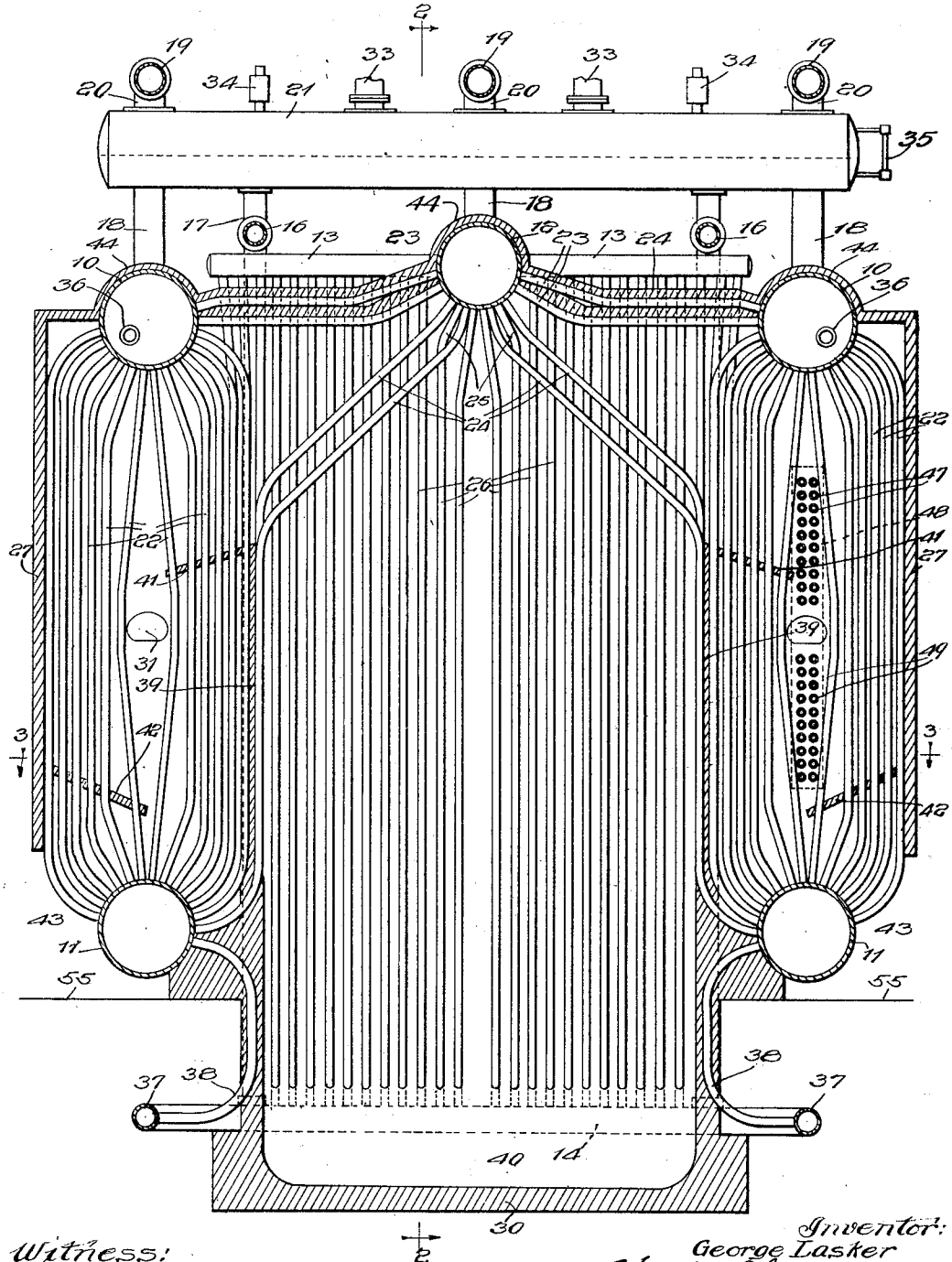
May 2, 1933. G. LASKER 1,906,633

BOILER

Filed July 25, 1930 4 Sheets-Sheet 1

Fig. 1.



Witness:
William P. Kilroy

Inventor:
George Lasker

By

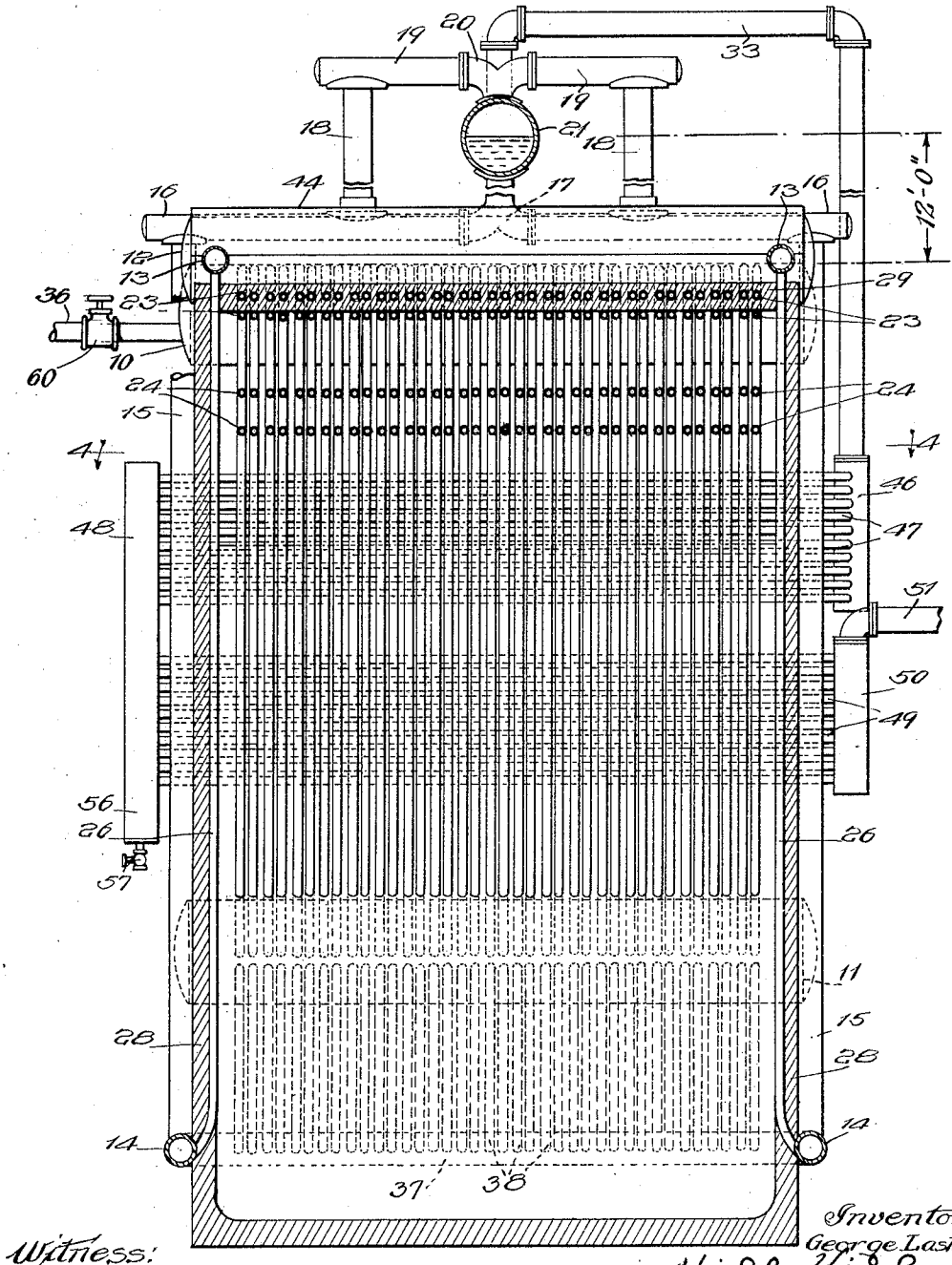
Attys.

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BOILER

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Fig. 2.



Witness:
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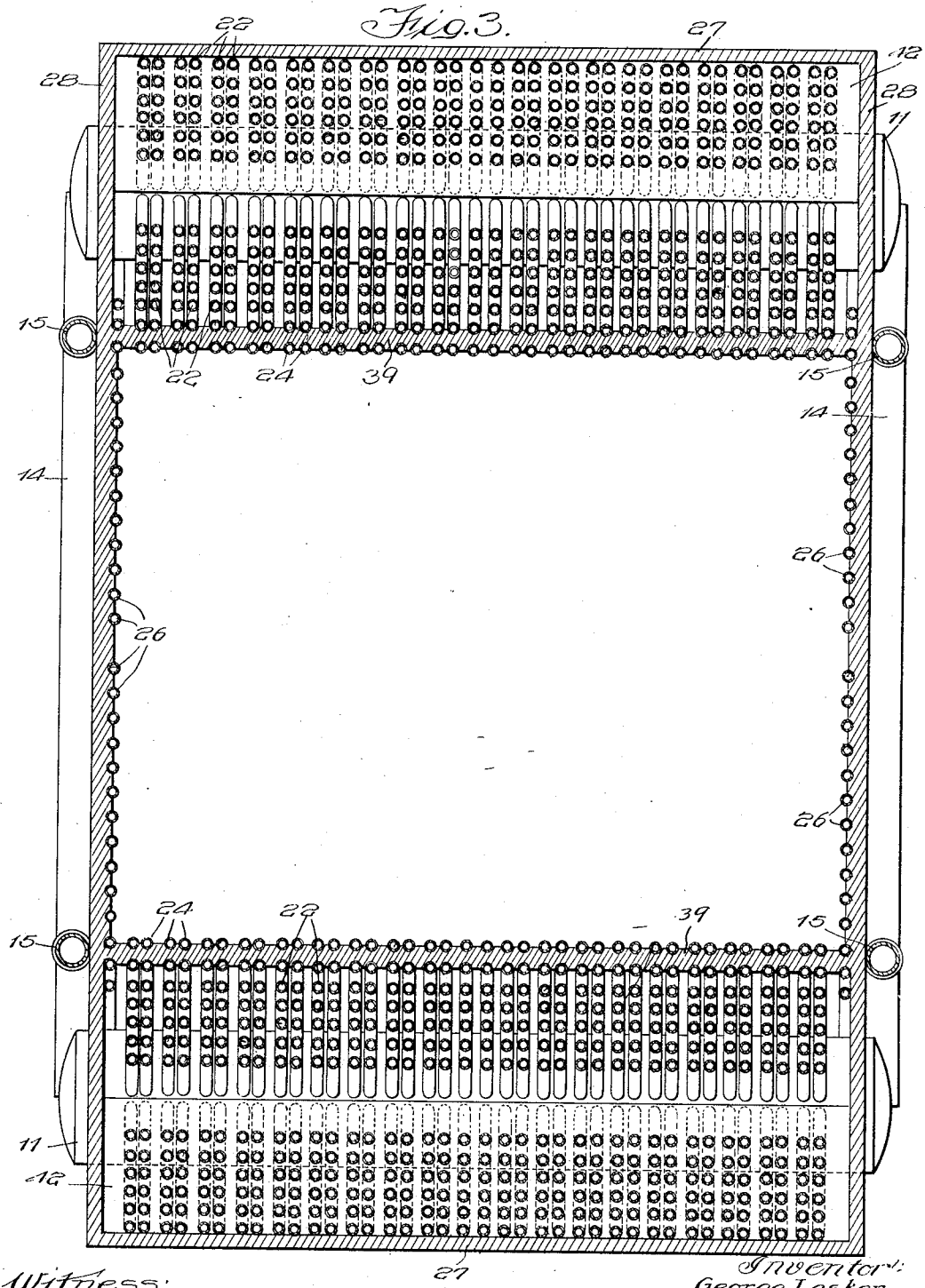
By Hill & Hill Attys.

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BOILER

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Fig. 3.



Witness:
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May 2, 1933. G. LASKER 1,906,633

BOILER

Filed July 25, 1930 4 Sheets-Sheet 4

Fig. 4.

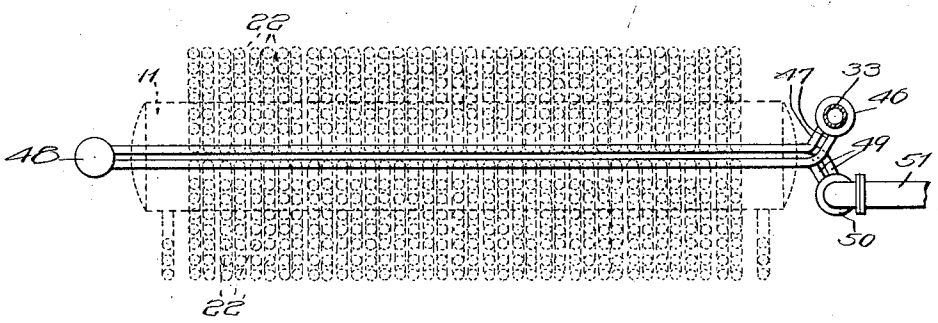
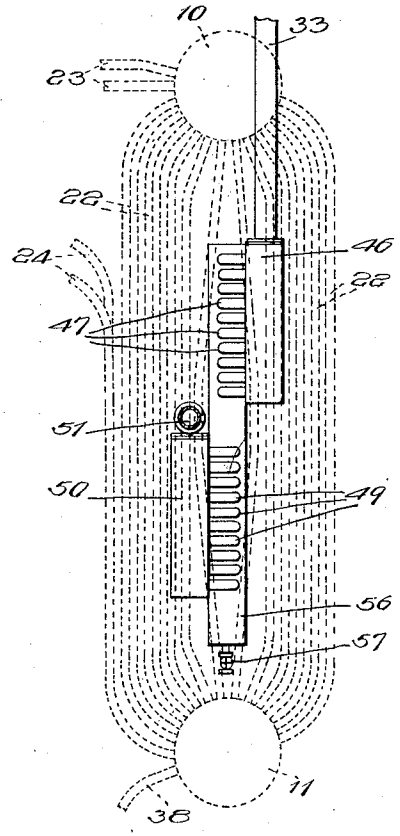


Fig. 5.



Witness:
William L. Kilroy

Inventor:
George Lasker
By Will. Will
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Patented May 2, 1933 1,906,633

UNITED STATES PATENT OFFICE

GEORGE LASKER, OF CHICAGO, ILLINOIS

BOILER

Application filed July 25, 1930. Serial No. 470,609.

The invention relates to boilers and more particularly it relates to boiler installations designed to carry suddenly changing loads or to meet rapidly changing power requirements. The rapid rise and fall of the water line, resulting from such sudden load variations, requires constant skilled supervision to prevent disaster and, even with such supervision, excessive strains result, necessitating frequent overhauling and repairing of the boiler, for reasons more fully set forth in my copending application Serial No. 470,359, filed July 24, 1930.

An object of the invention is the provision of an improved boiler construction comprising drums and connecting tubes wherein the water line is maintained at a predetermined elevation above all portions of the boiler proper and remains substantially constant under all conditions of load whereby the danger of destruction and deterioration incidental to a rapid drop in the water line under swiftly changing load conditions is avoided.

The boiler is so constructed that all parts thereof are under a static head pressure, the density of the water being dependent upon the temperature and pressure at which the boiler is being operated. The water line being constantly above the boiler proper, there is no steam bubbling or rising through the upper level of the water body with which the water column is connected.

Another object of the invention is the provision of a boiler so constructed that the water surface is substantially quiescent thereby avoiding erroneous readings occasioned by an attempt to read the water level when the same is volatile or emulsified as is the case when the water line lies below the top of the boiler.

Another object of the invention is the provision of a boiler construction in which the rapidity of circulation will permit the use of brackish or impure water which tends to scale in boilers of the usual type.

Many other objects and advantages of the construction herein shown and described will be obvious to those skilled in the art from the disclosure herein given.

To this end my invention consists in the novel construction, arrangement and combination of parts herein shown and described and more particularly pointed out in the claims.

Referring now to the drawings wherein like numerals indicate like or corresponding parts;

Fig. 1 is a transverse sectional view through a boiler embodying the principles of my invention;

Fig. 2 is a view along the line 2—2 of Fig. 1;

Fig. 3 is a view drawn to a larger scale along the line 3—3 of Fig. 1;

Fig. 4 is a view along the line 4—4 of Fig. 2; and

Fig. 5 is an end view of the structure shown in Fig. 4.

Referring now more particularly to the drawings, the boiler proper is shown as positioned in a furnace comprising side walls 27, end walls 28, a roof 29 and a floor 30. The floor 30 of the furnace is shown as positioned below the floor line 55 of the boiler room with the upper portion of the side walls 27 stopping short of the floor line to provide exit openings for the gases of combustion into air heaters (not shown). The furnace is constructed of suitable fire-resisting material and the air heaters, fuel inlet and other details of the furnace are omitted as being unnecessary to a disclosure of the invention.

A pair of longitudinally extending partitions 39 provide side walls for a combustion chamber 40. Baffles 41 extend outwardly from the top of the partitions 39, the space above the partitions and baffles forming a radiant heat zone. Baffles 42 are provided near the bottom of the space between the partitions 39 and the side walls 27 to direct the downwardly descending gases into contact with the drums 11 positioned at the exit openings 43.

The boiler system proper comprises a pair of upper spaced apart longitudinally extending drums 10 preferably parallel to and overlying the lower longitudinally extending drums 11. A drum 12 is positioned midway between and slightly elevated above the drums 10. Each of the upper drums 10 is

connected with the underlying lower drum 11 by a plurality of tubes 22. The tubes 22 are preferably positioned symmetrically about a vertical plane through the drums and are spaced apart at their mid portions to provide the necessary clearance for manholes 31 and a space for superheaters, if desired. The tubes 22 provide for rapid circulation of water between the drums 10 and 11. Water is admitted under pressure to the drums 10 through inlet pipes 36, each controlled by a valve 60, and descends to the drums 11 through the outer tubes 22 and returns to the drum 10 through the inner tubes 22.

The drum 12 is connected with the upper drums 10 by a plurality of tubes 23 and is connected with the lower drums 11 by a plurality of tubes 24 as best shown in Fig. 1. The tubes 23 are shown as arranged in two rows, the lowermost row forming a water cooled wall for the roof 29. The tubes 24 also form a water cooled wall for the partitions 39. The drums 10 and 12 project through the roof 29 and their projecting portions are covered with suitable insulation 44.

Pairs of upper and lower horizontal headers 13 and 14, respectively, are positioned at the ends of the boiler and extend transversely to the drums 10 and 11. The drum 12 is connected with the lower headers 14 by tubes 25, and the upper headers 13 are connected with the corresponding lower headers 14 by a plurality of tubes 26. The tubes 25 and 26 form water cooled walls for the ends of the furnace. The bottom headers 14 project through the side walls of the furnace below the floor line of the boiler room and are connected at their ends by pipes 37. The pipes 37 are connected with the drums 11 by a plurality of tubes 38 thereby connecting the lower headers 14 with the drums 11. A plurality of standpipes 15 are connected at their lower ends with the headers 14 and extend upwardly through the roof 29 where they form a connection with the main supply pipes 16.

A drum 21 is mounted at any convenient elevation above the roof 29 to provide a receptacle partially filled with water, the upper portion serving as a steam drum into which the emulsion and steam generated by the boiler is discharged. The pipes 16 are connected with the bottom of the drum 21 by a double L 17 as shown in Fig. 2, thereby connecting the standpipes 15 with the drum. The upper headers 13 discharge the mixture or emulsion of water and steam directly into the boiler drum 12. The upper row of tubes 23 functions only as equalizers of the static head of the boiler and the tubes comprising the upper row are insulated by being encased in the roof material. The lower row of tubes 23 are positioned within the radiant heat zone and are steam producers. All of the steam and emulsified water generated by the boiler system proper is discharged into the boiler drums 10 and 12. These drums in turn discharge the steam and emulsified liquid into the upper portion of the drum 21 through conduits comprising pipes 18, 19 and double L's 20, the water in the mixture being separated from the steam by gravity in the upper portion of the drum 21. The drum 21 is preferably positioned as high above the boiler system proper as space conditions permit and it is found in practice that an elevation of the drum of 12 feet provides sufficient pressure head to cause a circulation sufficiently rapid to prevent scaling even though brackish or impure water is used. It is obvious that the greater the elevation of drum above the boiler proper the more rapid will be the circulation by reason of the increased pressure head and as a result the efficiency of the boiler is increased proportionately to the elevation of the drum 21.

The entire boiler system is filled with water which enters through the inlet pipes 36 at the end of the drums 10, the supply of water being continued until it reaches an elevation in the drum 21 substantially as shown in Fig. 1. The capacity of the drum 21 is proportionate to the capacity of the boiler system proper and the water level is maintained in the drum 21 as shown by regulating valves 60 controlling inlet pipes 36.

Since all of the steam and emulsion generated by the boiler collects in the drums 10 and 12 which are connected with the drum 21 only through the pipes 18 and 19, there is no possibility of the water within the drum 21 being subjected to ebullition and it will remain substantially quiescent regardless of the capacity of the boiler or the load that the boiler may be carrying. The quiescent condition of the water within the drum 21 permits the accurate determination of the water line by observing a water column 35 mounted on one end of the drum 21. Inasmuch as the volume of emulsion and steam generated by the boiler system will be limited by the capacity of the boiler drum 12 and the connecting pipes 18 and 19, there is no possibility of more than a slight variation of the water line. The pressure head upon all portions of the boiler prevents the boiler from operating at a critical temperature and pressure and thereby avoids the formation of emulsion within the boiler proper. This arrangement and construction of the boiler under a constant pressure head eliminates any possibility of the water line dropping to a point where any portions of the boiler will be evacuated and exposed to burning or destruction by reason of rapid changes of temperature or pressure corresponding to sudden changes in load requirements.

A pair of safety valves 34 are mounted on the upper portion of drum 21 and a pair of

steam outlet pipes 33 are provided to convey the steam away from the boiler as needed in the performance of work.

My improved boiler construction, as shown, may be used either with or without super heaters and in the event a super heater is provided, one or more of the discharge pipes 33 will be connected therewith as shown in Fig. 2. The super heater comprising a header 46 into which the pipe 33 discharges and a plurality of tubes 47 connecting the header 46 with a header 48 positioned on the opposite side of the boiler. The tubes 47 extend through the space between the tubes 22 which connect the upper and lower boiler drums 10 and 11. A header 50 positioned on the same side of the boiler as the header 46 is connected with the header 48 by a plurality of tubes 49 occupying the space underneath the tubes 47. The steam passes from the header 46 into the header 48 and then back to the header 50 from which it is discharged through the steam line 51. The header 48 extends downwardly a substantial distance below the tubes 47 and 49 to provide a water trap 56. A valve 57 is provided for draining the trap 56 when necessary.

This method of distribution provides a practically uniform velocity for each tube. The trap 56 provides a place for the separation of any entrained water. The diameter, length, number of tubes in a row and number of rows of tubes used depend upon the requirements of the particular installation. The super heater is shown as positioned at only one end of the boiler, but may, if desired, be positioned at both ends.

Thus it will be seen that I have provided a relatively simple boiler construction by means of which a static pressure head is obtained for all portions of the boiler system and a rapidity of circulation of the water results which permits the use of brackish or impure water without scaling which would be impossible in the usual type of boiler. The static pressure head adapts the boiler for installations where the load is necessarily applied quickly or dropped suddenly and prevents the rapid deterioration or danger of destruction of the boiler which is the case in the usual type of boilers having no static pressure head.

Having thus described my invention, it is obvious that various immaterial modifications may be made in the same without departing from the spirit of my invention; hence, I do not wish to be understood as limiting myself to the exact form, construction, arrangement and combination of parts herein shown and described or uses mentioned.

What I claim as new and desire to secure by Letters Patent is:

1. A boiler comprising a system of horizontally extending drums arranged in pairs, the members of each pair of drums being spaced apart vertically, a plurality of tubes interconnecting the drums comprising each pair, a static head drum positioned at a predetermined elevation above said boiler, steam pipes connecting the upper portion of said static head drum with the upper boiler drums of each pair, a plurality of vertically extending tubes forming the end walls of the boilers, upper and lower headers in which said last mentioned tubes terminate, steam pipes connecting the upper headers with the upper portion of said static head drum and water pipes connecting the boiler with the lower portion of said static head drum and a valve controlled feed pipe adapted to connect the boiler with a supply of water under pressure.

2. A boiler system comprising a pair of upper spaced apart parallel horizontally extending drums, a pair of spaced apart drums positioned underneath and parallel to said first mentioned drums, a plurality of tubes connecting each of said drums with the corresponding lower drum, a drum positioned between and slightly above said upper drums, a plurality of standpipes positioned one adjacent the ends of each of said first named drums, a pair of lower headers extending transversely to said drums and connected with the bottom of said standpipes, a corresponding pair of upper headers overlying said first mentioned headers, a plurality of vertical tubes connecting said upper and lower headers, a plurality of tubes connecting said last mentioned drum with the other drums and with the lower headers, a static head drum positioned at a predetermined elevation above said boiler, steam pipes connecting the upper portion of the static head drum with the uppermost boiler drum, said standpipes connecting with the bottom of the static head drum and a valve controlled feed pipe adapted to connect the boiler with a supply of water under pressure.

In witness whereof, I hereunto subscribe my name this 16th day of July, A. D. 1930.

GEORGE LASKER.