(No Model.)

W. C. HIGGINS.

BOILER.

No. 593,297 Patented Nov. 9, 1897.

Fig. 1.

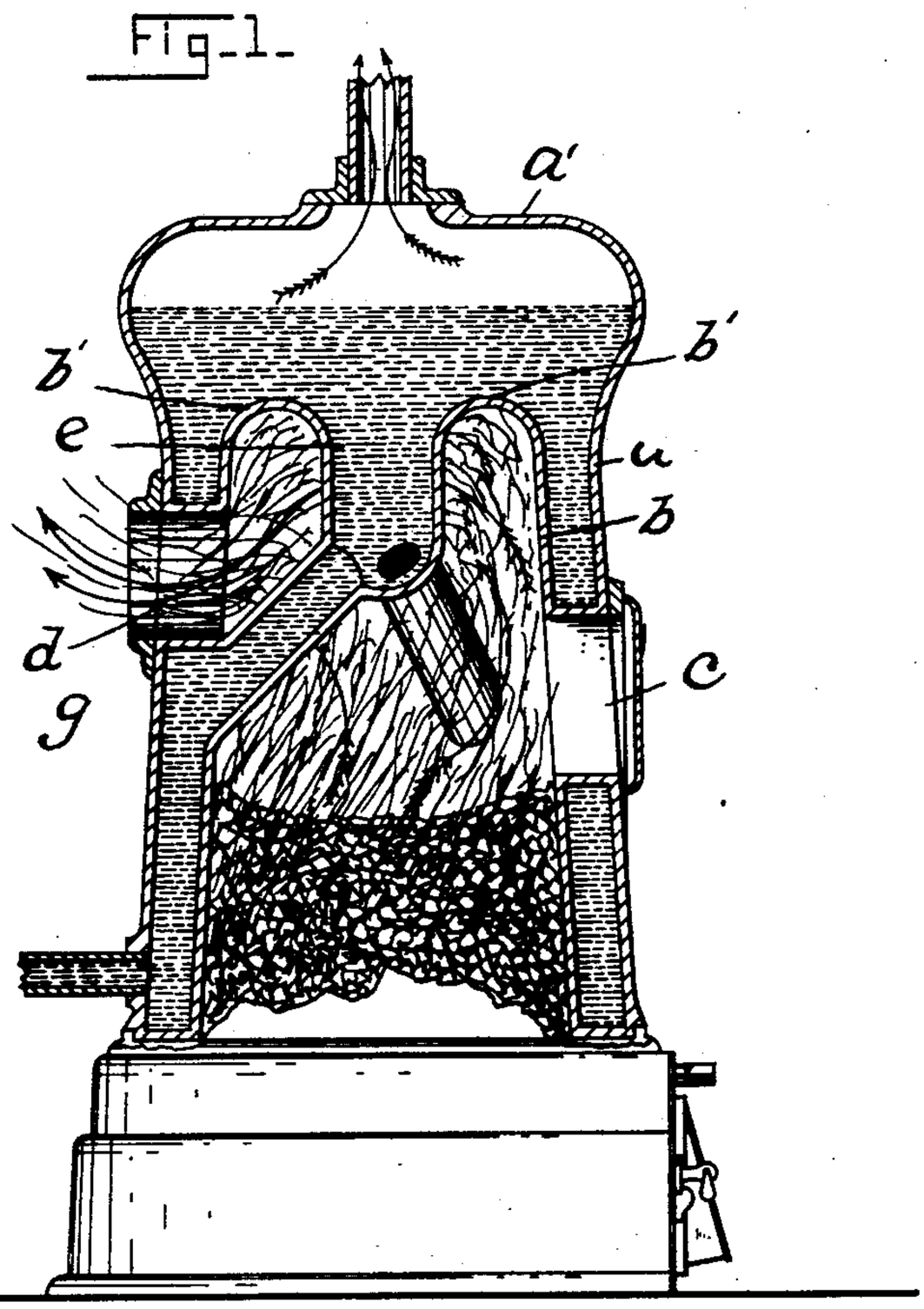


Fig. 2.

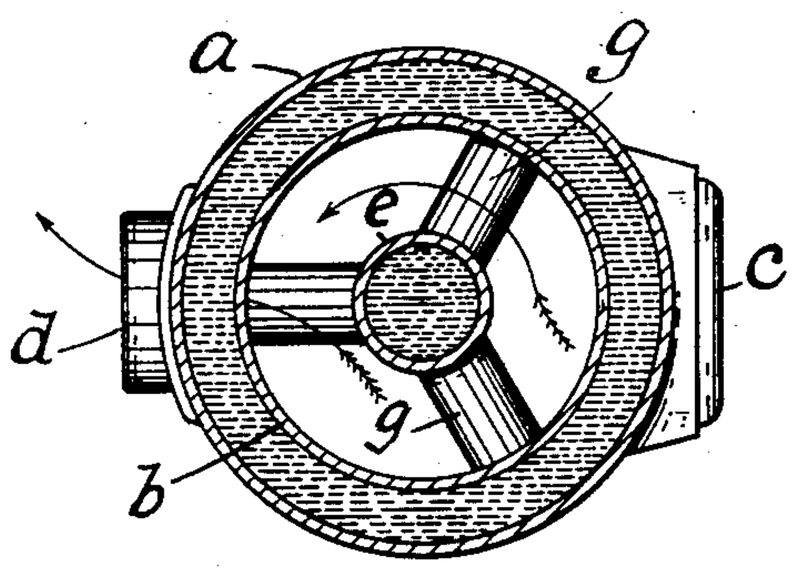
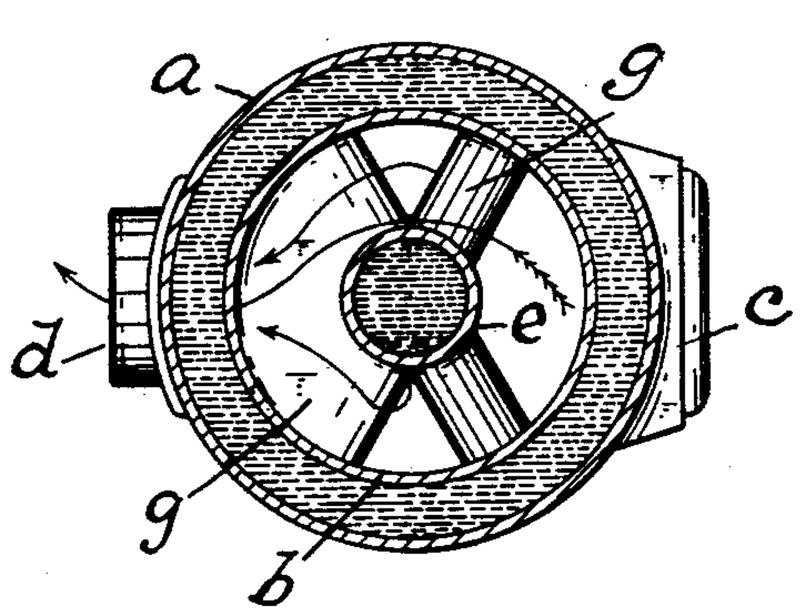


Fig. 3.



WITNESSES

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BOILER.

SPECIFICATION forming part of Letters Patent No. 593,297, dated November 9, 1897.

Application filed January 26, 1897. Serial No. 620,809. (No model.)

To all whom it may concern:

Be it known that I, WERTER C. HIGGINS, a citizen of the United States, residing at Norwich, in the county of New London and State of Connecticut, have invented a certain new and useful Improvement in Boilers for Steam and Hot-Water Heaters, of which the following is a specification, reference being had to the accompanying sheet of drawings, in which—

Figure 1 is a central vertical sectional view of a boiler of my newly-improved form, and Fig. 2 is a cross-sectional view of such a boiler, taken at the level of line *x x* of said Fig. 1. Fig. 3 is a similar cross-sectional view of a slightly-modified form of my said invention.

The chief aim of my present invention is to produce, for use in a steam or hot-water heater, a boiler-section in which such provision is made for the circulation of the water as will cause said water to flow in prescribed and unobstructed courses, thus not only maintaining a constant and free circulation, but also, because of the peculiarly arranged and proportioned conduits, preventing the ebullition or "churning" of the waters when the cooler portions of the water encounter the hotter portions in their efforts to return to the lower part of the boiler.

This invention is specially applicable to boilers in which a vertical cylindrical or conical water-jacket surrounds the fire-pot and combustion-chamber, and I have therefore illustrated such a form of boiler, the letters *a* and *b* indicating, respectively, the outer and inner shells of the boiler, said shells being located in such relation to each other that a water-space is provided between them, and said shells or walls are drawn in at the top, as at *a' b'*, to provide water-space immediately over the combustion-chamber, that is connected with and in effect a continution of the water-jacket which I have referred to as surrounding said combustion-chamber.

Those portions of the water in the boiler that are in nearest proximity to the fire-pot and combustion-chamber of course are most influenced by the caloric products, and such heated waters in seeking to rise to the upper part or dome of the boiler displace the cooler portions of said water and said cooler portions simultaneously seek to pass downward, and it is particularly desirable that the rising superheated waters shall not be met and obstructed by the returning cooler waters. My present invention is believed to provide such an arrangement of conduits or guideways as will positively control the courses of both the superheated and cooler waters and produce the best results obtainable.

In a boiler of the form here illustrated I provide a "feed-door" *c*, through which fuel may be introduced into the fire-pot, and preferably opposite said feed-door I provide an opening *d* for a smoke-exit, to which the usual smoke and draft pipe is attached.

Extending downward from the center of the wall *b'*, that forms the dome of the combustion-chamber, is a water-column *e*, whose lower end is connected with the water-jacket of the boiler by a multiple of pipes *g*, here shown as three in number, that extend radially and downwardly from said water-column, thus providing several connections or conduits between the water-jacket of the boiler and the central column *e*, which latter is open at its upper end, so that its contents may be discharged immediately into the space between the shells or walls *a' b'* of the dome.

I make the cross-sectional area of the central column *e* equal to the sum of the areas of the several radial pipes *g*, or approximately so, in order that the heated waters passing upward from the water-jacket through said pipes and discharging into the said column *e* may be in no way obstructed or even hindered in the upward passage.

Three of the radial pipes *g* are provided in the boiler here illustrated, one being located immediately below the smoke-exit *d* and so that the products of combustion as they seek to pass upward engage the lower side of said pipe and are by such engagement deflected in a greater or less degree, according to the width of said pipe, and caused to take an indirect course before reaching the said exit.

The three pipes *d* are here located equidistant from each other—that is to say, at an angle of one hundred and twenty degrees relatively to each other—and the feed-opening *c* is located between two of said pipes and so that the latter in no way interfere with the introduction of fuel into the fire-pot. If the number of pipes *d* be increased, it is my pur-

pose that the smoke-exit shall still be located over one of said pipes and that the feed-opening shall be located between two adjacent pipes, but said feed-opening need not be located opposite the said exit in order to be operative.

In some instances, particularly when it is desirable to increase the fire-surface, I broaden (extend laterally) that pipe *g* that is under the smoke-exit, so that a correspondingly-extended connection is provided with the water-jacket of the boiler, the said pipe being then substantially fan-shaped and having its inner end opening into the central column *e*, as seen in Fig. 3 of the drawings. This broadened form of pipe provides a deflecting-plate for the products of combustion, as well as a thin water-chamber that is so located within the combustion-chamber as to insure the ready heating of the water in said chamber, and also secures the desired additional fire-surface.

The described arrangement and relative proportions of the water-jacket, central column, and radial pipes make it both possible and easy for the superheated waters in the water-jacket and nearest the wall *a* to pass into the pipes *g* and thence upward in substantially direct courses into and through the central column *e*, being finally discharged in the center of the dome-space. By reason of this uninterrupted upward central flow of the superheated water the waters in said dome are being constantly displaced and forced outward until they are checked and guided downward by the outer shell of the boiler, being finally distributed throughout the space between walls *a b*, where they are again influenced and raised in temperature by the calorie products of combustion and again pass upward through the pipes *g* and central column. A constant uninterrupted and natural circulation is thus induced and maintained.

For the purpose of this invention it is not material whether the described arrangement of parts is utilized in connection with so-called "hot-water heaters" or for generating steam, as in either instance it is equally desirable that a constant and perfect circulation of the water in the boiler be maintained.

In the construction of my described boiler I prefer to make the water-jacket, dome, central column, and radial pipes as a single integral structure.

Having thus described my invention, I claim—

1. A boiler, having a dome, a water-column depending into the combustion-chamber from said dome and having its top in open communication with the lower end of said dome, a water-jacket surrounding said combustion-chamber and having an open top in direct communication with the lower edge of said dome, and a series of radiating pipes connecting the lower portion only of said water-column with said jacket, all of said pipes opening into said water-jacket considerably above the bottom and below the top thereof, substantially as shown and described.

2. In a boiler, in combination, a water-jacket inclosing the sides and top of the combustion-chamber, a water-column depending centrally from the dome of said boiler, and a multiple of downwardly-inclined radial pipes connecting the lower end of said central column with the water-space around the combustion-chamber; the cross-sectional area of the central column being approximately equal to the sum of the areas of the several radial connecting-pipes.

3. In a boiler, the combination of the dome, the water-jacket encircling the combustion-chamber and opening directly into the lower edge of the dome, a water-column depending from said dome, a smoke-exit extending through said jacket, and a pipe connecting said water-jacket and water-column together, said pipe being broadened toward its outer end and providing a deflecting-plate for the products of combustion and a thin chamber for conducting water to said column, substantially as described.

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