

No. 829,509.

PATENTED AUG. 28, 1906.

J. M. CROZIER.  
BOILER FLUE.

APPLICATION FILED JAN. 18, 1906.

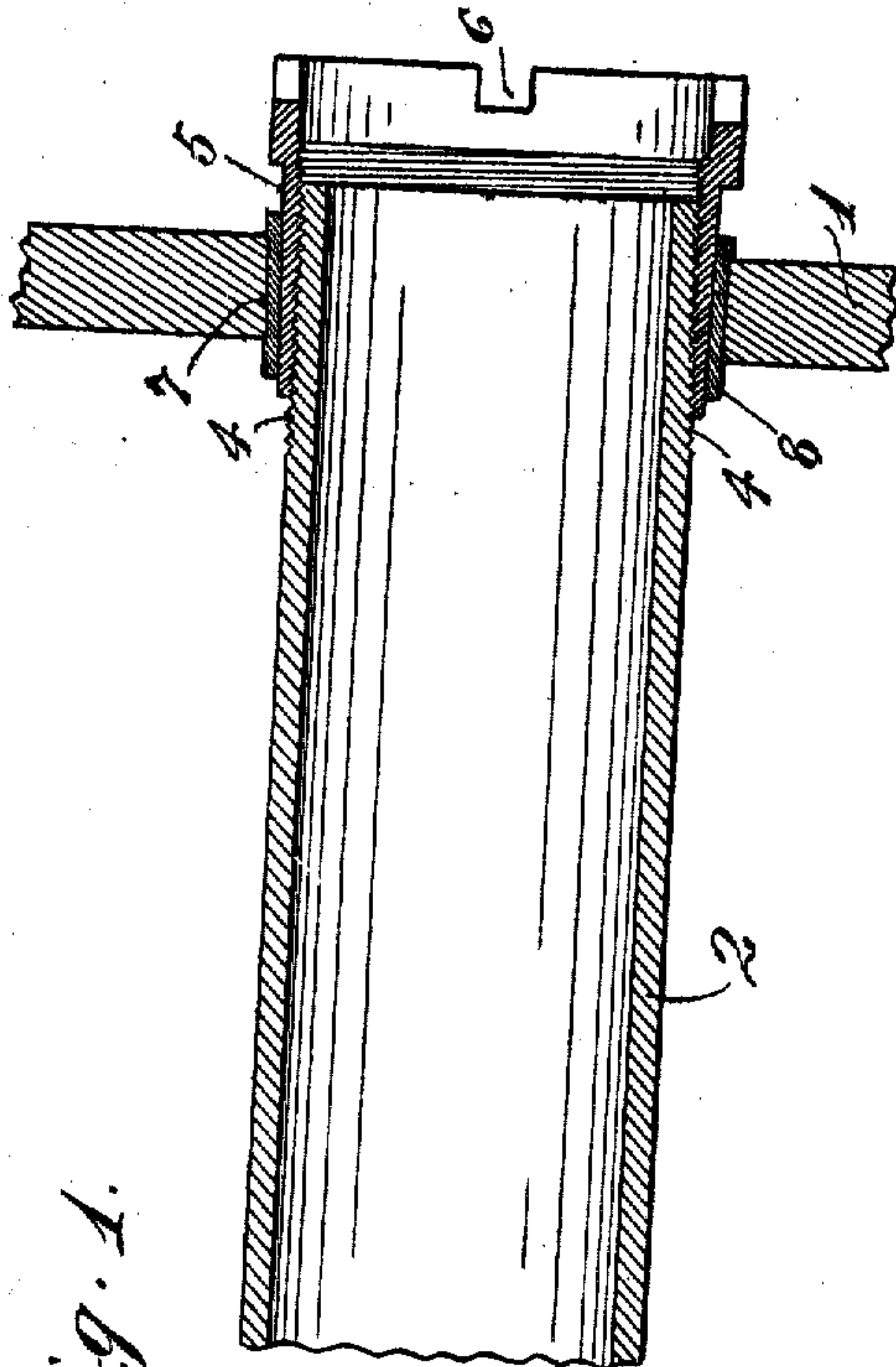


Fig. 1.

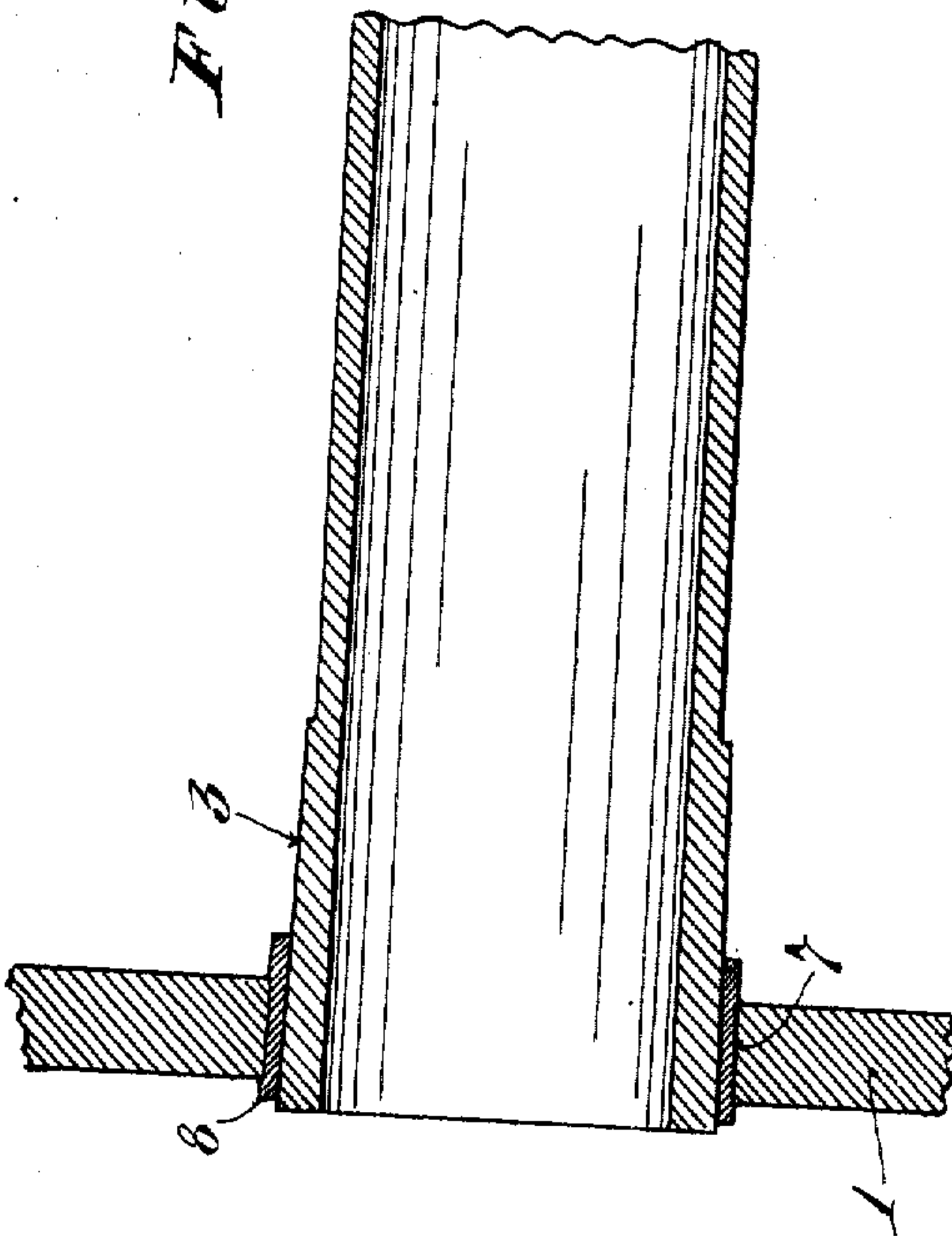


Fig. 2.

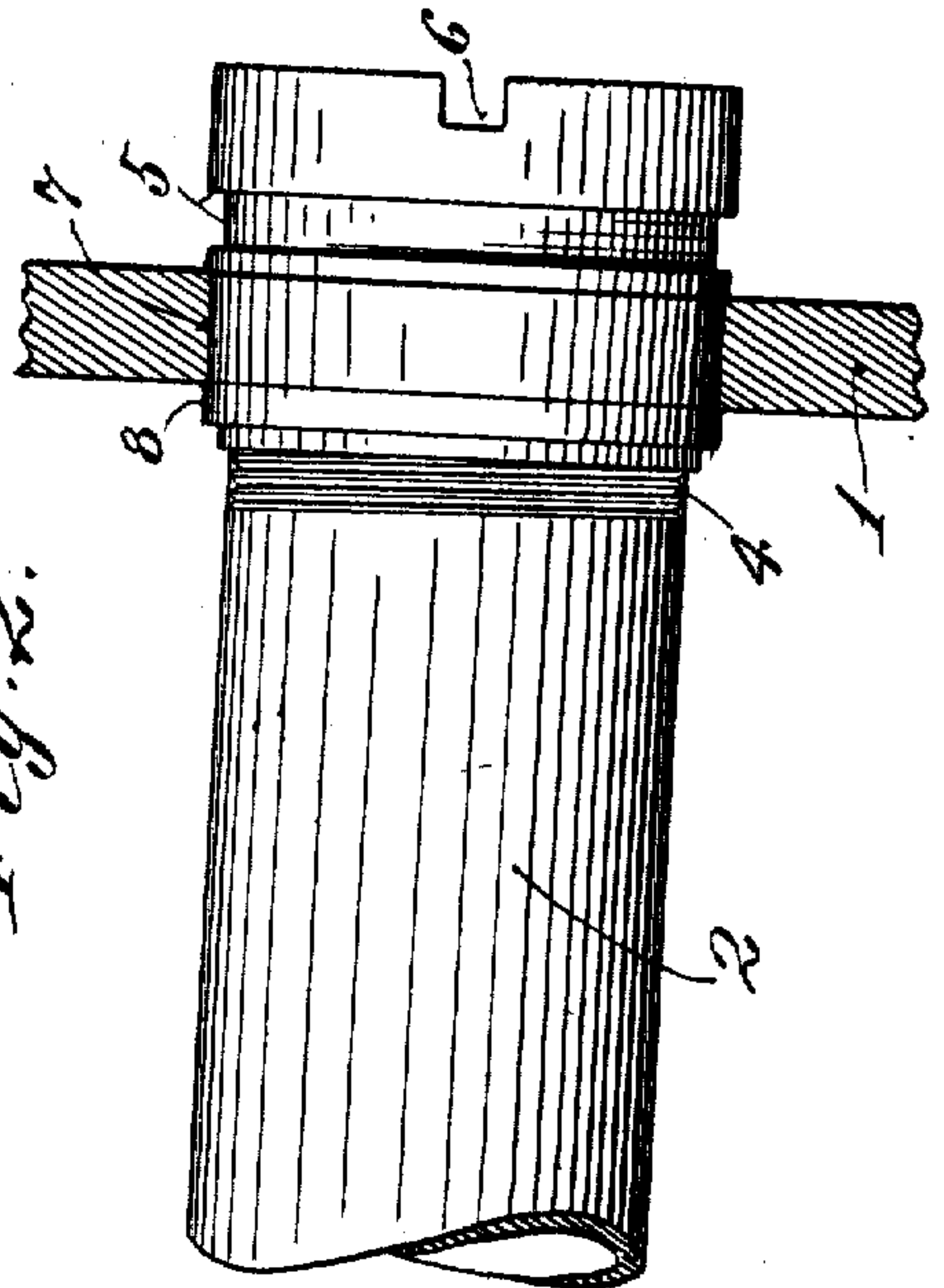
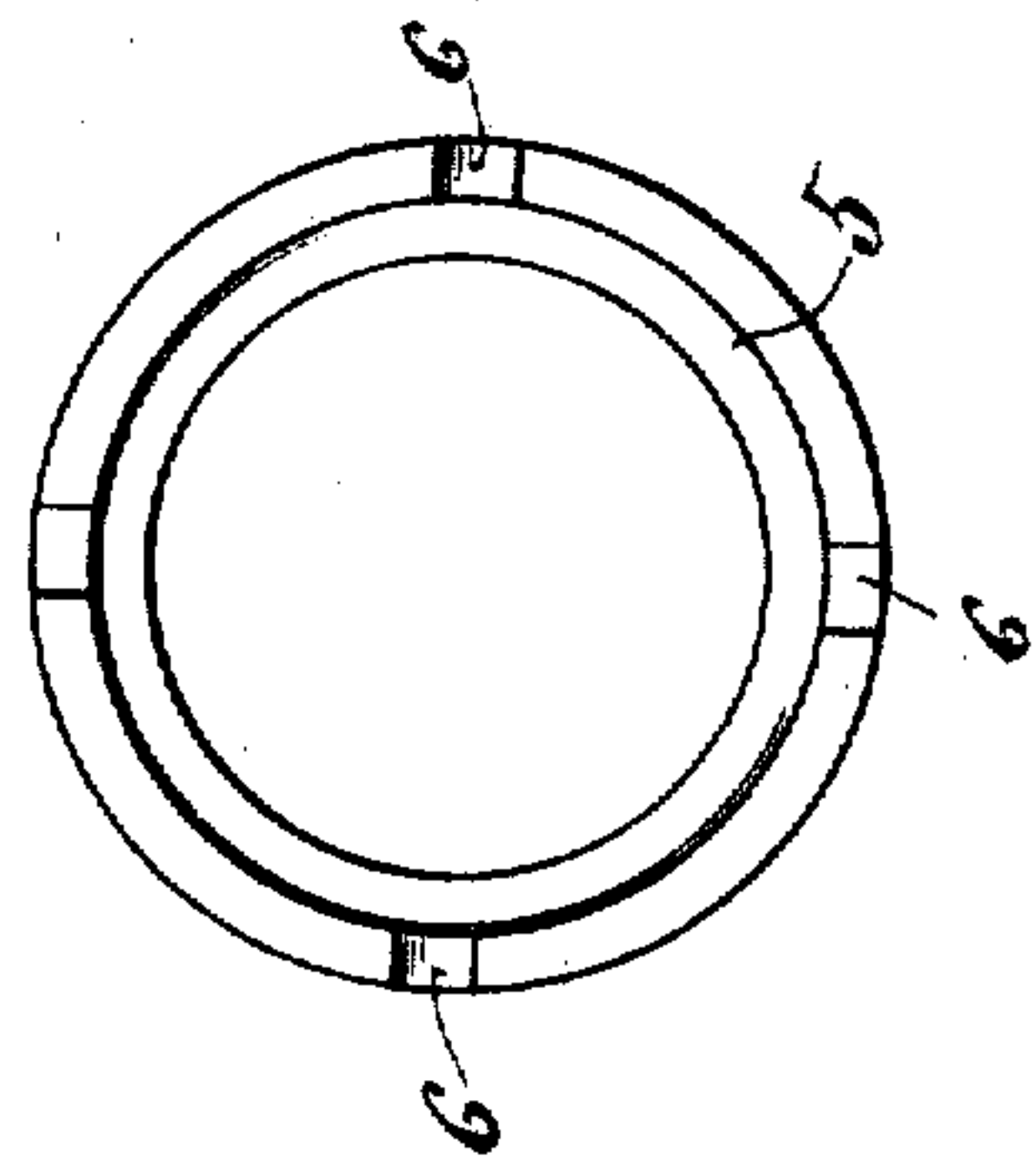


Fig. 3.



Witnesses.  
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# UNITED STATES PATENT OFFICE.

JOHN M. CROZIER, OF MINNEAPOLIS, MINNESOTA.

## BOILER-FLUE.

No. 829,509.

Specification of Letters Patent.

Patented Aug. 28, 1906.

Application filed January 18, 1906. Serial No. 296,638.

*To all whom it may concern:*

Be it known that I, JOHN M. CROZIER, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Detachable Boiler-Flues; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention has for its object to provide certain improvements in detachable boiler-flues; and it consists of the novel devices and combinations of devices hereinafter described, and defined in the claim.

In the accompanying drawings, which illustrate my invention, like characters indicate like parts throughout the several views. Referring to the drawings, Figure 1 is a vertical section taken longitudinally and centrally through the detachable boiler-flue and through the flue-sheets, to which it is shown as applied, some parts being broken away. Fig. 2 is a plan view of the right-side end of the flue shown in Fig. 1, the flue-sheet only being sectioned; and Fig. 3 is an end elevation looking at the right-hand end of the detachable flue.

The numeral 1 indicates laterally-spaced flue-sheets of the boiler, to which the flue is shown as applied. The numeral 2 indicates the flue. At one end the flue is slightly enlarged at its exterior surface, so as to form an inwardly-tapered slightly-conical sleeve portion 3, that is rigidly and integrally formed therewith. The other end of said flue is threaded externally at 4, and on this threaded portion works a slightly-conical inwardly-tapered sleeve 5, which is preferably formed with notches 6 at its enlarged end, so that it may be turned by a suitable wrench or tool.

The seats 7 in the flue-sheets 1 are tapered to correspond to the taper of the respective cooperating sleeve portions 3 and 5. Annular bushing or packing rings 8, of copper or other comparatively soft metal of high fusibility, are interposed, in the one instance, between the tapered sleeve 3 and cooperating tapered seat 7 and, in the other instance, between the tapered sleeve 5 and the cooperating tapered seat 7. These pliable or ductile packing-rings 8 are placed within their seats 5 in advance of the application of the flue and by a swaging, rolling, or other action

are permanently secured within their seats by having the projecting portions of the said packing-rings pressed outward or slightly beyond the respective seats 7 on the opposite sides of the flue-sheet.

The manner of applying the flue is probably obvious, but may be briefly stated as follows: While the removable sleeve 5 is removed from the flue, the flue is inserted through one of the seats 5 and its sleeve portion 3 is driven or otherwise forced in close and tight engagement with the cooperating relatively fixed bushing 8. Then the sleeve 5 is screwed onto the other end of the flue and is tightly forced into the other bushing 8. The taper of the sleeve portions 3 and 5 is so slight that very little lateral pressure will be put upon the flue-sheet, while very great pressure will be put upon the cooperating bushings 8. The bushings swaged or upset, so that they permanently hang to their seats in the flue-sheet, form extremely close and tight joints therewith and cannot possibly get out of place in applying the flue or in removing the flue. This feature is therefore very important.

The flue described is of small cost, and in actual practice it has been found efficient for the purposes had in view.

The seats 7 in the laterally-spaced flue-sheets 1 are of the same diameter. The sleeve portions at the opposite ends of the flue are of the same diameter, and the soft-metal bushings 8 are of the same diameter and thickness. This construction makes it possible to insert the flue either into the boiler—to wit, in Fig. 1 either from the left toward the right or from the right toward the left. It is of course desirable to always have the projecting sleeves 5 within the smoke-box as distinguished from the fire-box and the boiler, because of the fact that the rigid or integrally-formed sleeve portions 3 are better adapted to stand intense heat than are the said sleeves 5.

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

In a boiler, the combination with laterally-spaced flue-sheets having tapered flue-seats of the same diameter and taper, of a flue having at one end a fixed conical sleeve portion, and at its other end a screw-threaded conical portion, said two conical sleeve portions having the same diameter and the same taper as said flue-seats, and annular packing-rings of

relatively soft material but of high fusibility  
interposed between said conical sleeve por-  
tions and the surrounding seats in said flue-  
sheets, and which packing-rings are swaged  
5 or upset at their inner and outer portions so  
that they are permanently secured in the  
said flue-seats, substantially as described.

In testimony whereof I affix my signature  
in presence of two witnesses.

JOHN M. CROZIER.

Witnesses:

MALIE HOEL,  
F. D. MERCHANT.