No. 867,582. PATENTED OCT. 8, 1907.

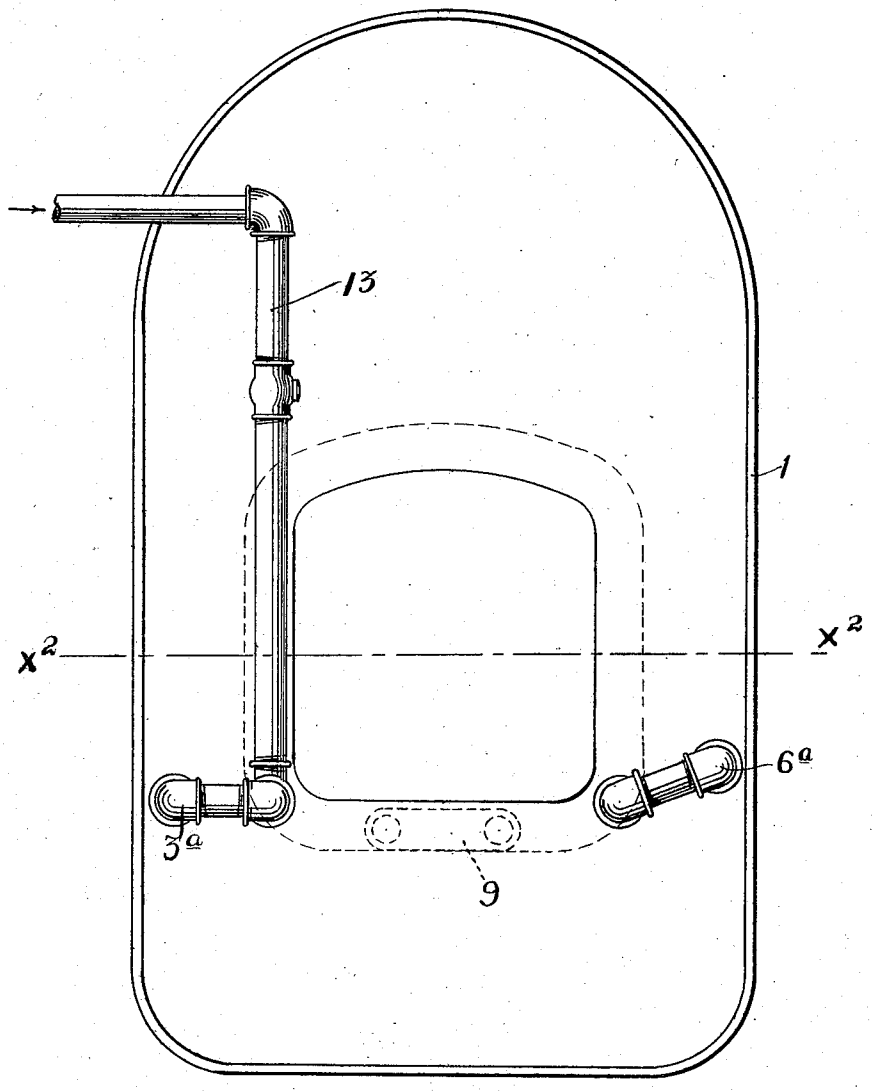
E. KYLLONEN.

TUBULAR GRATE.

APPLICATION FILED MAR. 25, 1907.

2 SHEETS—SHEET 1.

Fig. 1.



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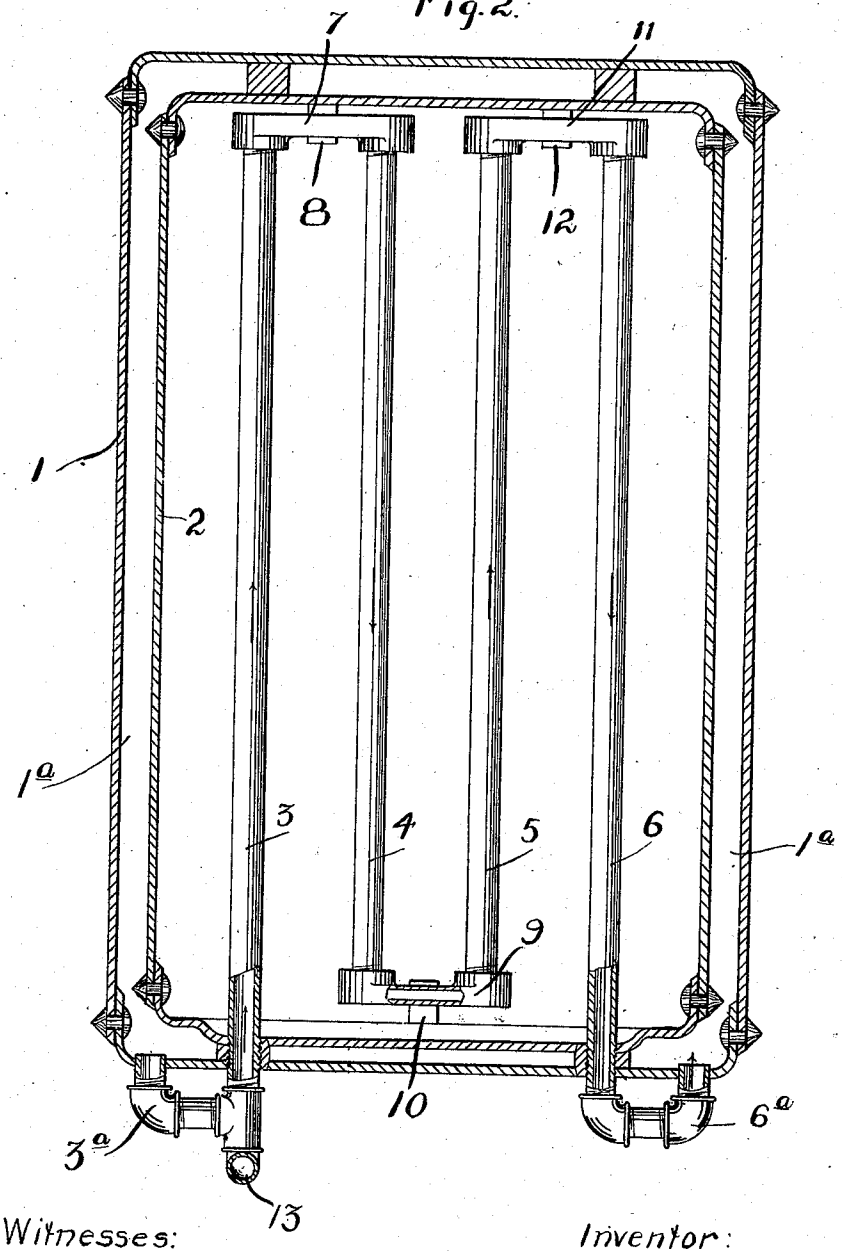
2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

ERIK KYLLONEN, OF ENTERPRISE, NORTH DAKOTA.

TUBULAR GRATE.

No. 867,582. Specification of Letters Patent. Patented Oct. 8, 1907.

Application filed March 25, 1907. Serial No. 364,525.

To all whom it may concern:

Be it known that I, ERIK KYLLONEN, a citizen of the United States, residing at Enterprise, in the county of Nelson and State of North Dakota, have invented certain new and useful Improvements in Tubular Grates; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to boilers, whether used for generating steam, or for the heating of water, as in hot water heating plants, and has for its object to improve the same in the several particulars hereinafter noted.

The chief feature of the invention consists in providing hollow or tubular grate bars through which water delivered to the boiler is passed. This greatly increases the heating or generating surface of the boiler and may be used as a feed water heater or simply for the purpose of increasing the steam generating efficiency of the boiler.

The invention is illustrated in the accompanying drawings, wherein like characters indicate like parts throughout the several views.

Referring to the drawings, Figure 1 is a view in front elevation, showing my invention applied to a horizontal boiler, such, for instance, as the boiler of a traction engine; and Fig. 2 is a horizontal section taken on the line $x^2 x^2$ of Fig. 1, some parts being broken away.

The numeral 1 indicates the outer shell and the numeral 2 the inner shell of the fire box end of the boiler, which parts may be of the usual or any suitable construction.

As illustrated in the drawings, my improved hollow bar grate is made up of water tubes 3, 4, 5 and 6, which tubes are horizontally or approximately horizontally disposed. The tubes 3 and 4 are connected at one end by a hollow coupling head 7, shown as supported by a lug 8 on the interior of the inner shell 2. The tubes 4 and 5 are likewise connected by a hollow coupling head 9 that rests upon a supporting lug 10 secured to the inner shell 2. Also, the tubes 5 and 6 are connected by a hollow coupling head 11 that rests upon another lug 12 secured to the inner shell 2. The tubes 3 and 6 extend to the exterior of the outer shell 1 and are connected by tubular extensions 3^a and 6^a, respectively, to the water space 1^a which is formed between the two shells 1 and 2. The cold water is supplied through a pipe 13 which, as shown, is coupled at its lower end to to the outer end of the tube 3 and its branch 3^a. With this arrangement, the cold water delivered through the pipe 13 will pass in part directly into the water space 1^a through the branch pipe 3^a, and in part through the pipes 3, 4, 5 and 6, hollow heads 8, 9 and 11 and tube extension 6^a, into the said water space 1^a. The water taken into the water chamber 1^a through the hollow tubes and heads of the grate will, of course, be heated to a very considerable extent before reaching the said chamber or water space 1^a. If the device is to be used simply as a feed water heater, the branch pipe 3^a will not be required.

What I claim is:

The combination with a boiler having shells 1 and 2 spaced apart to form a water chamber 1^a surrounding the fire box, of a grate made up of water tubes 3, 4, 5 and 6 and hollow coupling heads 7, 9 and 11, connecting the said tubes, tube extensions 6^a connecting said tubes 6 with said water chamber 1^a, a tube extension 3^a connecting said tube 3 with said water chamber 1^a, and a water supply tube 13 leading to said tube 3 and extension tube 3^a, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ERIK KYLLONEN.

Witnesses:
C. N. FRECH,
JOHN KYLLONEN.