

(No Model.)

H. T. LITCHFIELD.
UTILIZING EXHAUST STEAM.

No. 259,323.

Patented June 13, 1882.

FIG. 1.

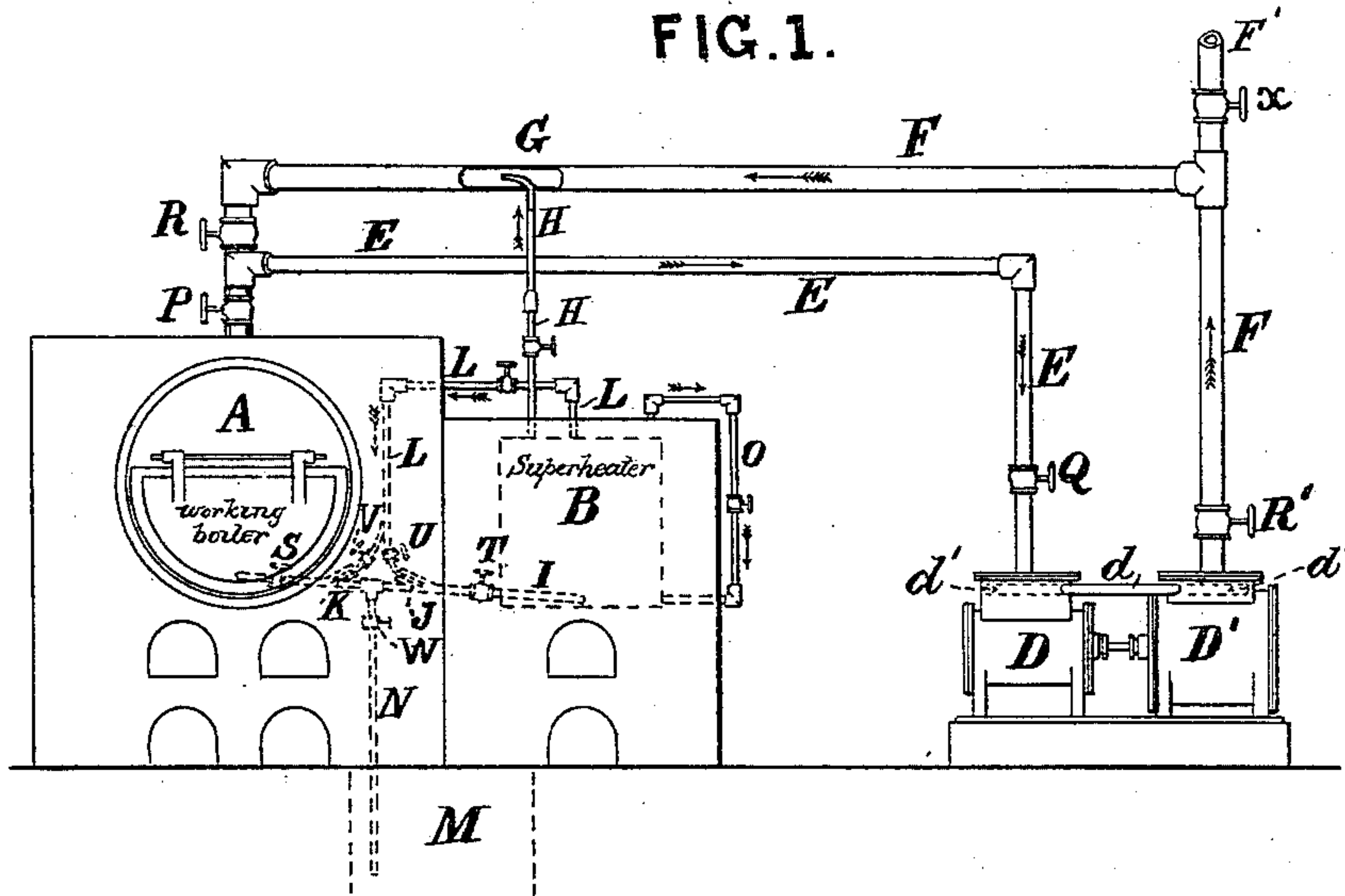


FIG. 3.

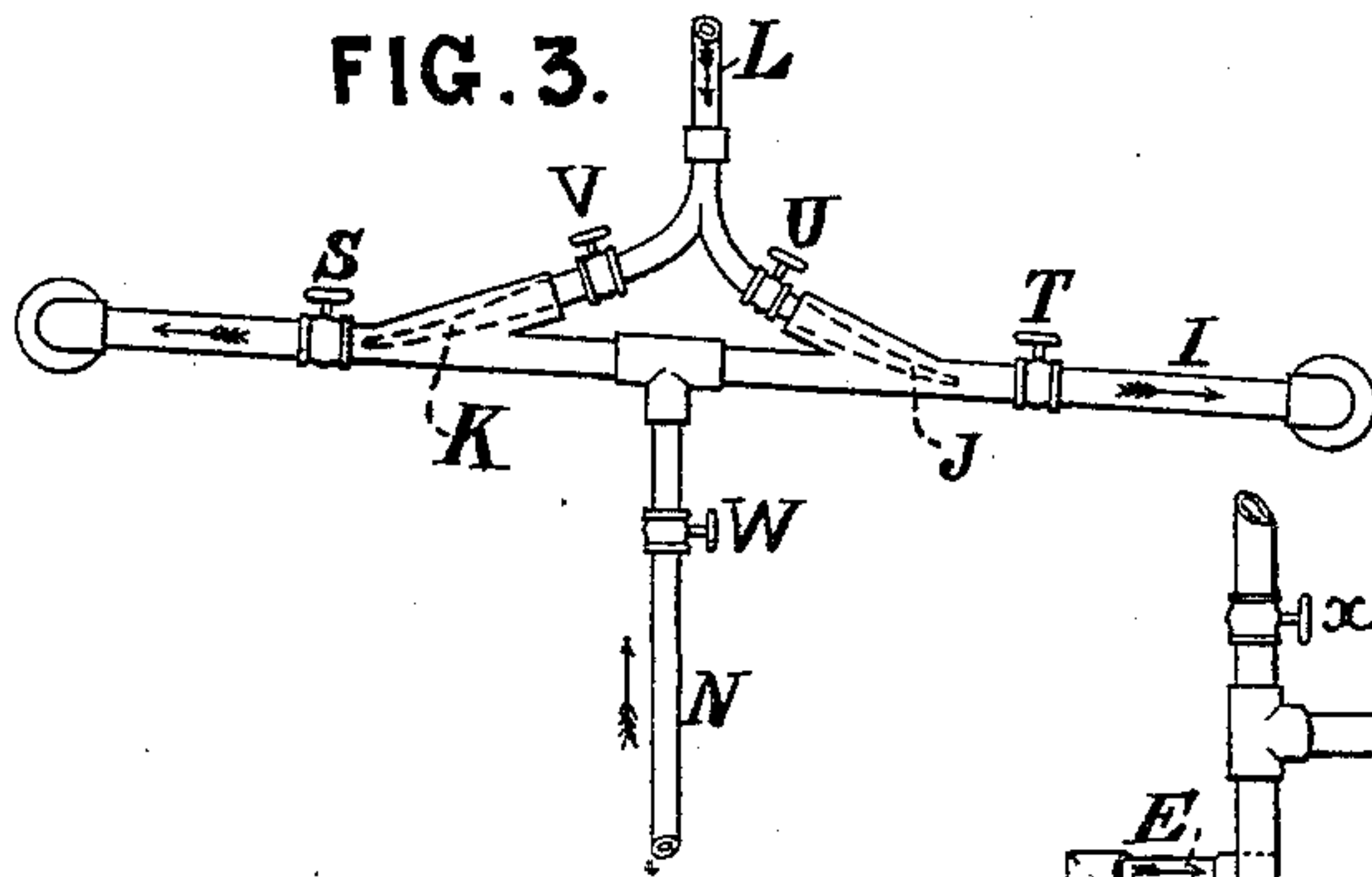
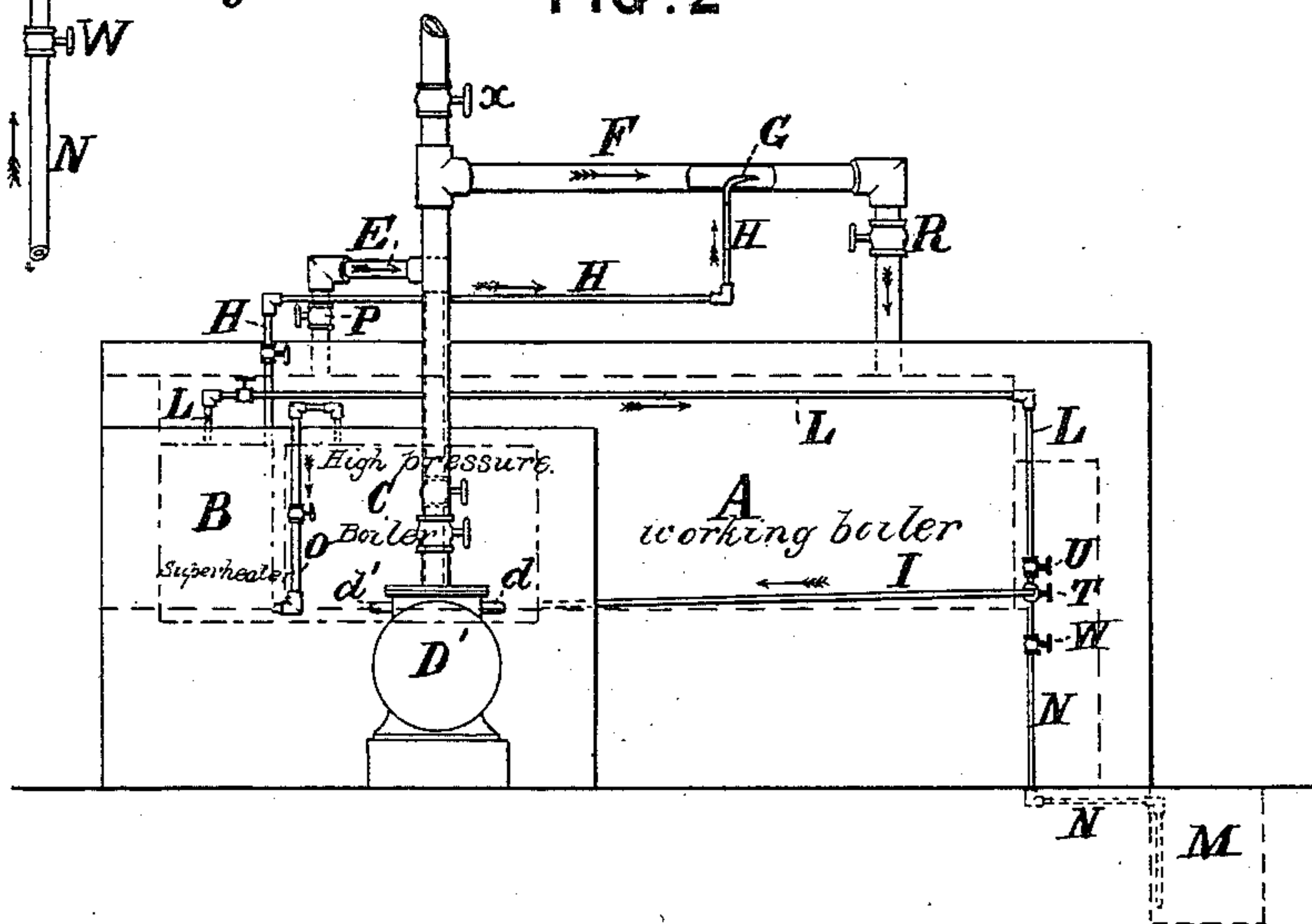


FIG. 2.



Witnesses

E. Blanka

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UNITED STATES PATENT OFFICE.

HARVEY T. LITCHFIELD, OF HULL, ASSIGNOR OF ONE-HALF TO DAVID
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UTILIZING EXHAUST-STEAM.

SPECIFICATION forming part of Letters Patent No. 259,323, dated June 13, 1882.

Application filed August 3, 1881. (No model.)

To all whom it may concern:

Be it known that I, HARVEY T. LITCHFIELD, of Hull, in the county of Plymouth and State of Massachusetts, have invented a new and
5 useful Improvement in the Process of Utilizing Exhaust-Steam, of which the following is a specification.

My invention has for its object the utilization of the exhaust-steam of engines, and retaining
10 and utilizing the same without the loss of heat and without any condensation except that due to radiation; and it consists in certain arrangements of parts in which the steam, or the steam and water, or water alone, may be fed to either
15 of the boilers from each other, when it is so desired, without a pump, and also by the same means regulate the pressure of steam in the working-boiler, as will hereinafter more fully appear.

20 In the drawings, Figure 1 illustrates all the various parts of my invention. Fig. 2 is a side elevation of the same. Fig. 3 is an enlarged view, showing certain details of the apparatus.

The same letters denote like parts in all the
25 figures.

A is a low-pressure boiler or receiver; B, the high-pressure boiler; b, the superheater, located in rear of the high-pressure boiler and exposed to the heat of the furnace. D D' is a
30 compound engine; E, the feed-pipe to engine; F, the exhaust-pipe from same; H, the superheated-steam pipe having nozzle G. I is a pipe leading to each of the boilers, and also to the water-tank. J K are branch pipes provided with cocks V U. L is the superheated-
35 steam pipe leading from the superheater to the branches K J. M is the water-tank, and N the pipe leading therefrom. The liquids and gases passing through all these pipes are regulated
40 by cocks and valves. O is the pipe which conveys the steam from the high-pressure boiler to the superheater, which is also controlled by a cock. F' is a pipe which leads off to heat buildings, or for other purposes.

45 While the high-pressure boiler will generate

sufficient quantity of steam for all ordinary purposes, it often happens that a greater quantity of steam is required. In that case the low-pressure boiler may be used for generating steam for that purpose.

Operation: Steam is generated in the high-pressure boiler. It is then conveyed to the superheater. When the engine is at work the superheated steam is used to inject the exhaust
50 of the engine into the low-pressure boiler or receiver. A portion of the superheated steam is used for injecting water from the high-pressure boiler into the low-pressure boiler, and when water is required for either of these boilers it is used for injecting it; but when too
55 much water accumulates in the receiver the cock V is shut off and the cocks S, T, U, and W are opened. Communication between the boilers is now established, and also with the water-tank, to such an extent as to permit a
60 small quantity of water from the tank to enter the injector. Steam is then let on, when the water from the low-pressure boiler is injected into the high-pressure one. Thus it will be seen that the feeding device is also a governor
65 for regulating the pressure and supply, the high-pressure boiler being of sufficient capacity to retain any surplus pressure.

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

The combination, with an apparatus for utilizing the exhaust of engines, of the branch injecting-pipes, communicating with two or more
80 boilers and with the water-tank, and adapted to force liquid from one to the other, or to either of them, in the manner shown and described.

In testimony whereof I have signed my name to this specification in the presence of two
85 scribing witnesses.

HARVEY T. LITCHFIELD.

Witnesses:

J. H. ADAMS,
B. O'HARA.