(No Model.)

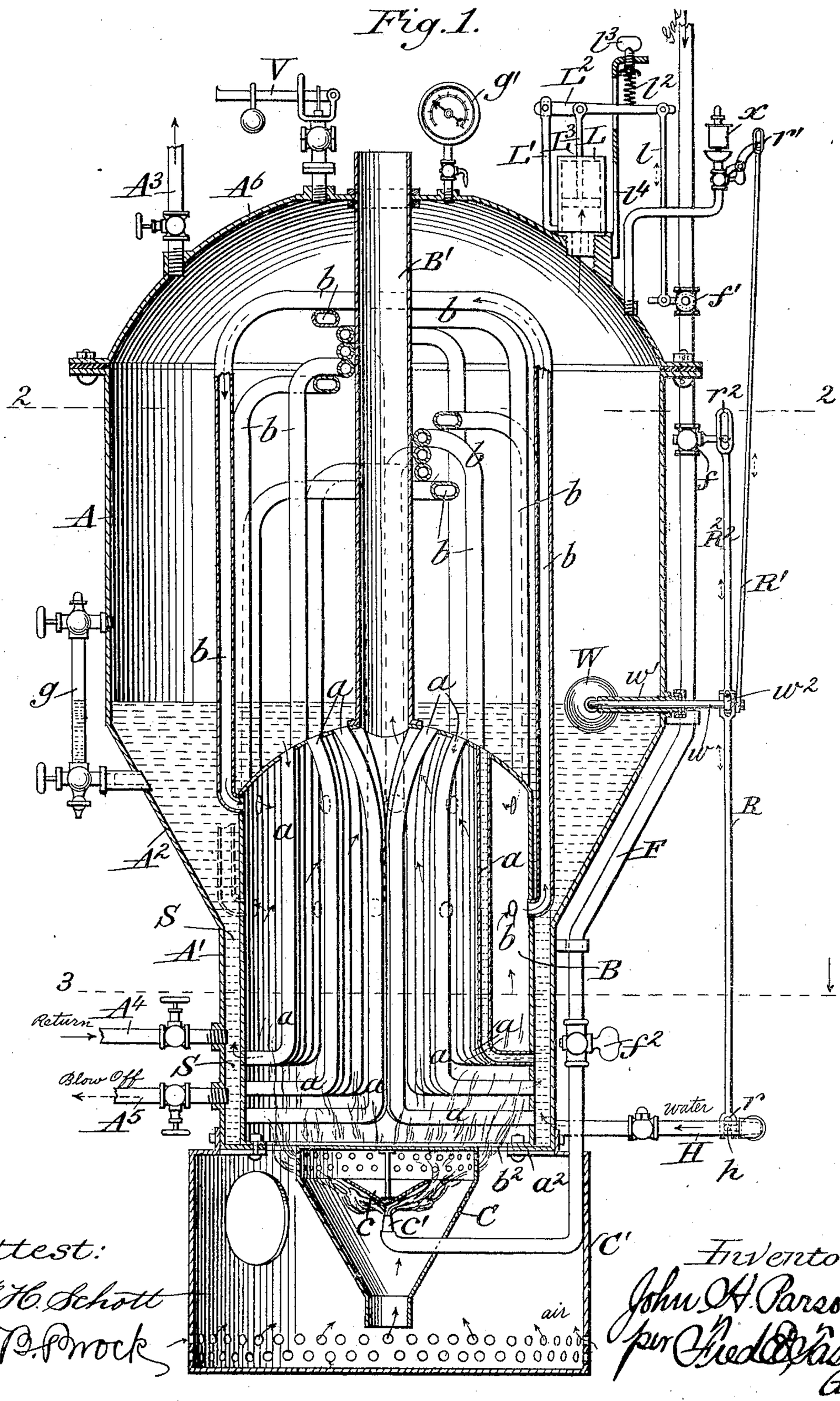
2 Sheets—Sheet 1.

J. H. PARSONS.

STEAM BOILER.

No. 590,905. Patented Sept. 28, 1897.

Fig. 1.



Attest:
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Atty.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

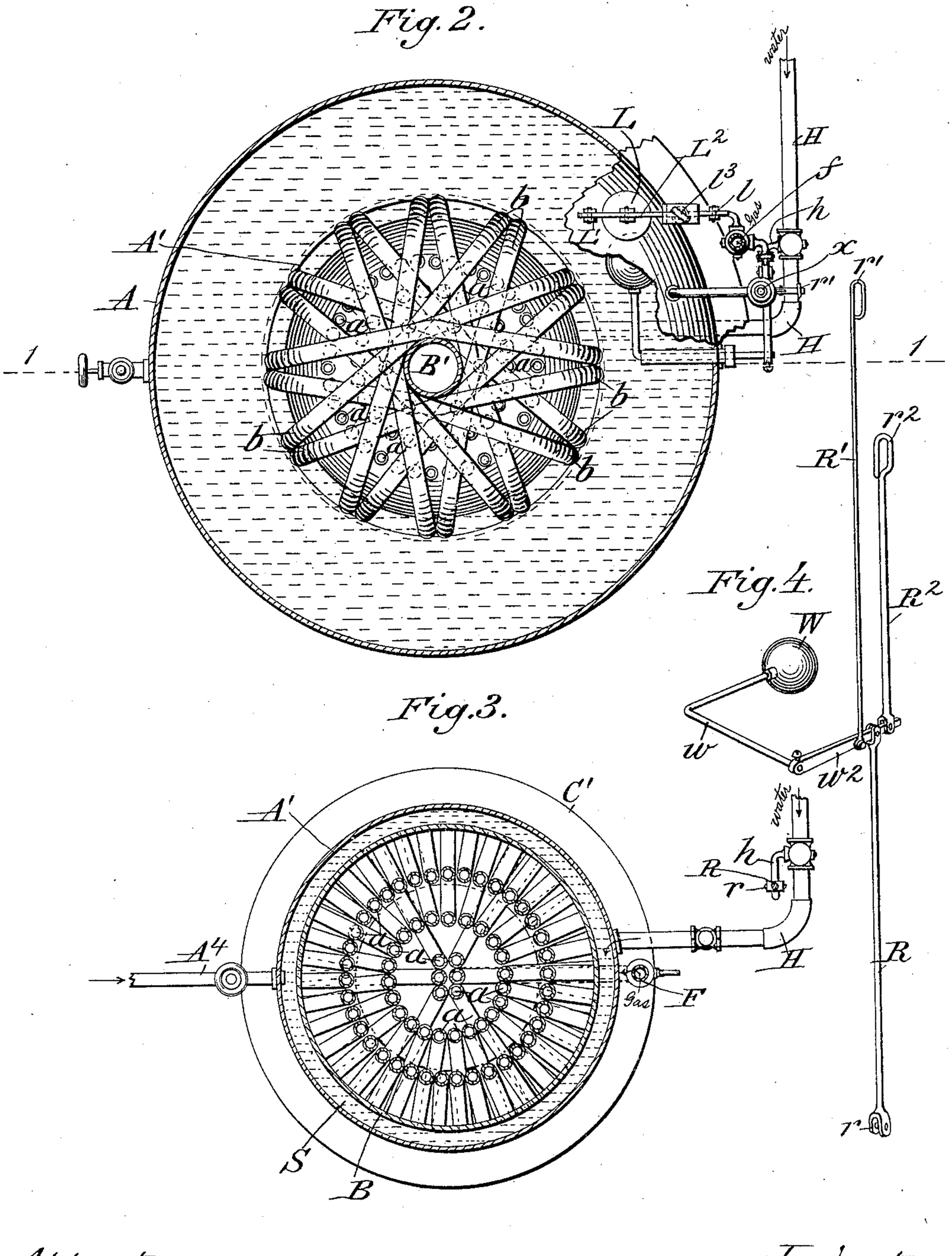

Fig. 3.

Fig. 4.

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UNITED STATES PATENT OFFICE.

JOHN H. PARSONS, OF WILMINGTON, DELAWARE.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 590,905, dated September 28, 1897.

Application filed December 16, 1896. Serial No. 615,883. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. PARSONS, a citizen of the United States, residing at Wilmington, in the county of New Castle and State of Delaware, have invented certain new and useful Improvements in Steam-Boilers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to steam-boilers, and has for its object the production at a minimum cost of a boiler for the generation of steam with an economical consumption of fuel and in which the supply of fuel will be automatically regulated, as will also the supply of water for the generation of the steam.

To these ends my invention consists in a fire-box or heating-chamber and a boiler proper surmounting and entirely surrounding the same except at the bottom, the boiler being contracted at its lower part, so as to form a narrow annular space between the walls of the boiler and the fire-box or heating-chamber.

Furthermore, my invention consists in a fire-box or heating-chamber surmounted and surrounded except at the bottom by a boiler so contracted at its lower portion as to leave a narrow annular space between the walls of the boiler and the heating-chamber, and passages and flues connected with said annular space near its base and projecting into the heating-chamber and upward through the top thereof.

Furthermore, my invention consists in a fire-box or heating-chamber projecting upward into a boiler and continuous superheating flues or passages in the upper portion of the boiler, each of said flues being connected at both its ends to the fire-box or heating-chamber, the points of connection being in different horizontal planes; and, finally, my invention consists in a boiler using a fluid fuel and provided with means dependent upon the pressure for automatically regulating the supply of fuel, means automatically cutting off the supply of fuel when the water is low in the boiler and turning on the supply when more water has been provided, and means automatically regulating the supply of water.

My boiler may be used to supply steam for running engines, for steam heating apparatus, and, in short, for the many purposes for which a steam-generating boiler is desirable.

In the accompanying drawings, which form a part of this specification, I have illustrated one embodiment of my invention, Figure 1 showing a central vertical section thereof on the line 1 1 of Fig. 2; Fig. 2, a horizontal section on the line 2 2 of Fig. 1, parts being in plan; Fig. 3, a horizontal section on the line 3 3 of Fig. 1; and Fig. 4, a perspective view of the automatic mechanism, controlled by the water-supply in the boiler, which regulates the feed of fuel and of water.

In the drawings, in which similar reference-letters refer to the same parts throughout, A represents the upper portion of a vertical boiler, circular in cross-section, and A′ the lower portion thereof, the latter being considerably less in diameter than the upper portion A and being connected thereto by the sloping walls A^2.

The top of the boiler may be formed in any suitable manner. I have shown it as composed of a concavo-convex piece A^6, united by flanges and bolts in the usual way to the part A.

The part A′ has at its lower edge an upwardly-turned flange a^2, upon which rests the circular fire-box or heating-chamber B, of slightly less diameter than the part A′ and projecting upward into the boiler approximately to the plane where the parts A and A^2 join, leaving an annular space S between the part A′ of the boiler and the outer surface of the fire-box or heating-chamber B, as is clearly shown in Figs. 1 and 3. This fire-box B is provided with a concavo-convex top, from the center of which a draft-flue B′ projects up through the boiler and out at the top thereof. The fire-box B is provided with inwardly-turned flanges b^2, by means of which it is firmly bolted to the flanges a^2 on the part A′ of the boiler. A large number of pipes or flues *a*, preferably arranged in annular series, project into the fire-box or heating-chamber B from the top thereof and outward through the lower part of the walls of the chamber B, thus establishing open communication between the lower part of the space S and the portion of the boiler immediately above the top of the chamber B. Other flues *b* start from the chamber B and after passing upward

into the boiler return and join the chamber B, preferably on the side opposite to the starting-point and always at a point in a plane above the starting-point. These flues serve to superheat the steam in the boiler.

The entire boiler may be supported upon a base C', centrally supported, within which is a burner C, closed at its top and provided with a spreader *c*, against which the fluid fuel impinges as it issues from the jet *c'* of the pipe F, through which any suitable fluid fuel, as illuminating-gas or acetylene gas, is supplied. The burner C has a contracted draft-opening in its lower portion and a series of perforations around its upper edge, through which the highly-heated air and products of combustion pass to the fire-box or heating-chamber.

f, *f'*, and f^2 are suitable cocks or valves in the pipe F, by means of which the supply of fuel passing through the pipe F may be regulated or entirely cut off. f^2 is operated by hand to turn on or off the fuel-supply. *f* and *f'* are automatically operated, *f'* to increase or decrease the supply, as occasion may require, and *f* to cut off entirely the supply when the water in the boiler reaches a dangerously low level.

W, Figs. 1 and 4, is a float attached to the end of a crank-arm *w*, journaled in a suitable bearing-sleeve *w'* and projecting outward through the wall of the boiler.

w^2 is an arm rigidly connected to the crank *w* and extending therefrom at right angles and having secured near its outer end three rods R R' R^2, R extending downward to the crank *h*, controlling the water-intake pipe II, R' extending upward and connecting with a whistle *x*, and R^2 extending upward and controlling the valve *f* in the fuel-pipe F.

The rod R is connected to the cock *h* of the water-pipe II by a pin passing through holes provided in its forked end *r*, the connection being such that every movement of the float W will produce a corresponding movement of the cock *h* in the water-pipe II.

The rods R' R^2 have in their upper ends oblong slots *r'* r^2, respectively, by means of which connection is made between the rod R' and the lever of the whistle *x* on the one hand and the rod R^2 and the cock *f* on the other hand, the parts being so adjusted that when the water in the boiler is at the desired level the pins connecting the whistle-lever to the rod R' and the cock *f* to the rod R^2 rest in the bottom portion of the respective slots *r'* r^2, as will be clearly understood from an inspection of Fig. 1.

It will thus be seen that when the water in the boiler is at its normal level, as shown in Fig. 1, the cock *h* in the water-pipe II is closed, but that any fall in the level of the water in the boiler will immediately act to open the cock *h* through the medium of the float W and the rod R. Should the water-level in the boiler continue to fall, through a failure of supply through the pipe II, for example, the float W would continue to fall and, acting through the rod R^2, would operate to close the valve *f* when the upper end of the slot *r* comes in contact with the valve-operating pin, just prior to which the whistle would be sounded. This construction renders it impossible for a careless person to turn on the gas at f^2 and light the burner when the water in the boiler is at a dangerously low level, as it is absolutely necessary that a safe water-level should be obtained before the cock *f* can be opened at all.

As a means of automatically regulating the supply of fuel, so as to keep the steam-pressure in the boiler at the point desired, I have devised the following—that is to say:

L is a cylinder having its lower end rigidly connected to the body of the boiler and in communication with the interior thereof. Pivoted to the standard L', located at one side of the cylinder L, is a horizontal lever L^2, to which is pivotally connected the piston-rod L^3 of a piston playing in the cylinder L. To the outer end of this lever L^2 is attached a link *l*, whereby it is connected to the cock *f'* in the pipe F. The lever L^2 is pressed downward by a spring l^2, whose tension may be regulated by a screw l^3, supported in the standard l^4. It will be readily understood that when the pressure in the boiler rises to the point where it is sufficient to overcome the tension of the spring l^2 the piston in the cylinder L will be forced upward, carrying with it the lever L^2 and link *l*, thereby operating the cock *f'* to shut off the flow of fuel to the burner.

g is any ordinary water-gage, *g'* a pressure-gage, and V a safety-valve of usual construction.

A^3 is the pipe through which steam is taken from the boiler to be conducted to the place where it is to be used, A^4 the return-pipe, and A^5 the blow-off.

The operation of the device may be readily understood. Water being admitted to the boiler until it reaches the level shown in Fig. 1, the float W will operate to turn the cock *h* in the pipe II so as to stop the flow of water, and the rod R^2 will be raised so as to open the cock *f* in the fuel-pipe F. The cock f^2 is then turned on by hand and the fire lighted at the burner. Owing to the great amount of surface exposed to the heat the water in the flues *a* will rise therein, and since the coolest water in the boiler will necessarily be in the space S the circulation will be from the body of the boiler downward through the said space and upward through the flues *a*. It will be evident that by this means a large amount of the water in the boiler is exposed to the heat of the fire-box. The heated gases of combustion will pass into the fire-box or heating-chamber B and, entering the lower parts of the flues *b*, pass through the flues and return to the fire-box by the upper parts of said flues and thence out through the flue B', some of the gases of

combustion of course passing directly out through said flue B′ without passing through the flues *b*. Should the steam-pressure rise above the point desired and to which the spring l^2 has been adjusted, the piston in the cylinder L will be raised, thus checking the flow of fuel in the pipe F, by turning the cock *f*′. As the water in the boiler falls the float W operates through rod R to open the water-cock *h*, and should the water-supply for any reason fail the rod R^2 would operate to turn off the supply of fuel and the rod R′ would sound the whistle *x*. By reason of the slots r' r^2 in the rods R′ R^2 this action will not take place upon a slight fall in the water-level, provision thus being made for slight variations in the level of the water without producing any effect on the supply of fuel or sounding the alarm.

Having thus described my invention, what I claim is—

1. A vertical boiler, consisting of an enlarged upper portion, a contracted lower portion, and tapering walls connecting said upper and lower portions, a fire-box of uniform diameter projecting vertically upward through the lower portion into the tapering portion and leaving a restricted or narrow annular space between the fire-box and the walls of the lower portion of the boiler, and an upwardly-expanding space between the fire-box and the tapering walls of the boiler, said annular space being connected with the upper expanded space in the boiler by circulating-tubes passing through the fire-box, substantially as described.

2. A vertical boiler, consisting of an enlarged upper portion, a contracted lower portion, and tapering walls connecting said upper and lower portions, a fire-box of uniform diameter projecting vertically upward through the lower portion into the tapering portion and leaving a restricted or narrow annular space between the fire-box and the walls of the lower portion of the boiler, an upwardly-expanding space between the fire-box and the tapering walls of the boiler, and a series of water-circulating flues connected with said annular space near its lower part and passing upward through the heating-chamber and connecting with the upper portion of the boiler through the top of said chamber, substantially as described.

3. The combination in a boiler, of a fire-box or heating-chamber projecting vertically into the boiler, superheating-flues in the steam-dome of the boiler each flue having its two ends in open communication with the interior of the fire-box or heating-chamber, but in different horizontal planes, substantially as described.

4. A steam-boiler having a fluid-fuel supply, combined with positive means for controlling said fluid-supply, automatically-operating means controlled by pressure in the boiler regulating the flow of fuel to the burner and independent means automatically cutting off the fuel-supply when the water reaches a predetermined level in the boiler, substantially as described.

5. In a steam-boiler heated by fluid fuel, the combination of automatic devices regulating the supply of water to the boiler, with automatic devices cutting off the supply of fuel, the regulating devices being rendered operative at different levels of the water in the boiler, and automatic devices controlled by steam-pressure for regulating the flow of fuel, substantially as described.

6. In a steam-boiler heated by fluid fuel, the combination of a fuel-conduit having two valves or cocks therein with an automatic device controlling each cock, the operation of one of said devices being dependent upon the steam-pressure and the operation of the other being dependent upon the water-level in the boiler, substantially as described.

7. In a steam-boiler using fluid fuel, a rod having crank-arms at each end one of said arms being within and one without the boiler, a float connected to the inner arm, and link-rods governing valves in the fuel and water supply pipes, connected to the outer arm, substantially as described.

8. In a steam-generator, the combination of a gas-burner having an air-mixing chamber separate from the combustion-space, and pipes from the combustion-space passing within the steam-space of the generator.

9. In a steam-generator, the combination of a gas-burner having an air-mixing chamber separate from the combustion-space, pipes from the combustion-space passing within the steam-space of the generator, and with an air-heating chamber within which such steam-space is located.

10. In a steam-generator, the combination of a gas-burner having an air-mixing chamber separate from the combustion-space, pipes from the combustion-space passing within the steam-space of the generator and with an air-heating chamber within which such steam-space is located, and means for the admission and removal of air from such air-heating chamber.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN H. PARSONS.

Witnesses:
JOS. H. BLACKWOOD,
FRED E. TASKER.