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PATENTED FEB. 14, 1905.

J. P. SNEDDON.
SUPERHEATING WATER TUBE BOILER.

APPLICATION FILED APR. 27, 1904.

2 SHEETS—SHEET 1.

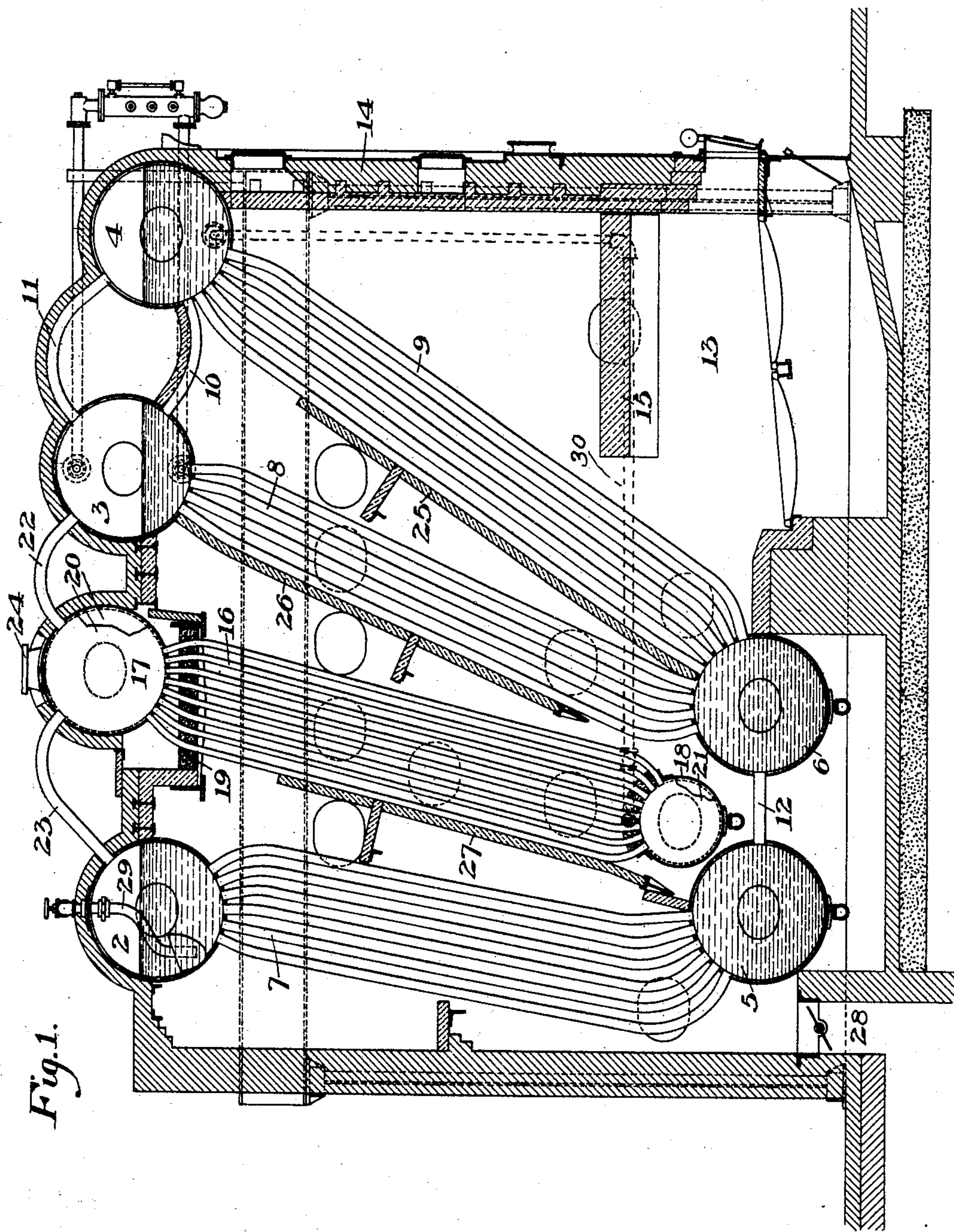


Fig. 1.

WITNESSES

Warren W. Swartz
G. B. Blumling

INVENTOR

J. P. Sneddon
by Gardner & Byrnes
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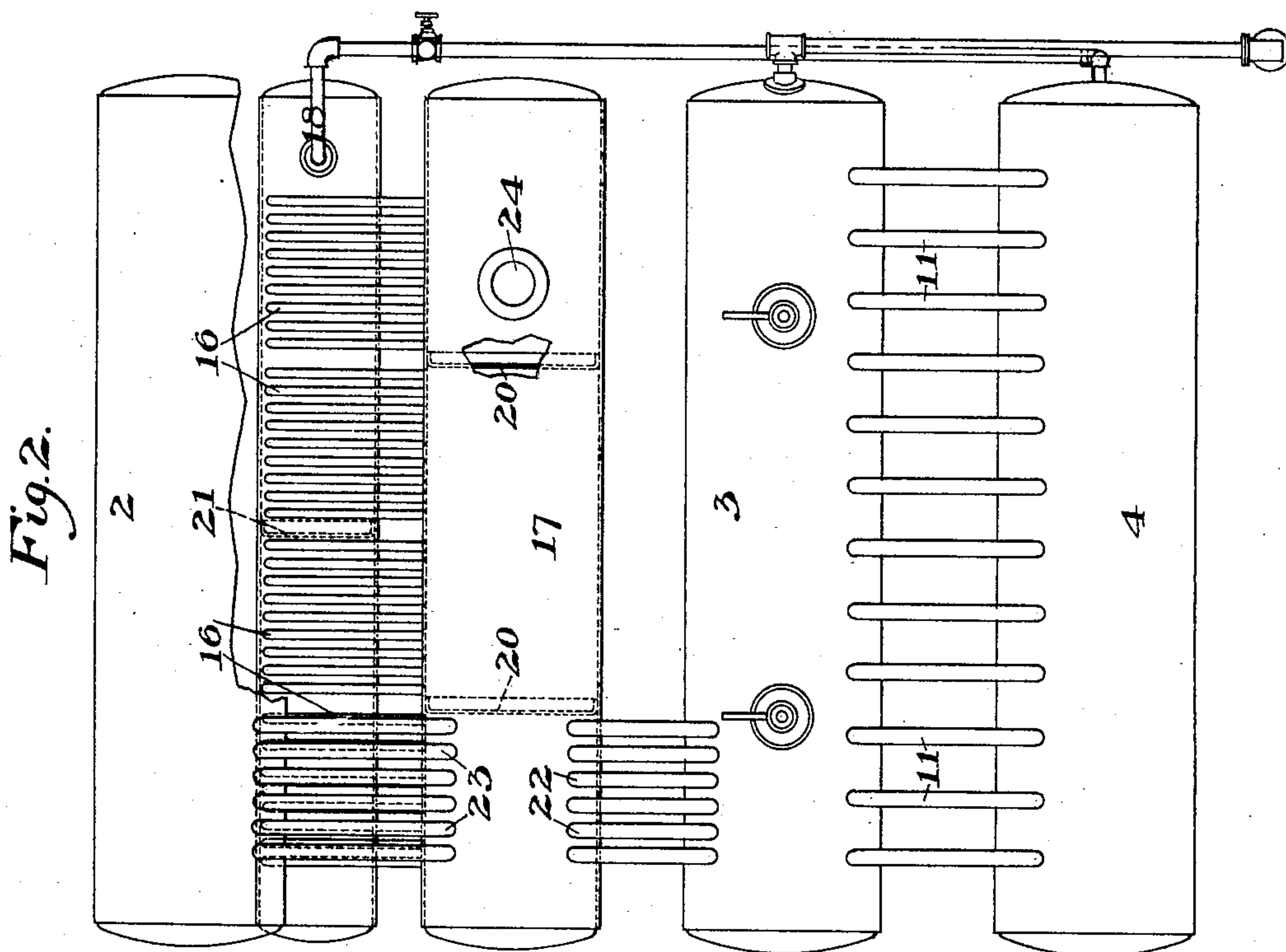
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Warren W. Swartz
G. B. Blum

INVENTOR

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UNITED STATES PATENT OFFICE.

JAMES P. SNEDDON, OF BARBERTON, OHIO, ASSIGNOR TO THE STIRLING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF NEW JERSEY.

SUPERHEATING WATER-TUBE BOILER.

SPECIFICATION forming part of Letters Patent No. 782,765, dated February 14, 1905.

Application filed April 27, 1904. Serial No. 205,181.

To all whom it may concern:

Be it known that I, JAMES P. SNEDDON, of Barberton, Summit county, Ohio, have invented a new and useful Superheating Water-Tube Boiler, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a sectional side elevation of my improved boiler, and Fig. 2 is a top plan view of the boiler structure.

My invention relates to a combined superheater and water-tube boiler, and is designed to so arrange a superheater in a transverse-drum serial-pass water-tube boiler that a low boiler of this type may be provided with the proper amount of heating-surface between the superheating-tubes and the source of heat.

In boilers of the Stirling type with transverse drums connected by banks of tubes over which the gases are given up and down passes the boiler structures differ in height, and such boilers are very flexible in being adapted to different requirements. Thus low boilers with a large ratio of heating-surface may be built for low-grade coal, and where floor-space is restricted high boilers can be used with tubes of greater length.

In placing a superheater within a boiler structure of the general Stirling type if a low boiler is used and the superheater placed in rear of the front bank of tubes the superheater will be liable to injury on account of the reduced water - evaporating surface between the furnace and the superheater.

I have found that by placing the superheater so that two banks of water-tubes intervene between it and the source of heat I can provide sufficient water-evaporating surface between the superheater and the furnace even in a low boiler. This arrangement of two banks of water-tubes over which the gases pass up and down before reaching the superheater-tubes enables me to obtain the proper amount of total water-evaporating surface in the boiler and put the maximum horse-power boiler in a minimum width with a limited height. My construction also comprises the using of the same circulating cycles as in the

ordinary four-drum Stirling boiler while the superheater is in a desirable and efficient location.

In the drawings, 2, 3, and 4 represent upper transverse steam and water drums, and 5 and 6 lower transverse mud-drums. The drums 2 and 5 are connected by the bank of tubes 7, while the drums 3 and 4 are connected to the mud-drum 6 by the banks of tubes 8 and 9. The water-spaces of the drums 3 and 4 are preferably connected by tubes 10 and their steam-spaces by tubes 11. The mud-drums are connected by tubes 12. I have shown the front bank as overhanging the combustion-chamber 13, 14 being the front wall of the setting, which is preferably provided with the arch 15, jutting over the combustion-chamber.

Between the banks of tubes 7 and 8 I place a bank of superheating-tubes 16, which connect the upper and lower steam-drums 17 and 18. The lower steam-drum 18 is preferably slightly above and between the drum of the mud-drums, and the drum 17 is preferably cut off from the gases by refractory packing 19, surrounding the tubes 16 below this drum.

The upper steam-drum 17 is preferably divided into three compartments by two transverse partitions 20, and the lower steam-drum 18 is divided into two compartments by a central transverse partition 21.

The tubes 22, which conduct steam from the steam and water drum 3, and the tubes 23, which conduct steam from the rear steam and water drum 2, preferably enter the same chamber of the steam-drum 17, this chamber being preferably at one end. The steam-outlet 24 from the drum 17 leads into the chamber at the other end, and the steam is thus given four up and down passes through the tube 16 before it reaches the compartment from which it is taken off to be used. I thus obtain an efficient superheating action by this serial up and down pass of the steam through the superheater tubes in the rear of the two banks of water-tubes.

I have shown a front baffle 25 leading from the drum 6 upwardly over the front bank 9, the next baffle 26 extending downwardly from

the drum 3 over the rear of the bank of tubes 8, while the third baffle 27 leads upwardly from the drum 5 along the back of the superheating-tubes. I have shown the offtake-flue 28 as
 5 leading downwardly to conduct the spent gases to the stack. This eliminates any dead-space or dead-pass in the setting proper. The gases rising from the fire-space pass upwardly among the tubes 9, downwardly among the tubes 8,
 10 upwardly among the tubes 16, and downwardly among the tubes 7 to the offtake. It will be noted in the form shown the gases sweep upwardly over the superheating steam-tubes.

I have shown the feed-water pipe 29 as lead-
 15 ing into a receiving-pocket in the rear upper steam and water drum, the water flowing down through the rear bank, upward through the tubes 12 into the front mud-drum, and entering the triangular circulation of the two front
 20 banks. The steam released in both the drums 3 and 4 passes to the drums 17 through tubes 22 and combines with the steam entering through tubes 23, this steam then being given the circulating passes before described to su-
 25 perheat it.

Suitable connections may be provided for flooding the superheating-section and also for supplying it with water to form a supplemental or auxiliary boiler, if desired. Thus
 30 I show the external valved pipe 30 leading from the water-space of the front upper steam and water drum into the lower drum 18 of the superheater. This flooding connection may of course be connected to any of the five boiler-
 35 drums or to an independent source of feed, although I prefer the connection shown, as it provides a supply of clean water to the superheater.

The advantages of my invention result from
 40 locating the superheater-section with two banks of water-tubes in front of it, so that in a low boiler the overheating of the superheater-tubes will be avoided and the proper amount of water-evaporating surface provided in front
 45 of it, also from the serial-pass arrangement for the steam during superheating, the drum connections, and the arrangement of the baffles. The baffle arrangement allows of the ordinary triangular circulation for the water, and the
 50 baffles are arranged so that there is no dead-pass in the structure proper.

The number of the drums may be varied, as well as the number of banks of tubes. The chambers of the steam-drums may be changed,
 55 as well as the connections to the steam and water drums, and other variations may be made without departing from my invention.

I claim--

1. A water-tube boiler having upper and
 60 lower transverse drums connected by at least three banks of water-tubes, a superheater having tubes arranged in the rear of the two front banks of water-tubes, and in the direct main path of the gases, and baffles between the su-
 65 perheater and the banks of water-tubes in

front of and behind it, the superheater forming at least the major part of the heating-surface in its pass between the baffles; substantially as described.

2. A water-tube boiler having at least three 70 transverse steam and water drums connected by banks of tubes to at least one mud-drum, a superheater having tubes in the direct main path of the gases and in the rear of the two front banks of water-tubes, a bank of water-
 75 tubes in the rear of the superheater and baffles in front and in the rear of the superheater arranged to give the gases at least four up and down passes; substantially as described.

3. A water-tube boiler having at least two 80 transverse connected mud-drums, banks of tubes connecting said mud-drums to elevated steam and water drums, a superheater having tubes arranged between the banks of water-
 85 tubes and in the direct main path of the gases, and baffles between the superheater and the banks of water-tubes in front of and behind it, the superheater forming at least the major part of the heating-surface in its pass between the baffles; substantially as described. 90

4. A water-tube boiler having at least three transverse steam and water drums connected by banks of tubes to at least one mud-drum, a superheater having an upper drum and tubes arranged in the rear of the two front banks
 95 of water-tubes in the direct main path of the gases, baffles between the superheater-tubes and the banks of water-tubes in front of and behind it, and steam-tubes leading from the steam and water drums to the upper drum of
 100 the superheater; substantially as described.

5. A water-tube boiler having at least three transverse steam and water drums connected by banks of tubes to at least two connected mud-drums, a superheater having an upper
 105 transverse steam-drum and located behind two front banks of water-tubes, baffles in front of and behind the superheater-tubes, said tubes forming the major part of the heating-surface between said baffles, and tubes connecting the
 110 steam-spaces of the steam and water drums to the superheating-drum; substantially as described.

6. A water-tube boiler having at least two transverse banks of water-tubes, a superheater
 115 having upper and lower drums connected by tubes arranged between the two banks of water-tubes and in the direct main path of the gases between the superheating-tubes and the banks of water-tubes in front of and be-
 120 hind it and tubes leading from the steam-spaces of the steam and water drums to the upper superheater-drum, the superheater-drums having transverse partitions arranged to give a plurality of up and down passes to
 125 the steam in the superheating-tubes before reaching the outlet; substantially as described.

7. A water-tube boiler having at least two upper transverse steam and water drums connected by banks of tubes to at least one mud- 130

drum, a superheater having an upper drum with tubes arranged between the two banks of water-tubes and in the direct main path of the gases, baffles between the superheater and the banks of water-tubes in front of and behind it, the superheater forming at least the major part of the heating-surface in its pass, and a transverse partition in the superheater-drum arranged to give serial passes to the steam before reaching the outlet; substantially as described.

8. A water-tube boiler having transverse upper and lower drums connected by banks of tubes, a superheater having an upper transverse drum with tubes arranged between two banks of water-tubes and in the direct main path of the gases, the superheater-drum having a transverse partition dividing it into compartments, a steam-outlet from one compartment and tubes leading from the steam-spaces of the steam and water drums to another compartment, whereby the steam is given up and down passes before reaching the outlet; substantially as described.

9. A water-tube boiler having three transverse steam and water drums connected by banks of tubes to two connected mud-drums, a superheater having transverse upper and lower drums connected by a bank of tubes, and located between the two front banks of

water-tubes and the rear bank of water-tubes, the superheater forming at least the major part of the heating-surface in its pass, and baffles arranged to give the gases serial up and down passes over the banks of tubes, the steam and water drums having their steam-spaces connected to the upper superheater-drum, the superheater being arranged to give serial up and down passes to the steam through its tubes, before reaching the steam-outlet; substantially as described.

10. A water-tube boiler having upper and lower transverse drums connected by at least three banks of water-tubes, a superheater having tubes arranged in the rear of the two front banks of water-tubes, and in the direct main path of the gases, baffles between the superheater and the banks of water-tubes in front of and behind it, the superheater forming at least the major part of the heating-surface in its pass between the baffles, and flooding connections for the superheater; substantially as described.

In testimony whereof I have hereunto set my hand.

JAMES P. SNEDDON.

Witnesses:

W. F. LUCAS,
J. E. BELL.