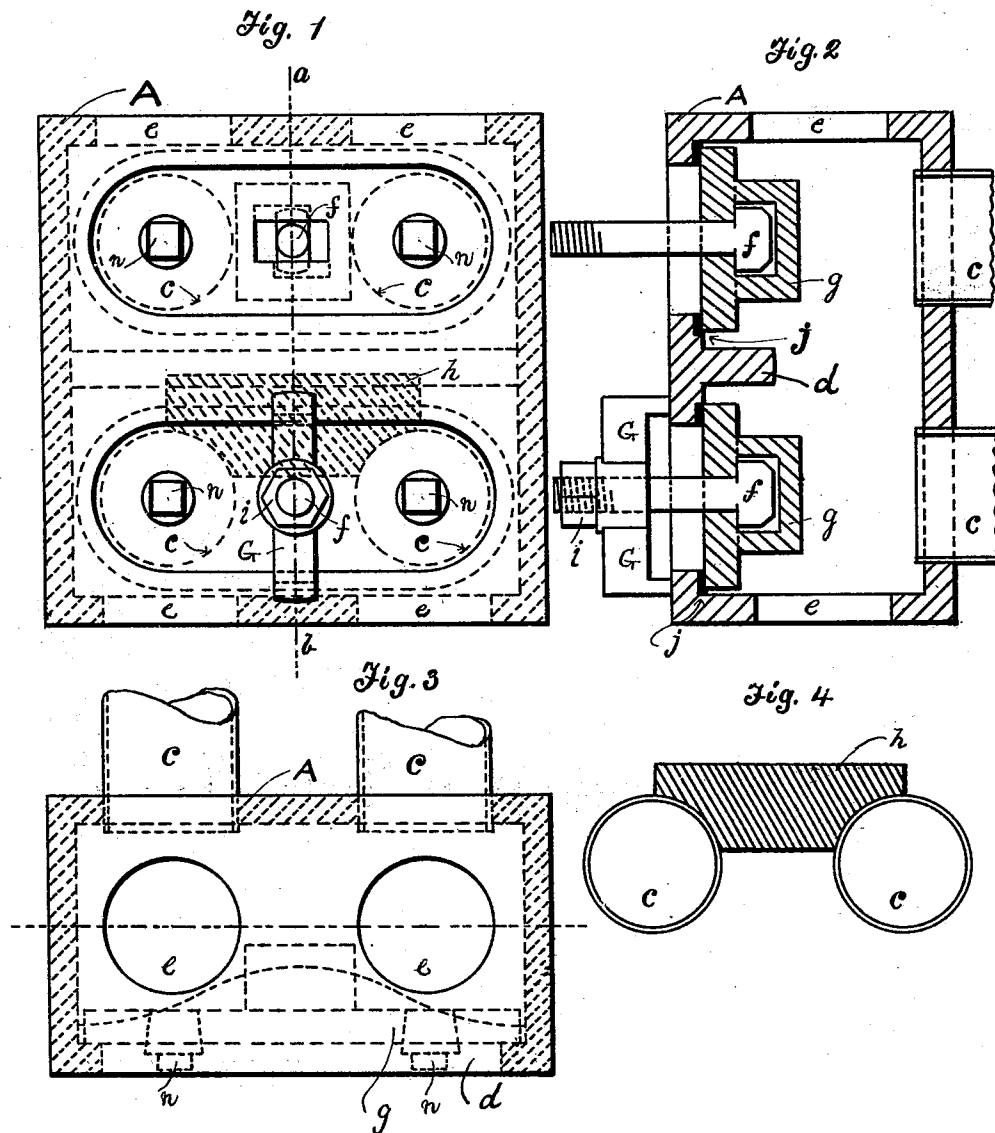


(No Model.)

J. A. CALDWELL.  
STEAM BOILER.

No. 521,204.

Patented June 12, 1894.



Witnesses  
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# UNITED STATES PATENT OFFICE.

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## STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 521,204, dated June 12, 1894.

Application filed March 28, 1894. Serial No. 505,363. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN A. CALDWELL, a citizen of the United States, and a resident of Bay Ridge, in the county of Kings and State of New York, have invented certain new and useful Improvements in Steam-Boilers, of which improvements the following is a specification, reference being had to the accompanying drawings, wherein—

Figure 1 is a front or face view of a boiler-header embodying my improvements. Fig. 2 is a central, vertical section of same, on the line *a—b* of Fig. 1. Fig. 3 is a top plan view of a header embodying my improvements. Fig. 4 is a detail view showing the disposition of the baffle-brick made use of, with respect to the water-tubes of the boiler.

Similar reference-letters denote like parts throughout the several views.

My invention relates to boilers the construction of which calls for the presence of a series of water-tubes, groups or sections of which are provided with box-like end-ports commonly termed "headers," and it consists of an improved header, quadrangular, or substantially quadrangular, in outline, and in which the covers for the front openings or hand-holes are arranged to close outwardly, by the pressure within the boiler, against an interior lip, bounding said openings or hand-holes, and thus form a steam and water tight joint.

It further consists of certain combinations of the parts, and in certain details of construction, all of which will be hereinafter specifically referred to, and particularly pointed out in the claims.

I am aware that headers for water-tube boilers have been heretofore constructed in which the covers for the hand-holes are forced outwardly to place; but, to the best of my knowledge and belief, this broad idea of seating the hand-hole covers has been applied only to staggered headers, which latter necessitate a staggered arrangement of the water-tubes, which is objectionable, and do not admit of the ready and convenient use of two nipples in connecting several headers together, which is still further objectionable, and seriously so. Where a header quadrangular in form is used, two nipples may be readily employed in interconnecting several

headers; and where the use of two nipples for the purpose stated, is admissible, a great advantage may be gained in the matter of circulation capacity or area, as will be clearly understood. It will be further observed that where a quadrangular header is used, the most natural and advantageous arrangement of the water-tubes is that in which the said tubes occupy substantially horizontal and vertical planes. But with tubes thus disposed it becomes desirable, if not essential, to adopt some medium or element whereby the gases which, in all boilers, pass upward among the tubes, may be obstructed at different points in, or diverted out of, their natural course, to the end that the tubes throughout the entire series, may be uniformly heated; and to accomplish this object I place alternately, by preference, upon each horizontal pair of the tubes, baffle-brick, of any suitable material, and as shown in Fig. 4 of the drawings.

It may be here stated that in this class of boilers a series of inclined water-tubes are connected at their ends by a series of interconnected headers, the whole being surmounted by a drum or drums containing steam and water, said drum or drums being connected at the respective ends thereof to said headers by means of short expanded nipples in front, and like though longer nipples at the rear. The water within the structure then circulates from the lower to the higher ends of said inclined tubes, up through the series of headers, by way of the connecting nipples, to the said drum or drums, along the latter to the rear thereof, and down said long rear nipples to the original starting point in the water tubes.

Having reference to the accompanying drawings, the letter *A* denotes the header, of any suitable material, the same having the nipple-holes *e* in both the top and bottom walls thereof. *c* are water-tubes expanded into suitable openings in the rear wall of said header, in substantially horizontal and vertical planes. The main opening in the front wall of the header, through which access is gained to the interior of said header, is bridged centrally by the horizontal bar *d*, formed integral with the header; and it is obvious that this bar *d* may extend vertically across said

main opening in the front wall of the header, if preferred. The bar *d* divides the said main opening into two oblong openings, each of which is surrounded by an interior lip, against  
 5 which the cover *g* (Fig. 2) is seated, outwardly from within the header, through the medium of the bolt *f*, which latter projects outwardly from said cover, passes through a suitable opening in the yoke *G*, and is threaded at its  
 10 outer end to receive the nut *i*. The cover *g* is held to its seat chiefly by the pressure within the boiler, as will be readily understood.

The yoke *G* is separable from the header *A*.  
 15 I prefer to interpose between the lips surrounding the oblong openings, and the respective covers therefor, packing service *j* of any suitable character, to render the joint more positively steam and water tight. The  
 20 water-tubes being disposed as nearly as practicable in vertical planes, to secure the advantages which flow from a staggered arrangement of said tubes, as adopted in the construction of certain boilers of the prior art,  
 25 I place upon substantially each alternate horizontal pair of water-tubes baffle-brick, *h*, as illustrated clearly in Fig. 4 and shown in dotted lines in Fig. 1. The function of these  
 30 brick is to divert the gases from their natural upward course among the tubes, and thereby secure the uniform heating of all the tubes comprised in the entire general series; which result is the one aimed for in prior  
 35 like structures through staggering the tubes. The advantages arising from placing the water-tubes in vertical planes, and from the use in connection therewith of headers inter-  
 40 connected by nipping (thereby securing a degree of flexibility at the junction thus formed) and bounded by right angles, so as to obtain the greatest possible connecting area for cir-  
 culation, are very substantial.

It is often desirable to wash out the interior of the water-tubes by means of a hose,  
 45 and to this end only a small hole is necessary in the covers *g*, opposite each tube. To break the cover joint for this purpose only is tedious and expensive, and to obviate this, and admit of the tubes being washed out as stated,  
 50 I place a small hole in each cover opposite the tubes, sufficient in diameter only to comfortably insert a steam-pipe, water-pipe or hose, which hole is threaded and plugged, said plug being provided with a many-sided  
 55 projection, to which may be applied a suitable wrench, and thus secure easy removal of the plug when desired.

An essential feature of my invention is the closing of the front openings in a single header, bounded by right angles, and in which  
 60 header tubes are fastened in vertical and horizontal planes in substantially the manner herein described.

It is obvious that the particular header described herein may be altered or changed to  
 65 a degree without departing from the spirit of my invention. For instance, the same may be given a rectangular form (longer in height than in width) and still be bounded by right angles; and in this event the main opening  
 70 in front may be bridged by two bars, as *d*, equi-distant apart, thus forming three oblong openings through which access may be had to the interior of the header, and which may be closed in the manner herein described.  
 75

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

1. In a sectional water-tube boiler, in which the several sections are so disposed that the water-tubes stand in substantially vertical  
 80 planes, in combination, a header, substantially quadrangular in outline, having a series of tubes fastened in its rear portion, in substantially horizontal and vertical planes, a suitably-contoured opening in front, bridged  
 85 so as to form oblong openings, one in front of each horizontal or vertical series of said tubes, and each of said oblong openings being bounded by an inner lip, and plates or covers adapted to close said oblong openings from the  
 90 inside outwardly, against suitable packing service, all substantially as described and for the purposes set forth.

2. In a sectional water-tube boiler, in which the several sections are so disposed that the  
 95 water-tubes stand in substantially vertical planes, and in which the several sections are interconnected by two nipples, in combination, a header, substantially quadrangular in outline, having in front a suitably-contoured  
 100 opening, centrally bridged so as to form two horizontal or vertical oblong openings, each of the latter being bounded by an inner lip, plates adapted to close said oblong openings from the inside outwardly, a series of tubes  
 105 communicating with said header at the rear, and baffle-brick, disposed, preferably, upon substantially each alternate horizontal pair of said tubes, all substantially as described and for the purposes set forth.

JOHN A. CALDWELL.

Witnesses:

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