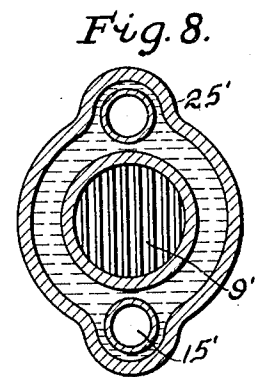
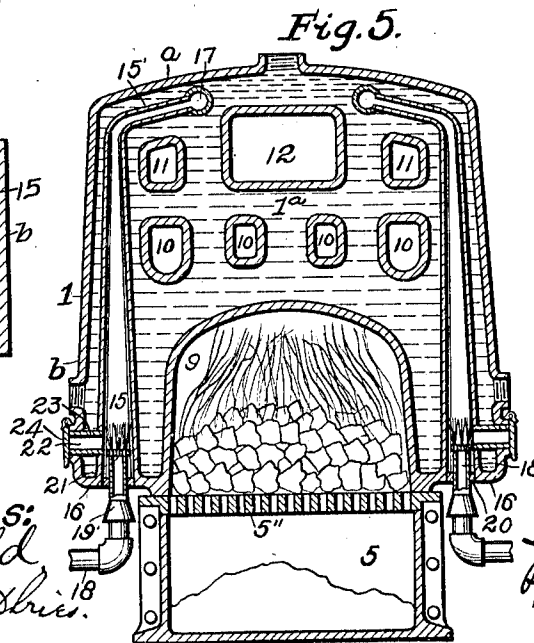
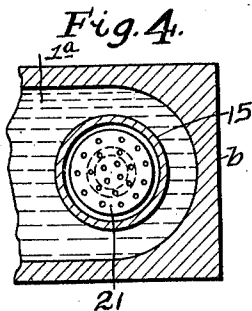
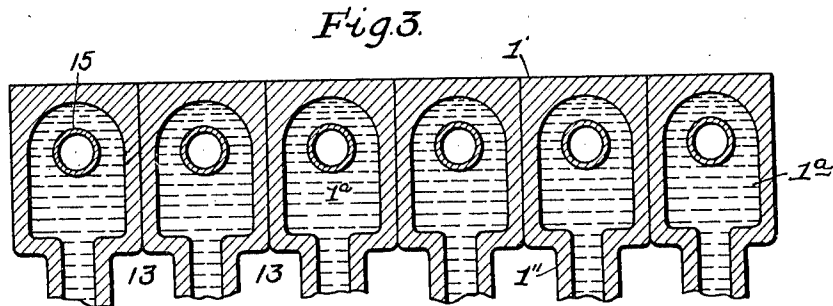
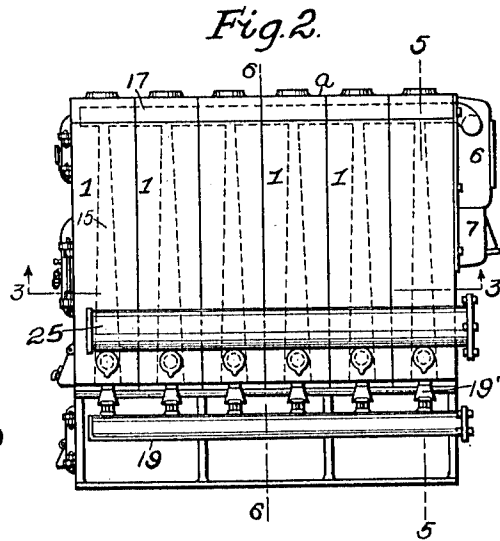
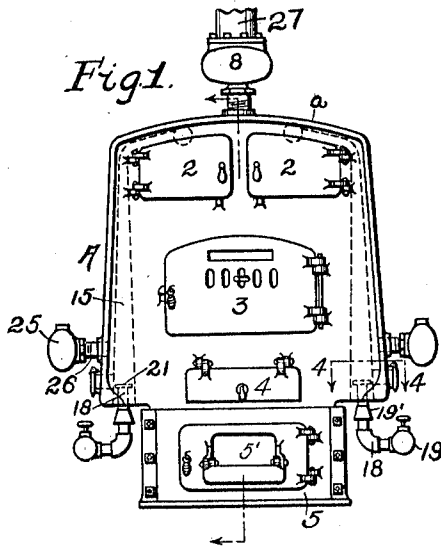


J. P. SCHAFER.
HOT WATER AND STEAM BOILER.
APPLICATION FILED DEC. 10, 1912.

1,061,503.

Patented May 13, 1913.

2 SHEETS-SHEET 1.



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Fig. 6.

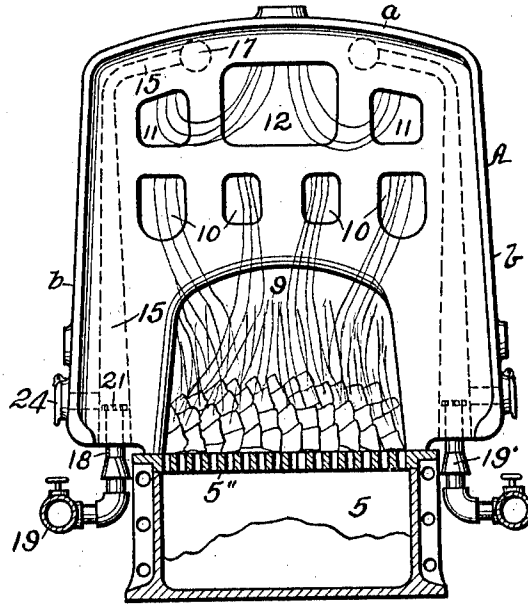
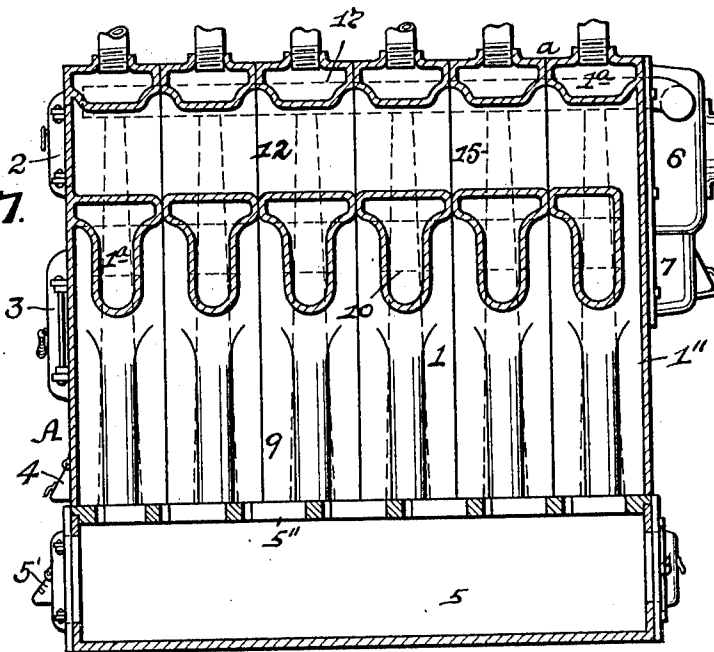


Fig. 7.



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UNITED STATES PATENT OFFICE.

JOHN P. SCHAFER, OF PITTSBURGH, PENNSYLVANIA.

HOT-WATER AND STEAM BOILER.

1,061,503.

Specification of Letters Patent.

Patented May 13, 1913.

Application filed December 10, 1912. Serial No. 735,981.

To all whom it may concern:

Be it known that I, JOHN P. SCHAFER, a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Hot-Water and Steam Boilers; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to boilers and has special reference to that class of boilers used in heating water or steam for houses, apartments and other buildings.

The object of my invention is to provide a cheap, simple and efficient boiler for such purpose, in which the fuel employed for heating the boiler can be either fluid form, such as gas or oil, or solid form, such as coal, coke, etc., and the boiler so arranged or constructed, whereby either or both of such forms of fuel may be used as desired.

To these ends my invention consists, generally stated, in the novel arrangement, construction and combination of parts as hereinafter more specifically set forth and described and particularly pointed out in the claims.

To enable others skilled in the art to which my invention appertains to construct and use my improved boiler, I will describe the same more fully, referring to the accompanying drawings, in which:—

Figure 1 is a front end view of my improved boiler. Fig. 2 is a side elevation of the same. Fig. 3 is an enlarged detail cross section on the line 3—3 Fig. 2. Fig. 4 is an enlarged cross-section on the line 4—4 Fig. 1. Fig. 5 is an enlarged vertical section of the boiler on the line 5—5 Fig. 2. Fig. 6 is an enlarged vertical section of the boiler on the line 6—6 Fig. 2. Fig. 7 is an enlarged longitudinal central section of the boiler. Fig. 8 is a detail cross-section showing another form of the invention.

Like symbols of reference herein indicate like parts in each of the figures of the drawing.

As illustrated in the drawings my improved furnace A is of the ordinary horizontal approved type for steam or water, and is composed of the usual series of hollow sec-

tions 1 to form the body of such furnace, which sections are set in a vertical line against each other and connected together in any suitable manner. These sections 1 form the front, intermediate and back sections of the furnace A, with the front section carrying the usual cleaning, charging and clinker doors 2, 3 and 4, respectively, and the rear section carrying the usual smoke box and draft check flue 6 and 7, respectively, while connected to the sections 1 in any suitable manner is the usual top header 8 and under said sections is the ash-pit section 5 carrying the door 5'. The hollow sections 1 are also so shaped or constructed that they form the combustion or fuel chamber 9, circulating flues 10, return flue 11 and smoke flue 12 within the same, while such sections are also constructed intermediate, as at 1', of their outer abutting portions or enlargements 1', so that they provide for the fuel circulating chambers 13 around and between the same. In the ordinary operation of such furnace, the products of combustion from the fuel, such as coal, coke, etc., on the grate 5" over the ash pit 5 will pass back through the fuel chamber 9 around, within and between the sections 1 in the flues 10, thence forward through the side flues 11 and thence back through the central flue 12 in said sections to the smoke box 6 where they can escape into the usual stack or chimney connected thereto, so that such products will have a staggered and return travel by reason of the arrangements or construction of said sections.

Extending vertically within the enlargements forming the abutting portions 1' on each of the sections 1 is a tubular flue 15, which leads from the outwardly extending base flange 16 on said sections and connects by an inwardly extending portion 15' at its upper end with a horizontal flue 17 under the dome or top *a* of the furnace A formed by said sections, and such flue is formed by each of said sections, and connects with the smoke box 6. The vertical flues 15 are preferably tapered inwardly toward the top of the same where they connect with the inwardly extending portion

15' on each of the same, and a fuel supply pipe 18 leads into the bottom of each of said flues from a common supply pipe 19 extending along each side of the furnace A, and such pipes 18 are each provided with the usual mixer 19' within each of the same. A suitable packing 20 is placed around each of the pipes 18 and within the flues 15 to close the openings between such pipes and flues and a perforated burner 21 is connected in any suitable manner to the top of each of said pipes, having in line with the same a sighter or igniter opening 22 which is formed by a pipe 23 extending through the side walls *b* of the furnace A into the flues 15 and closed by the usual door 24 at its outer end.

When my improved furnace A is to be operated the water for the generation of steam or to be heated for use enters each of the hollow sections 1 in the usual manner from the side header 25 through the nipples 26 so that the steam so generated or heated water passes from the furnace through the top header 8 into the pipe 27 connected to said header and thence to the different rooms to be heated by the usual pipes, not shown, connected to said pipe, while the circulation of the return steam or heated water is made in the usual manner to said furnace. The water in such sections 1 is heated by the products of combustion around and through said sections when fuel is used in the grate 5' in the manner hereinbefore described.

When it is desired to use gas as a fuel, the gas enters the vertical flues 15 from the supply pipe 19 through the pipes 18, and on being lighted at the burners 21 through the openings 22, the flames and products of combustion from such gas will pass up through said flues, thence into the horizontal flue 17, and thence into and through the smoke box 6 to the chimney or stack, so that the water in the hollow interior 1^a of said sections 1 and surrounding both of such flues will be heated thereby and the steam generated therefrom or heated water will be passed to the different rooms to be heated, as hereinbefore described.

In Fig. 8 my improved boiler is shown of the vertical type, and of substantially circular shape in which the hollow sections forming the furnace body are placed one upon the other and each provided with an extension 25' on each side to form an enlargement at the sides of the furnace for the reception of the vertical flues 15' connecting with the fluid supply for the fuel to the same and within the water of said body. In this case the fuel chamber 9' is in the center of the furnace, as many flues as desired can be placed in such furnace, while various other modifications and changes in the design and construction of my improved fur-

nace may be resorted to without departing from the spirit of the invention or sacrificing any of its advantages.

It will thus be seen that my improved furnace can be used with gas or other fluid as a fuel, or coal, coke or other solid fuel can be used and either or both in different parts of the furnace, and as desired, while the fluid connections are protected from injury when the solid fuel is used. The change from solid to fluid fuel, or vice versa, can be made at any time when desired by any unskilled person without change, addition or removal of parts, and no inconvenience will be caused by the use of such furnace. When either solid or fluid fuel, or both, are used in the furnace they will not in any way interfere with each other either in their construction or operation, and when the fluid fuel is used the furnace will be capable of great water heating power by reason of the fluid heating devices being located directly in the furnace and within the water to be heated.

What I claim as my invention and desire to secure by Letters-Patent is:—

1. In a boiler for heating water, the combination with the hollow boiler body for the water and having the fuel chamber therein, of a vertical tubular flue within the hollow sides of said body and within the water therein, a horizontal flue in the upper portion of said body connecting said vertical flue at its upper end with the smoke box, and a fluid supply pipe connected to said vertical flue for supplying fuel to the same to heat the water in said body.

2. In a boiler for heating water, the combination with the hollow boiler body for the water and having the fuel chamber therein, of a vertical tubular flue within the hollow sides of said body and within the water therein, a horizontal flue in the upper portion of said body connecting said vertical flue at its upper end with the smoke box, a fluid supply pipe connected to said vertical flue for supplying fuel to the same to heat the water in said body, and a burner within said vertical flue and above said pipe.

3. In a boiler for heating water; the combination with the hollow boiler body for the water and having the fuel chamber therein, of a vertical tubular flue within the hollow sides of said body and within the water therein, a horizontal flue in the upper portion of said body and connected to said vertical flue by an inwardly extending portion on said vertical flue, and a fluid supply pipe connected to said vertical flue for supplying fuel to the same to heat the water in said body.

4. In a boiler for heating water, the combination with the hollow boiler body for the water and having the fuel chamber therein,

of a vertical tubular flue within the hollow sides of said body and within the water therein, a horizontal flue in the upper portion of said body and connected to said vertical flue by an inwardly extending portion on said vertical flue, a fluid supply pipe connected to said vertical flue for supplying fuel to the same to heat the water in said body, and a burner within said vertical flue and above said pipe.

5. In a boiler for heating water, the combination with the boiler body formed of a series of hollow sections adapted to contain water and forming a fuel chamber therein, of a vertical tubular flue within the hollow sides of each of said sections and within the water therein, and a fluid supply pipe connected to each of said flues for supplying fuel to the same to heat the water in said body.

6. In a boiler for heating water, the combination with the boiler body formed of a series of hollow sections adapted to contain water and forming a fuel chamber therein, of a vertical tubular flue within the hollow sides of each of said sections and within the water therein, a fluid supply pipe connected to each of said flues for supplying fuel to the same to heat the water in said body, and a burner within each of said flues and above its supply pipe.

7. In a boiler for heating water, the combination with the boiler body formed of a series of hollow sections adapted to contain water and forming a fuel chamber therein, of a vertical tubular flue within the hollow sides of each of said sections and within the water therein, a horizontal flue in the upper portion of said sections connecting said vertical flue at its upper end with the smoke box, and a fluid supply pipe connected to each of said vertical flues for supplying fuel to the same to heat the water in said body.

8. In a boiler for heating water, the combination with the boiler body formed of a series of hollow sections adapted to contain water and forming a fuel chamber therein, of a vertical tubular flue within the hollow sides of each of said sections and within the water therein, a horizontal flue in the upper portion of said sections connecting said vertical flue at its upper end with the smoke box, a fluid supply pipe connected to each of said vertical flues for supplying fuel to the same to heat the water in said body, and a burner within each of said vertical flues and above the supply pipe.

9. In a boiler for heating water, the combination with the boiler body formed of a series of hollow sections adapted to contain water and forming a fuel chamber therein, of a vertical tubular flue within the hollow sides of each of said sections and within the water therein, a horizontal flue in the upper

portion of said sections and connected to said vertical flue by an inwardly extending portion on said vertical flue, and a fluid supply pipe connected to said vertical flue for supplying fuel to the same to heat the water in said body.

10. In a boiler for heating water, the combination with the boiler body formed of a series of hollow sections adapted to contain water and forming a fuel chamber therein, of a vertical tubular flue within the hollow sides of each of said sections and within the water therein, a horizontal flue in the upper portion of said sections and connected to said vertical flue by an inwardly extending portion on said vertical flue, a fluid supply pipe connected to said vertical flue for supplying fuel to the same to heat the water in said body, and a burner within each of said vertical flues and above its supply pipe.

11. In a boiler for heating water, the combination with the hollow boiler body and forming the fuel chamber therein, of a vertical tubular flue within the hollow sides of said body and within the water therein, said flue being inwardly tapered toward its upper end, and a fluid supply pipe connected to said flue for supplying fuel to the same to heat the water in said body.

12. In a boiler for heating water, the combination with the hollow boiler body for the water and forming the fuel chamber therein, of a vertical tubular flue within the hollow sides of said body and within the water therein, said flue being inwardly tapered toward its upper end, a fluid supply pipe connected to said flue for supplying fuel to the same to heat the water in said body, and a burner within said flue and above said pipe.

13. In a boiler for heating water, the combination with the hollow boiler body for the water and forming the fuel chamber therein, of a vertical tubular flue within the hollow sides of said body and within the water therein, said flue being inwardly tapered toward its upper end, a horizontal flue in the upper portion of said body connecting said vertical flue at its upper end with the smoke box, and a fluid supply pipe connected to said vertical flue for supplying fuel to the same to heat the water in said body.

14. In a boiler for heating water, the combination with the hollow boiler body for the water and forming the fuel chamber therein, of a vertical tubular flue within the hollow sides of said body and within the water therein, said flue being inwardly tapered toward its upper end, a horizontal flue in the upper portion of said body connecting said vertical flue at its upper end with the smoke box, a fluid supply pipe connected to said vertical flue for supplying fuel to the same to heat the water in said body, and a burner within said vertical flue and above said pipe.

15. In a boiler for heating water, the combination with the hollow boiler body for the water and forming the fuel chamber therein, of a vertical tubular flue within the hollow sides of said body and within the water therein, said flue being inwardly tapered toward its upper end, a horizontal flue in the upper portion of said body and connected to said vertical flue by an inwardly extending portion on said vertical flue, and a fluid supply pipe connected to said vertical flue for supplying fuel to the same to heat the water in said body,

16. In a boiler for heating water, the combination with the hollow boiler body for the water and forming the fuel chamber therein, of a vertical tubular flue within the hollow sides of said body and within the water therein, said flue being inwardly tapered toward its upper end, a horizontal flue in the upper portion of said body and connected to said vertical flue by an inwardly extending portion on said vertical flue, a fluid supply pipe connected to said vertical flue for supplying fuel to the same to heat the water in said body, and a burner within said vertical flue and above said pipe.

17. In a boiler for heating water, the combination with the boiler body formed of a series of hollow sections adapted to contain water and forming a fuel chamber therein, of a vertical tubular flue within the hollow sides of each of said sections and within the water therein, said flues being inwardly tapered toward their upper ends, and a fluid supply pipe connected to each of said flues for supplying fuel to the same to heat the water in said body.

18. In a boiler for heating water, the combination with the boiler body formed of a series of hollow sections adapted to contain water and forming a fuel chamber therein, of a vertical tubular flue within the hollow sides of each of said sections and within the water therein, said flues being inwardly tapered toward their upper ends, a fluid supply pipe connected to each of said flues for supplying fuel to the same to heat the water in said body, and a burner within each of said flues and above its supply pipe.

19. In a boiler for heating water, the combination with the boiler body formed of a series of hollow sections adapted to contain water and forming a fuel chamber therein, of a vertical tubular flue within the hollow sides of each of said sections and within the water therein, said flues being inwardly tapered toward their upper ends, a horizontal flue in the upper portion of said sections connecting said vertical flue at its upper end with the smoke box, and a fluid supply pipe connected to each of said vertical flues for supplying fuel to the same to heat the water in said body.

20. In a boiler for heating water, the

combination with the boiler body formed of a series of hollow sections adapted to contain water and forming a fuel chamber therein, of a vertical tubular flue and within the hollow sides of each of said sections and within the water therein, said flues being inwardly tapered toward their upper ends, a horizontal flue in the upper portion of said sections connecting said vertical flue at its upper end with the smoke box, a fluid supply pipe connected to each of said vertical flues for supplying fuel to the same to heat the water in said body, and a burner within each of said vertical flues and above the supply pipe.

21. In a boiler for heating water, the combination with the boiler body formed of a series of hollow sections adapted to contain water and forming a fuel chamber therein, of a vertical tubular flue within the hollow sides of each of said sections and within the water therein, said flues being inwardly tapered toward their upper ends, a horizontal flue in the upper portion of said sections and connected to said vertical flue by an inwardly extending portion on said vertical flue, and a fluid supply pipe connected to each of said vertical flues for supplying fuel to the same to heat the water in said body.

22. In a boiler for heating water, the combination with the boiler body formed of a series of hollow sections adapted to contain water and forming a fuel chamber therein, of a vertical tubular flue within the hollow sides of each of said sections and within the water therein, said flues being inwardly tapered toward their upper ends, a horizontal flue in the upper portion of said sections and connected to said vertical flue by an inwardly extending portion on said vertical flue, a fluid supply pipe connected to each of said vertical flues for supplying fuel to the same to heat the water in said body, and a burner within each of said vertical flues and above its supply pipe.

23. In a boiler for heating water, the combination with the boiler body formed of a series of hollow sections adapted to contain water and forming a fuel chamber therein, of a vertical tubular flue within the hollow sides of each of said sections and within the water therein, and means for supplying fuel to said flues to heat the water in said body.

24. In a boiler for heating water, the combination with the hollow boiler body and forming the fuel chamber therein, of a vertical tubular flue within the hollow sides of said body and within the water therein, said flue being inwardly tapered toward its upper end, and means for supplying fuel to the said flues to heat the water in said body.

25. In a boiler for heating water, the combination with the boiler body formed of a series of hollow sections adapted to contain

water and forming a fuel chamber therein,
of a vertical tubular flue within the hollow
sides of each of said sections and within the
water therein, said flues being inwardly
5 tapered toward their upper ends, and means
for supplying fuel to the said flues to heat
the water is said body.

In testimony whereof, I the said JOHN P.
SCHAFER have hereunto set my hand.

JOHN P. SCHAFER.

Witnesses:

T. B. HUMPHRIES,
J. W. MAYFIELD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."
