E. Reynolds,

Sectional Steam Boiler.

No. 47,130. Patented Apr. 4, 1865.

Fig. 2.

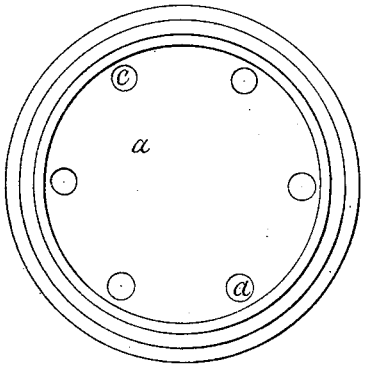


Fig. 3.

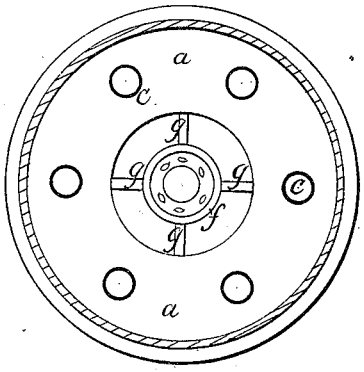


Fig. 4.

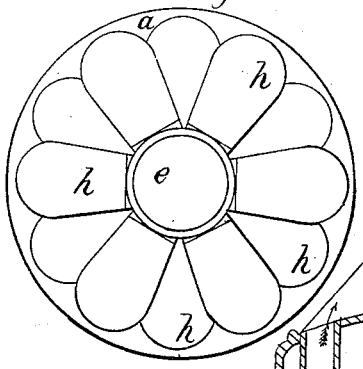


Fig. 5.

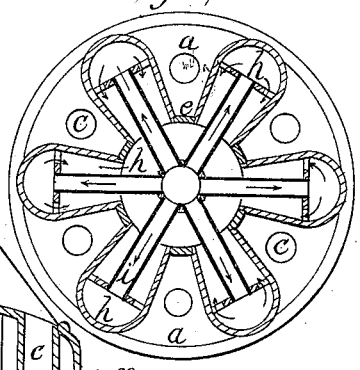


Fig. 1.

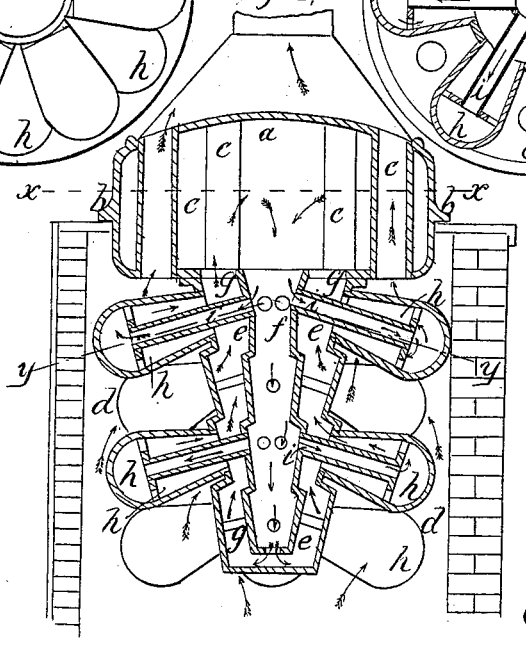
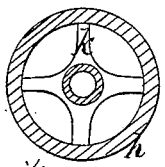
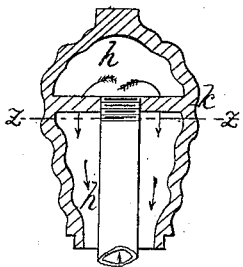


Fig. 7.



Witnesses;
P. B. Crosby
Francis Gould

Fig. 6.



Inventor
Edwin Reynolds

UNITED STATES PATENT OFFICE.

EDWIN REYNOLDS, OF MANSFIELD, CONNECTICUT.

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. **47,130**, dated April 4, 1865.

To all whom it may concern:

Be it known that I, EDWIN REYNOLDS, of Mansfield, Tolland county, in the State of Connecticut, have invented certain new and useful Improvements in Steam-Boilers; and I do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of my invention sufficient to enable those skilled in the art to practice it.

A recognized defect in many boilers organized and designed for the generation of steam is that no provision is made in their structure either to facilitate the formation of circulating-currents or to guide and control the direction of the water-circulation. The result of this is that it often happens that currents act in opposition to each other, forming eddies and places where no current at all exists, in which sediment and scale deposits and collects, and the boiler becomes clogged and under some circumstances the plates are burned through with disastrous results.

The object of my invention is to produce a boiler of small cost and easy of dismemberment for repairs and cleaning, with a large heat-absorbing surface disposed in the best manner to facilitate the rapid generation of steam, in which provision is made to determine circulating-currents in known directions and in harmony with each other and with the requirements for the most rapid generation of steam, and so as to avoid eddies and slack places in the currents as well as conflicting currents.

Before stating in what my invention consists, I will describe a boiler in which it is embodied, as the statement of the invention will then be more readily understood. Of the drawings before referred to, illustrating said boiler—

Figure 1 is a vertical cross-section of the boiler, showing the parts thereof beyond in elevation, and the setting in which the boiler is partly inclosed making the combustion-chamber of the boiler-furnace. On said figure the arrows in red denote the direction in which the gaseous products of combustion move in passing to the chimney, and the arrows in blue denote the directions of the water-currents formed under and by the influence of heat in the boiler. The water-level is shown in Fig. 1 at the line *x x*, the space above being the steam-chamber. Fig. 2 is a plan of the boiler-dome, with the chimney and smoke-bonnet covering the flues removed therefrom. Fig. 3 is a horizontal cross-section taken through the dome on the line of the water-level and showing the boiler in plan beneath. Fig. 4 is a reverse plan of the boiler. Fig. 5 shows a cross-section taken through the boiler on the line *y y* and the dome in reverse plan beyond. Fig. 6 shows one of the projections into the combustion-chamber, made in longitudinal section and on an enlarged scale, the corrugated form of the projection being a modification of the form shown in the other figures. Fig. 7 is a cross-section of one of said projections, taken on the line *z z*, Fig. 6.

The dome of the boiler is a cylindrical-shaped vessel, *a*, provided with flanges *b*, by which it is supported on the furnaced walls. This dome may be made of wrought or cast metal, and is shown provided with flues *c*, to conduct the gaseous products of combustion through the dome and its contents to the chimney. Secured to the dome *a* and pendent from it into the combustion-chamber *d* of the furnace is what may be termed the "water-leg" of the boiler. This water-leg *e* is of the shape shown in Fig. 1, and is or may be circular in cross-section, and contains within it a smaller but similarly-shaped piece, (marked *f*,) which is held centrally in *e* by stays *s* and forms the partition which, in connection with the projections *h* and the passages *i*, serve to direct and control the circulating-currents formed by the action of heat. The zigzag conical shape given to *e* is for the purpose of inclining the projections *h* and to give those in the upper rows a greater radial extension than those in the lower rows, as seen in Fig. 1, and in securing the projections *h* to *e* the different rows are made to interspace with each other, as seen in Fig. 4, so that the passage of the gaseous products of combustion among the projections will be tortuous, and so that each projection will receive the impingement of said products. The ends of the projections *h* and their seats upon *e* are faced to make joints, and the tubes *i* are screwed or expanded into *f*, passing through the openings in *e*, and having screw-threads cut on their projecting ends by which the projections are secured in their places, there being a spider, *k*, as shown in each of the projections *h*, the hub of each

spider being tapped to fit the screw-threads on pipes *i*.

The construction of the particular boiler shown in the drawings having been shown, it will be seen that if heat is applied to the boiler the water contained between the shells of *e* and *f* will be sooner heated than the water contained in *f*. Therefore the water between the shells will rise while that in *f* will descend and will flow through the tubes *i*, discharging into the projections *h*, and will pass from them and upward into the space between *e* and *f*, being heated on its passage. In the construction shown there is no place where regular currents of circulation are not established supplying the coolest water to the hottest places and taking it from thence as it becomes heated. The feed-water pipe is best introduced into the space within *f* with its mouth opening downward, so as to throw its current of cold water in the direction of the established current.

It will be seen that the inclination of the projections *h* is such that their inner upper surfaces all incline upward and inward, so that no places are found for accumulation of the generated steam by which the water in the said projections can be kept from contact with the heat-receiving surface.

The particular boiler described is only one of many forms of embodiment of my invention, which consists in the division of a water-space of a boiler by a partition when the subdivision most remote from the heating influence is connected by a passage or passages with water-containing projections extending into the furnace-chamber, so as to operate substantially as described—that is to say, so that the water-current will pass downward, where most remote from heat, through the passages connecting with the projections, into and out of the projections, and then upward. To that variety of boilers which have their fire-spaces or furnaces surrounded by water-spaces my invention is peculiarly applicable, as said water spaces or legs may be divided by diaphragms or partitions into two spaces, and the pipes *i*, being fastened to said partitions, would pass through the inner space and furnace-sheet, to which the projections would be secured.

The boiler shown in the drawings is so designed that it may be made almost wholly of cast-iron and will give at a low cost a great amount of fire or heating surface and a great amount of power from a small cubic capacity.

I claim—

The arrangement and construction of a boiler, substantially as described.

In testimony whereof I have hereunto set my hand this 28th day of January, A. D. 1865.

EDWIN REYNOLDS.

Witnesses:
J. B. CROSBY,
FRANCIS. GOULD.