(No Model.) 2 Sheets—Sheet 1.

# G. W. WOOD.

## FURNACE GRATE.

No. 458,208. Patented Aug. 25, 1891.

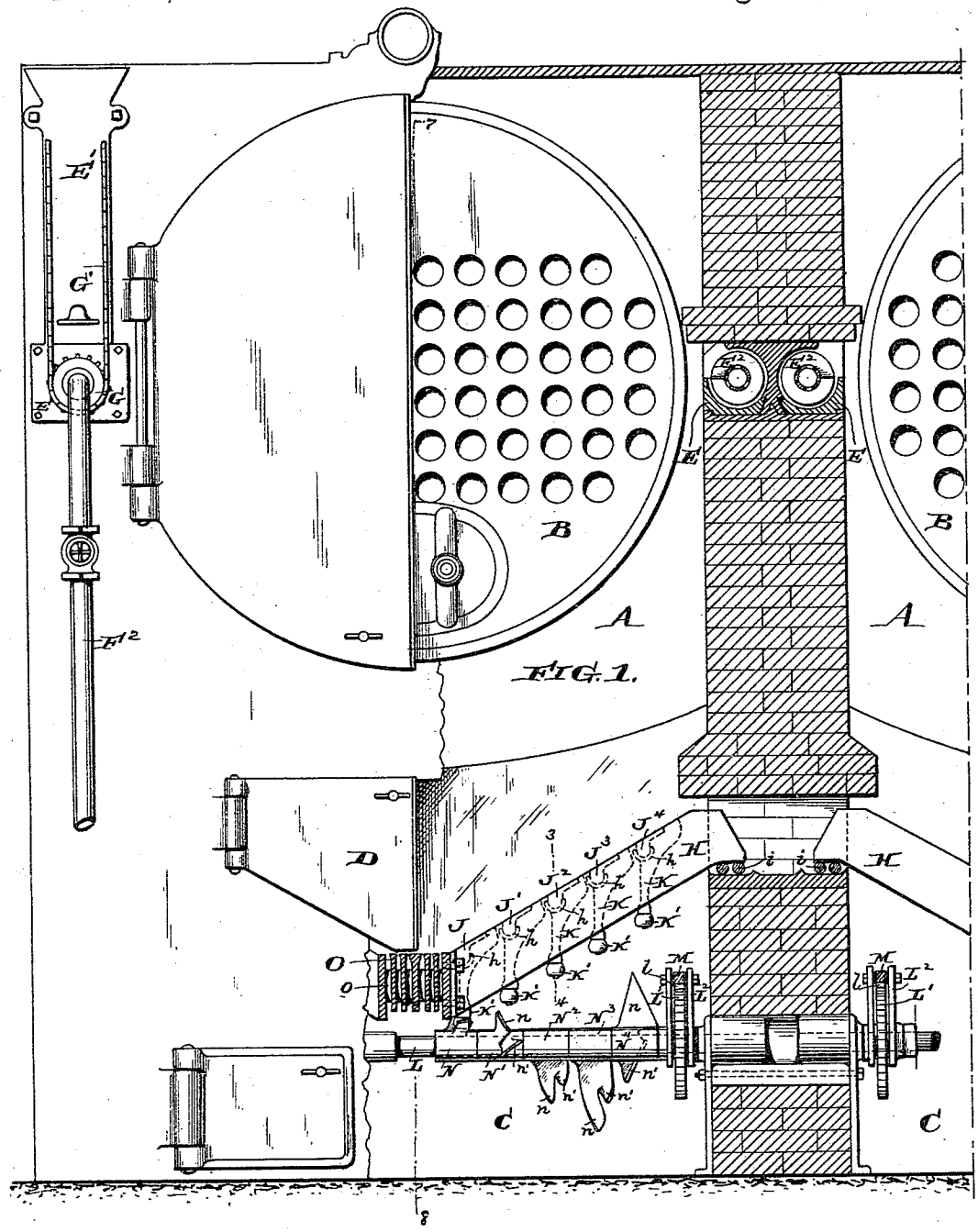



FIG. 1.

Witnesses:
Henry D. Munn
Joshua Wallack, Jr.

Inventor:
George W. Wood
by his atty.
Francis T. Chambers

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

# G. W. WOOD.

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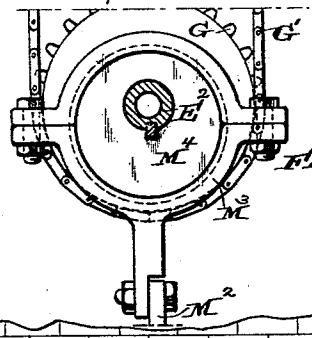



FIG. 3.




FIG. 2.




FIG. 4.




FIG. 5.

Witnesses:
Joshua Stockbridge Jr.

Inventor:
George W. Wood
by his atty.
Francis F. Chambers

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

# UNITED STATES PATENT OFFICE.

GEORGE W. WOOD, OF PHILADELPHIA, PENNSYLVANIA.

## FURNACE-GRATE.

SPECIFICATION forming part of Letters Patent No. 458,208, dated August 25, 1891.

Application filed October 23, 1890. Serial No. 369,036. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE W. WOOD, of the city and county of Philadelphia, State of Pennsylvania, have invented a certain new and useful Improved Furnace-Grate, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates particularly to the construction of furnace-grates adapted for burning culm or other finely-divided fuel, although in some particulars it is also fitted for use with other fuels.

My object is to provide a grate the bars of which, preferably set in an inclined series, shall be moved *seriatim*, or one after the other, so as to break up the fuel resting upon them, keeping it sufficiently open for the passage of air through it, and also gradually move it downward toward the bottom of the grate, where dumping mechanism should be provided.

The nature of my invention will be best understood as described in connection with the drawings in which it is illustrated, and in which—

Figure 1 is a front view, partly in section, of a furnace provided with my improvement in what I believe to be its best form; Fig. 2, a longitudinal section on the line 7 8 of Fig. 1; and Figs. 3, 4, and 5 are enlarged views of details of the mechanism.

A represents the furnace-chamber; B, a boiler situated therein; C, an ash-pit; D, an opening or door in front of the furnace; E, a box or trough set in the side of the furnace, over the front edge of which the finely-divided fuel falls upon the edge of the grate below; E′, a chute leading into the outer end of the said trough; $E^2$, a conveying-screw situated in the trough E and having a perforated shaft, as shown, which communicates with an air-blast pipe $F^2$, and upon which is secured a sprocket-wheel G, which is rotated by means of a drive-chain G′, actuated by any connecting mechanism. (Not shown in the drawings.)

F is an air-blast conduit, from which a branch F′ leads beneath the grate, and from which pipe $F^2$ also leads.

H H are iron bars secured to the front and back of the furnace in an inclined position, as shown, and provided with journal-bearings *h*. In order to allow for expansion, I prefer to firmly secure only the lower ends of these bars to the furnace, allowing the upper ends to rest on friction-rollers *i*, which in turn rest on a plate I, set in the wall of the furnace.

J J′ $J^2$, &c., represent the grate-bars, which are provided at each end with journals *j*, which rest in the journal-bearings *h*. Each of the bars is provided with a downwardly-projecting arm K, on the end of which may conveniently be secured an anti-friction roller K′. At the lower end of the series of inclined grate-bars I secure dumping-grates O O, and preferably these dumping-grates are in the center of the furnace, with an inclined series of bars J J′, &c., extending upward on each side.

As shown, the dumping-grates O are secured to a pivoted bar *o* and provided with a downwardly-extending arm *o′*, to the end of which arms rods P P′ are secured, by pulling on which the grates O O can be caused to tilt and dump the material resting upon them into the ash-pit.

To return to the inclined series of grate-bars, it will be noticed that each bar is independent of the others, and I combine with them a series of cams, each adapted to engage one of the downwardly-projecting arms and actuate it so as to give the grate-bar an oscillating movement, the cams being preferably arranged so as to come into action seriatim, moving one bar after the other. Any convenient means for actuating the cams may be employed; but preferably I use a construction such as is shown in the drawings, a shaft L being journaled beneath the inclined grate and having secured upon it a series of cams N N′ $N^2$, &c., each having two operative faces *n* and *n′*, one of which pushes the arm K in one direction and the other of which pushes it back to the point of rest. As the shaft L is rotated these cams engage the arms K of the bars J J′, &c., one after the other, causing first one bar to oscillate and then another, until the whole series is moved, and then again beginning with the first bar. In this way a continuous breaking up of the fuel-bed

is insured, and at the same time the fuel is caused to move slowly down toward the dumping-grates at the bottom of the inclined series.

The rotation of the shaft L is conveniently effected, as shown in the drawings—that is, by securing to it a ratchet-wheel L′ and also pivoting upon it a rock-lever $L^2$, on the end of which a pawl *l* is secured so as to engage with the teeth of the ratchet-wheel. The rock-lever is actuated by means of a connecting-rod M, extending through the front of the furnace and secured to one end of a pivoted bell-crank lever M′. Upon the other arm of the lever an adjustable sleeve *m* is secured, and to this sleeve a reciprocating rod $M^2$ is fastened. As shown, the desired reciprocation is given to this rod by securing its other end to an eccentric-strap $M^3$, which in turn is secured upon an eccentric $M^4$, fastened to the shaft $E^2$. By having the sleeve *m* adjustable the rapidity with which the shaft L is rotated can be regulated, and by withdrawing the sleeve the lever M′ can be actuated by hand.

The mechanism shown and described for feeding in culm or other culmunated fuel forms no part of my present invention, being the subject-matter of another application filed by me July 28, 1890, and bearing the Serial No. 360,179.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a furnace-grate, a series of pivoted oscillating grate-bars, as J J′, &c., having bearings at each end and having downwardly-extending arms, in combination with a series of cams each adapted to engage one of the grate-bar arms and oscillate the bar in its bearings and arranged to come into operation one after the other, so as to oscillate the bars *seriatim*.

2. In a furnace-grate, one or more series of pivoted oscillating grate-bars, as J J′, &c., set on an incline extending down from the side of the furnace and each bar of the inclined series having a downwardly-extending arm, in combination with a dumping-grate situated at the bottom of the inclined series, a device for feeding in culm or similar fuel, situated above the upper end of the series of grate-bars, a series of cams arranged to engage the arms of the bars and oscillate them *seriatim*, and means for actuating said cams.

3. In a furnace-grate, the combination of a series of pivoted oscillating grate-bars, each having a downwardly-extending arm with a rotating shaft, and a series of cams secured to said shaft and each adapted to engage one of the grate-bar arms and give it an oscillating motion, said cams being arranged to come into operation one after the other, so as to actuate the bars *seriatim*.

4. In a furnace-grate, the combination of the pivoted oscillating grate-bars having arms, as K, a shaft L, having a series of cams secured thereon and arranged to oscillate the grate-bars, as described, a ratchet-wheel L′, secured to shaft L, a rock-lever $L^2$, pivoted to shaft L, a pawl *l*, secured to lever $L^2$ and adapted to engage ratchet L′, a connecting-rod M, attached to lever $L^2$ and extending to the front of the furnace, and a lever, as M′, pivoted to rod M.

5. In a furnace-grate, the combination of the pivoted oscillating grate-bars having arms, as K, a shaft L, having a series of cams secured thereon and arranged to oscillate the grate-bars, as described, a ratchet-wheel L′, secured to shaft L, a rock-lever $L^2$, pivoted to shaft L, a pawl *l*, secured to lever $L^2$ and adapted to engage ratchet L′, a connecting-rod M, attached to lever $L^2$ and extending to the front of the furnace, a lever, as M′, pivoted to rod M, an adjustable sleeve *m* on lever M′, and a reciprocating rod $M^2$, attached to said sleeve.

GEORGE W. WOOD.

Witnesses:
GEORGE HOUSE,
JOSHUA MATLACK, Jr.