

(No Model.)

J. H. KRUSE & L. A. SMITH.

FEED WATER PURIFIER.

No. 387,425.

Patented Aug. 7, 1888.

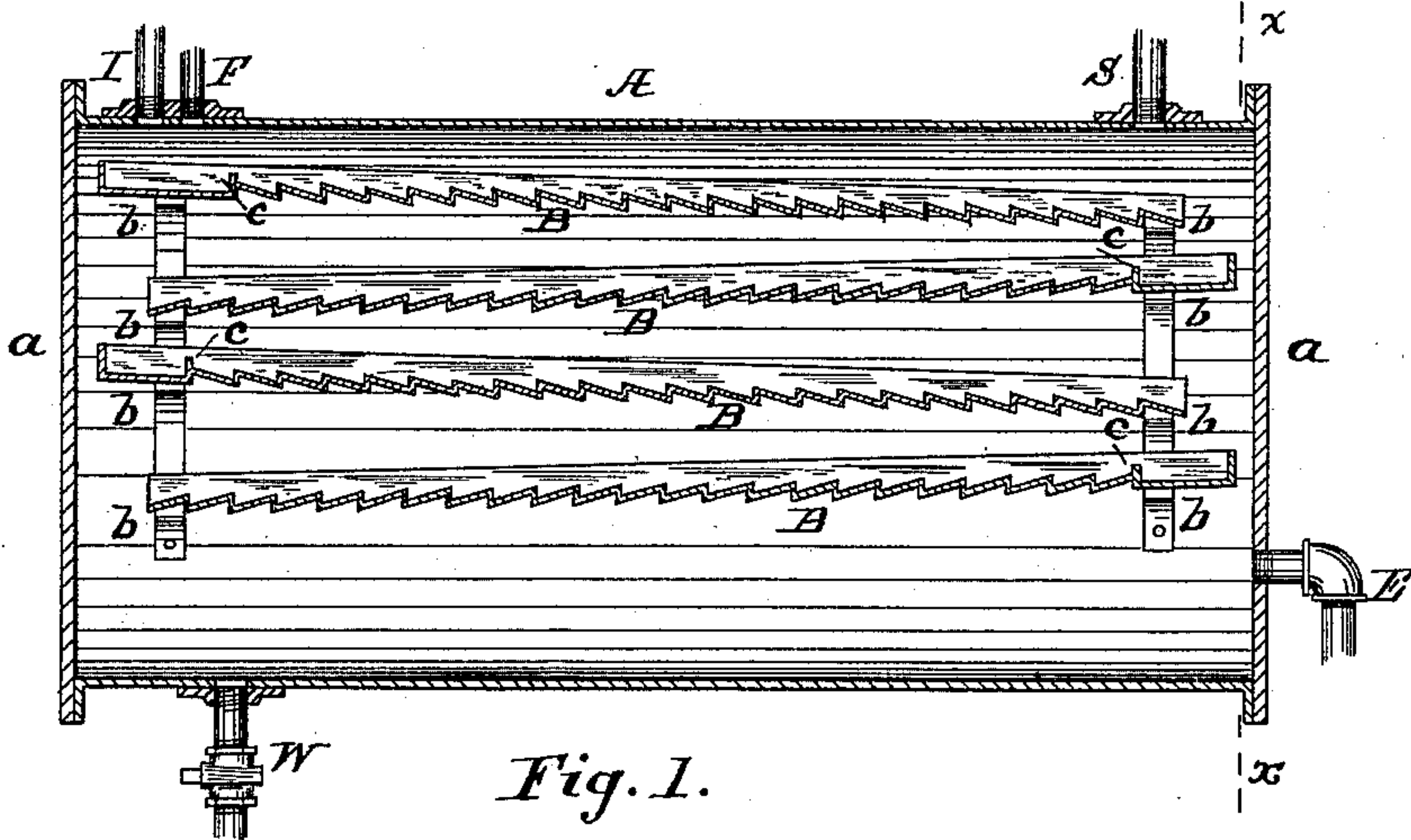


Fig. 1.

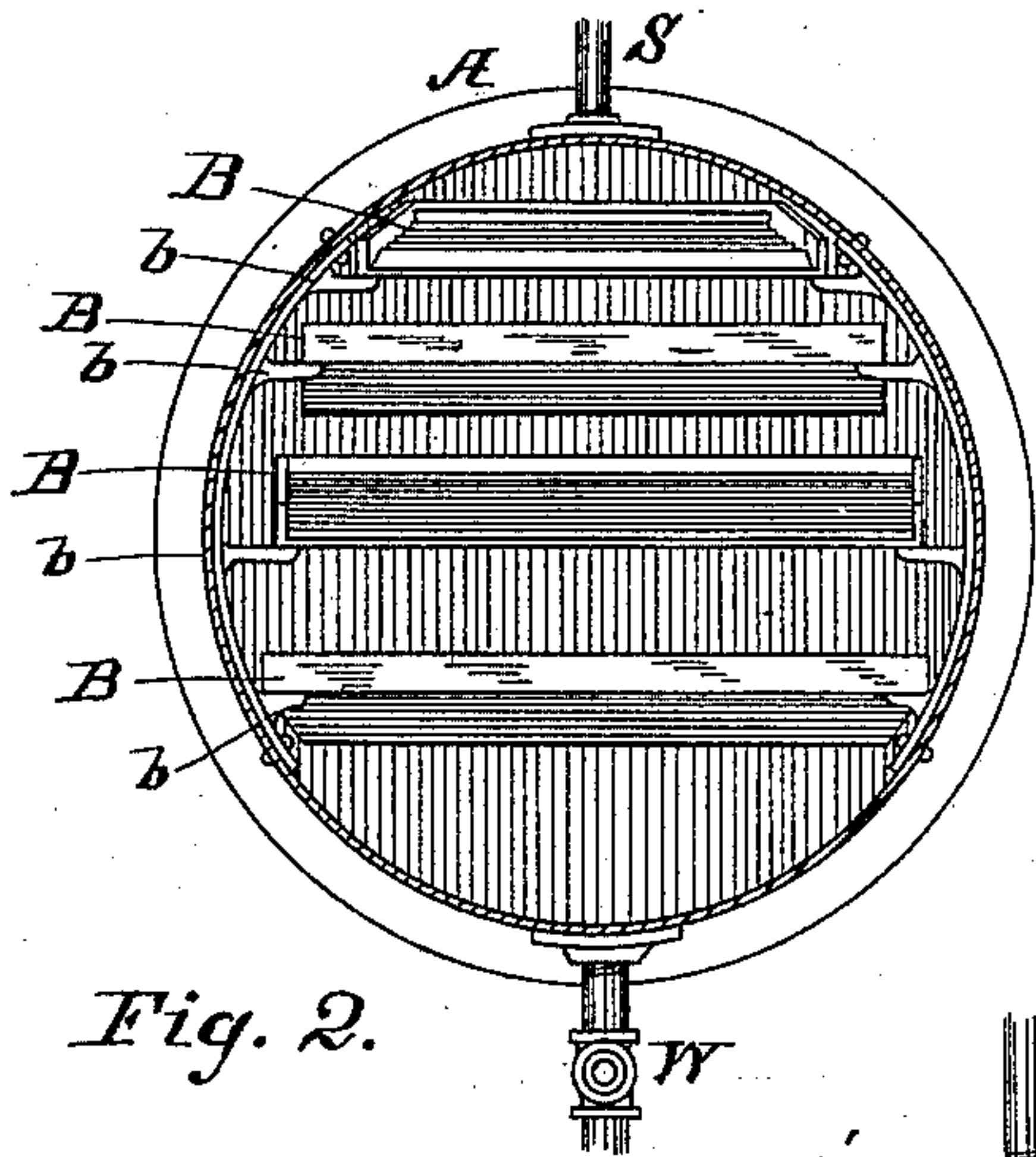


Fig. 2.

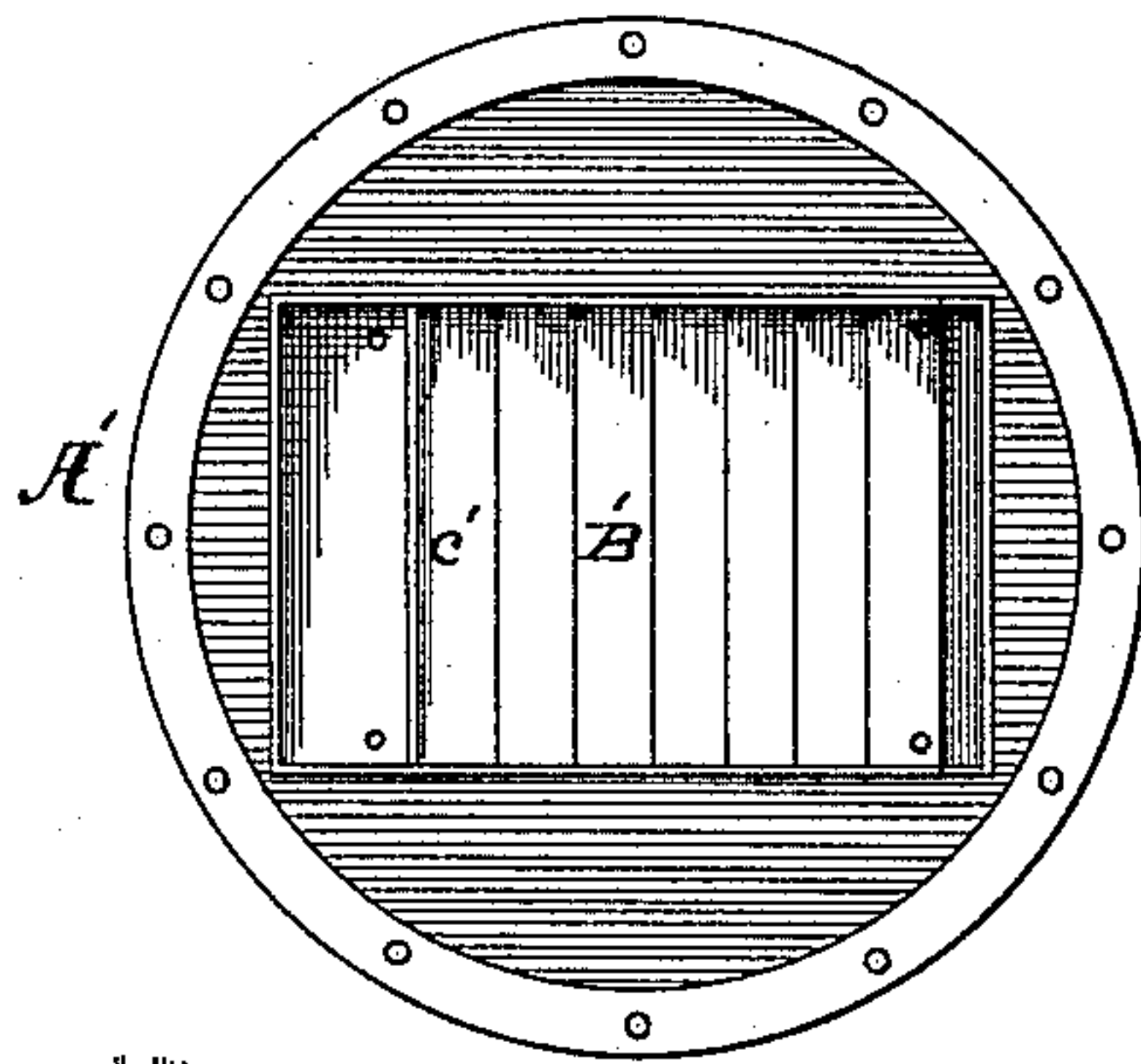


Fig. 4.

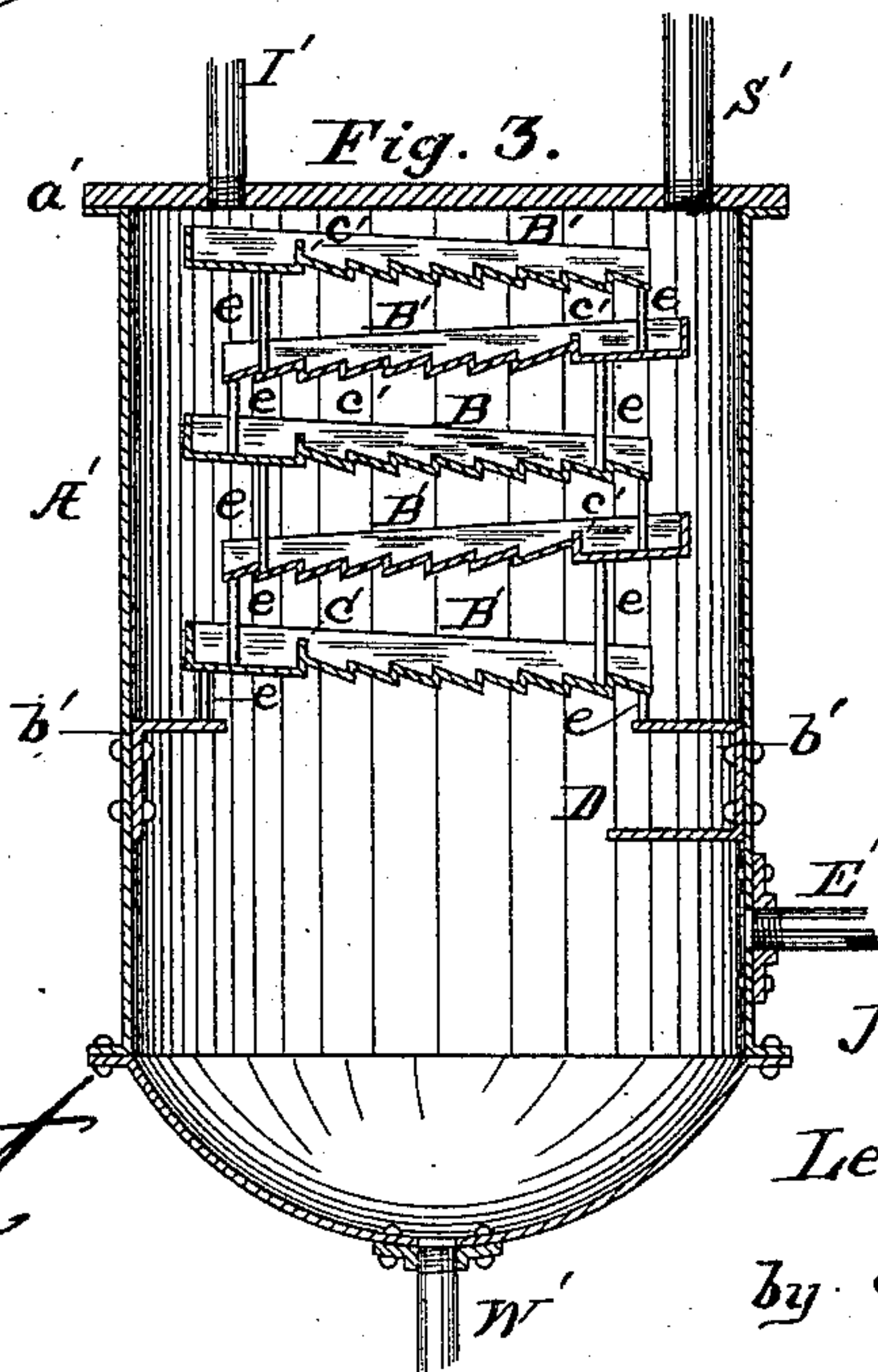


Fig. 3.

Witnesses:

J. H. Stuart,

E. W. Stuart

Inventors:

J. Henry Kruse;

Lewis A. Smith,

by C. P. Humphrey,
Atty.

UNITED STATES PATENT OFFICE.

J. HENRY KRUSE AND LEWIS A. SMITH, OF AKRON, OHIO.

FEED-WATER PURIFIER.

SPECIFICATION forming part of Letters Patent No. 387,425, dated August 7, 1888.

Application filed November 14, 1887. Serial No. 255,070. (No model.)

To all whom it may concern:

Be it known that we, J. HENRY KRUSE and LEWIS A. SMITH, citizens of the United States, residing at Akron, in the county of Summit and State of Ohio, have invented a certain new and useful Improvement in Feed-Water Purifiers, of which the following is a specification.

Our invention has relation to improvements in feed-water purifiers for steam-boilers, which remove from the water such substances as are held in suspension or chemically united therewith and rendered separable by heat; and it has special reference to that class of purifiers in which the water passes at a high temperature over metallic surfaces, upon which its impurities are deposited. It is found that the best results are obtained by rendering the film of water in its passage over the metallic surfaces as thin and even as possible.

The object of our invention is to provide devices which shall secure this result.

Our invention consists of the construction and arrangement of the several parts herein after described, and specifically pointed out in the claim, reference being had to the accompanying drawings, forming a part of this specification.

In the accompanying drawings, in which similar reference-letters indicate like parts, Figure 1 is a vertical central section of one form of our improved feed-water purifier in which the inclosing-cylinder is horizontal; Fig. 2, an interior elevation of the same from the line *xx* of Fig. 1; Fig. 3, a vertical central section of a form of our invention in which the inclosing-cylinder is vertical, and Fig. 4 an internal plan of Fig. 3 with the cover removed.

Referring to the form shown in Figs. 1 and 2, A is a hollow metallic cylinder having removable heads *a a* and provided with an inlet-pipe, I, for the feed-water, a steam-pipe, S, for the introduction of steam, an exit-pipe, E, through which the purified water passes to the boiler, and a waste-pipe, W, by which any impurities that may settle to the bottom of the cylinder may be drawn off.

Within the cylinder A is a series of shallow troughs, B, supported on brackets *b*, attached to the inside of the cylinder, each of which

troughs consists of a flat bottom, preferably corrugated, of sheet metal, turned up at each side to form side walls or provided with side walls of similar or other material and having a similar wall across one end, the opposite end being open. Across each trough a short distance from its closed end is a partition or dam, *c*, lower than the end and side walls of the trough, and with which it forms a shallow receptacle, into which the water enters and forms a pool before passing into the main body of the trough, and which spreads the water in a thin film in so passing. These troughs are placed one above another with their open ends alternating, each slightly inclined from the closed end and so arranged that the water from the inlet I shall enter the closed end of the upper trough above the partition or dam *c*, and thence pass successively out of the open end of each trough into the closed end of each succeeding trough until from the lowest it is discharged into the bottom of the cylinder A, where, by reason of the difference between the size of the inlet and the capacity of the cylinder, it becomes comparatively still, so that other particles of matter not retained by the troughs will settle to the bottom and permit it to be taken from near the surface by the pipe E.

When the troughs become coated with impurities from the water, one of the heads *a* is taken off, the troughs removed, cleansed, and replaced, while the accumulated sediment in the cylinder is removed by the waste-pipe W.

In the form shown in Figs. 3 and 4, A' is the cylinder; *a'*, the removable head; I', the inlet-pipe; S', the steam-pipe; E', the exit-pipe, and W' the waste-pipe.

The troughs B' are similar in construction to those shown in the other form, and are each provided with a similar partition, *c'*; but instead of resting on brackets each is supported by pins or lugs *e*, which rest on the next lower trough, except those on the lowest, which rest on brackets *b'*.

The course of the water is similar to that in the other form; but, as the horizontal area is less, we place, when the circulation is rapid, a deflector, D, above the exit-pipe to prevent the water from the lower trough entering directly therein.

When used with exhaust-steam, an additional pipe, F, is employed to convey water from the feeder thereto.

We claim—

- 5 In a feed-water purifier, the combination, with a closed vessel having pipes for the entrance of steam and feed-water and for the exit of purified water and sediment, of a series of troughs inclosed therein, each trough
10 closed at one end and open at the other, and each having a cross-partition near the closed end lower than its sides, said troughs being placed one above another and each inclined from its closed end, the upper trough being

arranged to receive the feed-water in its closed 15 end above its cross-partition, and it and each succeeding trough, excepting the lowest, arranged to discharge the water into the closed end of the next lower trough above its cross-partition, substantially as and for the purpose 20 hereinbefore set forth.

In testimony that we claim the above we hereunto set our hands.

J. HENRY KRUSE.
LEWIS A. SMITH.

In presence of—

C. P. HUMPHREY,
F. H. STUART.