F. R. ELLIS.

EXPANSION-JOINT FOR TUBULAR WATER FIRE BARS.

No. 191,325. Patented May 29, 1877.

FIG 1.

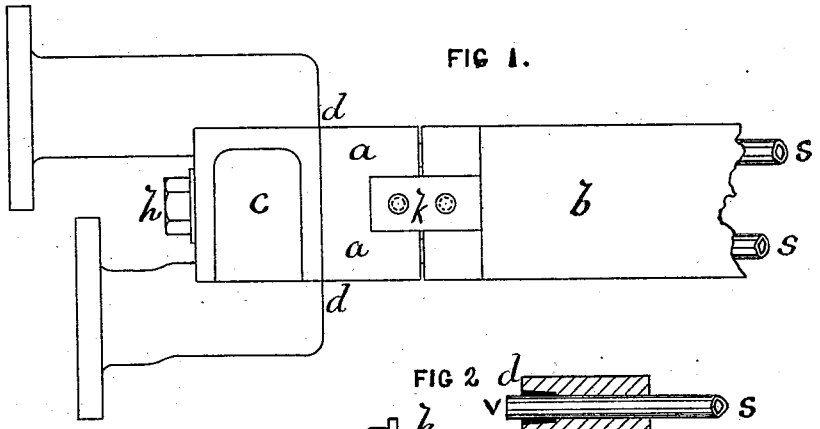


FIG 2

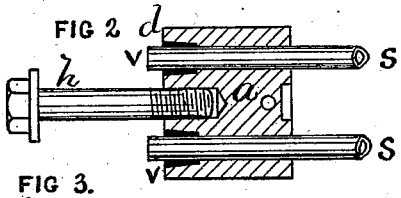


FIG 3.

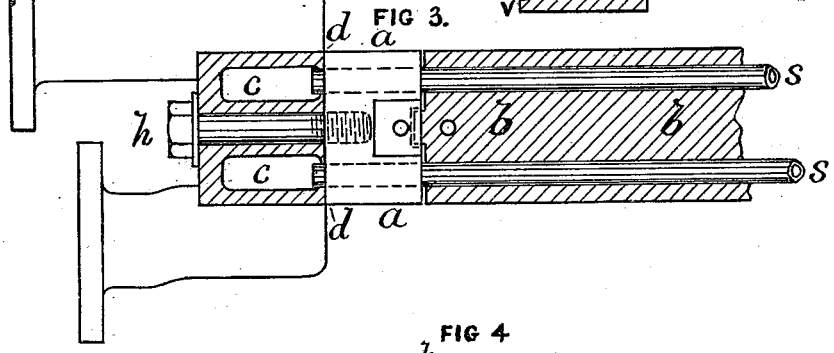


FIG 4

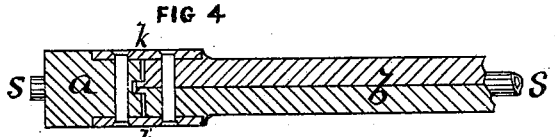


FIG 6.

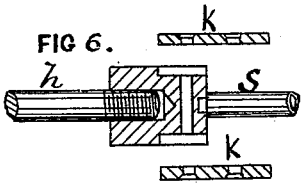


FIG 5

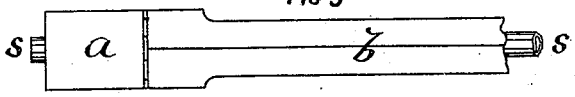


FIG 7.

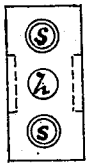


FIG 8

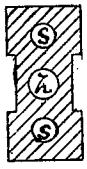


FIG 9

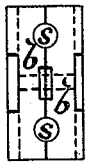
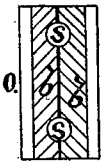


FIG 10.



WITNESSES.

Frederick John Chesbrough

Allen Hamilton Redmond

INVENTOR.

Frederick Robert Ellis.

UNITED STATES PATENT OFFICE.

FREDERICK ROBERT ELLIS, OF LIVERPOOL, ASSIGNOR TO GEORGE HAWORTH, OF ST. MICHAEL'S HAMLET, ENGLAND.

IMPROVEMENT IN EXPANSION-JOINTS FOR TUBULAR WATER FIRE-BARS.

Specification forming part of Letters Patent No. **191,325**, dated May 29, 1877; application filed August 11, 1876.

To all whom it may concern:

Be it known that I, FREDERICK ROBERT ELLIS, of Liverpool, in the county of Lancaster, in that part of the United Kingdom of Great Britain and Ireland called England, have invented a new and valuable Improved Expansion-Joint for Tubular Water Fire-Bars; and I do hereby declare the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed sheet of drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

Like letters represent like parts.

Figure 1 is a side elevation of a portion of a tubular water fire-bar and bearer with my improved expansion-joint applied thereto. Fig. 2 is a section of my improved expansion-joint piece or link. Fig. 3 is a side elevation of a portion of a tubular water fire-bar and bearer in section, with my improved expansion-joint applied thereto. Fig. 4 is a part sectional plan of Fig. 3. Fig. 5 is a part outside plan of Fig. 3. Fig. 6 is a sectional plan of my improved expansion-joint piece or link. Fig. 7 is an end view of my improved expansion joint or link; Fig. 8, a sectional end view of my improved expansion joint or link. Fig. 9 is an outside end view of a tubular water fire-bar. Fig. 10 is an end section of a tubular water fire-bar.

My invention consists in the introduction of the link-piece *a* between the fire-bar *b* and the bearer *c*, so as to form an expansion-joint, and compensate for the contraction and expansion and inequalities of the fire-bar *b* in relation to the front bearer *c*.

In applying my improved link-piece, the side *d* is faced so as to make joint with the bearer *c*. The link-piece *a* is held to the bearer *c* by the bolt *h*.

The fire-bar *b* and link-piece *a* are secured together by the fish-plates *k*. The ends of the tube *s* are provided with copper ferrules *v*, to make joint in the link-piece *a*. (See Fig. 2.)

By the use of my expansion-joint or link-piece the joint at *d* between the link *a* and the bearer *c* can be made, and will always remain, sound and tight, and will not be affected by the expansion or contraction of the bar *b*, nor by any irregular strain caused by bringing the face of the bar *b* to the face of the bearer *c*, which is the great defect in tubular water fire-bars now constructed.

Having now described the construction and operation of my invention, I beg to state that I disclaim all other expansion-joints now in use; but

What I claim as my invention is as follows:

The intervening link *a*, combined with and located between the end of the grate-bar and the water head or bearer *c*, by which the joint between the pipes *s s* and the water-head at *d* is prevented from breaking by the expansion or warping of the bar.

In witness whereof I, the said FREDERICK ROBERT ELLIS, have hereunto set my hand and seal this ninth day of June, one thousand eight hundred and seventy-six.

FREDERICK ROBERT ELLIS. [L. S.]

Witnesses:

FREDERICK JOHN CHEESBROUGH,
JOHN HAMILTON REDMOND,
Both of 15 *Water Street, Liverpool, England.*