

R. W. Bender
Evaporating Pan.

N^o 36,267.

Patented Aug. 26, 1862.

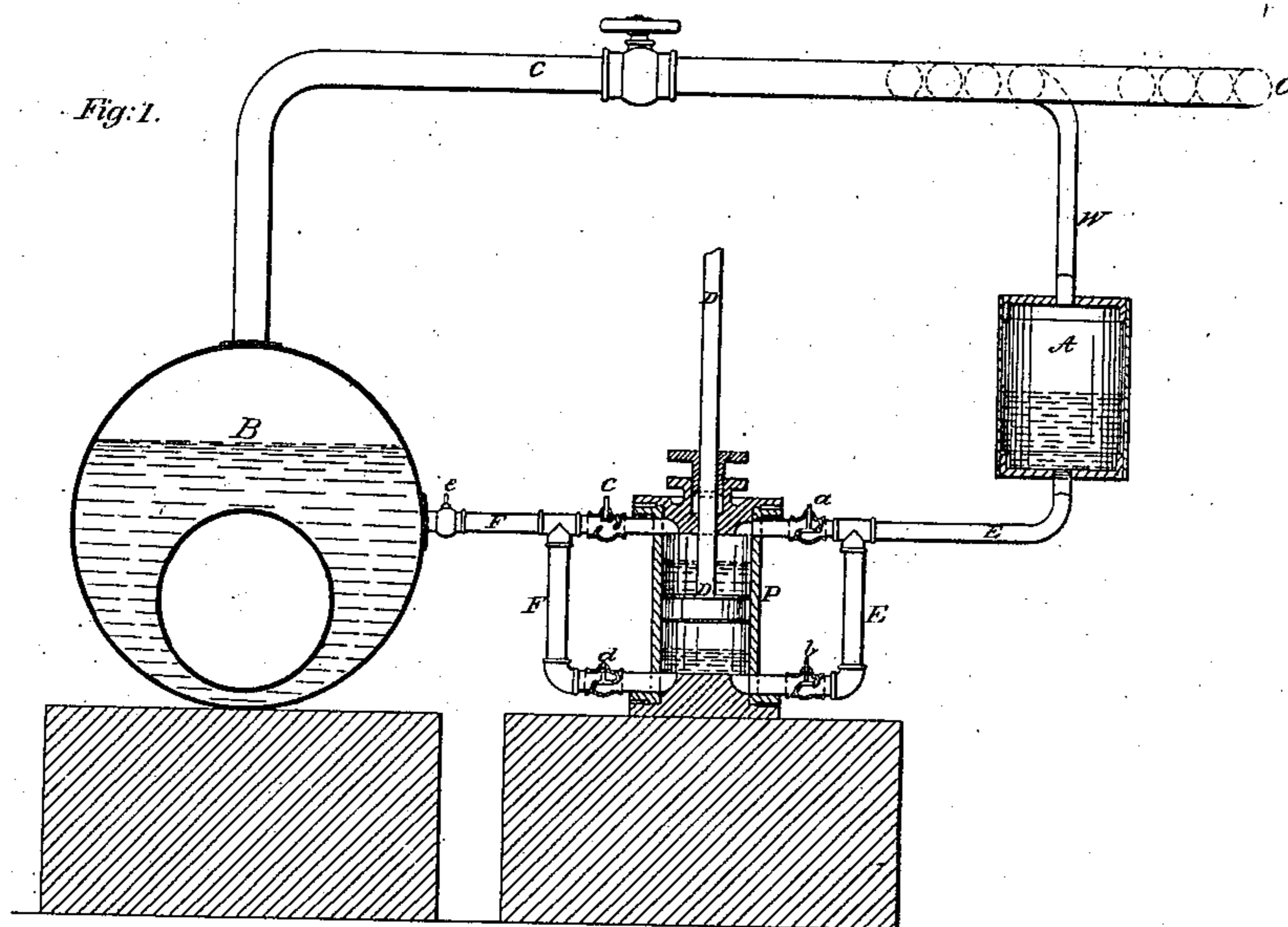
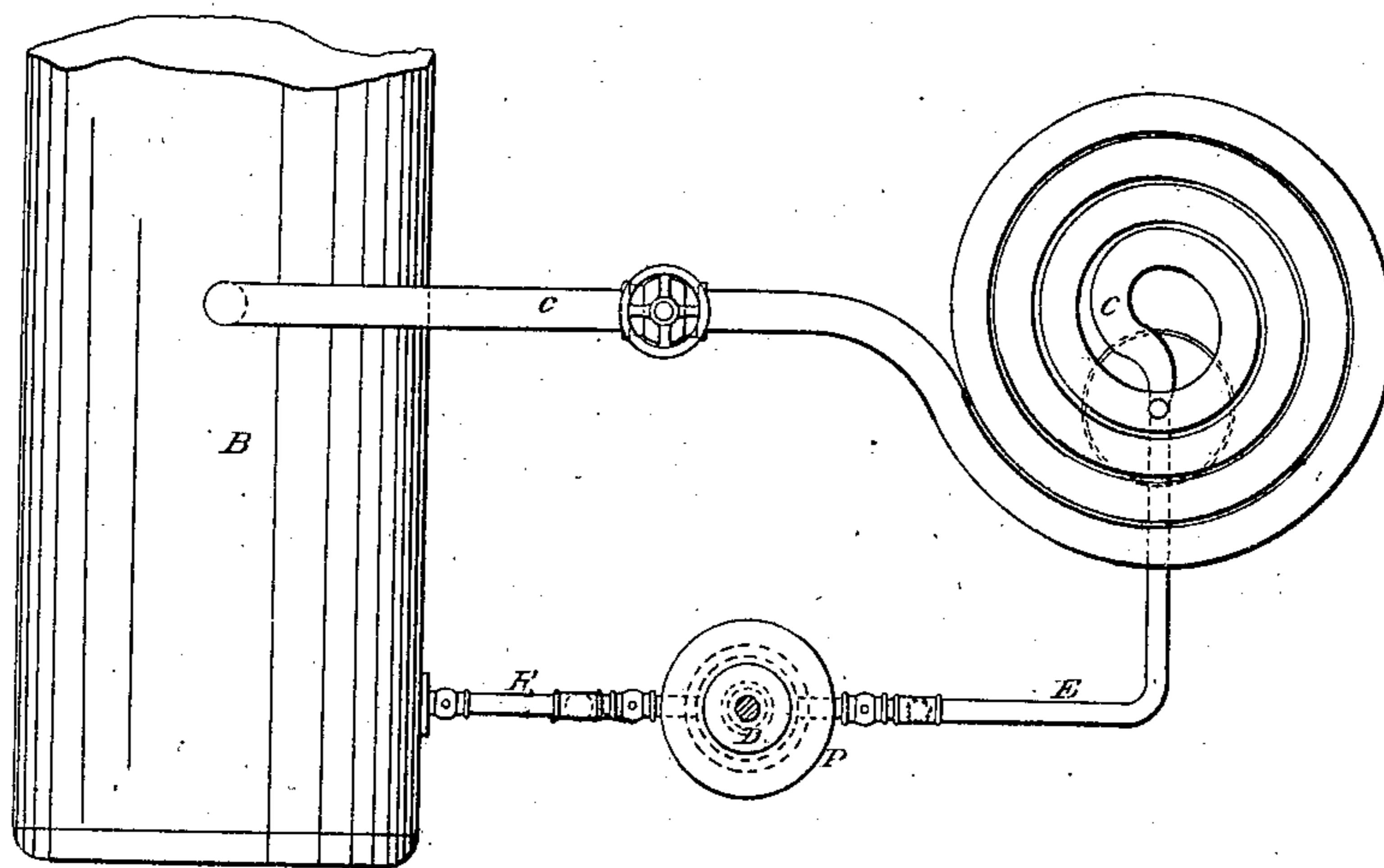


Fig. 2.



Witnesses:

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Inventor:

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UNITED STATES PATENT OFFICE.

RICHARD W. BENDER, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN APPARATUS FOR EVAPORATING BY MEANS OF STEAM.

Specification forming part of Letters Patent No. 36,267, dated August 26, 1862.

To all whom it may concern:

Be it known that I, RICHARD WILLIAM BENDER, of the city of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Steam-Coil Evaporator Used in Sugar-Refineries; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification, and to the letters and figures of reference marked thereon.

My invention consists in having the waste-pipe through which the spent steam escapes connected, either with the intervention of a receiver or without, to the boiler, in such a manner that by means of a pump the cooled or condensed steam and water may be forced back into the boiler, which will therefore require the introduction of less cold water than would otherwise be needed, and thus any given degree of heat can be produced with the use of less fuel.

To enable those skilled in the art to understand and use my invention, I will now proceed to describe the same with particularity.

In the accompanying drawings, Figure 1 represents a side elevation, showing sections of the boiler, the receiver, (when used,) and the pump. Fig. 2 is a plan view, which shows the horizontal coil in the pipe through which the steam passes. This coil is designed to be placed and to lie in the evaporating pan or boiler, immersed in the sirup or liquid sugar to be evaporated, which evaporation of said sugar or sirup is occasioned by the steam passing through the said coil.

In Fig. 1, B is the boiler, constructed in any of the known forms.

C C represent the heating pipe and coil.

W is the waste-pipe whereby the steam escapes from the coil. This waste-pipe W may be connected with the pump without the intervention of the receiver; but if the receiver is used, A represents its position.

P represents the double-acting pump, which, in connection or combination with the pipes E and F, forces the cooled and condensed steam and water back into the boiler. The pump P is operated by a steam-engine entirely separate and distinct from anything herein

described, being the engine used in connection with steam-coil evaporators for the purpose of pumping cold water into the boiler thereof, the pump being operated by connecting the piston-rod thereof (marked D in the drawings) with a jointed pitman driven by said engine, or by any other equivalent method. The steam-engine which drives the piston in operating the pump as aforesaid having nothing to do with the nature of my invention and forming no part of it, I have not shown it upon the drawings.

At *a b c d e* are valves, the one at *e* being to prevent the contents of the boiler from escaping into the pipe marked F.

The manner in which my invention operates is as follows: The steam, being generated in the boiler, passes into the heating pipe and coil, where, having performed its function, it loses its heat, and as it passes into the waste-pipe becomes converted into watery vapor and water, which collects in A, whence by the action of the pump it is forced first into the chambers above and below the piston, and thence by the opposite stroke into the boiler. At the upward stroke of the piston the contents of the receiver and waste-pipe are forced into the chamber directly beneath the piston, and the contents of the upper chamber are forced into the boiler, and at the downward stroke the contents of the receiver are forced into the upper chamber, and the contents of the lower chamber are forced into the boiler.

The object of my invention is to obtain a supply of steam for heating or boiling of a higher and more uniform temperature, and to save fuel. The steam, when only partially condensed, being supplied to the boiler in this manner, of course renders the quantity of cold water necessary very much less, and so requires less fuel to obtain a given temperature.

I claim as my invention—

The application, combination, and arrangement of the receiver A, the pipes E and F, and the double-acting pump P, operating as described, for the purposes substantially as set forth.

RICHARD WM. BENDER.

Witnesses:

WILLIAM E. MARRS,
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