W. H. WINSLOW.

BOILER.

APPLICATION FILED NOV. 2, 1908. RENEWED DEC. 11, 1911.

1,046,133. Patented Dec. 3, 1912.

Fig. 1.

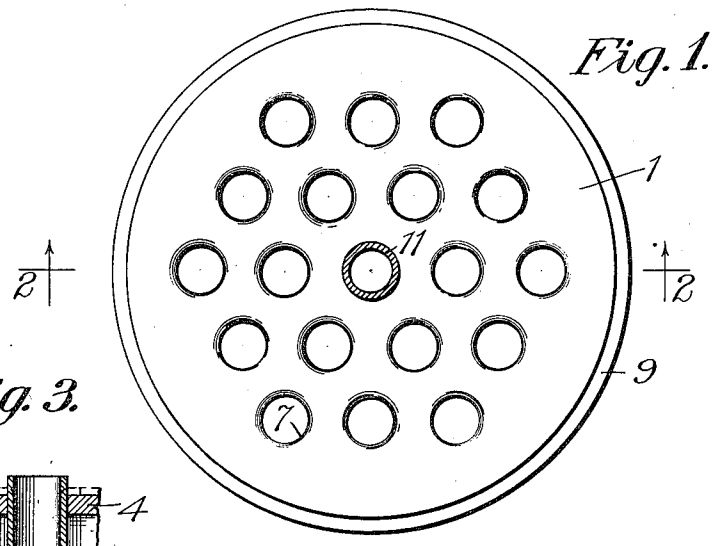


Fig. 3.

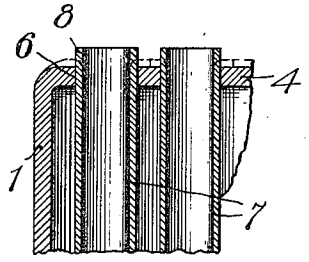


Fig. 2.

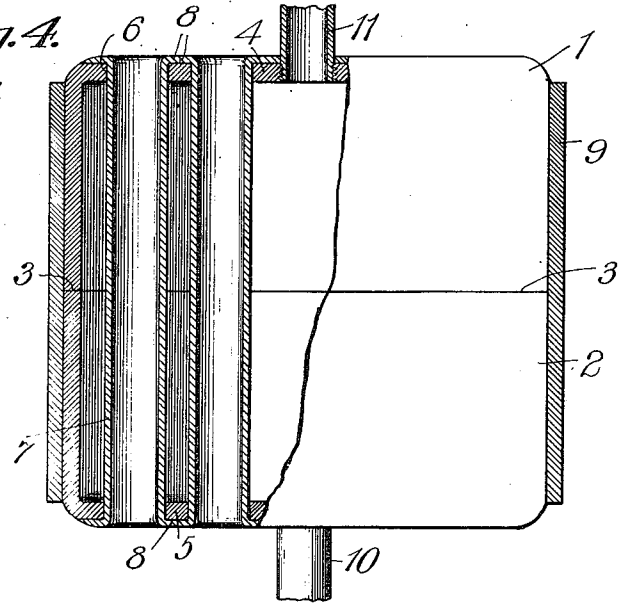
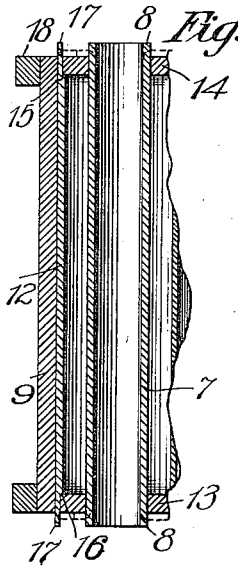


Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM H. WINSLOW, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE STEAM POWER DEVICES COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

BOILER.

1,046,133. Specification of Letters Patent. Patented Dec. 3, 1912.

Application filed November 2, 1908, Serial No. 466,650. Renewed December 11, 1911. Serial No. 665,154.

To all whom it may concern:

Be it known that I, WILLIAM H. WINSLOW, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Boilers, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to boilers, particularly to boilers having flues. In some boilers of this class the flues are expanded at their ends in openings in the boiler heads, this clamping engagement being depended upon to prevent leaking of the boiler. However, when the boiler is unequally heated or dry heated, the unequal expansion is such that the flues become separated from the head and the boiler becomes leaky and useless. In this construction it is also necessary that the heads be comparatively thick, in order that sufficient contact between flues and head be obtained during the expansion process. There is also a limit to the closeness in which the flues can be placed together, it being necessary that the amount of metal between flues be sufficient to prevent displacement of the metal from a flue which has already been expanded in place upon the expansion in place of other flues. If there is not sufficient metal to prevent this disturbance when one tube is expanded in place, the metal of the head will be drawn away from tubes previously expanded in place. Difficulty is also experienced in properly joining the heads with the shell, the heads and shell being usually separate pieces.

In accordance with my invention all the parts are securely fused together. The flues extend a distance beyond the openings in the heads, and the ends thereof are heated to a fusing heat and turned over to be fused together.

In the accompanying drawing, which illustrates my invention, Figure 1 is a top view of a boiler, Fig. 2 is an elevation view, partly in section along the plane 2—2, Fig. 1, Fig. 3 shows a corner of the boiler and the disposition of the tubes before the fusing operation, and Fig. 4 shows a modified arrangement.

In the form shown in Figs. 1, 2, and 3, the boiler shell is formed of two cup shaped halves 1 and 2, which may be stamped integral, and which are welded together at their edges 3. The head parts 4 and 5 of the shell have the openings 6, through which flues 7 are passed. The ends 8 of these flues primarily extend a distance beyond the head parts, and a flame such as the autogenous flame is applied to the ends until the ends fall outwardly against the head and become fused together. The heat can be applied for only a sufficient length of time to cause the flue ends to fuse together, or the heat may be further applied to also fuse the ends to the heads. If the metal of the flue ends is not sufficient for efficient welding, additional metal in the form of steel wire can be inserted in the flame and fused with the flue metal. After this welding operation the ends of the boiler present a smooth straight surface. The flue ends being thus securely fused together produce a very strong and efficient boiler construction, and the thickness of the material of the parts can be considerably lessened without reduction in strength. The flues all being fused together can also be grouped together more closely, which allows much greater flue area per cubic contents of the boiler and the weight and size of the boiler can, therefore, be much reduced, while at the same time a stronger construction results, and much greater efficiency is obtained. By grouping the flues close together, better circulation therethrough is possible and the water surrounding the tubes receives a greater number of heat units per unit of time. In practice I have been able to double the steaming capacity in relation to the cubic contents of the boiler as compared with prior flue spacing which is limited by the requirements for mechanical expansion of the tubes to make them steam tight. In general, therefore, my improved construction results in decreased weight, space, material, labor, and consequently cost, and in increased strength and efficiency.

A strengthening jacket 9 may be applied about the shell, this jacket being in the form of a tube which is first heated and then shrunk over the shell. Any suitable inlet and outlet means may be provided for the boiler. As shown, the center flue has been omitted and inlet and outlet members 10 and 11 threaded into the boiler heads. As

in boilers there is apt to be unequal heat, and therefore unequal expansion and contraction, I find it good practice to slightly bow or deflect the heads either inwardly or outwardly before the tubes are fused, thus giving an initial direction to expanding or contracting forces, and thus preventing unequal distortion of the parts.

In Fig. 4 is shown a modified arrangement which could be used. The shell, instead of being formed of two integrally stamped parts, is shown as comprising a cylindrical shell 12 and separate heads 13 and 14. The shell at its ends has the shoulders 15 and 16 against which the heads rest, the ends 17 of the shell extending a distance beyond the heads. When the flues are inserted through the head openings, the extending ends of the flues and the extending ends 17 of the shell are heated and fall toward each other to become fused together, the final disposition being indicated by the dotted lines, the heads being then securely held in place between the bent over ends 17 and the shoulders 15 and 16. A reinforcing jacket 9 can also be applied in this arrangement, and end rings 18 can also be applied about the ends, if desired. The separate heads 13 and 14 might also be of some material which will withstand the fusing heat, but which can be disintegrated after the fusing operation and removed from the boiler, thus leaving the boiler formed by the flues and shell 12 fused together at the ends.

As a protection against corrosion, the inner surface of the shell and the outer surface of the flues could be plated with some non-corrosive metal, such as copper. This plating, however, should not be applied to the surfaces which are to be fused together.

From the above it will appear that the boiler structure described above comprises a plurality of originally separate parts which, by the fusing operation, are so joined together that the steel of which the boiler is made is continuous throughout, and in the claims which form a part of this application I employ the term integral to refer to the parts thus united to designate the structure thus formed, meaning thereby that the parts are so joined that the metal is continuous from one part to another and the structure produced is substantially homogeneous throughout.

Having thus described my invention, I desire to secure the following claims by Letters Patent:—

1. In a boiler, the combination of an inclosing shell having heads provided with openings, and flues extending through the shell and through opposite openings, the ends of adjacent flues being fused together.

2. In improved boiler construction, the combination of an inclosing shell having openings, flues extending through the shell with their ends extending through said openings, the ends of the flues being bent over and fused together.

3. In improved boiler construction, the combination of a shell having heads provided with openings, flues extending through the shell with their ends primarily projecting a distance beyond the heads, the projecting ends being bent over against the heads and fused together.

4. In improved boiler construction, the combination of a shell having a head provided with openings, and flues extending through said openings and having their ends fused over against said head.

5. In a boiler, the combination of an inclosing shell having heads provided with openings at the ends of said shell, and flues extending between the openings in said heads, the projecting ends of said flues being bent over and welded to the ends of adjacent tubes and to said heads.

6. In boiler construction, the improved method of securing the ends of boiler tubes to the head, which consists in inserting said tubes in the openings in said head to allow the ends of said tubes to project outside of said head, and heating the projecting ends of said tubes, thereby causing said ends to become bent over against said head, and welding the ends of adjacent tubes together and to said head.

7. A boiler comprising wrought metal flues, and a tubular shell, said parts together constituting an integral structure.

8. A boiler comprising a tubular shell of steel, and flues of steel, said parts together constituting an integral structure.

9. An integral boiler structure consisting of parts of wrought metal of different thickness.

10. A boiler structure comprising wrought metal tubes and wrought metal closures connecting the ends of the tubes and integral therewith.

In witness whereof, I hereunto subscribe my name this 30th day of October A. D. 1908.

WILLIAM H. WINSLOW.

Witnesses:
CHARLES J. SCHMIDT,
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