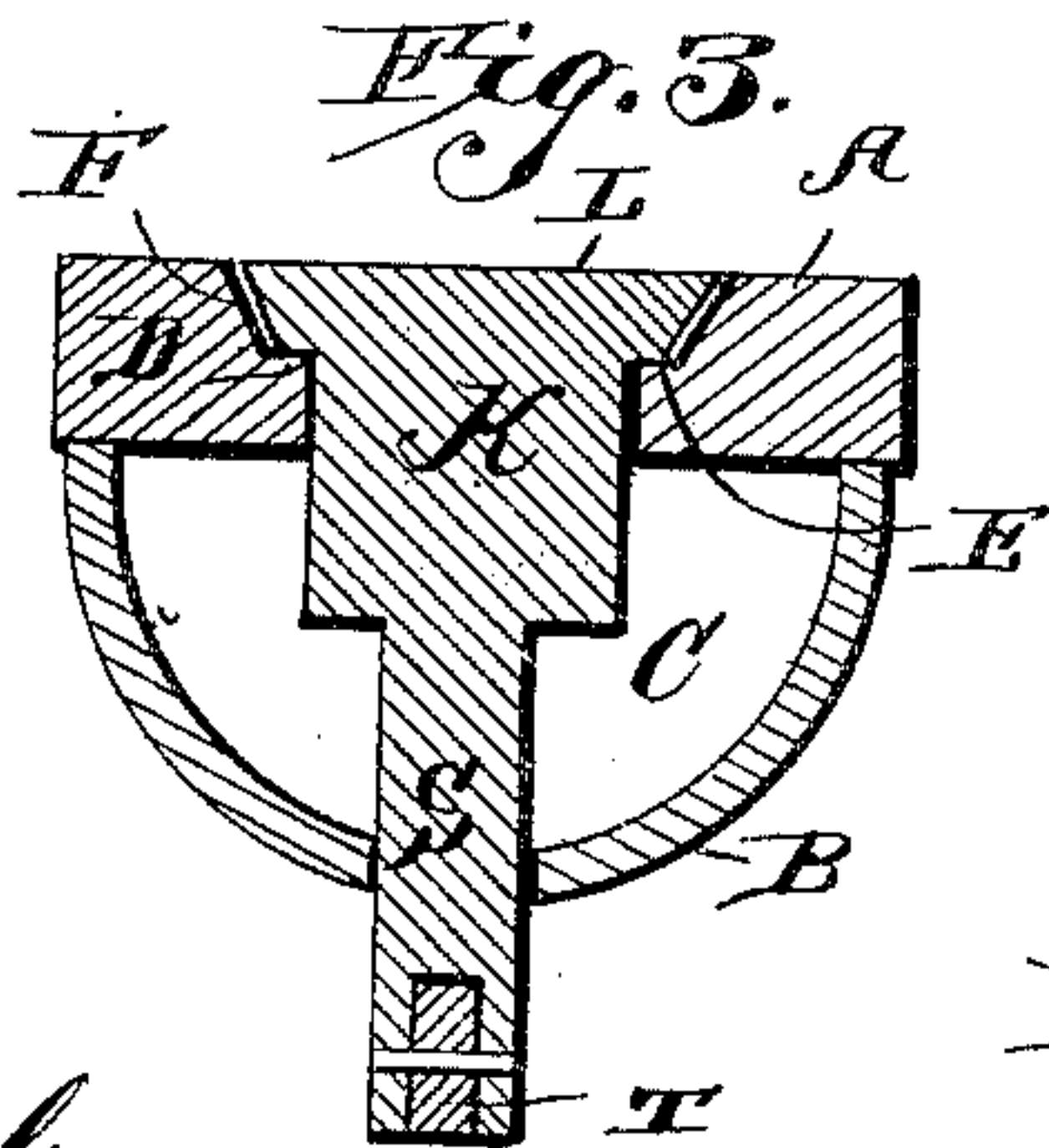
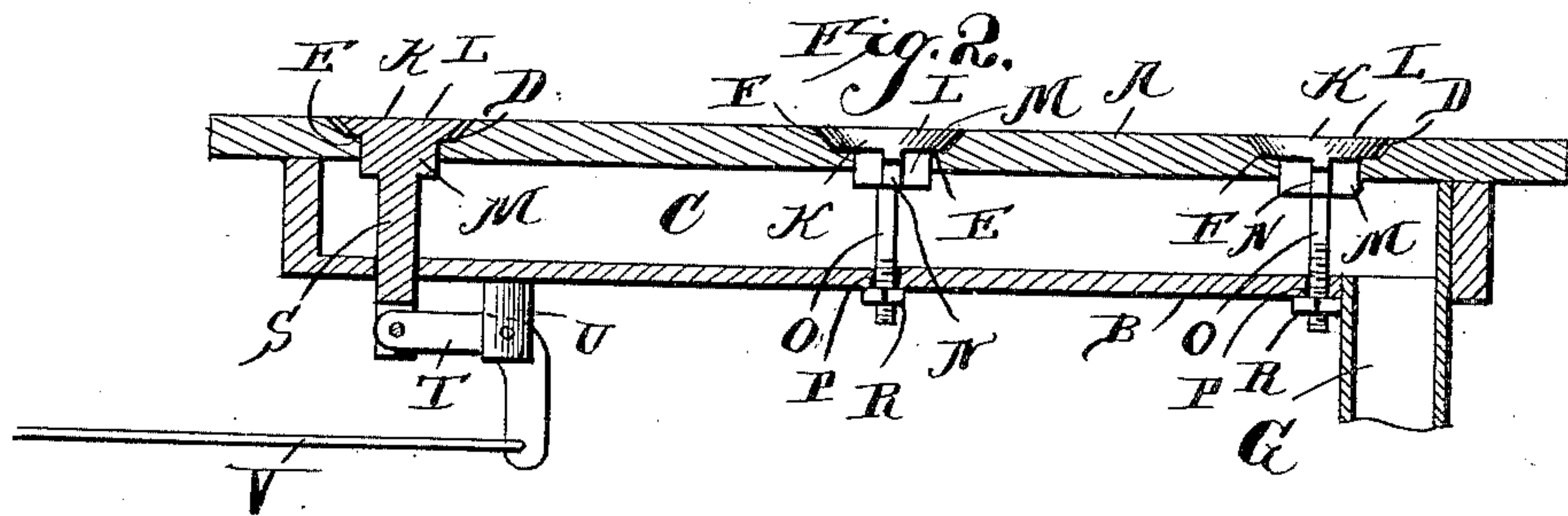
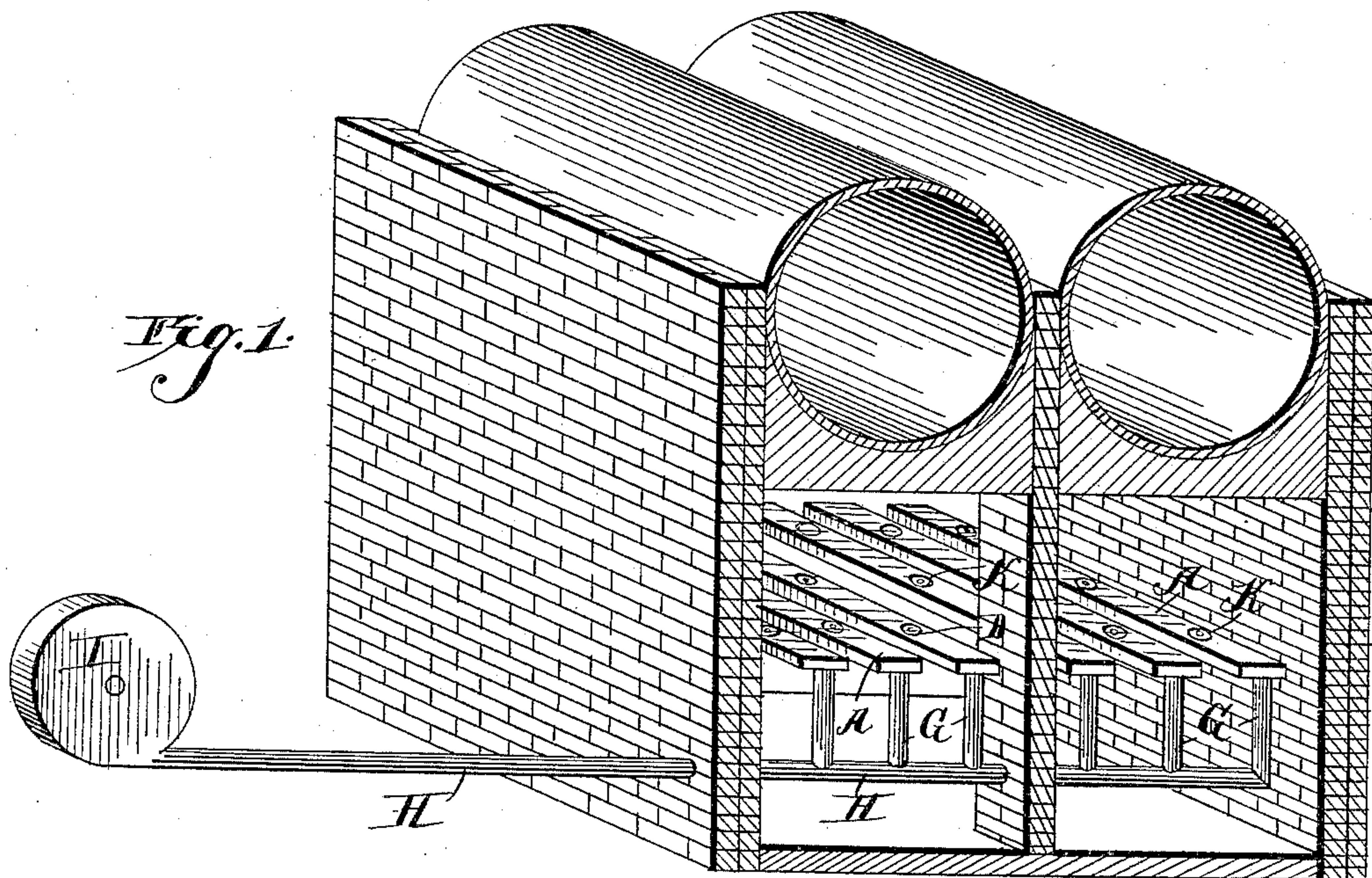


(No Model.)

E. J. GORDON.
GRATE BAR.

No. 411,379.

Patented Sept. 17, 1889.



Witnesses
Henry J. Dieterich
Wm. Bagger

Eltonso J. Gordon, Inventor

By his Attorneys

C. A. Snow & Co.

UNITED STATES PATENT OFFICE.

ELONSO J. GORDON, OF GREENVILLE, MICHIGAN, ASSIGNOR OF ONE-HALF
TO CHAS. S. HECOX, OF SAME PLACE.

GRATE-BAR.

SPECIFICATION forming part of Letters Patent No. 411,379, dated September 17, 1889.

Application filed April 2, 1889. Serial No. 305,713. (No model.)

To all whom it may concern:

Be it known that I, ELONSO J. GORDON, a citizen of the United States, residing at Greenville, in the county of Montcalm and State of Michigan, have invented a new and useful Grate-Bar for Steam-Boiler Furnaces, of which the following is a specification.

My invention relates to an improvement in grate-bars for steam-boiler furnaces; and it consists in the peculiar construction and combination of devices that will be more fully set forth hereinafter, and particularly pointed out in the claims.

The object of my invention is to provide a hollow grate-bar which is adapted to convey a blast of air to the burning fuel, to the end that more active combustion may be caused, and whereby a furnace may be arranged which is adapted to use green sawdust and green wood for fuel.

In the drawings, Figure 1 is a diagrammatic sectional perspective view of a steam-boiler furnace provided with grate-bars and a blower embodying my improvements. Fig. 2 is a detailed longitudinal sectional view of one of my improved hollow grate-bars. Fig. 3 is a transverse sectional view of the same.

Each grate-bar comprises a flat upper side A and a longitudinal convex rib B on the under side thereof. The said rib is provided with a longitudinal bore C, and near the end and in the center of the plate A are openings D, which communicate with countersunk annular recesses or valve-seats E, the outer sides of which are flared or inclined outwardly, as at F. The said grate-bars are arranged parallel with each other in the furnace, as shown in Fig. 1, and each grate-bar has a branch pipe G at one end of its bore that depends therefrom and communicates with a pipe H. The outer end of the latter communicates with the case I of a rotary-fan or blower adapted to be driven by an endless belt and pulley (not shown) of the usual well-known construction.

Arranged in the valve-seats are a series of vertically-movable plugs or valves K, having the flared heads L and the depending stems M, provided in their sides with vertical grooves or flutes N. The said stems extend down-

ward through the openings D. The valves at the center and at one end of each grate-bar are provided with bolt-rods or stems O, which extend entirely through them and through openings P in the bottom of the grate-bar, and on the lower ends of the said bolt-rods are screwed adjusting-nuts R, which may be regulated in such manner as to allow the valve to rise and fall to any desired extent. The valve at the inner end of each grate-bar is provided with an integral depending rod S, which extends through an opening in the lower side of the hollow grate-bar and is pivotally connected to a bell-crank lever T. The latter is fulcrumed in the lower end of a bifurcated stud U, which depends from the grate-bar, and to the said bell-crank lever is attached an operating-rod V, which extends through the front side of the furnace. By means of the said rod and lever the valve at the front end of the grate-bar may be opened or closed, as will be readily understood.

The operation of my invention is as follows: When the blower is in operation, a blast of air is forced through the pipe H and through the branch pipe into the bores of the hollow grate-bars and presses upward on the valves in the said grate-bars, thereby causing the valves to rise and permit the blast of air to escape upward from the hollow grate-bars into and through the fuel placed thereon, thereby supplying so much air to the furnace that the combustion therein will be almost perfect.

A furnace thus provided is adapted to burn green sawdust, green wood, and other similar material with such ease and rapidity that the same is perfectly adapted for the purposes of maintaining steam in boilers to operate machinery, and a furnace provided with my improved grate-bars will be found of great value, particularly in saw-mills, for the reason that the sawdust, which is now almost universally wasted, may be employed as fuel for operating the mill.

My improved grate-bars are also especially adapted to be used in the furnaces of the boilers of portable engines—such as are commonly employed for operating thrashing-machines—as the draft in a furnace thus con-

structed is so great that little necessity exists for opening the furnace-door, and all or substantially all of the fuel is entirely consumed, and no burning cinders or large sparks
5 escape from the smoke-stack; hence the danger of setting fire to the wheat-stack or to an adjacent barn or building is reduced to a minimum.

My improved grate-bars and blower will
10 also be found especially serviceable in steam-boiler furnaces having only an imperfect draft.

When the rods V are drawn outward, so as to cause the valves at the front ends of the
15 grate-bars to open to their full extent, dirt, ashes, or other foreign substances which may find their way into the bore of the hollow grate-bar will be blown out of the same, as will be readily understood.

20 Having thus described my invention, I claim—

1. A hollow grate-bar having the valved openings on its upper side and adapted to be connected with a pipe or duct, whereby a
25 blast of air may be forced through the said hollow grate-bar, substantially as described.

2. A grate-bar having the bore and provided with the valve-seat in its upper side communicating with the bore, and the gravity-
30 valve in the said valve-seat adapted to be

opened by the pressure of a blast of air within the bore, substantially as described.

3. The hollow grate-bar having the valve-seats, in combination with the valves arranged in the said valve-seats, the stems or rods depending from said valves and extending
35 through the lower side of the grate-bar, and the adjusting-nuts screwed on the lower end of said stems or rods for the purposes set forth, substantially as described. 40

4. The hollow grate-bar having the valved openings and provided at one end with the valve having the operating-lever, whereby said valves may be opened, and means, substantially as set forth, to force a blast of air
45 through the hollow grate-bar, substantially as described.

5. The hollow grate-bar having the valves provided with the depending stem S, the bell-crank lever T, connected to the said stem, and
50 the operating-rod connected to the said bell-crank lever, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

ELONSO J. GORDON.

Witnesses:

CHAS. S. HECOX,
JAMES GRACEY.