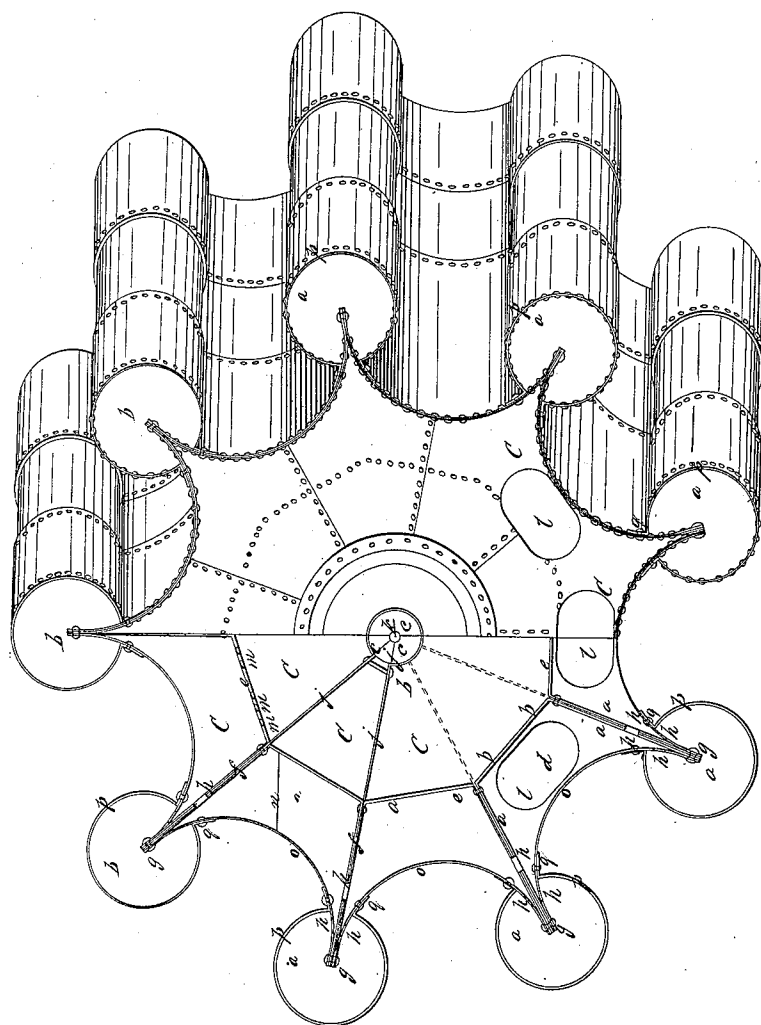


J. C. F. SALOMON.  
STEAM BOILER.

No. 1,415.

Patented Nov. 16, 1839.





# UNITED STATES PATENT OFFICE.

JOHN C. F. SALOMON, OF SHELBYVILLE, KENTUCKY.

## IMPROVEMENT IN THE CONSTRUCTION OF THE INVERTED-ARCH STEAM-BOILERS.

Specification forming part of Letters Patent No. 1,415, dated November 16, 1839.

### *To all whom it may concern:*

Be it known that I, JOHN C. F. SALOMON, formerly of Cincinnati, county of Hamilton, and State of Ohio, but now a resident of Shelbyville, county of Shelby and State of Kentucky, invented the Inverted-Arch Steam-Boiler, which was constructed as follows, viz: Eight sheets of boiler-iron were curved lengthwise, each being a longitudinal segment of a regular cylinder. Then one edge lengthwise of one sheet was riveted to a corresponding edge of a second sheet, and the other edge of said second sheet was riveted to the corresponding edge of a third sheet, and so on until all were riveted together in such manner as to have concave sides outward and to make a cylinder of eight inverted-arch sides. Then bars were placed diagonally from one abutment of the arches and extending to the abutment directly opposite to said first-mentioned abutment, and like bars were so fastened throughout to all the abutments for the purpose of securing and holding firmly said abutments, and concave heads were riveted to said eight-sided inverted-arch cylinder with the concave sides outward, and through the center of said heads a bolt was run, both ends of said bolt being riveted to their respective heads. For the above improvement the said SALOMON received Letters Patent on the — day of October, 1835, and since said date the said SALOMON has made an improvement on the said invention of the inverted-arch steam-boiler for the more effectually to prevent it from bursting; and I do hereby declare that the following is a full and exact description, viz.:

The nature of my improvement consists in making the inverted-arch steam-boiler and connecting-cylinders thereto for the purpose of giving it greater strength and security. Take nine pieces of the best boiler-iron, each piece being twenty feet long and six feet wide, (but I will now observe for fear of misapprehension that the construction is not confined to the number of pieces or dimensions or proportions as given above or as may be given hereinafter in my description, for these may vary according to circumstances.) Bend each of said pieces in two lines lengthwise, so as to resemble somewhat a long box divested of its ends and top, leaving the bottom and two sides, these sides diverging from each other

toward the tops. The two sides must be of equal width. Apply and rivet one side of one piece, to the corresponding side of a second piece and the remaining side of said second piece to the corresponding side of a third piece, and the remaining side of said third piece to the corresponding side of a fourth piece, and so on to the last piece, the remaining side of which last piece apply and rivet in like manner to the remaining side of the first piece, thereby forming a nine-sided cylinder, the bottoms of aforesaid pieces constituting the sides of said cylinder and every two connected sides of said pieces making a flange projecting from said cylinder in a right line from the center of said cylinders. Accordingly there will be nine flanges in all projecting from said cylinder. There must be inserted between the sides which are riveted together and which thereby, as above stated, compose each flange, eight bars of iron at equal distances from each other along each flange, said bars being of such size as to insure the strength that may be required. There must be made eight rings or collars, which must be placed at equal distances from each other along the center of aforesaid cylinder, and they must be of sufficient size to admit the riveting of nine of aforesaid inserted bars to each of them vertically and at equal distances around each of them. Furthermore all of aforesaid bars must extend from the outer edges of aforesaid flanges to aforesaid rings or collars, to which they are riveted. Then run a bolt through aforesaid rings or collars, said bolt being fully as long as the aforesaid cylinder. Then take nine pieces of boiler sheet-iron of the same length of the cylinder already formed, each of which pieces curve lengthwise as if about to make a longitudinal segment of a regular cylinder, and each piece after being so curved must be of sufficient width to cover in the spaces between every two of aforesaid flanges. Then cover each of said spaces by each of said curved pieces, respectively, observing to place the concave side outward, or, in other words, let the arch project toward the aforesaid cylinder and rivet the edges of each of said pieces laterally to its contiguous flange. Thus far you have a cylinder of nine equal plane sides, supported upon the flanges of which you have

another cylinder of nine inverted-arch sides. You must now fasten heads to the ends of aforesaid double cylinder of sufficient size to cover and of shape to fit the inverted-arch cylinder. Each end of the bolt above mentioned as running through the rings or collars must extend through each head, respectively, and be riveted on the outside of said heads firmly. Then make nine regular cylinders of from nine to twelve inches in diameter and of the length of the aforesaid inverted-arch cylinder, with heads to said cylinders in the manner of common steam-boilers, but each of said cylinders having an opening on one side throughout its whole length, each side of said opening being provided with a flange, and said opening being of sufficient width to receive an abutment of an arch of the aforesaid inverted-arch cylinder to a convenient distance. Then fasten said open cylinders to said abutments by riveting said flanges of said open cylinders thereto. There must be holes left through each of the nine flanges first above mentioned, and also through the abutments of the arches into the connected external cylinders, for the purpose of letting the water through into all the spaces or receptacles designed for holding water, and likewise for the steam to pass into its appropriate chambers. Then make the necessary man-holes, and the steam-boiler will be complete.

The principles upon which this boiler is constructed are the philosophical fact that a bar of iron measuring one square inch around will support sixty-four thousand pounds attached to one end thereof and that an arch may be made to support any required weight by equal pressure upon it. By reason of the former of above principles the bars inserted in the flanges and extending from the rings or collars to the outer edges of said flanges, as before mentioned, are used for the purpose of confining and holding as firmly as need be the abutments of the inverted arches. The bolt running through the rings or collars along the center of the cylinder is in like manner to secure more firmly the heads of the boiler. The inverted arches are used in accordance to the latter of the principles above mentioned, and the construction of the original invention, for which I have received Letters Patent, as before stated, was governed by the principles aforesaid; but my improvement consists in the combination of the cylinders — viz., the nine-sided plane cylinder placed internally and the regular cylinders covering the abutments of arches of the boiler.

The object of the nine-sided plane cylinder is to receive the steam as it is being generated, and is placed within centrally for the purpose of preventing the steam therein already generated from being further affected by the fire, thereby preserving equability in the expansion of the steam. The small regular cylinders covering the abutments of the arches are for the purpose of protecting said

abutments from the action of the fire, and also, the lower ones being filled with water, a greater fire-surface is presented. Consequently steam will be more easily and expeditiously generated. The diameter of said cylinders covering the abutments of the arches is so small that their bursting is not to be apprehended.

Reference to the drawings will now be made, viz:

Letters *e* represent the bottoms of the pieces which were said to resemble long boxes without tops or ends, and it will now be seen how they form the sides of the nine-sided plane cylinder.

Letters *g* show the flanges projecting from the nine-sided plane cylinder with the inserted bars running from the collars (which are placed along the center of said cylinder) to the abutments of the arches.

Letters *o* mark the inverted arches of the steam-boiler.

Letter *k* shows one end of the iron bolt which runs through the rings or collars, the ends of which are riveted, respectively, over the heads of the boiler for the purpose of securing more firmly the said heads of the boiler.

Letters *p* show the regular cylinders covering the abutments of the arches for the purpose of protecting said abutments from the fire, as before mentioned.

Letters *q* show the flanges of the cylinders *p*, by which flanges said cylinders are fastened over the abutments of the arches.

Letters *c*, *l*, and *d* show the man-holes.

Letters *a* show where the water is contained.

Letters *n* show the height of the water.

Letters *b* show the places where the steam is contained.

Letters *m* show the openings through which the steam enters into the nine-sided plane cylinder.

Letters *h* show the holes through the flanges and inverted arches.

Letters *h* *r* show the holes through which the steam passes as it is generated.

The fire-chambers may be under one or two or three of the lowermost arches, as seen in Fig. 2, and one arch on each side may be used as return-flues, as seen in Fig. 2, *h* *h*.

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

The combination of the cylinders *p p p* with the inverted-arch chambers, as described, also the method of constructing said chambers by connecting their sides as flanges and strengthening the same by means of radial bars extending to the rings or collars at the center of the boiler, the whole being constructed and operating as described.

JOHN C. F. SALOMON.

Witnesses:

H. H. MARTIN,  
W. KINKADE.