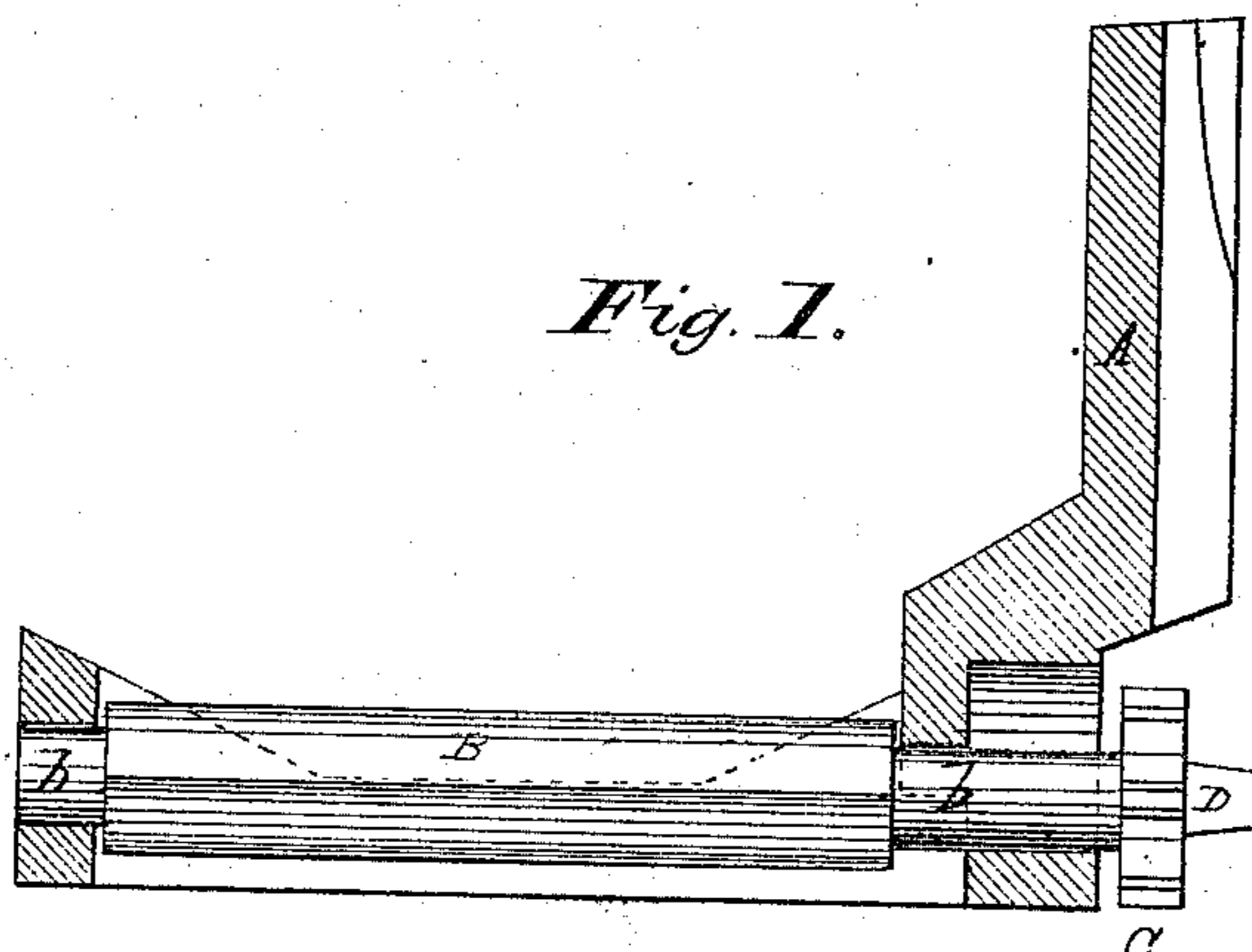


J. T. MARSHALL.  
Furnace Grate-Bar.

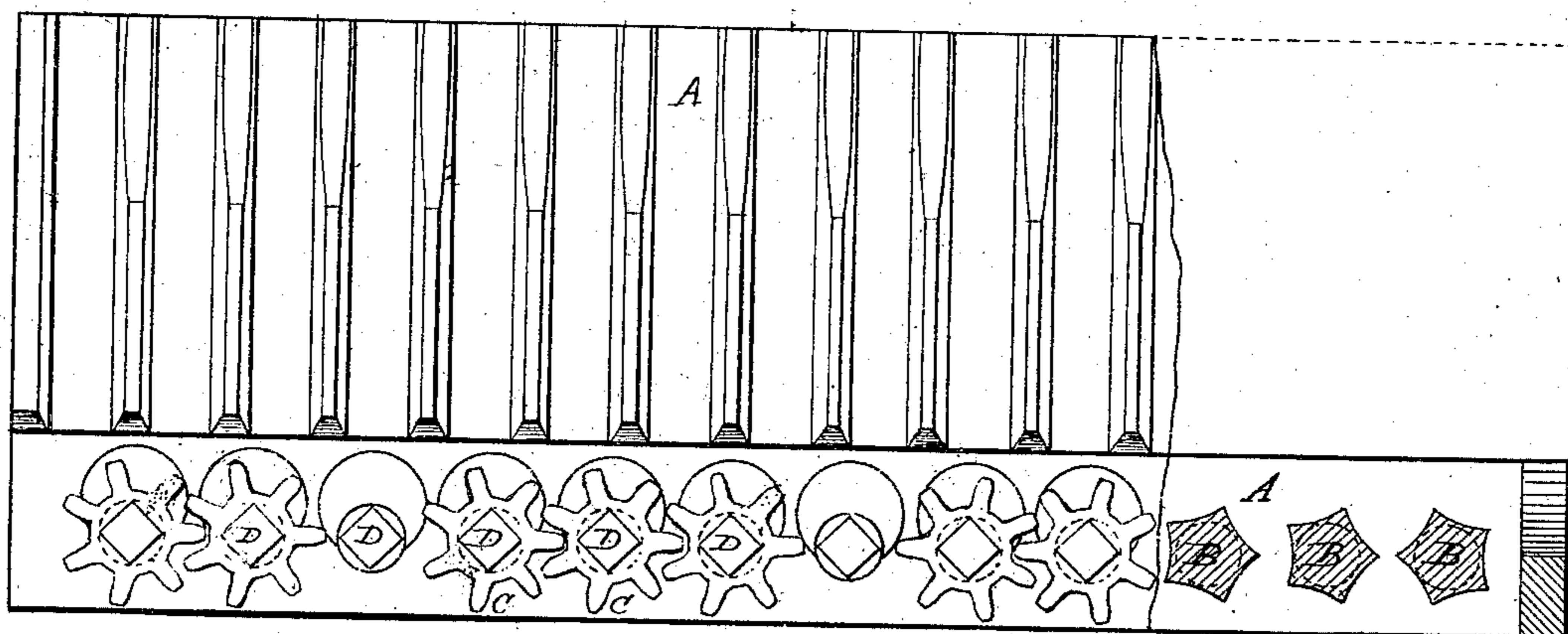
No. 111,223.

Patented Jan. 24, 1871.

*Fig. 1.*



*Fig. 2.*



Witnesses:

C. T. Class  
C. H. Fisher

Inventor:  
Joseph T. Marshall.

# United States Patent Office.

JOSEPH T. MARSHALL, OF WILMINGTON, DELAWARE.

Letters Patent No. 111,223, dated January 24, 1871.

## IMPROVEMENT IN GRATE-BARS.

The Schedule referred to in these Letters Patent and making part of the same.

Be it known that I, JOSEPH T. MARSHALL, have invented a certain new and useful Improvement in Grate-Bars, which I verily believe was never before known or used prior to my invention thereof.

The nature of my invention consists in grate-bars made and constructed for the purpose—

First, of equalizing the draught by means of removing readily and easily all impediments, such as cinders and clinkers.

Second, of economizing both in labor and in the consumption of coal, burning the coal more thoroughly, and being more easily raked down by means of a crank or lever.

In the accompanying drawing—

Figure 1 represents a cross-section of my improved grate.

Figure 2 is a front elevation, partly in section.

In the drawing—

A represents a frame in which the grate-bars are journaled at the front and back end, as shown at *b b*.

The grate-bars are of a pentagonal form, and the sides of the pentagon are concave. The bars are put in in such manner that the edge of one bar will always be in the center of the concave of the other bar, thereby thoroughly clearing each other, and allowing no refuse or ashes or clinkers to lodge and remain between them, thereby obstructing the draught.

Upon the front ends of the bars, on the outside of the frame, I arrange the gear or cog-wheels *O O*, when, by applying a proper crank on the square ends *D D* of the bars, they may be revolved partly or wholly, agitating the fire, as desired. By means of the gear-

ing they may be operated simultaneously, or, if preferred, the gear-wheels may be left off alternately, and the bars thus work in pairs.

In case any one of the bars becomes worn or burnt out, it may be removed and replaced by a new one, the rest of the bars still remaining intact.

Instead of being pentagonal the bars may be of any number of sides, the same being concave, always insuring the object of my invention, viz: that the point or edge of one bar shall come opposite to and cut out of the concave side of the next bar any residuum, such as clinkers, &c., thus leaving no possible chance for my grate to clog, and always producing a good draught.

Having thus described my invention,

What I claim as new, and desire to secure by Letters Patent, is—

1. A series of revolving grate-bars, with any number of concave sides, constructed for the purposes herein shown and set forth.

2. The combination of the frame *A* with the pentagonal or many-sided concave bars *B*, geared by wheels *O* and ends *D*, all constructed and arranged substantially as herein shown, and for the purposes set forth.

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

JOSEPH T. MARSHALL.

Witnesses:

CHAS. G. FISHER,  
JACOB W. SATTERTHWAIT.