

M. NOLDEN.

Water-Cleansing Apparatus.

No. 146,940.

Patented Jan. 27, 1874.

Fig. 1.

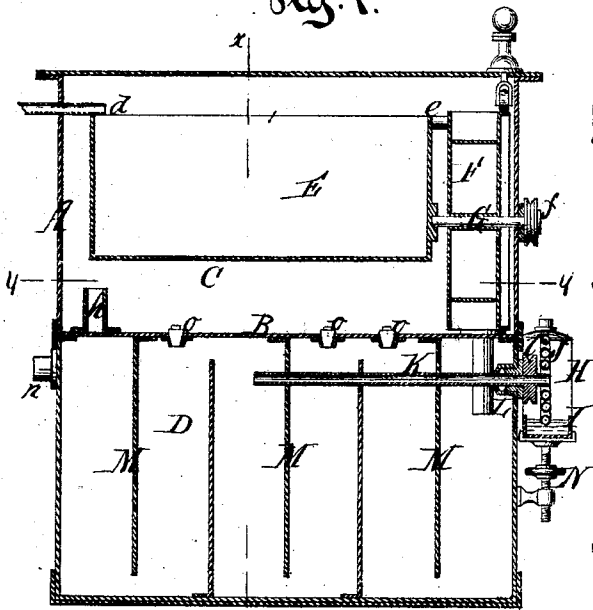


Fig. 2.

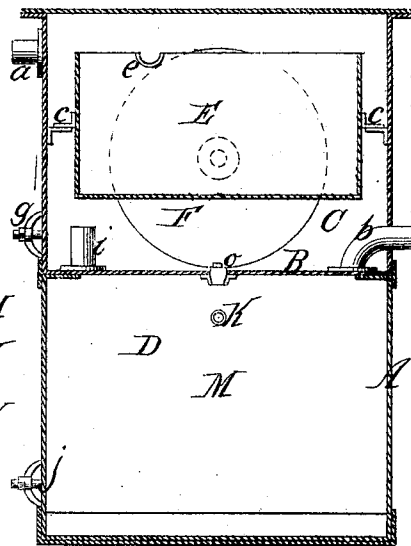


Fig. 3.

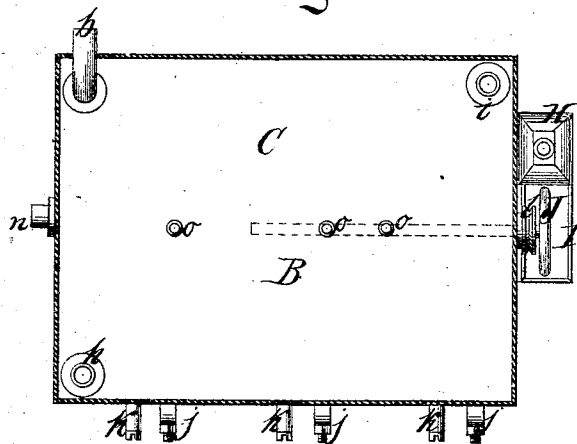
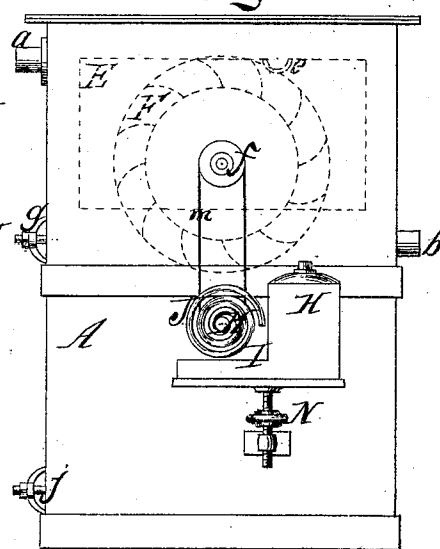


Fig. 4.



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MELCHIOR NOLDEN, OF FRANKFORT-ON-THE-MAIN, GERMANY.

IMPROVEMENT IN WATER-CLEANSING APPARATUS.

Specification forming part of Letters Patent No. 146,940, dated January 27, 1874; application filed June 11, 1873.

To all whom it may concern:

Be it known that I, MELCHIOR NOLDEN, of Frankfort-on-the-Main, Empire of Germany, have invented a new and Improved Water-Cleansing Apparatus; and I do hereby declare the following to be a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawing forming part of this specification, in which drawing—

Figure 1 represents a vertical central section of this apparatus. Fig. 2 is a transverse section thereof, taken in the plane *x x*, Fig. 1. Fig. 3 is a horizontal section in the plane *y y*, Fig. 1. Fig. 4 is a front view end of the same.

Similar letters indicate corresponding parts.

This invention relates to an apparatus in which the water is subjected to two separate and consecutive cleansing operations, first being thoroughly commingled or infused with steam, and then being subjected to the action of suitable chemicals, whereby all foreign matters contained in the water are precipitated and collected in the bottom of the apparatus, and the water flows out freed and devoid of all impurities.

My invention consists in the arrangement, in a water-cleansing apparatus, of a horizontal partition or false bottom forming two reservoirs or chambers, in each of which the water is subjected to a separate cleansing operation, said chambers communicating with each other by suitable openings. It further consists in the arrangement of a water-vessel in the steam-space of the upper cleansing-chamber, which acts in conjunction with a bucket-wheel mounted in said steam-chamber, the water in the vessel being heated to a high temperature by means of steam, while the bucket-wheel is operated by the flow of water from the said water-vessel, so that the water is made to serve as a motive power during the operation of cleansing. It consists further in the arrangement of a series of vertical partitions in the lower cleansing-chamber, each alternate partition terminating, respectively, a short distance from the top and bottom of said chamber, thus forming a communication between the spaces formed by the said partitions and producing a circulation of the water in said

chamber. My invention consists further in the arrangement of a box or vessel containing a liquid chemical on the outside of the lower cleansing-chamber, the liquid flowing from said vessel into a tubular shaft that extends to the inside of my apparatus, in such a manner that, when a revolving motion is imparted to said shaft, the liquid is taken up and passed into the lower cleansing-chamber.

In the drawing, the letter A designates the outer shell or case of my apparatus in which is arranged a horizontal partition, B, that divides it into two separate chambers or reservoirs, C D. Steam is let into the chamber C through a pipe, *a*, in the side of said chamber. In this steam-chamber C the water is subjected to the first cleansing operation, which consists in thoroughly infusing the water with steam, when it soon reaches a high temperature, and all alkaline matter contained in the water is precipitated and falls to the bottom, where it collects and is removed through port-holes *g* in the side of the apparatus, Fig. 4.

Of course, in the above operation the greater part of the steam is condensed and mixed with the water, but any part remaining uncondensed can pass out through a pipe, *b*, that issues from the lower chamber D, the steam entering said chamber through the openings *h i* in its floor.

In the steam-space of the chamber C I place an open water-vessel, E, free of the sides of said chamber, being supported by angle-irons *c*. (See Fig. 2.) Water is let into said vessel by means of a pipe, *d*. In this vessel E the water soon becomes heated to a high temperature and the lime or other alkaline matters are precipitated. The water leaving the vessel E by means of the spout *e*, flows on the buckets of a wheel, F, which is mounted on a shaft, G, at one end of the steam-chamber, on which shaft is also mounted a pulley, *f*, and the water, causing said wheel to revolve, forms a motive power for my apparatus at the same time that it is being cleaned. The water in passing from the vessel E on the bucket-wheel F, and thence to the floor of the steam-chamber, becomes more thoroughly infused and commingled with the steam, and a second and more thorough precipitation of alkaline matter takes place.

In the partition B are openings provided

with pipes *h i*, which form a communication between the two chambers C D, and through these pipes the water passes from the steam-chamber C into the lower chamber D, where it is subjected to the second cleansing operation which is, by means of suitable chemicals, by which the foreign substances chemically mixed with the water are precipitated, and, as in the steam-chamber, collect on the bottom and are removed through port-holes and pipes *k*.

The chemical solution is contained in a box or vessel, H, on the outside of the chamber D, said vessel having a pan or dish, I, arranged on one end thereof, into which the liquid flows through a small hole in the side of said vessel, whence it is dipped up by a spiral or coiled pipe, J, which has a revolving motion, and which leads into and is mounted on a tubular shaft, K, which extends to the inside of the chamber D. On the tubular shaft K is also mounted a pulley, *l*, which is connected, by means of a belt, *m*, with the pulley *f* of the wheel-shaft G, and thereby a revolving motion is imparted to the coil J, when it draws off and feeds the liquid into the shaft K, as already stated. The tubular shaft K has its bearing in a journal, L, in the side wall of the chamber D, and it is also supported by vertical partitions M M M arranged within said chamber, and these partitions communicate with each other by alternate openings on top and bottom of the same. The quantity of liquid to be dipped up and fed into the chamber D is regulated by raising and lowering the dish I, which has a screw-support, N.

If the water contains other substances besides plaster-of-paris, which are to be precipitated in a third cleansing, and whereby a special solution of chemicals is necessary, then a second vessel, H, containing the solution, such as carbonate of soda and chloride of barium, and a second feeding-pipe turned by a belt from the wheel-shaft G, are arranged next to the first one, which passes the solution into the first, second, &c., part of the chamber D. The water has time and opportunity to precipitate these substances in its circulation through the vertical partitions M. The lighter substances, as magnesia, so injurious to steam-boilers, are separated, being retained floating on the surface of the water between the partitions, which alternately reach above the water-level. After having passed through the two operations of cleansing, the water becomes nearly or entirely cold, and it flows out of the apparatus through an outlet or overflow pipe, *n*.

It will be observed that it is invariably by its overflow that the water passes from the water-vessel into the steam-chamber, and thence into the lower chamber D, as also in emerging from the apparatus, and by these means there is no danger of any sediment or impurities passing off with it.

In cleaning the apparatus, any water or sediment remaining on the floor of the steam-chamber C may be cleaned out through the port-holes *g*, as already stated; or it is allowed to drop down into the lower chamber D by removing the plugs *o o* in the partition B, and from there it is then cleaned out through the pipes *j* and holes *k*.

The great advantage that this apparatus offers is that, besides being able to make use of the exhaust steam of steam-boilers—also, by a continued working of the apparatus—all foreign substances mechanically and chemically combined with the water can be separated in a most rational and cheap manner.

What I claim as new, and desire to secure by Letters Patent, is—

1. The arrangement, in a water-cleansing apparatus, of a horizontal partition or false bottom, B, forming reservoirs or chambers C D, in each of which the water is subjected to a separate cleansing operation, substantially as described.

2. The water-vessel E, arranged in the steam-space of the upper cleansing-chamber C, in combination with a bucket-wheel, F, arranged in respect to each other, substantially as described, for the purpose specified.

3. The arrangement of a box or vessel, H, containing a chemical solution on the outside of the chambers D, the solution flowing from said vessel into a pan, from which it is dipped up by a coiled pipe and fed into a tubular shaft that extends to the inside of the chamber D, substantially as and for the purpose specified.

4. The combination of the partitions M M with the pipe K and dipping-pipe J, substantially as described, for the object specified.

5. The adjustable dish I and chemical-chamber H, in combination with the dipping-pipe J, pipe K, and partitions M M, substantially as described, for the purpose specified.

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Witnesses:

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