

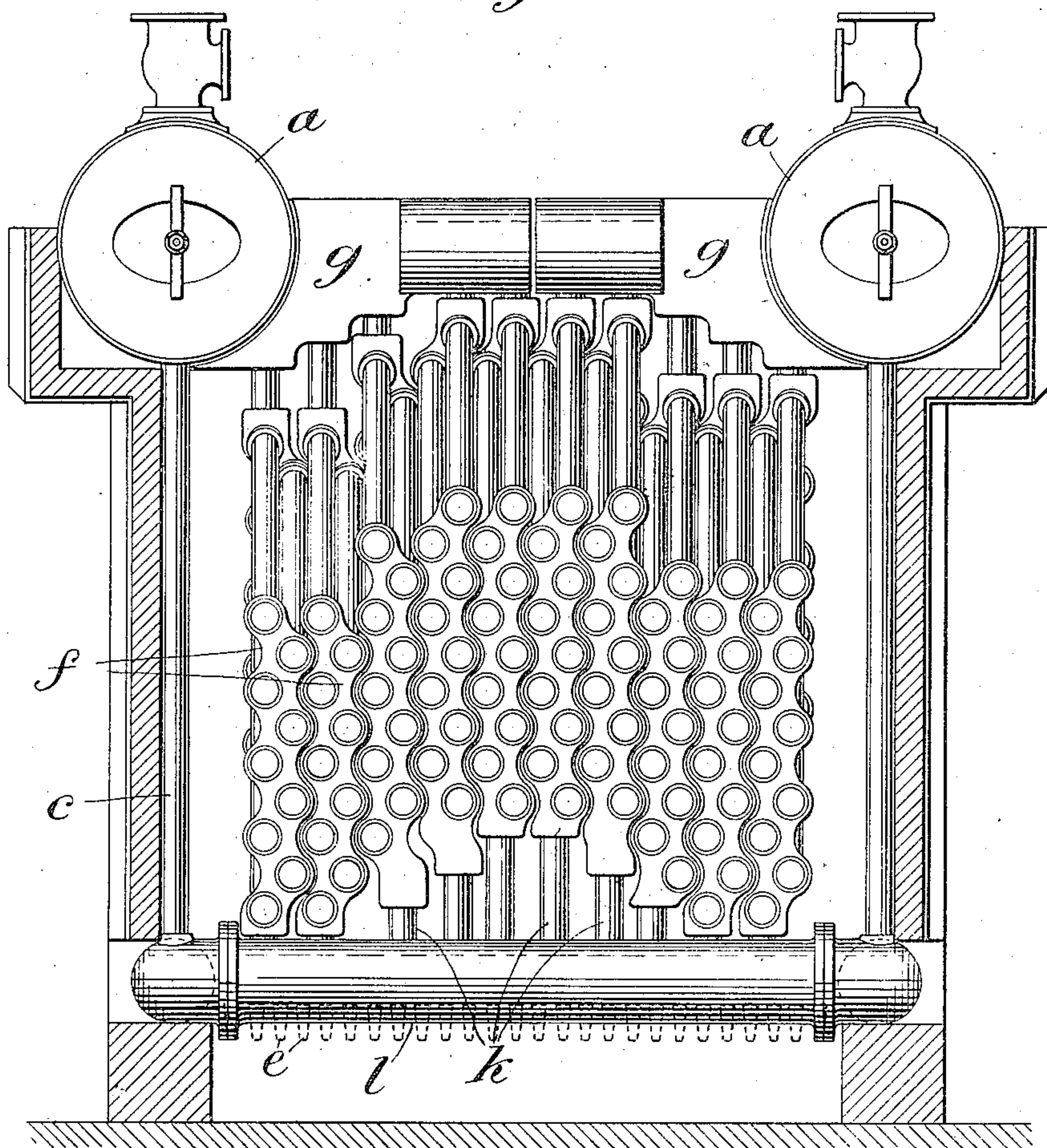
S. C. MUNOZ.  
WATER TUBE BOILER.  
APPLICATION FILED JAN. 9, 1905.

962,454.

Patented June 28, 1910.

2 SHEETS—SHEET 1.

*Fig. 1*



*Witnesses:*  
*Chas. W. King.*  
*Lucius E. Varney.*

*Inventor:*  
*Sigmondo L. Munoz*  
*by Redding Kiddle Greely*  
*Attys.*

S. C. MUNOZ.  
WATER TUBE BOILER.  
APPLICATION FILED JAN. 9, 1905.

962,454.

Patented June 28, 1910.

2 SHEETS—SHEET 2.

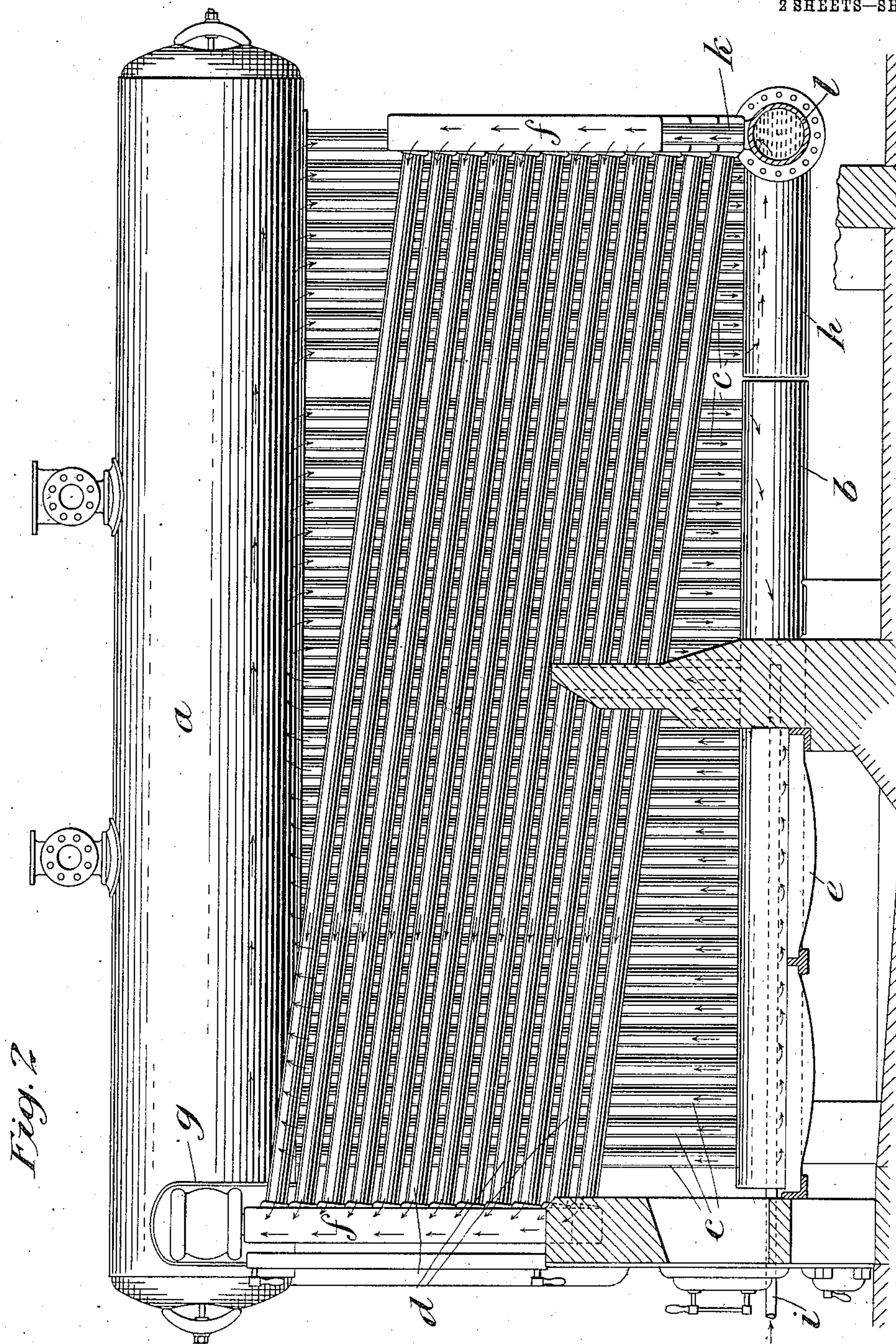


Fig. 2

Witnesses:  
Chas. D. King,  
Lucius E. Varney

Inventor:  
Sigmund C. Munoz  
by Redding Kiddle & Greeley  
Attys.



# UNITED STATES PATENT OFFICE.

SIGNONO C. MUNOZ, OF MONTCLAIR, NEW JERSEY, ASSIGNOR TO THE BABCOCK & WILCOX COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

## WATER-TUBE BOILER.

962,454.

Specification of Letters Patent. Patented June 28, 1910.

Application filed January 9, 1905. Serial No. 240,174.

*To all whom it may concern:*

Be it known that I, SIGNONO C. MUNOZ, a citizen of the United States, and a resident of the city of Montclair, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Water-Tube Boilers, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

In a water tube boiler it is well known that the lowermost tubes, which are arranged directly over the fire grate and upon which the direct heat of the fire impinges, do from 55 to 65 per centum of the entire work done by the boiler, and that in practice about 90 per centum of the repair work required to be done on a water tube boiler is upon these lowermost tubes which are destroyed through the action of the heat, owing to an insufficient supply of water, the water being generally circulated to them from above and passing through all of the upper tubes before reaching the lower ones. It is therefore particularly necessary to keep the lower tubes well supplied with water in order to guard against the burning out of such tubes.

As a general rule, in water tube boilers, the water is fed into one of the drums, usually the upper drum, and then down the vertical headers or water legs into the horizontal tubes, the water, as is obvious, thus supplying the upper horizontal tubes while permitting the lowermost tubes, unless the horizontal tubes are very few in number and the circulation is very free, to become deprived of water, to be choked with sediment, and finally burned out.

In accordance with the present invention, the water supply is arranged to feed the lowermost tubes over the fire grate in a direct manner or before the uppermost tubes are fed so that these lowermost tubes shall at all times be properly filled.

The invention will be more fully described hereinafter with reference to the accompanying drawings, in which,

Figure 1 is a view in rear elevation of a boiler with the improvements applied thereto; and Fig. 2 is a view in elevation taken through the central portion of the boiler.

The water tube boiler in which the present invention may be applied may be of any suitable form or type, but it is preferably

of the form or type illustrated in Letters Patent of United States No. 759,463, and dated May 10th, 1904. As shown in the drawing such a boiler has upper drums *a*, lower or mud drums *b* and vertical water tubes *c* connecting the upper and lower drums on the same sides.

The water or heating tubes *d* are arranged preferably at an inclination over the grate *e* and are provided both front and back with headers *f* or other suitable water leg connections. The upper ends of the heating tubes are connected through their headers *f* and cross boxes *g* with the upper drums *a*, while the lower ends of the heating tubes (and this is where the present improvements depart from the construction shown and described in the above-recited Letters Patent) are connected with a drum *l* near the bottom and, in the present case, at the rear end of the boiler. This drum *l* is fed directly from the main water supply in the drums *a*, by any suitable connection or connections through the boiler. In the present case these connections comprise the side tubes *c* at the rear end of the boiler which are exposed of course to the direct heat of the furnace. For the purpose of making these connections, the drum *l* is provided with side extensions *h* which these particular tubes *c* enter, said extensions being formed integral with or being secured to the drum *l* in any suitable manner and forming practically a U-shaped drum. Into the middle portion of this drum the lower ends of the headers or other water leg connections *f* are fitted, providing a construction which, as will be obvious, will assure the proper feeding of the lowermost heating tubes. In the present case nipples *k* are inserted between the headers and drum *l* to form satisfactory joints.

The feed water is introduced into either or both of the lower or mud drums *b* through such means as a pipe *i*, and the lower or mud drums are connected, as shown, with the upper drums *a* by the forward portion of the side tubes *c*. In this way the water entering the boiler through the lower drums passes up through the vertical side tubes connecting the lower and upper drums. There, meeting the upward circulation from the inclined tubes which is passing into the forward portion of the upper drum, the water flowing into the upper drum from



the vertical tubes is directed backward toward the rear end of the drum, some of the water passing down again through the vertical tubes, as indicated by the arrows in the drawing into the mud drums, while the rest of the water and by far the greater part passes down through the vertical side tubes connecting the upper drum and the U-shaped drum 7. The water which thus reaches the rear section of the lower drum enters the nipples *k* and the rear headers, and, as is obvious, flows directly into the lowermost horizontal tubes, without first feeding the uppermost horizontal tubes. Such a construction does away with the cross boxes or other direct connection between the rear headers and the upper drums and thereby substantially reduces the cost of manufacture of boilers of this class. It also increases the area for smoke connections and makes it easier to get at the working parts of the boiler; and by keeping a substantial water supply where it is most needed it increases the capacity, economy and general efficiency of the boiler.

It will be understood that the improvements are not limited to the precise construction shown and described herein but that the invention is capable of many modifications in which it may be embodied without departing from the spirit of the invention.

I claim as my invention:

1. In a water tube boiler, the combination with the heating tubes, of means to contain the main body of water, a U-shaped drum near the bottom of the boiler having a middle portion and side extensions, means to feed the heating tubes from the middle portion of the U-shaped drum, a connection between the means to contain the main body

of water and the side extensions of the U-shaped drum, a mud drum, means to introduce water into the mud drum, and a connection between the mud drum and the means to contain the main body of water.

2. In a water tube boiler, the combination with inclined heating tubes, of an upper drum on each side of the heating tubes, a mud drum on each side of the heating tubes, a U-shaped drum beneath the lower ends of the heating tubes, headers at said ends of the heating tubes communicating at the bottom with the U-shaped drum, and side tubes exposed to the heat of the furnace on each side of the boiler some of which connect the upper drums and the U-shaped drum and others of which connect the upper drum and the mud drum.

3. In a water tube boiler, the combination with inclined heating tubes, of an upper drum on each side of the heating tubes, a mud drum on each side of the heating tubes, a U-shaped drum beneath the lower ends of the heating tubes, headers at said ends of the heating tubes communicating at the bottom with the U-shaped drum, side tubes exposed to the heat of the furnace on each side of the boiler some of which connect the upper drums and the U-shaped drum and others of which connect the upper drum and the mud drum, and means to introduce water into the mud drums.

This specification signed and witnessed this twenty-third day of December A. D., 1904.

SIGNONO C. MUNOZ.

In the presence of—

ALFRED W. KIDDLE,  
ANTHONY N. JESBERA.