

No. 731,380.

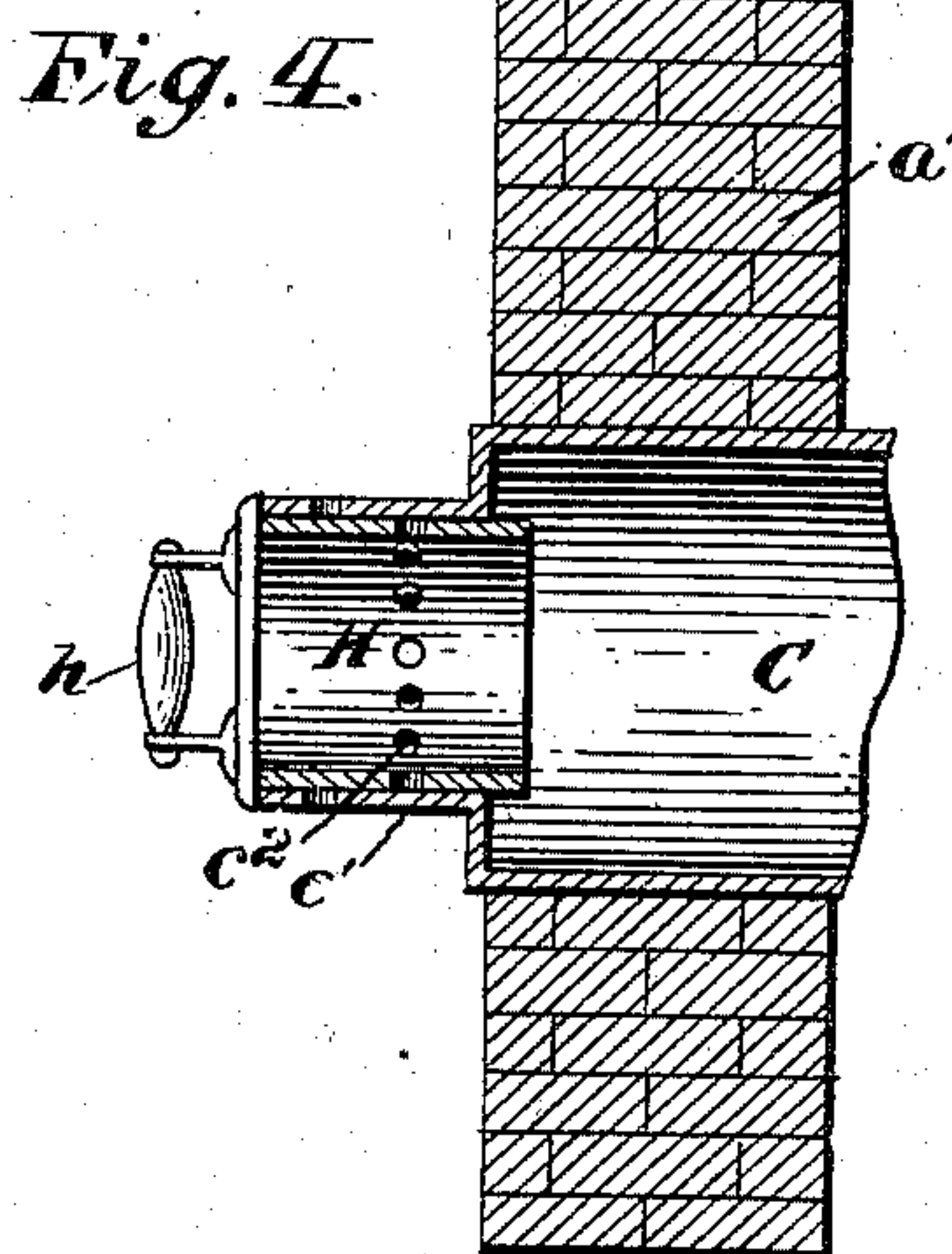
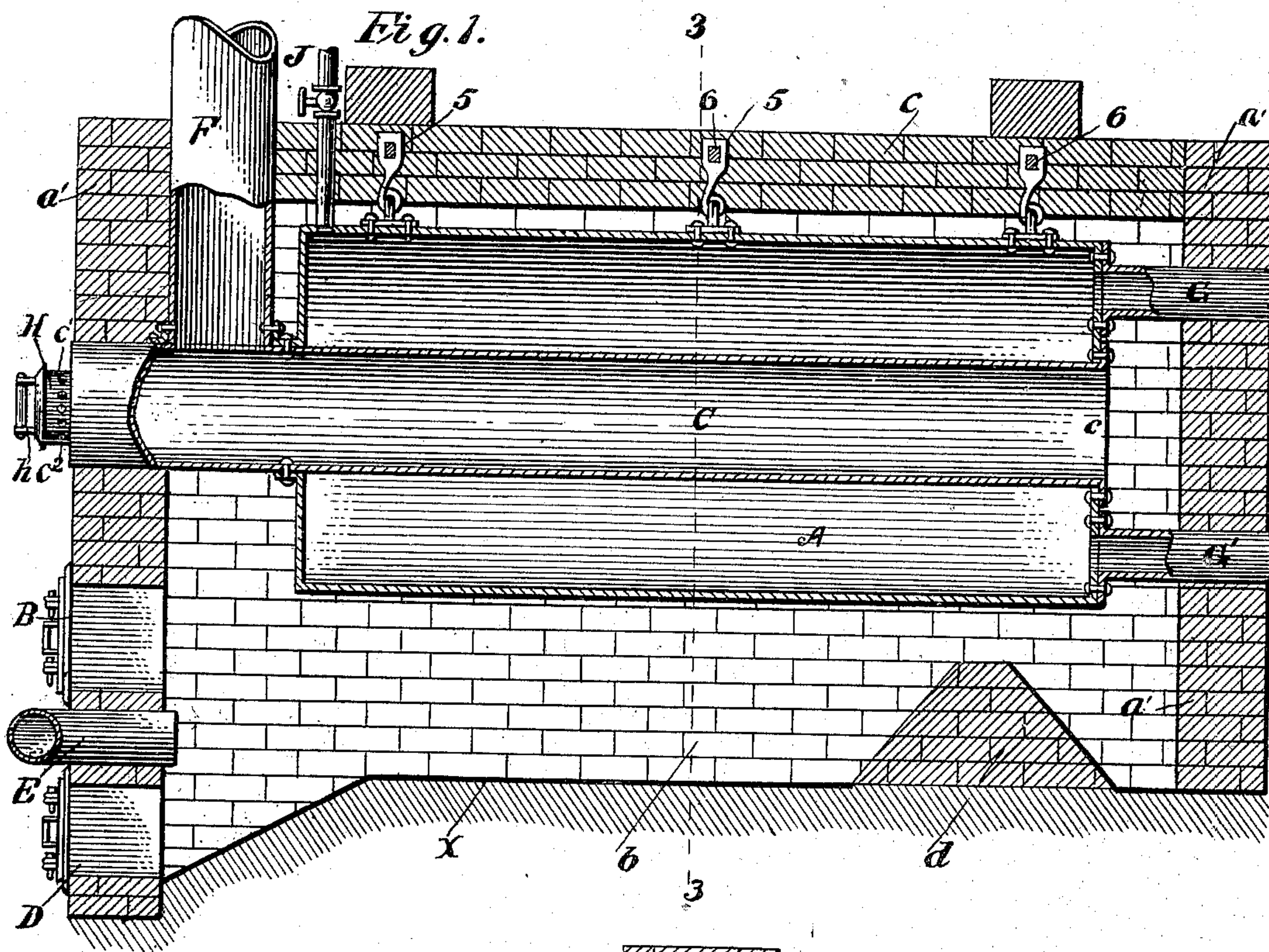
PATENTED JUNE 16, 1903.

L. & S. MAYHEW.  
AIR TIGHT HOT WATER BOILER.

APPLICATION FILED SEPT. 10, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES:

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2 SHEETS—SHEET 2.

Fig. 2.

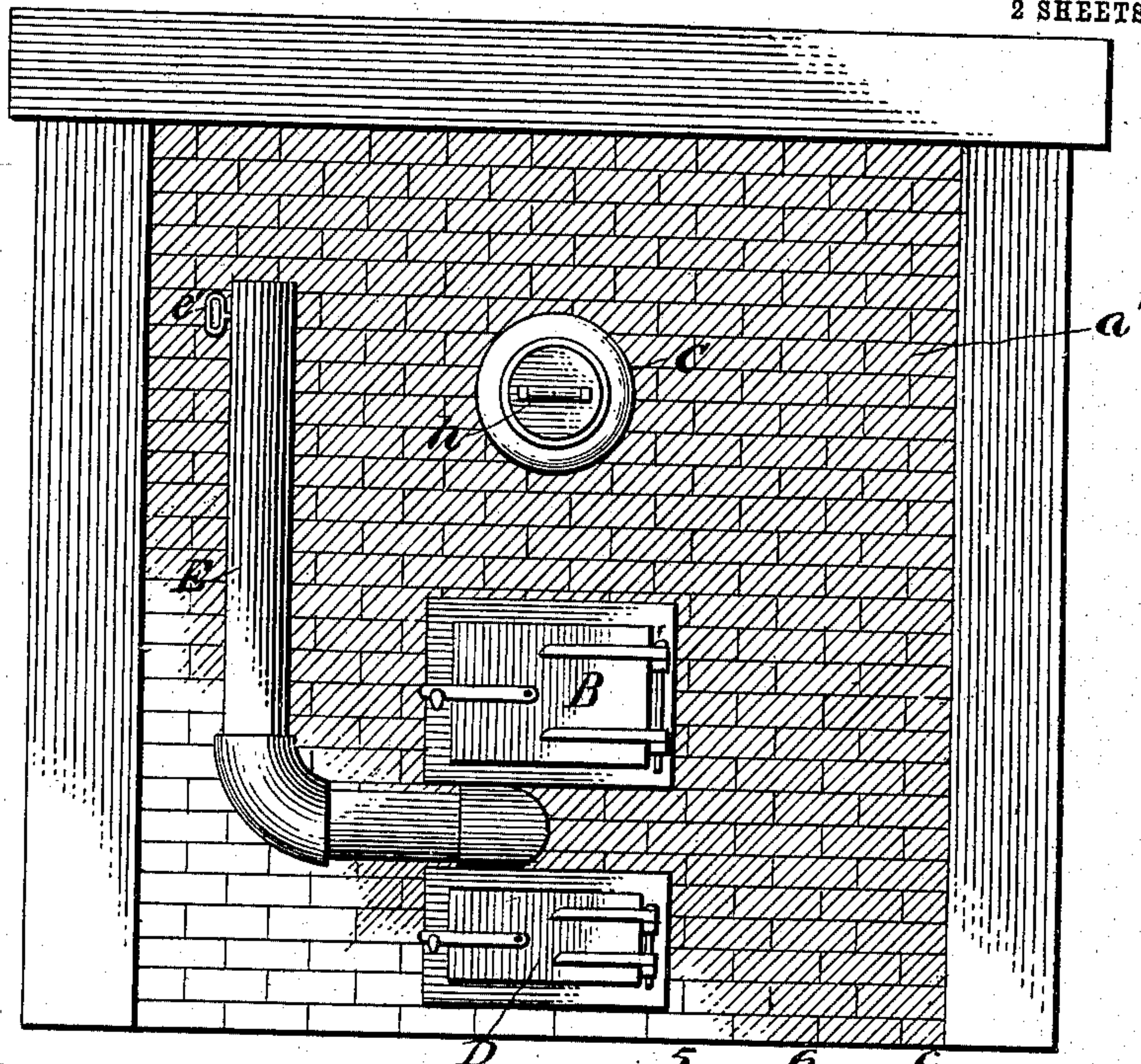
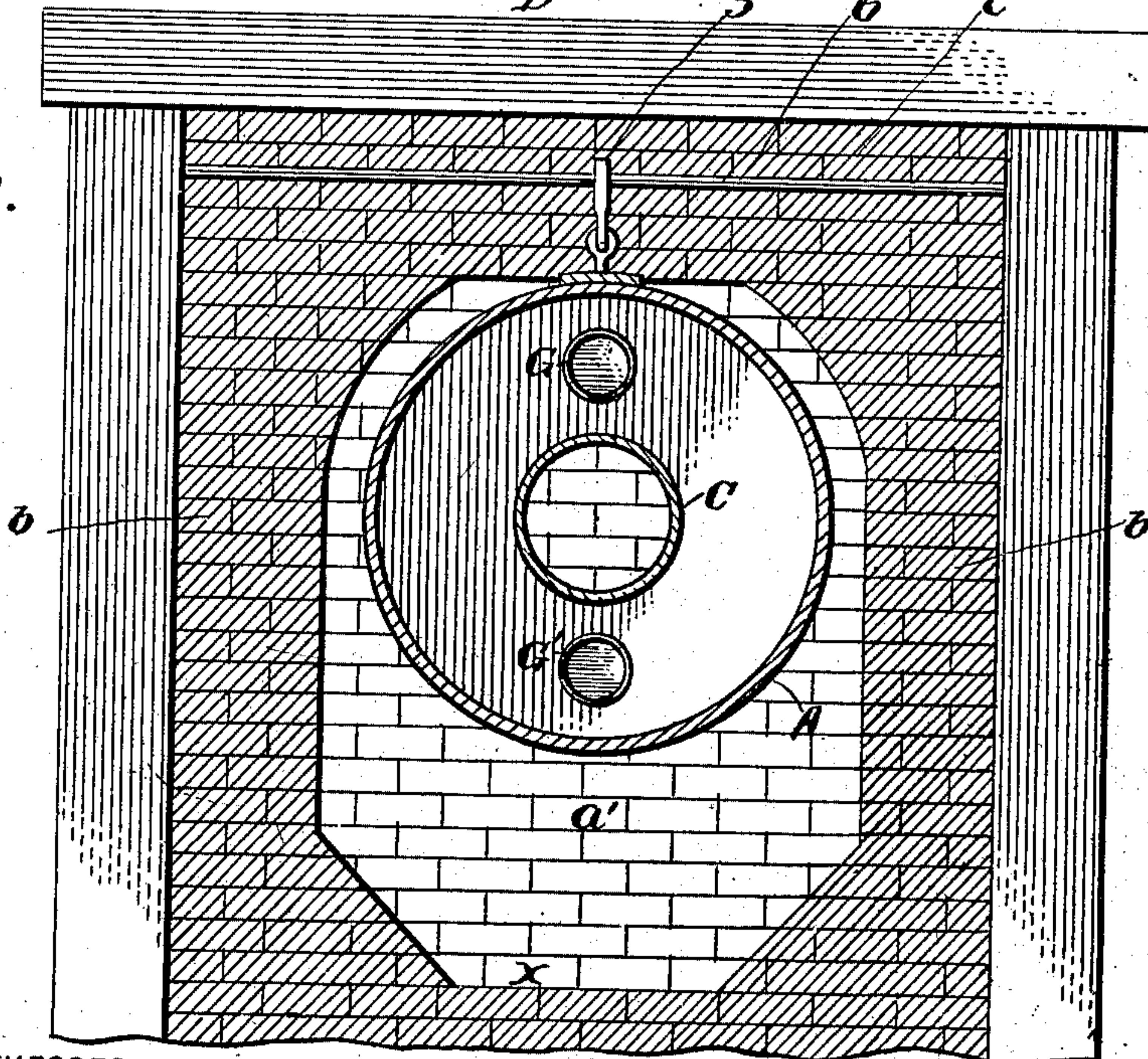


Fig. 3.



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# UNITED STATES PATENT OFFICE.

LEWIS MAYHEW AND SANFORD MAYHEW, OF WHATCOM, WASHINGTON.

## AIR-TIGHT HOT-WATER BOILER.

SPECIFICATION forming part of Letters Patent No. 731,380, dated June 16, 1903.

Application filed September 10, 1902. Serial No. 122,887. (No model.)

*To all whom it may concern:*

Be it known that we, LEWIS MAYHEW and SANFORD MAYHEW, residing at Whatcom, in the county of Whatcom and State of Washington, have invented a new and Improved Air-Tight Hot-Water Boiler, of which the following is a specification.

Our invention, which seeks to provide an economical, easily-constructed, and effective means for heating and circulating hot water for heating plants, more particularly is in the nature of an improved single-flue boiler, especially adapted for utilizing wood for the fuel; and generically it comprehends a new and novel coöperative arrangement of parts which serve to maintain a fuel combustion for a considerable length of time (from twenty to twenty-four hours) with one firing.

In its more complete construction our invention includes a grateless fire-box, a shell boiler suspended within the fire or combustion box in such manner that the heat will circulate around the ends, sides, top, and bottom thereof and having a draft connection co-operatively joined with a single flue that passes longitudinally and axially through the boiler or shell, whereby a maximum effect of the hot air is produced upon the heat-receiving surface of the boiler with a minimum expense of fuel and waste of said air into the offtake, and it also includes a special manner of suspending the boiler or shell within the fire-chamber, whereby the creosote and other like material that deposits within the single flue will gravitate back into the fire-box, and thereby automatically keep the flue clean and free from choking up with soot, creosote, and other similar deposits.

In its still more subordinate features our invention consists in certain details of construction and peculiar combination of parts, all of which will hereinafter be fully explained, and specifically pointed out in the appended claims, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section of our improved boiler. Fig. 2 is a front elevation thereof. Fig. 3 is a transverse section of the same on the line 3 3 of Fig. 1. Fig. 4 is a detail view of the back or adjustable draft members hereinafter referred to.

In the practical construction our air-tight

hot-water boiler comprises a fire-chamber, preferably formed within a brick casing, consisting of the ends *a' a'*, the sides *b b*, an arch top *c*, and a bridge-wall *d*, located near the rear end of the fire-chamber, as clearly shown in Fig. 1, by reference to which it will also be seen the front wall *a'* extends in a plane below the bottom *x* of the fire box or chamber, and the said bottom near the front end declines toward the ash-door *D* to facilitate the ready removal of the wood-ash that accumulates on the fire-box floor. The front end or wall *a'* is also provided with a feed-opening *B*, having a door of the usual construction, and through this feed-opening the fuel is dumped onto the fire-box bottom, and as our improved hot-water boiler is fired by wood fuel no grates are required, as the fuel is dumped on the bottom or floor of the fire-box between the feed-opening and the bridge-wall, and by reason of the ash-door being in a plane below the bottom of the fire chamber or box and as the bottom *x* is inclined toward the ash-pit door, as before stated, the wood-ash can be quickly and conveniently removed, as desired.

*A* designates a cylindrical shell of somewhat less length than that of the fire-box, whereby a circulating-space is provided at each end of the shell. The boiler or shell *A* is suspended from the arch or crown of the fire-box upon hangers *5 5*, pendently hung from the cross-bars *6 6*, anchored in the brickwork of the arch, and the said boiler or shell is supported with its top below the arch, whereby to permit the products of combustion to pass over the top as well as the sides and ends thereof, and the said boiler is also supported with its rear end in a plane slightly below that of the front end, for a purpose presently explained.

The boiler or shell *A* has a single tube *C*, in practice of about one-third the diameter of the shell, and the rear end of the tube *C* opens into the rear portion of the fire-box, as indicated by *c*, while the front end of the said tube extends beyond the front end of the shell and through the front walls *a'* of the brick casing, and the said end terminates in an extension *c'* of reduced diameter, provided with a series of air-inlets *c<sup>2</sup>*, that are normally closed by the tubular back check-valve



H, provided with a handhold *h* and slidably mounted in the extension *c'*, as best shown in Fig. 4.

That portion of the tube C between the front casing-wall *a'* and the front end of the boiler or shell connects with the stack or off-take-flue F, that passes up through the arch top of the brick casing, and E denotes a fire-box draft-flue that discharges into the fire-box at a point between the ash-pit and feed-door, and the said flue E extends up in front of the casing-wall *a'* and is provided with a damper *e'* for controlling the force of the draft.

G designates the hot-water offtake-pipe, which connects with the piping system in the plant to be heated, and G' the return-pipe, which discharges into the boiler-shell at a point just above the bridge-wall or hottest part of the fire-box, and J indicates a valve feed-pipe for charging the boiler or shell.

From the foregoing, taken in connection with the accompanying drawings, the advantages and operation of our invention, it is believed, will be readily apparent to those skilled in the art to which it appertains.

The boiler is especially adapted for use in localities where wood is the principal fuel employed. The forced draft into the fire-box can be regulated to suit, and by proper manipulation of the same and the back or check valve devices a single feed of fuel onto the floor of the fire-box can be kept alive for a considerable length of time, (twenty to twenty-four hours being usual in the practical use of our boiler,) and as the single boiler-tube communicates with the rear end of the combustion-chamber the products of combustion are carried entirely around the boiler and toward the back end thereof and concentrated at the bridge-wall portion, from whence it passes into the flue and toward the offtake or stack pipe.

By reason of the manner in which the slidable valve H joins with the extension of the tube C the same can be readily drawn out to uncover the apertures *c<sup>2</sup>* in the extension *c'*, and thereby permit an inflow of air into the end *c'* of the tube and directly into the stack-pipe, and thereby prevent soot or creosote from forming in the chimney and also act to check the fire-box draft to make the fire last longer under the boiler.

In the practical use of our improved boiler on account of the peculiar manner in which the draft is fed to the fire-chamber the circulation of the products of combustion around the boiler, the check-draft devices, and the offtake the combustion is so complete that under a full draft into the fire-chamber that end of the boiler into which the return-pipe discharges has the greatest heat, and by reason thereof the return-water is practically heated to the maximum degree in the return-pipe before it reenters the boiler.

The purpose of making the single tube of considerable diameter and using only one

tube within the boiler is to prevent the possibility of creosote and other deposits from choking up the flues in a manner which frequently occurs in tubular boilers, and thereby prevent danger of the tubes becoming choked to such an extent as to require boring out, as is frequently necessary in the ordinary construction of tubular boilers, and by reason of tipping the boiler rearwardly in the manner shown and described any creosote which deposits within the tube will run out at the back end thereof into the fire-box and be consumed.

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

1. An improved boiler of the character described, comprising a casing, a grateless fire-chamber therein, door-equipped feed and ash openings to the said chamber, a draft-flue positioned to discharge into the front end of the fire-chamber, a boiler-shell suspended within the fire-chamber and out of contact with the walls thereof, whereby to permit fire circulation entirely around the said shell, a single flue extending lengthwise of the shell, and communicating with the rear end of the combustion-chamber, the said flue extending beyond the front end of the shell, a stack or offtake pipe communicating therewith, a feed for the boiler, and hot-water distributing and return pipes connected to the rear end of the said boiler, for the purposes described.

2. In a boiler of the character described, the combination with the casing, having a grateless fire-chamber, a bridge-wall in the rear end of the said chamber, the front end of the casing having door-equipped feed and ash-pit openings, the latter being in a plane below the floor of the fire-chamber, a draft-pipe discharging into the front end of the fire-chamber in alinement with the floor, a boiler-shell suspended within the combustion-chamber, and with its ends and sides out of contact with the walls of the casing, whereby to provide for the circulation of heat entirely around the said boiler or jacket, a single flue axially mounted in the said jacket communicating with the rear end of the combustion-chamber, the front end of said flue being extended beyond the front end of the boiler-shell, and projected through the front wall of the casing, and terminating with a reduced tubular extension, the latter having apertures, a tubular valve slidably mounted in the said extension for controlling the air through the apertures in the said extension, a stack-flue communicating with the outwardly-extended portion of the boiler-flue, and the hot-water offtake and return pipes connected with the rear end of the boiler-shell, substantially as shown and for the purposes described.

3. The herein-described air-tight hot-water boiler, comprising a casing having a grateless fire-chamber, having a bridge-wall near its



rear end, its bottom being inclined at the front end, the front wall of said casing having door-equipped feed and ash-pit openings, the latter being in a plane with the inclined  
5 portion of the combustion-chamber floor, a valve draft-flue extended through the front wall of the casing in a plane with the floor of the fire-chamber, a boiler-shell suspended below the crown of the fire-chamber, said shell  
10 being of a length less than that of the fire-chamber, a single flue extending axially and longitudinally through the boiler-shell, with its front end projected through the front wall of the casing, and its rear open end in com-  
15 munication with the rear end of the fire-

chamber, the front end of the said flue having a reduced extension provided with air-inlets, a valve slidable in the said extension for controlling the said inlets, a stack-flue connected with the boiler-flue at a point in 20 front of the boiler-shell, a hot-water offtake and a return pipe connected with the rear end of the boiler, all being arranged substantially as shown and for the purposes described.

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