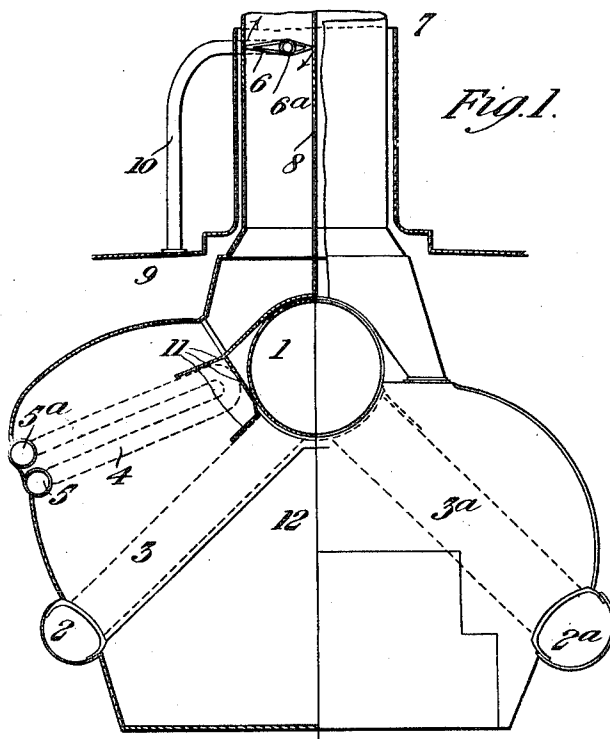


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2 SHEETS—SHEET 1.

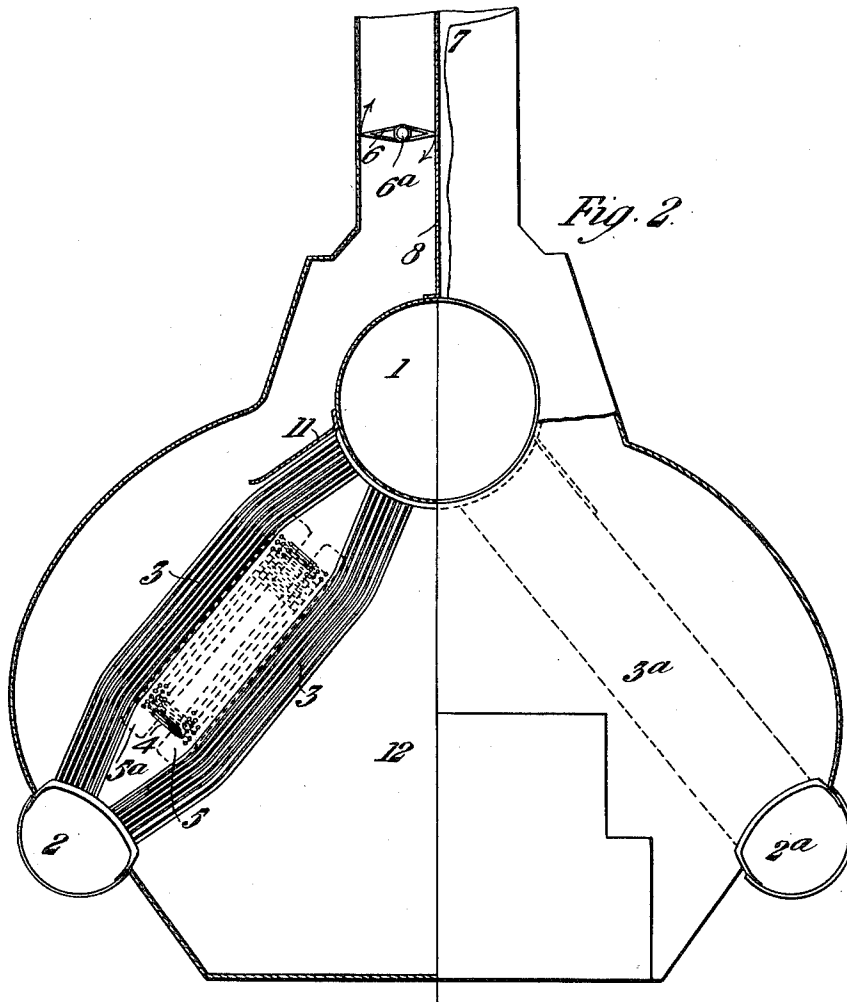


WITNESSES
E. B. Blaming
R M Conway

A. F. Yarrow,
by Baker, Byrnes & Carmichael,
his Attys.

1,038,812.

2 SHEETS--SHEET 2.



WITNESSES
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R M Conway

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UNITED STATES PATENT OFFICE.

ALFRED FERNANDEZ YARROW, OF SCOTLAND, NEW BRUNSWICK, CANADA.

WATER-TUBE BOILER.

1,038,812.

Specification of Letters Patent.

Patented Sept. 17, 1912.

Application filed April 17, 1911. Serial No. 621,566.

To all whom it may concern:

Be it known that I, ALFRED FERNANDEZ YARROW, a subject of the King of Great Britain, residing in Scotland, New Brunswick, Canada, and whose post-office address is Campsie Dene, Blane field, in the county of Stirling, Scotland, New Brunswick, engineer, have invented certain new and useful Improvements in Water-Tube Boilers, of which the following is a specification.

This invention relates to water tube boilers of the type in which a steam and water drum is connected by sets of downwardly extending tubes with two water drums, one on each side of the combustion space of the boiler furnace the gases from which pass divergently right and left through the respective sets of water tubes to a divided uptake or to separate uptakes. According to the present invention such water tube boilers are fitted with a superheater which is placed on one side only of the boiler so that the portion of the furnace gases which passes from the combustion space to that side flows through the superheater and the set or sets of water tubes arranged on that side, while the remaining portion of the gases passes to the side of the boiler and flows only through the set or sets of water tubes on the last named side. Such water tube boilers are also fitted with means for varying the flow of the gases through the superheater, the arrangement being such that the superheater may be at once put entirely out of action so that, for example, if there is a sudden stoppage of the engines the superheater tubes may be prevented from being burned out. The superheater tubes are preferably disposed on the farther side of the generator or water tubes in the direction of the flow of the gases, or interposed in a gap left within the bank of water tubes, the ends of these superheater tubes being expanded into steam chambers one of which is in communication with the steam space of the steam drum, while the other is in communication with the steam distributing pipe or pipes or with the steam stop valve.

The flow of the furnace gases through the bank of generator tubes on one side of the boiler and through the superheater on the same side is controlled by means of a damper preferably placed in the boiler funnel which is for this purpose divided centrally by means of a partition extending upwardly from the bottom of the uptake to

a point beyond the damper; alternatively there may be separate funnels or uptakes for the two sides of the boiler, that on the superheater side being provided with a damper by which the flow of the furnace gases on that side may be varied or entirely arrested. The damper may be hollow and cooled by introducing air into it through a hollow spindle, the supply of air being drawn from any suitable source, as for example, from the stokehold, or the delivery side of the forced draft fan, air outlets being provided to the damper, preferably toward the extremity thereof.

The invention is illustrated in the accompanying drawings as applied to a water tube boiler of the Yarrow type, Figure 1 being a somewhat diagrammatic cross section of such a boiler showing one arrangement of superheater and controlling damper, and Fig. 2 a view showing another disposition of the superheater.

In these drawings 1 is a steam and water drum, 2 and 2^a the water drums, 3 and 3^a the banks of generator tubes connecting the steam drum with the water drums, 4 the superheater tubes, 5 and 5^a steam chambers into which the tubes are expanded, 6 the hollow damper placed in the uptake on one side of the funnel 7 which is divided by a partition 8. The air is shown as supplied from the stokehold 9 by pipe 10 which is in connection with the hollow spindle 6^a of the damper 6.

Although baffles other than the fixed baffle plates 11 are not shown in the drawing, it will be understood that the distribution of the hot gases on their passage from the combustion chamber 12 to the uptake may be controlled by any suitable arrangement of baffles applied either to the generator tubes 3 or to the superheater 4, or to both.

It will be seen (as shown in Fig. 1) that on that side of the boiler which is fitted with the superheater, the bank of generator tubes may have fewer rows and the water drums associated therewith be of less capacity than the corresponding tubes and drum on the other side of the boiler, the object being to secure substantially equal resistance to the flow of the gases along the two sides.

It will be understood that any suitable arrangement of baffles may be provided for insuring a proper distribution of the furnace gases among the generator tubes and such arrangement of baffles might involve the di-

version past the superheater of part of the furnace gases traversing that side of the boiler, but even in this case the gases which traverse the superheater must also pass
5 among the generator tubes on the same side.

Having thus described the nature of this invention and the best means I know of carrying the same into practical effect, I claim;—

10 1. The combination with a water tube boiler having a steam and water drum, a pair of water drums one on each side of the combustion space of the boiler furnace and
15 sets of downwardly extending water tubes respectively connecting the steam and water drum directly with the water drums, of a superheater comprising a number of tubes and arranged on one side only of the said combustion space, uptakes located one on
20 each side of the steam drum, one of the uptakes adapted to receive the gases passing from the combustion space through the superheater and the water tubes disposed on one side of the steam and water drum and
25 the second uptake adapted to receive the gases traversing the water tubes on the other side of the steam and water drum, and means for controlling the flow of the gases to the first said uptake, as and for the purpose described.

30 2. The combination with a water tube boiler having a steam and water drum, a pair of water drums one on each side of the combustion space of the boiler furnace and
35 sets of downwardly extending water tubes respectively connecting the steam and water drum directly with the water drums, of a superheater comprising a number of tubes and arranged on one side only of the said
40 combustion space, uptakes located one on each side of the steam drum, one of the uptakes adapted to receive the gases passing from the combustion space through the superheater and the water tubes disposed on
45 one side of the steam and water drum and the second uptake adapted to receive the gases traversing the water tubes on the other side of the steam and water drum, and a damper fitted within the first said up-

take whereby the flow of gases through the 50 superheater and the water tubes associated therewith may be controlled.

3. The combination with a water tube boiler having a steam and water drum, a pair of water drums one on each side of 55 the combustion space of the boiler furnace and sets of downwardly extending water tubes respectively connecting the steam and water drum directly with the water drums, of a superheater comprising a number of 60 tubes and arranged on one side only of the said combustion space, uptakes located one on each side of the steam drum, one of the uptakes adapted to receive the gases passing from the combustion space through the 65 superheater and the water tubes disposed on one side of the steam and water drum and the second uptake adapted to receive the gases traversing the water tubes on the other side of the steam and water drum, a 70 damper fitted within the first said uptake whereby the flow of gases through the superheater and the water tubes associated therewith may be controlled, and means for air-cooling said damper. 75

4. A water tube boiler comprising an upper steam and water drum, two lower water drums one on each side of the furnace, two sets of water tubes one on each side of the furnace connecting the upper drum with 80 the respective lower drums, separate uptakes for the furnace gases traversing the respective sets of water tubes, a superheater on one side only of the furnace in the path of the gases to the uptake on that side and 85 a damper in the said uptake whereby the furnace gases can be diverted from the superheater when desired and the steam generating capacity of the boiler simultaneously reduced. 90

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALFRED FERNANDEZ YARROW.

Witnesses:

JOSEPH MILLARD,
W. I. SKERTEN.