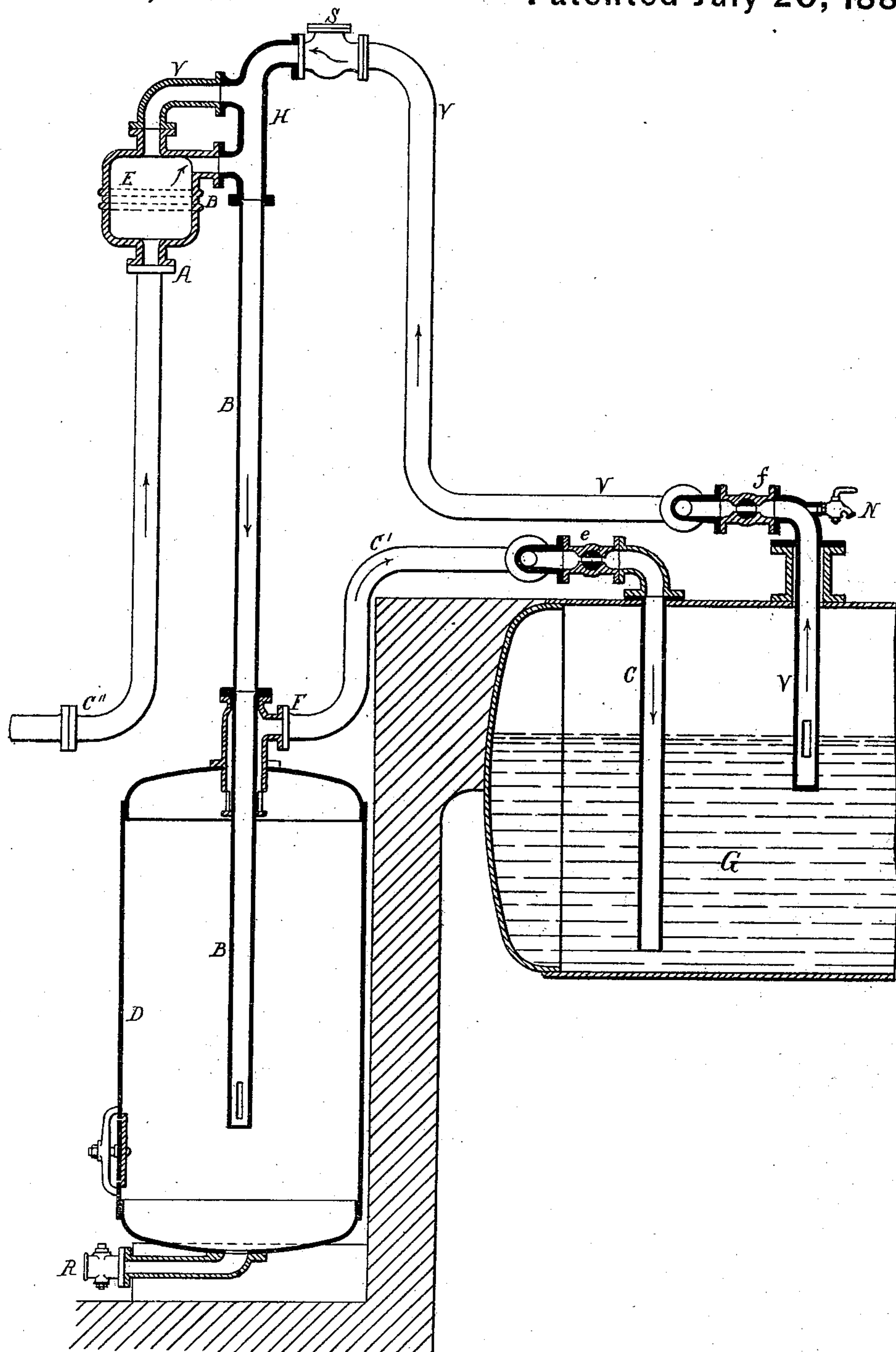


(No Model.)

A. DERVAUX.  
Purifying Apparatus for Steam Boilers.

No. 230,248.

Patented July 20, 1880.



WITNESSES

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# UNITED STATES PATENT OFFICE.

ALFRED DERVAUX, OF BRUSSELS, BELGIUM.

## PURIFYING APPARATUS FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 230,248, dated July 20, 1880.

Application filed May 20, 1880. (No model.) Patented in Belgium January 24, 1880.

*To all whom it may concern:*

Be it known that I, ALFRED DERVAUX, a subject of the King of Belgium and a resident of Brussels, Belgium, have invented a certain Improved Apparatus for Purifying the Water in Steam-Boilers, for which I have obtained Belgian Letters Patent, dated January 24, 1880, and of which the following is a specification.

10 The object of my invention is to construct an apparatus by which the water in steam-boilers may be purified while the boiler is in operation, and this object I attain by combining with the boiler and feed water apparatus  
15 a receptacle through which the boiler-water is caused to circulate automatically and deposit therein the calcareous and other matters which it contains in suspension, as more fully described hereinafter.

20 The accompanying drawing illustrates a sectional view of my improved apparatus applied to the rear end of an ordinary steam-boiler, G being the steam-boiler and C' C' C'' the feed-pipe, provided with a cock, *e*, and  
25 through which water is forced into the boiler by means of a pump, injector, or other feeding apparatus.

The portions C'' and C' of the feed-pipe communicate with each other through a vessel, E, above the water-level of the boiler, and through a pipe, B, and a vessel, D, below the water-level. Connection is made between the portion C'' of the feed-pipe and the vessel E at A, and between the portion C' and the extreme upper end of the vessel D at F, while  
35 the pipe B extends downward some distance into the vessel D, is preferably closed at its outer end, and is provided with an elongated lateral slot or slots near its end.

40 With the upper end of the vessel E communicates a pipe, V, the other end of which passes into the boiler, and is closed at its extreme end, but is provided with a lateral opening or openings extending between the highest and lowest points of the water-level, the mean level being shown in the drawing.

The pipe V is provided with a cock, *f*, and preferably, also, with a check-valve, S, opening in the direction of its arrow, while I also prefer to make a direct connection between the  
50 pipes V and B through the pipe H.

The feed-water, entering at A into the condensing-vessel E, is forced to flow through the pipe B into the depositing-vessel D, and thence through the feed-pipe C' C into the steam-  
55 boiler. Before leaving the condensing-vessel E, however, the feed-water is brought into contact with the steam, which rises through the pipe V from the boiler into the said vessel E, and the consequent condensation of this  
60 steam produces a vacuum in the pipe V, so that the water in the boiler is violently drawn toward the vessel E. From the continued condensation of the steam of this mixture by the feed-water the boiler-water is drawn up  
65 into the vessel E and pipe H, where it unites with the feed-water, and thence returns to the boiler through the vessel D, in which it will deposit the calcareous matters it contained in suspension. These impurities will settle at  
70 the bottom of the vessel D, and may be easily removed through the valved discharge-pipe R.

The suction or condensing chamber E and the decanting or depositing vessel D may be constructed in a variety of shapes, and may  
75 be combined so as to form a single vessel.

The vessel D may be placed at a level above that of the boiler, and be combined with a filter if desired.

An important point in the construction of  
80 the apparatus is to make the pipes V of the proper size, and to arrange the suction and condensing vessel E at a point sufficiently high, so that the feed-water forced into this chamber shall condense as much steam, and consequently exhaust as much water from the boiler, as possible. For the same purpose the suction-pipe V is brought into direct communication with the pipe B by means of the connection H. Thus a portion of the boiler-water,  
85 while drawn up with the steam, will be directly discharged into the pipe B without passing through the condenser E.

Instead of condensing the steam by bringing it into immediate contact with the feed-  
95 water, the vessel E may be so constructed as to allow the steam to circulate on the external surface of the water-chamber. The vessel E being, in this case, converted into a surface-condenser, it will be advisable, in order to increase its heating-surface, to make it multi-  
100 tubular, or in the form of a coil; or the vessel



E may be made with a large cooling-surface, so that the cooling will result from the outer contact of the atmosphere.

The pipe V may be open at its lower end, or the pipe may be arranged to extend laterally from the boiler, provided its opening extends between the highest and lowest water-levels, so that the apparatus may operate, no matter how the water-level may fluctuate. The pipe V may be provided with a test-cock, N, in order to ascertain the condition of the water in the boiler.

My apparatus may be applied to one or more boilers. In the case of a range of boilers, a single condensing-vessel, E, and a single depositing-vessel, D, will suffice, and it will be sufficient to provide one main suction-pipe, V, which has the requisite number of branch tubes, each, however, being provided with a valve, f, so that each boiler may be purified separately. The apparatus may also be applied to automatic boiler-feeders which are arranged above the boiler and connected with them through a steam-pipe extending to the normal water-level. These feeders being already partly adapted for the improvement, I complete the apparatus by combining therewith a decanting or filtering vessel together with the necessary pipe-connections and other devices, so as to assure the extraction of the calcareous matters from the boiler-water.

In some boiler systems it happens that the impurities precipitated by ebullition in the intensely-heated portions of the generator do not remain suspended in the water, but will settle in the less heated lower portions, from whence it would be impossible to extract them by circulation. In such cases, according to the construction of the boiler, a number of partitions may be arranged so as to prevent any descending current which might tend to start up in the interior of the boiler. By this means the precipitated matter is retained in the intensely-heated portions and maintained therein in suspension by the ebullition of the water.

Where the feed-water is liable to produce in-

crustations, a disin crustant, such as carbonate of soda, may be used, by which the incrustations will be transformed into mud, so that it can be easily extracted from the liquid by my apparatus.

I claim as my invention—

1. The combination of a steam boiler and its feed-pipe, communicating with the boiler through a condensing-vessel, and a depositing or filtering vessel, with a pipe communicating at one end with the upper part of the condensing-chamber and extending at the other end to the water-level in the boiler, all arranged substantially as and for the purpose described.

2. The combination of a steam-boiler and its feed-pipe with a depositing or filtering vessel, a condensing-vessel, and a pipe, B, through which the feed-water passes, with a pipe communicating at one end with the upper part of the condenser and at the other end with the water-level in the boiler, all substantially as set forth.

3. The combination of a steam-boiler, its feed-pipe, and a depositing or filtering vessel, a condensing-vessel, and pipe B, through which the feed-water passes, with a pipe, V, communicating with the upper end of the condenser, and branch H, substantially as specified.

4. The combination of a steam-boiler, its feed-pipe, and a depositing or filtering vessel, and condensing-vessel, through which the feed-water passes, with a pipe, V, communicating with the upper part of the condenser and passing at its other end down into the boiler, and provided with lateral openings extending from the highest and lowest points of the water-level, all substantially as and for the purpose set forth.

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

ALFRED DERVAUX.

Witnesses:

CH. WIESEMANN,  
JEAN VANDERSYPEN.