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A. B. STIRLING.
SUPERHEATING BOILER.
APPLICATION FILED MAR. 5, 1909.

Patented July 5, 1910.

3 SHEETS—SHEET 1.

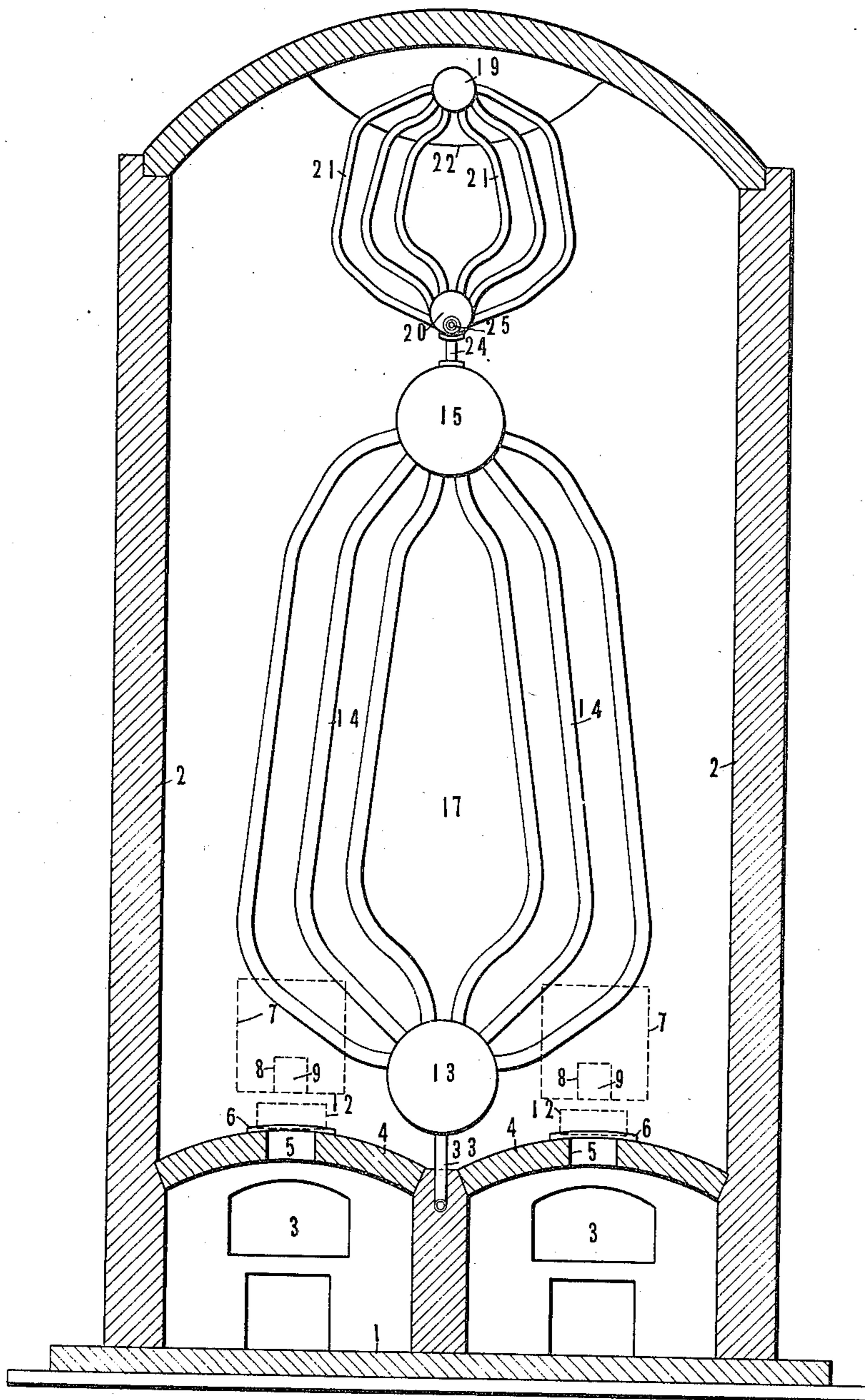


Fig. 1.

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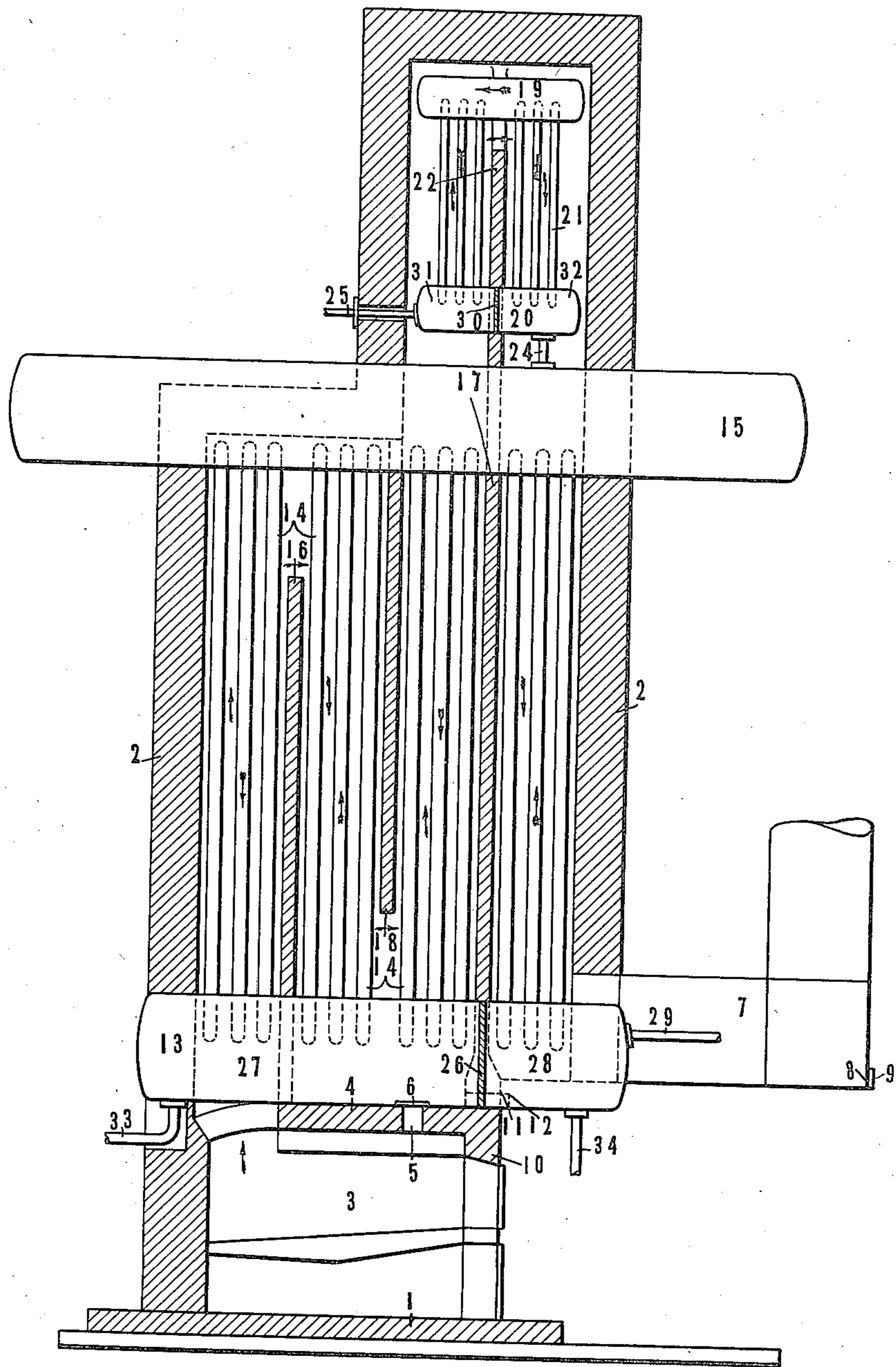


Fig. 2.

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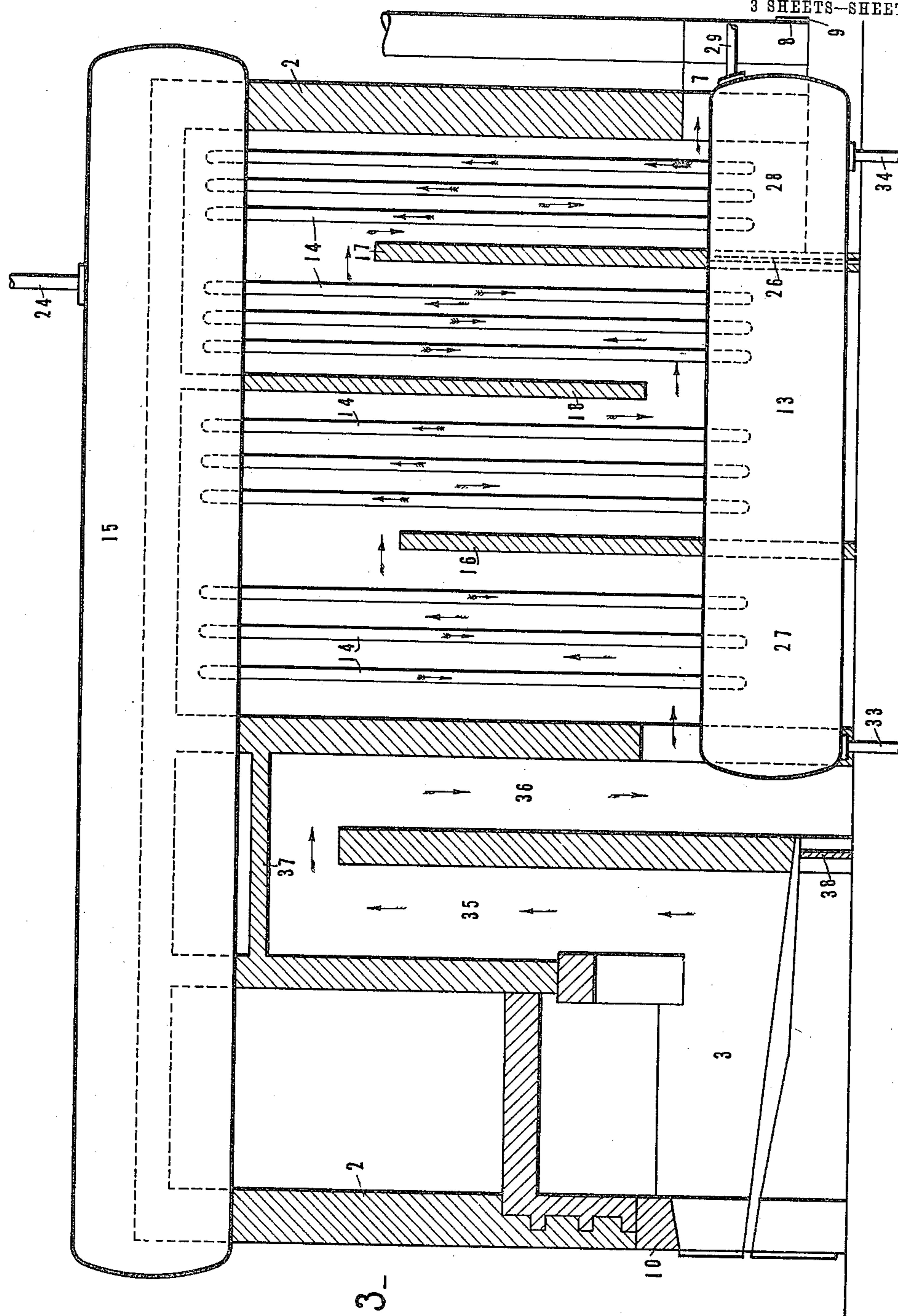
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

ALISON B. STIRLING, OF PLEASANT MOUNT, PENNSYLVANIA.

SUPERHEATING-BOILER.

963,257.

Specification of Letters Patent.

Patented July 5, 1910.

Application filed March 5, 1909. Serial No. 481,484.

To all whom it may concern:

Be it known that I, ALISON B. STIRLING, a citizen of the United States, residing at Pleasant Mount, in the county of Wayne and State of Pennsylvania, have invented certain new and useful Improvements in Superheating-Boilers, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in boiler construction and more particularly to boilers of the water-tube type.

One of the objects of the invention is to provide a boiler which will have a high heating efficiency combined with ease of cleaning.

Another object is to provide a boiler of this type in which the circulating water shall have a definite circulation and whereby the coolest gases will always be directed against the tubes containing the coolest water.

Another object thereof is to provide a new and improved superheater for a boiler of the above type.

Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, wherein is illustrated one of various possible embodiments of my invention, Figure 1 is a vertical sectional view taken transversely of the boiler near the front end thereof. Fig 2 is a vertical sectional view taken longitudinally of the boiler. Fig. 3 is a vertical, sectional view similar to Fig. 2, showing a modified form of boiler.

Similar reference characters refer to similar parts in all views of the drawings.

Referring now to the drawings, 1 indicates the foundation or base which supports the setting 2 of the boiler.

The fire-box is represented at 3, the upper wall of said fire box being formed by an arch 4, in the front portion of which is formed an aperture 5, which may, if desired, be connected with the ash pit. This aperture, in the present instance, is adapted to be closed

by a plate 6, although any suitable means may be employed in this relation.

A stack 7 leads from the setting of the boiler near the lower portion thereof above the fire-box. At this point it may be noted that while, in the present instance, two fire boxes having independent stacks are employed, which stacks may, if desired, be connected with a common flue or chimney, these portions of the construction are similar in all respects, and a description of one side of the boiler will, therefore, suffice to impart a clear understanding of the invention. Stack 7 is provided with an aperture 8 adapted to be closed by door 9; and the front wall 10 of the setting of the boiler is likewise provided with an aperture 11 adapted to be closed by a door 12. The object of these apertures 8 and 11 is to permit a scraper or similar instrument to be inserted in the space above the arch 4, and in space formed in front of the baffle 17, which instrument may be manipulated to discharge accumulations of dust and ashes resting upon the upper portion of the arch and in space 28.

In the central portion of the boiler is a longitudinally extending water-drum 13 from which leads a plurality of substantially vertically disposed tubes 14, the upper ends of said tubes leading into a steam and water-drum 15 which extends longitudinally of the boiler near the upper portion. A pair of baffles 16 and 17 extend upwardly between tubes 14, and a baffle 18 extends downwardly between tubes 14 and is interposed between baffles 16 and 17.

A superheater is located outside of the boiler setting above the steam and water-drum 15, said superheater comprising upper and lower drums or headers 19 and 20 respectively, connected by vertical tubes 21. These tubes are arranged in two sets as shown, and baffle 17 is extended upwardly, as at 22, between these sets of tubes, said baffle terminating below the upper drum or header 19, as clearly shown in the drawings.

It will be observed that the arrangement of the baffles with respect to the tubes of the boiler, as well as those of the superheater, provide channels so that the heated gases will pass progressively from the furnace through the spaces occupied by these tubes before the same is discharged from the boiler through the stack 7. The course of

the heated gases is illustrated by the half-barbed arrows. The superheater is attached to the steam and water-drum 15 as by means of the conduit 24, and the steam is discharged from the boiler through the conduit 25. Water-drum 13 is provided with a transverse partition 26 which divides the same into front and rear compartments 27 and 28 respectively, said partition, in the present instance, being located immediately below the baffle 17, and is adapted to compel the water flowing into compartment 28, through a feed connection 29, to flow in an upward direction through this series of water tubes, the circulation of the water being indicated by the full-barbed arrows.

It will be observed that the water circulates through the tubes 14 of the boiler, as well as in a direction opposite to that traveled by the heated gases from the furnace, and that the baffles are disposed in such manner that the coolest gases are always brought into contact with the tubes containing the coolest water. Similarly, the circulation of the steam in the superheater is always in a direction opposite to that traveled by the heated gases. This result is attained by providing a partition 30 in the drum or header 20 of the superheater, which divides the same into compartments 31 and 32 respectively, thus insuring a circulation through the tubes 21 in the direction indicated by the arrows. Blow-off pipes 33 and 34 lead from each compartment, 27 and 28 respectively, of the water-drum 13, and if desired partition 26 may be provided with an aperture in its lower portion so that the entire drum may be blown off through either of said blow-off pipes.

Referring to Fig. 3, there is shown a modified form of boiler which is so constructed as to be peculiarly adapted for the use of soft coal. In this modification the steam and water drum 15, tubes 14, and baffles 16, 17 and 18, are similar to the corresponding parts shown in Figs. 1 and 2, but the water drum 13 is located at the rear of, and preferably below, the fire-box 3, between which, and the water drum, vertically extending flues or passages 35 and 36 are formed, and an arch 37 is preferably provided above the flues to protect the steam and water drum. The gases of combustion from the furnace are forced to pass through these passages before contacting with the tubes or the water drum, whereby during their progress any smoke which may be present by reason of a too rapid volatilization of the gases will be consumed, thus insuring that the gases which will come into contact with the tubes will be practically smokeless and very hot. The boiler in other respects is similar to that heretofore described and shown in Figs. 1 and 2. If desired, the outlet 24 from the steam and water drum 15 may communicate

with a superheater such as is shown in said figures, in which instance, of course, the baffle 17 will be extended above the steam and water drum 15 as heretofore described. A door 38 is preferably provided at the rear of the furnace, to facilitate in the cleaning of the same.

In operation it will be seen that the gases from the furnace, when contacting with the vertical tubes 14 will first pass upward between the baffle 16 and the front of the boiler, then downward between baffles 16 and 18, then upward between baffles 18 and 17, and finally downward between baffle 17 and the rear of the furnace to the stack 7, and as the water within the boiler is circulating through the tubes in the opposite direction to that of the gases, it, of course, follows that the coolest gases will always contact the tubes containing the coolest water and vice versa. It will, accordingly, be seen that I have provided a construction well adapted to attain, among others, all the ends and objects above pointed out in a simple yet efficient manner.

By reason of the fact that the coolest gases are always contacted with tubes containing the coolest water, there is provided an economical and thorough abstraction of the heat carried by said gases. This latter advantage is also inherent in the superheating structure by reason of the disposition of the various parts and their relation to the baffles of the boiler proper. Another advantage accruing herein lies in the fact that the superheater being located above the boiler proper, may be readily removed therefrom if desired, or added to boilers which have been installed without such superheater.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense. It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention, which, as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a superheating boiler, the combination with the furnace, of a water-drum, a steam and water drum disposed above the water drum, vertically disposed tubes interposed between said drums, a superheater located above the steam and water drum comprising a plurality of drums or headers inter-connected by vertically disposed tubes,

a plurality of baffles extending upward from the furnace and interposed between said first-mentioned tubes, one of said baffles being also continued above the boiler and interposed between the tubes of the superheater, a baffle extending downwardly between said first-mentioned tubes and said baffles, and a partition arranged within the water-drum at a point adjacent one of said first-mentioned baffles.

2. In a superheating boiler, the combination with the furnace, of a water-drum, a steam and water drum disposed above the water-drum, vertically disposed tubes connecting said drums, a transverse partition arranged in said water-drum adapted to compel a flow of water in a certain direction through said tubes, a plurality of baffles arranged between said tubes and adapted to direct the coolest gases against the tubes containing the coolest water, a superheater located above the steam and water drum and connected with the latter, said superheater comprising upper and lower drums connected by vertically disposed tubes, one of said baffles being continued above the boiler and located between the tubes of the superheater, and a partition in the lower drum of the superheater which lies substantially in the plane of the baffle.

3. In a superheating boiler, the combination with the furnace, of a water-drum, a steam and water drum disposed above the water-drum, a plurality of vertically disposed tubes connecting said drums, a super-

heater located above the steam and water drum, said superheater comprising upper and lower drums or headers, and vertical tubes connecting said drums or headers, a plurality of baffles extending upwardly from the furnace between said first-mentioned tubes, one of said baffles also extending above the boiler between the tubes of the superheater, a baffle extending downwardly between said tubes and interposed between said first-mentioned baffles, and partitions in said water-drum and in the lower drum or header of the superheater, which are located in the plane of one of the baffles.

4. In a superheating boiler, the combination with the furnace, of a water-drum, a steam and water-drum disposed above the water-drum, upper and lower superheater-drums located above said steam and water-drum and connected therewith, a group of tubes connecting said steam-drum and said water-drum, a group of tubes connecting said superheater-drums, a partition in said water-drum, a partition in said lower superheater-drum, and a baffle located in the plane of said partitions extending upward from the water-drum among the tubes of both groups.

In testimony whereof I affix my signature, in the presence of two witnesses.

ALISON B. STIRLING.

Witnesses:

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L. M. PLATT.