

No. 661,720.

Patented Nov. 13, 1900.

G. C. HICKS, JR.
WATER TUBE BOILER.

(Application filed July 5, 1900.)

(No Model.)

2 Sheets—Sheet 2.

Fig. IV

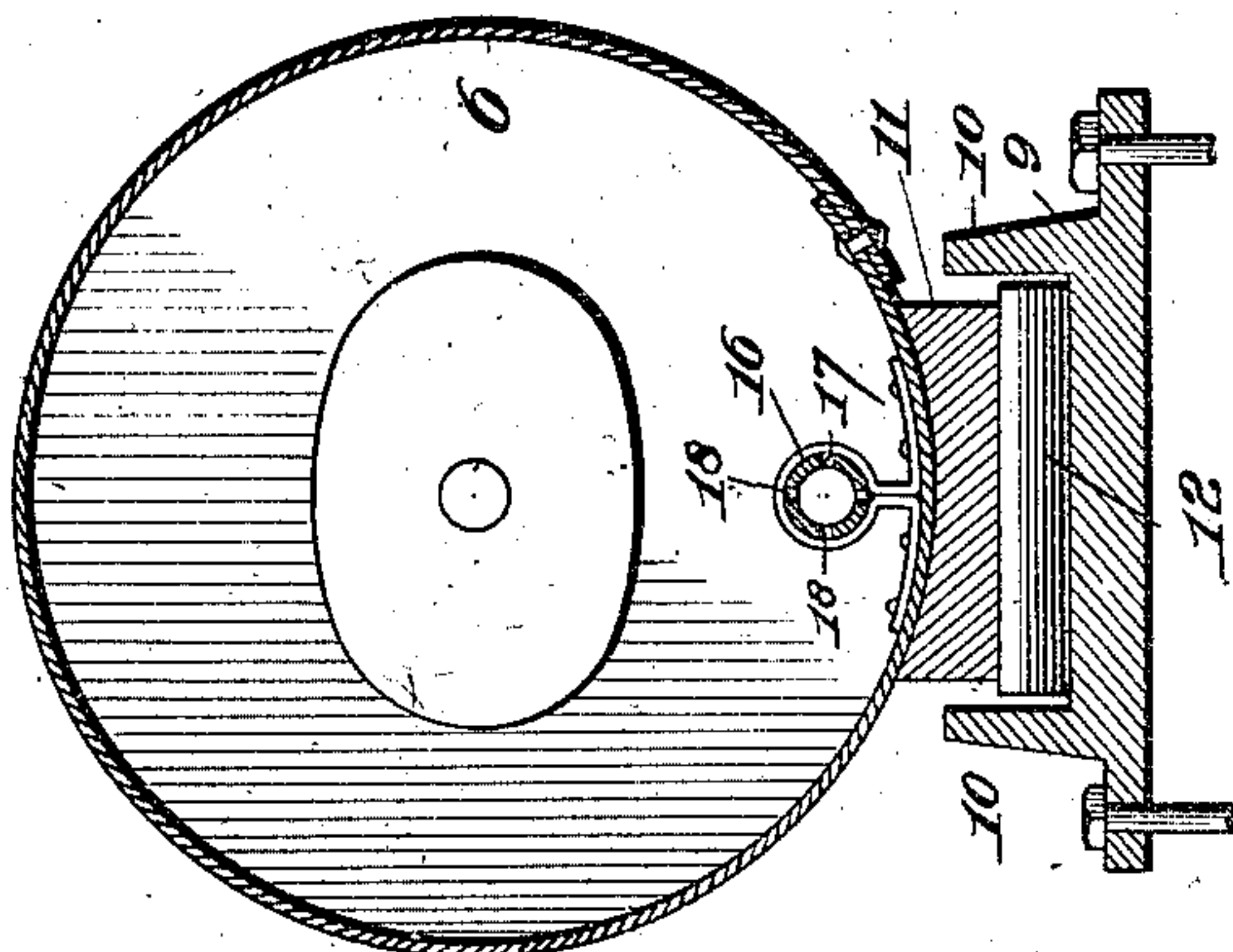
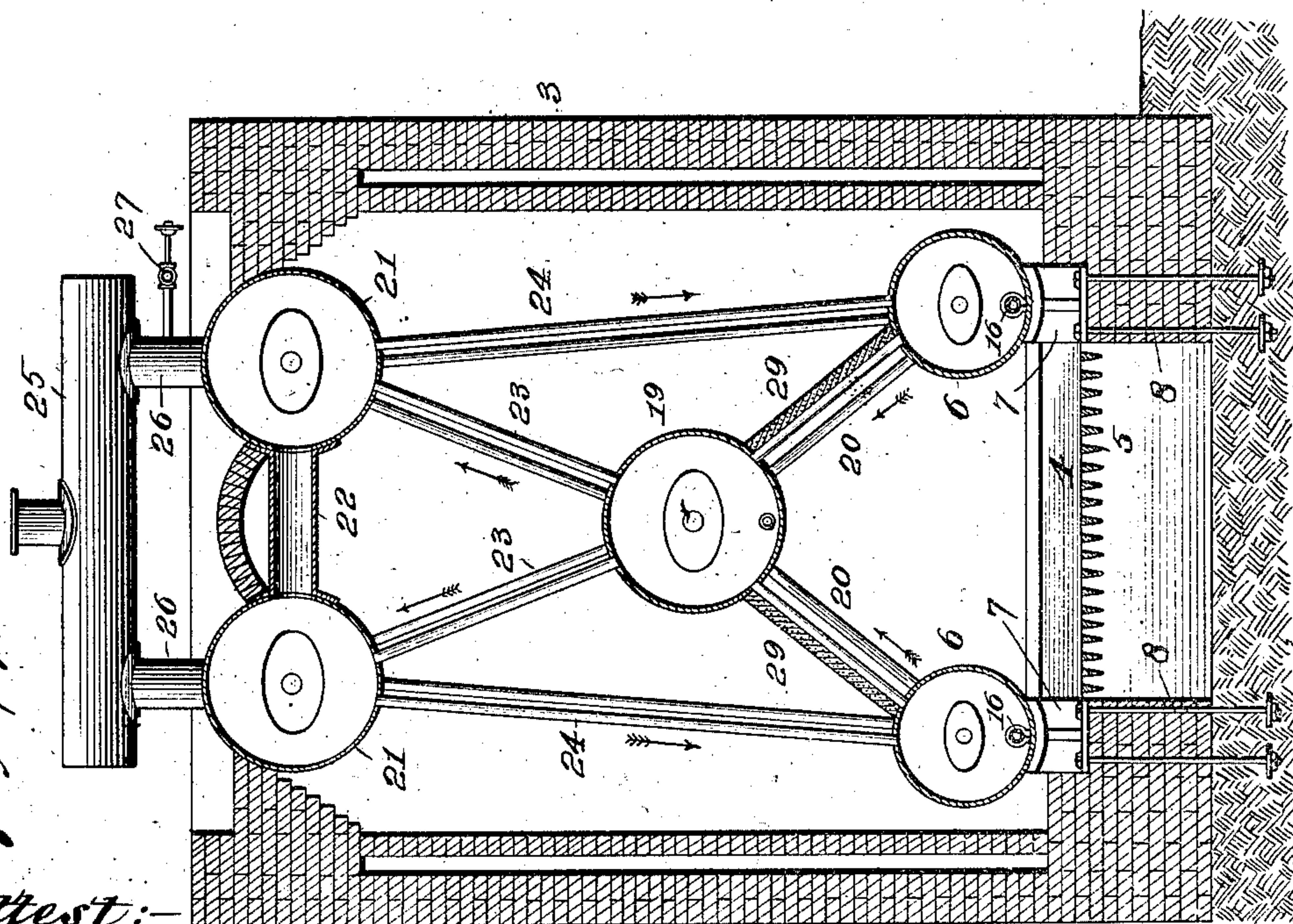


Fig. III.



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UNITED STATES PATENT OFFICE.

GEORGE C. HICKS, JR., OF ST. LOUIS, MISSOURI.

WATER-TUBE BOILER.

SPECIFICATION forming part of Letters Patent No. 661,720, dated November 13, 1900

Application filed July 5, 1900. Serial No. 22,475. (No model.)

To all whom it may concern:

Be it known that I, GEORGE C. HICKS, Jr., a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Water-Tube Boilers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to that class of steam-boilers in which a series of water and steam drums are utilized and banks of circulating-tubes provide communication between the various drums.

My invention consists in features herein-after fully described and claimed.

Figure I is a view in front elevation of a boiler constructed in accordance with my invention. Fig. II is a view, partly in vertical section and partly in side elevation, of my improved boiler. Fig. III is a view in vertical section taken on the line III III, Fig. II. Fig. IV is an enlarged vertical cross-sectional view through one of the water-drums and one of the carriages on which said drums are supported.

1 and 2 designate the front and rear walls of the boiler-setting, and 3 the side walls of said setting.

4 is the fire-chamber, and 5 the fire-grate therein.

6 designates the water-drums, the ends of which are seated in the boiler-setting and the forward ends of which are arranged immediately above the fire-chamber 4. The forward ends of the water-drums are supported upon fixed chairs 7, (see Fig. III and dotted lines, Fig. II,) that are held by anchor-rods 8. The rear ends of the water-drums 6 are so mounted upon chairs 9 (see Figs. II and IV) that the expansion and contraction of such drums in the heating and cooling thereof are permitted without liability of displacement of the drums or the water-tubes connected thereto. This movement of the drums on expansion and contraction is provided for by carriage-blocks 11, on which the drums are mounted, the said carriage-blocks being supported by rollers 12, that are guided between flanges 10, projecting upwardly from the chairs 9. As the rise and fall in the degree of heat within the boiler-chamber occasions contraction and expansion

of the water-drums, the carriage-blocks 11 move with said drums on the rollers 12, as will be readily understood.

Water is supplied to the drums 6 through supply-pipes 13, to which is connected the feed-pipe 14, the supply-pipes being provided with suitable valves 15. The supply-pipes 13 lead to delivery-pipes 16, (see Figs. II, III, and IV,) that extend through the water-drums approximately the full length thereof and are supported in suitable brackets 17. The rear ends of the delivery-pipes 16 are provided with perforations 18, (see Figs. II and IV,) through which perforations the water finds escape into the rear ends of the drums, from which it circulates forwardly.

19 designates a central equalizing-drum located at a greater elevation than the water-drums 6 and on a central line approximately equidistant from each of said water-drums. This equalizing-drum is connected to each of the water-drums 6 by banks of circulating-tubes 20, the tubes preferably being composed of two sets offset from each other.

21 designates steam-drums located at the upper end of the boiler-chamber and connected by a balance-tube 22. Communication from the equalizing-drum 19 to the steam-drums 21 is provided by banks of steam-circulating tubes 23, arranged in offset series.

24 designates return circulating-tubes leading from the steam-drums 21 to the water-drums 6, these last-named circulating-tubes being also arranged in offset series.

25 designates the steam-dome, into which communication is provided from the steam-drum 21 by the steam-columns 26.

27 is a water-column pipe leading from the equalizing-drum 19 to one of the steam-columns 26, said water-column pipe being provided with a suitable water-gage 28.

29 designates baffle-partitions located above the circulating-pipes 20, between the water-drums 6 and equalizing-drum 19, and extending rearwardly from the front wall of the boiler-setting to points beyond the center of the length of the drums, (see Fig. II,) so as to cause the heat and products of combustion to pass to the rear end of the boiler-chamber about said drums before ascending therein.

In the practical use of the boiler the water and steam follow the courses indicated by the

arrows, (see Fig. III)—i. e., the hot water and steam circulate upwardly from the water-drums 6 through the circulating-tubes 20 into the equalizing-drum 19, in which last-named drum the generation of steam is continued. The generated steam passes from the equalizing-drum 19 into the steam-drums 21, in which last-named drums the steam is constantly balanced through the balance-tube 22, while it escapes from both of the drums through the steam-columns 26 to the dome 25. The circulation of the water that has not been vaporized returns from the steam-drums 21 to the water-drums 6 through the return circulating-tubes 24, where it is again heated and rises as before, the circulation thus going on in the manner described continuously.

The water-drums 6 being arranged at the sides of the fire-chamber and immediately above the chamber, as shown, it will be seen that their inner surfaces receive the greatest amount of heat and their outer surfaces the least amount. By leading the return circulating-tubes 24 directly from the steam-drums 21 to the water-drums 6 the return water is caused to pass outwardly in said drums in a swirling manner into the coolest portions thereof, where it readily deposits instead of passing into the hottest inner portions of the

drums, where the circulation is greatest and the deposit of sediment is most difficult.

I claim as my invention—

In a water-tube boiler, the combination of a pair of water-drums, a central equalizing-drum, circulating-tubes leading directly from the said water-drums to said equalizing-drum; baffle-partitions located above the circulating-tubes and extending rearwardly to a point beyond the center of the length of the drums; steam-drums located above the equalizing-drum, steam-circulating tubes leading directly from the equalizing-drum to the steam-drums, return circulating-tubes leading directly from the steam-drums to the water-drums, a balance-tube 22 connecting the steam-drums, a steam-dome 25 located transversely of the steam-drums, steam-columns leading from the steam-drums into the steam-dome, and a water-column pipe 27, leading from the equalizing-drum, to one of the steam-columns, and a water-gage connected with said pipe 27.

In testimony whereof I have hereunto affixed my signature this 28th day of June, 1900.

GEO. C. HICKS, JR.

In presence of—

E. S. KNIGHT,
M. P. SMITH.