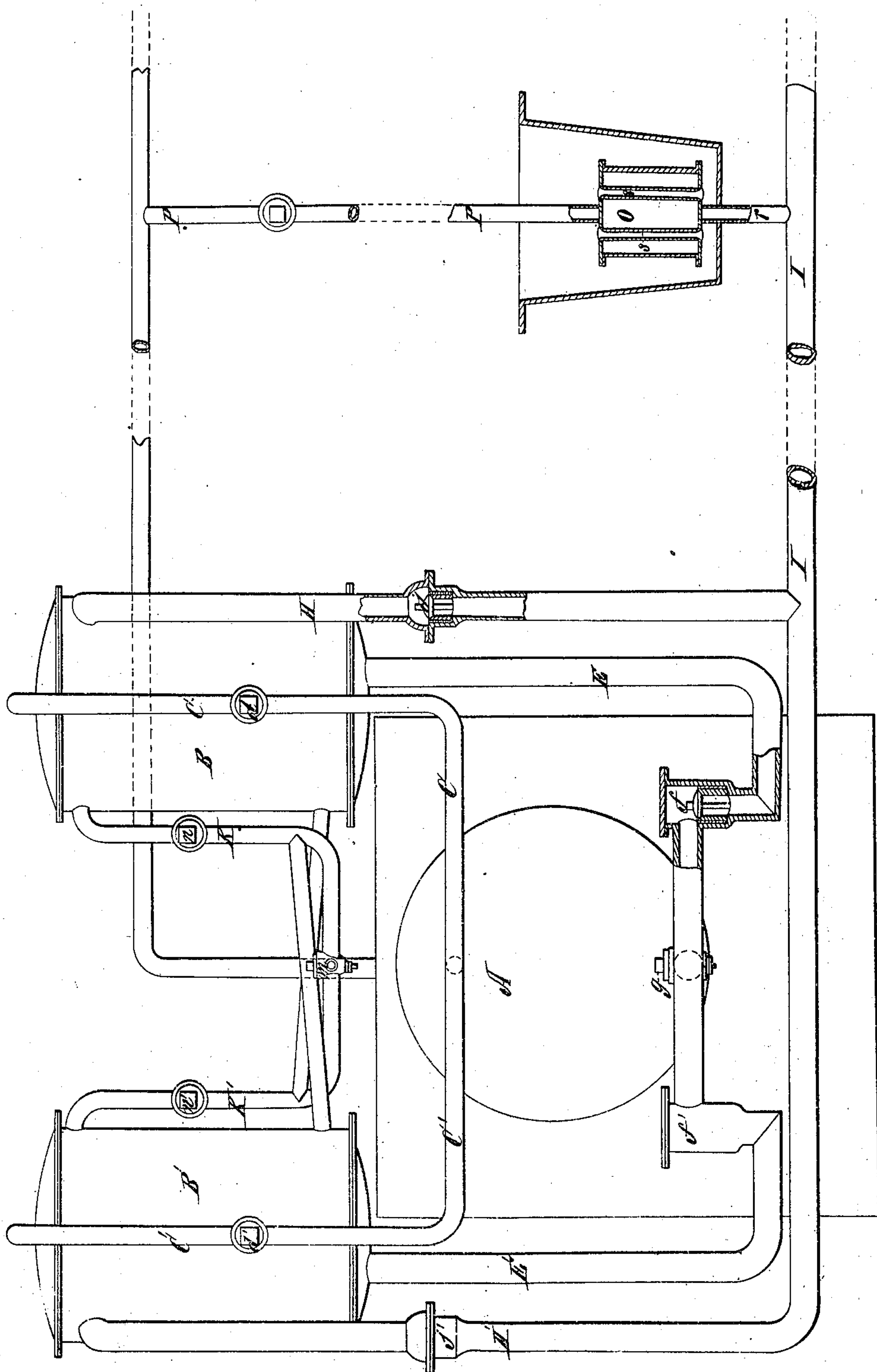


*Dennisson & Sealy,*  
*Steam-Boiler Water-Feeder,*

*Nº 19,493,*

*Patented Mar. 2, 1858.*





# UNITED STATES PATENT OFFICE.

JOHN N. DENNISON AND THOS. SEALY, OF NEWARK, NEW JERSEY.

## APPARATUS FOR SUPPLYING WATER TO BOILERS.

Specification of Letters Patent No. 19,493, dated March 2, 1858.

*To all whom it may concern:*

Be it known that we, JOHN N. DENNISON and THOMAS SEALY, of Newark, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Apparatus for Feeding Steam-Boilers; and we do hereby declare that the following is a full, clear, and exact description of our said invention, reference being had to the accompanying drawing, which represents an end elevation of a steam-boiler with our feeding apparatus applied thereto and a section of a hatter's kettle heated by steam from the boiler.

Our invention belongs to that class of apparatus by means of which water is supplied to steam boilers, and it operates in such manner that the water condensed from steam flowing from a boiler may be returned thereto at the highest temperature attainable, and that the flow of feed water into the boiler may be carefully graduated so as to equal in quantity the water evaporated, thus maintaining an equable water level in the boiler.

It is specially adapted for the feeding of boilers used in connection with steam heating apparatus where no power can be conveniently obtained for working feed pumps and it consists in a combination of two close chambers which are connected with each other, with the drain pipe of the steam heating apparatus or radiators, and with the boiler by a system of pipes and valves, in such manner that the chambers act alternately to receive the condensed water from the radiator to heat it by the passage of steam into it and to feed it in a heated state to the boiler in a continuous stream.

Our invention further consists in combining the said feeding apparatus with a steam heating apparatus situated lower than the level of the boiler, in such manner that the hot condensed water which from the want of a pump to raise it would otherwise be allowed to run to waste is raised and returned to the boiler, thus saving the fuel which would be required to heat an equal quantity of cold feed water to the same temperature.

The accompanying drawing represents our invention as applied to the boiler of a steam heating apparatus for heating hatters' kettles, for working and sizing hat bodies,

and one of the kettles is represented in the drawing as situated at a lower level than the boiler.

The boiler, A, is surmounted by two close chambers, B and B', which are of sufficient strength to sustain the highest pressure of steam it may be desirable to use. The top of each chamber is connected by a pipe, C, C', with the steam space of the boiler, and each pipe is fitted with a stop cock, *d*, *d'*, or valve by means of which the supply of steam to either chamber can be regulated or shut off. The bottom of each chamber is connected by a pipe, E, E', with the water space, or lower part of the boiler, and these pipes are each fitted with a valve, *f*, *f'*, opening toward the boiler. The branch by which these two pipes unite and enter the boiler is fitted with a stop cock, *g*, by which the amount of water flowing through it can be regulated. Each chamber is also connected by a pipe H H' with the drain pipe I of the system of heaters or radiators, and each of these connecting pipes is fitted with a valve *j*, *j'*, opening toward the chamber. The upper part of each chamber is connected with the lower part of the adjacent chamber by a pipe K, K'; these connecting pipes branch and unite in a snifting cock *m* common to the two, and each pipe is fitted with a stop cock *n*, *n'*.

The steam heater shown in the drawing is of the kind adapted to the heating of hatters' kettles for sizing hat bodies. It consists of a cylinder or drum O, to which the steam is admitted by a pipe P, proceeding from the boiler, and from which the condensed water escapes by a pipe *r* communicating with the drain pipe I, that receives the condensed water of the whole system of heaters. The drum is traversed by tubes *s*, through which the fluid in the kettle circulates, thus affording a large radiating or heating surface. The kettle is situated below the level of the boiler so that the condensed water must be raised in order to be returned to the boiler.

In the feeding apparatus thus described the two chambers B and B', act in such manner that while the chamber B is receiving water from the drain pipe I, the chamber B' is feeding water to the boiler; and while the chamber B' is receiving, the chamber B is feeding. In order that this alternation of functions may be demonstrated, let it be sup-



posed that the chamber B' is full of water, that the chamber B is full of steam admitted from the boiler by the pipe C, and that the stop cocks *d d' n n'* are all closed, the stop, *g*, being partially open. The first operation performed is to open the stop cock *n*, this permits the steam in the chamber B to exhaust through the pipe K into the chamber B', which is full of water, by which the steam is condensed. As the steam condenses a partial vacuum is created in the chamber B and the water in the drain pipe I being pressed upon by the pressure of the steam supplied to the heaters by the steam pipe P, is immediately forced upward in the pipe H and thus raising the valve *j* enters the vessel B. As the condensation of the steam is effected almost instantaneously the cock *n* may be closed after leaving it open for only a few seconds; when the stop cock *n* is closed the stop cock *d'* is opened. By opening this latter stop-cock steam from the boiler is admitted into the top of the chamber B'. As the pressure in the chamber B' and the boiler are thus equalized by a free communication through the pipe C', and as the chamber B' is above the boiler, the water presses by its gravity upon the valve *f'*, raises it and flows into the boiler through the stop cock *g*, whose greater or less opening regulates the speed with which the water flows. The cock, *g*, should be set in such manner that feed water flows in from the vessel B' about as fast as it is evaporated and discharged in the form of steam through the steam pipe P; meanwhile the drain pipe I receives all the water condensed by the heaters from the steam passing from the boiler through the steam pipe P, and as this water is pressed upon by the steam proceeding from the boiler, while a partial vacuum exists in the chamber B, the water is forced upward through the valve *j* into the chamber B. While therefore the chamber B' is acting as a distributing reservoir to feed water to the boiler, the chamber B is acting as a receiving reservoir to receive the water formed by the condensation of the steam, and if there be no leakages whatever, and the stop cock *g* be properly adjusted, the chamber B will be filled as the chamber B' is emptied. When these operations having taken place the functions of the two chambers or reservoirs are reversed, the stop cock *d'* is closed, thus shutting off the steam connection of the chamber B' with the boiler, and as this chamber contains no more water to act on the valve *f'* the latter closes by its own weight. The stop cock *n'* is then opened, which permits the steam which has taken the place of the water in the chamber B' to exhaust through the pipe K' into the water in the chamber B, thus imparting its heat to it. As soon as the stop cock *n'* is opened the partial vacuum in the chamber B is destroyed by the en-

trance of the steam from the chamber B', and the water in the chamber B tends to run back by its gravity into the drain pipe I; its return is however prevented by the valve *j* which being no longer raised by the flow of water upward, closes and prevents its escape. As soon as the steam in the chamber B' has been condensed, the steam cock *n'* is closed, and the steam cock *d* is opened, whereupon the chamber B begins to feed water to the boiler, while the chamber B' receives the condensed water from the drain pipe I. The functions of the two chambers are thus reversed, the one (B') becoming the receiving reservoir while the other (B) becomes the distributing reservoir.

We have thus described the operation as it proceeds while the apparatus is at work continuously, but in first starting the apparatus when both chambers are filled only with air it is necessary to make use of the snifting cock *m* to blow all the air out of the pipes and to exhaust the steam from the chamber first used as the receiving reservoir. When the whole apparatus has been heated up to the proper point the opening of the snifting cock is no longer necessary. We have also described the apparatus as in use without any leakage, but as it is practically impossible to prevent some escape of water either in the form of steam passing out of the safety valve of the boiler or by leakage from the heaters, it is necessary occasionally to introduce a fresh supply of water, which may be done by putting the drain pipe I in connection with some reservoir or other source, and by fitting a stop cock to the connection to regulate the supply. The chamber B, B', should be jacketed to prevent the radiation of heat, in which case the condensed water will be returned to the boiler at a very high temperature; and as the steam from one chamber is exhausted into the water in the other, the heat contained in this steam is absorbed and returned to the boiler, thus preventing any waste. As the pressure of the steam proceeding from the boiler always exceeds the partial vacuum formed in the chambers B B' by the condensation of the steam, and as in such cases the pressure of the steam will force the drain water upward, we are enabled to combine our feeding apparatus in the manner we have described with heaters or radiators situated below the level of the boiler. This combination is of great advantage in cases where the boiler and heaters are both situated upon the same floor, in which case the heaters must necessarily be below the level of the water in the boiler as they frequently are when hatters' kettles are heated by steam.

Having thus described the construction and operation of our feeding apparatus



what we claim as our invention and desire to secure by Letters Patent is—

1. The combination of two chambers with each other and with a steam boiler by means  
5 of pipes, stop cocks and valves constructed and operating substantially as herein set forth in such manner that the two chambers act alternately and interchangeably as receiving and distributing reservoirs to receive feed water to heat it by the discharge  
10 of steam from one vessel to the other and to feed it to the boiler.

2. We also claim the combination of the

said apparatus with a steam heating apparatus situated lower than the boiler so that 15 the condensed water is raised and returned to the boiler substantially as herein set forth.

In testimony whereof we have hereunto subscribed our names.

JOHN N. DENNISSON,  
THOS. SEALY.

Witnesses:

G. B. MOORE,  
H. G. DISTROW.