

No. 624,367.

Patented May 2, 1899.

E. McGOVERN.
BOILER TUBE FASTENING.

(Application filed Dec. 18, 1897.)

(No Model.)

Fig. 1.

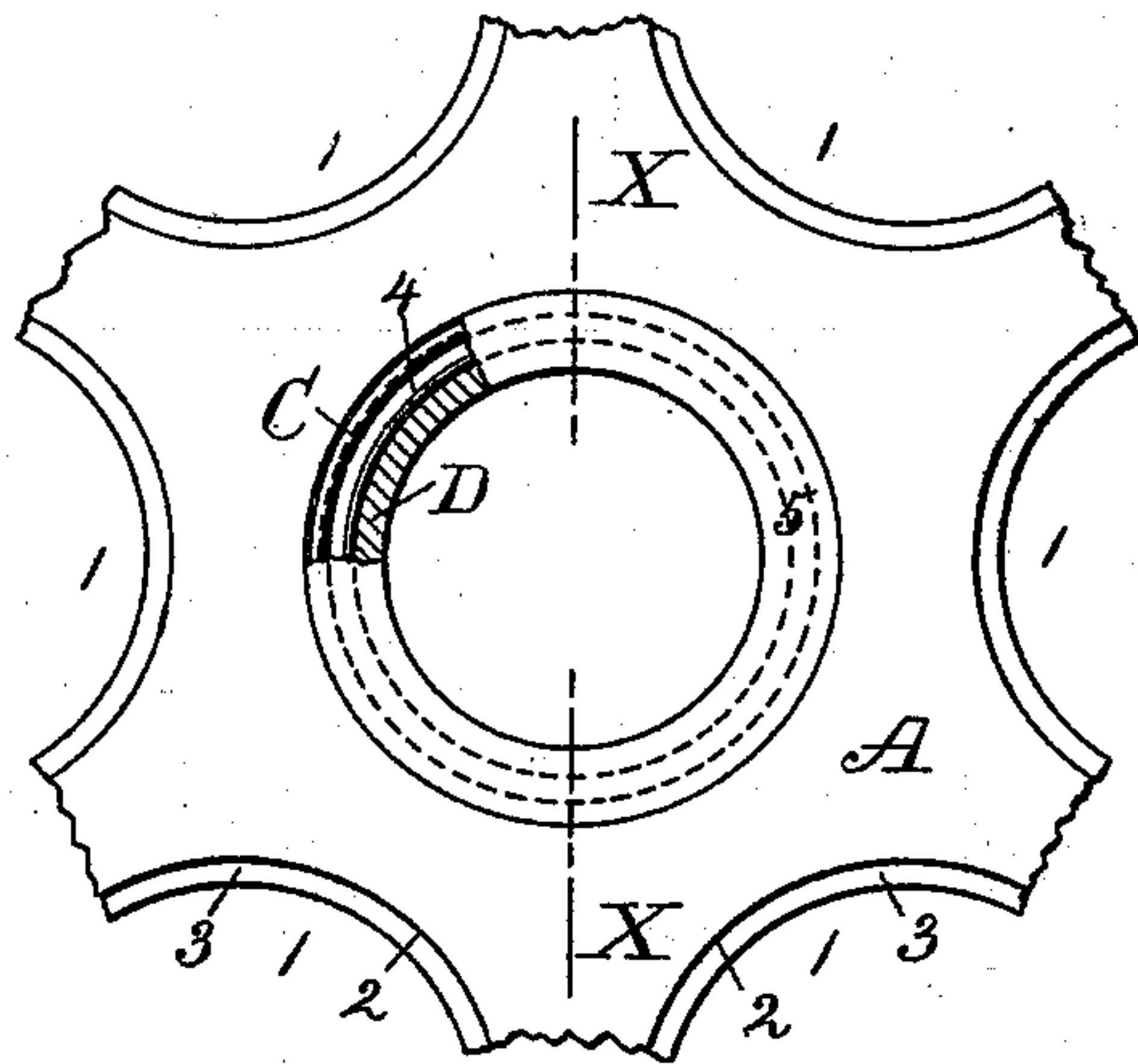


Fig. 2.

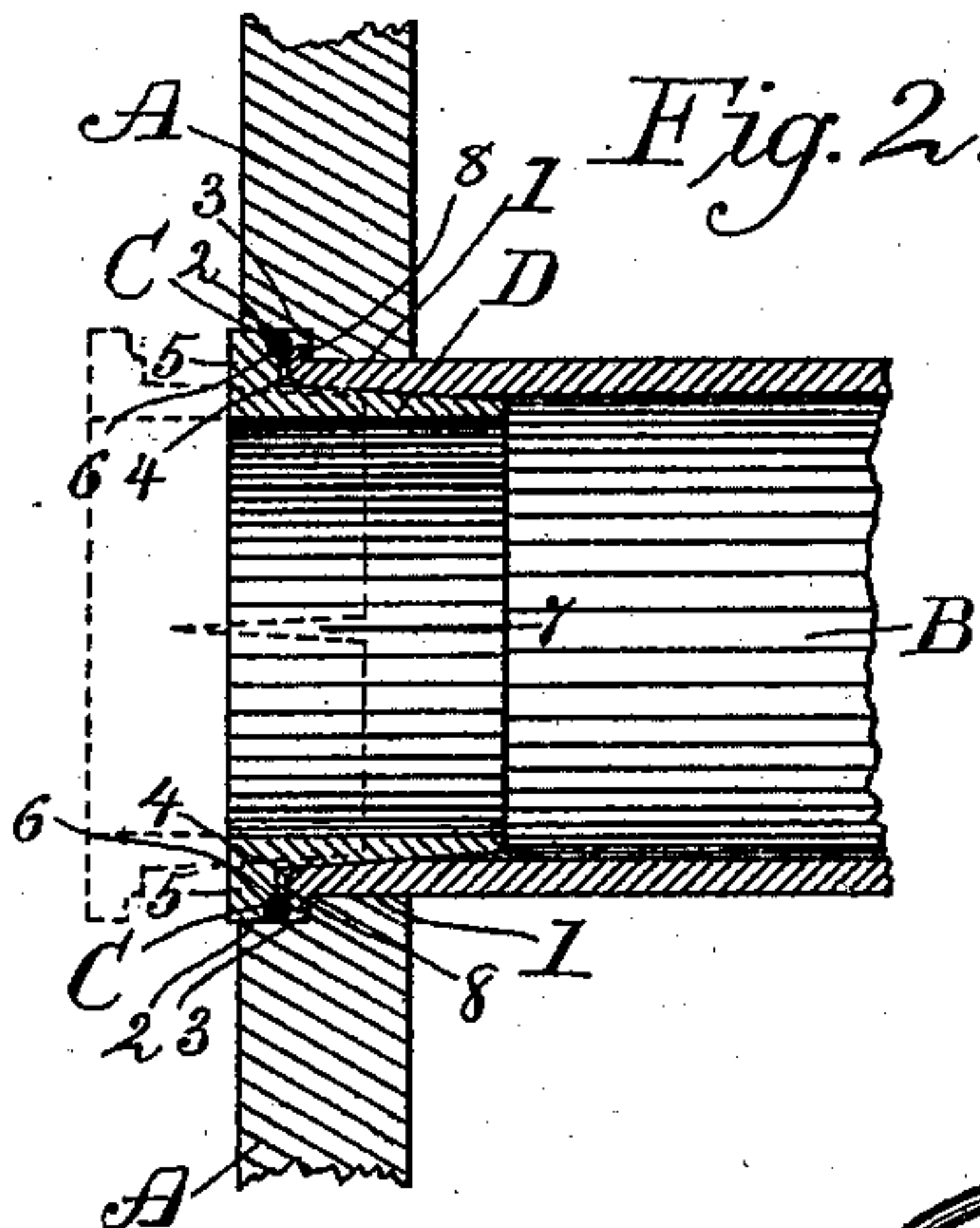


Fig. 3.

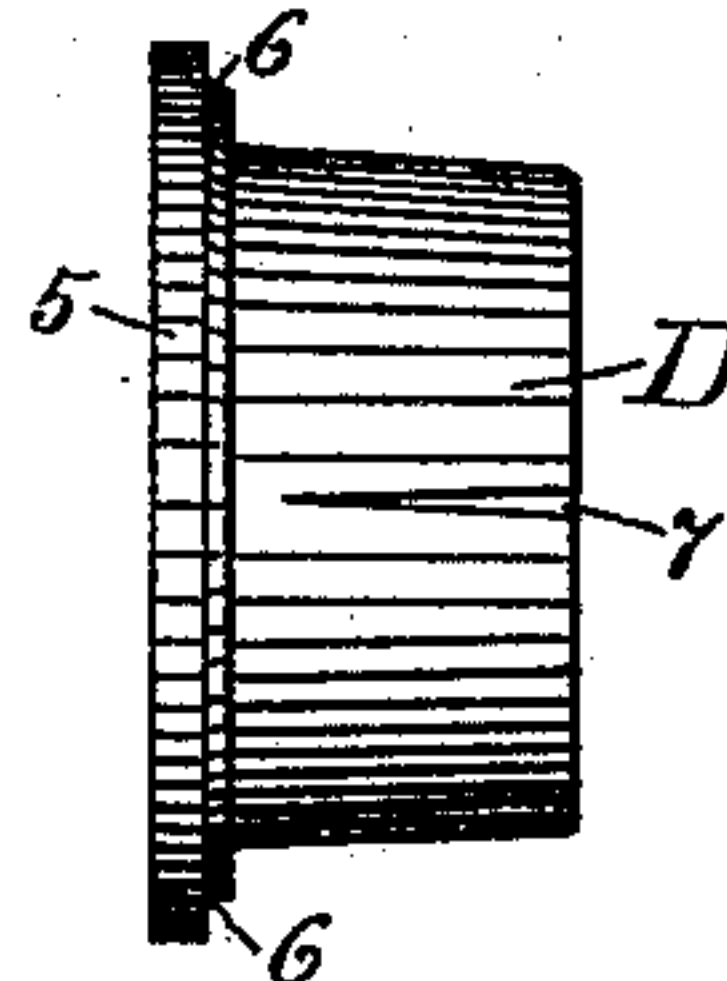
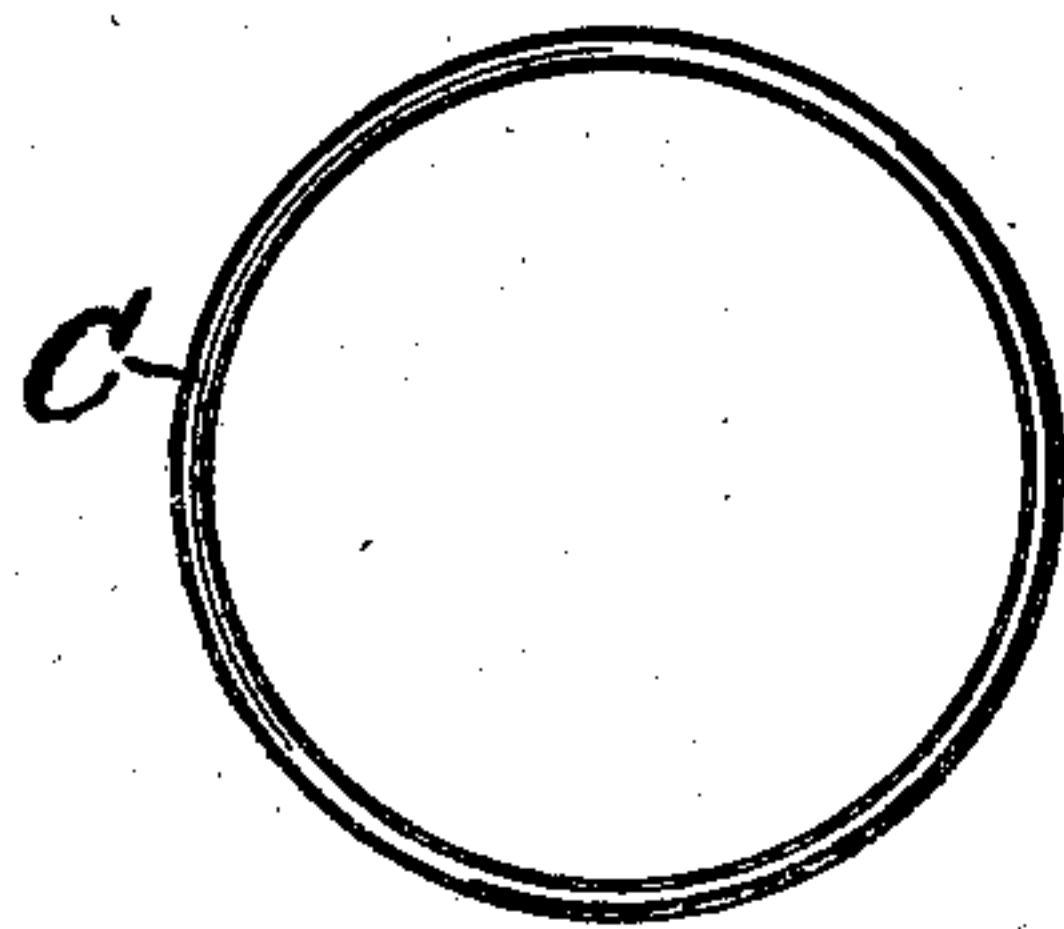


Fig. 4.



Witnesses:

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UNITED STATES PATENT OFFICE.

EDWARD MCGOVERN, OF ALBANY, NEW YORK, ASSIGNOR OF ONE-THIRD
TO JOHN T. McDONOUGH AND MATTHEW J. MANSION, OF SAME PLACE.

BOILER-TUBE FASTENING.

SPECIFICATION forming part of Letters Patent No. 624,367, dated May 2, 1899.

Application filed December 18, 1897. Serial No. 662,418. (No model.)

To all whom it may concern:

Be it known that I, EDWARD MCGOVERN, a citizen of the United States, residing at Albany, in the county of Albany and State of New York, have invented new and useful Improvements for Fastening and Protecting the Ends of Boiler-Tubes, of which the following is a specification.

My invention relates to certain improvements for fastening and protecting the ends of tubes of steam-boilers and analogous structures; and it consists in certain novel features of construction and combination and arrangements of parts, as hereinafter set forth, and pointed out in the claims.

The object of my invention is to provide, with the turned flanged or beaded end portion of a tube which is fastened in a tube-sheet, an internal thimble having an end flange seated in a recess annular to the fastened end of the tube and a soft-metal ring interposed between the flange of the tube and flange of the thimble at the joint of both with the wall of the recess receiving both said flanges, whereby the end portion of the tube may be protected against an excessive heating. I attain this object by the means illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of a portion of a tube-sheet adapted for use with my invention and illustrating the flange end of an internal thimble in part broken away for exposing the underlying parts. Fig. 2 is a vertical section of Fig. 1, taken at line X X. Fig. 3 is a side elevation of the internal thimble, and Fig. 4 is a front view of the soft-metal ring employed in conjunction with the flange or bead of the end of the fastened tube and the flange of the internal thimble.

The same letters and numerals of reference refer to the same parts throughout the several views.

In the drawings, A is the tube-sheet of a boiler or analogous structure, made of any suitable metal and of dimensions, form, and thickness suitable for the purpose of the structure. 1 1 are a series of tube-openings. B is a tube fastened in said tube-sheet.

C is a soft-metal ring, and D is the internal thimble.

The drawings show but one tube B secured and protected by my invention, and as the ends of all the tubes in the series employed in the tube-sheet are secured and protected by like means a description of the means shown to be employed for fastening tube B and protecting its fastened end portion from the action of heat will suffice.

Annular to the tube-opening 1 in the tube-sheet A is the circular recess 2, made with an outer circumference a little greater at its seat 3 than that of the turned end bead 4 of tube B, as shown in Fig. 2. The end of the tube is fastened, by the usual means employed, in the tube-opening 1, with its outer portion extended out past the seat 3 of said recess 2 to such a distance as may be necessary for forming the end bead 4 with an outer circumference a little less than the circumference of the wall of said recess at its seat. The said end bead 4 of tube B may be formed by any of the known means usually employed by the trade.

C is a ring of soft metal and made, preferably, of round wire between one-sixteenth and one-eighth of an inch in diameter, and also preferably of copper, because of its softness and adaptability to be impressed by the harder metal which may impinge on it at several lines in the circle of the same, as shown in Fig. 2. This ring C is of outside diameter corresponding to that of the wall of recess 2 at the end bead 4 of the tube, so as to nicely bear against said wall when in place, as in said Fig. 2.

D is an internal thimble made of thin malleable metal, preferably iron, and having an outer diameter of body in such correspondence with the diameter of the bore of the fastened end portion of tube B as to snugly fit in the same when tight-driven. Integral with said body of this thimble is the outwardly-extended circular flange 5, having its outer diameter about in correspondence with that of the wall of recess 2, so as to nicely fill the same when the thimble has been tight-driven in place in the fastened end of the tube B. This flange may have formed in its lower outer annular corner a seat 6, of small depth, for bearing on the corresponding opposite side portion of the soft-metal ring C, as shown in Fig. 2. The body of this thimble may have

in it one or more slits 7, extended from its inner end edge to any distance preferred as may be considered to be advantageous for allowing the entering end of the thimble to start in its entrance in the bore of the tube. The body of this tube is to be driven tight in the fastened end of tube B, with its flange 5 entering the chamber of the recess *a* annular to both the soft-metal ring C and end bead 4 of the tube until it has bearing on said ring C and has forced said ring to impinge all around in respective bearing-lines tightly against the side wall of the recess and the outer portion of the circular end bead 4 of the tube, so as to make said ring seal in a water and steam tight manner the joint between said bead and recess-wall. When this thimble has been so applied to the end of the tube, with the soft-metal ring C in place between the flange 5 of said thimble and the outer circumferential margin of the end bead 4 of the tube B, as shown in Fig. 2, there will be produced between the said flange and said end bead a small chamber 8. (Shown in said Fig. 2.) This chamber is continuous and annular and operates to prevent heat from the fire, heating the flange 5 of the thimble, heating by convection the portion of the end bead 4 of the tube to a degree as great as that to which the said flange 5 may be heated.

The portion of the tube B may be swaged or expanded against the sides of the tube-opening 2 by process of rolling as practiced by the trade, and the cylindrical body of the internal thimble D may also be roll-swaged in place in the bore of the fastened portion of the tube by the same process, if preferred.

The manner in which these improvements in my invention operate is as follows: The annular recess 2 in the tube-sheet operates to provide by its bottom the seat 3, Fig. 2, which is in situation inward from the plane of the face side of the tube-sheet and on which the flanged bead 4 of the tube is turned hard down. The internal thimble, by its outer flange 5, operates to prevent the flame of the furnace-fire from striking the end bead of the tube, while the body portion of said thimble operates as a shield for protecting the swaged portion of the tube from the action of the excessively hot products of combustion entering the flue. The soft-metal ring C operates to seal the joint of the outer edge margin of the end bead of the tube and wall of the recess receiving the same and the flange of the thimble and makes both water and steam tight, while the annular small chamber 8 between the flange of the thimble and the end bead of the tube operates to stop the direct passage of heat from the flange of the thimble to the beaded end of the tube. These several described elements unitedly operate to keep the end bead and swaged portion of the tube

and the metal of the tube-sheet which is in actual contact with said bead and swaged portion at about the like temperature, so that expansion and contraction of the metal of each will be approximately the same in both, while the flange and body of the thimble, by a greater degree of expansion, make a tight joint between it and both the wall of the recess receiving the flange and the tube-bore receiving the body, and at the same time the ring C is pinched at three lines in its circle of body by the metal of the parts it is in contact with, so as to effectually seal all joints and also cause the annular chamber 8 to occur between the flange of the thimble and the tube for the purposes stated.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination with the tube-sheet having in it a tube-opening and a recess which is annular to said opening and communicating with the same and sunken in said sheet from its face side, and a tube having its end portion of wall expanded tight against the sides of the said tube-opening and its end bead seating tight on the bottom of said annular recess, of an internal thimble having its body portion within the bore of said end portion of the tube and pressed tight against the wall of the same and having its outwardly-extended flange 5 extending to the sides of said annular recess, and the chamber 8 intervening between said flange of said thimble and the end bead of said tube, substantially as and for the purposes set forth.

2. The combination with a tube-sheet having in it the tube-opening 1 and the annular recess 2 made in it from its face side and communicating with said tube-opening, a tube having the wall of its end portion of inside diameter the same as that of its body portion and expanded against the sides of said tube-opening and having its end-turned bead 4 tight on the bottom surface of said recess, and the thimble D having its body portion tight against the inner surface of the wall of said end portion the tube and its flange portion 5 contained within said recess 2 and extending to the sides of the same, of the soft-metal ring C bearing all around against the side of the said recess and arranged between the flange of said thimble and the end bead of the tube, and the annular chamber 8 between said soft-metal ring and the wall of the thimble and between said flange of the thimble and end bead of the tube, all substantially as and for the purposes set forth.

EDWARD MCGOVERN.

Witnesses:

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