

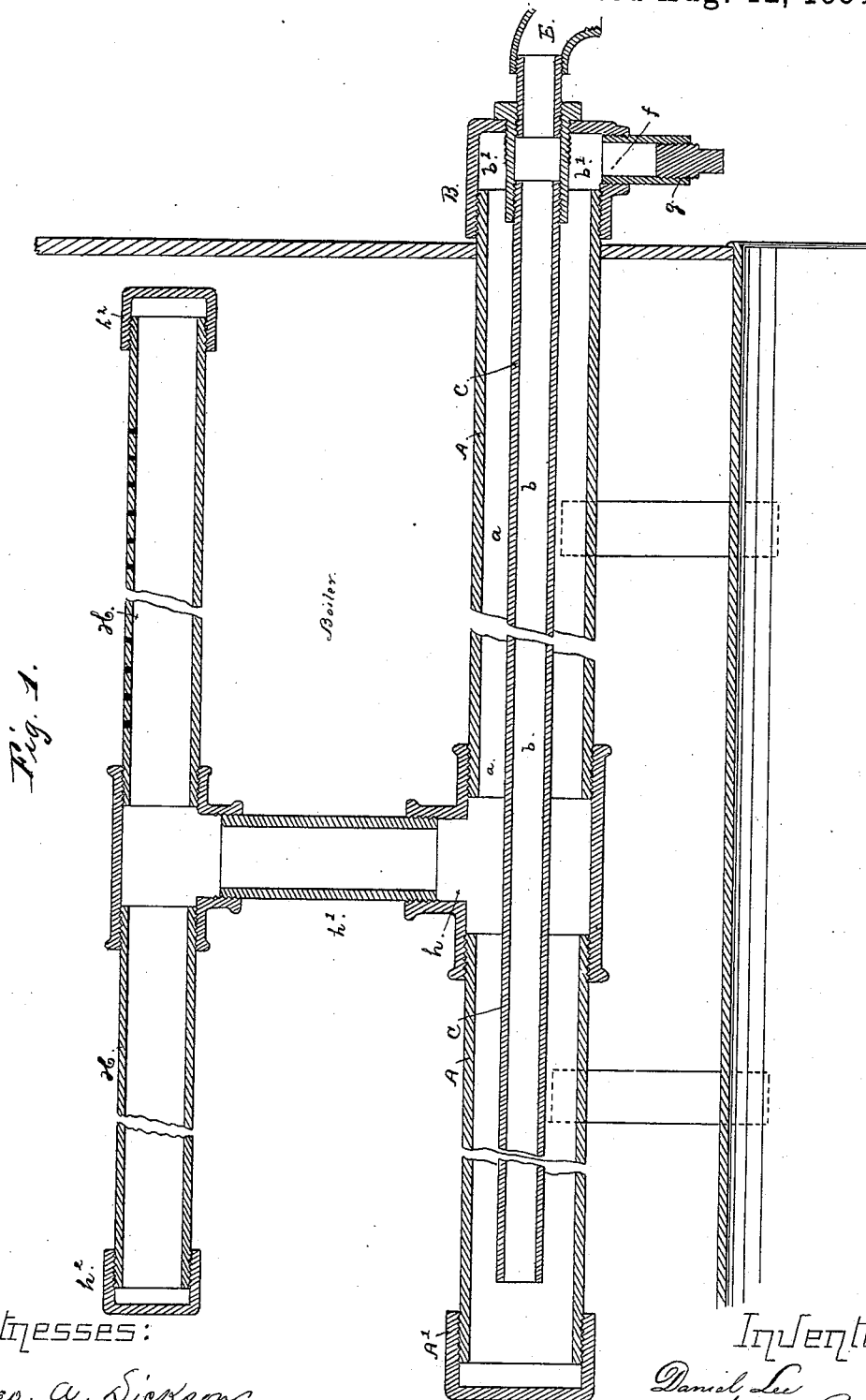
(No Model.)

2 Sheets—Sheet 1.

D. LEE & J. BELL.
FEED WATER PURIFIER.

No. 303,523.

Patented Aug. 12, 1884.



Witnesses:

Geo. A. Sicken
G. W. Emerson

Inventor:

Daniel Lee
and Joseph Bell
Attys.

(No Model.)

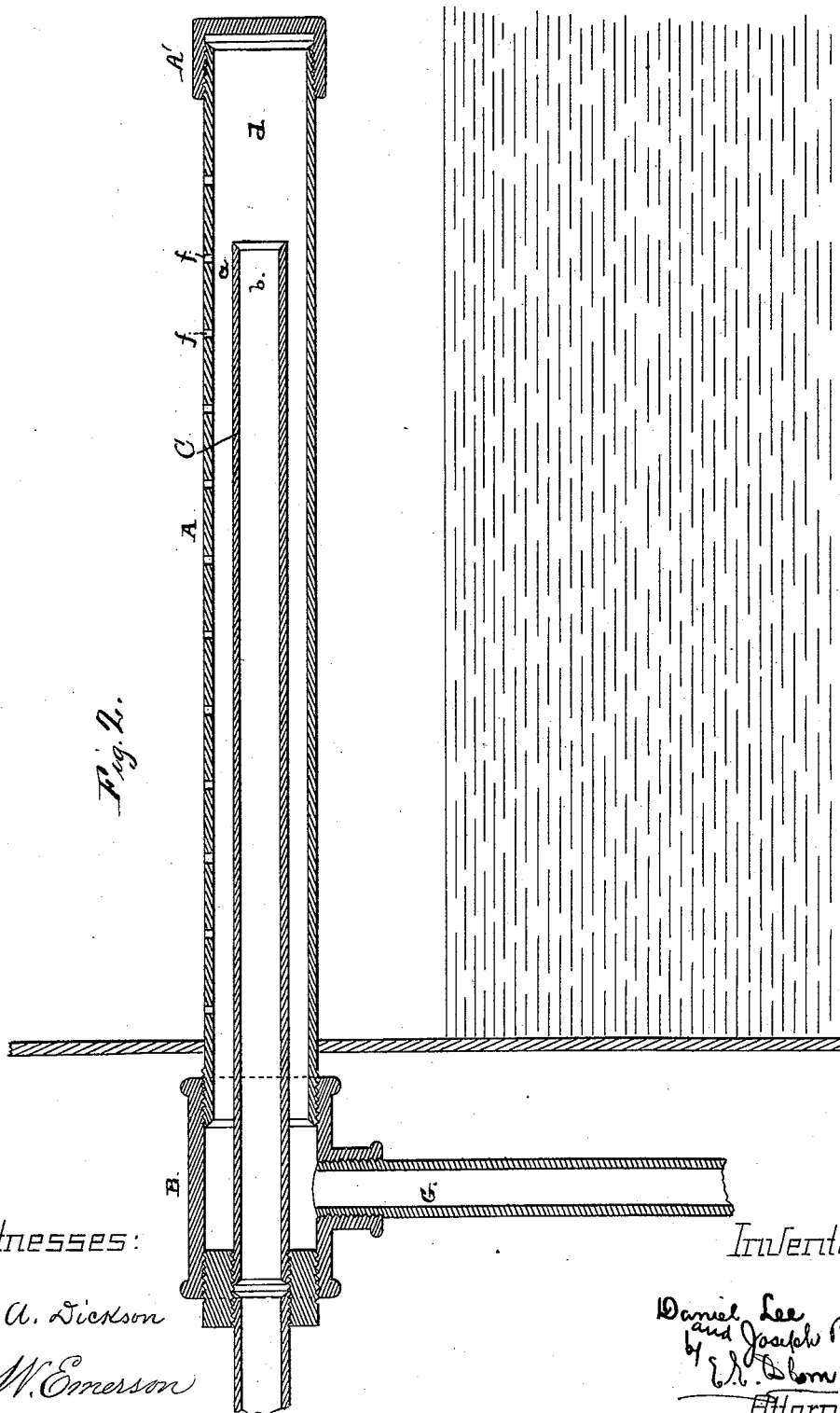
2 Sheets—Sheet 2.

D. LEE & J. BELL.

FEED WATER PURIFIER.

No. 303,523.

Patented Aug. 12, 1884.



Witnesses:

Geo. A. Tickson

G. W. Emerson

Inventor:

Daniel Lee
and Joseph Bell
by E. H. Brown
Attorney.

UNITED STATES PATENT OFFICE.

DANIEL LEE, OF SACRAMENTO, AND JOSEPH BELL, OF SAN FRANCISCO,
ASSIGNORS, BY MESNE ASSIGNMENTS, TO THE CALIFORNIA FEED
WATER PURIFYING COMPANY, OF SAN FRANCISCO, CALIFORNIA.

FEED-WATER PURIFIER.

SPECIFICATION forming part of Letters Patent No. 303,523, dated August 12, 1884.

Application filed October 24, 1883. (No model.)

To all whom it may concern:

Be it known that we, DANIEL LEE, residing in Sacramento, and JOSEPH BELL, residing in the city of San Francisco, both in the State of California, and both citizens of the United States, have made and invented certain new and useful Improvements in Feed-Water Purifier Attachments to Steam-Boilers; and we do hereby declare that the following is a full, clear, and exact description of the same, the accompanying drawings being referred to as a part of this specification.

Our invention relates to an improved means for treating water preparatory to its introduction into boilers for the production of steam; and it has for its object to produce a simple and effective device for the purpose, and that can be applied to a steam-boiler or generator of any kind, and in whatever situation it may be in use, at very small expense, and without altering the structure or the location and connection of any of its parts.

Our improvement includes a novel construction of precipitating and purifying cylinder or tube, and a means for delivering the purified water from said cylinder or tube into the boiler-water in the form of jets, spray, or finely-divided streams, the whole device being adapted to be placed and operated within the water or the steam-space of a boiler, and to be directly connected with the feed-pipe and feed-pump, or other source of feed-water supply, all as hereinafter more fully set forth.

The following description fully explains the manner in which we proceed to construct, combine, apply, and use our improvements, the said drawings being referred to by figures and letters, Figure 1 being a central longitudinal section of the preferred form, and Fig. 2, a similar view of a modification.

A is a tube about two and one-half inches in diameter, closed at one end by a screw-cap, A', and at the opposite end fitted into a coupling, B. Its interior is divided longitudinally into an annular space or chamber, *a*, and a central cylindrical space, *b*, by means of a tube, C, of about one-half its diameter, that is inserted through the coupling-end, and terminates just short of the cap end of the surround-

ing tube, so that at this end the two spaces communicate with each other. Both ends of the tube being open, the outer end takes into a screw-coupling, *d*, in the end of the part B. This coupling part *d* is a threaded sleeve adapted to close up the end of the coupling B, and to connect the tube with the end of a feed or supply pipe, E. The coupling B is practically of the same diameter internally as the main tube, so that a chamber, *b'*, is formed around the internal tube C, that is an extension of the annular space in the length of tube beyond. From this space *b'* is an outlet, *f*, and a connection for the end of a blow-off pipe, *g*. The pipe E is the feed-pipe having connection with the usual pump and source of supply for the boiler, and the tube C is a continuation of this feed-pipe into the precipitating-tube A, the whole length of this latter tube is inserted into the interior of the boiler through an opening cut in the shell, and the water led in through the feed-pipe, thus separated by the circuitous passage back and forth through the space *a b*, is brought into a condition or state to be acted upon by the surrounding temperature and the heated condition of the tube-surfaces. This application of heat and the state of quietness induced by the circuitous passage have the effect of producing separation and precipitation from the water of the solid matter and impurities held in suspension or contained in the water, in consequence of which the bottom surfaces of the two tubes receive the deposit, while the purified water rises or collects at the upper part of the space *a*. From this annular space we take the water for the boiler by discharging it through an outlet or outlets in the upper part of the outer tube. We do this either by providing several holes, nipples, or orifices along the top portion of the tube, to deliver the feed-water in small streams or jets; or, as we consider the most effective and desirable mode of delivery, by employing a single outlet, *h*, and coupling to it by a short upright connection, *h'*, a distributing-tube, H, provided with a number of small outlet-aper- tures, in spaced rows or in clusters, from end to end along its upper surface. This tube is of smaller diameter than the tube A. It is placed

in a horizontal position or parallel with the tube below it, and its ends are closed by caps $h^1 h^2$. The use of this distributing-tube enables the length of the precipitating-tube to be reduced, and a compact form of apparatus to be obtained; but, where the structure and situation of a boiler will admit of its insertion, a single long precipitating-tube can be applied, and the extent of heating-surface thus obtained will enable us to dispense with the distributing-tube H, the distributing of the purified water being effected through an outlet or outlets provided for the purpose in the top of the outer tube, A. In some situations, however, as where a boiler is in close proximity to a wall, or is in confined quarters, and is of such structure, also, that a long tube could not be introduced, then the construction of an apparatus as in Fig. 2 of the drawings will be of advantage, for the parts are readily inserted in separate pieces and then coupled together from the inside of the boiler.

This device can be readily made and applied by any mechanic of ordinary skill, and at an exceedingly low cost of manufacture and connection as compared with other and more complicated apparatus of the kind, for no special character or style of tube or coupling is necessary, and no alteration in the structure of the boiler is required.

In its operation upon water containing mineral matter, as well as mud and sediment, our device is found to remove all such substances and impurities, and to deliver the water in a pure state into the boiler-water. This accumulating matter extracted from the water in its passage through the concentric space is removed at intervals through the blow-off connection at the outer end.

Having thus fully described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a feed-water-supply attachment to steam-boilers, the combination of the precipitating-tube composed of the tubes A C, the coupling B, and the feed and blow-off pipes E G, the former connected with the tube C and the latter with the tube A, outside of the tube C, substantially as hereinbefore described.

2. In a feed-water-supply attachment to steam-boilers, a precipitating tube or cylinder adapted for insertion through the shell of a boiler, and formed of an inner and an outer tube placed concentrically to produce the water spaces $a b$, of which the inner one is made a continuation or extension of the boiler-feed pipe, and the outer one has a discharge-outlet outside of the boiler.

3. A feed-water-purifier attachment consisting of a precipitating tube or cylinder, A C, a feed-pipe coupled to the said tube C, a blow-off pipe leading from the annular space between the two tubes, and a delivery outlet or outlets in the upper part of the outer tube, A, substantially as herein described.

4. The combination, with the precipitating tube or cylinder A C, of the perforated distributing-pipe H, and connection between the said tube or cylinder and the said pipe, substantially as and for the purpose described.

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