

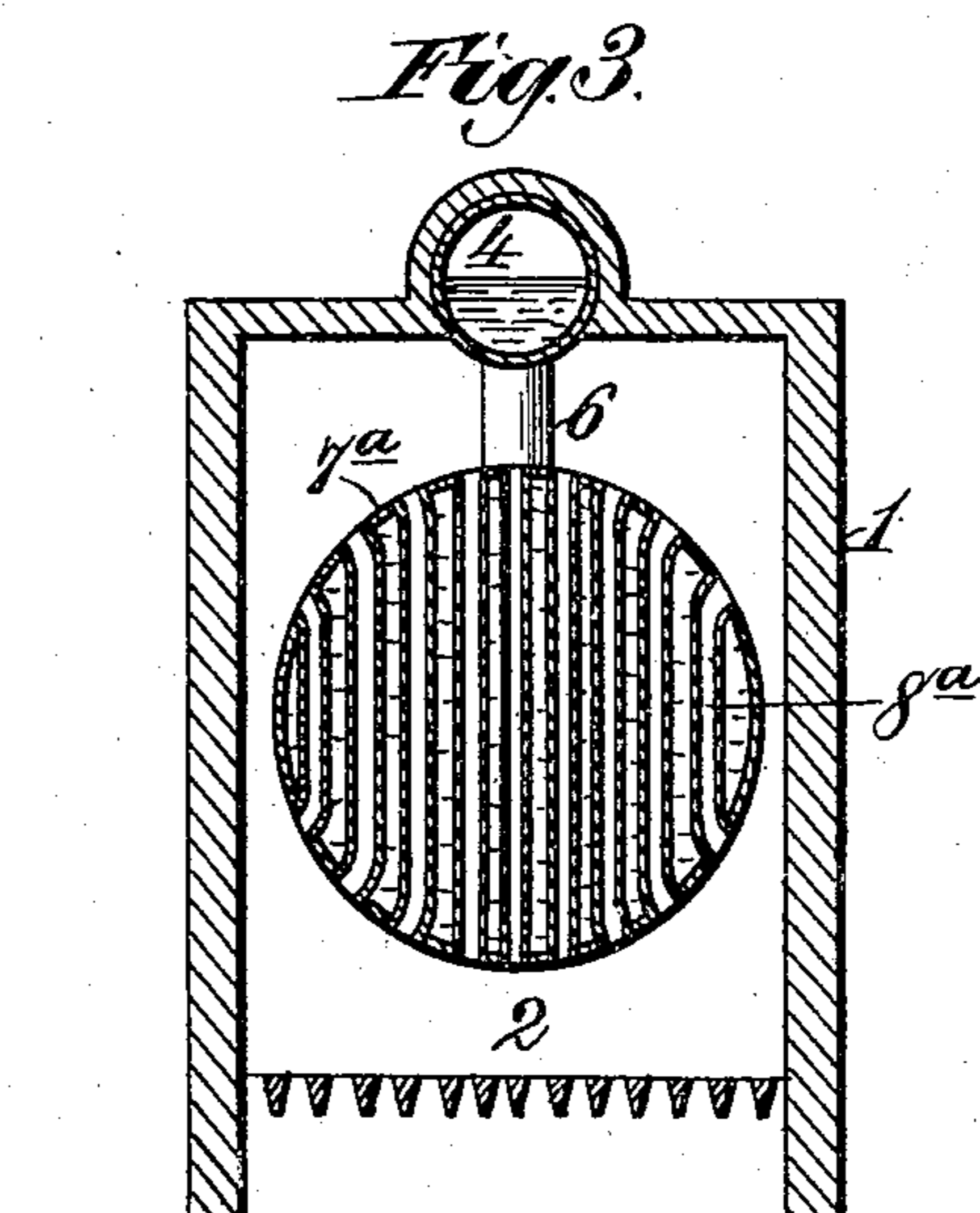
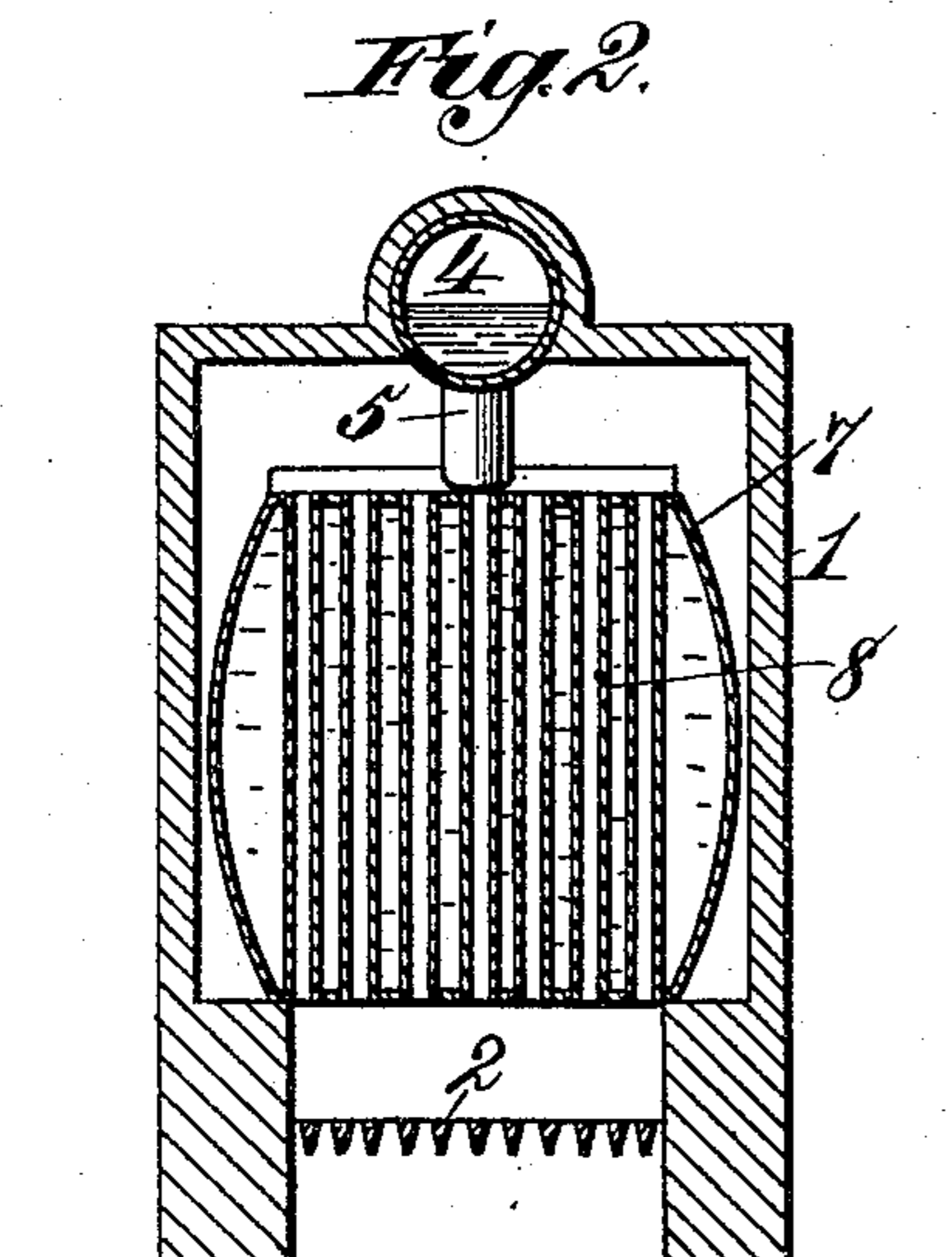
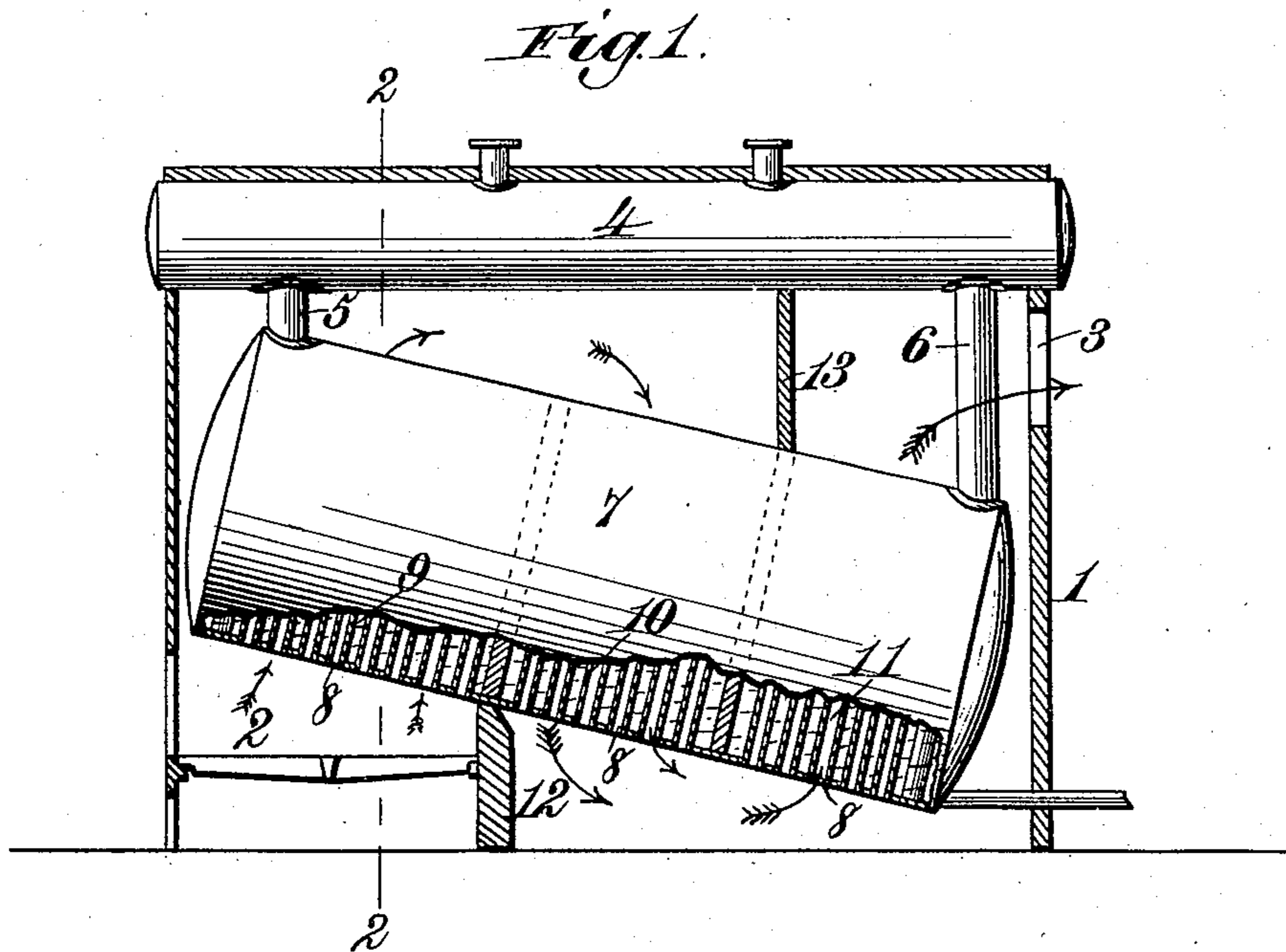
No. 639,530.

Patented Dec. 19, 1899.

W. H. COOK.  
STEAM BOILER.

(Application filed Jan. 26, 1899.)

(No Model.)



Witnesses.

Robert G. Gault.  
J. B. Keefe

Inventor.

Walter H. Cook.  
By James L. Norris  
Att'y.

# UNITED STATES PATENT OFFICE.

WALTER H. COOK, OF NEW ORLEANS, LOUISIANA.

## STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 639,530, dated December 19, 1899.

Application filed January 26, 1899. Serial No. 703,480. (No model.)

*To all whom it may concern:*

Be it known that I, WALTER H. COOK, a citizen of the United States, residing at New Orleans, in the parish of Orleans and State of Louisiana, have invented new and useful Improvements in Steam-Boilers, of which the following is a specification.

This invention relates to steam-boilers, and has for its objects to provide a fire-tube boiler so constructed that a maximum amount of the water to be heated or converted into steam is repeatedly exposed to the action of the heat and products of combustion, to insure a rapid and thorough circulation of the water, and to simplify, lessen the cost, and increase the efficiency of this type of steam-boilers generally.

To these ends my invention consists in the features and in the construction, combination, and arrangement of parts hereinafter described, and particularly pointed out in the claims following the description, reference being had to the accompanying drawings, forming a part of this specification, wherein—

Figure 1 is a longitudinal vertical sectional view of a steam-boiler constructed in accordance with my invention. Fig. 2 is a transverse sectional view thereof, taken on the line 2 2 of Fig. 1. Fig. 3 is a similar view of a slightly-modified form of boiler.

Referring to the drawings, the numeral 1 indicates the furnace-wall of any preferred construction suitable for the purpose, 2 the fire-box, and 3 the exit-flue, leading to the smoke-stack.

Supported in the furnace-walls is a horizontal-water-and steam drum 4 of ordinary construction. Pendent from the opposite ends of the drum 4 are water legs or tubes 5 and 6 of unequal length, as clearly shown in Fig. 1 of the drawings, to the lower ends of which are connected the opposite ends of a water-drum 7. The water-drum 7 is suspended from the upper drum 4 and is entirely supported by the water-legs 5 and 6, and owing to the unequal length of said legs said drum 7 will rest in an inclined position. The drum 7 is preferably of the form of a cylinder, having a flat top and bottom.

Extending vertically through the drum 7 are numerous fire-tubes 8, the ends of the tubes being preferably expanded in the flat

top and bottom of the drum. As clearly shown in Fig. 1 of the drawings, the fire-tubes 8 are divided into two or more groups or series, in the present instance three such groups being shown and respectively indicated by the numerals 9, 10, and 11. That portion of the drum between the groups 9 and 10 rests directly over the rear wall 12 of the fire-box, while a bridge-wall 13 is built in the upper part of the furnace directly above that part of the drum between the groups 10 and 11 of the fire-tubes.

The operation of the boiler is as follows: The heat and products of combustion pass from the fire up and through the tubes 8 of the group 9, thence under the drum 4 over to the upper ends of the tubes of the group 10, down through said tubes, from whence the heat and products of combustion pass to the bottom of the tubes of the group 11, up through said tubes to the space behind the bridge-wall and under the rear end of the drum 4, and finally out through the flue 3 to the smoke-stack. The heat and heated gases are thus caused to pass back and forth through the vertical tubes of the water-drum, which pass transversely through the drum from end to end of the latter, thus being repeatedly brought into contact with every portion of the water. The heat and heated gases are also caused to come in contact with the bottom of the water-and-steam drum 4. By these means the furnace-gases are thoroughly consumed and caused to give up the greatest possible amount of caloric. Owing to the inclined position of the drum 7 the forward group of tubes 9 are at the highest point of the drum and being disposed in the fire-box are subjected to the greatest heat. Therefore these tubes initiate the circulation of the water, which passes up through the water-leg 5 into the upper drum 4 and from the latter descends through the water-leg 6 into the lowermost portion of the drum 7, where, being again subjected to the furnace heat, it ascends to the higher end of the drum, a rapid and constant circulation of the water being thus maintained.

In Fig. 3 I have shown a lower drum 7<sup>a</sup> as being of true cylindrical form instead of having a flat top and bottom, as before described; but while said drum is equally as efficient in

some respects it is not so cheaply manufactured, for in order to set the fire-tubes 8<sup>a</sup> in place it is necessary to bend them at their ends, as clearly shown in Fig. 3.

5 Having described my invention, what I claim is—

1. In a steam-boiler, the combination with an upper horizontal steam-and-water drum, of a lower inclined water-drum connected at  
10 its opposite ends and wholly supported by water-legs pendent from the opposite ends of the steam-and-water drum, said water-legs being of unequal length, vertical fire-tubes passing transversely through said lower drum,  
15 said tubes being arranged in groups, and vertical fire-walls arranged between the groups of fire-tubes alternately above and below the drum and operating to cause the heat and products of combustion to pass through said  
20 groups of tubes in opposite directions, substantially as described.

2. In a steam-boiler, the combination with an upper horizontal steam-and-water drum,

of a lower inclined water-drum connected at its opposite ends and wholly supported by 25 water-legs pendent from the opposite ends of the steam-and-water drum, said water-legs being of unequal length, vertical fire-tubes passing transversely through said lower drum and arranged in groups, the group at the high 30 end of the water-drum being arranged over the fire-box of the furnace, a bridge-wall at the rear of the fire-box between the first and adjacent groups of fire-tubes, and a fire-wall arranged above the water-drum between op- 35 posite end group and adjacent group of fire-tubes, substantially as described and for the purpose specified.

In testimony whereof I have hereunto set my hand in presence of two subscribing wit- 40 nesses.

WALTER H. COOK.

Witnesses:

PORTER PARKER,  
FELIX J. PUIG.