(No Model.) 2 Sheets—Sheet 1.

K. A. PETZOLD.

PURIFIER FOR FEED WATER.

No. 365,093. Patented June 21, 1887.

Fig. 1

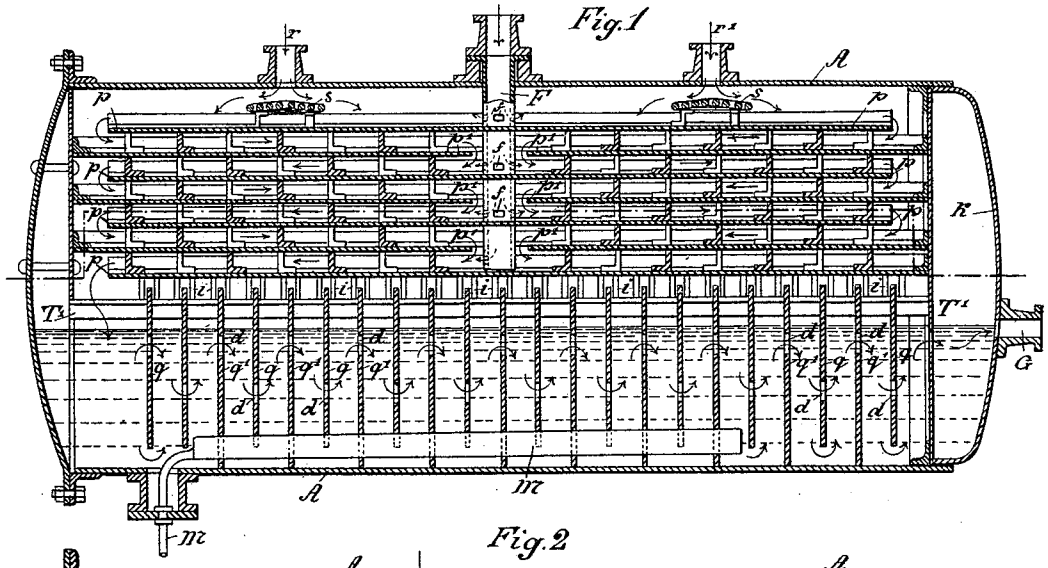


Fig. 2

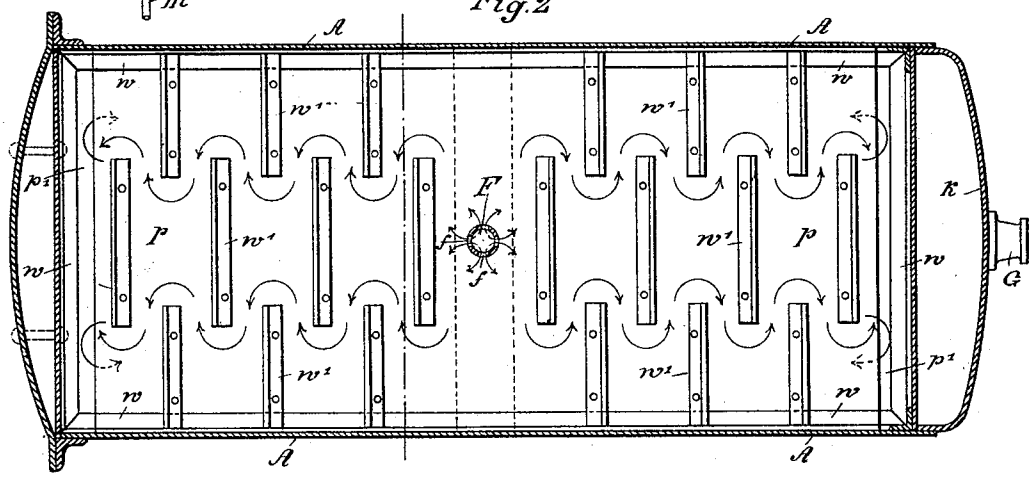
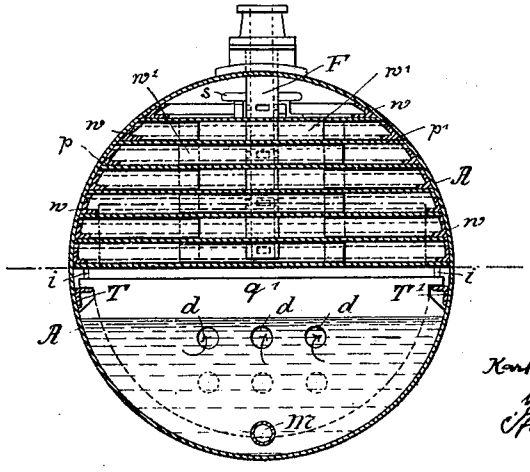


Fig. 3



Witnesses:
R. Kühlcken
C. Wagner.

Inventor:
Karl Albert Petzold
by Robert Deissler
(Firm A. Kuhnert & R. Deissler
atty

N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.) 2 Sheets—Sheet 2.

K. A. PETZOLD.

PURIFIER FOR FEED WATER.

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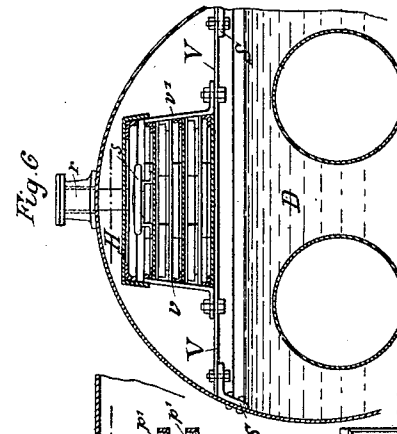


Fig. 6

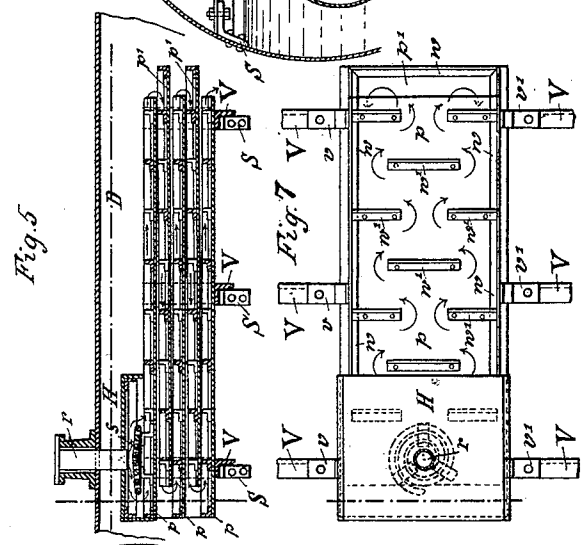


Fig. 5

Fig. 7

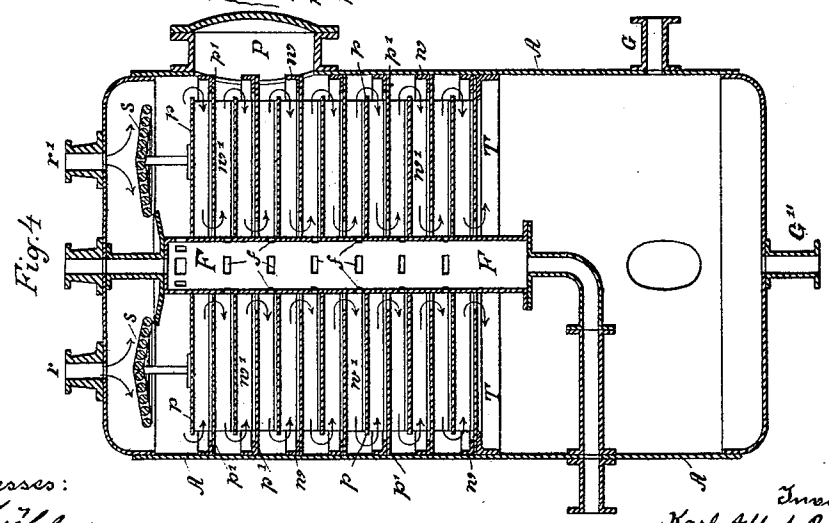


Fig. 4

Witnesses:
A. Kühlmey
C. Wagner.

Inventor:
Karl Albat Petzold
by Robert Deissler
his firm A. Kuhlmey & R. Deissler
atty

N. PETERS. Photo-Lithographer. Washington, D. C.

UNITED STATES PATENT OFFICE.

KARL ALBERT PETZOLD, OF WERNIGERODE-ON-THE-HARZ, ASSIGNOR OF ONE-HALF TO OTTO SCHAROW, OF BERNBURG, GERMANY.

PURIFIER FOR FEED-WATER.

SPECIFICATION forming part of Letters Patent No. 365,093, dated June 21, 1887.

Application filed November 8, 1886. Serial No. 218,362. (No model.) Patented in Germany December 17, 1884, No. 32,313.

To all whom it may concern:

Be it known that I, KARL ALBERT PETZOLD, a subject of the King of Prussia, residing at Wernigerode-on-the-Harz, in the German Empire, have invented new and useful Improvements in Purifiers for Feed-Water, (for which I have obtained patent in Germany on the 17th of December 1884, No. 32,313,) of which the following is a specification.

My invention relates to improvements in purifiers for feed-water of steam-boilers; and the object of it is to precipitate in this apparatus the crustaceous matters and other impurities contained in the feed-water before the latter is allowed to enter the steam-boiler.

This apparatus is represented in the accompanying drawings in three modifications.

Figures 1 to 3 show a vertical section, a horizontal section, and a cross-section of the apparatus when in horizontal position. Fig. 4 shows a vertical section of the apparatus when in a vertical position. Figs. 5, 6, and 7 represent a vertical section, a cross-section, and a view from above of the apparatus when set up in a horizontal position in the steam-room of a steam-boiler.

Similar letters refer to similar parts of the apparatus throughout the different views.

The feed-water should be heated well before being let into the apparatus, into which it runs through the inlet-pipes r and r'. Under each of these inlets is a spiral-shaped twisted piece of round iron or pipe, s, which is fastened by means of feet to the uppermost register-plate, p, of the apparatus. This spiral-shaped body serves to distribute the water in sprays when it runs into the apparatus.

In this apparatus a number of plates, $p\,p'$, are placed horizontally, one above the other, and in such a way that the water falling onto them is forced to run from plate to plate and must pursue a zigzag course in a vertical direction. For this purpose escape-holes for the water are made in the ends of the first, third, and fifth, &c., plate p, and in the centers of the second, fourth, and sixth, &c., plate p'. The water runs in its downward course through these holes onto the plate below in each case.

A steam-pipe, F, passes through the middle of the plates $p\,p'$, and is provided just above each of the plates, running right through the apparatus—that is to say, just above the first, third, and fifth, &c., plate p—with escape-holes f for the steam. The water coming from the plates just above the steam-holes f—that is to say, from the second, fourth, and sixth, &c., plate p'—is caught by the steam coming out of f and is driven to the right and the left along the plates p. The last of the plates p is built up on the right side, (it has no hole on the right side,) and therefore the water is forced to run from the left into the lower space of the apparatus. To prevent the water from running smoothly along the sides of the plates, angle-iron pieces w are riveted along the sides of the plates p, and also round plates p', and by this means the water is forced to pursue a zigzag course. Further, in order to prevent the water from flowing in a straight direction along the plates $p\,p'$, and for the purpose of conducting it as long as possible over the same, removable angle-iron pieces w' are applied to the plates p p'. The angle-iron pieces w' are provided with pins which fit into corresponding holes in the plates $p\,p'$. The separate plates $p\,p'$ are put into the apparatus successively, one above the other, and are kept apart from one another and held in a vertical position by the angle-iron pieces w'. The last register-plate, p, rests on the angle-iron pieces T and T', fastened to the apparatus.

Below the horizontally-arranged register-plates p and p' a number of vertical plates, q and q', are placed, which are suspended to the angle-iron pieces T and T'. Passages for water are left round the whole circumference of plates q, while plates q' run right up to the mantle of the apparatus. Holes $d\,d$, for the water to pass through, are made in the surfaces of plates q and q', and are arranged in such a way that the water is forced to pursue also a zigzag course in a longitudinal direction. In the end plate, K, of the apparatus the outlet-pipe G is arranged, through which the purified water passes into the boiler, there to be converted into steam.

At about three-fourths of the length of the register-space there is a steam-pipe, M, which can be fed with fresh boiler-steam, and which serves to heat the water or turn it into steam.

The mouth of this steam-pipe M is made slightly declined, so that if condensed water should be formed it can always run off through it.

Owing to the long course the feed-water pursues, and owing to the influence the steam has on it, the impurities and crustaceous matters contained in it are separated and deposited on the register-plates over which it runs. When it reaches the escape-hole in the lowest register-plate and descends into the lower space of the apparatus, it has, during its long course along the plates, gained great vital force and motion, which is, however, soon checked by the vertically-arranged register-plates q and q', and the water calms down.

Any impurities the feed-water may still contain sink in the compartments formed by the plates q and q' and the water passing through the outlet-pipe G is almost entirely free of impurities. The register-plates p and p' and q and q' can be removed whenever the apparatus requires cleaning. After being in use for a certain time the apparatus can be cleaned and restored to its original condition.

Fig. 4 shows a cleaning apparatus of the same construction as that just described, with the difference that the mantle is set up vertically in this case and the register-plates, serving to calm down the water, are unnecessary. G is the outlet-pipe for the purified feed-water on its way to the boiler.

G″ is a pipe for letting off the water whenever the apparatus has to be cleaned.

The steam-pipe F is connected with the boiler both above and below, so that the steam can be conducted into the cleaning apparatus from both sides. T is also in this case an angle-iron piece fastened to the apparatus and serving to support the register-plates p and p', which lie one above the other and are provided with angle-iron pieces w'.

The register-plates p and p' can be made in separate pieces, so that the separate parts can be removed through the man-hole.

Figs. 5, 6, and 7 represent a cleaning apparatus without a special mantle. It can be fastened up in the steam-room of a steam-boiler, and the supports S S′ riveted to the side of the boiler serve as a rest for it.

The register-plates p and p' of the above-described construction are connected with one another by the iron pieces v and v' at the sides, so that they form a compact body and can be secured with the horizontal guides P on the supports S S. At the place where the feed-water enters the apparatus the latter is provided with a cap, by means of which the water is prevented from spurting. All register-plates p and p' are made to slope a little in the direction in which the water runs, so that the latter requires no impetus. The slit steam-pipe F is done away with in this case.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. In an apparatus for cleaning the feed-water of steam-boilers, the combination of a horizontal mantle, A, with horizontal register-plates p and p', kept apart from one another by angle-iron pieces w', and with a steam-pipe, F, provided with escape-holes $f f$ for the steam, and likewise with vertical register-plates q and q', which are suspended below the horizontal plates to the angle-iron supports T and T′ in the mantle A, so that the feed-water is forced to run backward and forward in a horizontal direction at first and then in a vertical direction, and deposits on its way the impurities it may contain, all substantially as set forth.

2. In an apparatus for cleaning the feed-water of steam-boilers, the combination of a vertical mantle, A, with horizontal register-plates p and p', kept apart from one another by angle-iron pieces w', and with steam-pipe F, provided with escape-holes for the steam, so that the feed-water is forced to run backward and forward in a horizontal direction and deposits on its way the impurities it may contain, all substantially as set forth, and for the purpose specified.

In witness whereof I have hereunto set my hand in presence of two witnesses.

KARL ALBERT PETZOLD.

Witnesses:
W. PILUMEYER,
O. KAHUT.