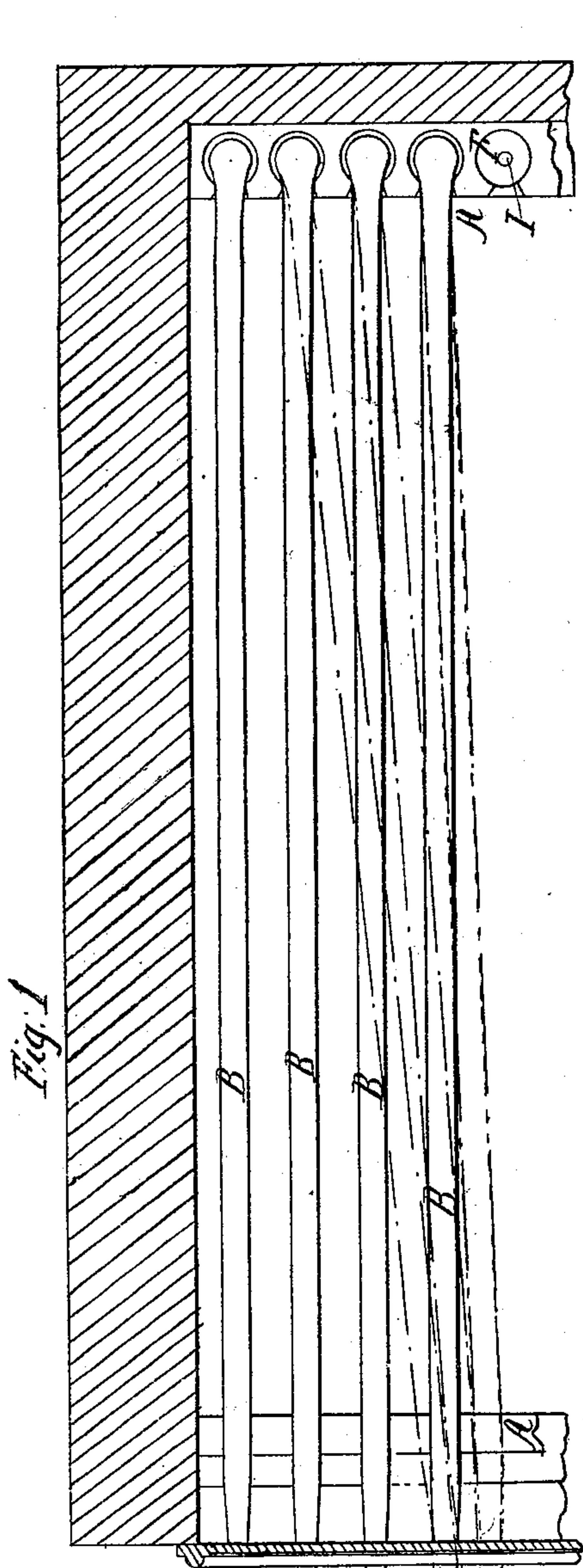


J. McDonald,

Furnace-Grate Bar.

N^o 42,099.

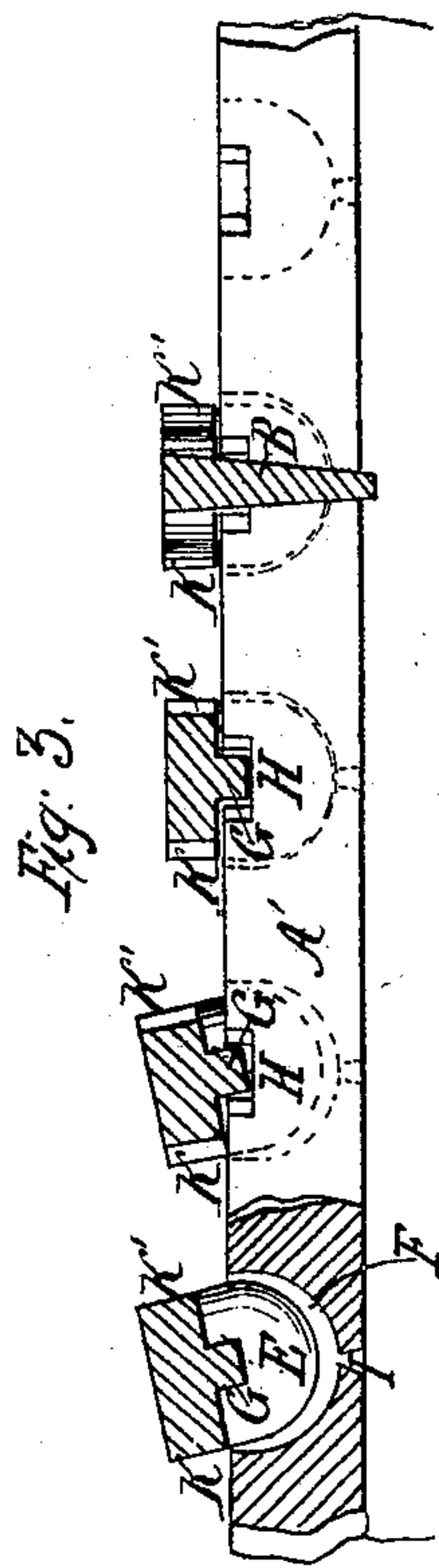
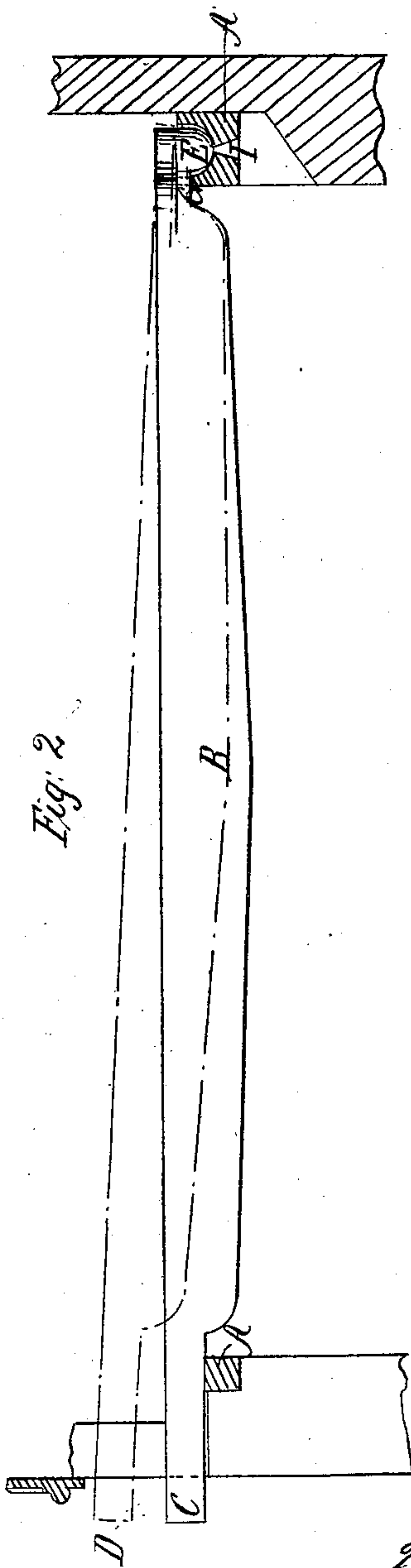
Patented Mar. 29, 1864.



Witnesses;

Charles L. Fisher

Am Curme



Inventor

J. McDonald
per Knight Bros
Attys

UNITED STATES PATENT OFFICE.

JAMES McDONALD, OF CINCINNATI, OHIO.

IMPROVEMENT IN GRATE-BARS.

Specification forming part of Letters Patent No. 42,099, dated March 29, 1864.

To all whom it may concern:

Be it known that I, JAMES McDONALD, of Cincinnati, Hamilton county, Ohio, have invented a new and useful Improvement in Furnace-Grate Bars; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

This invention is an improvement on the movable grate-bar for steam-boiler furnaces, the same being adapted for more effective and varied agitation than devices heretofore employed for this purpose.

Figure 1 is a plan of a portion of a grate, illustrating my invention. Fig. 2 is a longitudinal section thereof. Fig. 3 is an enlarged transverse section taken at different parts of the bars.

A A' represent, respectively, the front and the back bearing-bars.

The grate-bars B terminate at their front ends in handles C, which protrude through an opening, D, in the furnace-front, while their rear ends are provided with hemispherical projections or balls E, which occupy corresponding sockets F in the rear bearing-bar A', so as to form universal joints.

When in place, the shoulders K K' of each

grate-bar rest upon the top of the rear in placing the hemispherical projection upon the bearing-bar and the sockets in the grate bars.

I do not claim, broadly, mounting the rear ends of grate-bars on joints so that the front ends may be capable of independent motion, as I am aware that Letters Patent were granted to B. C. Vandugen for a grate in which the forward ends of the bars may be moved laterally, but without any capacity for being either rocked or raised.

I claim herein as new and of my invention—

1. Connecting the bars of a furnace-grate to the rear bearing by universal joints E F, which enable the bars to be agitated in three several modes or directions, as set forth.

2. The provision on a universal jointed grate-bar of shoulders K K' and fillet G, in the described combination with the jog H in the bearing-bar, for retaining such grate-bars firmly in position when at rest, as herein explained.

In testimony of which invention I hereunto set my hand.

JAMES McDONALD.

Witnesses:

GEO. H. KNIGHT,
JONATHAN CREAGER.