

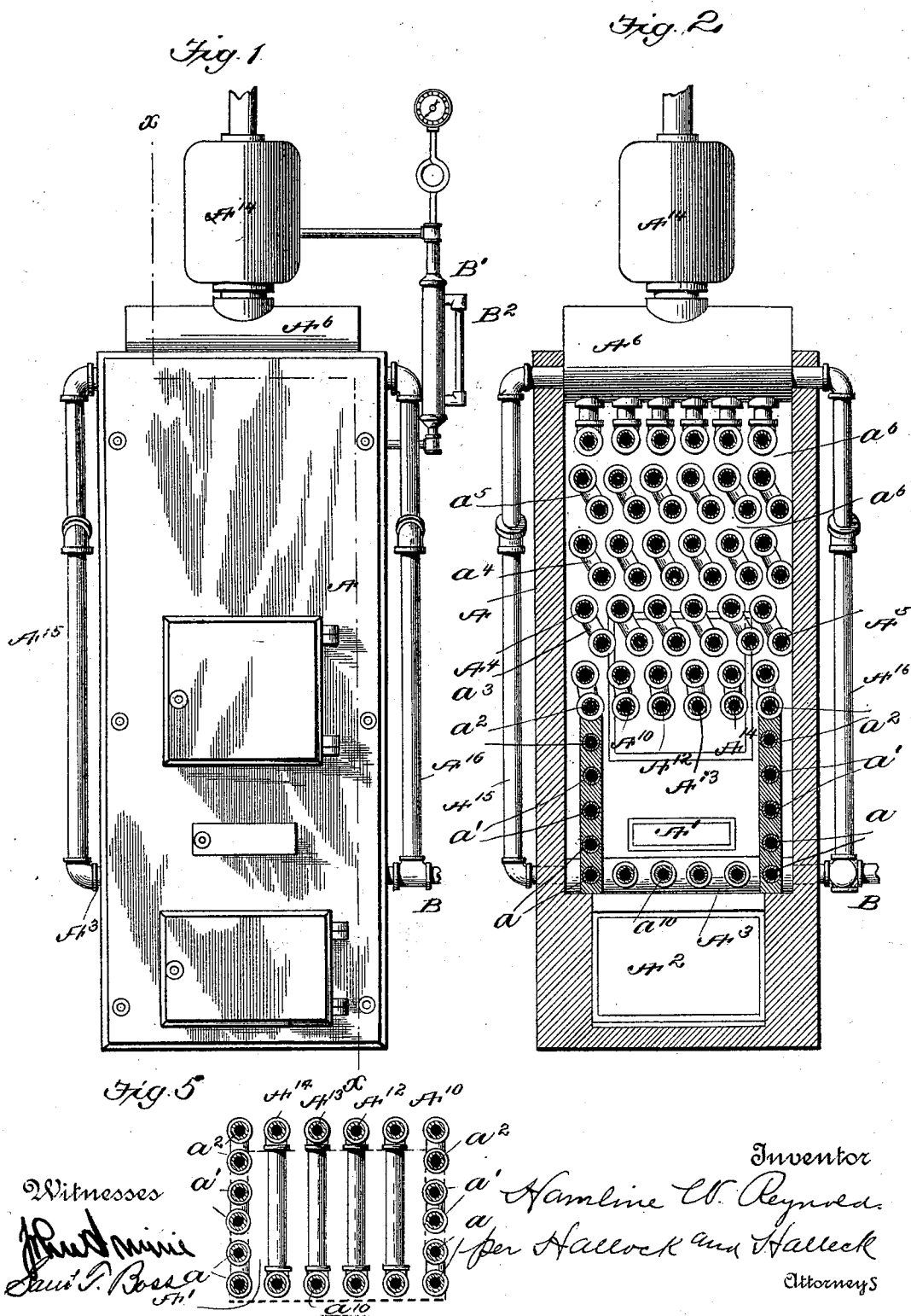
(No Model.)

3 Sheets—Sheet 1.

H. W. REYNOLDS.
BOILER.

No. 517,826.

Patented Apr. 3, 1894.



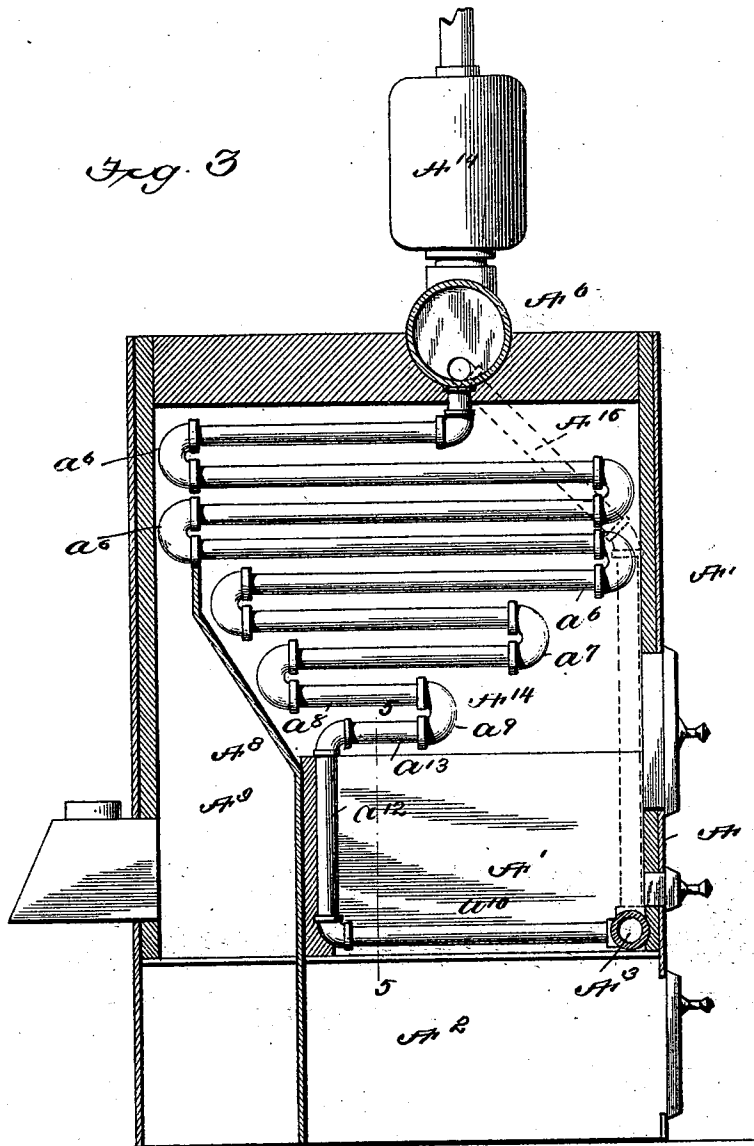
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Witnesses

Arthur M. Ross
Sam'l P. Ross

Inventor
Sam'l W. Reynolds
per *Hallock and Halleck*
Attorneys

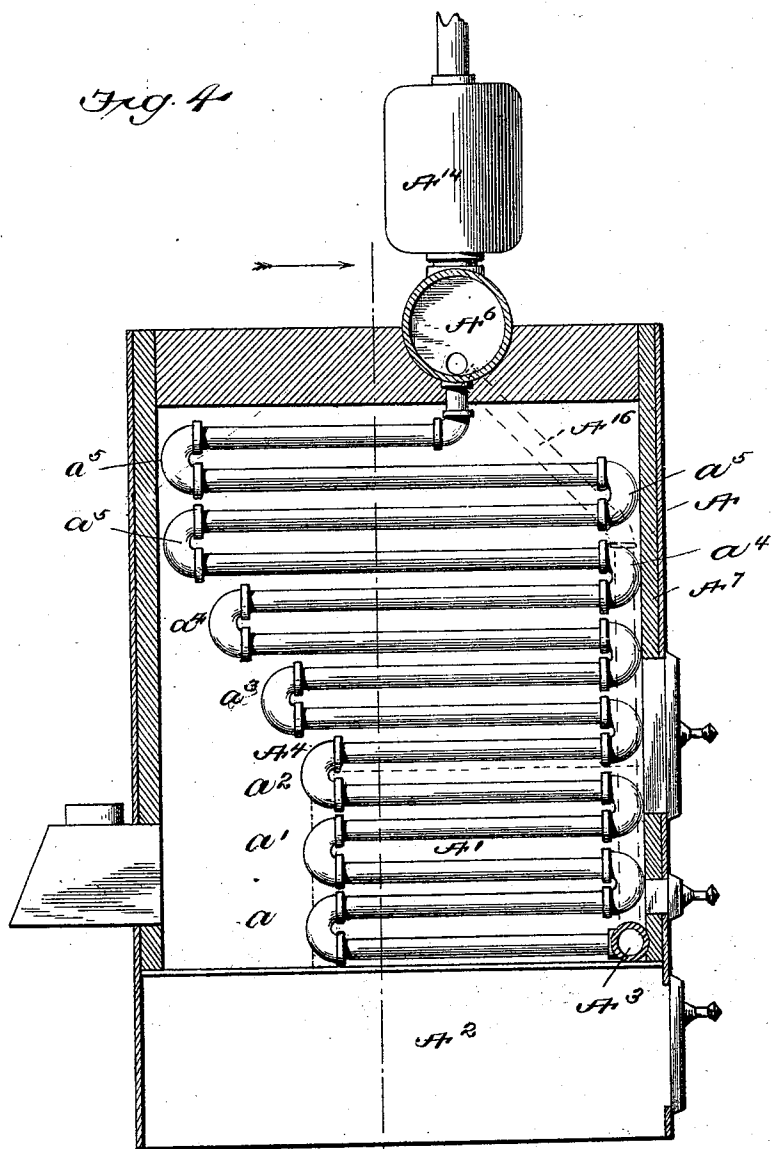
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H. W. REYNOLDS.
BOILER.

3 Sheets—Sheet 3.

No. 517,826.

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Witnesses
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UNITED STATES PATENT OFFICE.

HAMLIN W. REYNOLDS, OF GENEVA, NEW YORK, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO AMOS B. SMITH, ELLA J. REYNOLDS, AND JAMES C. KNAPP, OF SAME PLACE.

BOILER.

SPECIFICATION forming part of Letters Patent No. 517,826, dated April 3, 1894.

Application filed September 25, 1893. Serial No. 486,412. (No model.)

To all whom it may concern:

Be it known that I, HAMLIN W. REYNOLDS, a citizen of the United States, residing at Geneva, in the county of Ontario and State of New York, have invented certain new and useful Improvements in 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 that class of boilers known as water tube.

The objects of the invention are to obtain a free circulation of the water; to have all the pipes free to expand and contract without strain upon the joints; to use part of the water circulating tubes as a grate thus insuring a constant flow of water through the water grate bars; to have the fire box also formed of the water circulating tubes; and to protect said tubes in the fire box with fire proof cement filled in between the pipes to give a smooth surface to the fire box and also keep the fuel away from the tubes so as not to check combustion when the pipes are cold.

The invention consists of constructions and combinations all as will hereinafter be described in the specification and pointed out in the claims reference being had to the accompanying drawings, in which—

Figure 1. is a front view of a generator complete. Fig. 2. is a vertical cross section showing the arrangement of the tubes. Fig. 3. is a vertical longitudinal section showing one of the inside series of pipes. Fig. 4. is a vertical longitudinal section showing one of the outside series of pipes; and Fig. 5, a detail showing the rear of the fire box in elevation.

The boiler can be set in brick or be in a portable form. The device is shown in the drawings in the latter form.

A, represents an inclosing jacket for the water tubes and having the usual doors to the fire box A' and ash pit A² and other openings for the pipes and escape of the products of combustion. A tube A³ is arranged at the lower front end of the fire box as a header for the water tubes inclosed in said casing. The water tubes A⁴, A⁵, one on each side of the

furnace are bent or coupled upon themselves to form a continuous coil upon themselves until the upper header A⁶ is reached. The lower coils a, a' and a² form the side of the fire box and the upper coils a³, a⁴, and a⁵ are of different lengths. The coils a³ and a⁴ extend from the front wall A⁷ to the flue or partition wall A⁸ that extends from the upper tubes a⁵ to the bottom of the casing and is bent upon an angle to form the enlarged flue A⁹ back of the fire box. The water tubes A¹⁰, A¹², A¹³ and A¹⁴ are formed of horizontal tubes a¹⁰ that serve as grate bars, of vertical tubes a¹² that form the back of the fire box, of horizontal tubes a¹³ that project a short distance over tubes a¹⁰ and form a bridge a⁹, of tube a⁸ that supports bridge a⁷, and of coils a⁶ which are similar to coils a⁵ in construction. All of the tubes are connected with the header A⁶ and it in turn supports the steam drum A¹⁴ of any desired form. To the ends of headers A⁶ the return tubes A¹⁵, A¹⁶ are secured. The tubes are secured at their lower ends to header A³ and are preferably placed outside of the casing A, to insure the return of the water from the upper header to the lower header as they will in that position not be subjected to the intense heat of the fire box that the inner tubes are. The water in the tubes inside the fire box would naturally ascend as its temperature increased. By this means and the particular arrangement of the coils in the water tube which are arranged to offer as little resistance as possible, a perfect circulation of the water is assured. The products of combustion also circulate thoroughly through the coils and bridges a⁷ and a⁹ deflect the products of combustion toward the front of the boiler thus insuring the heating of the front part of the coils. When the coils are arranged in a staggering manner as shown in Fig. 2, the products of combustion are divided very evenly and produce the best result. To protect the tubes forming the fire box from the intense heat therein and also to protect the fuel from the cold water when the fire is first started the tubes are covered and the interstices between are filled with a fire proof cement which prevents the fuel from getting between the coils. By making the inner face

of the cement smooth the coal will not hang to the wall when the grate is cleaned or raked. The header A³ is connected with a feed water pipe B, and the boiler supplied
5 with the usual appliances such as a gage B' and a water indicator B².

It will be noted that the tubes projecting into the fire box, where they will be subjected to great heat, extend only part of the way
10 across toward the door way, leaving a space between them and said doorway, so that coal can be put in the fire box without said tube interfering with the act; that the vertical tubes forming the rear of the fire box are near
15 the vertical part of the partition A⁸ and receive additional heat from the flue back of it which is enlarged at its lower end to bring it near the said vertical tubes; and that the
20 upper part of the partition A⁸ is inclined upward and backward to form a support for the rear end of the pipes forming the bridges a⁷ and a⁹ and a support for part of the pipes a⁶ which rest thereon.

Having thus described my invention, what
25 I claim as new, and desire to secure by Letters Patent, is--

The combination of the casing having a coal supply door and partition A⁸, the upper part

of which is inclined upward and rearward and forms with the rear of said casing a down
30 take flue for the boiler; a fire box made of tubes forming part of the water circulating system of the boiler, and having its rear end next to the partition; water tubes projecting,
35 from the tubes forming the rear of the fire box, into said fire box and toward the front of the casing and of less length than the depth of said fire box and having their rear ends on said inclined part of partition A⁸;
40 water tubes above and forming a continuation of the tubes projecting into the fire box and extending from the front to the rear wall of the casing and overlapping and part resting on the top of the partition A⁸; an upper header
45 into which these last named tubes are inserted; down take water tubes; a header connecting the ends of the tubes forming the fire box, and connected with said upper header by the down take water tubes.

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

HAMLIN W. REYNOLDS.

Witnesses:

A. B. SMITH,
G. H. GELLETTE.