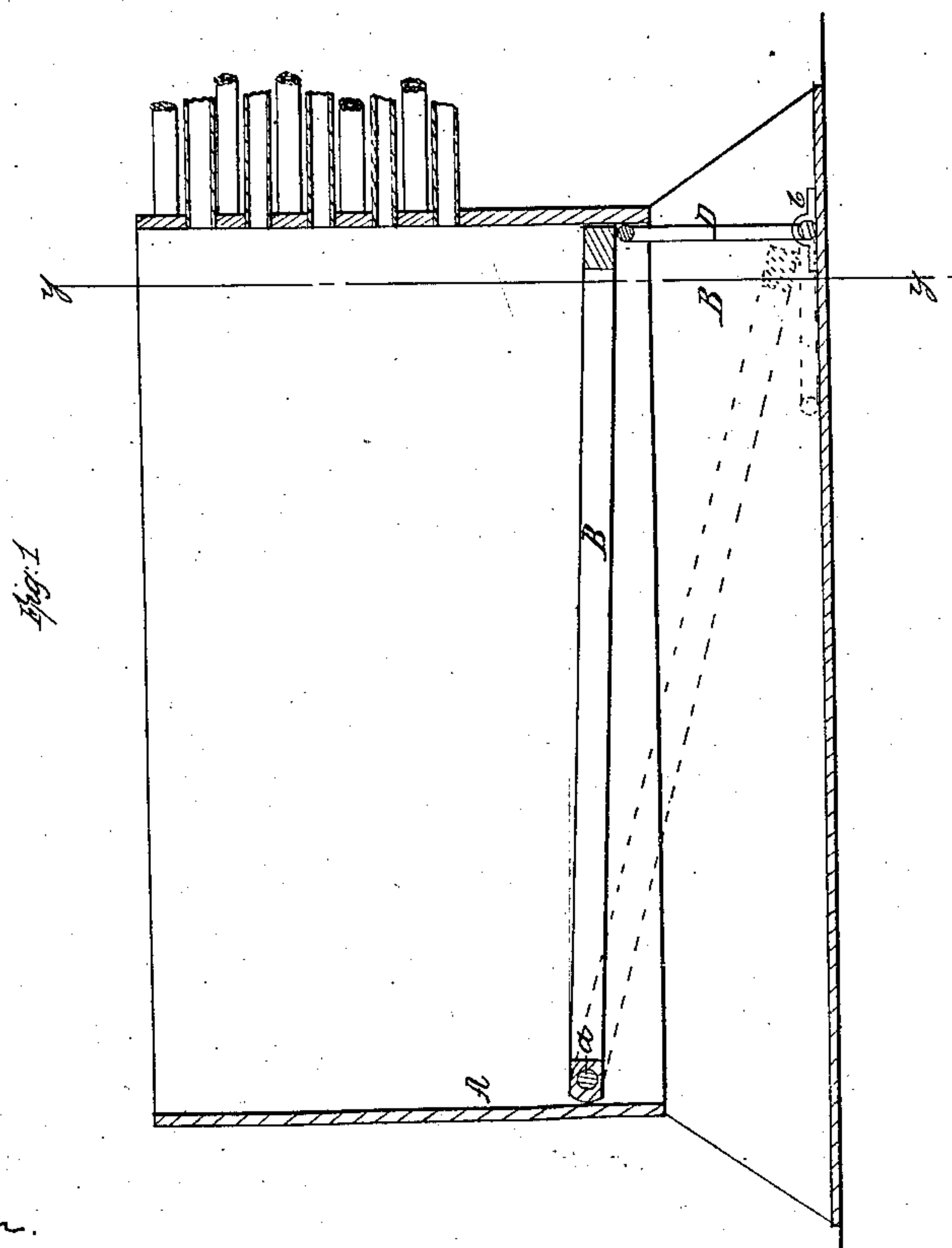
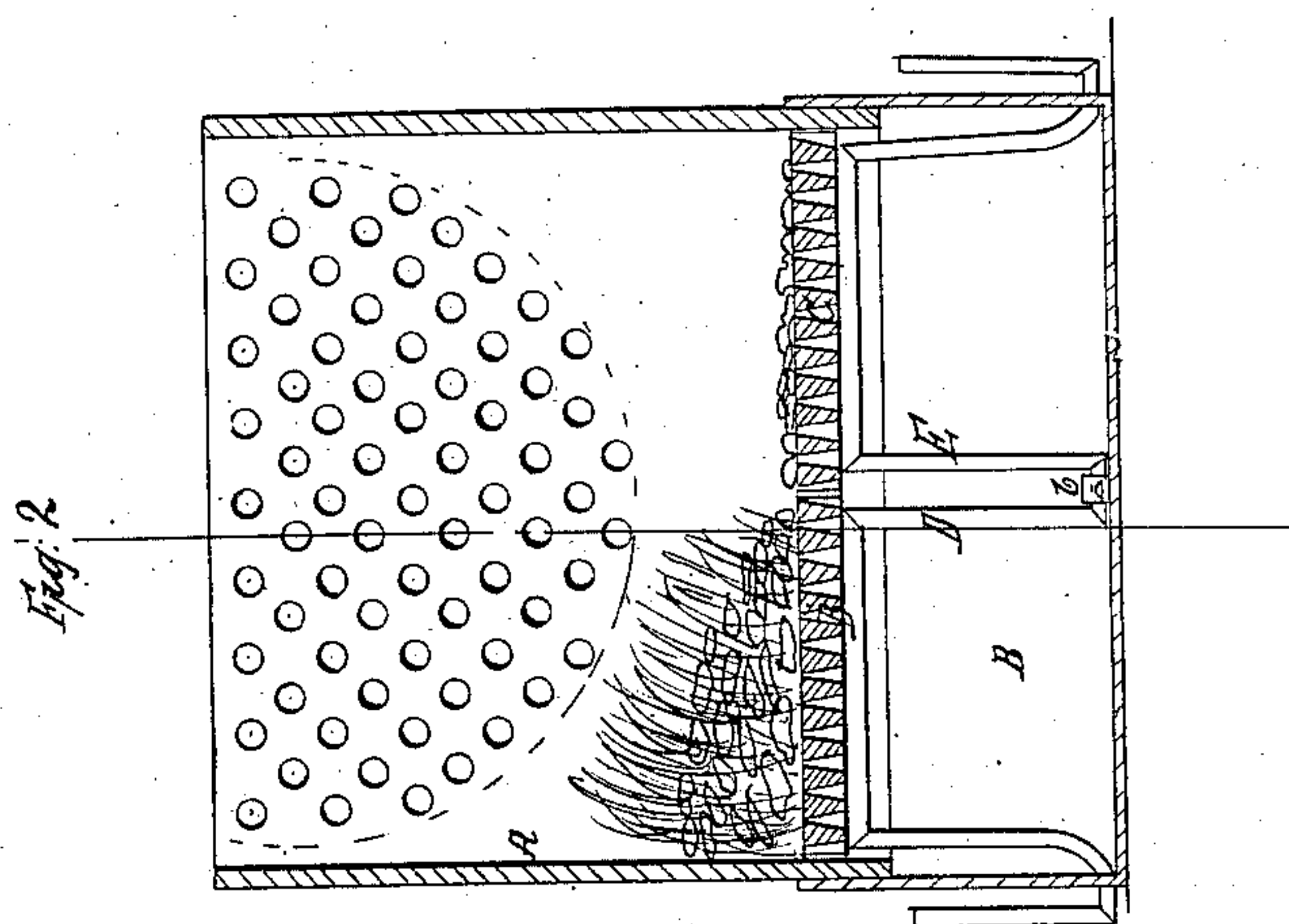


F. A. Hull,
Furnace Grate.

Nº 29,974.

Patented Sep. 11, 1860.



Witnesses:
J. W. Corbin,
A. S. Spurr.

Inventor:
F. A. Hull
per Munn & Co
attorneys.

UNITED STATES PATENT OFFICE.

F. A. HULL, OF BELVIDERE, ILLINOIS.

GRATE FOR STEAM-BOILERS.

Specification of Letters Patent No. 29,974, dated September 11, 1860.

To all whom it may concern:

Be it known that I, F. A. HULL, of Belvidere, in the county of Boone and State of Illinois, have invented a new and Improved
5 Drop-Grate for Steam-Boilers &c.; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, forming a part of this speci-
10 fication, in which—

Figure 1, represents a longitudinal vertical section of my invention, the line x, x , Fig. 2, indicating the plane of section. Fig. 2, is a transverse vertical section of the same
15 taken in the plane indicated by the line y, y , Fig. 1.

Similar letters of reference in both views indicate corresponding parts.

This invention consists in arranging a
20 grate with two or more sections which are hinged at one end and supported by separate crank levers or links in such a manner, that each of the sections can be raised or dropped independently of the other section
25 or sections and that the fireman is enabled to clean one section after the other without putting out the fire.

To enable those skilled in the art to make and use my invention I will proceed to describe its construction and operation, with
30 reference to the drawing.

The fire box A, with the ashpit B', is constructed in the ordinary manner, and it must be remarked that my improvement is
35 applicable with equal advantage to the fire box of a locomotive boiler or to the furnace of any other steamboiler or to any furnace whatever. My principal intention however is to apply it to locomotive boilers and to
40 render the use of coal with locomotives practicable.

With ordinary grates the use of coal with locomotive engines is not practicable because it is impossible to keep the grate clean and
45 as soon as the grate is stopped up the draft is impaired and the fire loses the required energy and intensity. In order to obviate this difficulty and to enable the engineer or fireman to clean out the grate at
50 leisure, I have constructed my grate out of two or more sections B, C, which are secured

to the front end of the fire box by means of a bar a , passing through the ends of the sections in a direction transversely to the direction of the grate bars, or each section of the
55 grate may be attached by a separate hinge or in any other manner, which allows said sections to rise and fall one independently of the other. The opposite or back end of each section is supported by a crank lever
60 or link D, E, each of which extends through one of the sides of the ash pit, so that it can be operated from the outside by a suitable handle. These crank levers are constructed
65 of an iron bar bent over at right angles five times and each of them has one of its bearings in one of the sides of the ash pit and the other bearing is in a common socket
70 b , that is firmly secured to the bottom of the ash pit exactly in its center or under the point where the sections of the grate meet.

By turning one of the crank levers down to a position shown in red outlines in Fig. 1, the end of the section, which was supported by the same is allowed to sink down, as
75 clearly represented in red outlines in Fig. 1. If it is now desired to clean the grate while the engine is in motion and without interrupting the formation of steam, the fire is
80 packed all on one section of the grate, the other section is dropped and it can now be cleaned with perfect ease either from the furnace door or from the door of the ash pit.
85 After it has been thoroughly cleaned, this section is raised, the fire is packed on it and the other section is now dropped and cleaned in the same manner, and when both sections have been cleaned and raised the fire is
90 scattered over the whole surface and a few shovels full of coal enable the engineer to proceed without interruption. The whole operation can be completed in about ten minutes, and the formation of steam proceeds as usual.

At the end of the route, or whenever it is
95 desired to put out the fire both sections of the grate are dropped at once, all the fire is hauled out, and all the coals, which are not burned, can be saved.

This arrangement is very simple, and it
100 gives to the engineer or fireman perfect control over the fire, so that he can run a loco-

motive engine entirely with coal for any length of time without interruption.

Having thus fully described my invention, what I claim as new, and desire to secure by

5 Letters Patent, is—

The arrangement of the crank levers D, E, in combination with the hinged sections B,

C, of a grate constructed and operating as and for the purpose set forth.

F. A. HULL.

Witnesses:

G. N. WOODWARD,
J. MIDER.