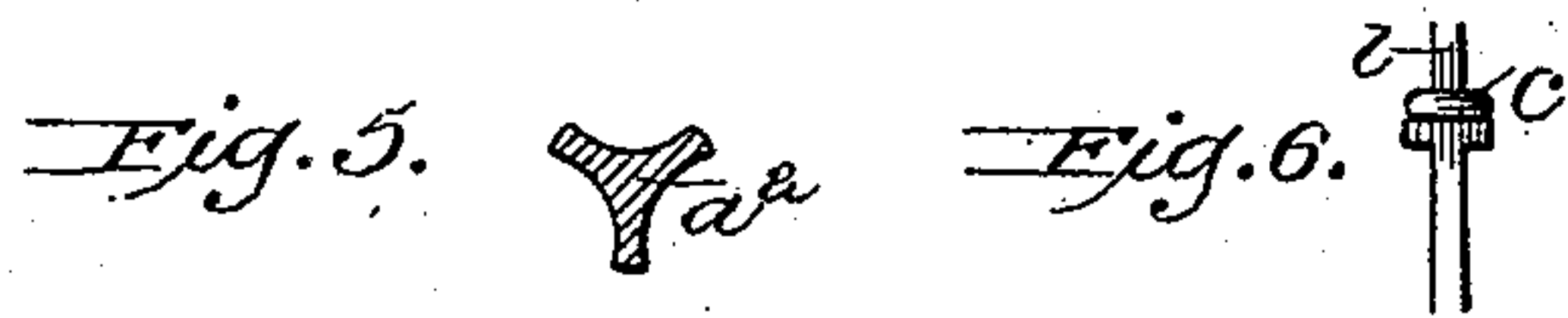
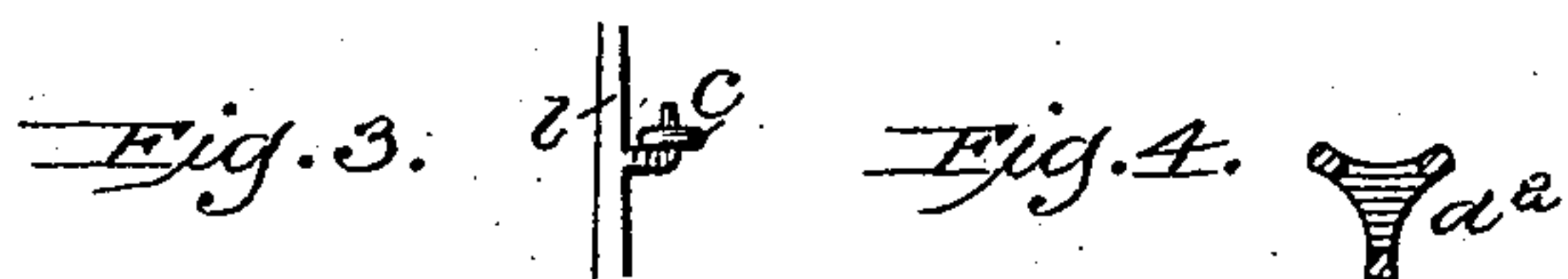
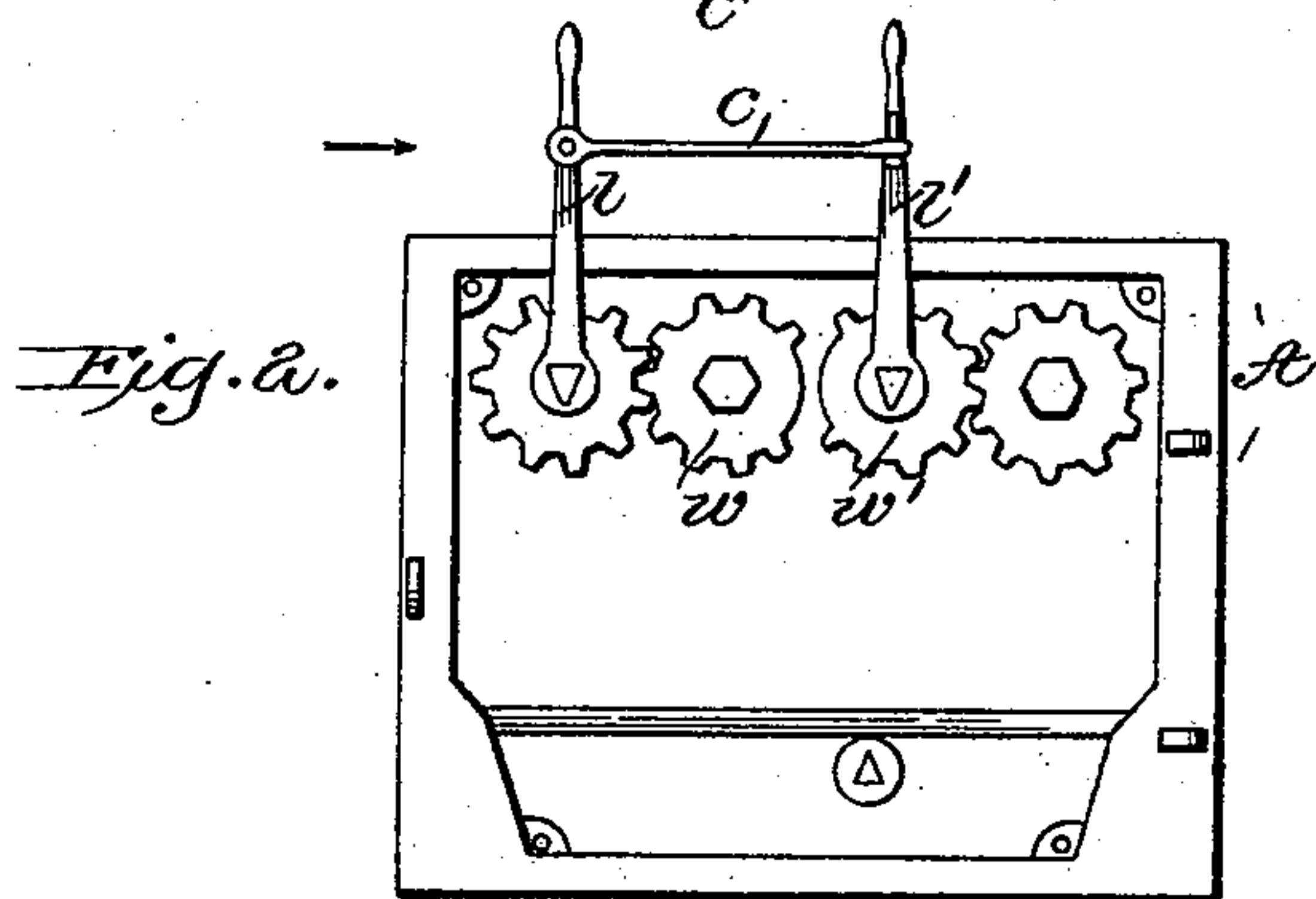
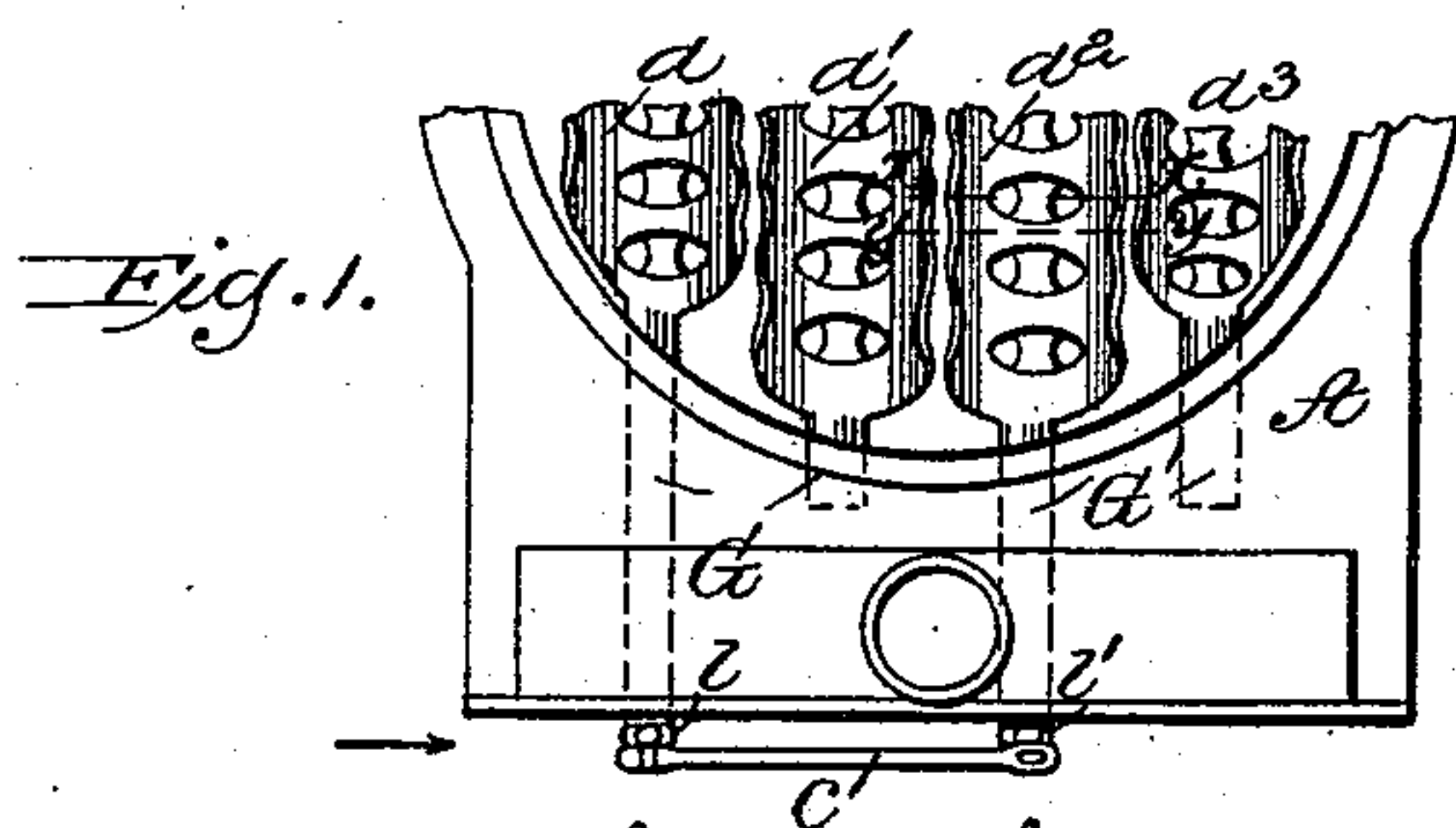


(No Model.)

H. T. RICHARDSON.  
GRATE BAR AND GRATE.

No. 494,694.

Patented Apr. 4, 1893.



Witnesses:

Arthur Ashley

James F. Duhamel

Inventor:

Henry T. Richardson

*Attesty*

# UNITED STATES PATENT OFFICE.

HENRY T. RICHARDSON, OF BROOKLYN, NEW YORK.

## GRATE-BAR AND GRATE.

SPECIFICATION forming part of Letters Patent No. 494,694, dated April 4, 1893.

Application filed August 12, 1892. Serial No. 442,917. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY T. RICHARDSON, a citizen of the United States, and a resident in the city of Brooklyn, in the county of Kings, of the State of New York, have invented certain new and useful Improvements in Grate-Bars and Grates, of which the following is a correct description.

The invention relates particularly to improvements upon the grate which constitutes the subject-matter of United States Patent No. 320,001, which was issued on the 16th day of June, 1885, to Dwight S. Richardson. The construction shown and described in the patent referred to has proven wholly satisfactory in so far as the fuel-supporting and heat-resisting functions of the individual bars which constitute the grate, are concerned; but it has been found in some instances, especially in the use of grates of large dimensions, that the oscillatory movement or partial rotation of the bar or bars which are most remote from the operating bar, has been somewhat imperfect, through loss of motion between the primary and the terminal bars. To obviate this imperfection, and the consequent incomplete clearance of such remote bar or bars, I have, in this improvement, provided for a division of the series of bars into two or more groups or sub-series; and a means whereby the distinct groups or sub-series are so connected that the power which operates one group or sub-series of bars shall serve with equal force and directness, to operate the other groups or sub-series, also.

In the accompanying drawings which constitute a part of this specification:—Figure 1 represents a partial top plan view of a portion of a furnace, showing my modified grate applied thereto, the top plate of the projecting front of the base having been removed. Fig. 2 is a front elevation of the base, the ash-pit door having been removed, and portions of the frame being broken out, to show the connection of the operating-lever with the journal of one of the grate-bars in each group or sub-series of bars. Fig. 3 is a detail side elevation, showing the connection of one of the lever or operating arms of one of the grate-bars, as when looking in the direction indicated by the arrow seen in Figs. 1 and 2. Figs. 4 and 5 are transverse vertical sections, respectively, in lines  $x-x$ , and  $y-y$ , in Fig. 1. Fig. 6 is a detail, showing a slight modification in the construction represented in Fig. 3.

As will be seen in Figs. 1 and 2, of the drawings, the three-faced bars  $a$  and  $a'$ , in the base A, constitute one group or series, as G, and the bars  $a^2$  and  $a^3$  constitute a second group or series G', the coincident portions of the gear-wheels  $w$  and  $w'$ , being unprovided with cogs. Under this construction the entire force exerted upon each lever-arm is brought to bear upon the bars which constitute the group or series operated by that lever-arm, without at all affecting the relation of the several bars as parts of a common fuel-supporting surface. In other words, no portion of the power applied to oscillate one bar in a group or series, is transferred, through such bar, to any of the bars in an adjacent group or series, and thus, even in grates of the greatest dimensions, no appreciable portion of the power applied is lost by friction, and all the bars are given rotative movement through an equal space. It will be apparent that under this construction it will be practicable to agitate a single group or series only of the bars, it being necessary only to detach the connecting-bar  $c$ , from either of the lever-arms  $l$  or  $l'$ , in order to accomplish this operation.

It will be understood that claim is not herein broadly made either to a group of parallel grate-bars; a triangular grate-bar; a series of grate-bars which are geared together for joint and simultaneous operation; or two distinct grate-bars each of which has an attached operating lever or arm.

The invention having been thus described, what is claimed is—

A grate which consists of two distinct groups or series of revoluble triangular grate-bars, each group or series of which embraces a plurality of bars which are geared together by cog-wheels, one of the bars in each group or series being provided with an operating-lever, and the operating-lever being provided with a detachable connecting-bar;—whereby the groups or series are operable either together and simultaneously, or separately and independently; substantially as shown and described.

HENRY T. RICHARDSON.

Witnesses:

JAMES B. TAYLOR,  
GEORGE R. FODDY.