T. CHAMPION.

STEAM BOILER.

No. 12,360. PATENTED FEB. 6, 1855.

12360

fig 1

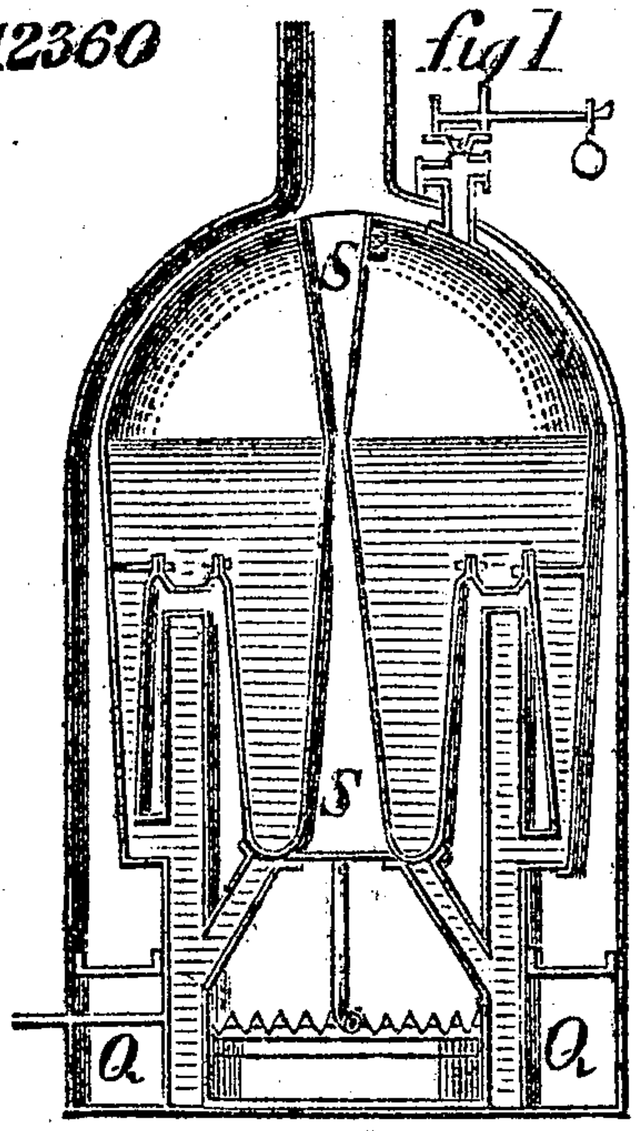
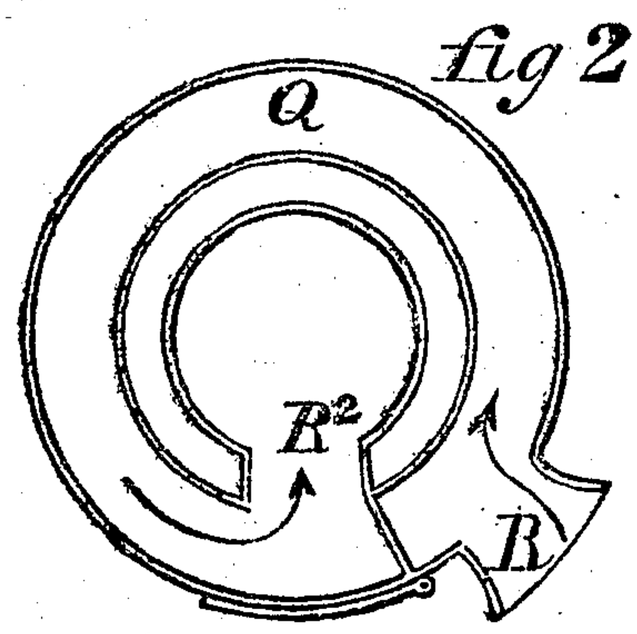


fig 2



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1855 - VOL-II-
ONLY DRAWING ACCESSIBLE (1913)

UNITED STATES PATENT OFFICE.

THOMAS CHAMPION, OF WASHINGTON, DISTRICT OF COLUMBIA.

STEAM-BOILER.

Specification of Letters Patent No. 12,360, dated February 6, 1855.

To all whom it may concern:

Be it known that I, THOMAS CHAMPION, of the city and county of Washington, in the District of Columbia, have invented certain new and useful Improvements in Steam-Boilers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings of the same, making part of this specification, and in which—

Figure 1 is a vertical section of a boiler embracing my improvements; Fig. 2 represents a similar section, taken at right angles to that of Fig. 1; Fig. 3 represents a horizontal section taken at the line XX of Fig. 1; Fig. 4 represents a similar section taken at the line O, O of Fig. 1 and Fig. 5 represents a section taken beneath the grate (on a small scale,) to show the union of the annular flue and ash pit.

My invention and improvement consists of a hollow scroll grate, the convolutions of which commence in the center and extend regularly to the circumference of the furnace, thereby forming a durable grate free from joints and angles, or short turns which have been the greatest objection to the hollow grates as heretofore constructed.

My invention also consists in making an annular flue at the bottom of an upright boiler which receives the air to supply combustion and conducts it to the ashpit beneath the grate.

My invention further consists in having a tube or tubes of peculiar construction passing through the boiler. The peculiarity of the tube consists in making it of a double cone the upper one being inverted the objects and advantages of it are that the heat in rising through the lower cone which is surrounded by water acts with the greatest effect, but while passing through the upper cone, which is surrounded by steam, it is prevented from heating it to a degree that would be dangerous, because it enlarges upward and thus allows the heat to pass off freely. With tubes of uniform diameter, that portion passing through the steam becomes often over heated and this is the cause of many of the explosions of upright tubular boilers.

The boiler shown in the drawing is of the upright variety, and consists of an external shell A, which together with its chimney B, may be made of Russia sheet iron. Within this shell there is another shell C, the dome of which forms the steam space, and the flue D, between these two shells conducts the smoke, and gases to the chimney. The water shell C, does not extend to the bottom of the outer shell, but is connected to, and supported by a series of concentric plates which approximate to cylinders, two of which E E rest upon the outer shell, and extend up a suitable distance within the water shell, while the others are united the one F, with the shell C and the other G, to the lower end of a central tube of peculiar construction, the whole being so disposed as to form alternate water, and fire spaces, which communicate respectively with each other, by means of tubes I, and J, in any suitable manner that will allow the sediment to pass down into the lowest water space below the fire, and a circulation of heat through the boiler. These concentric plates or cylinders are united to each other, and to the shell C in any convenient manner that will insure the requisite strength to the several parts.

The grate K, of the furnace L, consists of a scroll, being hollow, and supported upon cross bars or tubes in any suitable way. The transverse section of this grate tube is, in this instance, of triangular form, but it may be round, oval, or of any other form, which would suit the purposes of a hollow grate. I propose to make the grate in one piece, with its convolutions regular, commencing at the center and winding horizontally from it, till it fills the diameter of the furnace space, and then joining its end to a tube M, which passes out of the boiler and connects with the feed pump; while the inner end of the grate tube is joined to another tube N, which passes up into the water space and terminates near the surface of the water, thereby insuring a free communication to the interior of the boiler through the scroll grate.

The advantages of this construction of grate, besides supplying the boiler through it, are having but one joint in the furnace, it is thereby not likely to leak, as with other tubular grate bars; it is far more durable than any other grate, because the feed water being forced through it prevents its destruction by the fire. An aperture P, is made in the tube M, where it passes through the water space between the cylinders E; it will be seen this opening is between the grate and pump, and the object of it, is to maintain a constant circulation of the water

through the grate when the pump is not working, and this will be caused by the pressure of the water in the boiler at the aperture, assisted by the tendency of the hot water and vapors in the grate to pass upward through the tube N, and this is another advantage incident to the scroll grate; the circulation of the water in the boiler being continuous and not dependent alone on the action of the force pump.

An annular flue Q is made at the bottom of the boiler between the cylinder E, and outer shell, having a bell mouthed opening R, through which the air passes into it; the end of the flue next to the opening R, is closed and its opposite end communicates with the ash-pit as seen in Fig. 5, so that it will be seen, that air to supply the combustion of the fuel has to pass entirely around this flue in contact with heated plates before it can pass beneath the grate, except when starting the fire, then the ash pit door is opened till the fire is under way when it must be closed again. The central tube of the boiler extends from the dome of the water shell C, to a level with the bottom thereof; it is composed of two cones S and S^2 of unequal diameter, and length, united at their apices, the point of union being at or near the water line in the boiler. The longest cone S, of this tube is the lower one, and the diameter of its base is about six times greater than its apex, and the diameter of the base of the upper cone S^2 (which is inverted) is about three times as great as that of its apex. The object of this double conical tube is to receive the heat from the furnace into its lower branch, and by its gradually diminishing diameter cause the heat to pass slowly through it until it passes the apex or throat of the tube, so that it shall act with the greatest possible effect in that portion of the tube surrounded by water, and then to pass off through the upper cone rapidly without heating that portion of the tube surrounded by steam to a degree that would endanger its explosion. This has been the great difficulty with upright tubes of uniform diameter, the heat acting upon them uniformly so that, that portion of them above the water and in the steam space would be the hottest, and thus frequently produce their explosion.

T is an opening through which the fuel is introduced into the furnace.

I have described the double conical tube as being of unequal length, but this need not necessarily be so, unless to suit the boiler as in this instance. Also a number of tubes may be used instead of one, and I propose to build tubular or flue boilers with this, as well as other parts of my invention.

Various other modifications may be made in the construction of the several parts, without changing the character of my improvements; but as such changes as these are obvious I do not deem it necessary to describe them in detail.

What I claim as my invention and desire to secure by Letters Patent, is,

1. Arranging an annular flue Q at the bottom of an upright boiler, for receiving the air at its mouth R and conducting it at R^2 beneath the grate, as illustrated in Fig. 5 of the drawings.

2. Making the vertical tube in the form of a double cone, the upper cone being inverted, and the two united together at their apices, the same being for the object and possessing the advantages herein stated.

THOMAS CHAMPION.

Witnesses:
ROBERT CLARKE,
W. S. VENABLE.