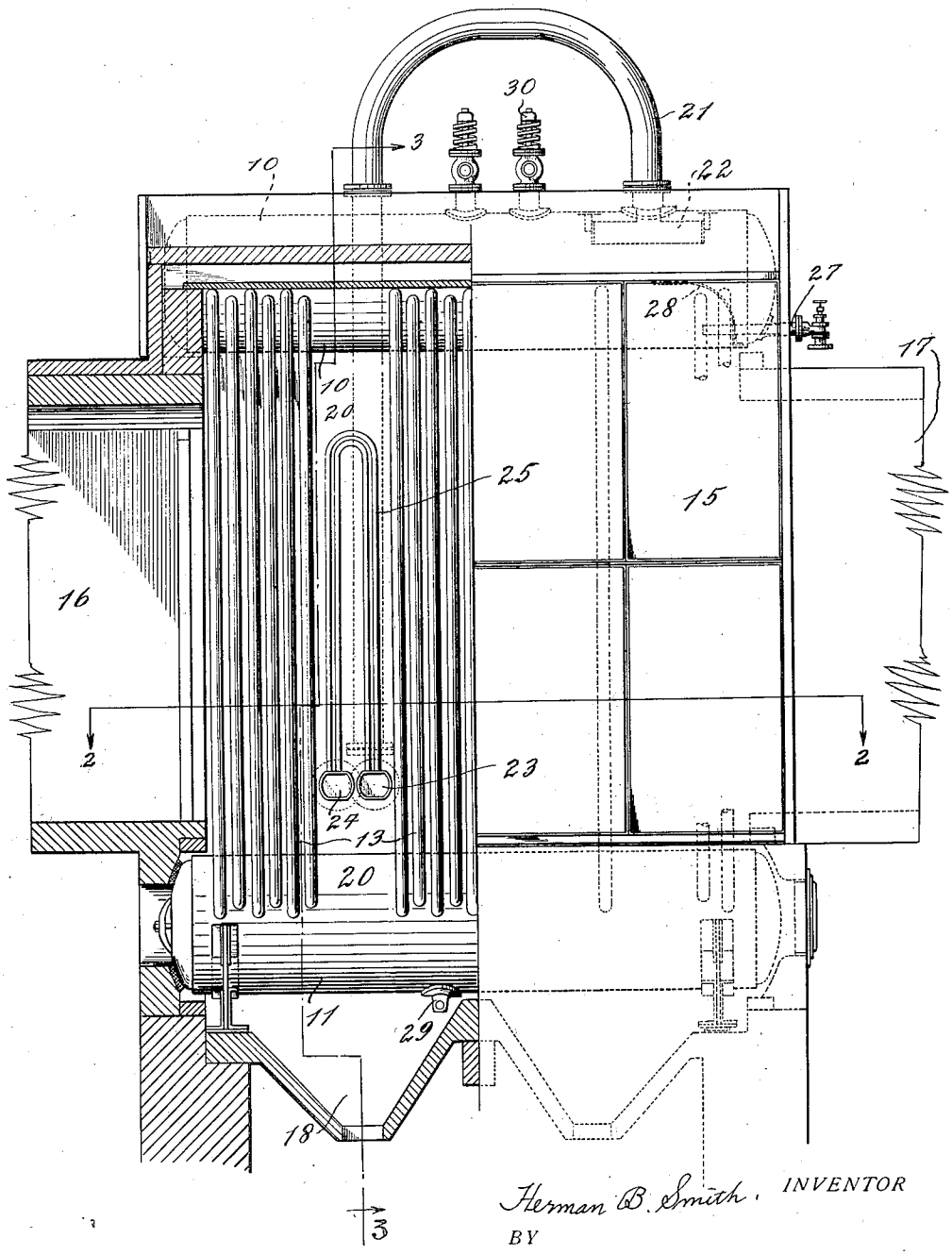
Oct. 6, 1931. H. B. SMITH 1,826,029

WASTE HEAT BOILER

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Fig. 1.



Herman B. Smith, INVENTOR

BY

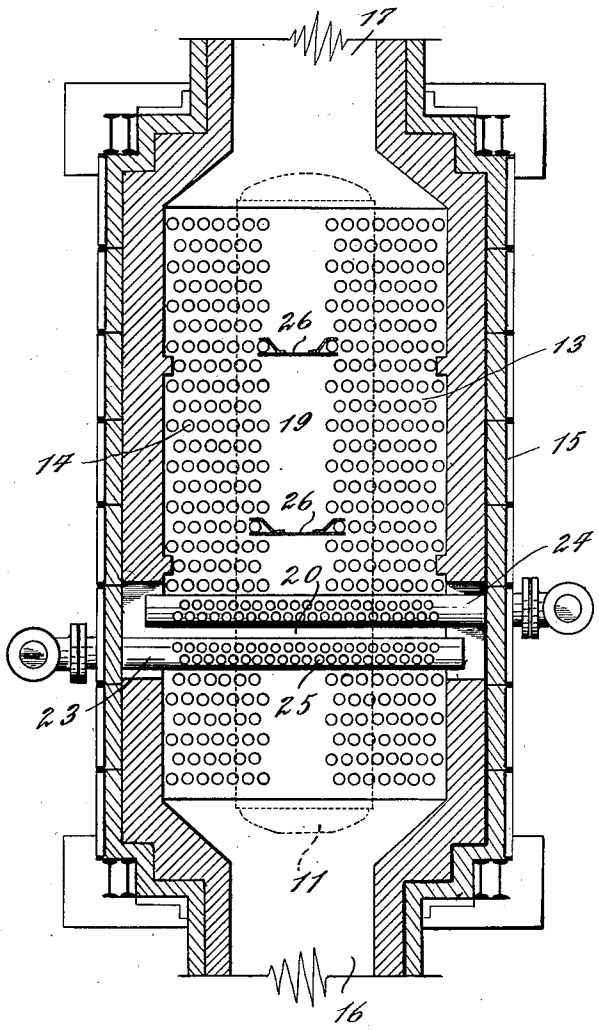
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Fig. 2.



Herman B. Smith INVENTOR

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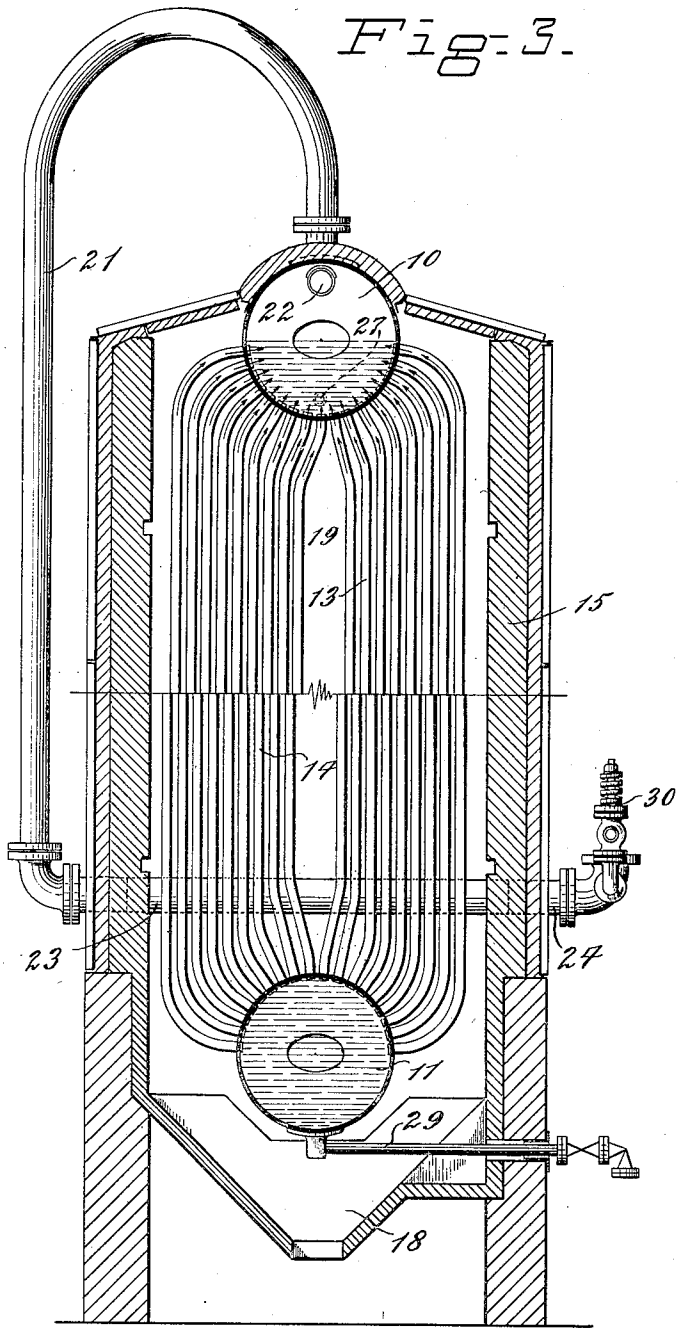
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Fig. 3.



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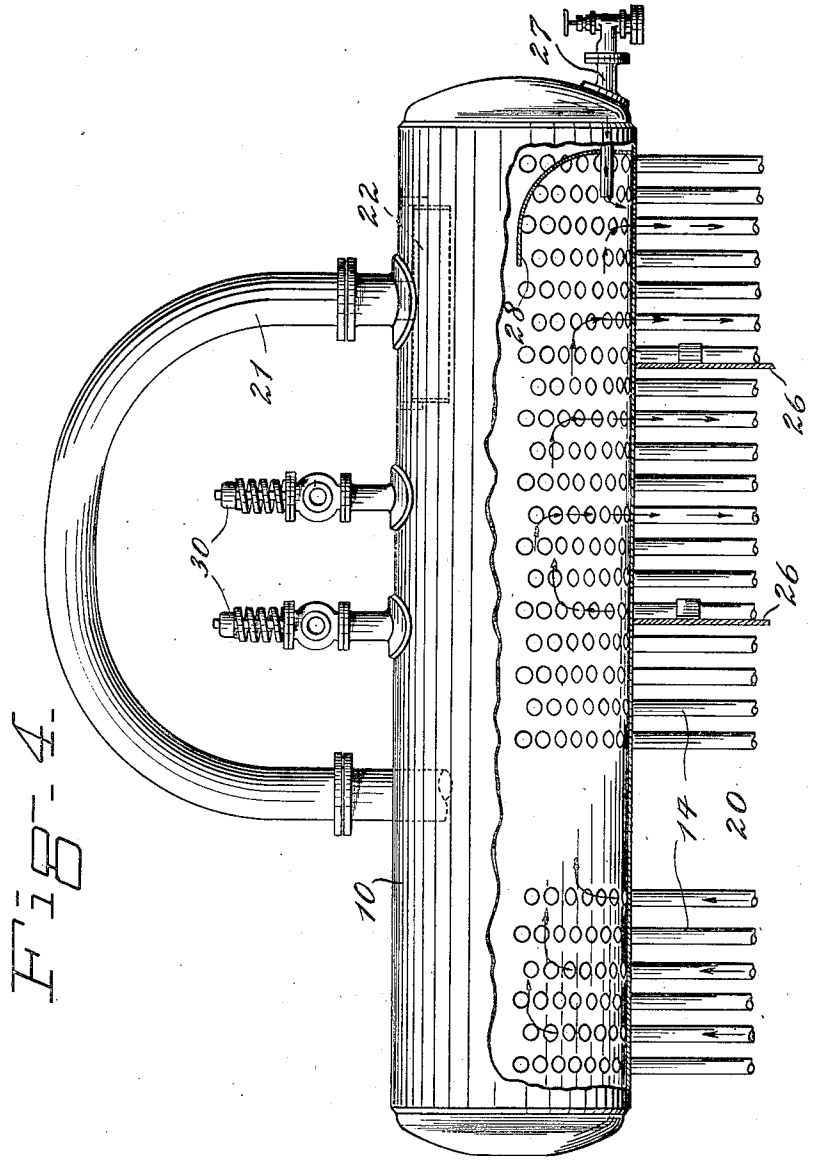


Fig. 4.

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Patented Oct. 6, 1931

1,826,029

UNITED STATES PATENT OFFICE

HERMAN B. SMITH, OF PLAINFIELD, NEW JERSEY, ASSIGNOR TO THE BABCOCK & WILCOX COMPANY, OF BAYONNE, NEW JERSEY, A CORPORATION OF NEW JERSEY

WASTE HEAT BOILER

Application filed January 23, 1926. Serial No. 83,187.

This invention relates to a boiler for utilizing waste heat gases as, for example, gases from open-hearth furnaces, for generating steam, and will be understood from the description in connection with the accompanying drawings, in which Fig. 1 is a side elevation of the boiler, partly in section; Fig. 2 is a section along the line 2—2 of Fig. 1; Fig. 3 is a section along the line 3—3 of Fig. 1 with the superheater tubes omitted and Fig. 4 is a side view on an enlarged scale, partly in section and partly broken away.

In the drawings, reference characters 10 and 11 indicate upper and lower drums having their axes in substantially the same plane that are connected by banks 13 and 14 of tubes, that are divided longitudinally into two groups with a space between the groups longitudinally of and located between the drums 10 and 11. The drums and tubes are surrounded by a casing 15, that is provided with an inlet 16 at its front end for hot gases, and an outlet 17 at the other end for the same. The casing is provided along the bottom thereof with soot pockets 18. The banks of tubes are not only spaced so as to leave the space 19 between the banks, but each bank is also divided into groups with a similar number of tubes in each front group, thus leaving a space 20 transversely across the casing between the tubes, to form a superheater chamber.

A pipe 21 extends from the steam space of the upper drum 10 from the dry pipe 22 to the inlet header 23 of the superheater. The outlet header 24 of the superheater is connected to the header 23 by a plurality of U-tubes 25 that are located in the space 20 between the groups of tubes 13 and 14, and extend transversely across the casing, as indicated. The superheater headers may be horizontally disposed, and the U-tubes vertically disposed, as shown, or the superheater headers may be arranged vertically and located outside the casing with the superheater tubes horizontal.

Baffles 26 may be attached to the tubes and extend between the drums 10 and 11 and close the space 19 between the groups of tubes 13 and 14, thus preventing the gases from laning through the space between the tubes. A feed water inlet 27 is shown by which the feed water is introduced into the water space at the rear or cool end of the upper drum 10. The curved plate 28 is provided as a splash plate, and the flow of water through the tubes will be as is indicated by the arrows in Fig. 4, with the water flowing downwardly through the rear tubes and upwardly through the front tubes at the hot or front end of the boiler. The drain pipe 29 is shown leading from the bottom of the mud drum 11, and the boiler may be provided with safety valves 30.

The operation is as follows: Hot gases are introduced from some external source of heat into the casing through the inlet 16, and flow longitudinally between the drums 10 and 11 in contact with the front group of tubes, and then over the tubes of the superheater, and thence over the other tubes of the groups 13 and 14. The tubes 13 and 14, as well as the U-tubes of the superheater, are preferably staggered, and after the gases pass beyond the superheater, and a few of the tubes 13 and 14 therebehind, they are diverted from the space 19 by means of the baffles 26, so as to force the same to flow over the remaining tubes of the groups 13 and 14. Some of the gases which contact with the superheater flow through the space between the groups of tubes, and contact with the superheater before being cooled by the tubes 13 and 14, thus giving up sufficient heat to the superheater to raise the steam therein to the desired temperature.

I claim:

In combination, a boiler comprising an upper and a lower drum having their axes

disposed substantially in the same plane, a casing enclosing the boiler and forming a single straight gas pass longitudinally of said drums with an inlet and an outlet adjacent opposite ends of the drums, said inlet adapted to be connected to a source of heat outside the casing, two banks of tubes connecting the drums and disposed on opposite sides of said plane and spaced apart, baffles disposed in said space to prevent laning of gases therethrough, the tubes in said banks being arranged in groups spaced lengthwise of the drums, and a superheater extending transversely of the drums and disposed in spaces between said groups and across the space between said banks.

HERMAN B. SMITH.