

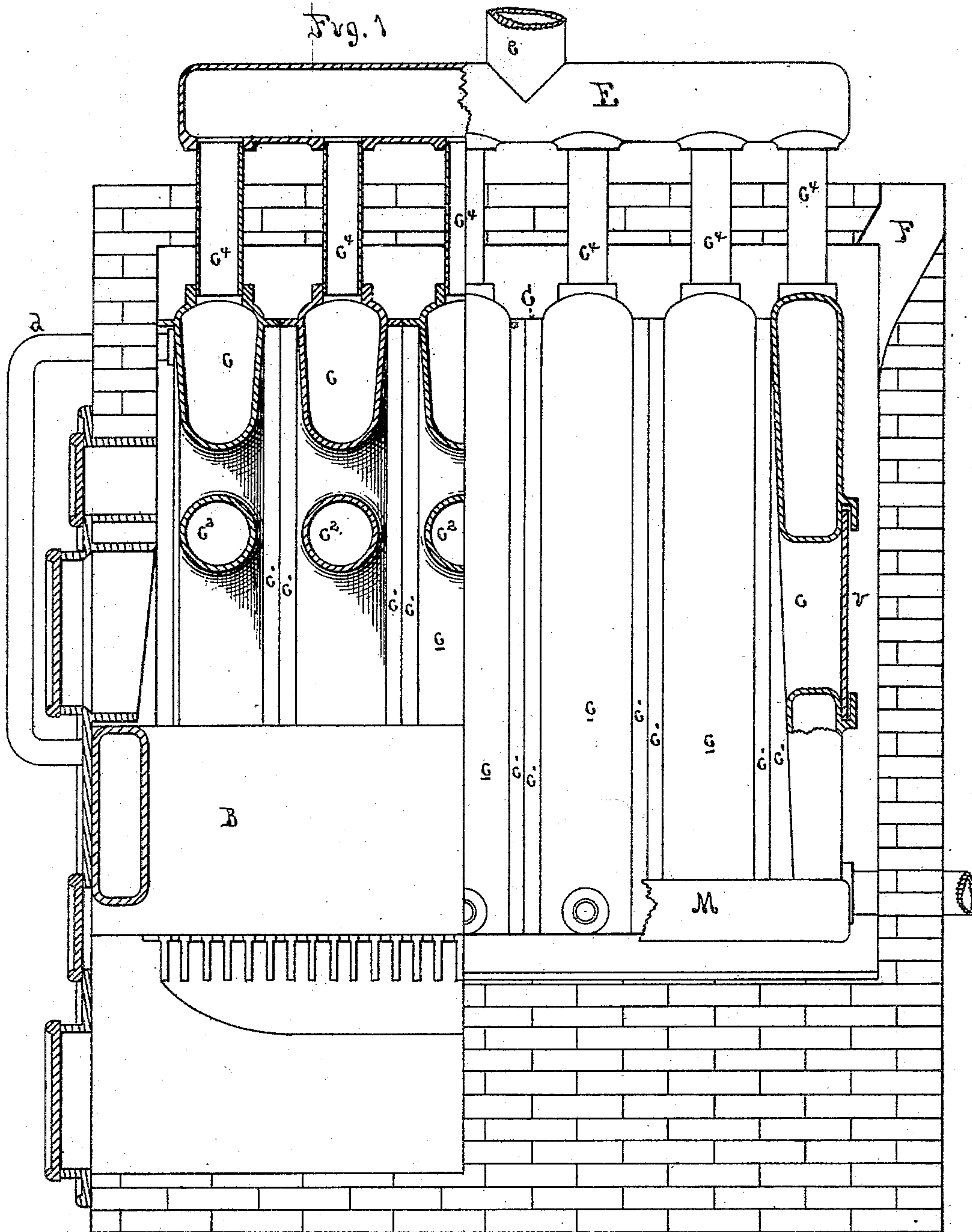
(No Model.)

3 Sheets—Sheet 1.

R. G. BROWN.
STEAM HEATER.

No. 411,885.

Patented Oct. 1, 1889.



Witnesses

R. G. Brown
A. P. Ockington.

Inventor

Rufus G. Brown

(No Model.)

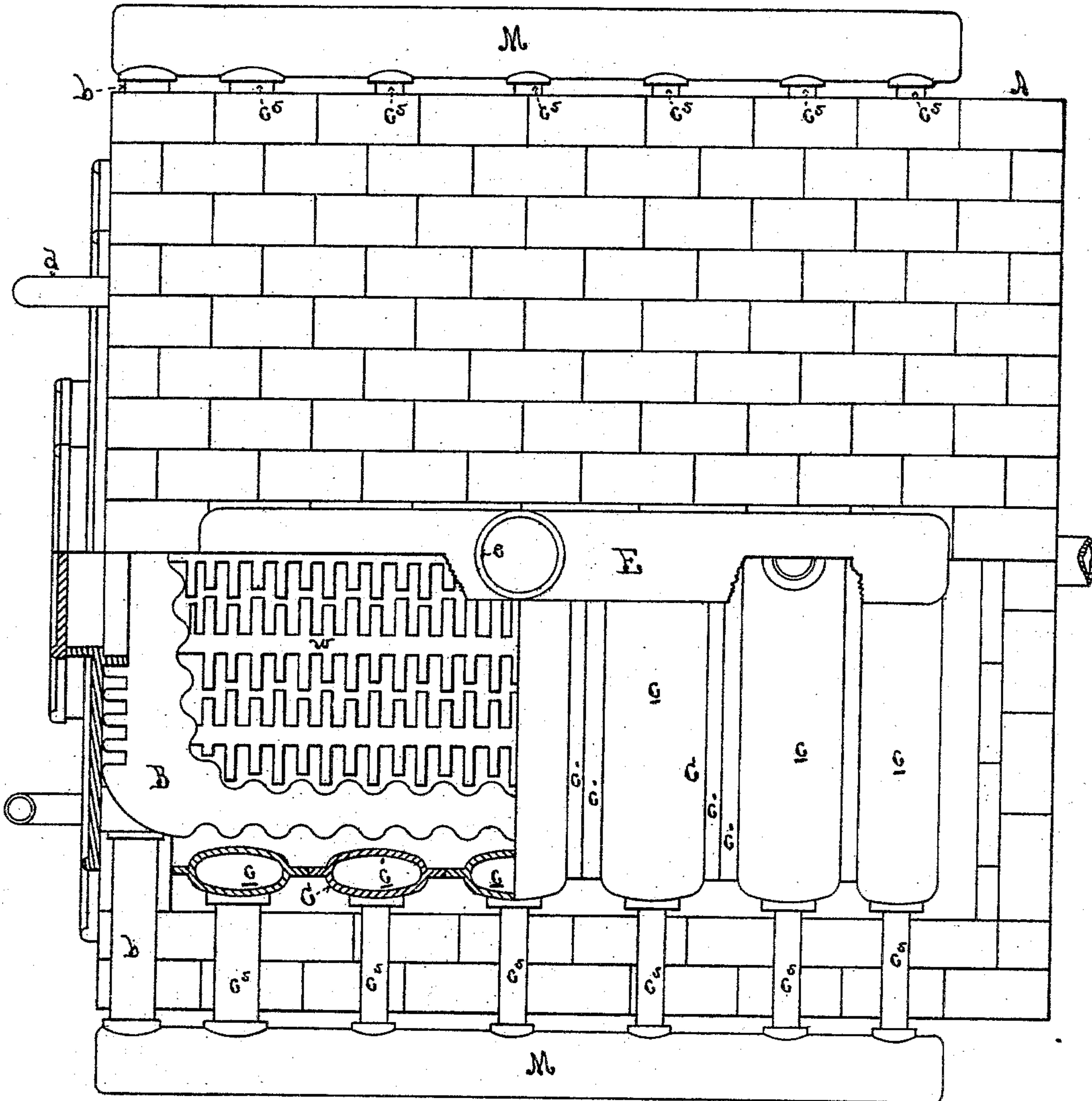
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Fig. 2



Witnesses

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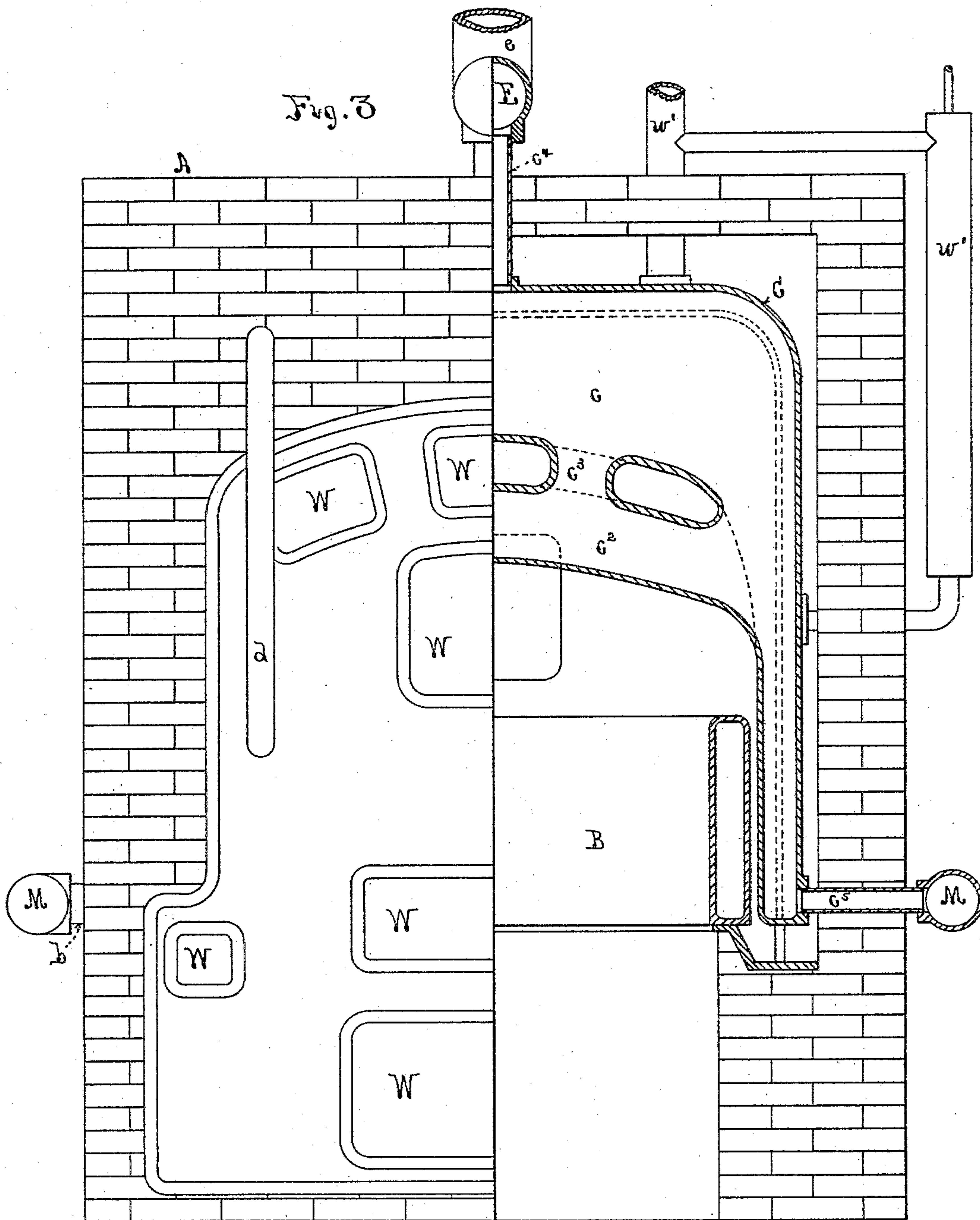
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UNITED STATES PATENT OFFICE.

RUFUS G. BROWN, OF WALTHAM, MASSACHUSETTS.

STEAM-HEATER.

SPECIFICATION forming part of Letters Patent No. 411,885, dated October 1, 1889.

Application filed April 16, 1886. Serial No. 199,128. (No model.)

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 a certain new and useful Improvement in Steam-Heaters, of which the following is a specification.

My invention relates to steam-heaters; and it consists in certain improvements in the construction and arrangement of the same, substantially as hereinafter described and claimed.

In the drawing, Figure 1 is a side elevation of a steam-heating apparatus constructed according to my invention with a portion of the outer brick casing broken away and its interior partly in section to show the construction and arrangement of the parts. Fig. 2 is a top plan view of the same with the brick casing broken away and partly in section in like manner. Fig. 3 is a front elevation of the same with one-half having the casing broken away and parts in section in like manner.

A is the outer casing, of brick or other suitable material. Inside of this casing the heater consists, fundamentally speaking, of a tubular boiler or reservoir B, forming the fire-pot, and an outer boiler C, covering and surrounding the other, forming the crown-sheet and outer water and steam reservoir. The operation of these together first causes the heat of the fuel in the fire-pot to impinge against its inner fire-surface; next, ascending, to impinge against the interior fire-surface of boiler C, forming the crown-sheet; next, descending, to pass between boilers B and C until it passes under the lower edge of the latter, and, lastly, ascending between the outer casing A and boiler C to heat the outer surface of the latter. The smoke and gases then pass off through the flue F to the chimney. Boiler C is attached to the front of the casing A and supported on struts within the brick-work to retain its position. In both horizontal and vertical section it is U-shaped in its general form.

Owing to the different rates of temperature to which they are at all times exposed, the boilers B and C make steam at quite unequal rates, and hence there must be ample provis-

ion for a circulation of steam and water between them to insure their efficient and equal co-operation. This has heretofore been accomplished by connecting the bottom part of boiler B with the like part of boiler C and the top part of boiler B with the top part of boiler C by separate pipes *b* and *d*, which provide for a constant circulation of the steam and water, as shown in my Patent No. 191,796, dated June 12, 1877. It may, however, be accomplished by any other suitably-shaped conduit, in connection with my present invention, which delivers the steam and water from one of these boilers to the other, my present invention consisting, essentially, in forming the outer boiler C of a series of pipes or tubes and providing them with a common water and steam connection with the fire-pot boiler B, as well as with the steam-pipes of the house to be heated. The object of this is to enable me to form the outer boiler C so as to present the greatest possible heating-surface, and so as to prevent leakage, and also so that I can make it of any desired size and capacity by merely adding tubular sections of the same kind and shape one to another, thus obviating the necessity of employing a great number of different sizes of patterns in their manufacture.

Although tubular boilers are well known, I am not aware that they have ever been constructed and the parts connected together so as to enable them to be properly connected to the fire-pot boiler B, or even so as to form a crown-sheet and jacket for a base-burning furnace like the one shown in this application, and at the same time produce the proper circulation and equalization of pressure throughout the boilers by means of connecting-pipes between them, substantially as set forth.

The boiler C is formed of a series of U-shaped tubes *c c*, having flanges *c' c'* projecting outward on each side, which fit closely together on their edges and form the whole series into the boiler C. Over the top of the fire-pot boiler B each of these tubes *c c* is connected from side to side by a cross-tube *c²* below the most horizontal part of the main tube *c*, thus forming what may be termed a "double crown-sheet," the lower one nearest the fire

being the tubes c^2 , with spaces between for the ascent of heat, and the upper one being the tubes c . The tubes c^2 are formed arching to bring them nearest the fire over the edges of the fire-pot, so as to equalize the heat upon them in some degree; but as this construction would also tend to cause steam to accumulate and remain in the upper part of the arch of these tubes, I provide for the escape of this steam as fast as formed by connecting the upper side of each pipe c^2 with the lower side of the pipe c above it by one or more short vertical passages c^3 . As the steam would also form in pipes c and accumulate in the upper part of pipes c^2 , I also connect each of these by a vertical pipe c^4 with a drum E over the center of the furnace. All the steam rising into this drum causes itself to flow with an equal pressure into the steam-pipe e , which leads to the apartments to be heated.

In order to connect the lower ends of each of the tubes c with the fire-pot boiler B properly, I first lead from its lower ends pipes c^5 into the common reservoirs M M on each side of the furnace. From each of these reservoirs I lead pipes b into the lower end of fire-pot boiler B. The pipe b leads out of the upper end of boiler B into one of the tubes c , as shown, thus delivering the steam formed in that boiler into the latter as fast as formed. In order to provide for this extra amount of steam and the consequent extra pressure upon the water in this tube, I form the pipes c^4 and c^5 , leading from it, larger than those leading from the other tubes c . I also form the pipes b , leading from drums M M, larger than the pipes c^5 , leading into them.

The action of the water in forming steam is as follows: The contiguity of fire-pot boiler B and pipes c^2 to the fire causes steam to form in them first, which escapes through pipes d , c^4 , and c^3 into drum E. This starts a circulation of the cold water through drums M M into boiler B and through pipes c^2 c^3 in the crown-sheet part of boiler C, which circulation continues as long as the heater is operated, the hot water and steam continually rising in the more heated parts of the boilers and colder water continually flowing into its place, not only in each boiler separately, but between the boilers.

W W W represent the places for the various doors of the furnace for access in firing and cleaning it. The fire-grate w is placed in the fire-pot in the usual position. The pipes w' are for connection with the safety-valve and steam-gage in the usual way. A plate v closes up the rear side of the jacket formed by the tubes c and completes the same, so as to force the heat to pass downward under the base of the jacket all around.

My steam-boilers present a great amount of surface to the action of the heat.

What I claim as new and of my invention is—

1. In combination with the fire-pot boiler B, two or more \cap -shaped tubes c , reaching over and around it and connected by a common water and steam passage with it and with each other at their top and bottom ends, substantially as described.

2. In combination with the fire-pot boiler B, two or more \cap -shaped tubes c , reaching over and around it, each provided with cross-tubes c^2 c^3 and connected by a common water and steam passage with said boiler and with each other at their top and bottom ends, substantially as described.

3. In combination with a fire-pot boiler B, two or more \cap -shaped tubes extending over and around it and connected with each other at top and bottom by a common water and steam passage, and the outer shell or casing A around the latter, connected by pipes with boiler B, the whole forming a base-burning heating-furnace, substantially as described.

4. The combination of steam-drum E, \cap -shaped tubes c , one or more water-drums M, fire-pot boiler B, and steam and water escape passage d , leading from the upper end of the latter, the whole being connected together by water and steam passages, substantially as described.

5. In combination with fire-pot boiler B, a \cap -shaped tubular reservoir c , embracing the fire-pot between its lower ends and provided with a cross-tube c^2 , passing over the fire-pot between its opposite sides and forming a double crown-sheet for the ascending heat, substantially as described.

RUFUS G. BROWN.

Witnesses:

N. P. OCKINGTON,
DAVID HALL RICE.