

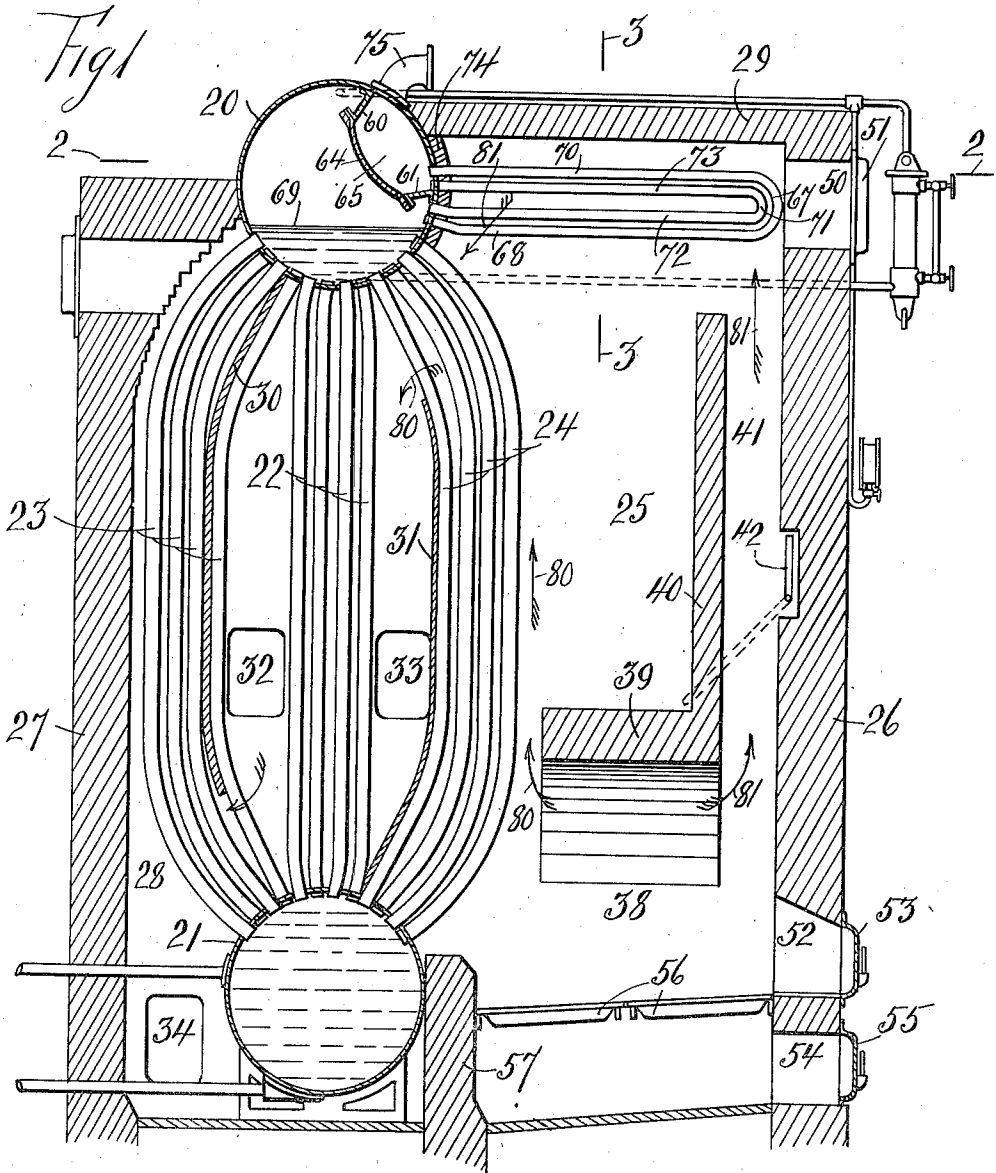
J. MILNE.  
SUPERHEATER.

APPLICATION FILED AUG. 24, 1910

997,688.

Patented July 11, 1911.

3 SHEETS—SHEET 1.



Witnesses:  
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Mabel A. Fay

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3 SHEETS-SHEET 2.

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Fig 2

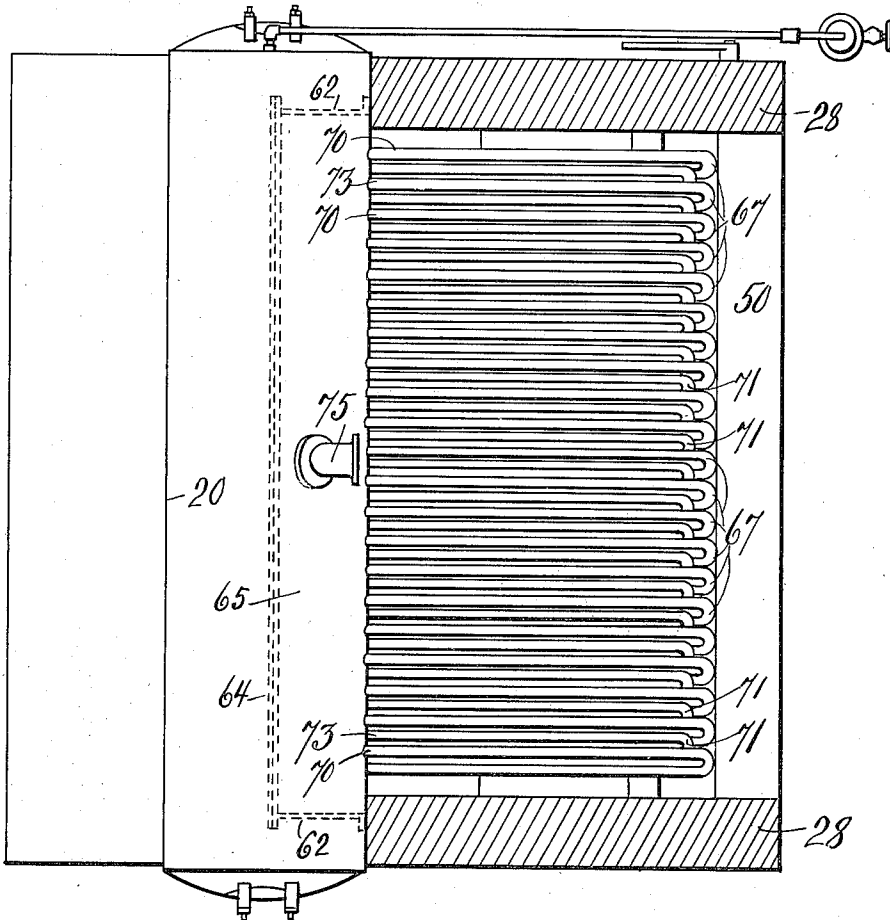
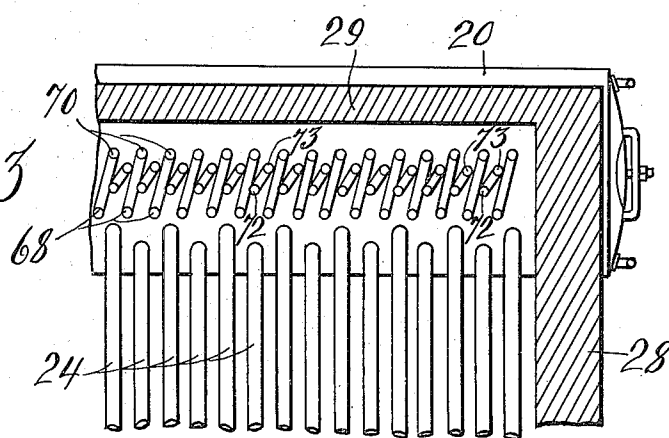


Fig 3



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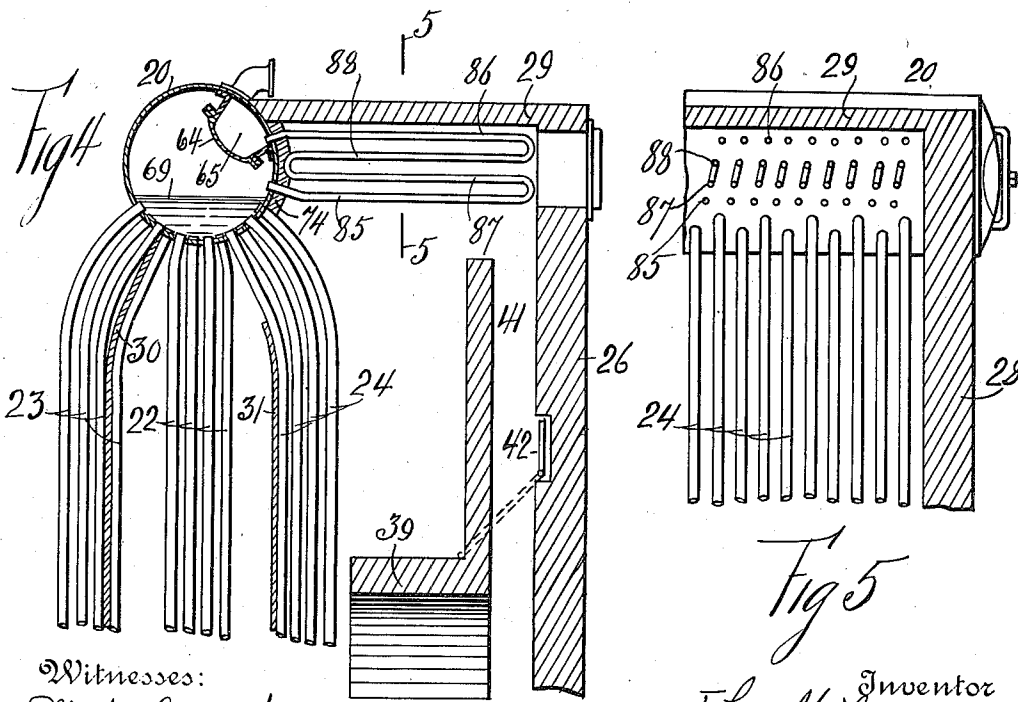
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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

JOHN MILNE, OF NEW YORK, N. Y.

## SUPERHEATER.

997,688.

Specification of Letters Patent. Patented July 11, 1911.

Application filed August 24, 1910. Serial No. 578,752.

To all whom it may concern:

Be it known that I, JOHN MILNE, a citizen of the United States, and a resident of the borough of Manhattan, in the county of New York and State of New York, have invented certain new and useful Improvements in Superheaters, of which the following is a specification.

This invention relates to steam superheaters, which may be applied to various types of boilers. The invention is represented in this instance with a two drum boiler in which a duct is formed for directly leading the heated gases from the combustion chamber to the superheater.

In the accompanying drawings Figure 1 represents a vertical section of a boiler with the invention connected up therewith, Fig. 2 shows a top plan view and partial section of Fig. 1, on the line 2, 2, Fig. 3 represents a partial section of Fig. 1 on the line 3, 3, Fig. 4 represents a fragmentary portion of the boiler shown in Fig. 1 and a modification of the invention, and Fig. 5 shows a partial section of Fig. 4 on the line 5, 5.

Referring particularly to Figs. 1 to 3, a boiler is shown to comprise the upper or steam drum 20, the lower drum 21, the central nest of steam generating tubes 22 and the outer nests of steam generating tubes 23 and 24.

A main chamber 25 of the boiler is formed with inclosing structure of the boiler, the said structure comprising the front wall 26, rear wall 27, side walls 28 and roof 29. A partition 30 extends from the drum 20 to within a short distance of the drum 21, and a partition 31 extends from the drum 21 to within a short distance of the drum 20. Openings 32, 33, 34, with doors not shown are formed in the sides 28 of the said structure. The combustion chamber 38 of the boiler is represented with the arch 39 from which extends a wall 40 connecting the sides 28, and forming a duct 41 leading from the said combustion chamber 38 to the upper portion of the chamber 25 and a damper 42 operates in said duct. An opening 50 with the door 51 is shown in the front wall 26, as well as the opening 52 with the furnace door 53, and the opening 54 with the ash pit door 55. Grates 56 extend from the opening 52 to the central wall 57.

Channel irons 60, 61, with the end plates 62 and removable cover 64 form an isolated chamber 65 in the drum 20. Rows of in-

clined outer return bend or U shaped superheating tubes 67 have their inlet legs 68 extending from the drum 20 outside of the isolated chamber 65, and above the normal water line 69 in the drum. The outlet legs 70 of said tubes enter the chamber 65 of the drum. Rows of inclined inner return bend or U shaped superheating tubes 71 have their inlet legs 72 extending from the drum 20 outside of the said isolated chamber 65, above said water line 69, and their outlet legs 73 enter the chamber 65. The planes of the tubes 67 and 71 preferably alternate with each other. A protecting and insulating cover 74 preferably of asbestos covers the drum 20 to prevent its injury by the heated gases of the combustion chamber 38.

A steam outlet 75 extends from the chamber 65 of the drum 20. The tubes 67 and 71 constitute the superheater for the boiler.

In the operation of the boiler the hot gases generated in the combustion chamber 38 are divided in their upward flow by the arch 39, taking the directions shown by the arrows 80 and 81, the former directly heating the nests of steam generating tubes 22, 23, 24 and the gases taking the direction of the arrows 81 entering the duct 41 to directly heat the steam superheating tubes 67, 71 and then heating the said nests of steam generating tubes. The damper 42 controls the volume of gases passing through the duct 41 to heat the said superheating tubes.

In Figs. 4 and 5, fragmentary portions of the same boiler are shown while the superheater is modified and comprises rows of inclined double return bend tubes each having four legs, comprising the inlet legs 85 extending from the drum 20 above the water level 69 and the outlet legs 86 entering the chamber 65.

A U shaped member with the legs 87 and 88 connects the legs 85 and 86. The gases from the chamber 38 take directions as already described, and the steam generated in the drum 20 enter the legs 85, then passes through the legs 87, 88 and finally is conducted through the legs 86, to enter the chamber 65.

The superheater in any of the forms of my invention can be flooded by raising the water level in the upper drum of the boiler.

Having described my invention what I desire to secure by Letters Patent and claim is:

1. In a superheater for a boiler the com-

- bination of a drum, an isolated chamber in  
 said drum, a removable cover for said cham-  
 ber, tubes with one end of each extending  
 from the drum outside of the isolated cham-  
 ber, and their other ends connected to said  
 chamber, and means to directly expose the  
 tubes to heated gases without previously  
 coming in contact with any steam generat-  
 ing portions of the boiler.
2. The combination of a drum of a boiler,  
 U shaped superheating tubes connected up  
 with the drum, an inclosure for said tubes, a  
 furnace within the inclosure, an arch for  
 the furnace to divide the products of com-  
 bustion thereof, and means to directly lead  
 a portion of said products to the superheat-  
 ing tubes, without previously coming in con-  
 tact with any steam generating portions of  
 the boiler.
3. In a superheater for a boiler the com-  
 bination of a drum, an isolated chamber in  
 said drum, U shaped superheating tubes  
 with one end of each extending from the  
 drum outside of said chamber and their  
 other ends connected up with the chamber,  
 means to directly expose the said tubes to  
 heated gases without previously coming in  
 contact with any steam generating portions  
 of the boiler and means to partially insulate  
 the drum from the heated gases.
4. In a superheater the combination of a  
 drum, an isolated chamber formed in said  
 drum, rows of outer U shaped superheating  
 tubes with one leg of each extending from  
 the drum outside of the isolated chamber  
 and with the other legs thereof connected  
 to said isolated chamber, rows of inner U  
 shaped tubes with one leg of each extend-  
 ing from said drum and the other leg there-  
 of connected to said isolated chamber, a duct  
 to directly expose the tubes to heated gases,  
 and means to conduct superheated steam  
 from said isolated chamber.
5. The combination with the drum of a  
 boiler of an isolated chamber in the drum,  
 U shaped superheating tubes with one end  
 of each connected to the drum and the other  
 end connected to the said chamber, an in-  
 closure for the tubes, a combustion chamber  
 in the inclosure and a duct leading from the  
 combustion chamber to the said tubes to di-  
 rectly heat the latter.
6. The combination with a drum of a  
 boiler of an isolated chamber therein, a  
 superheater comprising rows of double re-  
 turn bend tubes, inlet legs and outlet legs  
 for each tube, the said inlet legs connected  
 to the drum above the normal water level  
 therein and the said outlet legs connected to  
 said isolated chamber, a combustion cham-  
 ber for the boiler, a duct to lead the products  
 of combustion to said tubes, and an outlet  
 for the isolated chamber.
7. The combination with the drum of a  
 boiler of an isolated chamber in the drum, a  
 superheater comprising rows of double  
 return bend tubes, inlet legs and outlet legs  
 for each tube, the said inlet legs connected  
 to the drum above the normal water level  
 therein, and the said outlet legs connected to  
 said isolated chamber, a combustion chamber  
 for the boiler, a duct to lead heated gases  
 from said combustion chamber directly to  
 said superheater and an outlet connected  
 with said isolated chamber on the outside of  
 said drum.
8. The combination with a drum of a  
 boiler of an isolated chamber in the drum, a  
 superheater comprising rows of double re-  
 turn bend tubes, inlet legs and outlet legs  
 for each tube, the said inlet legs connected to  
 the drum above the normal water level  
 therein, the said legs connected to said iso-  
 lated chamber, a combustion chamber for  
 the boiler, and a duct to lead heated gases  
 from the combustion chamber directly to  
 said superheater, an outlet connected with  
 said isolated chamber on the outside of said  
 drum, man-holes on the drum and a damper  
 in said duct.
9. The combination with the drum of a  
 boiler of an isolated chamber therein, super-  
 heating tubes with one end of each connect-  
 ed to the drum outside of said chamber and  
 the other end of each tube connected to said  
 chamber, an inclosure for the tubes, an open-  
 ing in said inclosure adjacent to the tubes,  
 a cover for said opening, and means for the  
 combustion of fuel in said inclosure and  
 to lead the products of said combustion to  
 the superheating tubes without coming in  
 contact with any steam generating portions  
 of the boiler.
10. In a superheater for a boiler the com-  
 bination of a drum an isolated chamber in  
 said drum, tubes with one end of each ex-  
 tending from the drum outside of the iso-  
 lated chamber and their other ends connect-  
 ed to said chamber, a duct to directly expose  
 the tubes to heated gases without previously  
 coming in contact with any steam generat-  
 ing portions of the boiler, and a damper in  
 said duct.
- Signed at the borough of Manhattan in  
 the county of New York and State of New  
 York this 20th day of August A. D. 1910.
- JOHN MILNE.
- Witnesses:  
 A. A. DE BONNEVILLE,  
 ARTHUR MARION.