

(No Model.)

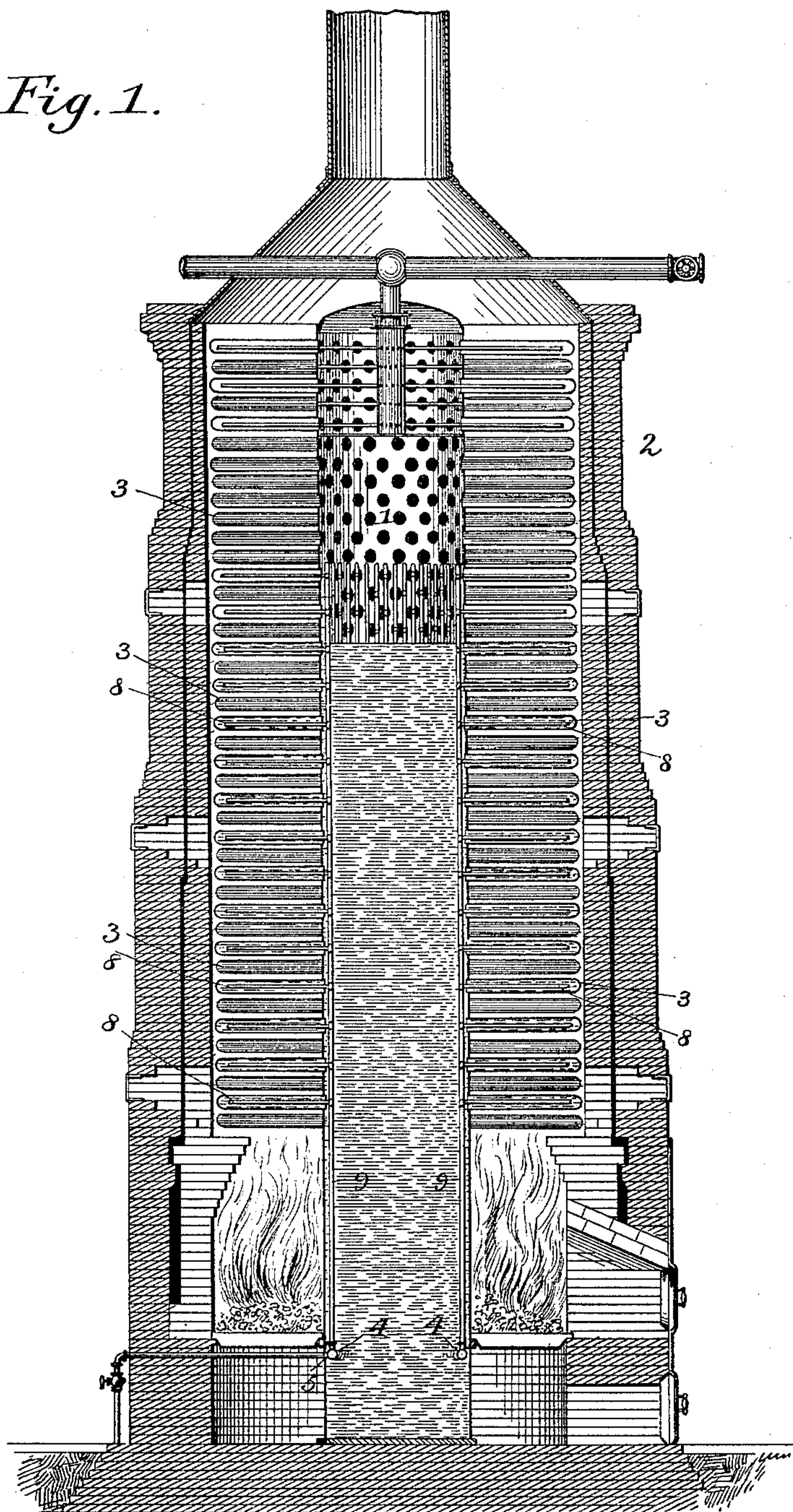
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J. N. RICE.
TUBULAR BOILER.

No. 592,511.

Patented Oct. 26, 1897.

Fig. 1.



Inventor

Witnesses

Chas H. Ourand
V. B. Hillyard.

By *his* Attorneys,

James N. Rice

CA Snow & Co.

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Fig. 2.

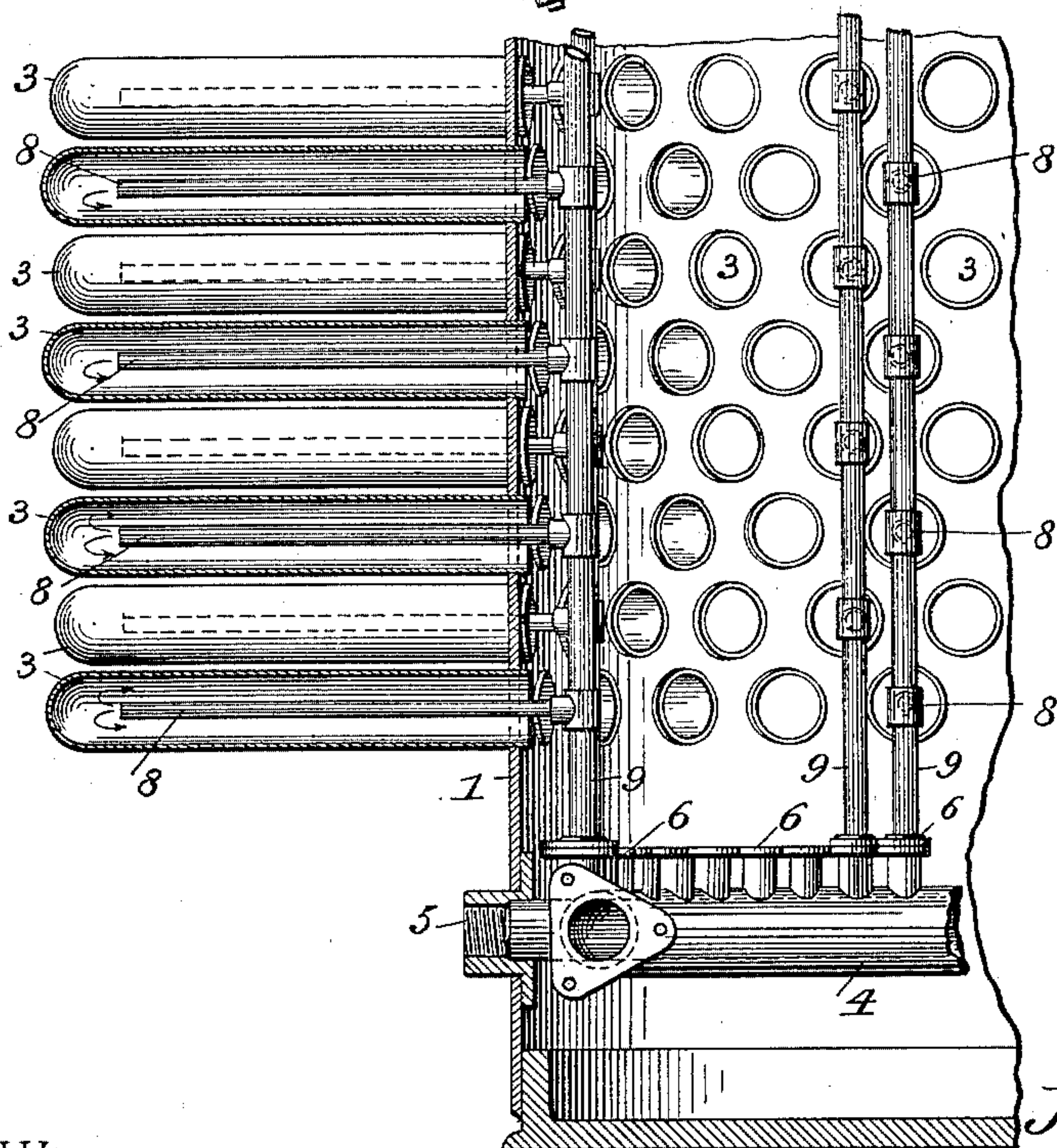
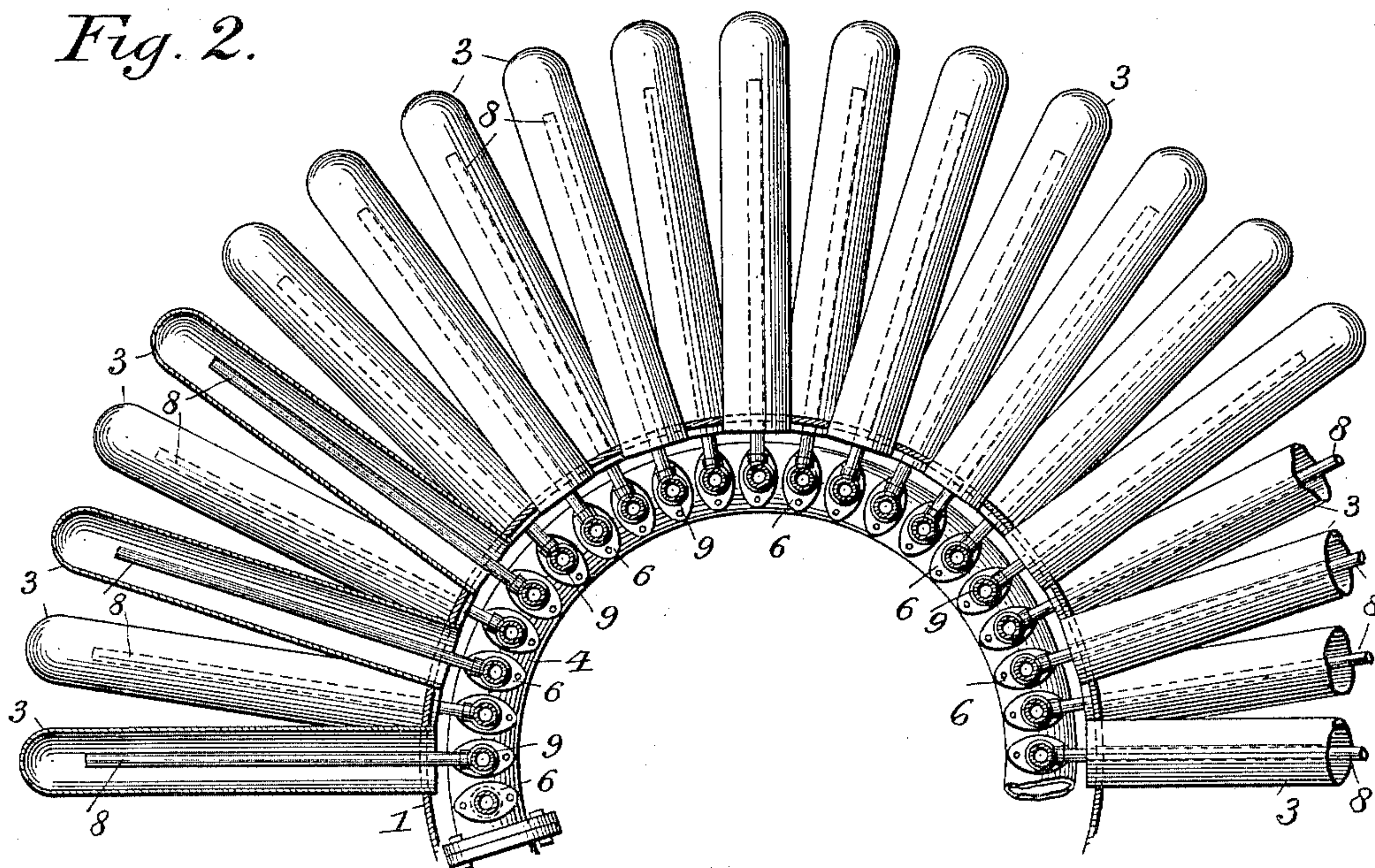


Fig. 3

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UNITED STATES PATENT OFFICE.

JAMES NELSON RICE, OF SCRANTON, PENNSYLVANIA.

TUBULAR BOILER.

SPECIFICATION forming part of Letters Patent No. 592,511, dated October 26, 1897.

Application filed April 6, 1897. Serial No. 631,005. (No model.)

To all whom it may concern:

Be it known that I, JAMES NELSON RICE, a citizen of the United States, residing at Scranton, in the county of Lackawanna and State of Pennsylvania, have invented a new and useful Tubular Boiler, of which the following is a specification.

In steam generators or boilers of the tubular type, comprising an upright shell or casing and a series of tubes extending horizontally therefrom into the surrounding hot-air space or combustion-chamber, great difficulty has been experienced in securing a positive circulation of the water through the individual tubes of the series and in keeping them free from scale and incrustation.

To overcome and meet these objections is the purpose of the present invention, which consists, essentially, in the provision of a ring or annular manifold located within the lower portion of the boiler and connected with the injector or pump for supplying water under pressure thereto, a series of nipples formed at intervals with the ring or manifold, individual pipes applied to the nipples or otherwise connected with the manifold and arranged in a circle about the inner sides of the boiler in vertical and parallel relation, and small tubes having connection with the vertical pipes and projecting into the horizontal tubes radiating from the boiler, all as will appear more fully hereinafter and as shown in the accompanying drawings, in which—

Figure 1 is a vertical central section of an upright boiler, showing the application of the invention. Fig. 2 is a plan section thereof. Fig. 3 is a detailed view, partly in elevation and partly in section.

Corresponding and like parts are referred to in the following description and indicated in the several views of the accompanying drawings by the same reference-characters.

The boiler or steam-generator illustrated is of ordinary construction and comprises an inner shell or casing 1, an outer jacket or shell 2 of masonry, and a series of horizontal tubes 3, radiating from the inner shell or casing 1 and extending into the hot-air space or combustion-chamber formed between the parts 1 and 2, said tubes being closed at their outer ends and opening at their inner ends into the

shell or casing 1. A hollow ring or manifold 4 is located in the lower portion of the part 1 and is in communication with an injector or pump through an opening 5 in a side thereof, whereby water for feeding the boiler is supplied thereto under proper pressure to secure the desired forced circulation, whereby all the advantages of the invention are attained. This hollow ring or manifold 4 has nipples 6 formed therewith at intervals on its top side, to which are secured the upright or vertical pipes 9, the latter being bolted or otherwise fastened thereto.

Each of the tubes 3 has a tube 8, of smaller diameter, located centrally thereof and terminating at their inner ends a short distance from the closed ends of the tubes 3. The series of tubes 8, in vertical relation, have connection at their inner ends with the upright or vertical pipes 9, which are closed at their upper ends and are connected at their lower ends with a hollow ring or manifold in the manner aforesaid. These pipes 9 are arranged in parallelism and in a circle around the inner wall of the shell or casing 1 and prevent the feed-water from mixing directly with the water in the boiler until it shall have passed through the tubes 3 and 8.

The construction disclosed herein insures a positive and forced feed of the water through all the tubes 3 and parts of the boiler, whereby sediment is prevented from accumulating in the tubes 3 and the latter are practically kept free from scale and incrustation and whereby the heat is utilized to the best possible advantage in converting the water into steam and maintaining it at the required temperature.

While it is preferred to locate the manifold or hollow ring 4 in the lower portion of the boiler, it is obvious that it may occupy any desired position so long as it serves to supply the upright pipes with water for replenishing the boiler, and such construction is contemplated within the scope of the invention.

By having the manifold 4 located within the boiler or casing 1 the water supplied thereto is heated before it enters the pipes 9, whereby chilling is obviated. The individual pipes 9 being located close to the inner wall of the boiler or casing are more rapidly heated and do not obstruct the central portion of the

boiler and admit of any pipe 9, with the tubes 8 attached, being removed for repairs or other purpose.

It will be observed that the tubes 8 are of less length than the distance across the boiler. Hence upon disconnecting a pipe 9 from the manifold it can be moved laterally until the tubes 8 clear the tubes 3, when the pipe can be removed from either end of the boiler.

Having thus described the invention, what is claimed as new is—

In a boiler, the combination of an upright cylindrical shell or casing having a series of tubes arranged in vertical lines and projecting radially therefrom, and closed at their outer ends, a manifold located within the shell

or casing, a series of upright pipes disposed in parallel relation about and contiguous to the inner side of the shell and having connection with the said manifold, and a series of tubes located centrally within the radial tubes and having connection with the upright pipes, substantially as shown for the purpose described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JAMES NELSON RICE.

Witnesses:

E. F. SCHIVE,

J. ROBERT SIMPSON.