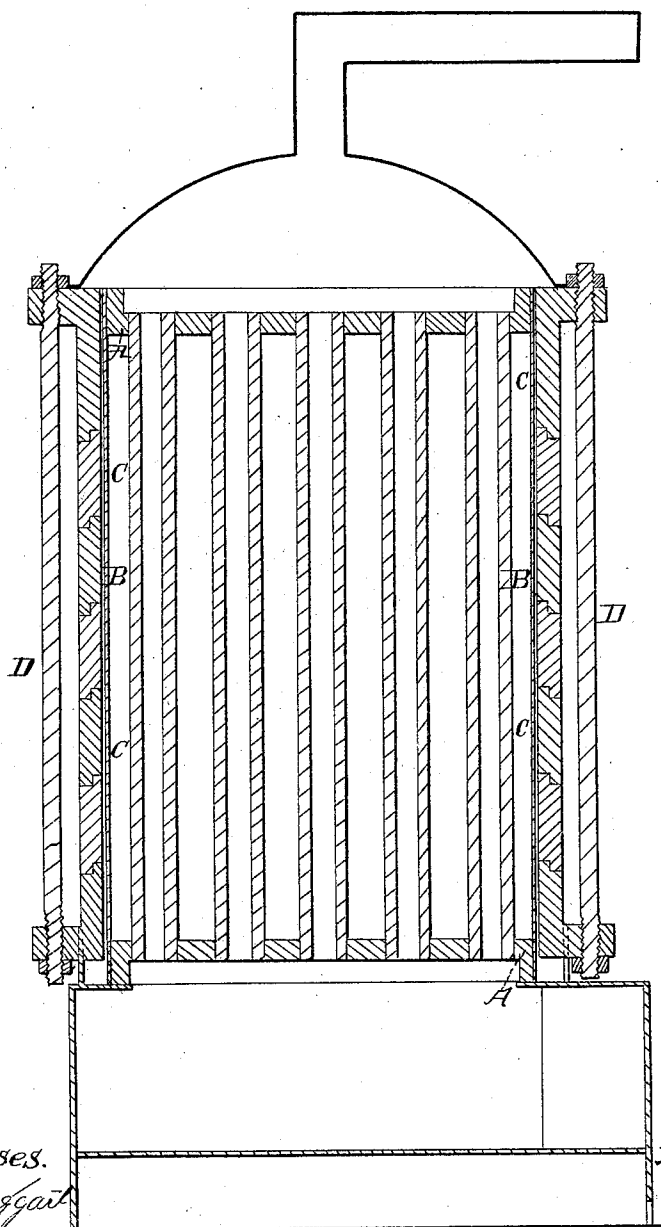


R. E. Rogers,
Steam-Boiler Fire-Tube.
N^o 27,930. Patented Apr. 17, 1860



Witnesses.
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ROBERT E. ROGERS, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN STEAM-GENERATORS.

Specification forming part of Letters Patent No. 27,930, dated April 17, 1860.

To all whom it may concern:

Be it known that I, ROBERT E. ROGERS, of the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvement in Steam-Generators; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings and to the letters and marks thereon.

My improvement has for its object the construction of steam generators or boilers economically of great strength and separate portable parts.

In carrying out my invention I either dispense altogether with the so-called "boiler-sheet," or, if retained, considerably reduce its thickness and weld the edges or use small rivets, and obtain the requisite strength, and, indeed, a greatly-increased amount of strength, by the substitution of a system of broad rings, which, when bolted or otherwise secured side by side, either form of themselves the entire boiler-sheet or serve the part of a strong sustaining outer casing to the thin boiler or generator sheet immediately within.

In the accompanying drawings, which form part of this specification, A A are the heads of the boiler, whether it be of the tubular, cylindrical, or other form of construction. The dome on the boiler-head, to collect the products of combustion, is indicated by the black line A', and is shown in connection with the chimney or smoke-pipe A''.

B is the boiler-sheet, assuming it to be retained in the construction of the boiler.

C C C C are broad metallic rings, intended to be adjusted and held firmly in place side by side, and when so adjusted to constitute a system which shall extend the whole length of the boiler or chamber from head to head and inclose the boiler-sheet when it is retained in the construction.

D D D D are rods provided with nuts, by means of which the system of rings may be firmly bound together. The heads of the boiler or steam chamber may be either of cast or wrought iron, and need only to be provided with an edge or flange sufficiently wide to furnish adequate bearing for the rings to form, when driven upon them, steam-tight joints. To render this edge or flange true and

adapted to receive the boiler case and rings, the heads are placed in a lathe and turned with a slightly conical or tapering form.

The boiler-sheet I make of thin metal, or at least greatly thinner than such as is ordinarily used in boilers and steam-chambers, because it is not intended that it shall bear or resist any pressure, but that the rings alone shall withstand it. To unite the edges or form the seams with as little interruption to the uniform and smooth curvature as possible, I either weld or braze them, when copper is used, or employ small rivets, which are hammered flat and even with the boiler-sheet.

The metallic rings I construct out of broad bar-iron, which has its length in the direction of the fiber, thereby giving to them greater tenacity. These rings are made true in their diameters by forming them on a mandrel or by turning, and are also made true on their edges, where they adapt themselves to each other. I prefer to weld the ends of the bars together for forming the rings, although various other modes of securing the ends may be employed, such as rivets, screws, &c. A half-groove or a complete tongue and grooves may be turned on the alternate edges of the rings for the sake of a closer fit between them, though when the thin boiler-sheet is used a simple close contact of the two flat edges is sufficient. An advantage, however, of having some such grooving as named is derived, since it prevents all possibility of any displacement of the rings by jarring. In building up or putting together the boiler or steam-chamber with these separate and detachable parts the following are the steps: The boiler-heads having been properly shaped and turned true, are set in their place in the boiler-sheet. The ring intended for one end is now heated and in that condition put over the boiler-sheet and driven tightly over the head, thereby binding, when it has become cold, the boiler-sheet very securely and steam-tight upon the boiler-head. The rest of the rings, excepting that one intended for the other end, are next passed successively over the boiler-sheet, being made large enough to do so without force, and now the last ring is secured in its place in the same manner as that in which the first one was done. This accomplished, the bolts are passed through the ears of the extreme rings, and by

means of the screw-nuts the whole system bound firmly together. The operation and efficiency of this arrangement is readily perceived. The end rings having formed tight joints between the boiler-heads and the boiler-sheet, the effect of the pressure of the confined steam can only be to force the thin and somewhat yielding boiler-sheet closely against the strong confining-rings, while no conceivable pressure can drive the boiler-sheet through or between the close joints which exist between the successive rings.

The rings may be made of any required thickness, and where extreme strength is demanded two sets of rings may be used, one outside of the other and so adjusted that the joints of one set may be covered and protected in strength by the solid body of the rings of the other.

I do not confine myself to any particular metal for making the boiler-sheet, but prefer copper for the purpose, since it may be made thin and inexpensive, while by its yielding readily to pressure it adapts itself perfectly to the interior surface of the confining-rings.

Should circumstances render it inexpedient to secure the boiler-heads, boiler-sheet, and rings by driving the latter over the former, then the boiler-head may be made larger than the rings, and, having its face turned true, may be made to rest upon the equally true edge of the adjacent ring, the edge of the boiler-sheet, however, having been turned over as a flange and caught between the boiler-head and ring. In this position the bolts are passed through the proper holes of the heads and the system secured by the screw-nuts. It is evident that the bolts used may either be long ones, passing from the extreme rings on the boiler-heads, or may be short and tie together into successive groups any number of rings until all are united. In the above-named combination of parts a steam-close joint is obtained by the copper or iron boiler-sheet, while the strength of the structure is secured by the rings.

The boiler-sheet may be altogether dispensed with, and in that case the rings are made to serve the double office of forming close or steam-tight joints and a strong surface to resist pressure. For that purpose it is necessary that the edges of the rings should be turned with great accuracy and be provided with a half-groove or tongue and groove that in adapting themselves closely to each other they may be retained always in their place. The groove or tongue and groove

serves a further purpose of aiding to retain paint or any metallic washer used as a packing for the joints.

This mode of constructing boilers and steam-chambers is adapted equally well to those which are horizontal as to those which are vertical. It is obvious that this manner of constructing steam generators or boilers is applicable to the construction of steam-cylinders, cylinders of blowing-machines, pumps, &c.

Among the advantages of this system in the construction of apparatus to which it applies are the following:

First. Superior strength over the usual form, since rings of any required thickness may be employed, whereas any considerable increase in the thickness of the ordinary boiler-sheet involves great difficulty in the workmanship in the bending and riveting. Should rings of fully the same thickness as that of the common boiler-sheet be used, they will still be greatly stronger than the plate-iron, owing to the direction of the fibers, which permits a tearing in the plate-iron and which does not so readily follow in the bar-iron.

Second. Facility of original construction and ease with which it may be taken apart for inspection and repair and again put together.

Third. Its portability. Being made of separate and detachable parts, the largest structure may be easily handled, packed, and transported.

Fourth. Durability. Not only may the rings be made thicker than the thickest boiler-sheet, and thus be able to withstand longer the ordinary destruction, but since the plan admits of the use of a lining-sheet of any metal such a selection may be made as will under the circumstances resist corrosion.

Thus with an iron boiler composed of the rings herein referred to a copper interior lining may be used for such acid or saline waters as will corrode the former but leave the latter uninjured.

Having thus fully set out my invention, what I claim as new, and desire to secure by Letters Patent, is—

Constructing steam generators or boilers of the rings, as herein set forth, either alone or in combination with the interior sheet, substantially as described.

R. E. ROGERS.

Witnesses:

JOHN THOMPSON,
WM. P. SMITH.