(No Model.) 2 Sheets—Sheet 1.

J. WATSON.

BOILER TUBE EXPANDER AND STOPPER.

No. 519,143. Patented May 1, 1894.

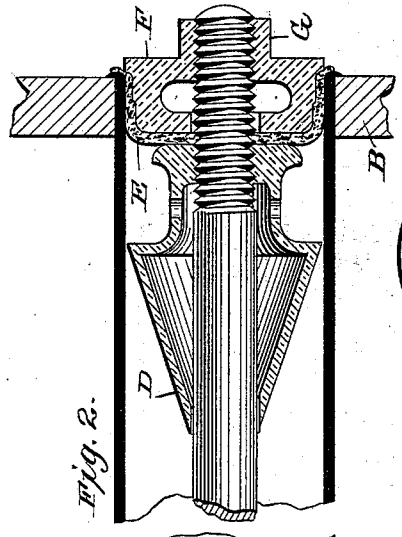

Fig. 2.

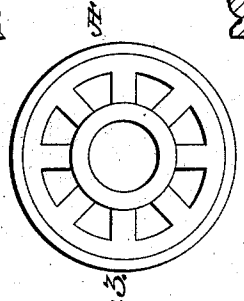

Fig. 3.

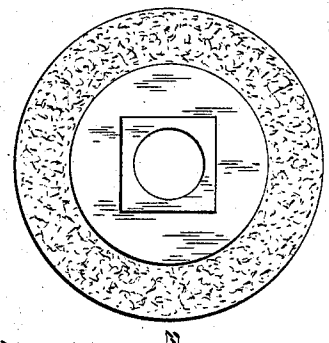

Fig. 4.

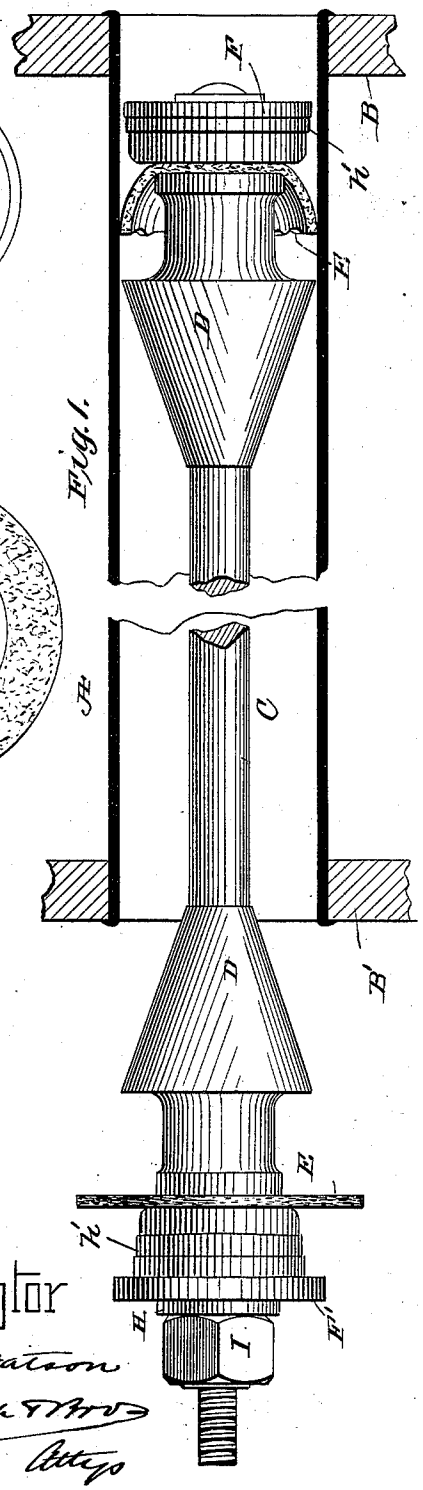

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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BOILER TUBE EXPANDER AND STOPPER.

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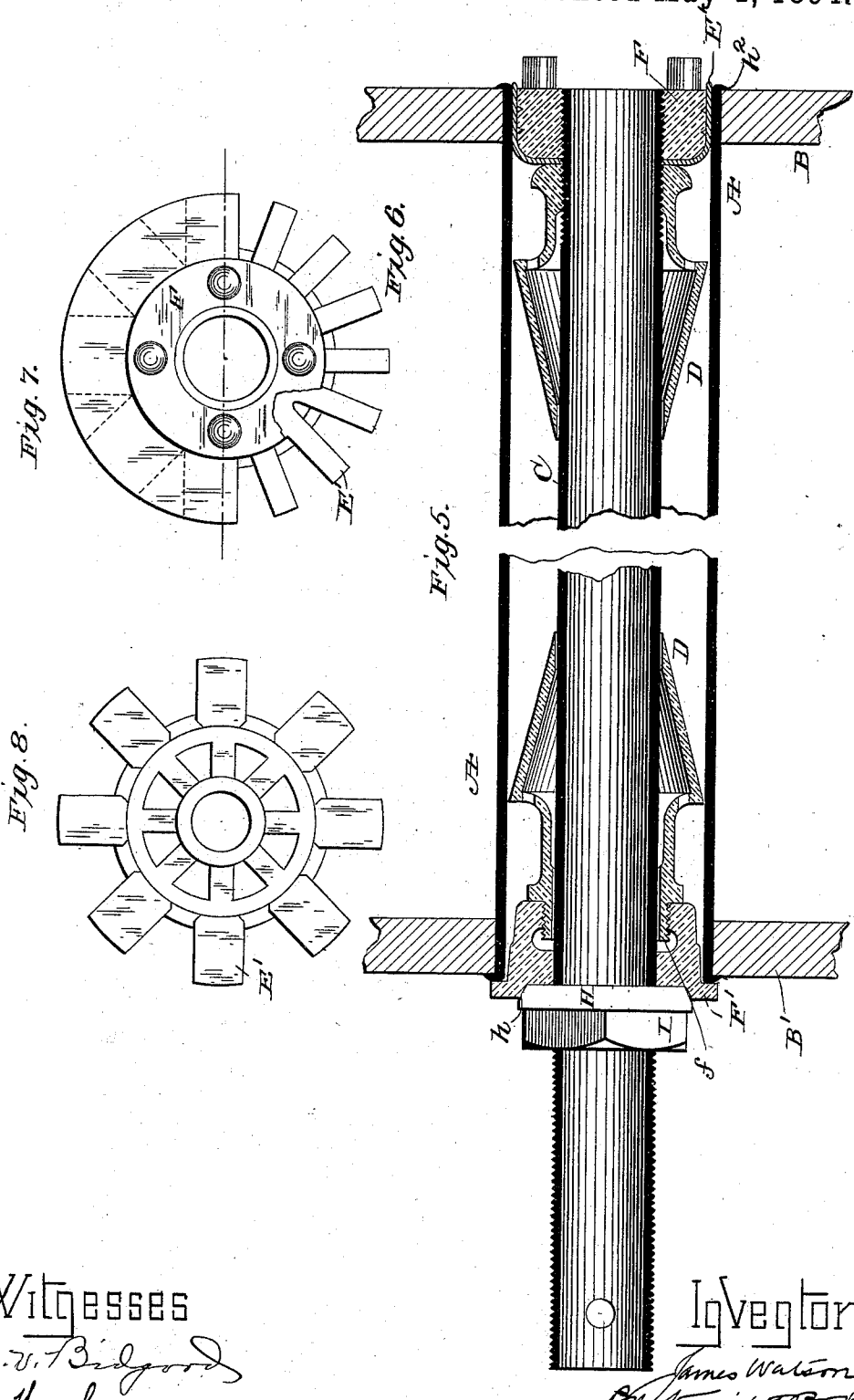

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UNITED STATES PATENT OFFICE.

JAMES WATSON, OF LIVERPOOL, ENGLAND.

BOILER-TUBE EXPANDER AND STOPPER.

SPECIFICATION forming part of Letters Patent No. 519,143, dated May 1, 1894.

Application filed February 28, 1893. Serial No. 464,140. (No model.) Patented in England January 26, 1892, No. 1,515.

To all whom it may concern:

Be it known that I, JAMES WATSON, engineer, a subject of the Queen of Great Britain, residing at 2 Tancred Road, Stanley Park, Liverpool, in the county of Lancaster, in the Kingdom of England, have invented certain new and useful Improvements in Boiler-Tube Expanders and Stoppers, (for which I have received Letters Patent in England, No. 1,515, dated January 26, 1892,) of which the following is a specification.

This invention has for its object an improved apparatus for stopping leaks in boiler tubes.

The invention will be understood from the following description, reference being had to the accompanying drawings, in which—

Figure 1 is a section partly in elevation showing the apparatus partly pushed through the boiler tube. Fig. 2 is a section showing the apparatus fixed in position in the tube. Fig. 3 is a view of the open expanding plug with rod and connections withdrawn. Fig. 4 is a view of close plug with ring of woven asbestus. Fig. 5 is a section of the apparatus with a hollow tube rod applied instead of a solid one. Fig. 6 is a half elevation of expanding device for hollow rod. Fig. 7 is a half elevation of plug and asbestus ring for hollow rod; and Fig. 8 is a face view of expanding device for solid rod.

If the leak should occur, say in the middle of the boiler tube, the apparatus shown in Figs. 1 and 2 may be used.

In the figures—A, is the boiler tube; B B′ the tube plates at the back and front of the boiler respectively; C, the tube rod screwed at the ends; and D, guides. These latter may be mounted so as to slide loosely on the rod C, and coupled together by a screwed union or the like, or one may be screwed and the other loose on the rod as shown.

E are pieces of insertion of any suitable flexible material, such as rings of woven asbestus, as shown in said Figs. 1, 2, 4 and 7 or flexible metal as shown in the other figures. These insertions E are passed tight over the screwed ends of the rod C, and plugs F, F′, screwed tightly thereon, are adapted to secure the insertions on the end of the guides D. The back plugs F have a projection G to receive a spanner for screwing up purposes, while the front plug F′ is screwed on to a sleeve *f*, forming part of the front guide D.

H is a lead washer, and *h* a recess formed in the front plug to receive it. This washer, when the nut I is screwed tight against it, spreads out and fills up the thread in the rod preventing leakage in that direction.

The mode of action is as follows: The tube rod with its attachments is passed from the front of the boiler into the leaky tube A, causing the insertion E at the foremost end of the rod C to fold itself round the head of the guide D while passing through the tube (Fig. 1). When, however, the back plug F and guide D, together with the insertion at one end of the rod, have passed right through the tube, the insertion spreads out, and, when the nut I at the front of the boiler is screwed up, the insertion E at each end is forced or drawn simultaneously into the tube somewhat in the form of a cup leather by means of the plugs, the said insertions folding themselves round the plugs, and completely stopping the tube, as depicted in Fig. 2. They are held fast by the projections or steps *h′*. When leakage takes place at the end or ends of the tube, say, at the point h^2, Fig. 5, where the tube passes through the tube plate, the woven asbestus insertion rings are replaced by insertion E of thin flexible or springy metal (Figs. 5, 6 and 8) and the plugs F formed with through holes if desired as shown in Figs. 3 and 8. The mode of action is similar to the foregoing. The nut I at the front of the boiler is screwed up, the plugs draw the plates E′ tightly against the tubes, expanding the latter and stopping the leak. A washer of asbestus may be inserted, if desired, between the plates or springs E′ and the guides D. If the leak be at one end only of the tube, the rod C can be unscrewed from the plug after use and withdrawn together with the guides, leaving the plug in the back end of the tube held firmly by the metallic plates or springs. Any number of plugs can thus be put in, making use of the same rod for all the tubes. In such case, a strong washer can be used in place of the plug F′, Fig. 5, if desired. The same plugs can be used over and over again, the aforesaid guides and rod being used as a ram to force out the plug.

I do not limit myself to the shape of the

metal insertion depicted in Figs. 6 and 8, as an insertion of any suitable shape may be used. The guides D may be hollowed out, and the center filled with asbestus dust or any other suitable material. The pressure from the leaking tube forces the material through suitable holes in the guide D and fills up any small leakage which might remain.

The advantage of making the tube C hollow, is that the heating surface of the boiler tube is then not entirely lost, as the heated gases can pass through the tube, which thus becomes a temporary boiler tube.

I declare that what I claim is—

1. The combination of the operating rod C, having a screw threaded inner end, the inner guide D, formed with a head having a screw thread connecting it with the inner end of the rod, the inner plug F, formed with a stepped periphery h', an angular projection G, and a screw thread connecting it with the inner end of the rod, a flexible insertion E of sufficient diameter to overlap the stepped periphery of the plug, secured between the guide and the plug the outer guide, and the outer plug; substantially as described.

2. The combination of the operating rod C, having a screw threaded outer end, the outer guide D, formed with a head having a sleeve f, provided with a screw-thread, the outer plug F′ formed with a stepped periphery h', a recess h and a screw thread connecting it with the sleeve, a flexible insertion E, adapted to overlap the stepped periphery of the plug, secured on the sleeve between the head and the plug, the lead washer H located in the recess of the plug, a securing nut I the inner guide and the inner plug; substantially as described.

3. The combination of the operating rod, the inner guide D, provided with a head having screw threaded connection with the rod, the inner plug F, having screw threaded connection with the rod, the piece of flexible material E secured between the head and the plug, and adapted to overlap the latter, the outer guide D provided with a head sliding upon the rod, the outer plug F′ having a recess h and screw-threaded connection with the head of the outer guide, a washer H located in the recess, and a securing nut I working on the rod and bearing against the washer; substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES WATSON.

Witnesses:
G. C. DYMOND,
H. P. SHOOBRIDGE.