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C. D. MARLOWE & H. T. IRVING.

STEAM BOILER.

APPLICATION FILED APR. 4, 1906.

Fig. 1.

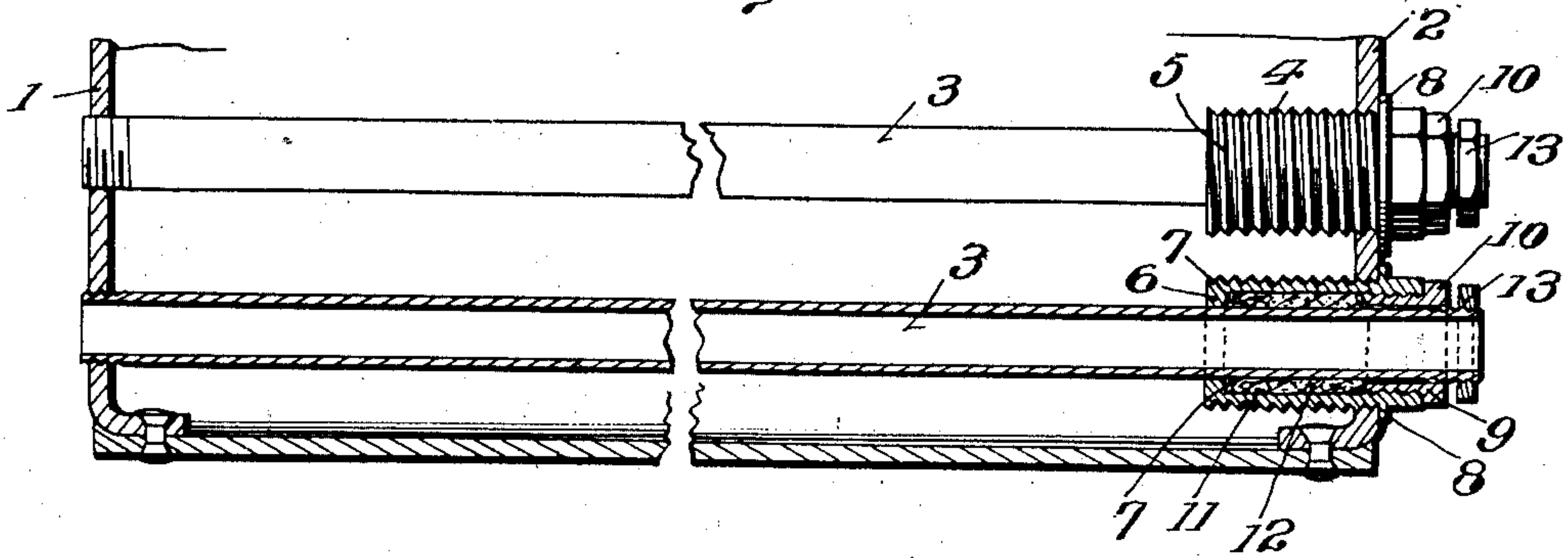


Fig. 2.

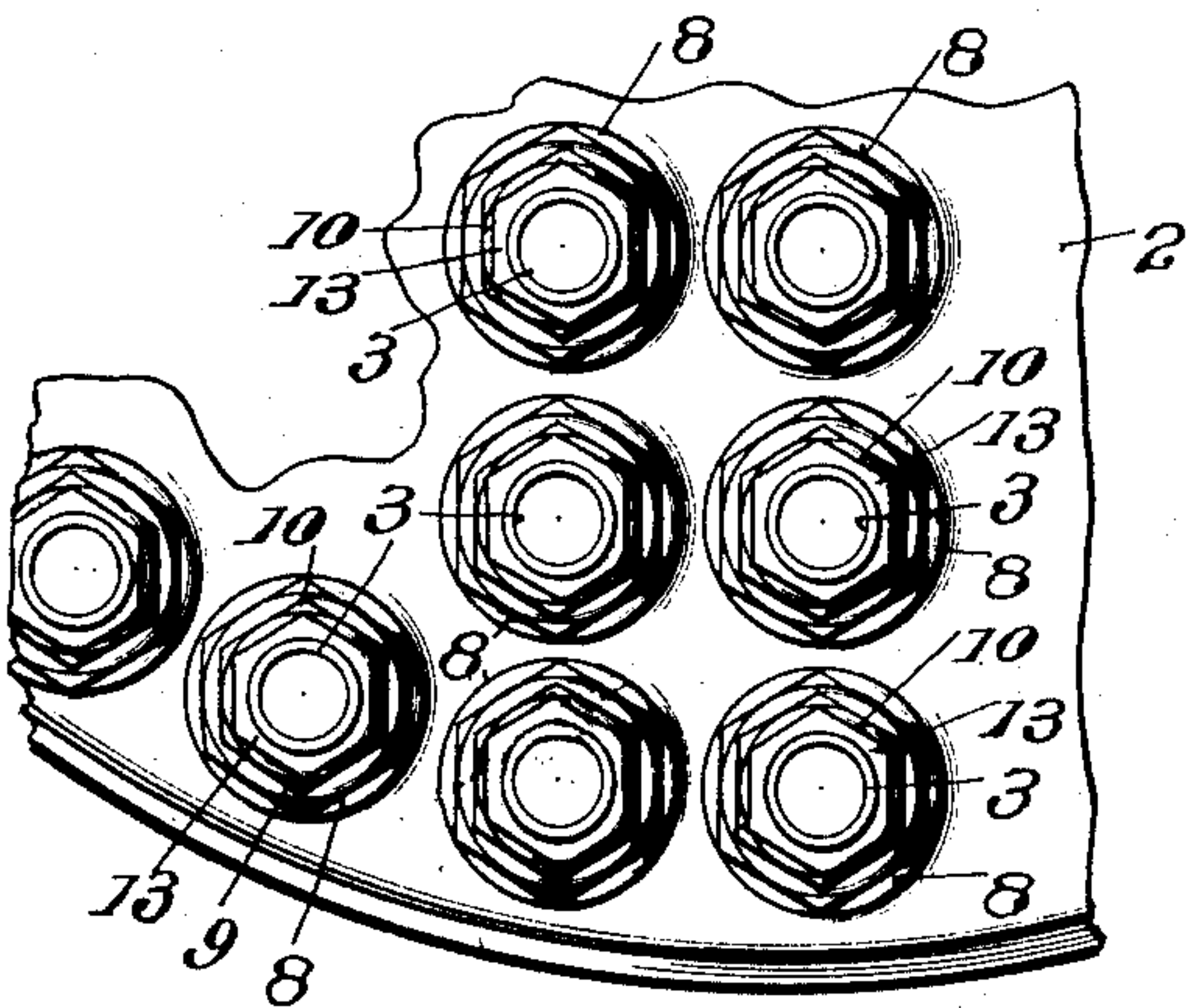
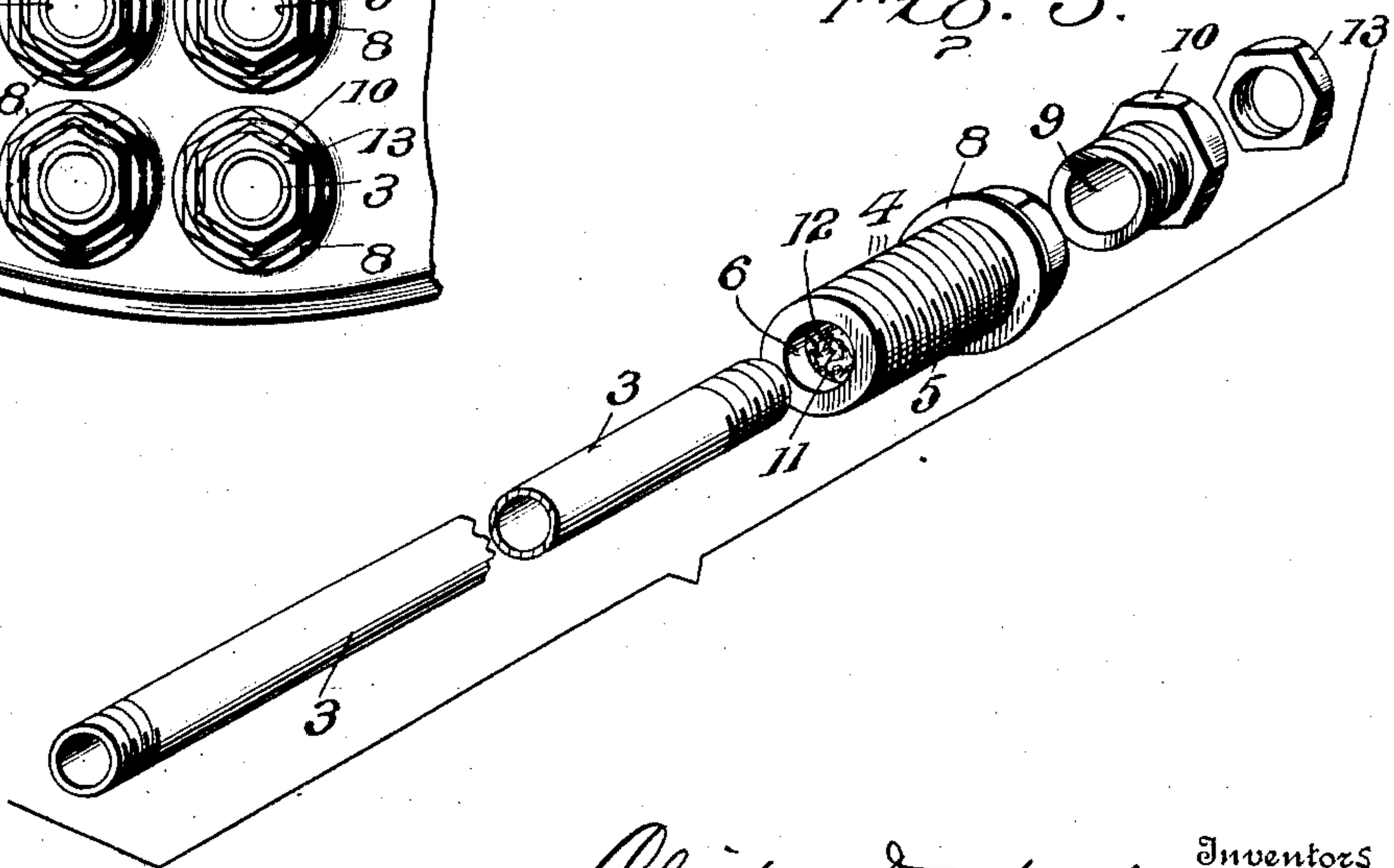


Fig. 3.



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UNITED STATES PATENT OFFICE.

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STEAM-BOILER.

No. 827,027.

Specification of Letters Patent.

Patented July 24, 1906.

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To all whom it may concern:

Be it known that we, CLINTON D. MARLOWE and HARLEY T. IRVING, citizens of the United States, residing at Johnstown, in the county of Cambria and State of Pennsylvania, have invented certain new and useful Improvements in Steam-Boilers, of which the following is a specification, reference being had therein to the accompanying drawings.

Our invention relates to steam-boilers, and more particularly to that class having tubes or flues therein, such as are used on locomotives and the like, one of the objects being to provide means for permitting the expansion of the boiler-tubes, and particularly of the tube-sheet nearest the fire-box, where the intense heat causes the same to materially expand, especially at and near the center, when the boiler is fired up, and to afford means for the corresponding contraction when the fire is withdrawn or permitted to die out.

It is a fact well-known to firemen and engineers that when the fire-box is opened to replenish the fuel the draft created immediately cools the tube-sheets and tubes, causing contraction, and that as soon as the door of the fire-box is closed the sheets and tubes again expand. It is to provide against damage and injury to the boiler by this and other contractions and expansions caused by the heating and cooling of the boiler that our invention is designed, as by its use in tube-boilers substantial provision for material expansion and contraction of tube-sheets and tubes is made, as will be obvious from the construction and operation of parts herein-after in the specification and claims more particularly described.

An additional object of the invention is to provide means which while permitting of expansion and contraction of the tube-sheets and tubes will effectually prevent the discharge or escape of water or steam at the points where the tubes are connected with the tube-sheets.

A still further object is to provide a water and steam tight slidably and adjustably mounted connection or joint between the tube-sheet and the tubes to permit of slight movement of the tube-sheet in contracting or expanding upon the tubes.

Other objects and advantages of our invention, as well as the structural features by

means of which these objects are attained, will be made clear by an examination of the specification, taken in connection with the accompanying drawings, in which the same reference-numerals indicate corresponding portions throughout, and in which—

Figure 1 is a longitudinal sectional view of a portion of a boiler and showing the application of our invention. Fig. 2 is a view of a portion of a flue-sheet with our device in operative position, and Fig. 3 is a detail detached perspective view of the several parts shown in alinement.

1 designates the tube-sheet of a boiler nearest the fire-box, 2 the tube-sheet at the other end of the boiler, and 3 one of the tubes or flues connecting said sheets. Each tube-sheet opening in the tube-sheet 2 is provided with female threads, which are adapted to receive the exterior male threads 4 on a sleeve or thimble 5, having its outer end provided with interior female threads and having its inner end provided with an integrally-formed interior annular projection or rim 6, forming a shoulder 7. The interior circumference of the sleeve or thimble 5 at the point of the integrally-formed annular rim or projection 6 is of a diameter sufficient to fit closely and snugly upon the tube 3, and the outer end of said thimble or sleeve is provided with an annular projecting flange 8, which rests against the outer side of the flue-sheet 2.

9 designates a hollow gland or cap provided with exterior male threads adapted to be received by the female threads in the sleeve 5. This gland or cap has a projecting rim 10 in the shape of a hexagon for the reception of an ordinary nut-wrench whereby it may be screwed into the outer end of the sleeve or thimble 5. The thickness of the threaded portion of said gland is the same as the depth of the annular projecting rim 6, so that when said cap is in place, as shown in Fig. 1, an annular space or recess 11 is left between the interior of the sleeve 5 and the tube 3, which space or recess is provided with any suitable packing 12, such as vulcanized asbestos and the like.

The end of the tube 3 which passes through the sleeve 5, and consequently the tube-sheet 2, is provided with exterior threads for the purpose of receiving a stop-nut 13, which screws thereon.

In order to insert new flues or tubes in old boiler flue-sheets, it may be found necessary to insert a collar in the openings of the flue-sheet 1 corresponding in thickness to the sleeve 5, as will be obvious, for the flues used with our invention must necessarily be somewhat less in circumference than the tube-openings in flue-sheet 2 in order to leave sufficient space for the sleeve or thimble 5.

10 In operation the sleeve or thimble 5 is screwed into the opening through the flue-sheet until the annular flange 8 is brought against the outer edge of said sheet. The tube is then passed through the sleeve, the packing pressed into the recess 13, the gland or cap 9 screwed into position to bear against and press the packing firmly into said recess to completely fill the same, and then the stay-nut 13 is screwed upon the end of said flue, 20 as shown, to a point sufficiently near the outer end of the gland or cap 9 to admit of the necessary expansion of the flue-sheet 1, which will occur after the fire is started in the fire-box and the water in the boiler becomes 25 heated to the desired degree.

It will be observed that the gland or cap may be gradually tightened as the packing in the recess 12 wears away, so that said packing is kept continuously compact to render a 30 perfectly water and steam tight joint.

It is thought that from the foregoing description, taken in connection with the drawings, the construction and operation of our invention will be obvious and further explanation is not deemed necessary. 35

While we have illustrated and described a preferred embodiment of our invention, it is obvious that various modifications of form and arrangement of parts can be made by 40 the skilled operator or mechanic, which modifications and arrangements come well within the scope and spirit of our invention as disclosed and claimed, and we do not, therefore, desire to be limited to the exact construction 45 and arrangement shown.

Having thus described our said invention, what we claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a steam-boiler, the combination, with 50 a tube-sheet and a tube, of a sleeve passing through an opening in the tube-sheet and slidable on the tube, said sleeve having an annular packing-recess closed at one end by an inwardly-projecting annular flange formed 55 integral with the sleeve and surrounding the tube, packing arranged in the recess and surrounding and contacting the tube, a gland removably and adjustably mounted in the other end of the sleeve and adapted to engage and compress the packing, and adjustable 60 means for limiting the travel of the sleeve on the tube.

2. In a steam-boiler, the combination, with a tube-sheet and a tube, of a sleeve adjust- 65 ably mounted in an opening in the sheet and

slidable on the tube, said sleeve having an inwardly-projecting annular flange formed integral with one end thereof and closing one end of a longitudinal annular packing-recess 70 within the sleeve, packing arranged in the recess and adapted to surround and contact the tube, a gland adjustably and removably mounted in one end of the sleeve and adapted to engage and compress the packing, and adjustable means for limiting the travel of 75 the sleeve on the tube.

3. In a steam-boiler, the combination, with a tube-sheet and a tube, of a threaded sleeve passing through an opening in the tube-sheet and slidably mounted on the tube, said sleeve 80 having a longitudinal packing-recess therein, an annular flange formed integral with and adapted to close one end of the sleeve around the tube, packing arranged in the recess and adapted to surround and contact the tube, a 85 screw-gland adapted to close the other end of the sleeve and to engage and compress the packing, and adjustable means for limiting the travel of the sleeve on the tube.

4. In a steam-boiler, the combination, with 90 a tube-sheet and a tube, of a threaded sleeve slidably mounted on the tube, said sleeve having an annular packing-recess therein, packing within the recess, a screw-gland adapted to screw into the sleeve and gradu- 95 ally compress the packing, and a stay-nut on the end of the tube.

5. In a steam-boiler, the combination, with a tube-sheet and a tube, of a threaded sleeve adapted to screw into a tube-opening in the 100 sheet, said sleeve having an annular rim reducing the circumference of one end thereof, a screw-gland screwing into the other end of the sleeve leaving a packing-space between the rim and the gland, means for limiting the 105 travel of the gland into the sleeve, and a stay-nut adapted to screw onto the end of the tube and engage the gland.

6. The combination, with a boiler tube-sheet and a tube, of an exteriorly-threaded 110 sleeve encircling the tube and adapted to screw into an opening in the sheet, said sleeve having a packing-recess therein, packing in the recess, means for closing one end of the sleeve to retain the packing, and means 115 for closing the other end of the sleeve and compressing the packing.

7. The combination, with a boiler tube-sheet and a tube, of an exteriorly-threaded sleeve encircling the tube and adapted to 120 screw into a threaded opening in the sheet, said sleeve having a packing-space therein, means for closing one end of the recess, and a screw-gland adapted to engage threads in the interior of the sleeve and limit the space. 125

8. The combination, with a boiler tube-sheet and a tube, of an exteriorly-threaded sleeve encircling the tube and adapted to 130 screw into an opening in the sheet, said sleeve having a packing-recess therein, pack-

ing in the recess, means for closing one end of the sleeve to retain the packing, means for closing the other end of the sleeve and compressing the packing, and a stay-nut screwed on the end of the tube and adapted to limit the expansion of the sheet.

9. In a steam-boiler, the combination, with a tube-sheet and a tube, of a threaded sleeve adapted to screw into the sheet and receive the tube, said sleeve having a packing-recess therein, packing arranged in the recess, means for closing one end of the sleeve, and a screw-gland adapted to screw into the other end of the sleeve and compress the packing.

10. In a steam-boiler, the combination, with a tube-sheet and a tube, of a threaded sleeve adapted to screw into the sheet and receive the tube, said sleeve having a packing-recess therein, packing arranged in the recess, means for closing one end of the sleeve, a screw-gland adapted to screw into the other end of the sleeve and compress the packing, and a stay-nut adapted to screw on the end of the tube to limit expansion of the sheet.

11. In a steam-boiler, the combination, with a tube-sheet and a tube, of a threaded sleeve slidably mounted on the tube and adapted to screw into the tube-opening in the sheet and receive the tube, said sleeve having a packing-recess therein, packing arranged in the recess, means for closing one end of the recess, a screw-gland adapted to screw into the sleeve

and compress the packing, and means for limiting the travel of the sleeve on the tube.

12. In a steam-boiler, the combination, with a tube-sheet and a tube, of a sleeve removably and adjustably mounted in an opening in the tube-sheet and slidably mounted on the tube, said sleeve having an annular recess therein adapted to receive packing, means for closing one end of the recess, a gland adapted to screw into one end of the sleeve and close one end of the recess, and a stay-nut on the end of the tube and adapted to limit the travel of the sleeve on the tube.

13. In a steam-boiler, the combination, with a tube-sheet and a tube, of a threaded sleeve slidably mounted on the tube and removably and adjustably mounted in an opening in the tube-sheet, said sleeve having an annular recess therein, packing in the recess, means for closing one end of the recess, a screw-gland adapted to screw into the sleeve and close the other end of the recess and compress the packing, and a stay-nut adjustably mounted on the end of the tube.

In testimony whereof we hereunto affix our signatures in presence of two witnesses.

CLINTON D. MARLOWE.
HARLEY T. IRVING.

Witnesses:

L. LANGWORTHY,
DAISY L. LOVELESS.