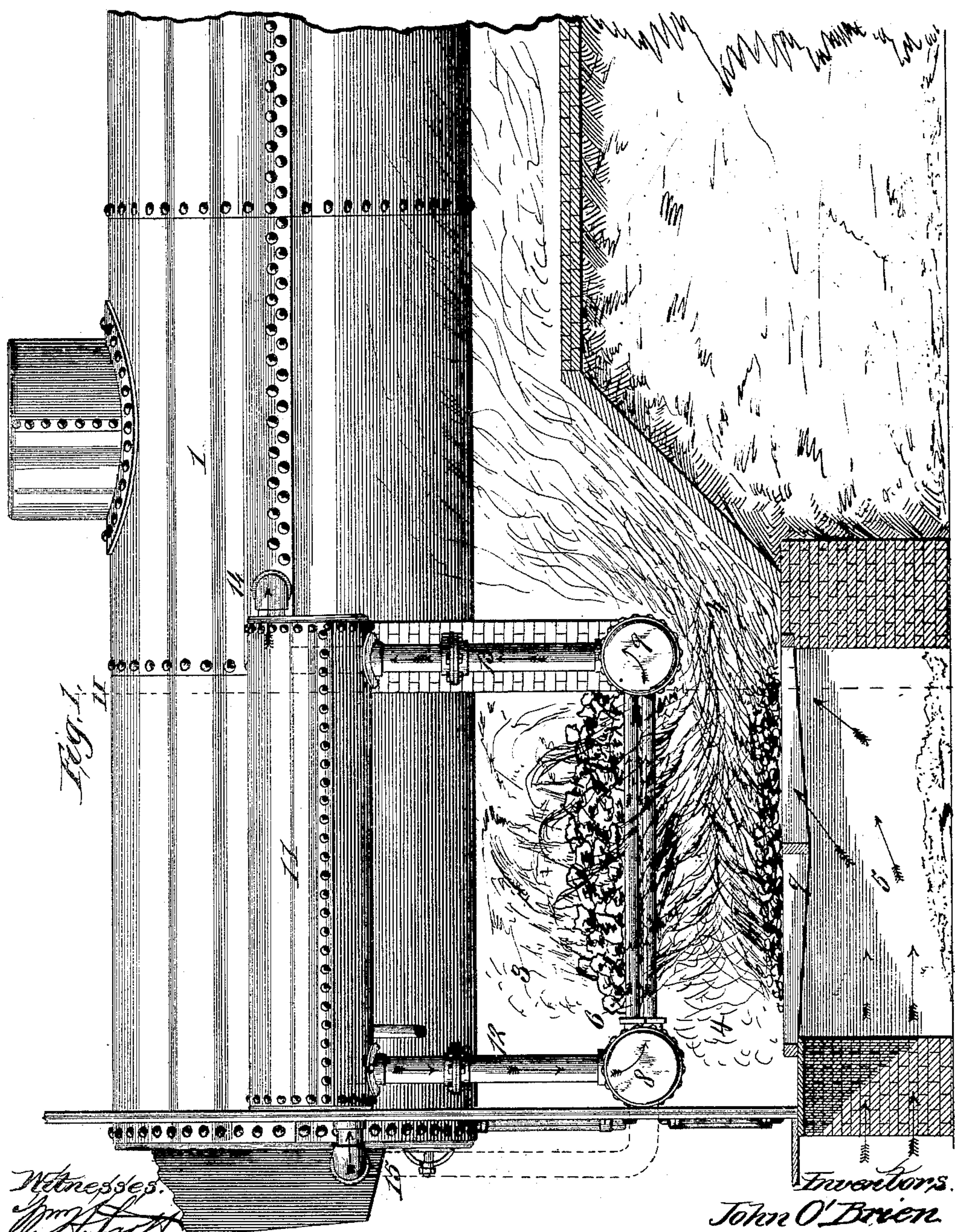


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No. 477,145.

Patented June 14, 1892.



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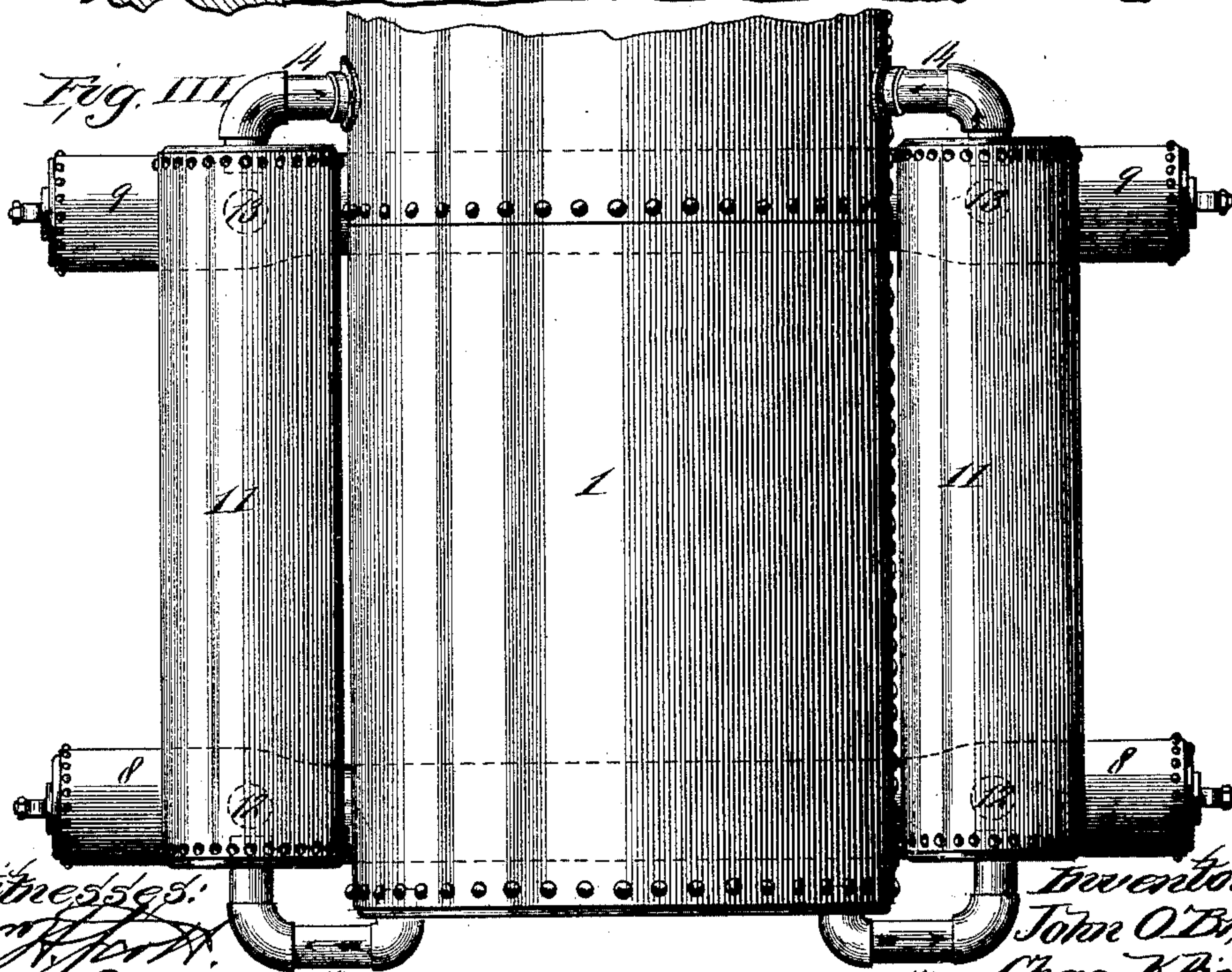
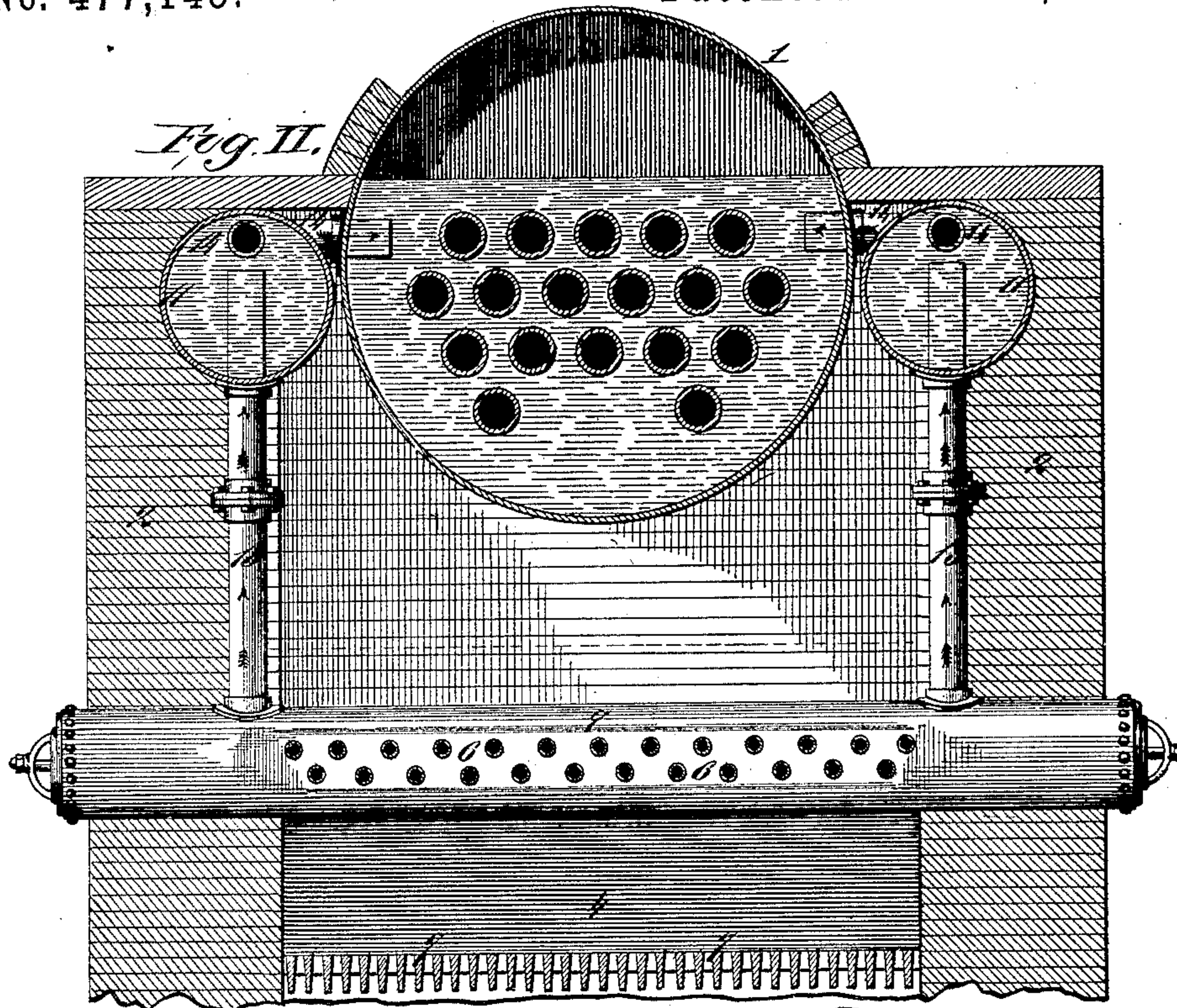
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STEAM BOILER ATTACHMENT.

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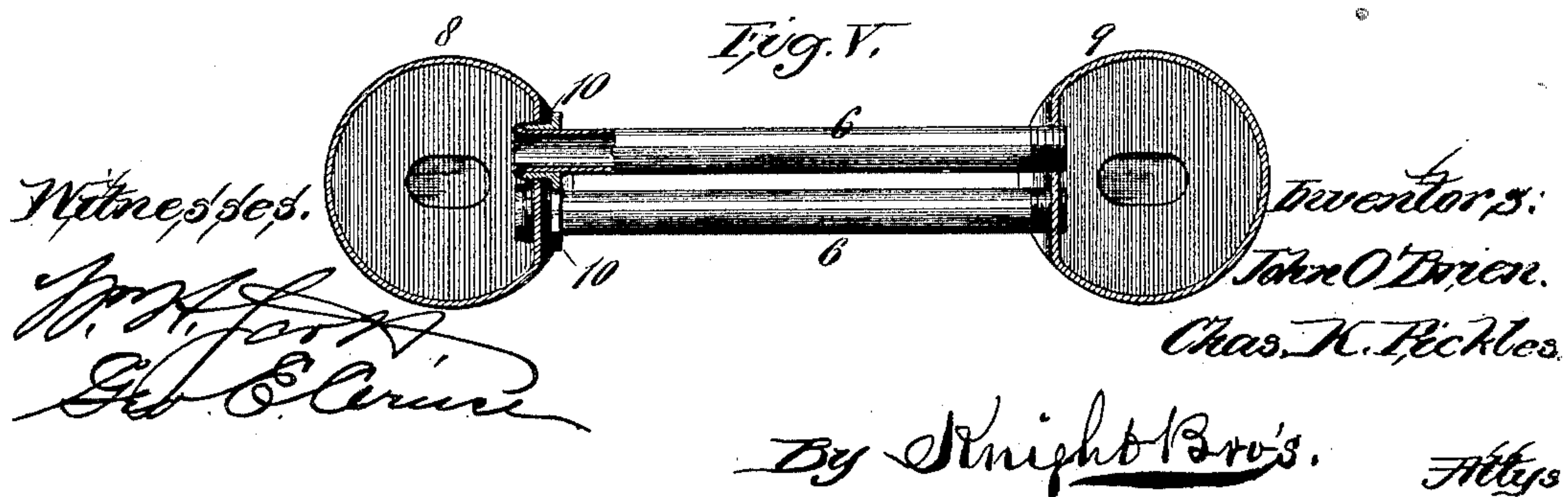
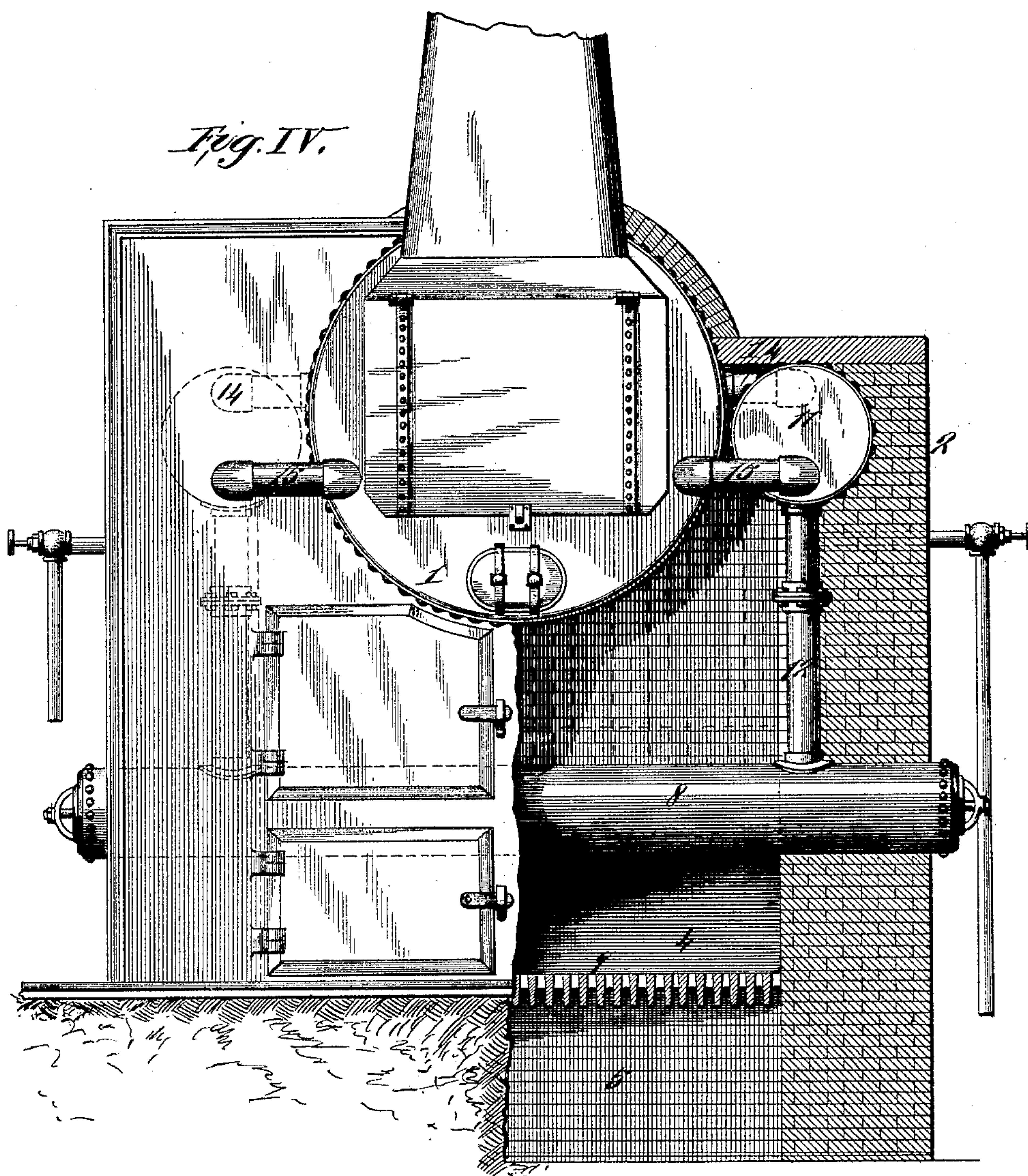
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STEAM BOILER ATTACHMENT.

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(No Model.)

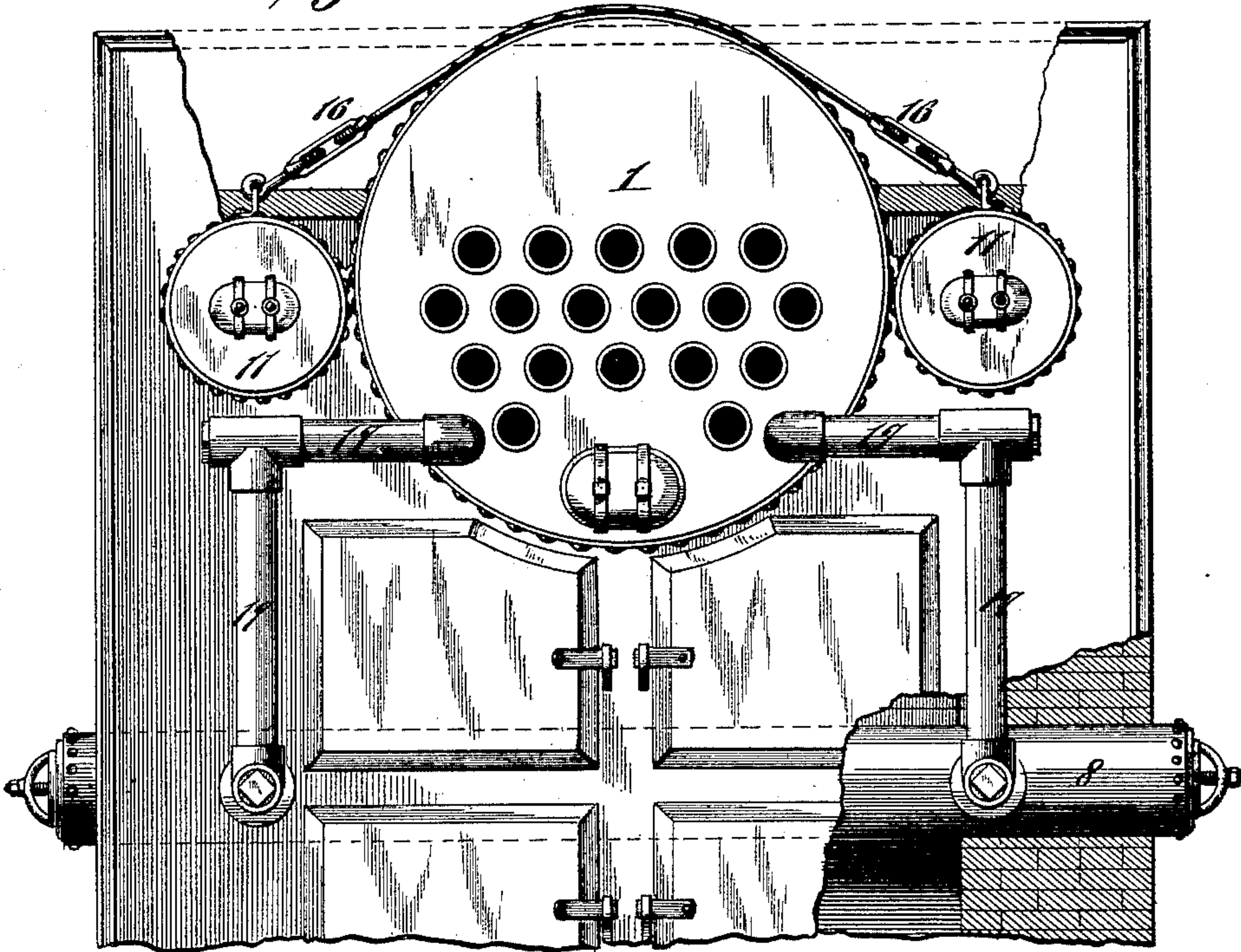
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STEAM BOILER ATTACHMENT.

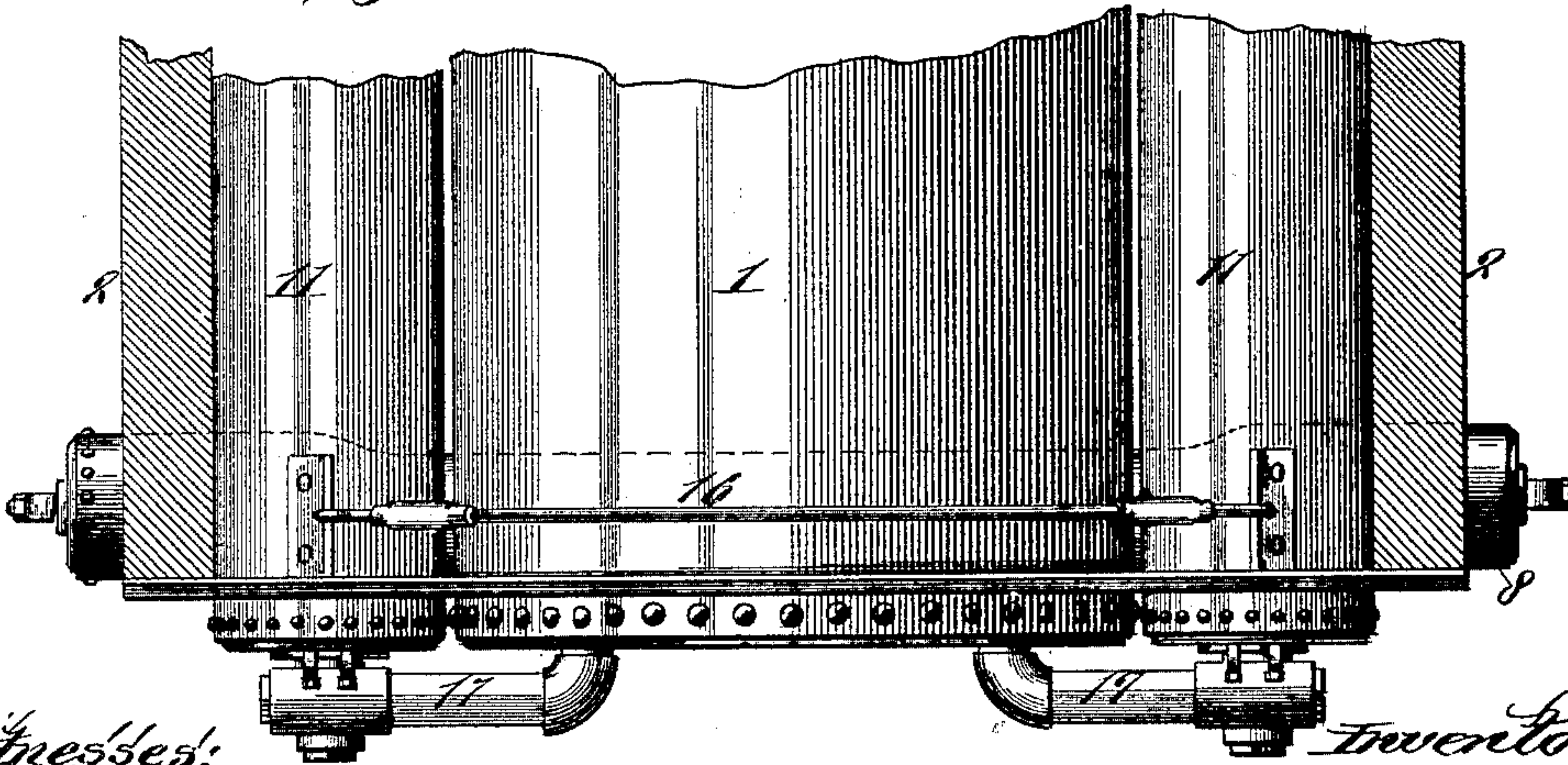
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*Fig. VI.*



*Fig. VII.*



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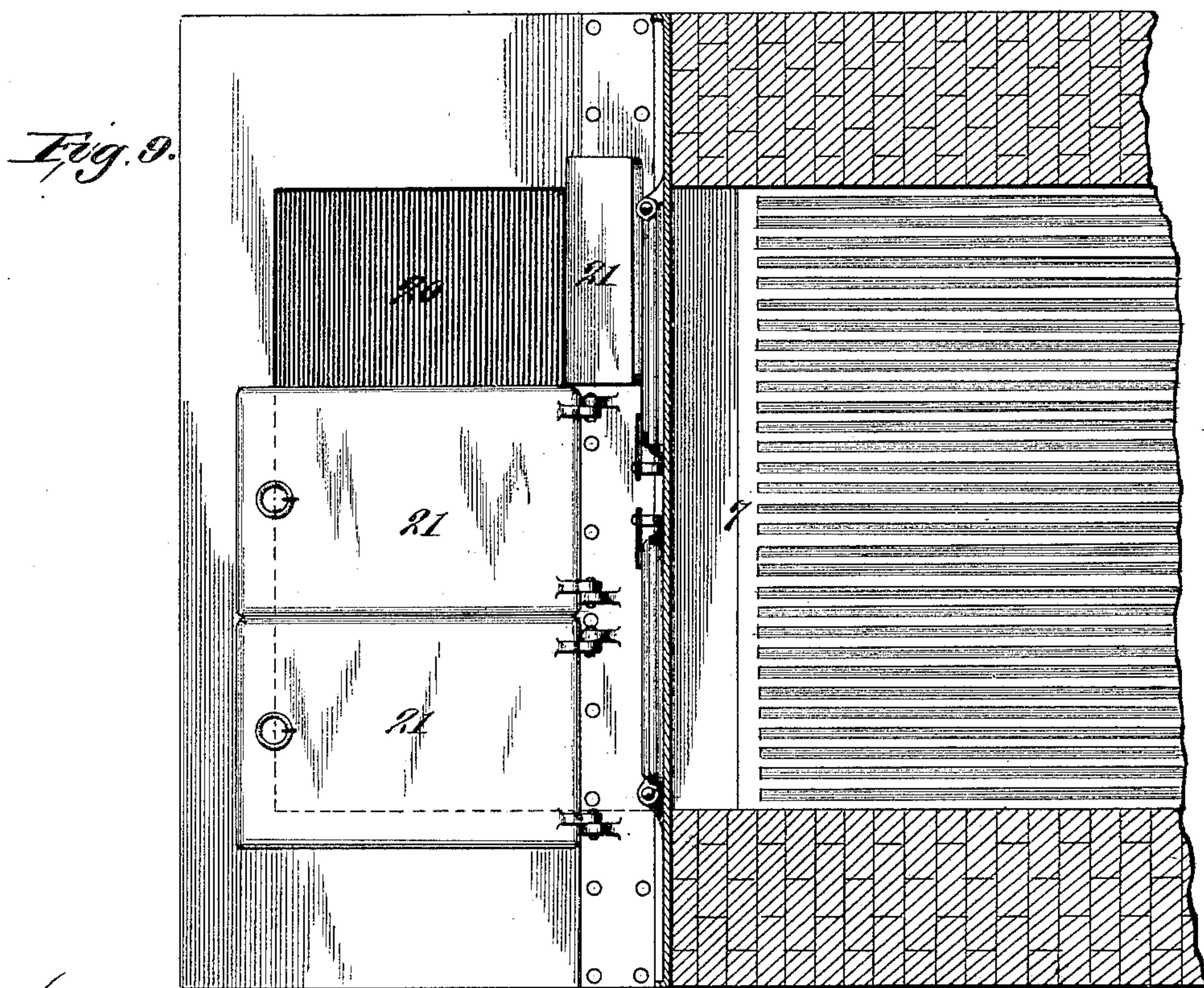
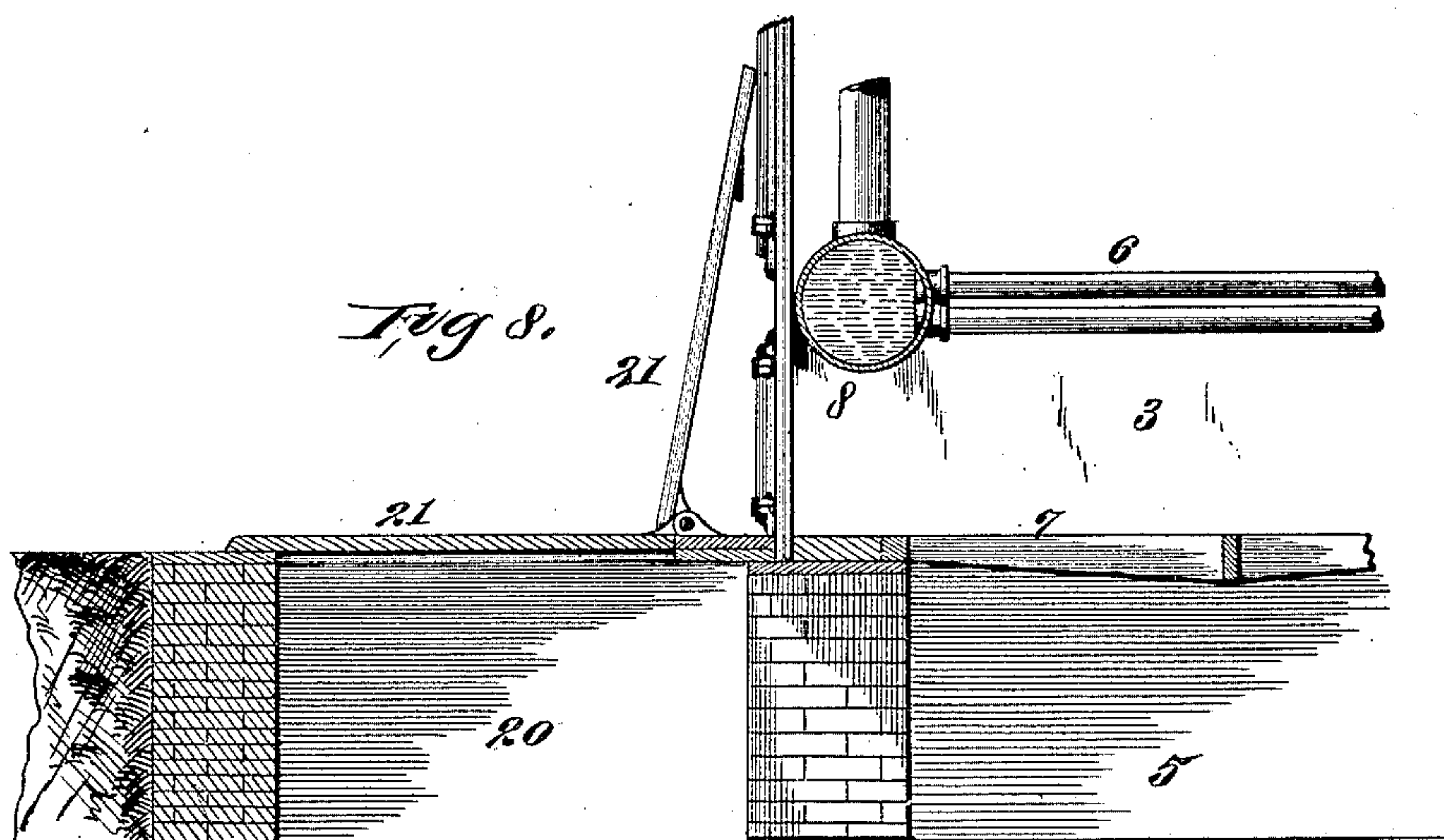
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# UNITED STATES PATENT OFFICE.

JOHN O'BRIEN AND CHARLES K. PICKLES, OF ST. LOUIS, MISSOURI.

## STEAM-BOILER ATTACHMENT.

SPECIFICATION forming part of Letters Patent No. 477,145, dated June 14, 1892.

Application filed March 31, 1892. Serial No. 427,241. (No model.)

*To all whom it may concern:*

Be it known that we, JOHN O'BRIEN and CHARLES K. PICKLES, both of the city of St. Louis, in the State of Missouri, have invented  
5 a certain new and useful Improvement in Steam-Boiler Attachments, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

10 Our invention relates to certain improvements in that class of steam-boiler attachments in which hollow grate-bars are employed, the bars communicating with front and rear manifolds, through which the water  
15 circulates to the boiler.

Our invention consists in features of novelty hereinafter fully described, and pointed out in the claims.

Figure I is a side view of our improved boiler, 20 showing a furnace in section. Fig. II is a vertical section taken on line II II, Fig. I. Fig. III is a detail top view. Fig. IV is part an end view and part in vertical section. Fig. V is a view illustrating the manner of securing the  
25 hollow grate-bars to the manifold. Fig. VI is a front end view, part in section, illustrating a modification. Fig. VII is a detail top view of the form shown in Fig. VI. Figs. VIII and IX are detail views showing the construction  
30 of the ash-receiving pit.

Referring to the drawings, 1 represents the boiler, placed in the usual "setting" 2.

3 is the main fire-box, 4 a sub-fire-box, and  
5 the ash-pit.

35 6 represents the grate of the fire-box, and 7 the grate of the sub-fire-box. The grate 6 is composed of a number of tubes joined at their outer ends to a manifold 8 and at their inner ends to a manifold 9, as clearly shown  
40 in Fig. I. As a manner of connecting the tubes to the manifolds we have shown in Fig. V a construction in which the tubes are screwed into one of the manifolds and have upon their other ends externally-threaded  
45 sleeves 10, which screw into the other manifold, and these ends of the tubes are flared so that a tight joint will be formed between the collars and the tubes.

11 represents a settling or collecting tank  
50 located above the grate of the furnace, so as to be subjected to the heat of the furnace, and which communicates with the boiler and

with the hollow grate through one or both of the manifolds. We have shown two of these tanks, one located on each side of the boiler. 55 In the form shown in Figs. I to IV, inclusive, the outer end of each tank is connected to the manifold 8 by means of a pipe 12, which preferably extends a short distance up into the tank, as shown by dotted lines in Fig. 60 I, and the inner end of each tank is connected to the manifold 9 by the pipe 13, which preferably extends a considerable distance up into the tank, as shown by dotted lines in Fig. I. The inner end of each tank is con- 65 nected to the boiler by a pipe 14, and the other end of each tank is connected to the boiler by a pipe 15. In this form of our invention the water circulates from the boiler through the pipes 15 into the tanks 11, thence 70 through the pipes 12 into the manifold 8, thence through the hollow grate-bars 6 into the manifold 9, thence through the pipes 13 back into the tanks 11, and thence through the pipes 14 into the boiler. The tanks 11 75 being subjected to the heat of the fire-box, it will be seen that the water after entering them through the pipes 13 will reach its highest point of temperature, the result being that the sediment and lime in the water will be pre- 80 cipitated and will settle in the tanks 11, from which it can be blown out or removed, and thus does not enter the boiler.

In the form shown in Figs. VI and VII the tanks 11 are shown suspended from the boiler 85 by means of straps 16, and in this form of the invention the water, instead of passing from the boiler to the tanks 11 and thence to the manifold 8, passes direct from the boiler to the manifold 8 through pipes 17, the remain- 90 der of the construction being the same as that shown in the other figures.

In Figs. VIII and IX we have shown a pit 20 for receiving the ashes from the ash-pit. This pit has doors 21, which when open lean 95 against the front plate of the furnace and when down close the pit, so as not to interfere with the firing of the furnace.

We claim as our invention—

1. The combination, in a steam-boiler at- 100 tachment of a downdraft-furnace, of hollow grate-bars, a boiler, a tank located above the grate-bars and subjected to the heat of the fire-box, and pipes forming a communication

between the boiler, hollow grate-bars, and tank, substantially as and for the purpose set forth.

2. In a boiler attachment of a downdraft-  
5 furnace, the combination of hollow grate-bars communicating with front and rear manifolds, a pipe forming a communication between the boiler and the front manifold, a settling-tank located above the grate-bars, a  
10 pipe forming a communication between the rear manifold and the tank, and a pipe forming a communication between the tank and the boiler, substantially as and for the purpose set forth.

15 3. In a steam-boiler attachment of a downdraft furnace, the combination of hollow grate-bars, front and rear manifolds with

which the grate-bars communicate, settling-tanks located above the grate-bars, pipes forming a communication between the boiler 20 and the settling-tanks, pipes forming a communication between the settling-tanks and the front manifold, pipes forming a communication between the rear manifold and the settling-tanks and which extend up a dis- 25 tance into the settling-tanks, and pipes forming a communication between the settling-tanks and the boiler, substantially as and for the purpose set forth.

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In presence of—

A. M. EBERSOLE,

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