(No Model.) 3 Sheets—Sheet 1.

Z. P. BOYER.

STEAM HEATING APPARATUS.

No. 347,463. Patented Aug. 17, 1886.

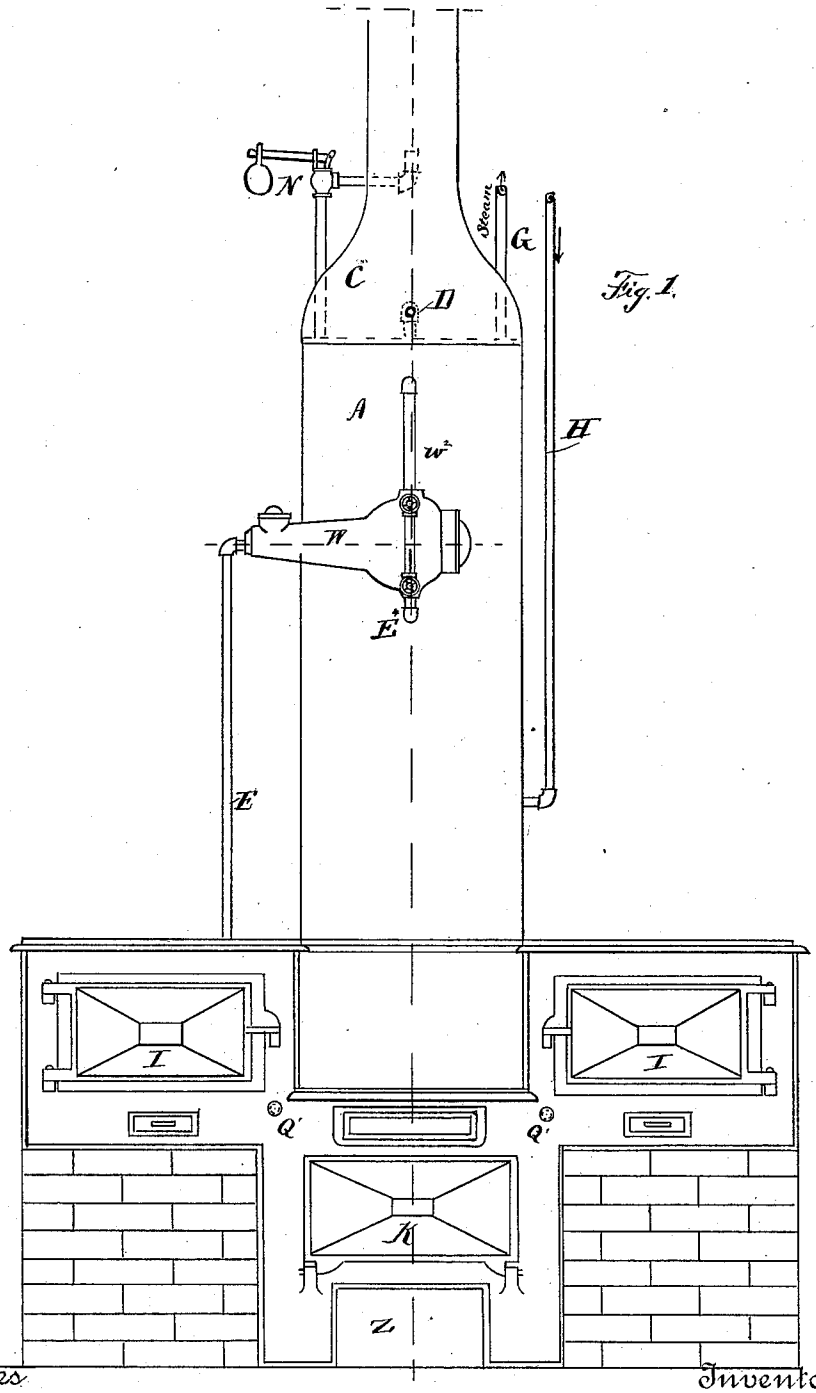


Fig. 1.

Witnesses
W. H. Brown.
A. M. Bright

Inventor
Zaccur Prall Boyer
By his Attorney
Geo. Roads.

N. PETERS, Photo-Lithographer, Washington, D. C.

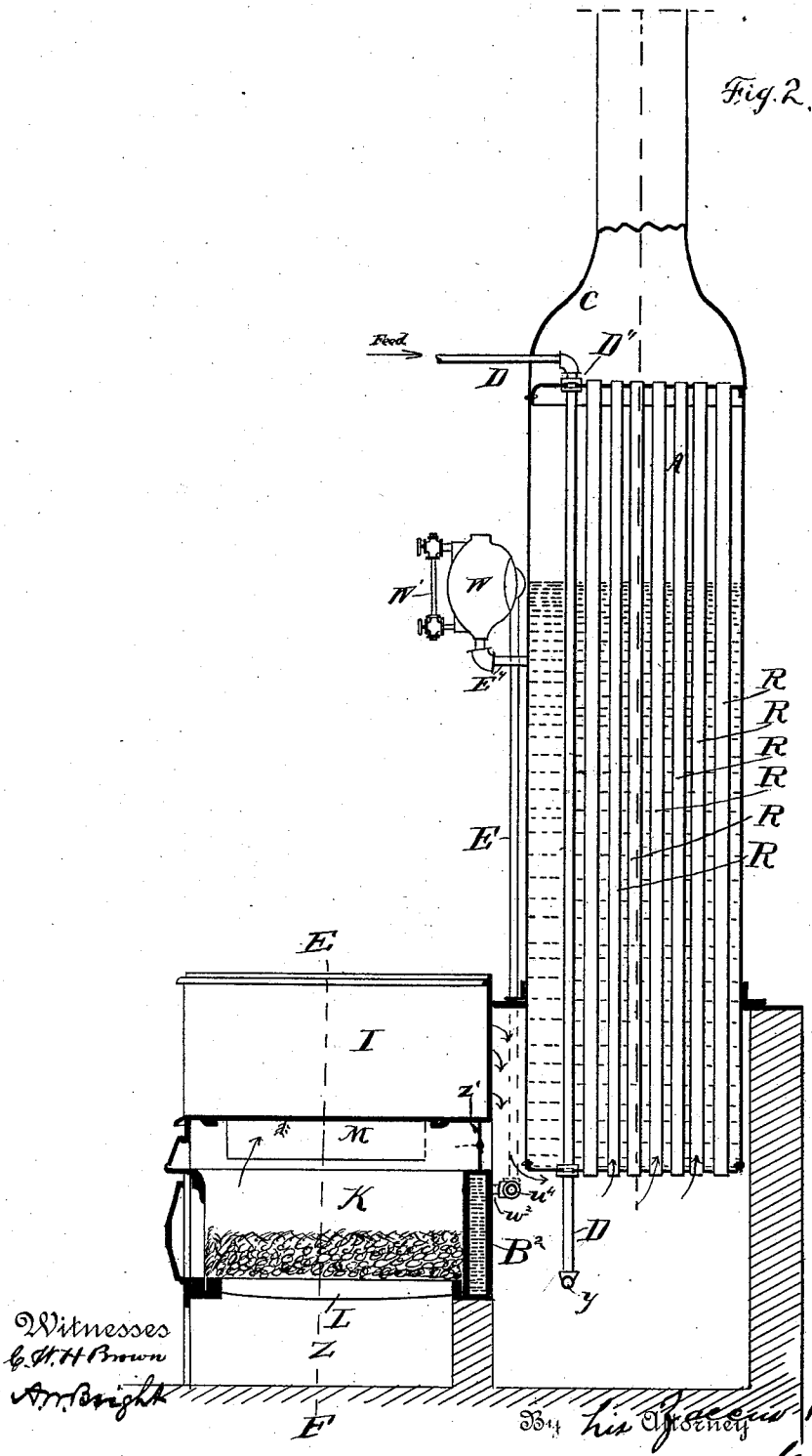
(No Model.) 3 Sheets—Sheet 2.

Z. P. BOYER.

STEAM HEATING APPARATUS.

No. 347,463. Patented Aug. 17, 1886.

Fig. 2.



Witnesses
C. H. Brown
A. M. Bright

Inventor
Phall Boyer
By his Attorneys
Geom. Roads

N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.) 3 Sheets—Sheet 3.

Z. P. BOYER.

STEAM HEATING APPARATUS.

No. 347,463. Patented Aug. 17, 1886.

Fig. 4.

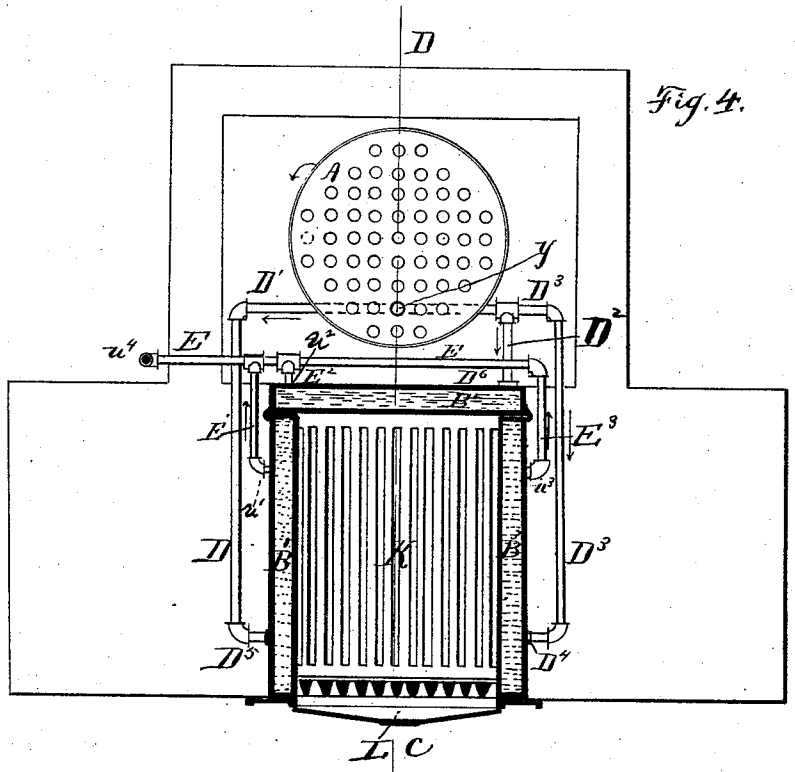
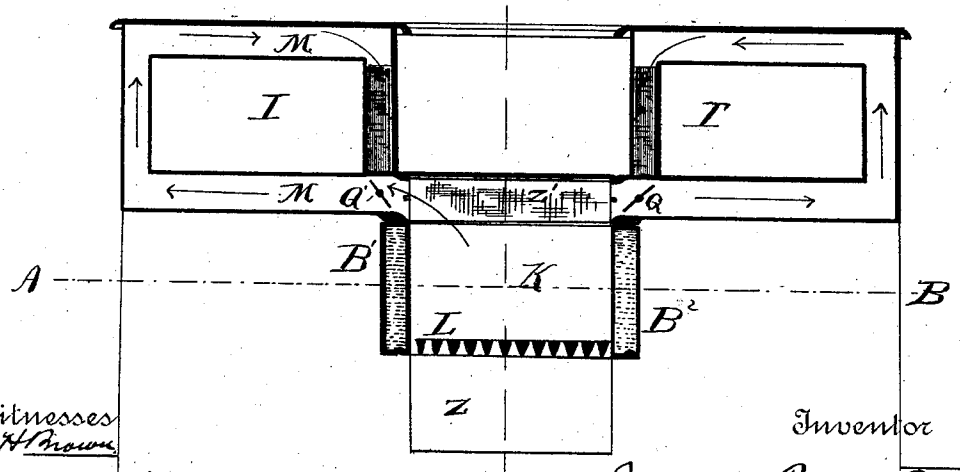


Fig. 3.



Witnesses
C. M. H. Brown
A. W. Bright

Inventor
Zaccur Prall Boyer
By his Attorney
Geo. W. Roads.

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

ZACCUR PRALL BOYER, OF PHILADELPHIA, PENNSYLVANIA.

STEAM-HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 347,463, dated August 17, 1886.

Application filed January 2, 1886. Serial No. 187,475. (No model.)

To all whom it may concern:

Be it known that I, ZACCUR PRALL BOYER, a citizen of the United States, residing at Philadelphia, Pennsylvania, have invented a new and useful Improvement in a Combined Range and Steam-Heating Apparatus, of which the following is a specification.

My invention relates to an improvement in steam-heating apparatus; and the objects of my invention are, first, to provide a simple and economical apparatus for the heating of a building or buildings by steam generated by means of a tubular boiler, combined with a stove, range, or other heating or cooking apparatus, so as to utilize the waste heat from said stove or range; second, to economize in the use of fuel in heating a building by steam; third, to do away with the necessity of a furnace in the cellar of a building, or of any heating appliance in any part of a house, except in such part thereof where my invention is in operation. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of the combined range and steam-heating apparatus. Fig. 2 is a sectional elevation of same. Fig. 3 is a cross-section on line E F. Fig. 4 is a sectional plan view on line A B.

Similar letters refer to similar parts throughout the several views.

A is an upright tubular boiler with the usual connections—feed-pipe D and distributing steam-pipe G and safety-valve N—set as shown in Fig. 1, exhausting surplus steam into stack C.

B′ B^2 B^3 are water-backs surrounding the fire-box, on three sides of the same, in separate sections or parts, as shown in Fig. 4. These water-backs may be of any shape or form, according to the form of the fire-box and to the quantity of water desired to be heated.

C is a short smoke, gas, or draft stack leading into the chimney of the building.

D is a water-feed pipe passing lengthwise through boiler A at D″, as shown in Fig. 2, connected at Y with part D′, which in turn is connected to water-back B′ at D^5, part D^2 connected to water-back B^2 at D^6, and part D^3 connected to water-back B^3 at D^4.

E is a water-pipe to convey water from water-backs at U′ U^2 U^3, through parts of same pipe, E′ E^2 E^3, into the regulator W, from which it enters through part E^4 into the boiler A. These hot and cold water connections between boiler A and the water-backs B′ B^2 B^3 may be so placed or arranged as shall make the most suitable and desirable connections for the purposes of conveying the cooler water into the water-backs, and from thence the hot water into the boiler.

G is a pipe to convey the steam generated in the boiler to the coils or radiators throughout the building.

H is a pipe to return to the boiler the steam-condensation resulting from changes in the temperature along the line of the pipes, coils, or radiators.

I I are the ovens on each side and above the fire-box K, as shown in Fig. 1.

K is a fire-box.

L are the grate-bars.

M M are the hot-air flues conveying the heated current of air around the ovens.

N is a safety-valve.

Q Q′ are dampers to turn the heated current into the flues M M.

U^4 is an elbow on main pipe E.

W is a water-line regulator of any of the well-known forms with attachments complete, adjusted to the side of the boiler.

W′ is a water-gage showing level of water in the boiler.

Y is an elbow of supply-pipe D.

Z is the ash-box.

Z′ is a plate above and behind the fire-box, to cut off the current, when desirable, from entering the boiler-tubes direct, and to send said current around the ovens.

The fire-box K is shown in Fig. 4 as a parallelogram; but it may be constructed in form square, circular, or otherwise, as desired. Boiler A need not be placed just in the rear of the fire-box. It may be placed on either side or at any angle with the fire-box, as the location of the place wherein the apparatus is to be set may require.

The operation of my invention is as follows: The water enters the boiler at D″ through main feed-pipe D, which passes through steam and water-space of the boiler lengthwise and extends below the lower end of the boiler, where, at Y, it passes through parts D′ and D^3 of feed-pipe D, entering the water-backs B′ at D^5 and B^3

at D^4. From part of feed-pipe D^3 extends D^5, which has a connection with water-back B^2 at D^6. After being heated the water in the water-backs passes out through pipe E' at U', E^2 at at U^2, and E^3 at U^3 into main pipe E, through which the water passes into the inlet end of the water-level regulator W, and, passing out through pipe E^4, is discharged into the boiler A. The heated air-current from the fire-box rises, and if the dampers Q Q' are open, as shown in Figs. 2 and 3, passes up and around the ovens and under boiler A and up the hot-air flues, as R R R. If said dampers be closed and damper or plate Z' open, the hot air passes directly under the boiler and up the hot-air flues, as R R R, thus presenting a large heating-surface, and, owing to the supply-pipe D passing through the steam and hot temperature of the upper part of the boiler A, the supply-water is gradually heated from its introduction into the boiler, and the temperature of the water is high before it enters the water-back. To introduce cold water into a water-back of a stove in which there is a fire would be attended with some degree of danger. It is readily seen that, owing to the position of the feed-pipe D in the boiler in such close proximity to the heat-tubes, the water in the feed-pipe receives additional heat therefrom before it reaches the water-backs. After leaving the regulator and entering the boiler the water is near to the vaporizing-point, and when inside the boiler is converted into steam by the heat circulating through the heat-flues R. The steam then collects at the upper part of the boiler and passes out through steam-pipe G, to be distributed to any point desired by any of the well-known means. The condensation of the steam, caused by the difference in the temperature along the line of the distribution appliances, is carried back to the boiler by means of returning-pipe H. The regulator maintains the water in the boiler at an even height by means of an ordinary automatic float-valve or other appliance suitable for the purpose. To the regulator is adjusted the proper connections for a gage indicating the exact height of the water in the boiler.

When the pressure of the steam on the boiler becomes too great, it is relieved by the opening of the safety-valve N. The surplus steam is thus enabled to escape into the smoke-stack C.

Of course, it is understood that the stove or range can be used for any and all domestic purposes for which they are at present adapted, and it is also evident that the stoves, ranges, or other heating appliances now in use may be altered or changed so as to meet the requirements of adjustment with my invention without necessitating the construction of new ranges or stoves.

It is of course understood that the hot water needed for ordinary kitchen and bath-room purposes is derived from the steam-boiler. It will be obvious that the foregoing invention greatly reduces the cost of heating the houses, where it is customary to have independent apparatus for that purpose, by entirely dispensing with the ordinary furnace, and by a saving of from fifty to seventy-five per cent. in the amount of fuel required for purely heating purposes. A great drawback to the employment of heating-furnaces as at present practiced is the inconvenience arising from the heating of the cellars in which they are generally placed. This is entirely obviated by my invention.

Having sufficiently described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a combined range and steam-heating apparatus, a water-back, with a boiler having tubes, pipes connecting water-backs and boiler, and a feed-pipe passing through said boiler and connecting with a water-back.

2. In a combined range and steam-heating apparatus, a water-back, with a boiler having heat-tubes, pipes connecting the water-backs and boiler, and a feed-pipe passing through said boiler in close proximity to the heat-tubes.

3. In a combined range and steam-heating apparatus, a fire-box, a plate above the fire-box, dampers Q Q', a flue between the plate and fire-box, ovens at either side and above the fire-box, and flues leading around said ovens communicating with the exit-flue.

ZACCUR PRALL BOYER.

Witnesses:
JOHN LUCAS,
JOS. R. BLACK.