

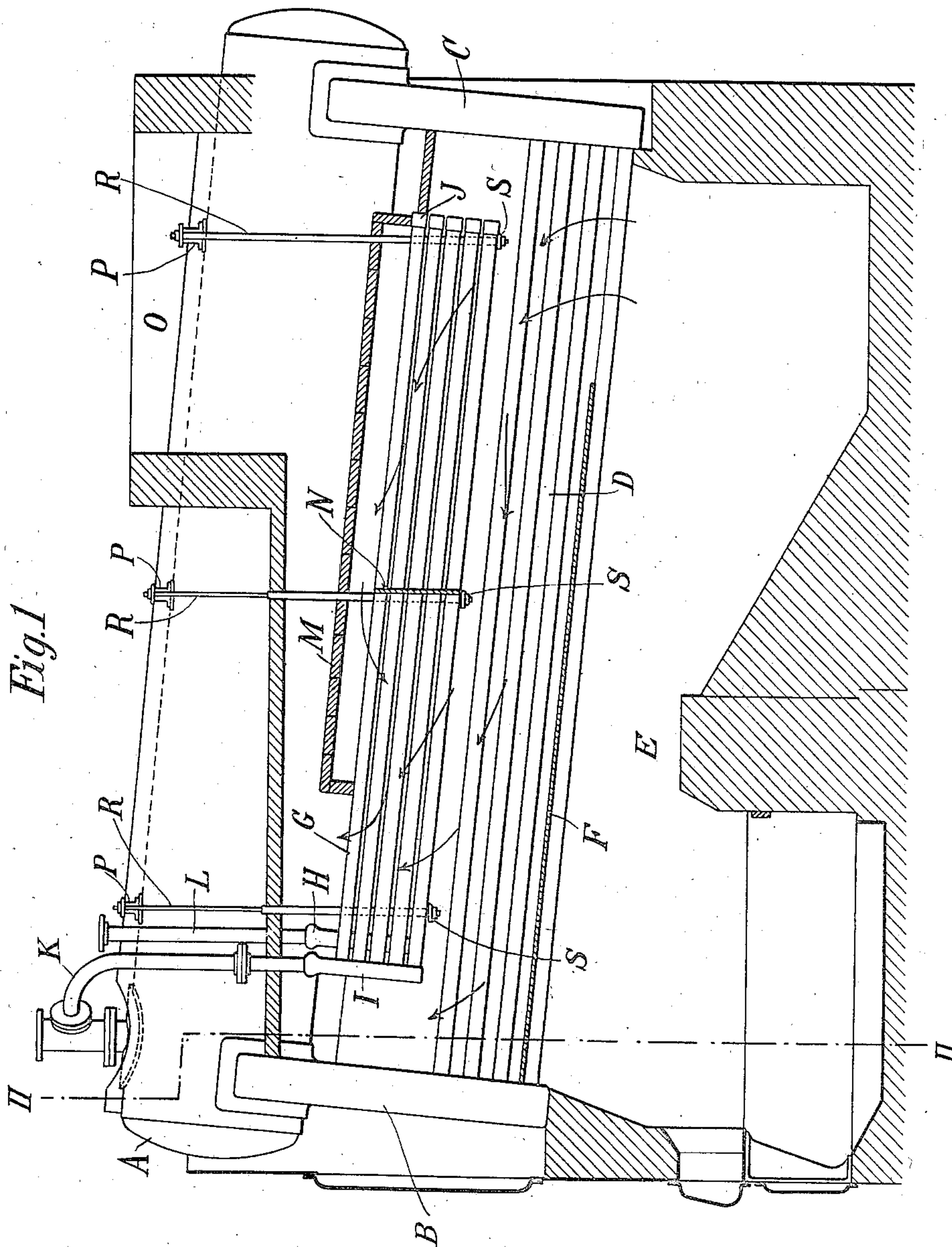
No. 883,871.

PATENTED APR. 7, 1908.

E. H. FOSTER.  
SUPERHEATER.

APPLICATION FILED DEC. 6, 1904.

2 SHEETS—SHEET 1.



Witnesses  
Thos. J. Byrnes  
ss Dunham

E. H. Foster Inventor

By his Attorneys  
Kerr, Page & Cooper

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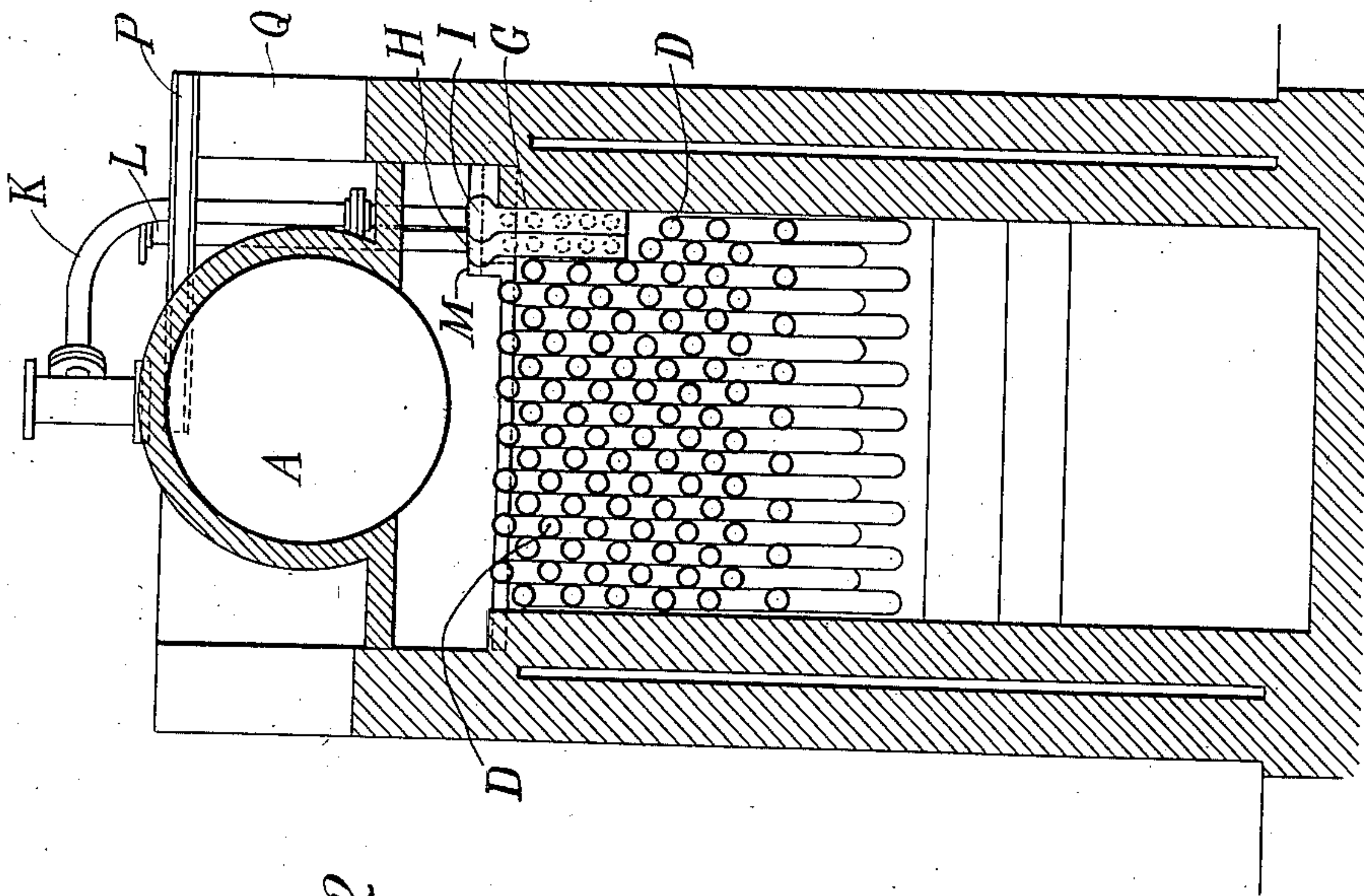


Fig. 2

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# UNITED STATES PATENT OFFICE.

ERNEST H. FOSTER, OF NEW YORK, N. Y.

## SUPERHEATER.

No. 883,871.

Specification of Letters Patent.

Patented April 7, 1908.

Application filed December 6, 1904. Serial No. 235,670.

*To all whom it may concern:*

Be it known that I, ERNEST H. FOSTER, a citizen of the United States, residing at New York, in the county of Richmond and State of New York, have invented certain new and useful Improvements in Superheaters for Water-Tube Boilers, of which the following is a specification, reference being had to the drawings accompanying and forming part of the same.

The chief object of my invention is to provide a superheating apparatus in connection with "watertube" boilers, particularly the well known type of boiler in which a plurality of water tubes are arranged below the steam drum and connected therewith through "water legs" or headers.

Another object is to provide a superheater which may be readily removed without disturbing the water tube connections of the boiler.

A further object is to provide for effective baffling of the hot gases from the boiler furnace, so as to utilize the heat thereof in an efficient manner for the water tubes and the superheater.

In carrying out my invention to secure these and other objects, I prefer to employ a superheater composed of pipes connected in pairs at one end to as many connectors as there are pairs, and connected at their other ends to independent headers which are in turn connected one to the steam drum of the boiler and one to the service pipe or otherwise with the apparatus in which the superheated steam is utilized. The superheater is located below the steam drum and to one side of the same, and occupies space which would otherwise be occupied by several of the water tubes. The connections of the headers with the steam drum and service pipe are readily detachable, so that the superheater, being at the side of the drum, and there being no water tubes above the superheater, may be lifted bodily out of the boiler casing.

In the accompanying drawing I have shown the preferred embodiment in a more or less diagrammatic way, but clearly showing all the novel features of the invention as I prefer to construct and arrange them.

Figure 1 is a side elevation of a boiler and superheater with the side of the boiler and furnace casing removed to show the various parts inside the same. Fig. 2 is a cross section on line II—II, of Fig. 1.

A indicates the steam drum of the boiler, from which depend front and rear headers or water legs B, C. Between the latter are water tubes, indicated by D. The whole is supported, usually in an inclined position as shown, over a furnace E, incased by suitable external walls. Resting on the lowermost series of water tubes is a horizontal baffle plate F, extending from the front of the furnace, but terminating short of the rear header so as to leave a passage for the hot gases from the furnace.

As shown in Fig. 2, the space between the water legs is substantially filled with the longitudinal water tubes. In applying my invention to such a boiler I omit a number of tubes from an upper corner of the header and in the space or pocket thus obtained I locate the superheater. This latter consists, in its preferred form, of a number of tubes so arranged as to be connected at one end to vertical headers H, I, as shown in Fig. 2. At their other end they are connected in horizontal pairs to return couplings, indicated by J, Fig. 1. One of the headers, as I, is in communication with the steam drum through a pipe K, and the other is adapted to the service pipe or other steam conduit leading to the steam-utilizing apparatus, by means of a pipe L. The steam on entering the header I divides and passes through the tubes G to the rear of the apparatus, then forward to the header H, from which it is delivered to the point of utilization, as described. During its passage through the tubes G the steam is subjected to the heated products of combustion coming from the furnace E and is thoroughly superheated.

For the purpose of effectively utilizing the heat of the furnace gases I have devised the following novel system of baffles. Above the water tubes and superheater I place a horizontal baffle plate M, extending from the rear water leg toward the front, but leaving a passage next to the forward header. Across the superheater is a vertical baffle plate N, preferably centrally located. The horizontal upper baffle is arched transversely over the superheater, as shown in Fig. 2, or otherwise arranged so that part of the furnace gases, striking the upper baffle M, may pass over the vertical baffle N, leaving the rest to go under the latter. Passing from the baffle M, the gases are delivered to the stack O.

The superheater is held in place by suspending it from bars P, resting on the steam



drum and supports Q on the boiler casing, by means of rods R. The latter extend between the vertical series of superheater tubes, as indicated by the dotted lines in Fig. 1, and carry on their lower ends cross bars or plates S, on which the lower tubes rest. The top baffle M and the top of the boiler casing are usually composed of loose brick or tiles laid in position. By removing those directly over the superheater and detaching the connections of the superheater the latter may be lifted out of its place without disturbing any of the other parts of the plant. Instead of the loose tiles or bricks the baffle may have a single removable section over the superheater, or any other suitable arrangement for readily opening a way for the removal of the superheater may be used. Likewise the top of the boiler casing over the superheater may be a single piece.

My invention will be found to possess a number of important advantages. In the first place it is located in a position which interferes in no way with the free passage of gases through the water tubes, while at the same time it receives its share of heat. Its position to the side of the steam drum, with no water tubes above it, gives a clear passage for its removal as a unit by merely disconnecting it, and removing sections of the top of the boiler casing and the upper baffle. The combination of baffle plates, horizontal and vertical, is also important, and gives very satisfactory results. As shown by the arrows in Fig. 1, the course of the furnace gases is such as to bring them into contact with all parts of the superheater without sacrificing their free sweep through the water tubes.

While I have shown and described specifically only one form of the apparatus, it is to be understood that the invention may be embodied in a variety of other forms.

It will of course be obvious that the superheater may be duplicated on the other side of the boiler. Likewise there might be two or more steam drums. These, however, are very obvious variations and need not be shown herein.

What I claim is:

1. The combination with a water tube boiler comprising a steam drum, water legs depending therefrom and water tubes extending between the water legs, of a superheater between the water legs as substan-

tially the level of the upper strata of water tubes in place of a part of said water tubes, and means for removably supporting the superheater in the position described and permitting removal of the superheater bodily from the setting, as set forth.

2. The combination of a steam drum, water legs depending therefrom, a plurality of water tubes extending between the water legs, a baffle plate arranged under the water tubes and open at the rear for the passage of furnace gases, a superheater located between the water legs to one side of the steam drum and substantially level with the upper strata of water tubes, a baffle plate over the water tubes and superheater and open at the front, and a vertical baffle plate located across the superheater, as set forth.

3. The combination with a steam drum, water legs depending therefrom, and a series of water tubes extending between the latter, of a superheater arranged between the water legs at an upper corner of the series of water tubes in place of a part of said tubes, and removable bodily from such position, as set forth.

4. The combination of a steam drum, water legs depending therefrom, a plurality of water tubes extending between the water legs, a superheater between the water tubes to one side of the steam drum and substantially at the level of the upper strata of water tubes, removable suspension rods carrying the superheater, inlet and outlet pipes for the superheater, and a removable baffle plate arranged horizontally above the superheater, as set forth.

5. The combination of a steam drum, water legs depending therefrom, water tubes extending between the water legs, a superheater between the water legs at substantially the level of the upper strata of water tubes and removable vertically from the setting, inlet and outlet pipes for the superheater, a removable baffle plate arranged above the superheater and spaced therefrom and extending horizontally over the water tubes, and a vertical baffle plate across the superheater and spaced from the said horizontal baffle plate, as set forth.

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Witnesses:

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