

(No Model.)

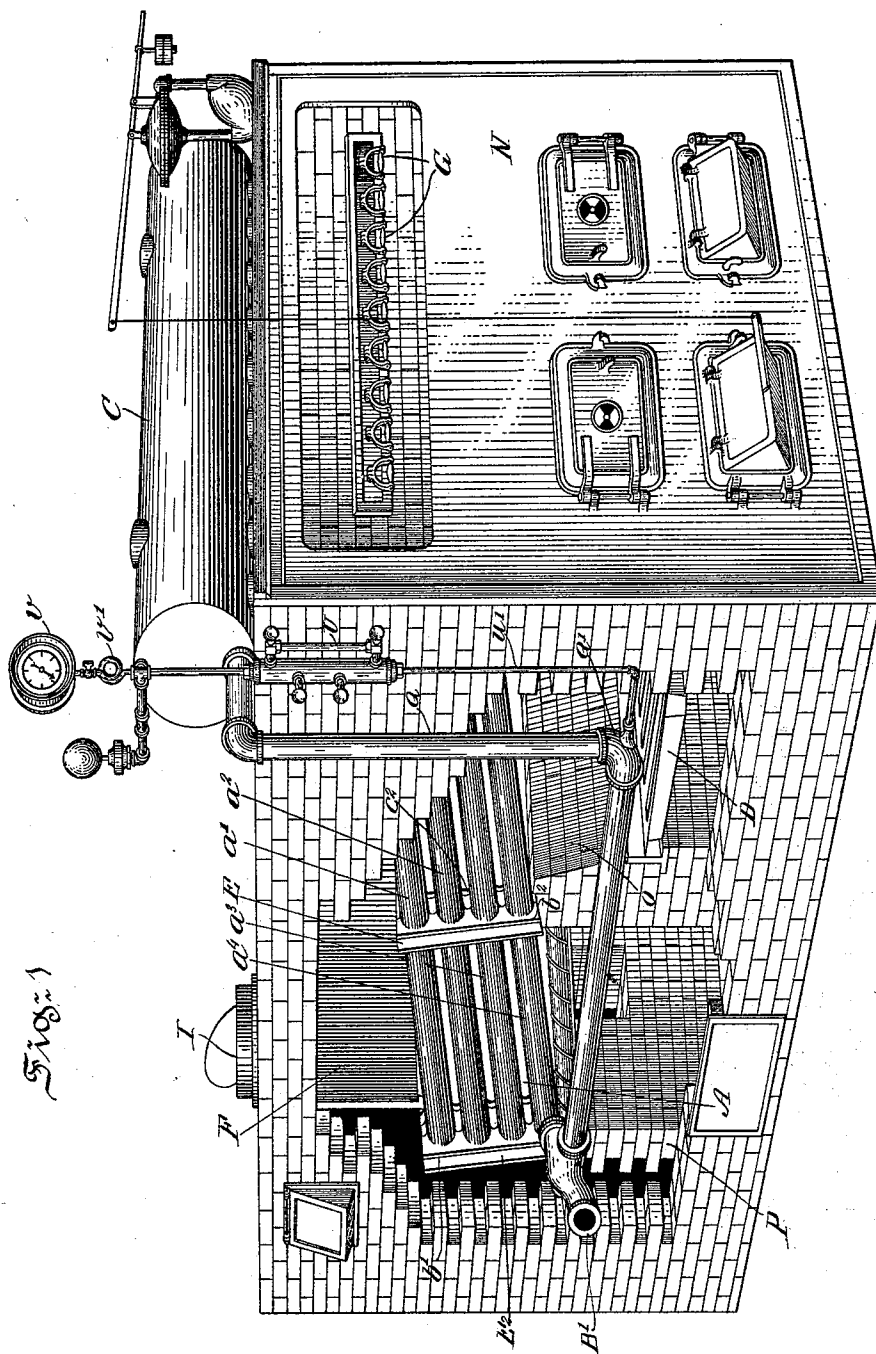
2 Sheets—Sheet 1.

J. R. BANNAN.

SECTIONAL STEAM OR HOT WATER BOILER.

No. 544,245.

Patented Aug. 6, 1895.



Witnesses:
Thomas M. Smith.
Richard C. Maxwell.

Inventor:
John R. Bannan,
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Attorneys.

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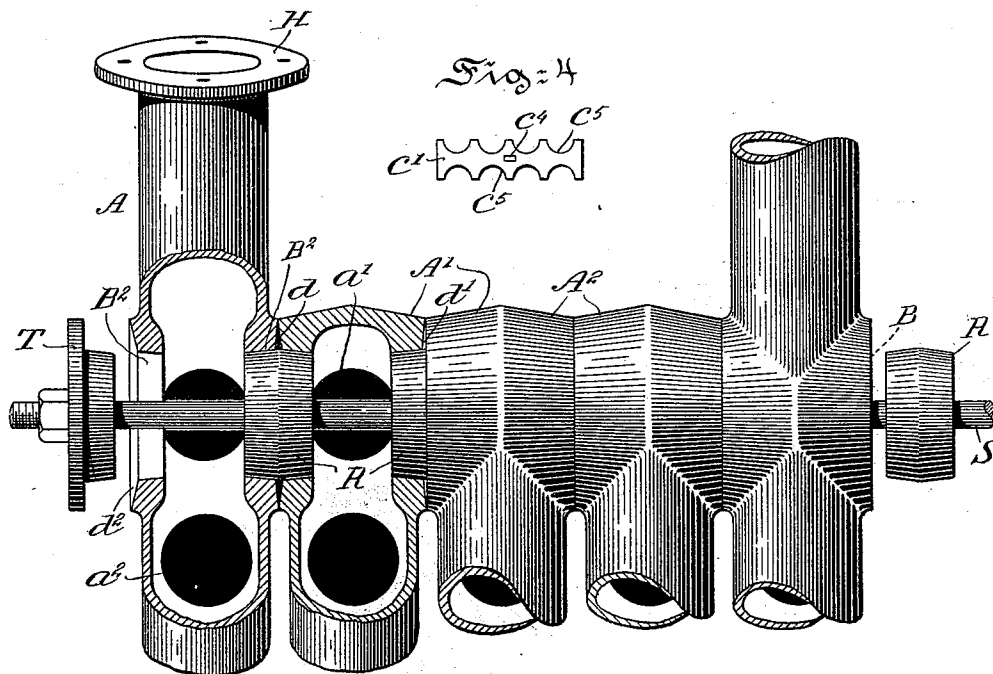
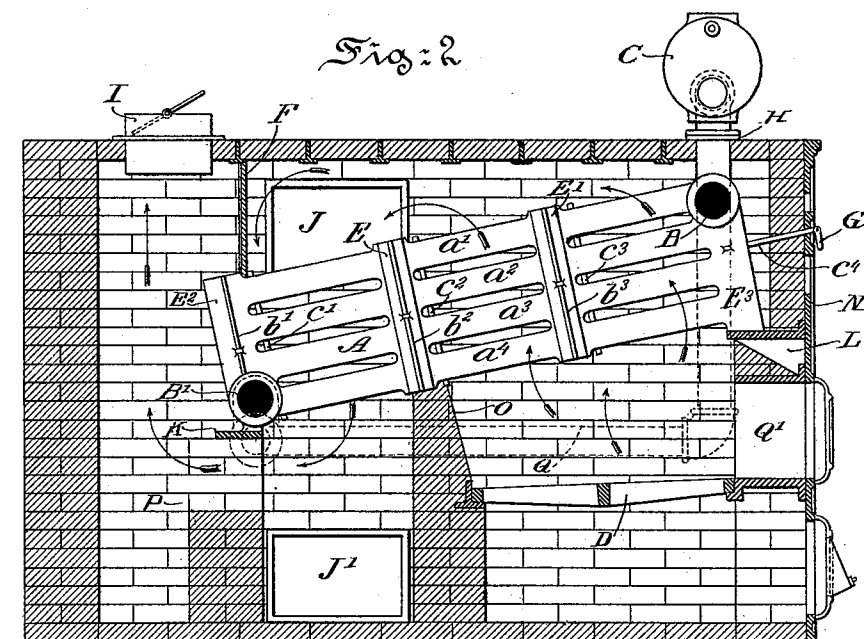
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Fig: 3

Inventor:
John R. Bannan,
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UNITED STATES PATENT OFFICE.

JOHN R. BANNAN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE
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SECTIONAL STEAM OR HOT-WATER BOILER.

SPECIFICATION forming part of Letters Patent No. 544,245, dated August 6, 1895.

Application filed May 17, 1895. Serial No. 549,610. (No model.)

To all whom it may concern:

Be it known that I, JOHN R. BANNAN, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Sectional Steam or Hot-Water Boilers, of which the following is a specification.

My invention relates to a sectional steam-boiler of the class employed in the generation of steam or hot water for heating purposes or for the generation of high-pressure steam for power or other purposes, and in such connection it relates particularly to the details of construction and arrangement of such a boiler.

The principal objects of my invention are, first, to provide a steam or hot-water boiler consisting of sections, each constructed of a single casting and provided with a series of tubes having openings at their ends to constitute, with the tubes and openings of the next contiguous section, a series of transverse headers or manifolds; second, to provide in such a sectional boiler a series of sections provided with joining taper-nipples, recessed and adapted to receive plastic or other material to form a joint adapted to withstand internal pressure and to resist the destructive action of the fire-gases, and, fourth, to provide in such a sectional boiler a series of scrapers adapted to surround the tubes of the various sections and united together by a rod terminating in a handle outside the walls of the boiler-setting, whereby the exterior of the tubes may be cleansed of impurities or of the refuse of combustion without extinguishing the fire and while the boiler is in full operation.

My invention, stated in general terms, consists of a sectional steam-boiler constructed and arranged in substantially the manner hereinafter described and claimed.

The nature, characteristic features, and scope of my invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, and in which—

Figure 1 is a perspective view of a sectional boiler embodying features of my invention.

Fig. 2 is an elevational view showing the sections of the boiler supported at an incline within a brick-setting having the usual grates, fronts, and castings for such setting. Fig. 3 is an enlarged detail of the joint employed for connecting the sections together in numbers, as required, and Fig. 4 is a top or plan view of one of a series of scrapers employed for cleaning the fire-surface of the boiler.

Similar letters of reference indicate corresponding parts in the several figures.

Referring to the drawings, A is one of the sections of the boiler, which, as illustrated, consists of a series of four inclined cast tubes a^1 , a^2 , a^3 , and a^4 , extending the length of the sections and joined together by means of the hollow manifolds or headers E, E', E², and E³, and connected to the other sections forming part of the boiler by the openings B and B', provided with means for establishing a suitable joint, as illustrated in Fig. 3 of the drawings. These openings are in communication with each other, forming transverse headers between the several sections at the points indicated in Figs. 2 and 3 of the drawings.

H is a flanged outlet provided on all or any number of sections, as may be desired, and connected to a drum C, which is supplied with a suitable number of outlets for pipe connections and a corresponding number of flanged connections for forming joints with the outlet H.

b^1 , b^2 , and b^3 are small flanges or ribs abutting, overlapping, or so arranged between the sections of the boiler as to form smoke flues or channels, extending the length and across the width of the sections for controlling the passage of the gases of combustion before the final exit thereof into the smoke-flue.

D is a grate of any suitable design.

O is a bridge-wall for retaining the fire.

N is a cast-iron front of suitable design provided with the necessary fire and ash-pit doors.

K is a bearing-plate extending over the rear retaining-wall P for supporting the several sections of the boiler.

F is a flame plate or wall for controlling the action of the gases, to be hereinafter more fully explained.

L is an upper rest or knee-plate extending from side to side and to which the front N is suitably secured.

P is a retaining-wall provided with suitable openings for the exit of gases, and is intended to support the plate K on which the boiler rests.

c' , c^2 , and c^3 are castings made concave, as at c^5 , to conform to the contour of the exterior of the boiler-sections, as illustrated in Figs. 2 and 4, and connected to a rod c^4 , running between the sections and extending through the front, where it is provided with a handle G for drawing in and out to serve as means for cleaning the various tubes which the scrapers c' , c^2 , and c^3 contact with, the idea being that these scrapers will encircle as much of the outer surface of the tubes as is found practical. The arrows in Fig. 2 indicate the relative course of gases of combustion.

I is a smoke-collar provided with a damper for establishing and cutting off the necessary flue connection.

J and J' are clean-out doors, which are to be employed as required.

Q is a circulating-pipe connected with the lowest portion of the boiler and with the steam-drum C, or, if desired, with the outer sections of the boiler proper. The idea is to have two of these pipes, one on each side of the steam-boiler, so as to separate the water which is carried into the steam-drum C as a result of the rapid generation of the steam, thereby securing dry steam before it is desired to utilize it. These side circulating-pipes serve also to equalize the internal pressure at the farthest or remote parts of the boiler. When the boiler is intended for generating hot-water, these side connections are not necessary, and therefore may be dispensed with.

In Fig. 3 is illustrated in detail the joints established at B and B' and consisting of a double taper-nipple R, of suitable metal, inserted into a corresponding reamed opening B², provided with recesses d , d' , and d^2 for the reception of a plastic material unaffected by heat for bringing the faces of the castings to a true joint. It will be observed that the said recesses are tapered so that the castings come in contact at their outer edges, thereby retaining the material inserted between them and forcing it around the nipple as well as protecting the material from the action of the gases of combustion.

A' and A² are intermediate sections, which are not provided with flanges H.

S is a bolt extending through the several sections provided with flanges T at its extremities, whereby the taper-nipples R may be drawn into place, the spaces d , d' , and d^2 inclosing the plastic material and being contracted so as to come together at their outer edges at the same time that nipples R have been drawn so as to seat.

In operation the gases of combustion generated from the fire-chamber of the grate D

ascend between, around, and above the boiler tubes a' , a^2 , a^3 , and a^4 , forming the sections in conjunction with the manifolds E, E', E², and E³, and are so controlled by means of the smoke flues or channels formed by the ribs or flanges b^2 and b^3 as to pass over the combustion-chamber and descend by means of the smoke-channel formed by the ribs b' and b^2 as a result of the deflecting of the flame plate or wall F to the opening in the retaining-wall P, and then to the flue by means of the outlet I, connected therewith, substantially as indicated by the course of the arrows in Fig. 2 of the drawings, whereby a rapid generation of steam or hot water results therefrom. The steam or hot water so generated is conducted by means of pipes leading from the steam-drum C to the point where the steam or hot water is to be used. If desired to generate hot water, the operation will be just as efficient without the use of the drum C, when the pipe connections for conveying the hot water may be made directly with the flanges H.

The means employed for supplying water to the boiler is that ordinarily in use, the necessary openings being provided where desired, but preferably at the lowest point thereof.

When, as in the case of hot-water or steam heating, the circulating-pipe Q is employed, the forward lower bend Q' thereof is connected with a water-gage U by means of the pipe w' , and with the upper portion of the steam-drum C is connected a pressure-gage v by means of a nipple or pipe connection v' . By this means the attendant is enabled to ascertain from the outside of the boiler the height of the water in the sections of the boiler and the pressure of the steam in the drum C thereof.

A sectional steam or hot-water boiler constructed and arranged according to my invention possesses, first, the advantage of being able to utilize to the greatest possible extent the heat-units from a perfect combustion of the gases of the furnace, and thereby securing a far more rapid generation of steam and hot water, and, second, possesses the advantages of being absolutely tight under any pressure that may be desired, depending upon the thickness of the material of the various parts thereof, and is so constructed as that all joints required in the construction of the boiler and exposed to the action of the gases of the furnace are not affected thereby or by contraction or expansion of steam or water contained therein.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a sectional steam or hot water boiler, a series of sections each provided with a series of open ended tubes, the interior of the openings of which are tapered and join corresponding openings of contiguous tubes oppositely tapered, a series of double tapered nipples uniting the contiguous tubes at certain portions thereof, and a tapering ring interposed between said nipples at other portions

thereof, substantially as and for the purposes described.

2. In a sectional steam or hot water boiler, a series of sections each provided with open
5 ended tubes, the interior of the openings of which are tapered and join corresponding openings of contiguous tubes which are oppositely tapered, a series of double tapered nipples uniting the openings of contiguous
10 tubes to form therewith transverse headers or manifolds, the joining openings being con-

caved on their face to form a triangular or tapered ring-like cavity, and plastic material located in said cavity and confined by said nipples, substantially as described.

In testimony whereof I have hereunto set
my signature in the presence of two subscri-
ing witnesses.

JOHN R. BANNAN.

Witnesses:

I. WALTER DOUGLASS,
THOMAS M. SMITH.