(No Model.)

W. B. SALMON.

STEAM BOILER.

No. 540,407. Patented June 4, 1895.

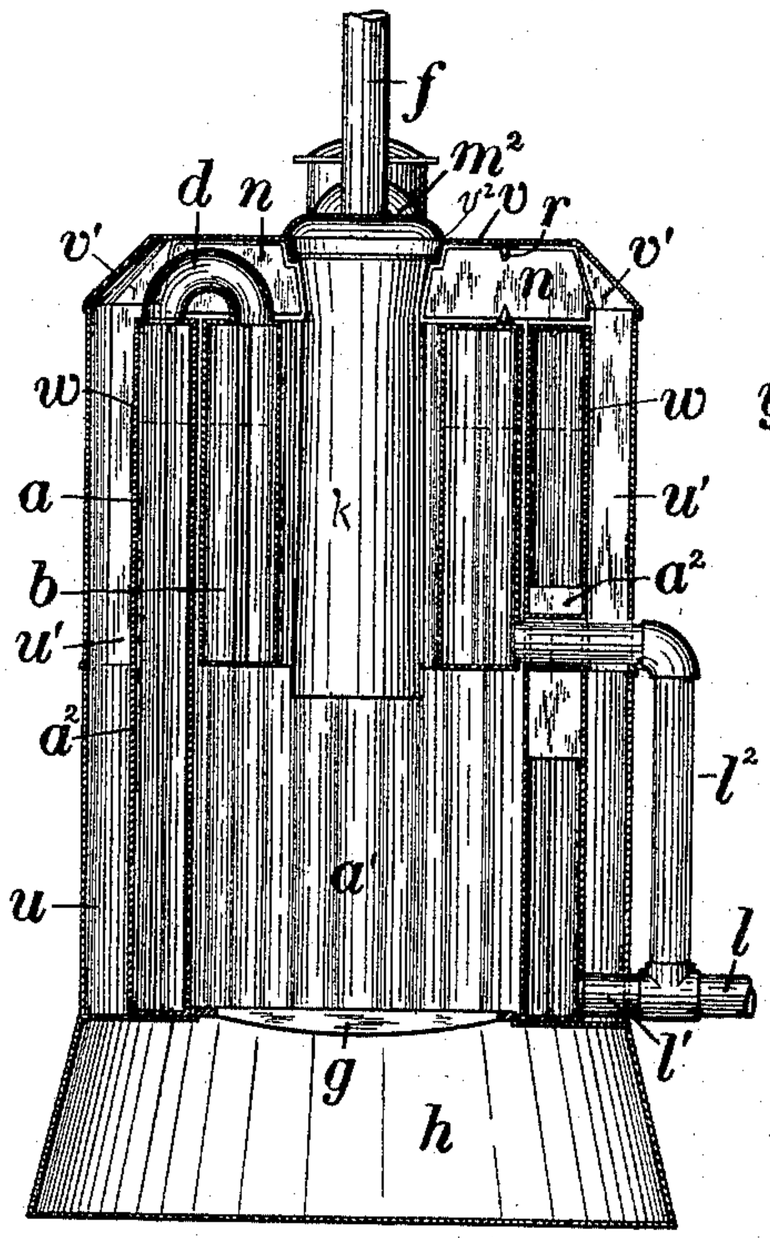


Fig. 1.

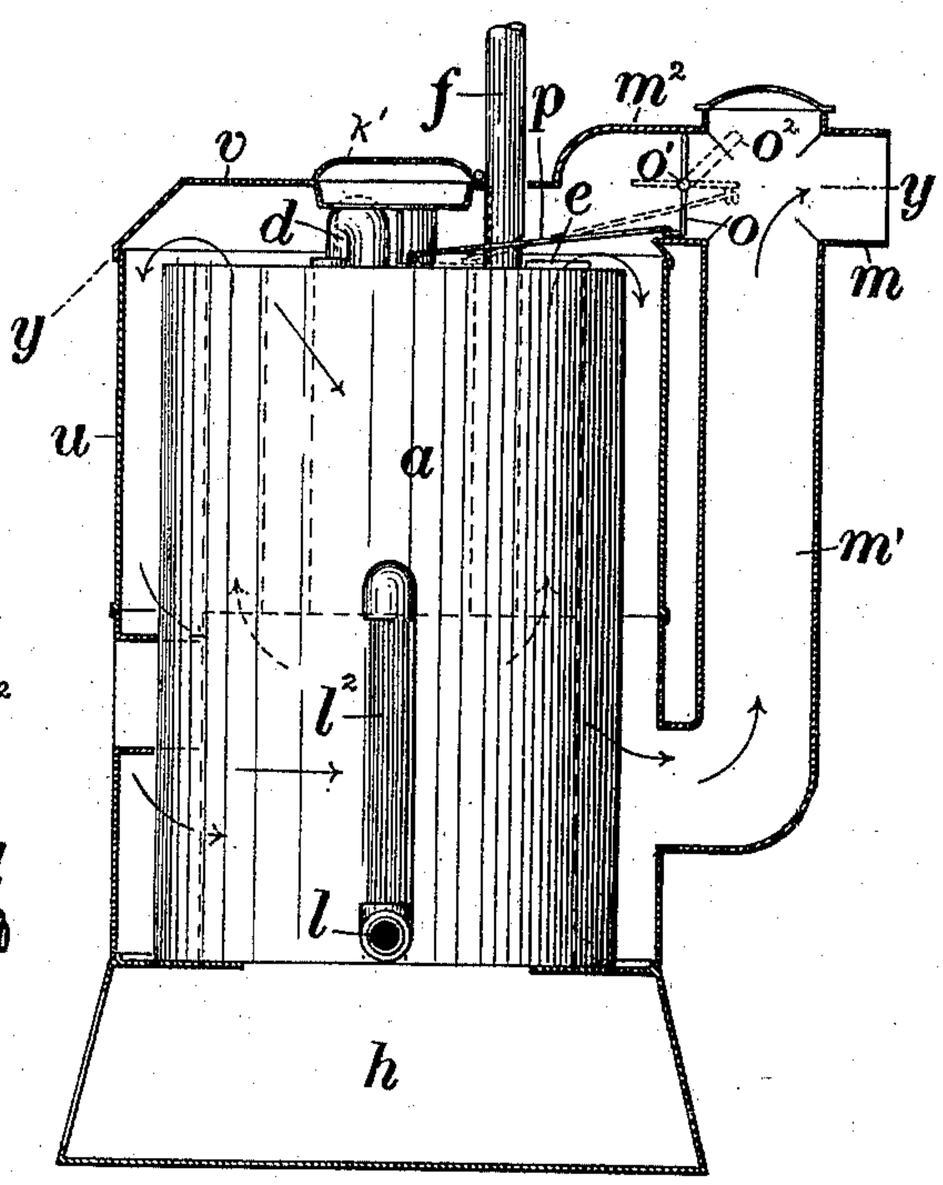


Fig. 2.

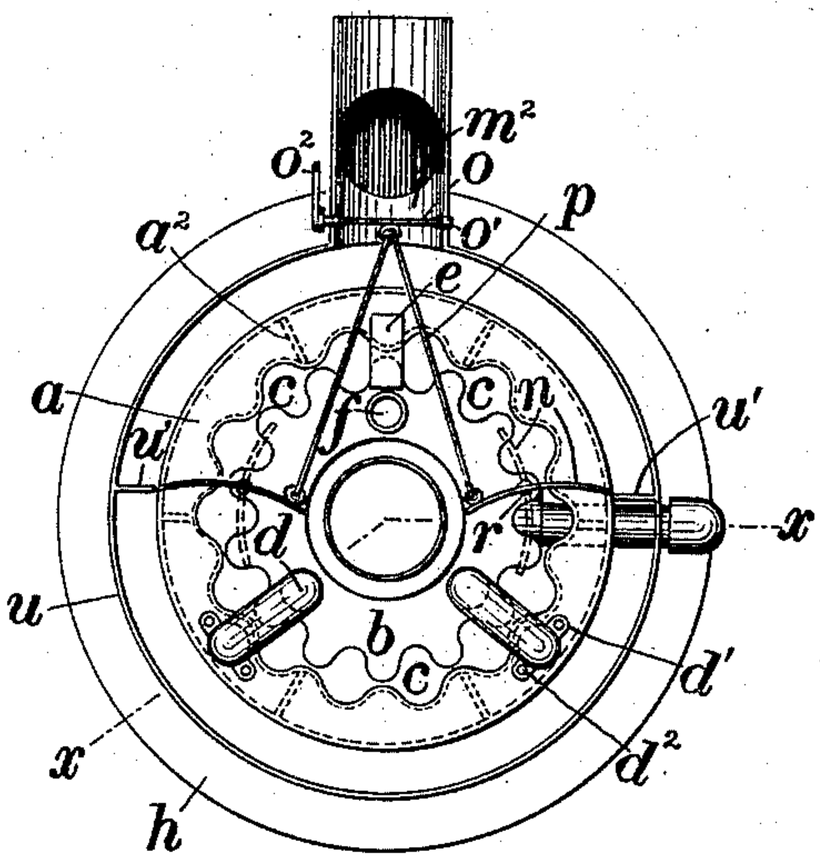


Fig. 3.

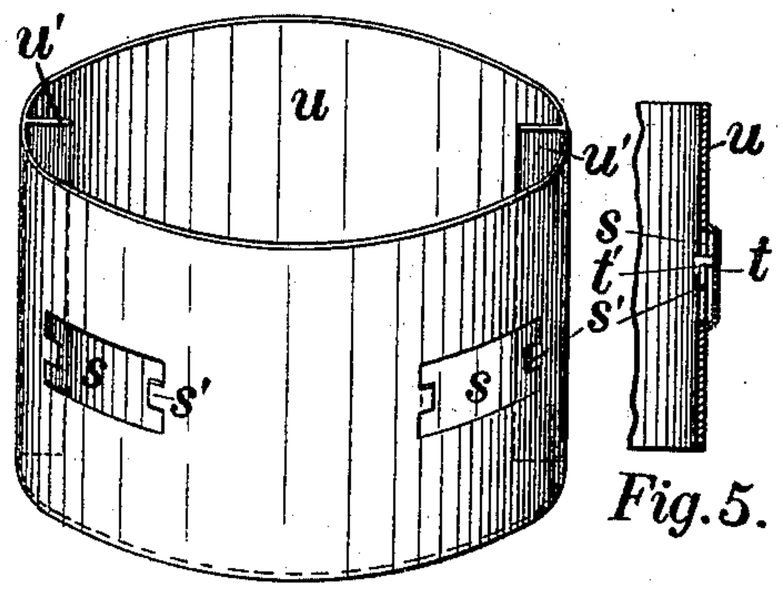


Fig. 5.

Fig. 4.

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UNITED STATES PATENT OFFICE.

WILLIAM BARTLEY SALMON, OF ORANGE, NEW JERSEY.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 540,407, dated June 4, 1895.

Application filed February 26, 1894. Serial No. 501,488. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM BARTLEY SALMON, a citizen of the United States, residing at Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Steam-Boilers, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The object of this invention is to provide a simple and efficient boiler for generating steam for heating purposes.

The invention consists partly in the particular construction and relation of the concentric sections of an upright boiler; and partly in the construction and arrangement of the dampers for the return and direct draft.

In the annexed drawings, Figure 1 is a sectional elevation of the boiler on line *x x* in Fig. 2. Fig. 2 is a plan of the same with the cap in section along its under side, as indicated by the dotted line *y y* in Fig. 3. Fig. 3 is an elevation of the boiler with the casing in section on its center line and that of the smoke-outlet pipe. Fig. 4 is an oblique view of the upper division of the boiler-casing, and Fig. 5 a vertical section through the center of one of the clean-out apertures with the door applied thereto.

The boiler is shown herein of the upright type, comprising an outer annular water section *a* extending the full height of the generating portion and corrugated upon its inner periphery, and with an inner section *b* of less height having exterior corrugations and suspended in the upper portion of the outer section; the corrugations of the two sections being opposed to form a series of fire tubes *c* between the same adapted to carry off the heated products of combustion from the fire pot *a'* inclosed within the outer section below the section *b*.

While the customary provision must be made for the expansion and contraction of the two separate and independent sections due to variations of temperature, it will be observed that the opposed corrugations of each are in substantial contact with one another so as to form flues practically closed at their junction and which are separate and distinct each from the others. By this means I am enabled to secure a maximum capacity for the two sections with a corresponding maximum area of heating surface exposed directly to the heated gases generated in and issuing from the fire pot.

The section *a* is provided intermediate to its top and bottom with a series of integral webs a^2 extending between its inner and outer walls and disposed at intervals around the same to serves as stays in order to prevent the spreading of the same when under pressure.

The sections are shown connected together at the top by the inverted U-tubes *d* cast integral with the top of the inner section *b* with foot pieces or flanges *d'* secured upon the top of the outer section *a* by means of studs d^2 thereon, and serving, in conjunction with the laterally projecting lug *e* also cast integral with the top of the inner section to support such inner section *b* with its top flush with the section *a*. An independent outlet or delivery pipe *f* is applied to the top of the inner section to conduct to the radiator circuit the steam generated in the two sections; and the return pipe *l* of such circuit is provided with a branch *l'* connected with the lower end of the section *a* and another branch l^2 passing through a suitable aperture cored in the outer section and similarly connected with the inner section, as indicated in Figs. 1 and 2.

The grate *g* forms the bottom of the fire pot and is supported in the usual manner upon the base *h* constituting the ash pit.

A casing *u*, comprising a cylindrical shell cast in two horizontal divisions, surmounted by a cap *v* incloses the water sections; and is connected with the chimney by an outlet pipe *m* having a branch *m'* connected with the lower division of the casing and an upper branch m^2 connected with the cap *v*. The upper division of the casing is provided with partitions *u'* extending inwardly to the surface of the water section *a* to form about the upper portion of the latter an annular smoke space divided into two segmental compartments. The cap *v* is formed similarly with partitions *v'* continuous with the partitions *u'* and with a fuel aperture in the top having an annular seat v^2 from which is suspended the self-feeding fuel magazine *k* with cover *k'*, to admit which magazine the inner water section *b* is made of annular form.

Segmental dampers *n* are movably secured

by means of the vertical pivots r upon the top of the water section b between the partitions v' and the magazine k; and when closed form, in conjunction with the partitions u' and v' and the magazine, a continuous partition for the upper portion of the smoke space formed between the casing and the outer water section a. The dampers n are of such curvature that when open they are concentric with the water sections, as indicated in the dotted lines in Fig. 2, in order to oppose the least possible resistance to the passage of the heated products of combustion directly to the smoke pipe m. A damper o is pivoted horizontally within the branch m^2 of the smoke outlet pipe m and is provided with a lever o^2 mounted upon its spindle o' for actuating the same. The damper o is provided upon its lower side with an eye, as are also the inner ends of the dampers n; and each of the latter is connected with the damper o by means of the links p attached to such eyes and operating to shift the dampers n when the lever o^2 is turned to actuate the smoke pipe damper o.

The casing u is provided, as shown in Figs. 4 and 5, with clean-out apertures s having opposed lugs s' upon their vertical edges; and doors t are fitted over such apertures and provided at their vertical edges with inwardly projecting hooks t' to engage the ears s' and to thereby serve the function of the latch and hinges commonly used for the purpose of holding the doors in place. Such means of fastening the clean-out doors removably in place enables me to cast both the casing and the doors complete without the subsequent employment of tools to fit them or any of their parts together, and thus offers a saving in the labor and expense of manufacture.

It will be observed that the primary object of the generator is to present to the heating surface separate and distinct divisions of the whole body of water to be heated in order to increase the rapidity of its action. By forming the concentric sections entirely separate, I am enabled without material loss of capacity of the apparatus to secure such division of the water and also to secure additional surface exposed to the heated gases in the provision of continuous division walls in the place of the vertical fire tubes passing through a single section now in common use. While preventing the free circulation of the whole volume of water in the apparatus, I am enabled by means of the two branches of the return pipe l to provide ample communication between the sections to maintain the water level w at the same height in both sections; and the steam pipes d connecting the tops of the sections serve to mingle the steam generated in the outer section with that in the section b for distribution by means of the steam pipe f.

The drawings illustrate all the dampers closed; whereby the smoke rising through the tubes c in front of the dampers n is deflected downward by the latter and the partitions u' to mingle with that upon the other side of the partitions in the lower portion of the casing, whence they are carried off through the branch m' of the smoke pipe. It is evident that by opening the dampers, as indicated in dotted lines in Figs. 2 and 3, the heated products of combustion are permitted to pass off directly from the cap v through the branch m^2 to the smoke pipe in the ordinary manner.

Having thus set forth the nature of my invention, what I claim herein, and desire to secure by Letters Patent, is—

1. A heating boiler comprising an outer annular water section corrugated upon its inner periphery and inclosing the fire pot, and a separate inner water section formed with an equal number of exterior corrugations inserted within the same above the fire pot with its corrugations opposed to and practically in contact with those of the outer section to form in conjunction therewith a series of separate smoke flues, substantially as and for the purpose set forth.

2. In an upright boiler, the combination, with a water section having vertical fire tubes, of a casing for the same formed with partitions in its upper portion extending inward to such water section, a cap for the said casing provided with inwardly projecting partitions continuous with those in the said casing, a smoke outlet pipe having branches leading from the casing below the partitions and above the top of the water section, a damper in the said upper branch of the smoke pipe, a damper between the top of the water section and the said cap and adjoining the said partitions in the cap, and means for actuating the said dampers, substantially as herein set forth.

3. In an upright boiler, the combination, with a water section having vertical fire tubes, of a casing for the same formed with partitions in its upper portion extending inward to such water section, a cap for the said casing provided with inwardly projecting partitions continuous with those in the said casing, a smoke outlet pipe having branches leading from the casing below the partition and above the top of the water section, a damper in the said upper branch of the smoke pipe, a damper between the top of the water section and the said cap and adjoining the said partitions in the cap, a connection between the said dampers, and means for actuating one of the said dampers from without the casing, substantially as herein set forth.

4. In an upright boiler, the combination, with a cylindrical water section having vertical fire tubes and a central self-feeding fuel magazine, of a casing formed of a concentric cylindrical shell with partitions in the upper portion thereof extending inwardly to such water section, a cap for the said casing provided with inwardly projecting partitions continuous with those in the said casing, a smoke outlet pipe with branches leading from the casing below the partitions and above the top

of the water section, a damper in the upper branch of the smoke pipe, dampers between the top of the water section and the said cap and extending between the said partitions in the cap and the fuel magazine with connections from each to the damper in the smoke pipe, and means for positively actuating one of such dampers, substantially as shown and described.

5. In an upright boiler, the combination, with a cylindrical water section having vertical fire tubes and a central self-feeding fuel magazine, of a casing formed of a concentric cylindrical shell with partitions in the upper portion thereof extending inwardly to such water section, a cap for the said casing provided with inwardly projecting partitions continuous with those in the said casing, a smoke outlet pipe with branches leading from the casing below the partition and above the top of the water section, a damper in the upper branch of the smoke pipe, segmental dampers with vertical pivots upon the water section between the said partitions in the cap and the fuel magazine and concentric when open with the water section, link connections from each of the latter dampers with that in the smoke pipe, and a lever upon the spindle of the damper in the smoke pipe for actuating the same, substantially as herein shown and described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM BARTLEY SALMON.

Witnesses:

CHAS. KNIGHT,

HENRY J. MILLER.