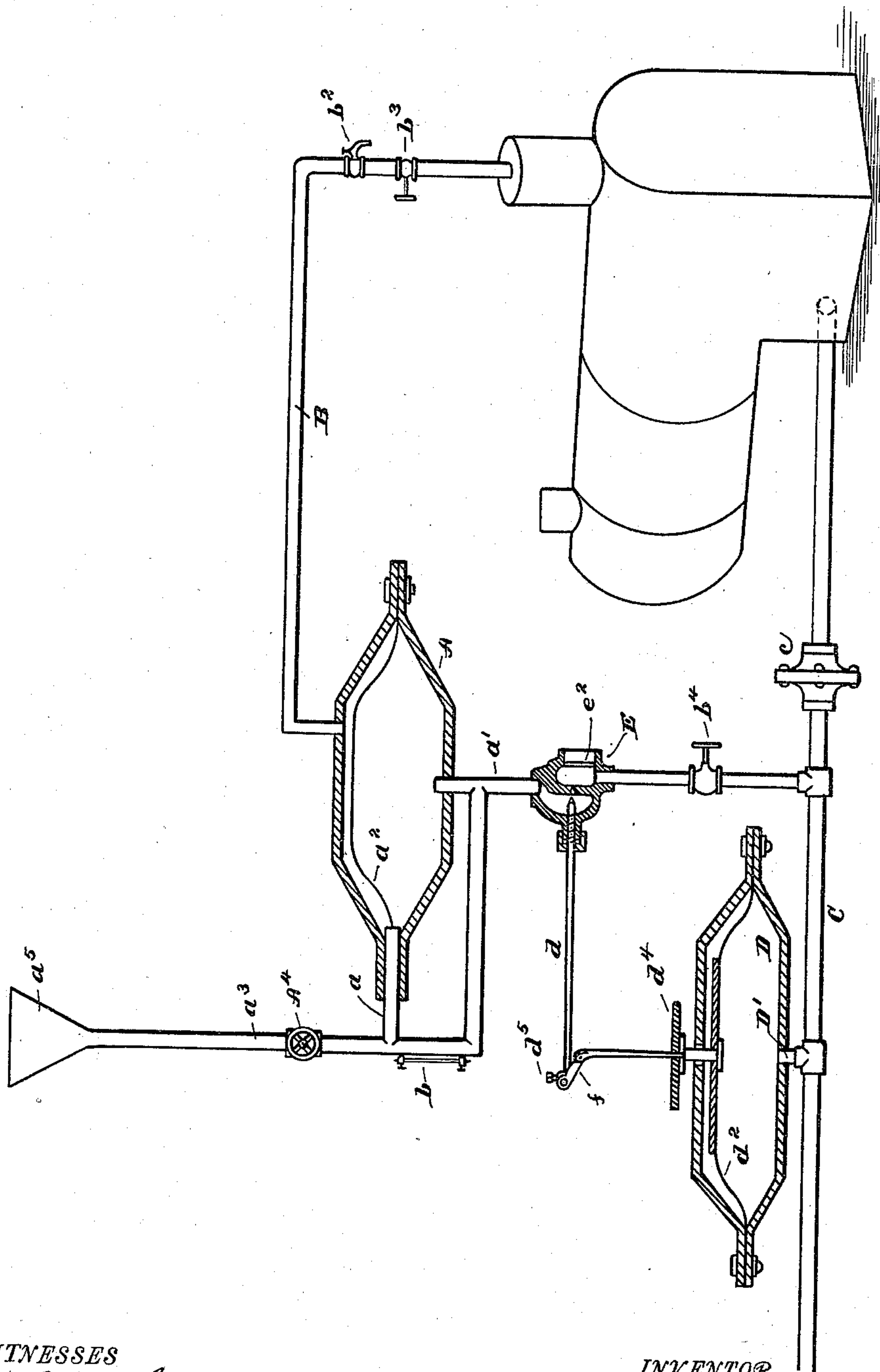


(No Model.)

E. S. HOYT.  
DEVICE FOR FEEDING DEPURGATIVE LIQUID TO BOILERS.  
No. 547,436.

Patented Oct. 8, 1895.



WITNESSES

*W. Clough.*

*V. M. Clough*

INVENTOR

*E. S. Hoyt*

By

*Parker and Ruston*

*Attorneys.*

# UNITED STATES PATENT OFFICE.

EZRA S. HOYT, OF DETROIT, MICHIGAN.

## DEVICE FOR FEEDING DEPURGATIVE LIQUID TO BOILERS.

SPECIFICATION forming part of Letters Patent No. 547,436, dated October 8, 1895.

Application filed February 4, 1895. Serial No. 537,176. (No model.)

*To all whom it may concern:*

Be it known that I, EZRA S. HOYT, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Devices for Feeding Depurgative Liquid into Boilers; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawing, which forms a part of this specification.

This invention relates to devices for feeding depurgative liquid into boilers for the purpose of loosening and removing the scale from the boiler and from the tubes or flues of the boiler. It also may be used to feed in a liquid which will in the first instance prevent the deposit.

It has for its object an improved means by which the depurgative liquid is forced by gravity into the feed-water and passes with the feed-water into the boiler, and while the force of gravity is used for the purpose of carrying the depurgative liquid into the feed-water the back pressure from the boiler or from the feed-water is equalized.

The drawing is intended to indicate rather than picture the apparatus, which it shows in section, the parts being enlarged with reference to the boiler that is shown at the right of the drawing.

A indicates the tank, having an inlet-pipe  $a$  and an outlet-pipe  $a'$ . Across the tank is a flexible diaphragm  $a^2$ , and the tank itself is so formed and shaped that the flexible diaphragm  $a^2$  may take a position substantially parallel with and coincident with the inner walls of either the upper half-section or the lower half-section. The inlet-pipe  $a$  and the outlet-pipe  $a'$  both pierce the walls of the tank A on the same side of the flexible diaphragm  $a^2$ . A live-steam pipe R pierces the walls and leads into the tank in that section of it which lies on the other side of the flexible diaphragm  $a^2$ . The inlet-pipe  $a$  branches from a filling-pipe  $a^3$ , which terminates at its upper end with an opening  $a^5$ , into which the depurgative liquid can be poured. A branch from the filling-pipe  $a^3$  leads by the tank A and into the outlet-pipe  $a'$ , and on this shunt-

pipe is located a sight-gage  $b$ , so arranged as to show the depth of the liquid in the tank A, or a portion of the depth of the liquid, as it is only useful to know that there is some liquid still remaining in the tank A.

C indicates the ordinary feed-water pipe, through which feed-water is forced to the boiler by any suitable or usual means for forcing feed-water.

$c$  indicates an ordinary check-valve, and the outlet-pipe  $a'$  leads into the feed-water pipe C on the pump side of the check-valve  $c$ . The flow of the liquid through the pipe  $a'$  is regulated automatically by a needle-valve  $d$ , which is actuated by the force imparted to the water in the feed-pipe C, and the force is imparted to the valve by the following-described mechanism: At any convenient point from the pipe C branches a pipe  $D'$ , which expands or opens into a tank D. Across this tank is a flexible diaphragm  $d^2$ , and connected with the diaphragm, reaching through the walls of the tank D, is a plunger that communicates with the valve-stem  $d$ . As indicated in the drawing, the connection between the plunger  $d'$  and the valve-stem  $d$  is a crank-lever, which turns the stem  $d$ , and on this stem the set-screw  $d^5$  allows of any adjustment desired.

$d^4$  indicates a weight used to counteract force of the water in the tank D and close the valve  $d$  on its seat or toward its seat, whereas the pressure of the fluid tends to open the valve. The needle-valve  $d$  seats against or into a needle-opening  $e$  in the diaphragm  $e'$ , across the valve-casing E.

$e^2$  indicates the glazed opening in the valve-casing E, which furnishes a chance to inspect the flow of the liquid from the tank A into the feed-water in the pipe C. The connection between the valve-stem  $d$  and the branch  $f$  of the bell-crank lever is adjustable in any suitable way, as by a screw and nut engagement between the two. The nut may be hung on trunnions, so that the parts will not be rigid, although the movement of the valve-stem  $d$  is so slight that the spring of the rods of which the parts are made will generally be sufficient to permit all the necessary movement. At  $A^4$  is a valve which is opened when the tank A is filled and closed afterward. At  $b^2$  is a pet-cock, through which any water of condensa-



tion that gathers in the pipe B can be drawn off, and at  $b^3$  and  $b^4$  are valves by means of which the tank A and its adjuncts can be thrown into use or thrown out of use as may be desired.

With this device any liquid suitable for depurgative purposes can be fed into the boiler along with the feed-water, the appliances used keeping the liquid entirely separate from the steam, which serves to equalize the pressure on both sides of it.

What I claim is—

1. In a device for feeding depurgative liquid into boilers, a tank, a diaphragm separating the same into two parts, a feed outlet from one side of said tank, a balance steam pipe leading into the tank on the opposite side of said diaphragm, substantially as described.

2. In a device for feeding depurgative liquid into boilers, a tank, a diaphragm separating the same into two parts, a feed outlet from one side of said tank, a balance steam pipe leading into the tank on the opposite side of said diaphragm, means for regulating the out-flow of liquid from the tank, substantially as described.

3. In a device for feeding depurgative liquid

into boilers, the combination of a tank divided by a diaphragm into two chambers, means for filling with depurgative liquid one of said chambers, means for introducing steam pressure into the other of said chambers, an outlet and pipe leading from the first chamber to the feed water pipe, a needle valve adapted to control the flow of depurgative liquid through said pipe, and means actuated by the pressure of water in the feed water pipes adapted to control the needle valve, substantially as described.

4. In combination with a tank adapted to contain depurgative liquid, an out flow pipe leading into the feed water pipe of the boiler, a valve in the out flow pipe, a movable diaphragm adapted to be actuated by the feed water, connections between the movable diaphragm and the valve, whereby the valve may be actuated by the diaphragm, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses:

EZRA S. HOYT.

Witnesses:

V. M. CLOUGH,  
F. CLOUGH.