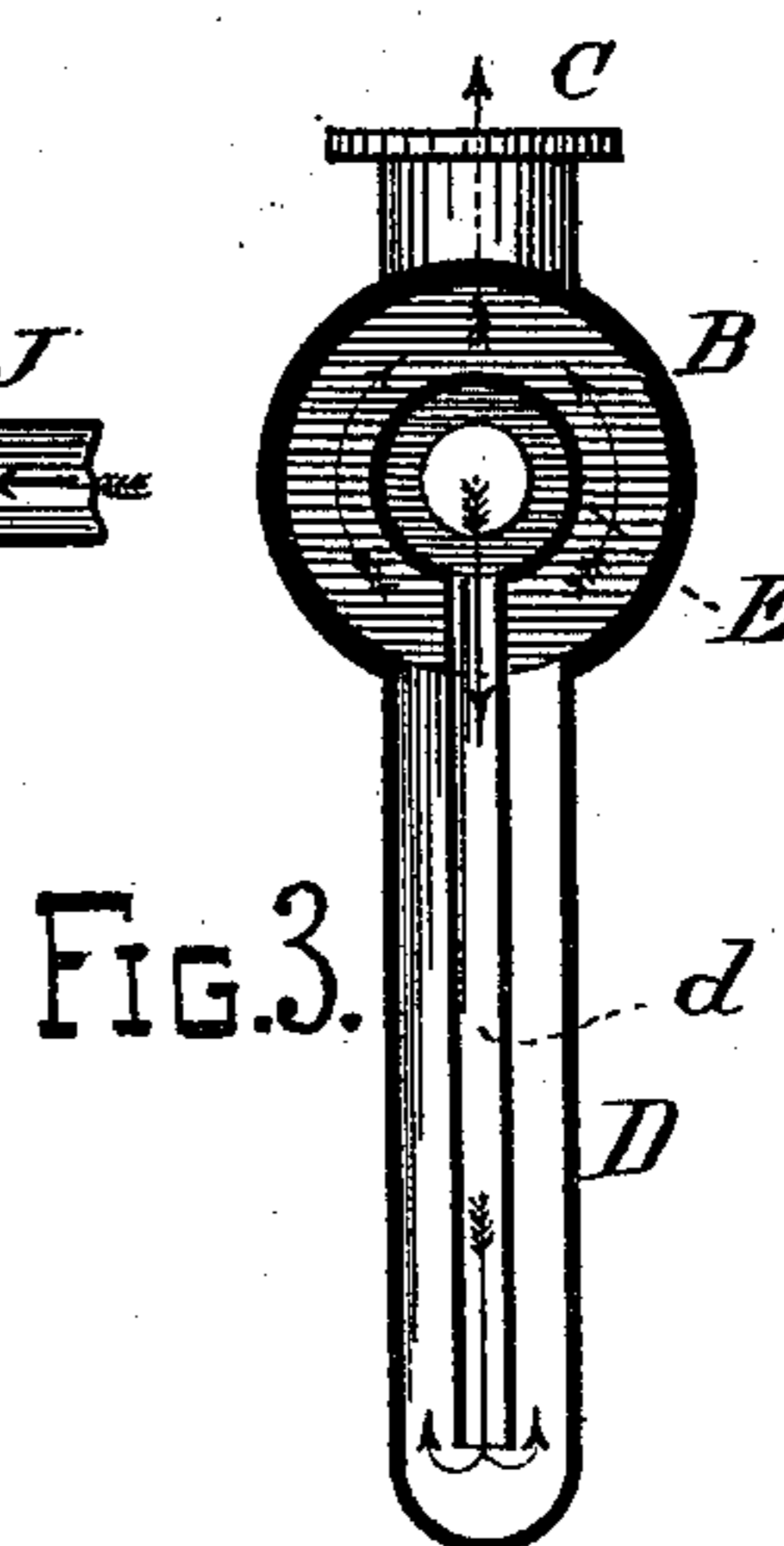
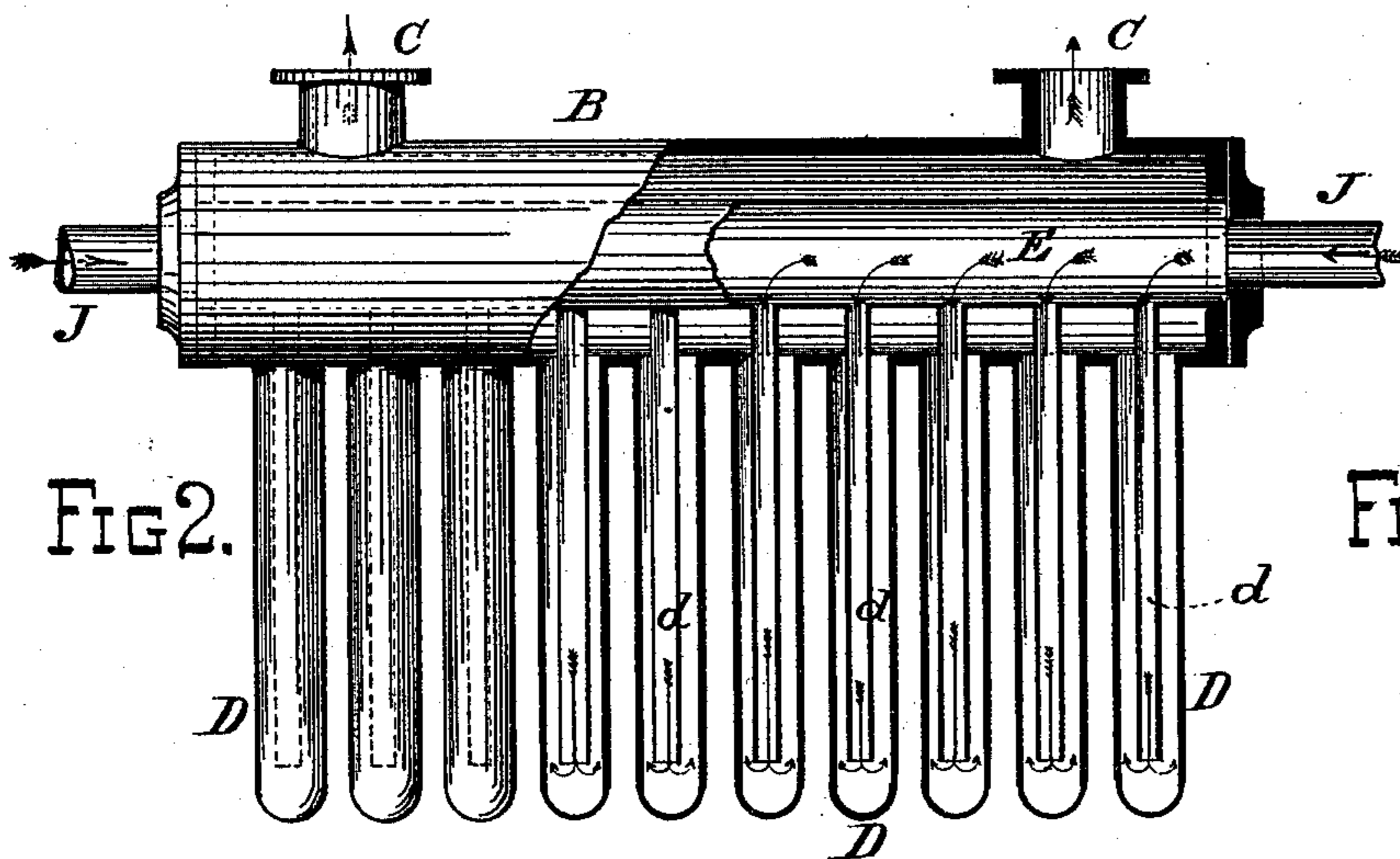
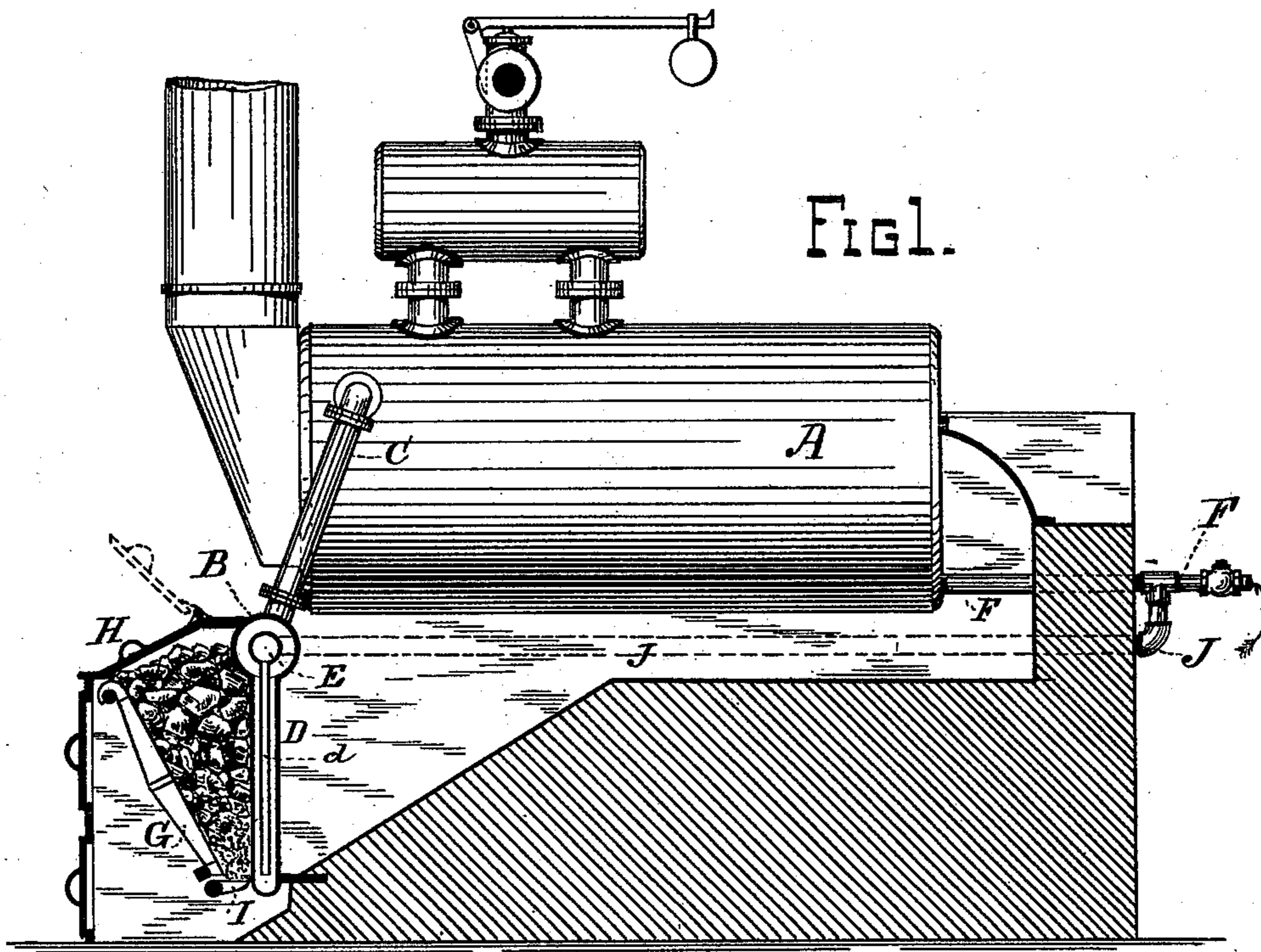


(No Model.)

W. G. DODD.
STEAM BOILER FURNACE.

No. 417,475.

Patented Dec. 17, 1889.



WITNESSES.

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STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 417,475, dated December 17, 1889.

Application filed June 19, 1889. Serial No. 314,856. (No model.)

To all whom it may concern:

Be it known that I, WILLIS G. DODD, a citizen of the United States, residing at the city of San Francisco, county of San Francisco, State of California, have invented certain new and useful Improvements in Steam-Boiler Furnaces, of which the following is a specification.

My invention relates to that class of steam-boiler furnaces in which the fuel-chamber is formed transversely of the furnace-mouth between inclined grate-bars and a grilling backing of vertical water-pipes communicating with the boiler; and my invention consists in the novel improvements in the arrangement, construction, and combination of said pipes and connections hereinafter fully described, and specifically pointed out in the claims; and the objects of my improvements are to provide a furnace that will be almost automatic in its operation and obtain greater useful effect from the fuel consumed, with cheapness of construction, combined with simplicity, affording free access for repairs. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a horizontal elevation of a boiler with setting in part section, showing my improved furnace attached. Fig. 2 is a detail showing front elevation in part section of my improved water-grating. Fig. 3 is a cross-section of same.

Similar letters refer to similar parts throughout the different views.

A represents a boiler of the ordinary horizontal tubular type in general use.

B represents a water leg or tube, which extends transversely across in front of the boiler, having a pipe or pipes C, connecting same with the boiler-shell at the water-line. This water-leg is provided with a series of drop-tubes D, that are screwed or otherwise attached to it on its under side and extend downward, forming a grillage or grating, which, with the inclined fire-bars G, setting in front of same, form a receptacle for holding the fuel. The water-leg B has an internal pipe E, passing through it horizontally, and provided at its under side with small branch pipes *d*, which project downward into each of the drop-tubes D. These pipes are

open at their lower ends. The internal pipe E is connected at one or both ends of the water-leg with the feed-pipe F of the boiler by suitable pipes J.

G is a set of ordinary grate-bars set at any inclination suitable to the fuel employed. The hinged cover or door H is placed above the grates, through which the fuel is introduced. The small hinged grate I is for the purpose of partially supporting the fuel, as also for dropping ashes and clinker which accumulate in the furnace. If light coals are employed as fuel—such as coke—the grate-bars will be placed on a steep incline, as shown. If small coal is employed, the inclination must be reduced to an angle which will prevent packing and allow the air to freely circulate through the fuel.

Having described the various parts, the operation is as follows: The flame and heat of the fire passing through the grillage or grating of tubes D causes the water within them to be heated and to rise upward, entering the boiler through the pipes C at the water-line of same. The water thus forced out of the tubes D is replaced by the water flowing from the feed-pipe into the internal pipe E through pipes J, from whence it is delivered into the drop-tubes D through branch pipes *d*, causing a complete and rapid circulation of the water in the boiler, and owing to the lightness of the iron in the tubes the heat is quickly absorbed by the water as fast as generated, producing great economy. The drop-tubes D, as before stated, being secured at one end only, allow free expansion and contraction. Should it become necessary from any cause to replace one or more of these tubes, the connections between the boiler, which are placed entirely outside the setting, can be broken and the water-leg removed for repairs without disturbing any other portion, which is of great importance.

This furnace can be automatically fed with fuel by gravity from a bin, the chute setting at an incline sufficient to allow the fuel to slide into the furnace, and by dropping the ash and clinker as they accumulate, by use of the small grate I, makes the furnace almost automatic in its operation.

I am aware that grates made of tubes through which water circulates have been

used; also, that a basket-like grate formed between inclined grate-bars, tubular or solid, and vertical water-pipes is known, and, finally, that steam-generators are old which comprise concentric horizontal water-pipes and connected concentric vertical water-pipes. I therefore make no claim to such.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a steam-boiler furnace, the boiler, the furnace, the grate-bars at the mouth of the furnace, and a pipe connected with the boiler for feeding the water thereto, in combination with the horizontal transverse water leg or tube at the front of the furnace, the series of drop-tubes secured at their upper ends to the water leg or tube and communicating therewith and having their lower ends free and closed, said drop-tubes forming a grillage back wall for the fuel-chamber, the pipes C, communicating at their lower ends with the ends of the water leg or tube and passing up on each side of the boiler-front and communicating with the interior of the boiler at the water-line, a pipe within said water leg or tube, a series of open-ended circulating-pipes depending from said inner pipe and extending down within the series of drop-tubes, and the pipes J, connecting the ends of said inner pipe with the feed-water pipe of the boiler, whereby said feed-water is supplied to the boiler through the pipes J, the grillage back

wall of the grate, and the pipe C, substantially as herein described.

2. In a steam-boiler furnace, the boiler, the feed-water pipe therefor passing through the back of the furnace and communicating with the lower back end of the boiler, the furnace, and the grate-bars at the furnace-mouth, in combination with the horizontal transverse water leg or tube at the front of the furnace, the series of drop-tubes secured at their upper ends to the water leg or tube and communicating therewith and having their lower ends free and closed, said drop-tubes forming a grillage back wall for the fuel-chamber, the pipes C, connecting the ends of the water leg or tube with the sides of the front of the boiler at the water-line, an inner pipe, a series of open-ended circulating-pipes depending from said inner pipe and extending down within the series of drop-tubes, and the pipes J, connecting the ends of said inner pipe with the feed-water pipe, whereby the feed-water is fed to the boiler through the grillage back wall of the fuel-chamber and a circulation established from the front of the boiler backwardly through the feed-water pipes and pipes J to said grillage back wall, substantially as herein described.

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Witnesses:

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