

(No Model.)

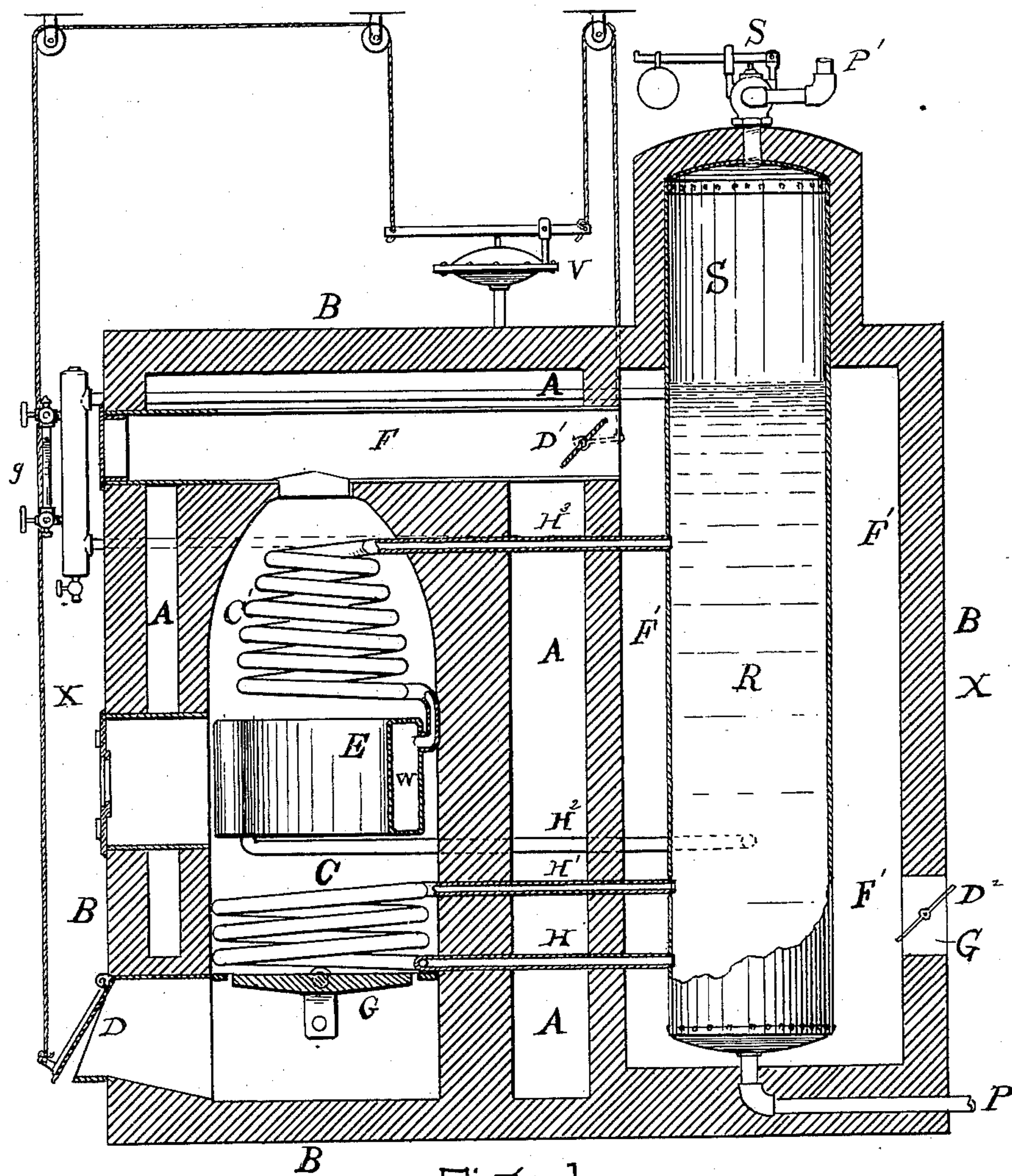
2 Sheets—Sheet 1.

C. W. RUGG.

## STEAM HEATING APPARATUS.

No. 303,667.

Patented Aug. 19, 1884.



WITNESSES.

Wm. T. Gilbert  
Bro. J. Adams

INVENTOR.

Chas. W. Ruggs  
by J. B. H. Dowsen  
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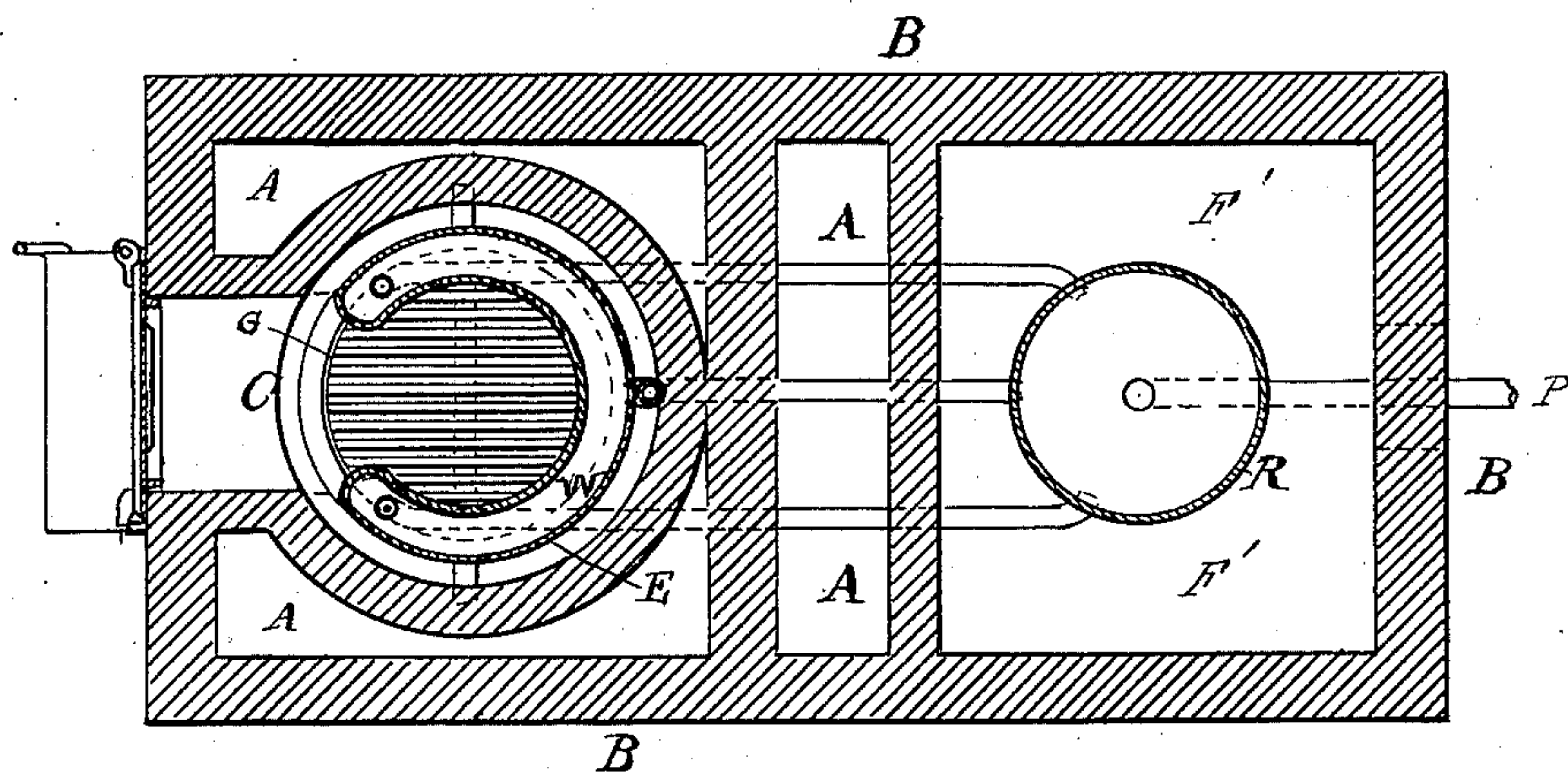


Fig. 2.

WITNESSES.

Wm. T. Gilbert.  
Geo. J. Adams

INVENTOR.

Chas. W. Rugg  
By  
W. B. H. Down  
Atty.



# UNITED STATES PATENT OFFICE.

CHARLES W. RUGG, OF CAMBRIDGE, MASSACHUSETTS.

## STEAM-HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 303,667, dated August 19, 1884.

Application filed March 12, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES W. RUGG, a citizen of the United States, residing at Cambridge, Middlesex county, Massachusetts, have invented certain new and useful Improvements in Steam-Heating Apparatus, of which the following is a specification.

The object of my invention is to produce a very quick circulation of water in low-pressure steam-heating apparatus, and thereby effect a large saving in the consumption of fuel. I accomplish these results by a peculiar arrangement of the coils and heating-drums in connection with the reservoir.

Figure 1 is a vertical longitudinal section through the whole apparatus and inclosing-walls. Fig. 2 is a horizontal section on the line *x x* of Fig. 1.

B B are walls of brick or other masonry inclosing the heater; A A, air-spaces; C, lower heating-coil; C', upper heating-coil; D D' D<sup>2</sup>, dampers; E, heating-drum; F F', flues; G, grate-bars; H, pipe connecting bottom of coil C with bottom of reservoir R; H', pipe connecting top of coil C with reservoir; H<sup>2</sup>, pipe connecting bottom of drum E with reservoir; H<sup>3</sup>, pipe connecting top of coil C' with reservoir R; P, water-supply pipe; P', steam-pipe; R, reservoir; S, safety-valve; V, diaphragm-valve; W, water in heating-drum.

The heating apparatus consists of a coil of pipe placed below the furnace-door and upon the grate-bars, connected at each end with a water-reservoir. Above this is placed a hollow doubled-walled C-shaped vessel, with its opening toward the furnace-door. Above this, and connected with it, is a second coil of pipe, C', communicating at its upper end with the reservoir R, which is cylindrical, of boiler-plate, inclosed in a chamber of brick-work, connected at the bottom with a water-supply pipe and at the top with the pipe for conducting steam through the building, a safety-valve intervening. The dampers are made automatic by a diaphragm-valve, according to method now in use on similar apparatus. Air-spaces are built in the brick-work to economize heat. The furnace has a curved roof with an opening, through which the smoke passes into a horizontal flue, and this leads into a flue-room surrounding the water-reservoir R. Thence a flue, G, connects with the

chimney. The lower coil is connected at both ends with the reservoir, so as to have an independent circulation. The drum E is connected at the bottom with the reservoir and at the top with the bottom of the upper coil of heating-pipe, the upper end of which is connected with the reservoir, the drum and upper coil having in the apparatus shown a common circulation, though this is not essential, and it is sometimes desirable to have the coil and drum each with an independent water-circulation.

The operation is as follows: Water enters the reservoir R through the supply-pipe P, and fills it partially. The cold water at the bottom then passes through the pipe H into the coil C, is heated, and, by its expansion, circulates through the coil, and returns by the pipe H' to the reservoir. The partly-warmed water enters the pipe H<sup>2</sup>, and passes into the annular space of the drum E, where it is further heated, and ascends into the bottom of the coil C', where, becoming still further heated, it ascends to the top of the coil, producing steam, and passing into the reservoir through the pipe H<sup>3</sup>. The reservoir R being completely surrounded by the hot air of the flue F', the water in the reservoir is partly heated by the escaping gases, and at the upper part loss by radiation or condensation is prevented. The steam-dome S, situated in the upper part of the reservoir R, is made of the size and shape shown that the steam may be of the dryest nature and of the highest temperature possible in a steam-producing apparatus of low pressure. The steam passes out of the steam-dome S into the pipes and radiators through the building to be heated, and is there condensed, and flows back in the supply-pipe, and thus a constant circulation takes place. The water in the reservoir R should always be kept a sufficient height that the upper and lower heating-coils and heating-drum may be always full. The radiating-surface of the heating coils and drum should be as large as possible, in order to produce the quickest circulation of water possible. Therefore, to effect the greatest possible results in an apparatus arranged as shown in my invention, the space above the grate should be as completely filled with the heating-coils and heating-drum as is possible, allowing for space for fuel and proper draft over the same.



One great advantage of the peculiar arrangement of my apparatus is that the reservoir R is situated adjacent to the furnace-fire and within the limits of the brick-work which surrounds the fire-pot of the furnace. The air about the reservoir R thus loses but little of the high temperature which it has when it leaves the space around the heating-coils. The water in the reservoir R by this arrangement is thus partially heated even before it enters the heating-coils or heating-drum.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a steam-heating apparatus, a grate and the steam-heating devices C and C' E, located within hollow inclosing-walls, in combination and connected with a reservoir, R, adjacent

thereto and within a separate chamber, all arranged and operating substantially as described.

2. An improved steam-heating apparatus, hereinbefore described, consisting of the reservoir R, located within the chamber F', in combination with a grate, flues, and water-heating devices C and C' E, each connected with reservoir R, all arranged and operating substantially as described, and for the purpose set forth.

In witness whereof I have hereunto set my hand.

CHARLES W. RUGG.

Witnesses:

WM. B. H. DOWSE,  
WM. T. GILBERT.