

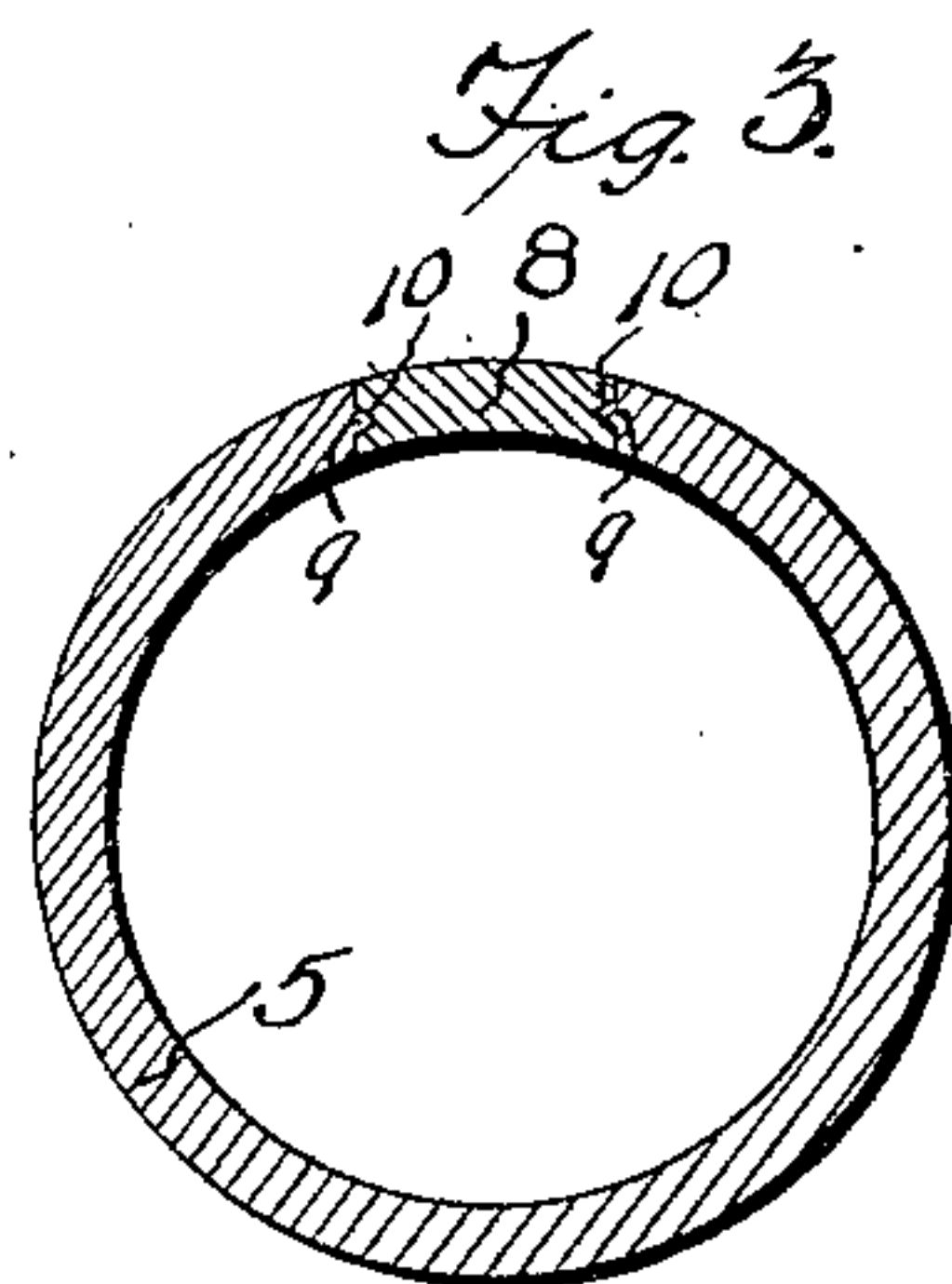
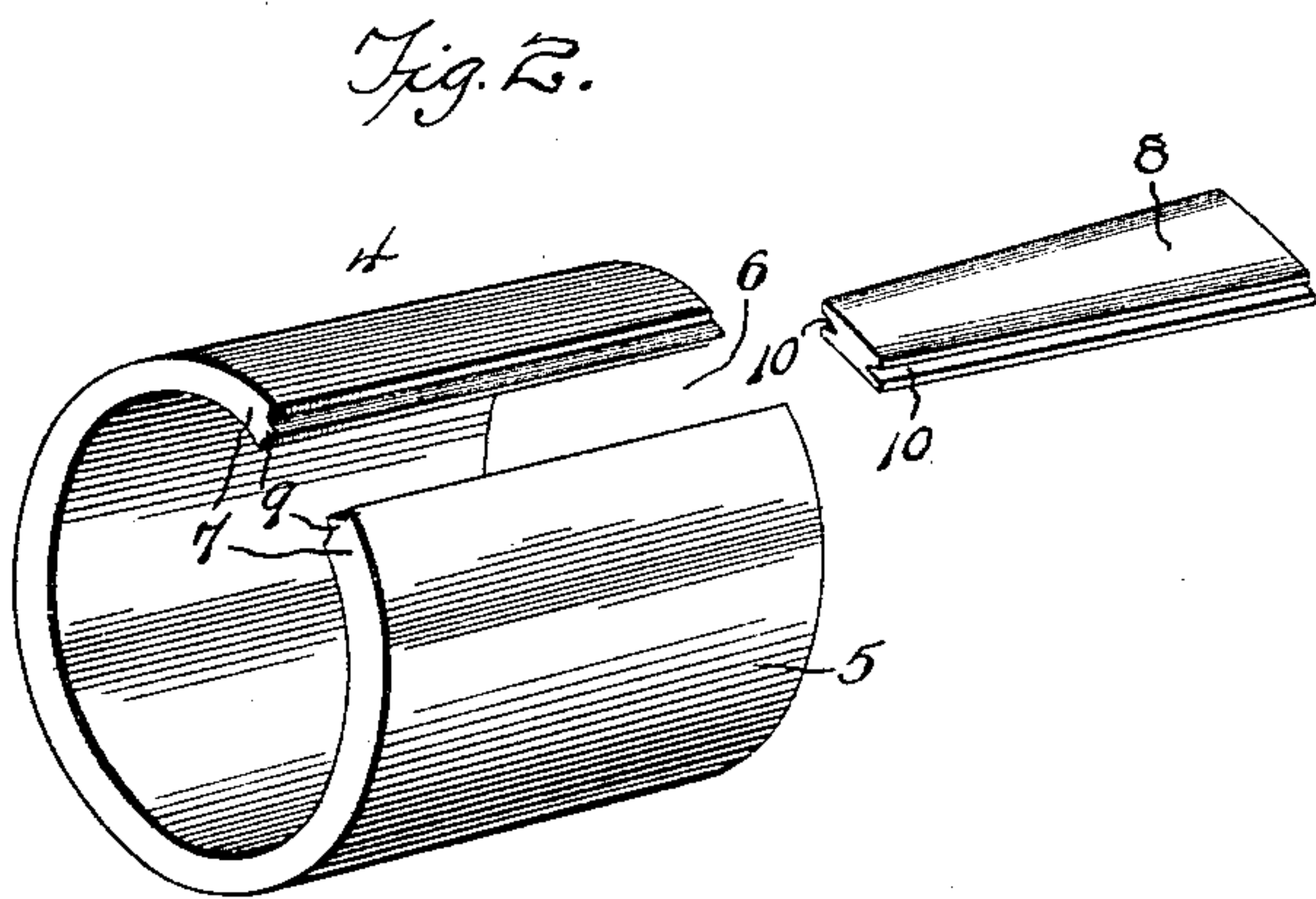
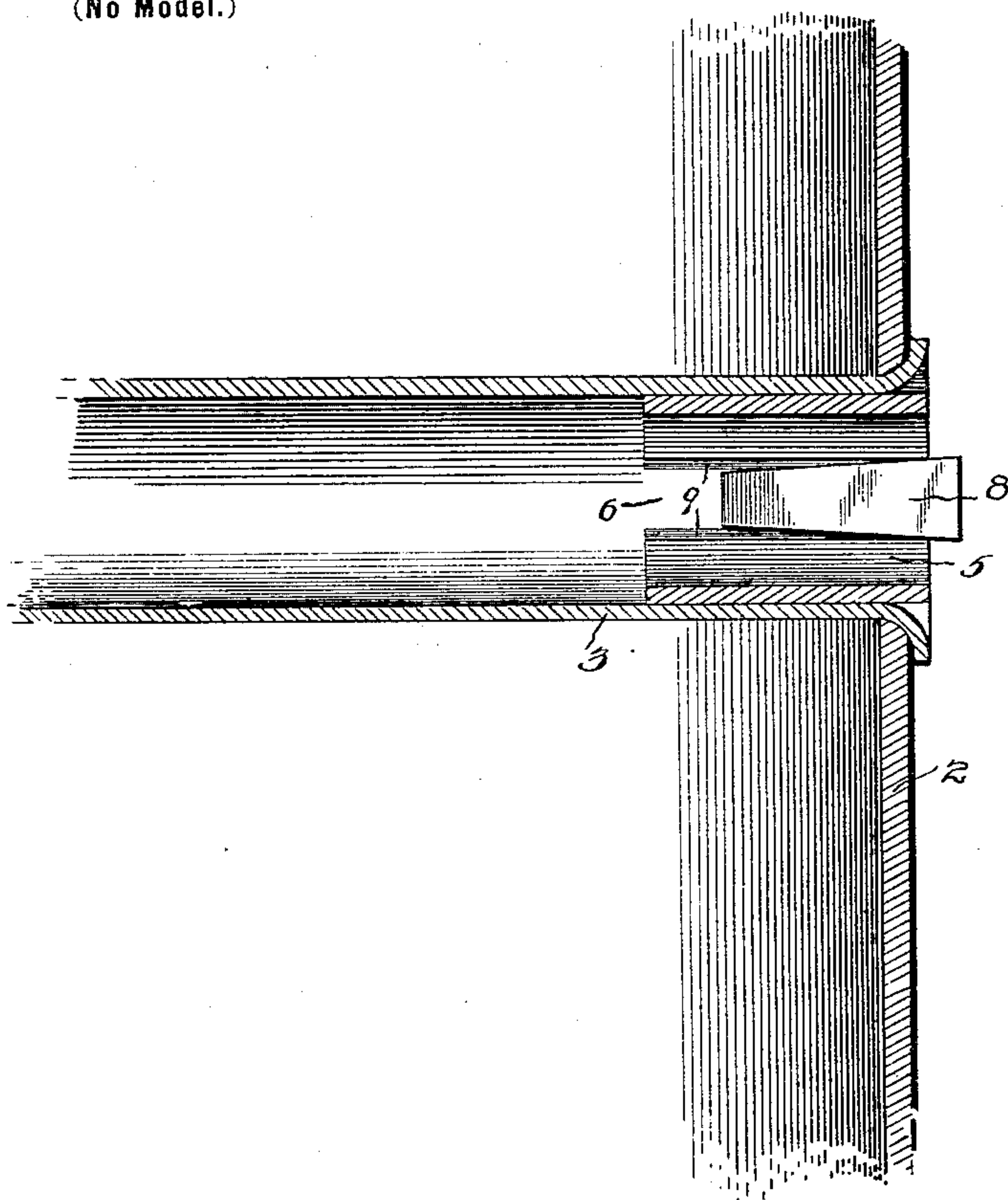
No. 633,037.

Patented Sept. 12, 1899.

W. Q. PFAHLER.  
TUBE EXPANDER.

(Application filed Mar. 1, 1899.)

(No Model.)



Witnesses

Ralph Shepard  
Heath Luntz

By His Attorneys,

W. Q. Pfahler, Inventor

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# UNITED STATES PATENT OFFICE.

WILLIAM QUIN PFAHLER, OF PRENTISS, OHIO.

## TUBE-EXPANDER.

SPECIFICATION forming part of Letters Patent No. 633,037, dated September 12, 1899.

Application filed March 1, 1899. Serial No. 707,257. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM QUIN PFAHLER, a citizen of the United States, residing at Prentiss, in the county of Putnam and State of Ohio, have invented a new and useful Tube-Expander, of which the following is a specification.

This invention relates to an expanding device for boiler-tubes, flues, and different kinds of piping, and has for its object to provide a simple and effective device which may be quickly introduced into the end of a boiler and expand the end thereof against the periphery of the perforation in the sheet in substitution of the usual rerolling operation employed.

It is well known that in tubular boilers the first points to leak are the joints between the ends of the tubes and the heads or sheets of the boiler, due to burning out and rusting of both the tube and the head. This leaking is usually stopped, when the disintegration has not progressed too far, by rerolling the ends of the tubes, and thus expanding them against the peripheries of their respective perforations in the heads. In the present instance I have formed a substantially cylindrical tubular member having a longitudinal section removable from and resulting from the formation of a split cylinder. In this split or slot of the cylinder is a tapered key, the curvature of whose outer surface corresponds to the curvature of the outer surface of the cylinder. This cylinder is inserted in the end of the leaky tube and the wedge is driven inwardly to the desired extent, resulting in the expansion of the cylinder against the inner surface of the tube and expanding and reinforcing the latter. This device may be also employed as a patch upon the inner surface of a tube or pipe.

With these ends in view the invention consists in the novel combination of elements and in the construction and arrangement of parts, which will be hereinafter fully described and claimed.

To enable others to understand the invention, I have illustrated the preferred embodiment thereof in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a sectional plan view of the in-

ner end of a boiler, a tube connected therewith, and my improved expanding device seated in one end of the tube. Fig. 2 is an enlarged perspective view of the tube-expanding device. Fig. 3 is a transverse section of the expanding device with the expanding-key therein.

Like characters denote like and corresponding parts in each of the several figures of the drawings.

In the drawings I have shown the tube-sheet of a boiler and the same is denoted by 2, and secured to the same is the tube 3, in which the expanding device 4 is disposed.

The expanding device includes in its construction a parti-annular member or cylinder 5, which may be made of any suitable length and which is expansible within the tube 3, and it may be made from any desired material, such as from piping. The adjacent edges 7 of the parti-annular member 5 are normally parallel and adapted to receive between them a taper key or wedge 8, which is adapted to be driven between the edges 7 for the purpose of spreading the part 5 in the tube 2, and the outer surface of this key or wedge is curved and in conformity with the periphery of said part 5, whereby when the parts are in assembled relation in a boiler-tube a continuous and firm contact is produced between the expanding device and the inner surface of the tube, thereby to lock said expanding device firmly in place and to cover any weak spot in the tube, whereby the escape or leakage of water will be prevented.

The taper key 8 can be driven into place by the use of a suitable tool, and to secure a finished job the end thereof which projects beyond the face of the tube-sheet or like part can be cut off.

As a means for properly guiding the expanding key or wedge between the meeting edges 7 of the parti-annular member 5 I provide or connect said parts with a tongue-and-groove joint. The adjacent or meeting edges 7 are provided with inwardly-extending tongues 9, adapted to fit within the grooves 10, formed upon the opposite edges of the key 8, longitudinally of the latter, whereby the proper guiding of the taper key into its seat is assured.

The expanding device hereinbefore de-



scribed can be very quickly and easily manufactured and can be produced at a low cost and is capable of quick introduction into a boiler or other tube and serves when in place  
5 to prevent all leakage of water or the like, and the device by reason of its construction is firmly and rigidly locked in position within the tube or other part inclosing it.

Changes in the form, proportion, size, and  
10 the minor details of construction within the scope of the appended claims may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus described the invention, what  
15 I claim is—

1. A device of the class described, consisting of a cylindrical member having a longitudinal slot through one side thereof and bounded by normally parallel walls, and a  
20 tapered wedge adapted to enter said slot at

one end through and expanding the adjacent end of the member radially, substantially as described.

2. A device of the class described, consisting of a cylindrical member having a longitudinal slot through one side, the walls of which are normally parallel, a tapered wedge adapted to enter said slot and expand said member radially with a force diminishing from one end toward the other, and tongue-  
25 and-groove connections between the wedge and the walls of said slot, substantially as described. 30

In testimony that I claim the foregoing as my own I have hereto affixed my signature in  
35 the presence of two witnesses.

WILLIAM QUIN PFAHLER.

Witnesses:

J. WERNER,

THEODORE LUTFRING.