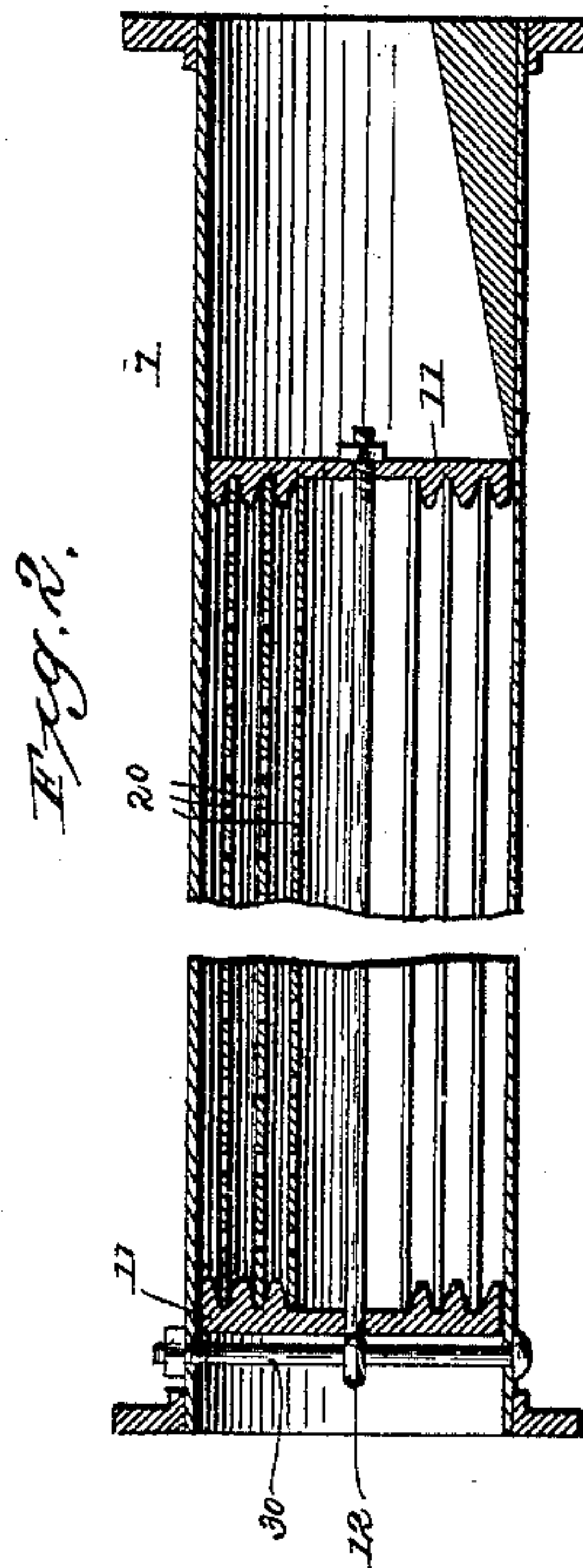
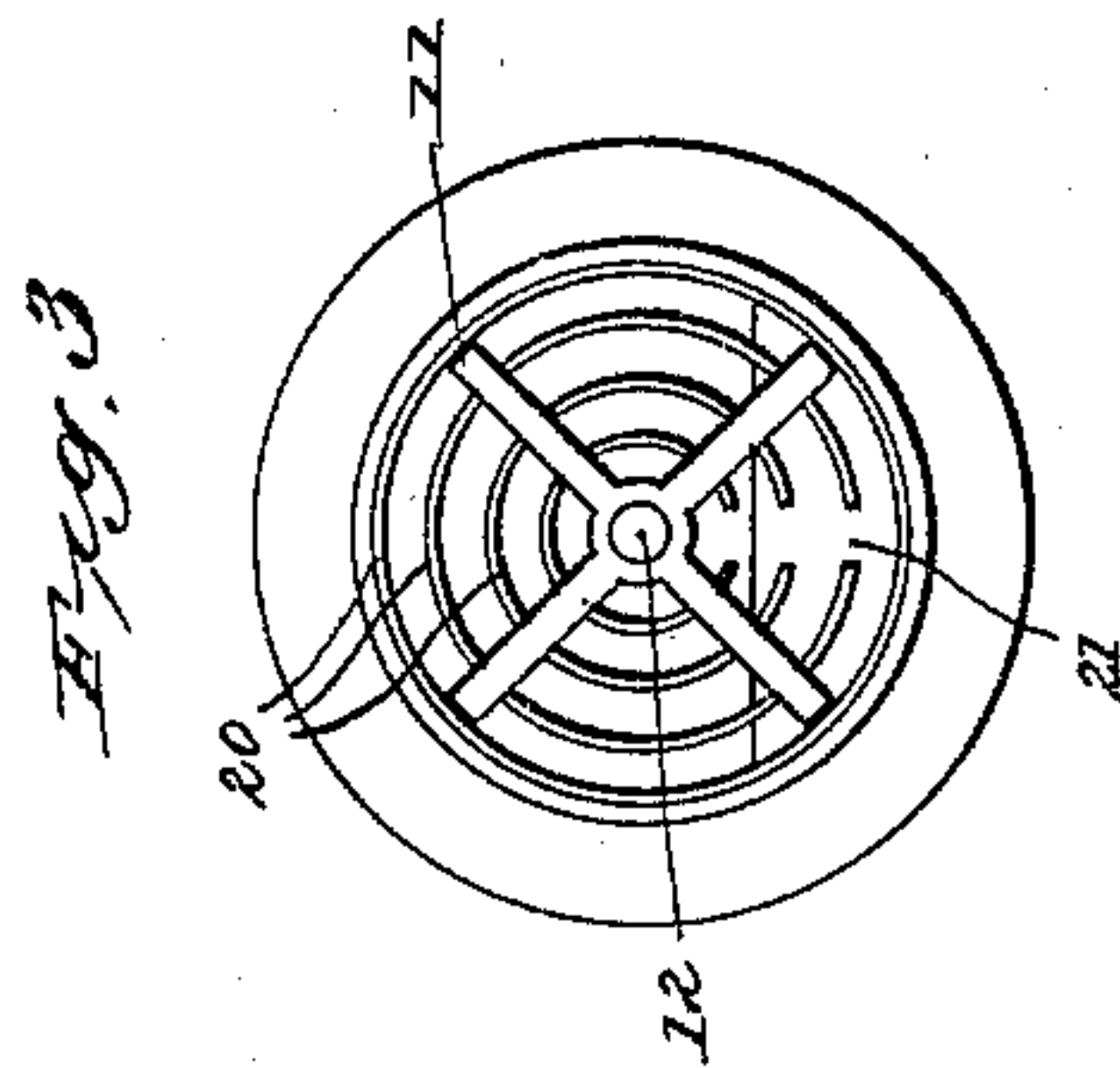
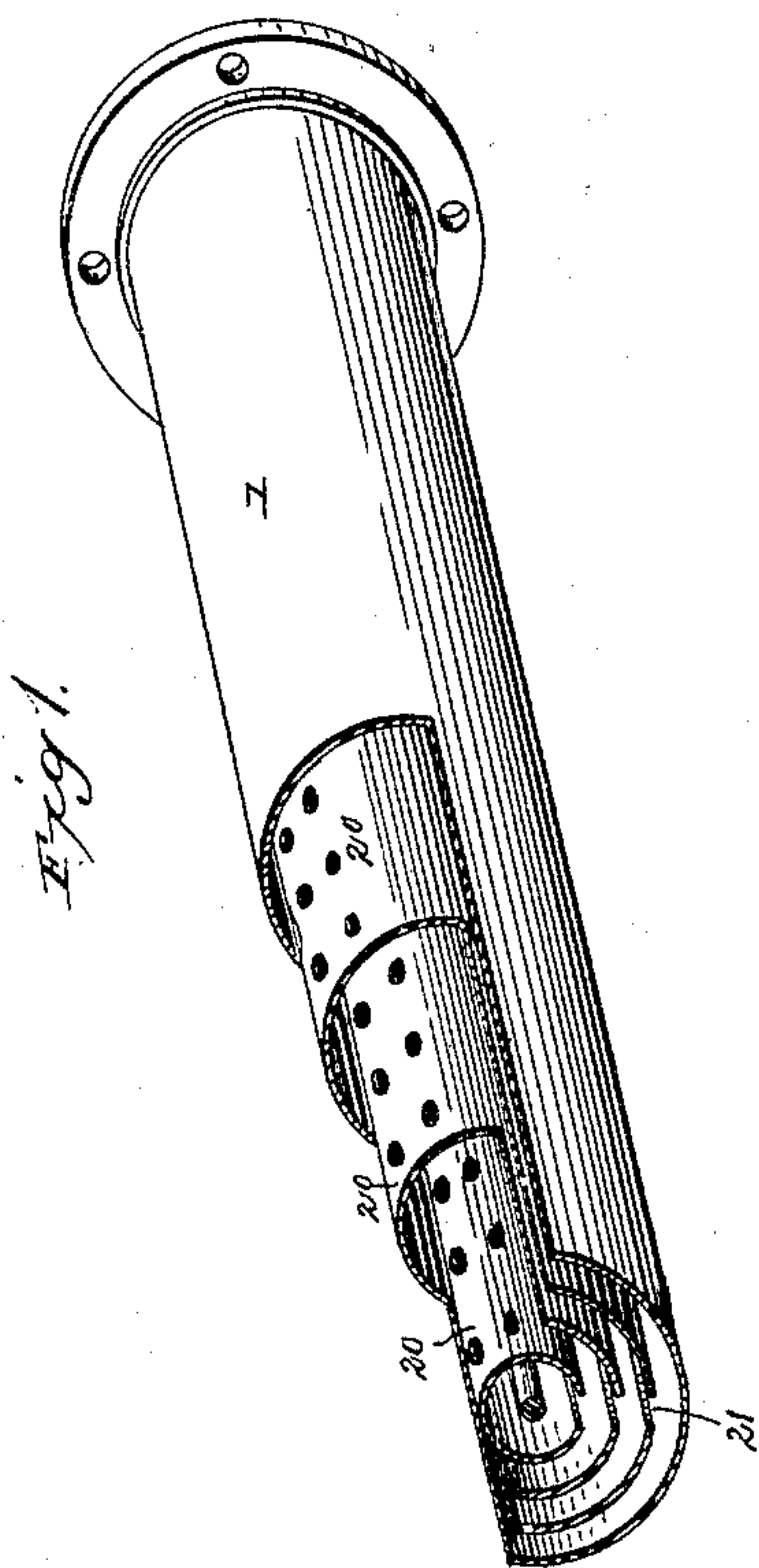


(No Model.)

B. F. FIELD.
FEED WATER PURIFIER.

No. 432,026.

Patented July 15, 1890.



Witnesses
E. D. Smith
Thomas Durant

Inventor
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UNITED STATES PATENT OFFICE.

BENJAMIN F. FIELD, OF CHICAGO, ILLINOIS.

FEED-WATER PURIFIER.

SPECIFICATION forming part of Letters Patent No. 432,026, dated July 15, 1890.

Original application filed September 27, 1889, Serial No. 325,238. Divided and this application filed December 26, 1889. Serial No. 335,447. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN F. FIELD, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful
5 Improvements in Feed-Water Purifiers; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and
10 to the figures of reference marked thereon.

This invention relates primarily to that class of feed-water purifiers for which Letters Patent Nos. 410,509 and 416,033 were granted, respectively, September 3, 1889, and November
15 26, 1889; and it consists in the novel and improved construction and arrangement and application of the internal plates or tubes employed in said apparatus for assisting in the purification of the water, all as hereinafter
20 fully described, and pointed out in the claims.

In the drawings, Figure 1 is a perspective view, partly in section, of a section of the conduit, Fig. 2 is an end view, and Fig. 3 a longitudinal sectional view of the same.

25 Similar numbers of reference in the several figures indicate the same parts.

In the drawings, 1 represents a section of the conduit or pipe through which the feed-water is conducted into the boiler, said conduit being formed in sections for convenience and suspended within the boiler above the
30 flues, the feed-water being heated and purified during its passage and before delivering into the general circulation of the boiler, as explained in my before-mentioned patents. In some or all of the sections 1 of the conduit are arranged a series of internal tubes or plates
35 20, with the surfaces of which the water is brought into contact and caused to deposit
40 the scale-producing materials.

Instead of supporting and holding the inner tubes separated by means of cross-bolts and washers, as heretofore, they are supported and sustained in position within the conduit by
45 means of spiders 11, fitted within the conduit-section and provided with supporting and separating shoulders to receive the several tubes. These spiders are applied to opposite ends of each series of tubes 20, and are clamped
50 and held in place by means of a rod 12, pro-

vided with tightening devices, such as nuts or equivalent means for drawing the spiders together or toward the ends of the tubes. The nest of tubes is held from longitudinal motion within the conduit by a cross-bolt 30, preferably passed through an eye in the rod 12. The
55 tubes 20 are provided with a series of slots or perforations along the upper side, and a longitudinal slot 21 is formed at the bottom, this arrangement being adapted to facilitate the
60 free circulation of the water through the various passages to permit the steam generated within the purifier to rise to the upper portion of the conduit, and to cause the sediment deposited within the tubes 20 to be directed into
65 the lower portions of the conduit. This form of internal tube is preferable to the perforated tube of my prior patents, as it retains all the advantages of the former in so far as the purification of the water is concerned and
70 can be produced and applied at much less cost, as the riveting, welding, or other means employed for retaining the metal in tubular form can be done away with and the tubes formed from sheets, properly perforated to provide
75 the upper series of openings, and bent partially around into tubular form, with the edges separated, however, to provide the slot or opening in the bottom portion for the escape of sediment, &c. The bent sheet or partial
80 tube is held and retained in proper form with its edges separated by means of the spiders hereinbefore described, and which are applied to the ends of the tubes so as to separate the
85 latter, and at the same time retain them in proper relative position.

This application is filed as and constitutes a division of my prior application, Serial No. 325,238, filed September 27, 1889.

Having thus described my invention, what
90 I claim as new is—

1. In a feed-water purifier such as described, the conduit provided with a series of internal tubes, supported upon spiders held in place by a tie-rod, as and for the purpose set forth.
95

2. In a feed-water purifier such as described, the combination, with the conduit and the internal tubes arranged one within another, of the spiders located at the ends of the series
100 of tubes and provided with retaining-should-

ders and a tie-rod connecting said spiders, substantially as and for the purpose set forth.

3. In a feed-water purifier, the combination, with the conduit, of a series of metal sheets
5 bent into tubular form, but with their edges separated to form longitudinal slots, and provided with openings in their upper sections, said tubes being of different diameters and arranged one within another and supported
10 within the conduit with their slotted portions opening downward, substantially as described.

4. In a feed-water purifier such as described,

the combination, with the conduit through which the feed-water is conducted, of a series of internal tubes or plates arranged one with- 15 in another and supported and held apart by cross-pieces, provided with shoulders interposed between and engaging the ends of the said internal tubes or plates, substantially as described.

BENJAMIN F. FIELD.

Witnesses:

THOS. DURANT,
A. KELLY.