

(No Model.)

E. W. TUCKER.
BOILER TUBE PLUG.

No. 397,450.

Patented Feb. 5, 1889.

Fig. 1.

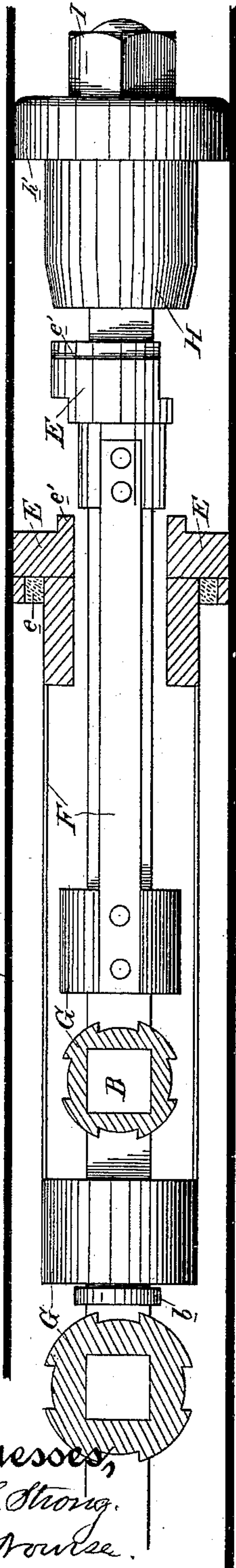


Fig. 4.

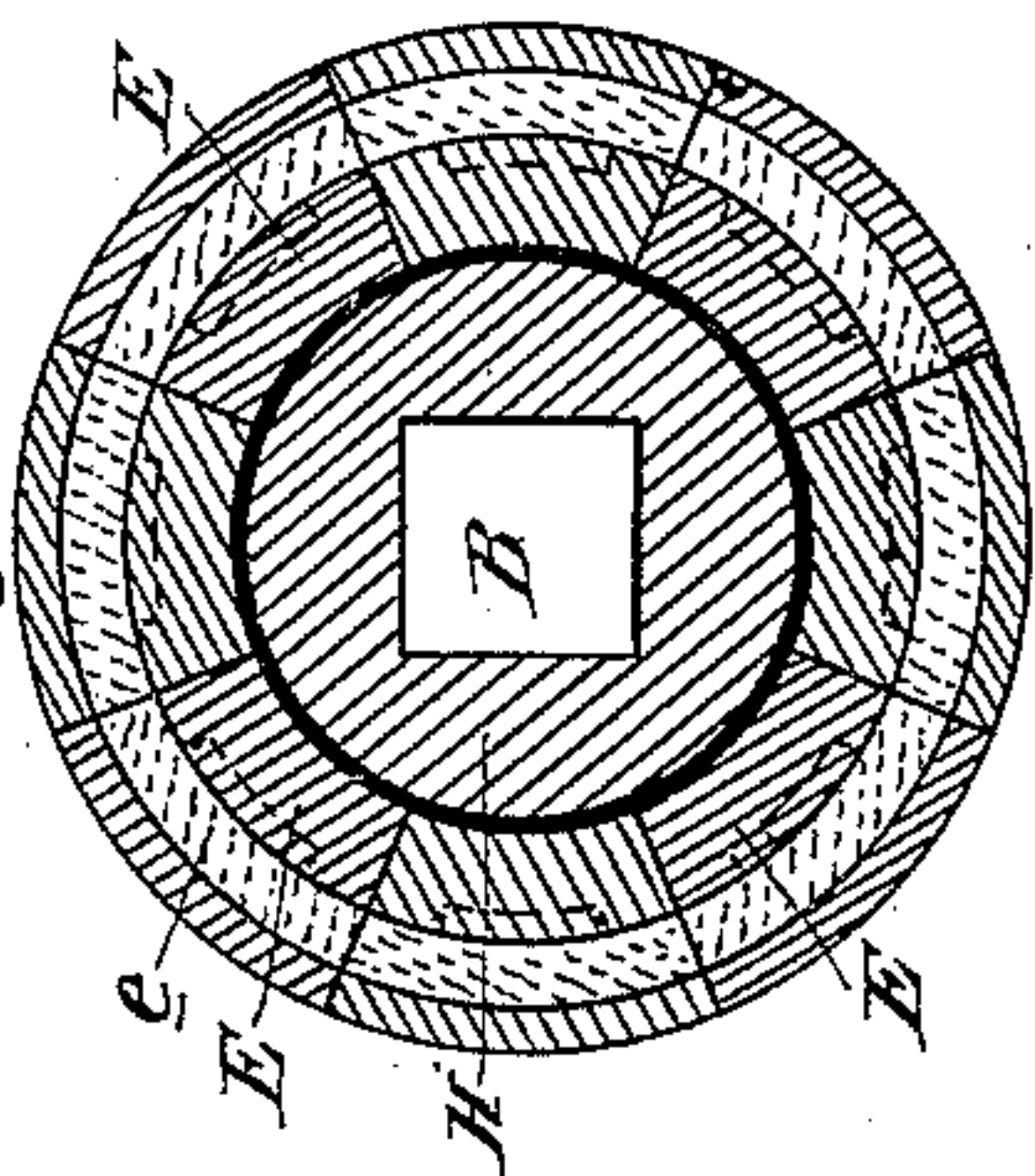


Fig. 5.

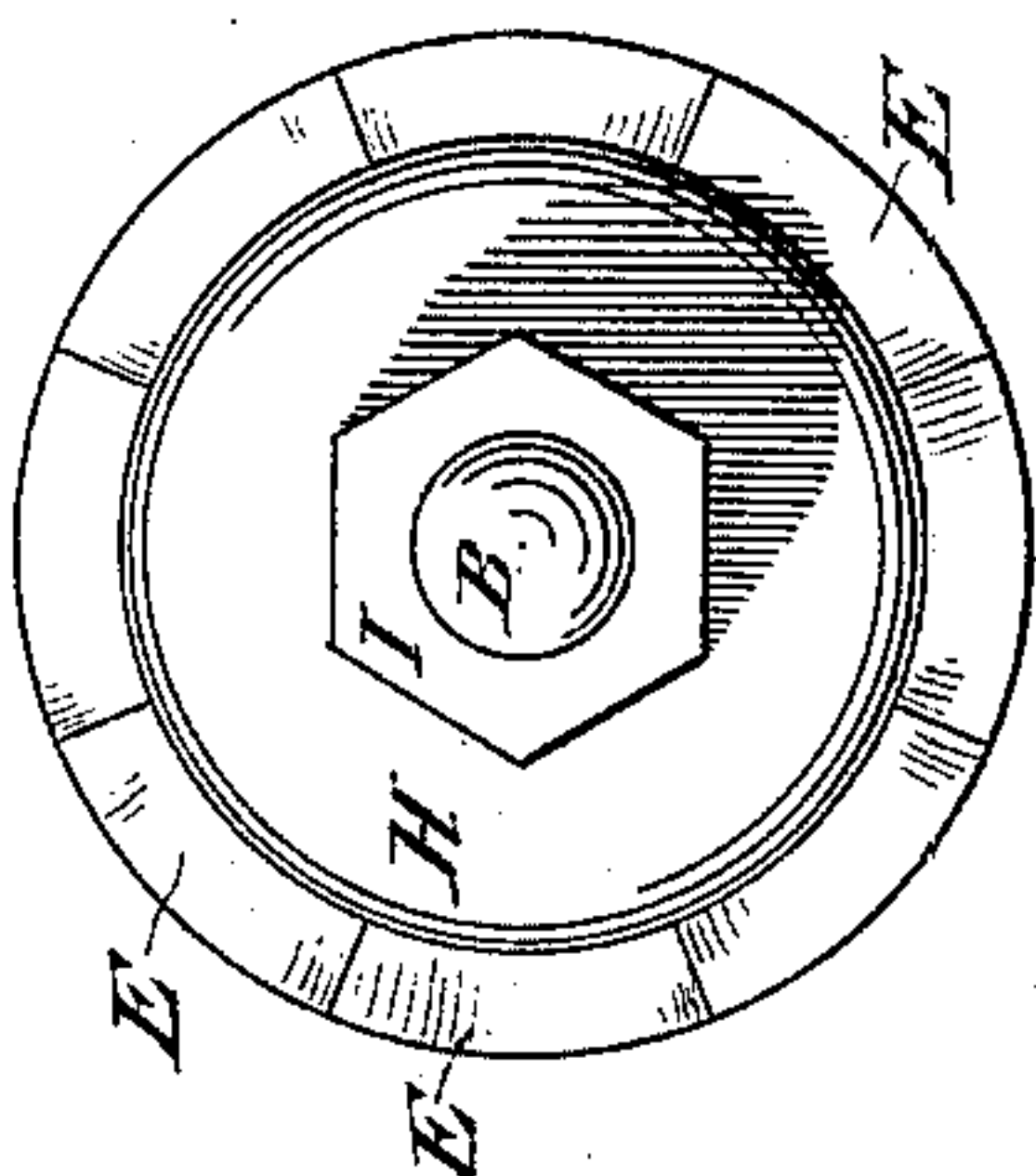


Fig. 2.

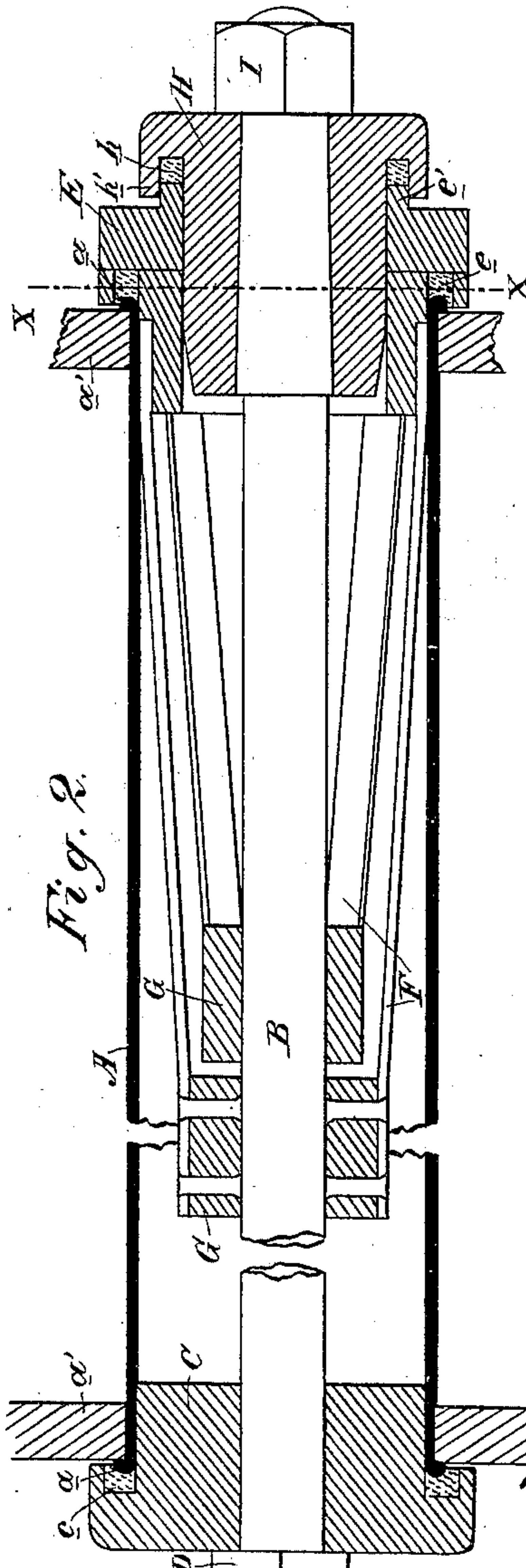
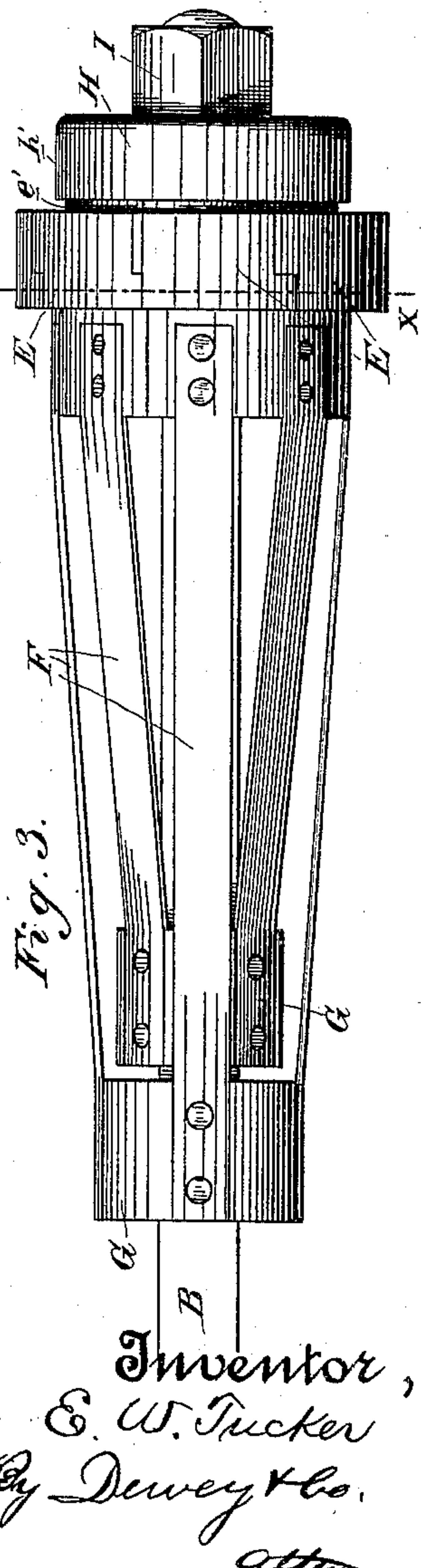


Fig. 3.



Witnesses,
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UNITED STATES PATENT OFFICE.

EDWIN W. TUCKER, OF SAN FRANCISCO, CALIFORNIA.

BOILER-TUBE PLUG.

SPECIFICATION forming part of Letters Patent No. 397,450, dated February 5, 1889.

Application filed March 26, 1887. Renewed July 17, 1888. Serial No. 280,240. (No model.)

To all whom it may concern:

Be it known that I, EDWIN W. TUCKER, of the city and county of San Francisco, State of California, have invented an Improvement in Boiler-Tube Plugs; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to the class of plugs or stoppers which are used for closing up leaky boiler-tubes; and my invention consists, essentially, in a sectional plug adapted to be contracted to a diameter sufficient to enable it to be passed through the tube from the front to the rear end, said plug expanding again upon emerging from the rear end of the tube and encircling and covering its bead.

My invention consists, also, of the novel expansible plug hereinafter described, and consisting of the sectional ring carried by spring-arms and the core fitting in said ring and holding it to place, the rod for carrying the expansible plug, and the nuts for tightening it up, all of which, together with certain details of construction, I shall herein- after fully describe.

When a boiler-tube becomes leaky from any cause, it is essential that it immediately be plugged up. This is usually done by drawing the fires of the boiler, to enable a man to pass into the combustion-chamber at the inner end of the tubes and there to place upon the rod which is passed through the tube from the front end a plug and nut similar to those which have already been placed upon the front end of the rod, so that by turning up the front nut both plugs may be drawn together tightly upon the end beads of the tube. The disadvantages of this mode of operation lie in the waste of time necessary for the boiler to cool after the drawing of the fires, the disuse of the boiler during this time, and the danger to the operator, and these have led to many attempts to plug the tube entirely from the front. In some instances plugs in the form of ordinary interior stoppers have been passed through to the rear end of the tube and held in that position and wholly within the tube by means of a rod; and in one case an expansible washer or packing has been employed, which could be pressed partially to cover the inner end of the tube.

It is the object of my invention to provide

a plug which can be passed through the tube from the front end and pushed entirely through, so that upon emerging from the rear end of the tube it can be fitted to place and cover the inner bead of the tube in substantially the same manner as the ordinary plug covers it at the front end. This I accomplish by means of the expansible plug, which I shall now proceed to describe, reference being made to the accompanying drawings, in which—

Figure 1 is a longitudinal section of the tube, showing my expansible plug in the course of its passage, the sliding hubs in this figure being also shown in cross-section. Fig. 2 is a longitudinal section of the tube, showing the plugs at the ends in place. Fig. 3 is a side elevation of my expansible plug. Fig. 4 is a cross-section on line X X, Figs. 2 and 3. Fig. 5 is an end elevation of the plug.

A is a boiler-tube, and *a* are its beads, which overlap the tube-sheets *a'* at each end.

B is a rod by which the plugs are carried and placed.

C is a common plug for the rear end of the tube, said plug having an annular washer, *c*, which bears upon the bead of the tube, the plug being closely tightened to the tube-sheet by means of the nut D. The expansible plug which constitutes my invention has for one part an annular band or ring made of sectors or sections E, which are wholly independent of one another, and are each provided with a groove which forms a continuous annular channel, in which is inserted the packing *e*, as shown. To these sections are secured spring-arms F, the rear ends of which are riveted to the heads or hubs G G, fitted and adapted to slide upon the rod B, which is made for a certain distance square in cross-section, as is shown in Fig. 1. I have two of these hubs or heads—one in advance of the other—each hub having secured to it alternate spring-arms of alternate sections E. The object of this is to enable me to push forward, out of the circle of the others, some of the sections when the plug is being passed through the tube, as is shown in Fig. 1, thereby providing for the proper contraction of the annular band or ring formed by the sections, and its expansion to the proper diameter upon emerging from the tube, so that the sections when expanded lie close together, as is shown

in Fig. 4. This could not be the case if in passing through the tube the sections maintained the same circle by being all attached to the same head, for in that case when expanded they would be separated from each other. A fixed collar, *b*, on the rod B prevents the spring-arm-carrying hub from moving back as the plug is being pushed through the tube. The remaining part of the expansible plug is the tapering core H, in which is made a channel or groove for the packing *h* and a lip, *h'*, which, when in position, as shown in Fig. 2, fits over a tongue, *e'*, on the forward end of the sectors or sections E of the annular band or ring. This core is fitted on the rod B, and before it, on said rod, is threaded a nut, I.

The operation of my plug is as follows: The end of the rod is inserted in the forward end of the tube and pushed along, so that the core H enters the tube first, followed by the forward sections, E, of the ring, which are themselves followed by the rear sections of said ring, as is shown in Fig. 1, said sections being mounted upon spring-arms enabling them to contract so as to pass easily through the tube. The rod is pushed in far enough until all the sections of the ring have emerged from the inner end of the tube, whereupon they spring outwardly or expand.

The rod is now drawn back until the core enters the forward sections of the ring and its lip fits over the tongue *e'* of said sections, whereby they are forced back into their places adjacent to the rear sections, and the lip of the core then overlaps the tongues of the rear sections, thus embracing the sections of the entire ring, said core fitting within and closing up said ring, making a tight joint by means of its packing. The forward nut, D, is now tightened up, whereby the forward plug, C, is tightened to its place against the forward bead of the tube, and the core H is drawn in, tightening all the sections of the ring against the inner bead of the tube, making a tight joint by means of the packing *e* in the annular groove of said ring. It will thus be seen that the entire operation is performed from the forward end of the tube, thus avoiding the necessity of drawing the fires and sending a man into the combustion-chamber.

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

1. A boiler-tube plug comprising an expansible and contractible ring or band composed of independent sections connected with independent spring-arms adapted to pass through the tube and to expand upon emerging from its inner end and embrace and cover the bead of said tube, and a core fitting within said ring and holding it to place, substantially as herein described.

2. A boiler-tube plug comprising a sectional ring or band, spring-arms attached to sliding hubs and carrying and supporting each sec-

tion, whereby the ring is contractible while passing through the tube and expansible upon emerging from its end, and a core fitting within the ring or band and holding it to place, substantially as herein described.

3. In a boiler-tube plug, the combination of a rod for passing through the tube, a sectional ring or band connected with spring-arms and adapted to be contracted as it passes through the tube and to be expanded upon emerging from its end to cover the bead of said tube, and a core carried upon said rod and fitting within the ring or band and holding it to place, said core having a lip engaging tongues on the sections, substantially as herein described.

4. In a boiler-tube plug, the combination of a rod for passing through the tube, a sectional ring or band, spring-arms carrying the sections of said ring or band, whereby it is contractible or expansible, a sliding hub on the rod and to which said arms are secured, and a core on the rod for fitting within the ring or band and holding it to its place against the end of the tube, substantially as herein described.

5. In a boiler-tube plug, the combination of a rod for passing through the tube, a ring or band formed of independent sections, and spring-arms for carrying and supporting said sections, independent sliding hubs on said rod, to each of which some of the spring-arms are secured, whereby the ring or band formed by said sections may be broken and contracted to pass through the tube and expanded to a perfect circle upon emerging at the inner end, whereby the bead of said inner end is covered, and a core on said rod for fitting within the ring or band and holding it to place, substantially as herein described.

6. In a boiler-tube plug, the combination of a rod for passing through the tube, a ring or band formed of independent sections, and spring-arms for carrying and supporting said sections, independent sliding hubs on said rod, to each of which some of the spring-arms are secured, whereby the ring or band formed by said sections may be broken and contracted to pass through the tube and expanded to a perfect circle upon emerging at the inner end, whereby the bead of said inner end is covered, a core on said rod for fitting within the ring or band and holding it to place, a plug on the forward end of the rod for closing the forward end of the tube, and a nut on each end of the rod for tightening up the plugs, substantially as herein described.

7. In a boiler-tube plug, the combination of a rod passing through the tube, a plug with packing upon the forward end of said rod, and a nut for tightening said plug against the forward bead of the tube, a ring or band with packing and composed of independent sections, spring-arms carrying and supporting said sections, and independent hubs sliding on the rod and to which the spring-arms

are secured, whereby the plug may be contracted as it passes through the tube and expanded upon emerging therefrom to fit its packing over and against the inner bead of
5 the tube, a core with packing carried by the rod and adapted to fit within the ring and press its packing against its forward edge, and a nut on the inner end of the rod for tightening up the core, all arranged and

adapted to operate substantially as herein described. 10

In witness whereof I have hereunto set my hand.

EDWIN W. TUCKER.

Witnesses:

S. H. NOURSE,
H. C. LEE.