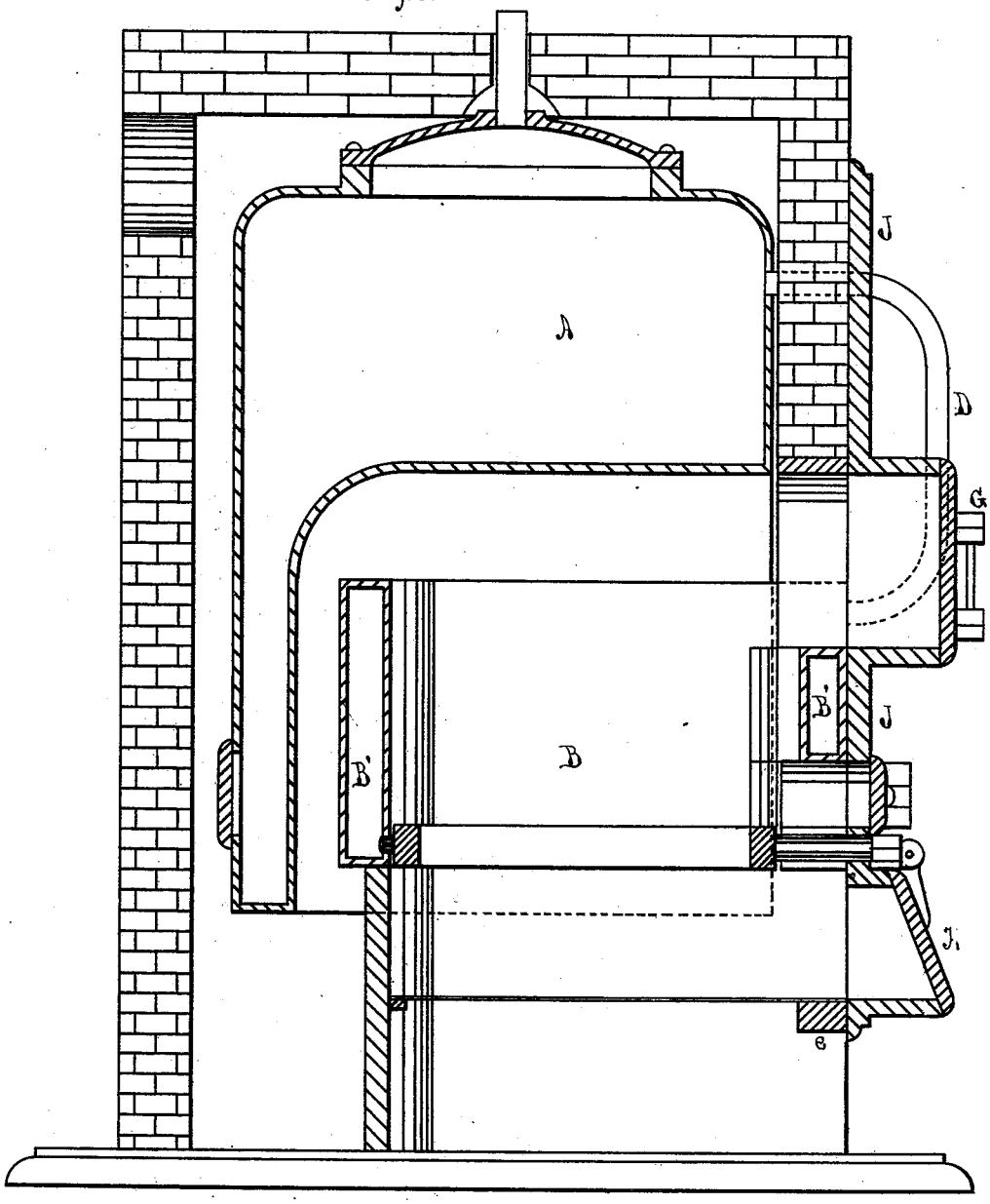
3 Sheets—Sheet 1.

# R. G. BROWN.

## STEAM-HEATER.

No. 191,796. Patented June 12, 1877.

Fig. 1.

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3 Sheets—Sheet 2.

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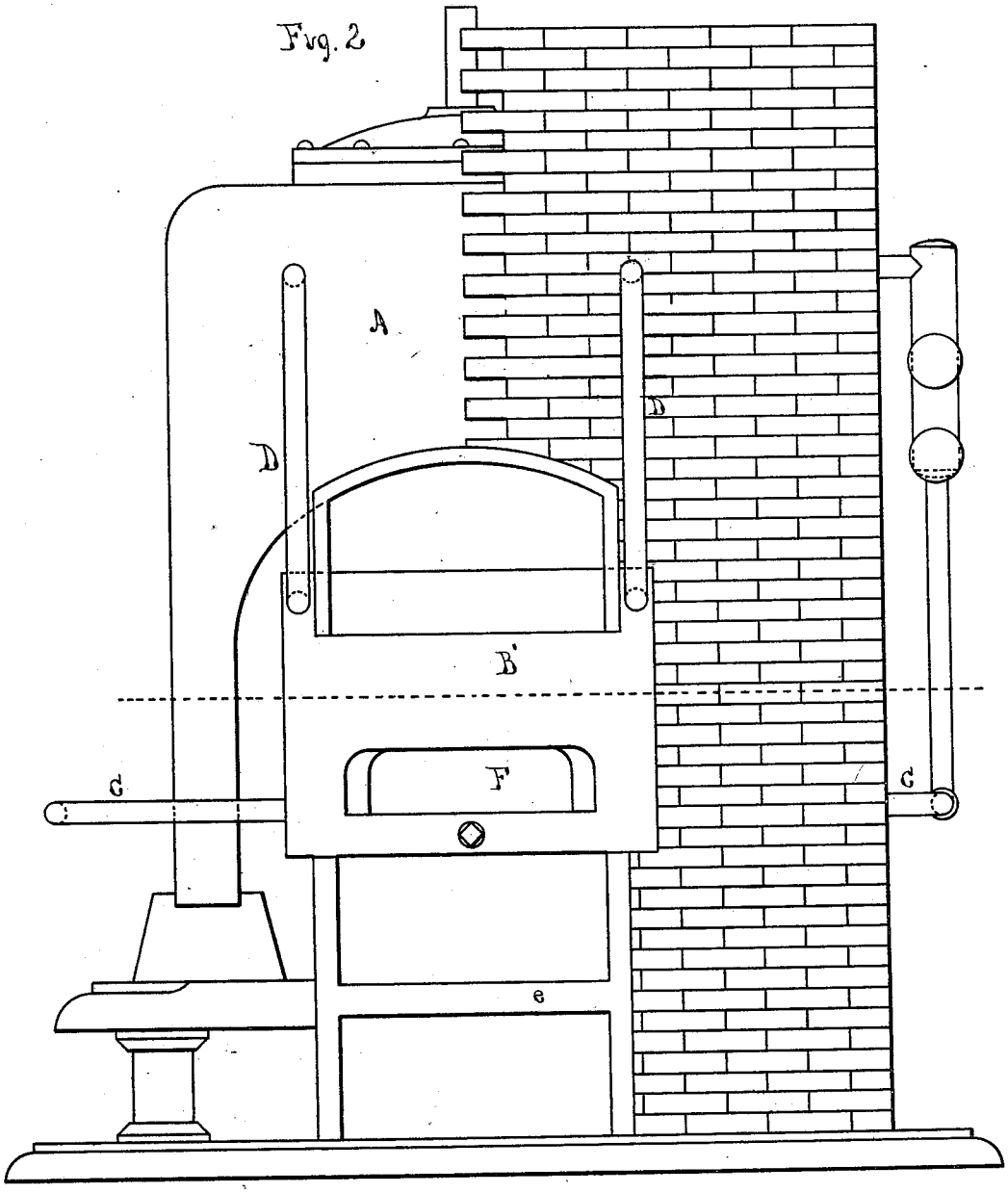
## STEAM-HEATER.

No. 191,796. Patented June 12, 1877.

Fig. 2.

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3 Sheets—Sheet 3.

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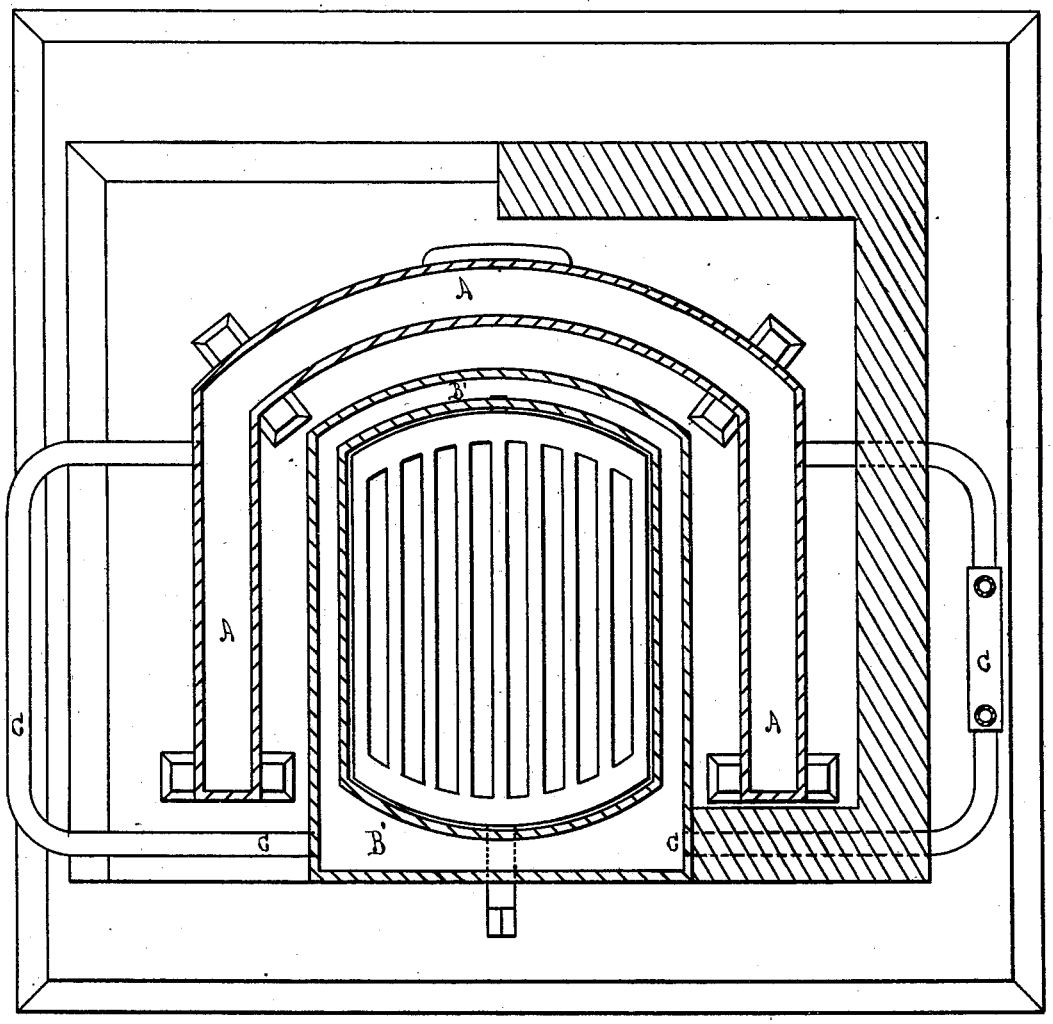
## STEAM-HEATER.

No. 191,796. Patented June 12, 1877.

Fig. 3.

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# UNITED STATES PATENT OFFICE.

RUFUS G. BROWN, OF WALTHAM, MASSACHUSETTS.

## IMPROVEMENT IN STEAM-HEATERS.

Specification forming part of Letters Patent No. **191,796**, dated June 12, 1877; application filed April 4, 1877.

*To all whom it may concern:*

Be it known that I, RUFUS G. BROWN, of Waltham, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Steam-Heaters, of which the following is a description:

My invention relates to certain improvements made upon the steam-heating apparatus described in the Letters Patent of the United States No. 176,508; and consists in connecting the boiler and fire-box with a number of pipes, as hereinafter more fully described, the object of my invention being to provide for an increased and constant circulation of the water from the lower part of the boiler, which is least exposed to the heat of the fire, through the water-space of the fire-box, where it is heated, and steam generated soonest, the steam and hot water being carried through pipes out of the said water-space into the boiler, while the colder water from the lower part of the boiler flows into the water-space of the fire-box, thus keeping up a constant and free circulation of the water.

In the drawings, Figure 1 is a sectional elevation through the center of the boiler and fire-box. Fig. 2 is a front view with the front plate removed; and Fig. 3 is a horizontal section.

A represents the boiler, and B the fire-box. This boiler is made independent of and separate from the fire-box, and of the shape and position shown and described in said Letters Patent.

The fire-box B is made of an inner and outer shell, extending entirely around it, a water-space, B′, being left between the shells. A grate is put in in the usual manner, and also an opening made through the front walls of the fire-box, on a level with the grate, for the insertion of a poker. This fire-box is placed within the opening formed by the ∩-shaped inner shell of the boiler, a space being left between the inner shell of the boiler and the outer wall of the fire-box, through which space the smoke and heated air from the fire pass under the boiler, and out through the flue.

G is the fire-box door, the fire-box and boiler being so arranged that the door is above the fire-box, and immediately between it and the crown-sheet of the boiler, so that very little or none of the heating-surface is lost on account of the door. This door is attached to the plate J, as is also the ash-pan door H. This plate J I put onto the front part of the boiler, which is not covered by the brick-work, and it serves to prevent the outside air from coming in contact with the boiler, and especially that part of the fire-box below the door.

C C are pipes, one end of each being inserted in the lower part of the boiler, on either side, while the other ends enter the lower part of the fire-box. D D are delivery-pipes, one end of each being inserted in the upper part of the water-space of the fire-box, while the other ends enter the boiler above the level of the water.

When the fire is made, the water in the water-space of the fire-box becomes heated sooner than the water in the boiler, and being so heated, and steam generated, the steam rises, carrying more or less water with it through the pipes D D, into the boiler, and as the lower part of the boiler is only indirectly exposed to the heat of the fire, I take the water from this part of the boiler and force it into the water space of the fire-box through the pipes C C by the pressure upon it, and the vacuum, so that as fast as the steam and heated water flow out of the fire-box the colder water from the lower part of the boiler flows in, and is in turn heated, and carried up into the boiler with a rapid circulation.

I am thus enabled, by means of the construction and arrangement of the fire-box and pipes, to maintain a free and constant circulation of the water from that part of the boiler which is least exposed to the heat of the fire, to, and through the water-space of the fire-box, where it is quickest heated, so that not only is the water in the boiler heated from the fire in the usual manner, but it is also very materially heated by the hot water and steam from the fire-box without condensing the latter to any great degree.

By this improvement it is found that in addition to the advantages of the mechanism shown in the said Letters Patent No. 176,508,

I produce so rapid a circulation in the contents of the boiler and fire-box chamber that all parts of such contents are kept at a substantially uniform temperature when the furnace is in operation, and prevent the loss of heat from the steam heretofore experienced.

I claim as new and of my invention—

In combination with the boiler A and fire-box B, the inlet and outlet pipes C and D, constructed and arranged substantially as described.

RUFUS G. BROWN.

Witnesses:
H. F. WELCH,
A. K. GARLAND.