, 1883.

Application filed February 27, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, RICHARD GARSTANG, of the city of St. Louis, in the State of Missouri, have invented a certain new and useful Improvement in Steam-Boilers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to base-burning steam-boilers; and my improvement consists in certain details of construction which enhance the usefulness of this form of boiler.

Figure 1 is an axial section at 1 1, Fig. 2. Fig. 2 is a transverse horizontal section at 2 2, Fig. 1. Fig. 3 is a transverse section at 3 3, Fig. 1.

A is the outer shell of the boiler, and B the walls of the fire-chamber, C being the crown-sheet.

D is an annular water-leg surrounding the fire-pot.

E are the grate-bars.

At F is shown an annular offset surrounding the fire-pot, and through which pass the lower ends of the straight water-tubes G and H. These tubes extend upward through the fire-chamber, and their upper ends extend through the crown-sheet C, thus connecting the water-chamber beneath the offset F with the water-chamber I above the crown-sheet. The lower ends of the tubes or pipes G and H are arranged in a circle concentric with the shell of the boiler and the wall B. Each alternate tube G is vertical, while the intermediate tubes, H, are inclined inward and pass through the crown-sheet in a circle concentric with but inside the circle passing through the upper ends of pipes or tubes G. (See Figs. 2 and 3.) By means of this arrangement of tubes a circular fire-chamber is obtained at bottom, where the fire is located, and the upper parts of the pipes are in more open order to give the products of combustion more freedom to pass among the pipes. Further, the crown-sheet, having much more area than the offset, needs more extended support, and this is given by inclining inward each alternate pipe.

K is the smoke-flue extending axially upward through the chamber I, and connecting with the smoke-stack N by means of a horizontal portion, M.

The base-burning attachment consists of a vertical feed-tube, O, passing through the smoke-flue, and a flaring lower portion, P, descending to the lower portion of the fire-chamber, substantially as shown, where the tubes G and H assume a single circle.

The feed-tube O may be surmounted by a hopper, Q, or by any device for feeding coal into the tube.

I have shown a valve, R, for closing the upper part of the feed-tube to prevent the entrance of fuel and the escape of gases. Two valves may be used, one above the other, forming a gas-seal during the act of feeding, the chamber between the valves being filled when the upper valve is open, and emptied by opening the lower valve after the upper one has been closed. This feeding arrangement is not novel, and no claim is made therefor. The valve R is shown as operated by the arm S of a bell-crank lever having other arms, T U, carrying, respectively, a hand-rope to open the valve and a weight to close it.

My feed-tube O being formed with a downwardly-flaring lower portion, the boiler is adapted for use with bituminous coal as fuel, whereas if the lower end of the tube is drawn in, as in common forms of feeders, bituminous coal would cake and not be burned, for the reason that it jams fast in such tubes.

I claim as my invention—

1. The combination of outer shell, A, inner shell, B, within the outer shell, having crown-sheet C, fire-pot having offset F, water-chamber I above the crown-sheet, annular water-chamber between the shells, the water-leg D, surrounding the fire-pot and connected to the upper chamber by means of the annular chamber, and smoke pipe or flue K, extending from the crown-sheet through the top of the outer shell, as shown and described.

2. The combination of outer shell, A, inner shell, B, having annular water-chamber between them, water-chamber I, above the inner shell, water-leg D, surrounding the fire-pot beneath the inner shell, smoke-flue K, connecting the top of the fire-chamber to the top of the outer shell through the upper water-chamber, and vertical feed-pipe O, extending down through the smoke-flue, and provided with flaring lower portion, P, descending to the



lower part of the fire-chamber, as shown and described.

3. The combination of outer shell, A, inner shell, B, having crown-sheet C, fire-pot having offset F, connecting inner shell to fire-pot, upper water-chamber, I, water-leg D, surrounding the fire-pot, annular water-chamber between the shells, connecting the water-leg to the upper chamber on the outside of the fire-chamber, the straight tubes G H, connecting the water-leg to the upper chamber on the inside of the fire-chamber through the offset and crown-sheet, and a smoke-flue extending from the crown through the top of the outer shell, as set forth.

4. A steam-boiler consisting of outer shell, A, inner shell, B, having crown-sheet C, fire-pot having offset F to support inner shell, water-space between the shells, around, above, and beneath the inner shell, water-tubes connecting the lower and upper water-chambers, I D, inside the inner shell, smoke-flue K, passing through crown-sheet and top of outer shell, and feeder O, extending down through the

smoke-flue, and provided with flaring portion P at its lower end, as set forth.

5. In a steam-boiler, the combination of inner and outer shells, B A, having water-space between them, straight tubes G H, connecting the upper water-chamber to the water-leg, arranged in a single circle at bottom, and alternately projected inwardly at top to form two circles to expose the upper ends of the tubes to the products of combustion, and a central smoke-flue, K, as set forth.

6. In a steam-boiler, the combination of inner and outer shells, B A, upper, lower, and connecting water-spaces between the shells, straight water-tubes on the inside of the inner shell, forming a single circle at bottom and two circles at top, as shown, and a feeder, O, having flaring lower portion, P, conforming to the incline of the tubes H, as set forth.

RICHARD GARSTANG.

Witnesses:

SAML. KNIGHT,  
GEO. H. KNIGHT.