

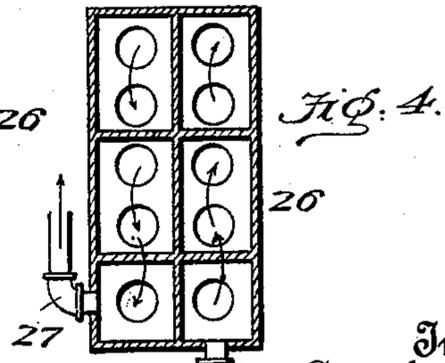
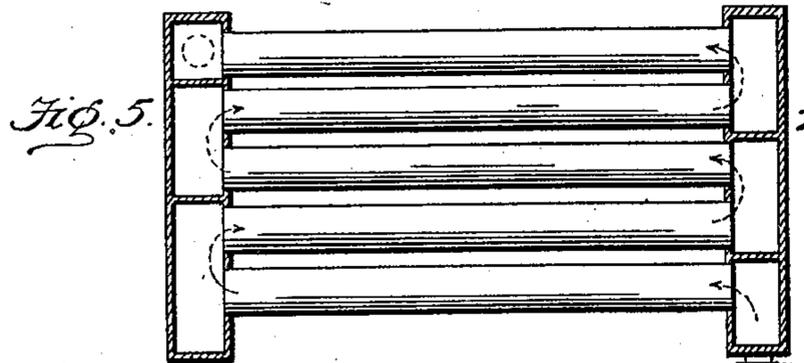
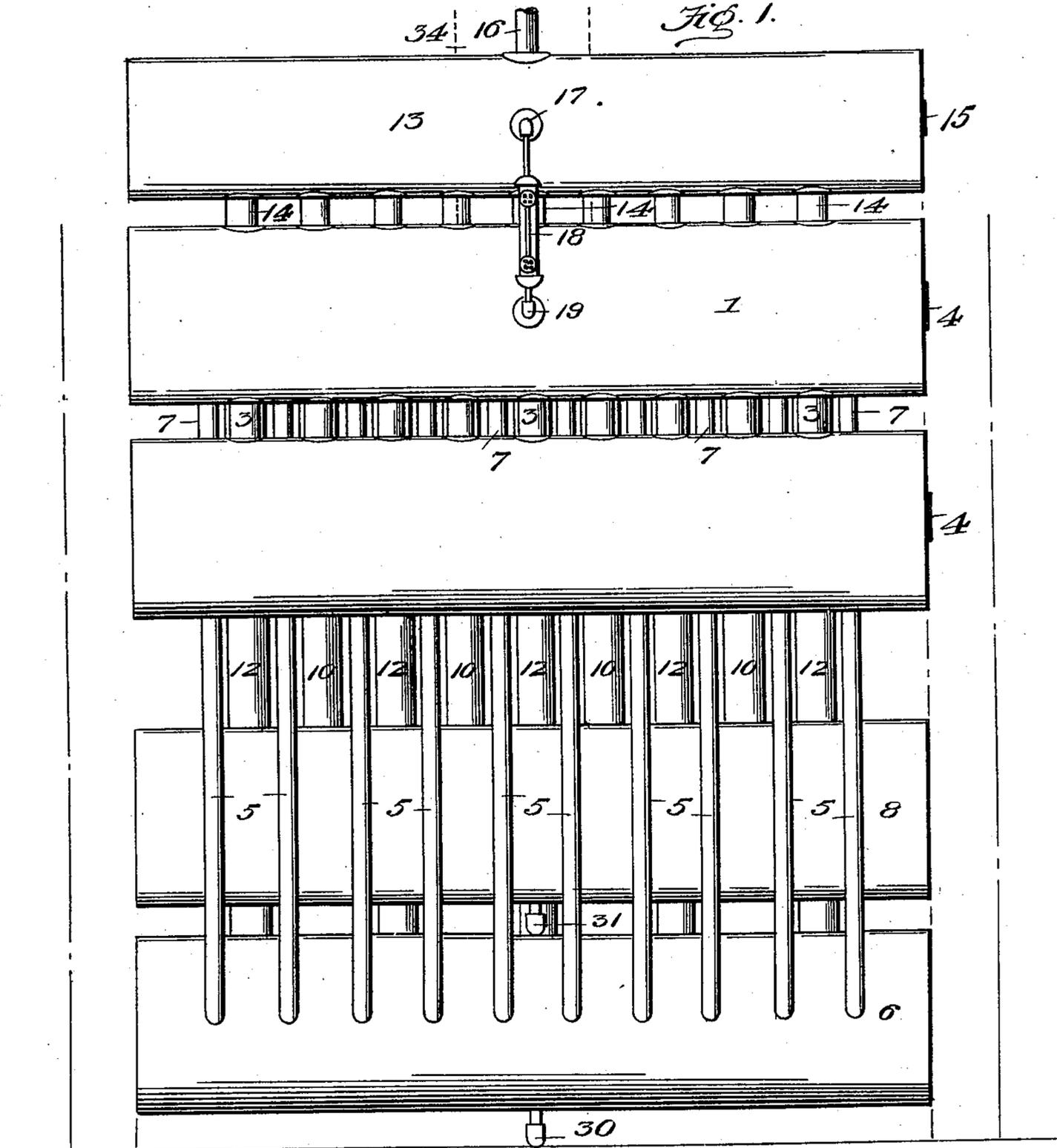
(No Model.)

3 Sheets—Sheet 1.

G. E. TURNER.
WATER TUBE STEAM GENERATOR.

No. 594,163.

Patented Nov. 23, 1897.



Witnesses
Wm. C. Oshieen
A. Hink

Inventor
George E. Turner.
 by *A. B. Wilson*
 Attorney

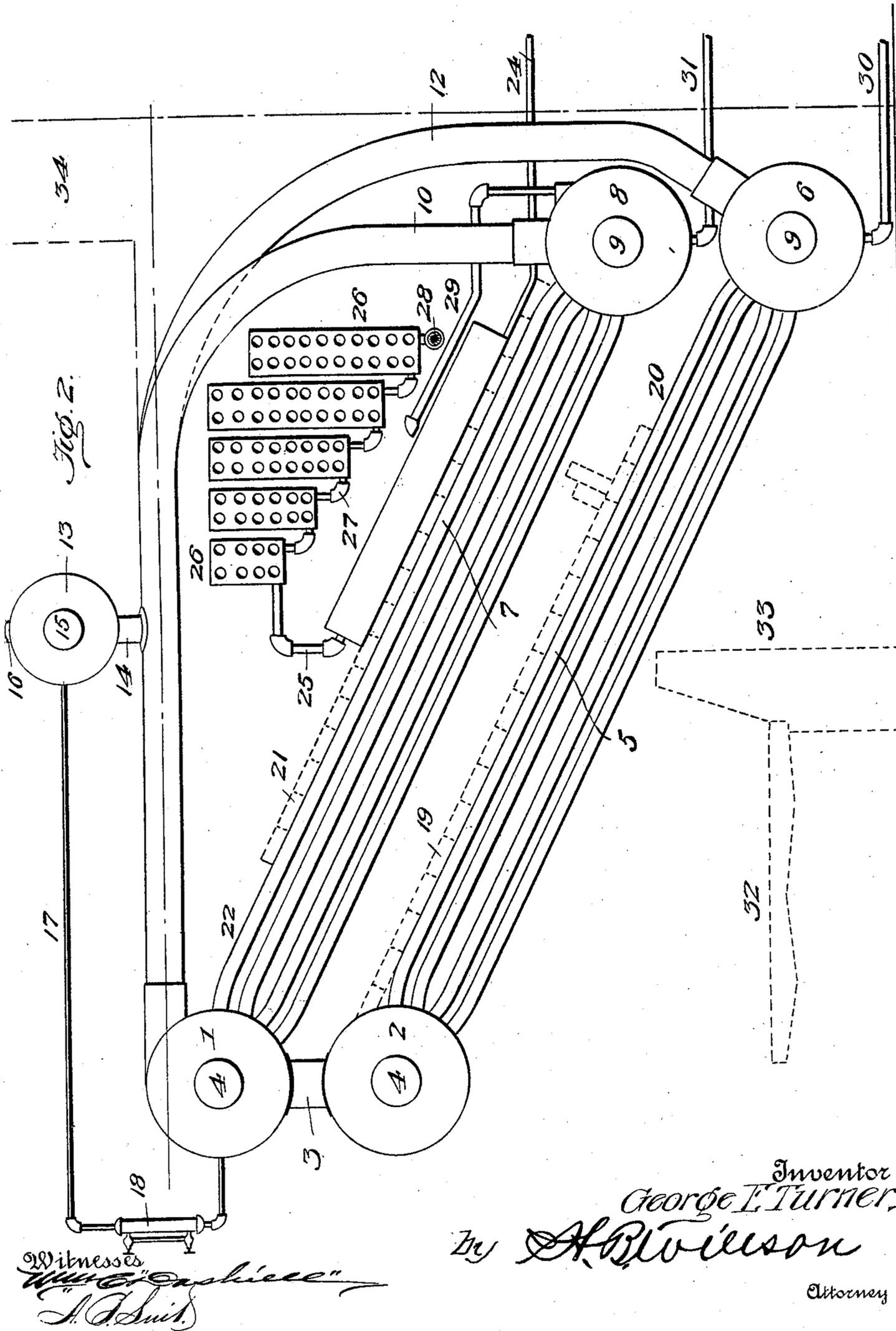
(No Model.)

3 Sheets—Sheet 2.

G. E. TURNER. WATER TUBE STEAM GENERATOR.

No. 594,163

Patented Nov. 23, 1897.

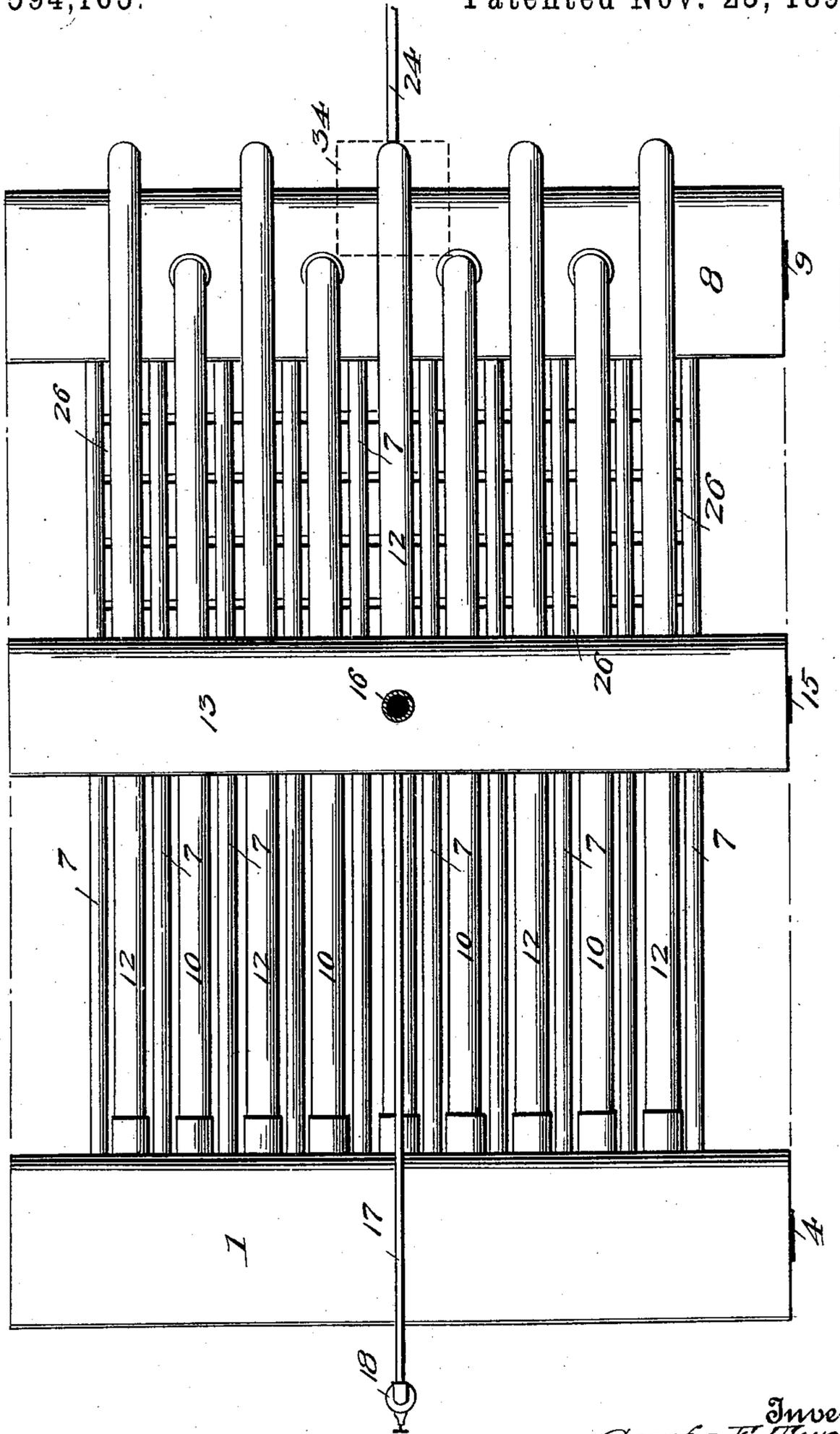


G. E. TURNER.
WATER TUBE STEAM GENERATOR.

No. 594,163.

Patented Nov. 23, 1897.

Fig. 5.



Witnesses

Wm. C. Washburn
J. J. Smith

Inventor
George E. Turner

By *A. B. Wilson*

Attorney

UNITED STATES PATENT OFFICE.

GEORGE E. TURNER, OF MARION, OHIO.

WATER-TUBE STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 594,163, dated November 23, 1897.

Application filed February 19, 1897. Serial No. 624,239. (No model.)

To all whom it may concern:

Be it known that I, GEORGE E. TURNER, a citizen of the United States, residing at Marion, in the county of Marion and State of Ohio, have invented certain new and useful Improvements in Water-Tube Steam-Generators; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention has relation to improvements in water-tube steam-generators; and the object is to provide a simple, effective, and durable, as well as economical and convenient, generator of this class.

To these ends the novelty consists in the construction, combination, and arrangement of the several parts of the same, as will be hereinafter more fully described, and particularly pointed out in the claims.

In the accompanying drawings the same reference-characters indicate the same parts of the invention.

Figure 1 is a front view of my improved water-tube steam-generator with the front of the boiler removed. Fig. 2 is a side or end elevation. Fig. 3 is a top plan view of the same. Fig. 4 is a transverse section of one of the tiers comprising the settling-chamber, and Fig. 5 is a longitudinal section of the same.

1 and 2 represent two horizontal parallel drums arranged in the same vertical plane and connected at suitable intervals by the saddles 3 3. The ends of these drums are provided with the usual manholes 4.

5 5 represent the lower series of inclined parallel water-tubes extending downwardly and connecting the lower forward drum 2 with a corresponding lower rear drum 6. A similar series of water-tubes 7 connect the upper forward drum 1 with the upper rear drum 8. These rear drums 6 and 8 are likewise arranged in the same vertical plane parallel with each other and are also provided at their respective ends with the usual manholes 9 9. A series of enlarged return-tubes 10 10 extend horizontally rearward from the upper front drum 1 and are then turned vertically downward and connect with the upper rear drum 8. An alternate series of similar enlarged return-tubes 12 12 lead from the up-

per front drum 1 and extend horizontally rearward parallel with the first-mentioned series 10 10 and are then turned horizontally downward and connect with the lower rear drum 6.

13 represents the steam-drum, extending transversely across the tops of the horizontal portions of the return-tubes 10 and 12, to which it is connected by the saddles 14 14. The usual manholes 15 are provided in the ends of the steam-drum, and 16 represents the connection through which the steam is conducted to the engine.

17 represents a steam-pipe leading from the steam-drum to the upper end of the water-gage 18, and a short pipe leads from the gage and enters the upper forward drum 1 below the water-level, which is shown by the dotted line *a a* in Fig. 2.

19 represents a layer of fire-brick or other heat-resisting material extending transversely across the upper layer of the lower series of water-tubes 5 and extending rearwardly from the lower forward drum 2 to within such a suitable distance of the lower rear drum 6 as will leave a draft-space of sufficient area to accommodate the products of combustion from the furnace. A similar layer 21 of fire-brick extends across the upper layer of the upper series of water-tubes 7, beginning at the upper rear drum 8 and extending forwardly to within a suitable distance of the upper forward drum 1 to form a draft-passage 22.

23 represents the settlings-chamber, provided with a blow-off or mud pipe 24, communicating with its lowermost end, and 25 is a pipe connecting the forward end of said chamber with the forward tier of a series of transverse boxes 26 26, each tier communicating with the adjacent tier by an elbow-coupling 27, the lower end of the rear tier being provided with an inlet-pipe 28, through which the feed-water is admitted.

29 represents the outlet-pipe from the settlings-chamber 23, through which the heated and purified feed-water is fed to the drum 8.

30 31 represent blow-out or mud pipes connected to the rear drums 6 and 8.

32 represents the position of the grate-bars; 33, the bridge-wall, and the arrows show the direction or course of the heated air and gases from the furnace to the smoke-stack 34.

Although I have specifically described the construction and relative arrangement of the several elements of my invention, I do not desire to be confined to the same, as such changes or modifications may be made as clearly fall within the scope of my invention without departing from the spirit thereof.

Having thus fully described my invention, what I claim as new and useful, and desire to secure by Letters Patent, is—

1. In a steam-generator, the combination with the two sets of drums 1 and 2 and 6 and 8, the drums of each set arranged one above the other, and one set arranged above and in advance of the other set, a series of tubes connecting respectively the upper and lower drums of each set, circulating-tubes 10 12 connected to the rear set of drums 6 8 extending upwardly, horizontally and forwardly, and connected with the upper drum of the forward set, a steam-drum communicating with the steam-space of the tubes 10 and 12, and blow-off pipes leading from the lower set of drums 6 and 8, substantially as set forth.

2. In a steam-generator, the combination with the drums 1 and 2 and 6 8, connecting-tubes 5 and 8, circulating-tubes 10 and 12 connecting the drums 1 2 and 6 8, a steam-drum communicating with the steam-space of the tubes 10 12, a band of separated but communicating feed-water heaters, an inclined settlings-chamber communicating with the feed-water heaters, a pipe establishing communication between the settlings-cham-

ber and the lower drum 8, blow-off pipes for the settlings-chamber and the lower drums 6 8, and the inclined walls 19 21 arranged as described.

3. A water-tube steam-generator, comprising the forward horizontal drums 1 and 2 arranged in the same vertical plane and connected by the saddles 3, the rear horizontal drums 6 and 8 mounted in the same vertical plane, a series of inclined tubes connecting the drums 1 and 8 and 2 and 6, respectively, a series of curved return-drums 10 connecting the drums 1 and 8, and an alternate series of curved return-drums 12 connected to said drum 1 and the lower rear drum 6, a transverse steam-drum 13 connected to the return-drums 10 and 12, substantially as and for the purpose set forth.

4. A steam-generator comprising the drums 1 2 and 6 8, the drums of each set arranged vertically above each other, and the front set arranged above and in advance of the rear set, a series of tubes connecting the upper and the lower drums of each set, and a series of independent circulating-tubes 10 12, connecting the rear set of drums with the upper drum of the front set, substantially as shown and described.

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

GEO. E. TURNER.

Witnesses:

F. W. PETERS,
KENDRICK TURNER.