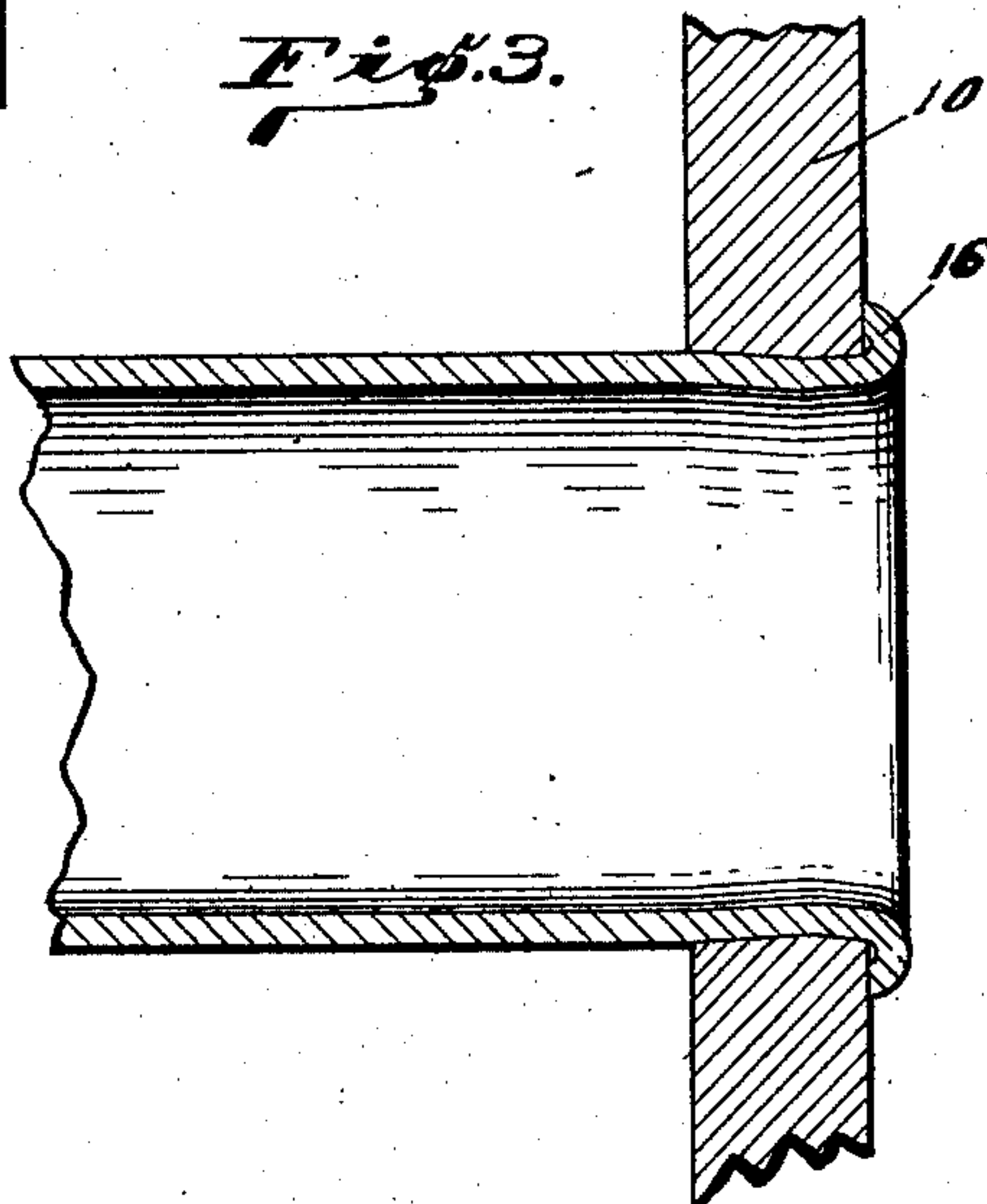
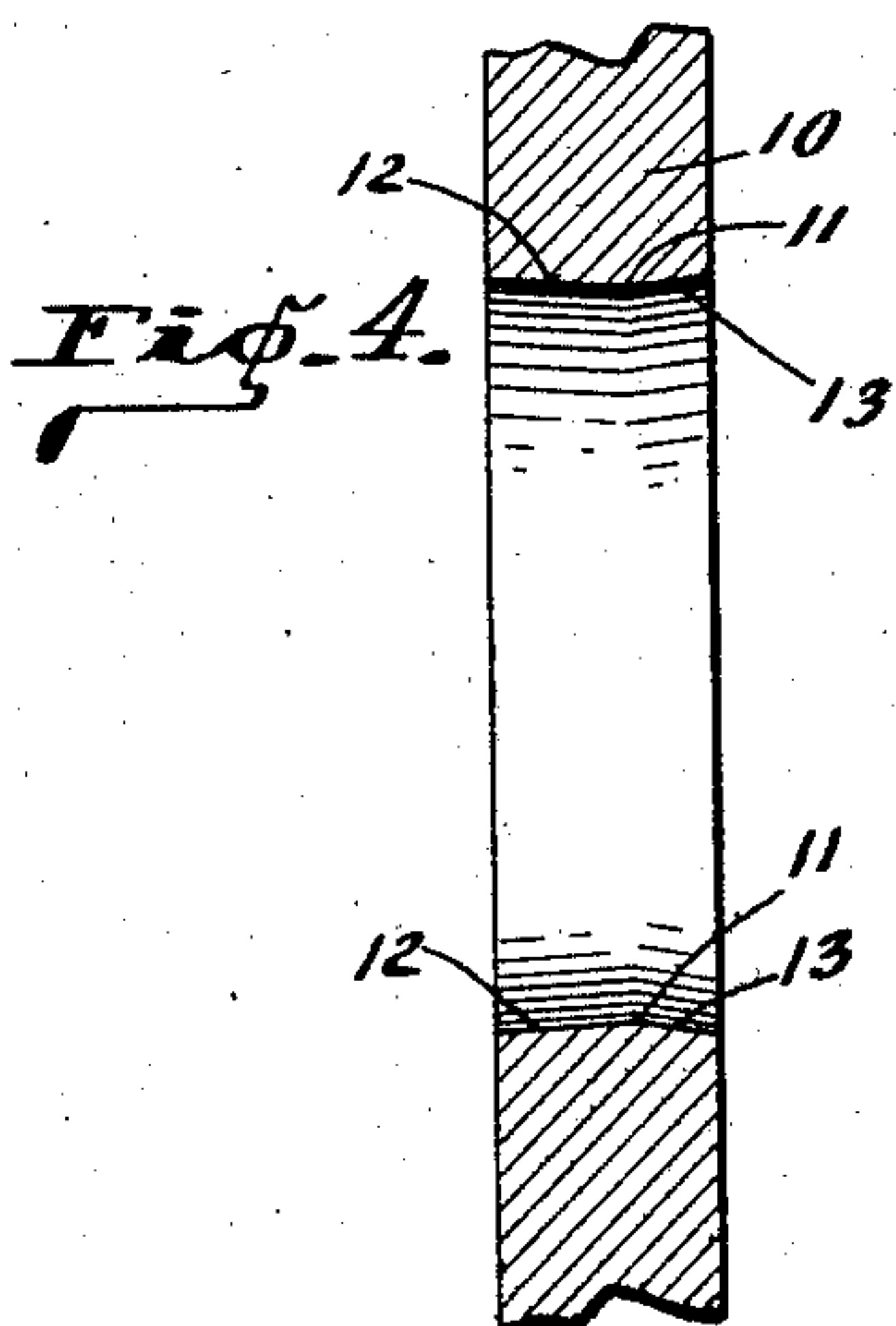
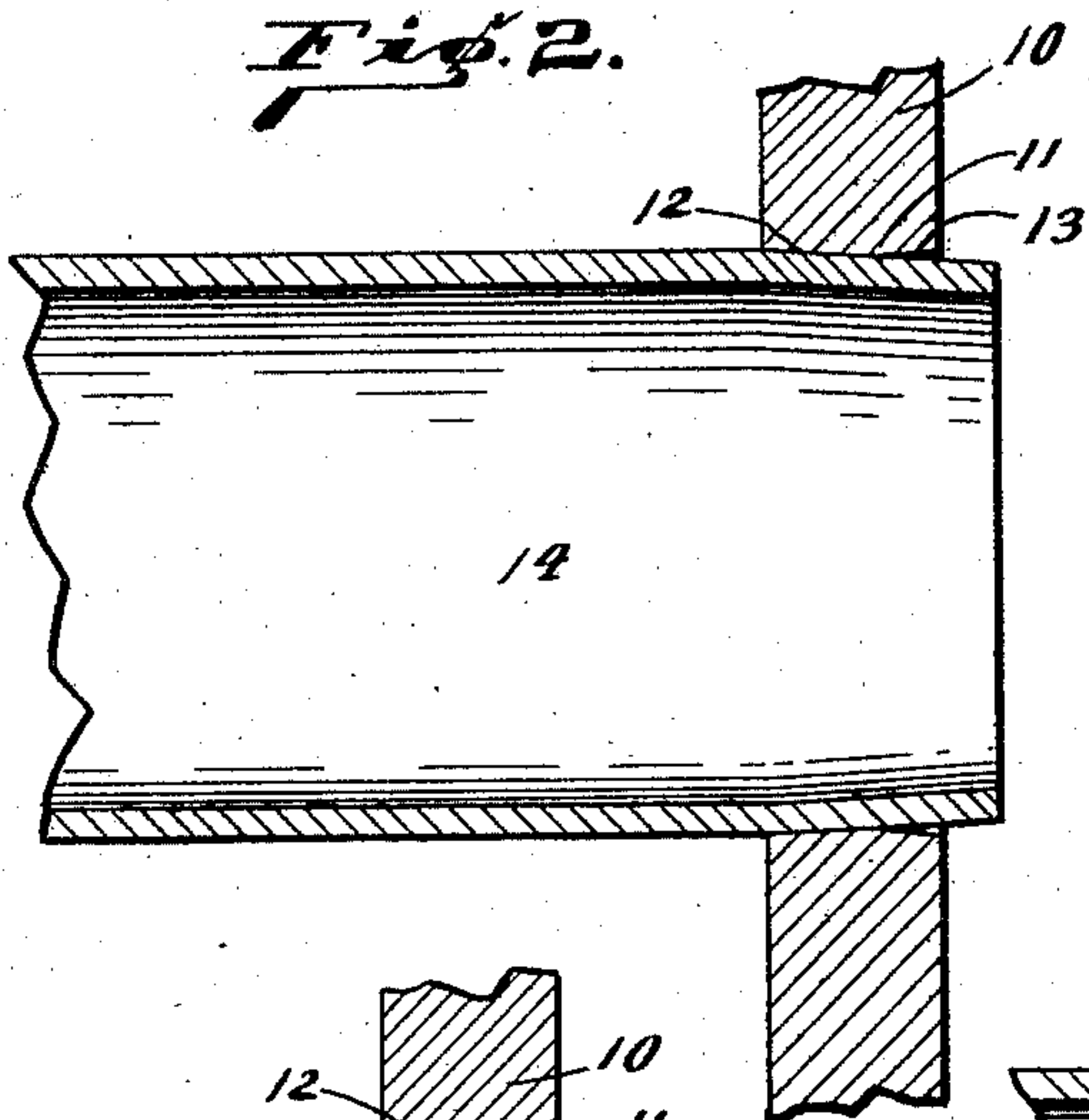
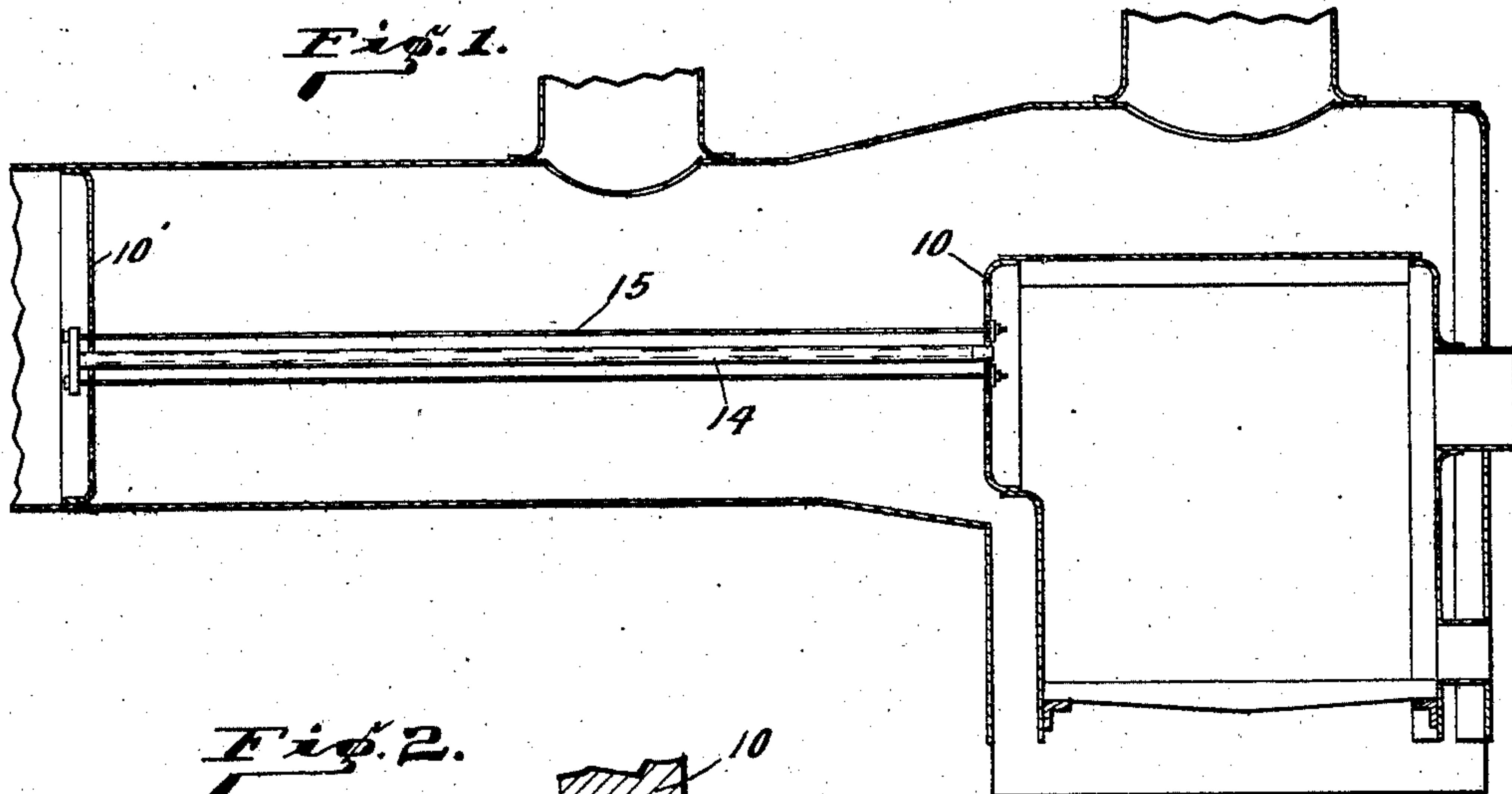


No. 850,299.

PATENTED APR. 16, 1907.

W. M. DICKERSON.
ART OF SETTING BOILER TUBES.
APPLICATION FILED SEPT. 10, 1906.



Witnesses
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UNITED STATES PATENT OFFICE.

WILLIAM M. DICKERSON, OF INDIANAPOLIS, INDIANA.

ART OF SETTING BOILER-TUBES.

No. 850,299.

Specification of Letters Patent.

Patented April 16, 1907.

Application filed September 10, 1906. Serial No. 333,972.

To all whom it may concern:

Be it known that I, WILLIAM M. DICKERSON, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in the Art of Setting Boiler-Tubes, of which the following is a specification.

The object of my invention is to secure boiler flues or tubes in head-plates in such manner that a tight unyielding joint may be secured.

The particular object of my invention is to provide means by which the fire-box end of flues in a locomotive and other similar boilers may be secured in such manner as to remain tight for a much longer period than is possible with flues secured in the present ordinary manner.

The accompanying drawings illustrate my invention.

Figure 1 is a sectional view of a locomotive-boiler, showing the manner of attaching the fire-box end of a flue to the head-plate. Fig. 2 is a sectional detail, about full size, of a flue and adjacent head-plate during an initial stage of my process. Fig. 3 is a similar view showing the same parts in completed condition, and Fig. 4 a detail of one of the flue-receiving openings.

In carrying out my process I provide the head-plates with openings to receive the flues, the smallest diameter of these openings being less than the largest diameter of the tube and this smallest diameter of the opening being at a point intermediate between the outer and inner faces of the head-plate, preferably nearer the outer face than the inner. The flue is then tapered (or automatically tapered by forcing the flue into the opening) and the flue inserted in the opening and forced through the same, and while the pressure is maintained longitudinally of the flue the outer projecting end of the flue is enlarged by rolling, swaging, or otherwise, so as to flare outwardly, this enlargement of the outer end of the flue taking place while the pressure longitudinally of the flue is continuously maintained. The outer end of the flue may then be beaded over, if desired.

In the drawings, 10 indicates the head-plate provided with a plurality of flue-receiving openings each of which is tapered from an intermediate point 11, thus forming a tapered portion 12, which is larger at the in-

ner face of the head, and a tapered portion 13, which is larger at the outer face of the head. The flue 14 has an external diameter substantially equal to the largest diameter of the portion 12 of the flue-receiving opening and is forced into said portion 12 and through the opening, so as to project beyond the outer face of the head-plate, as shown in Fig. 2. This forcing pressure may be exerted in any desired manner—for instance, by means of bolts 15, passed through the two head-plates 10 and 10'. When the tube has been forced through the opening in the head-plate 10 until it fits tightly in the portion 12 of the flue-opening, it is then cut so as to project any desired amount from the head-plate, and the portion lying within the part 13 of the opening is swelled by rolling or otherwise until it lies tightly within the tapered portion 13 of the flue-opening, this swelling being accomplished while the pressure is being exerted longitudinally of the tube to continuously crowd it into the part 12 of the flue-opening, so that when the operation is completed the head-plate 10 has been crowded onto the flue by a pressure which is wholly independent of any force exerted by the swelling of the tube in the portion 13 of the opening.

If desired, the outer tip of the tube may be turned over to form a bead 16; but it will be understood that the flue will be held tightly in the head-plate without this bead.

In case the swelling of the tube within the portion 13 of the flue-opening is accomplished by blows, a heavy sledge or similar article should be held against the farther end of the tube in order to resist the blows.

The far ends of the tubes in the head-plate 10' may be rolled or otherwise secured in the head in any well-known manner, as at this point the tubes are not subjected to as great stresses as are the tubes immediately adjacent the fire-box.

I claim as my invention—

1. That improvement in the art of setting boiler flues or tubes which consists in forcing them into a tapered opening and expanding their outer ends while under the forcing pressure.

2. That improvement in the art of setting boiler tubes or flues which consists in forcing the end of the tube through an opening in a plate, which opening is tapered outwardly in opposite directions from an intermediate

point, and swelling the outer end of said tube while maintaining the forcing pressure longitudinally of the tube.

3. That improvement in the art of setting
5 boiler tubes or flues which consists in forcing the end of the tube through an opening in a plate, which opening is tapered outwardly in opposite directions from an intermediate point, and swelling the outer end of said
10 tube while maintaining the forcing pressure longitudinally of the tube, and forming a bead on the outer end of the tube.

4. That improvement in the art of setting
15 boiler tubes or flues which consists in tapering the end of the tube or flue to correspond with the taper of one end of a flue-receiving opening, which opening is also tapered in the opposite direction toward the outer face of the head-plate, maintaining a pressure on
20 the flue tending to force its tapered end into and through the tapered opening of the head-plate, and during said maintenance, swelling the outer end of the tube into the aforesaid

oppositely-tapered portion of the flue-receiving opening.

5. That improvement in the art of setting
boiler tubes or flues which consists in tapering the end of the tube or flue to correspond with the taper of one end of a flue-receiving opening, which opening is also tapered in the
30 opposite direction toward the outer face of the head-plate, maintaining a pressure on the flue tending to force its tapered end into and through the tapered opening of the head-plate, and during said maintenance, swelling the
35 outer end of the tube into the aforesaid oppositely-tapered portion of the flue-receiving opening, and forming a bead on the outer end of the tube.

In witness whereof I have hereunto set my
40 hand and seal, at Indianapolis, Indiana, this 5th day of September, A. D. 1906.

WILLIAM M. DICKERSON. [L. S.]

Witnesses:

ARTHUR M. HOOD,
THOMAS W. McMEANS.