R. J. ELLIS.

Tubular Fire Bars and Connecting-Bearings.

No. 145,995. Patented Dec. 30, 1873.

FIGURE.1.

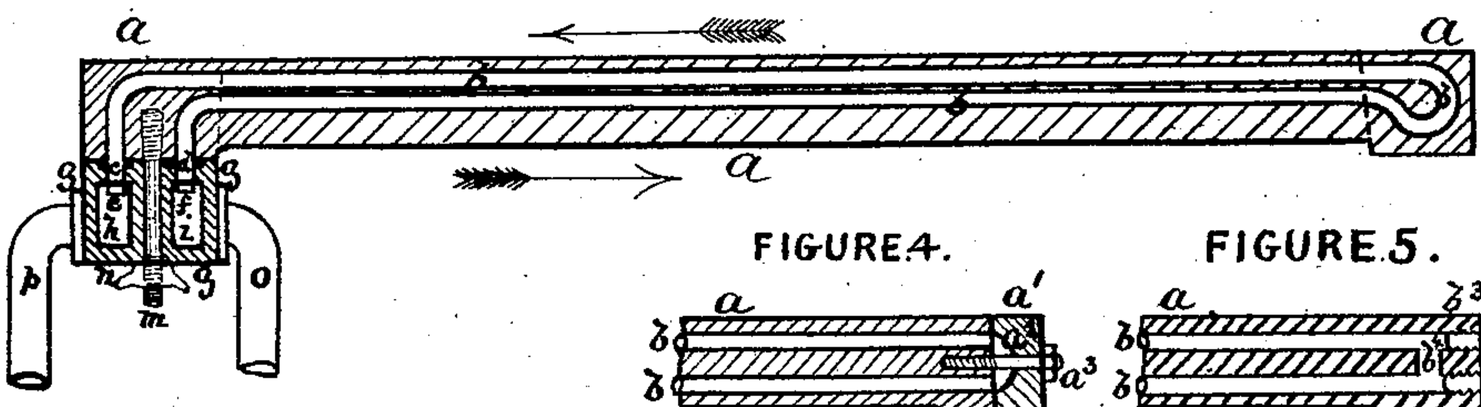


FIGURE.4.

FIGURE.5.

FIGURE.2.

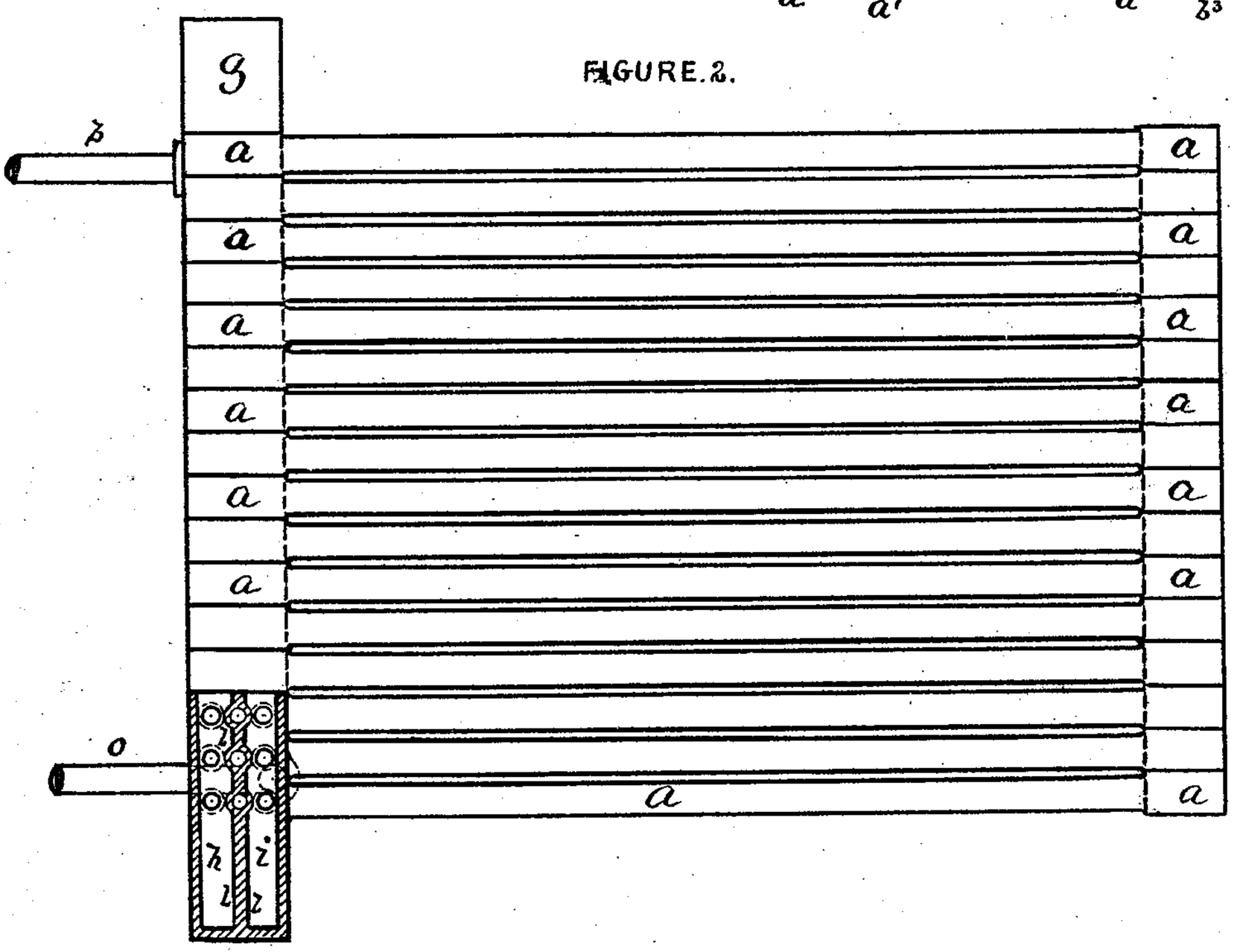
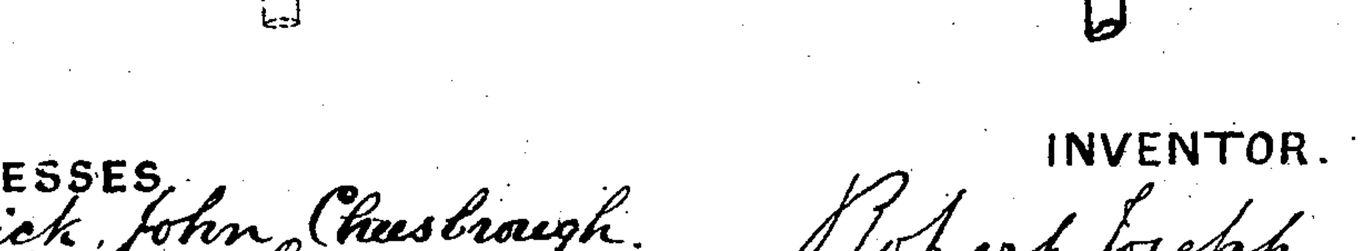


FIGURE.3.



WITNESSES.
Frederick John Chesbrough.
John Hamilton Redmond.

INVENTOR.
Robert Joseph Ellis

UNITED STATES PATENT OFFICE.

ROBERT J. ELLIS, OF LIVERPOOL, ENGLAND.

IMPROVEMENT IN TUBULAR FIRE-BARS AND CONNECTING-BEARINGS.

Specification forming part of Letters Patent No. **145,995**, dated December 30, 1873; application filed September 10, 1873.

To all whom it may concern:

Be it known that I, ROBERT JOSEPH ELLIS, of Liverpool, in the county of Lancaster, in that part of the United Kingdom of Great Britain and Ireland called England, have invented an Improved Tubular Fire-Bar and Connecting-Bearer; and I do hereby declare the following to be a full, true, and exact description thereof, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon.

Like letters and figures denote similar parts.

My invention is contained in the object represented in the accompanying drawings, of which—

Figure 1 is a sectional side elevation; Fig. 2, a plan; Fig. 3, an end elevation; and Figs. 4 and 5 are modifications shown in section.

Upon reference, it will be seen that *a* is a cast-metal fire-bar, in which is cast, molded, or embedded a steel or iron tube, *b*, the tube opening out at the front under side of the bar *a* with two nipples, *c d*. These nipples take into openings *e f* in a front bearer, *g*, which bearer is divided into two passages, *h i*, by a diaphragm, *l*. The nipples *c d* are provided with india-rubber, or other suitable packing-rings, to form a tight joint at *e* and *f*. The bar *a* is held in position to the bearer *g* by a screw-stud, *m*, and nut *n*; *o*, feed-pipe; *p*, a delivery-pipe.

Referring to Fig. 4, it will be seen that the modification represented consists in cutting off the end of the bar *a* at a^1, and coring it out at a^2, the tube *b* passing through the bar *a*, the object being that the end a^1 may be removed by undoing the screw a^3, and the tube *b* can then be scraped and cleaned, if requisite.

Referring to Fig. 5, it will be seen that the modification represented consists in coring a hole from the tube *b*, through the casting at b^3, and connecting the tube *b* by a core, b^4. The cored holes b^3 are stopped by the removable plugs b^5, which plugs can be removed for cleaning purposes.

The functions of my improved tubular fire-bar and connecting-bearer may be thus stated: The water flows through pipe *o* into the division *h* of the bearer *g*, and from thence through the nipples *d* of each fire-bar, passing through the tube *b* in the direction of the arrows, Fig. 1, and returning, through the nipples *c*, into the division *i* of the bearer *g*, and from thence through the pipe *p*, or vice versa; the water, being heated by its passage through the fire-bar, is then fed into the boiler.

The main advantages attendant upon this my invention may be thus enumerated: First, there is a complete water circulation in the fire-bar; second, the water being injected and returned at one end only, into and from the front bearer, and from thence into the boiler, accidents by expansion and contraction are impossible; third, the feed-water, by being forced through the bar via the front bearer to the boiler, becomes so hot that feed-heaters and economizers are rendered superfluous; fourth, in no case can the bar be of greater temperature than the boiler when in work, and consequently there is less wear and tear by the use of firing-tools; fifth, the bars being, by external appearance, like the ordinary solid bar, they can consequently be adopted without additional expense, where that bar has been used, and are suitable for marine or land boilers, or in reverberatory furnaces, for iron-puddling, glass-making, general chemical-manufacturing, in evaporating or brewing pans, or, in fact, in all places or situations where fuel is consumed by the aid of a fire-bar.

Having now fully described the nature, object, and purposes of my invention, and how the same is to be carried into practical effect, I wish it to be clearly understood that I disclaim all water fire-bars and bearers now in use; but

What I claim as my invention, and for which I seek Letters Patent, is—

The tubular fire-bar and connecting-bearing, constructed, respectively, as herein described, and arranged in relation to each other as set forth, for the purpose specified.

In witness whereof I, the said ROBERT JOSEPH ELLIS, have hereunto set my hand and seal this 8th day of August, 1873.

ROBERT JOSEPH ELLIS. [L. S.]

Witnesses:

FREDERICK JOHN CHEESBROUGH,

JOHN HAMILTON REDMOND,

Both of 15 *Water Street, Liverpool, England.*