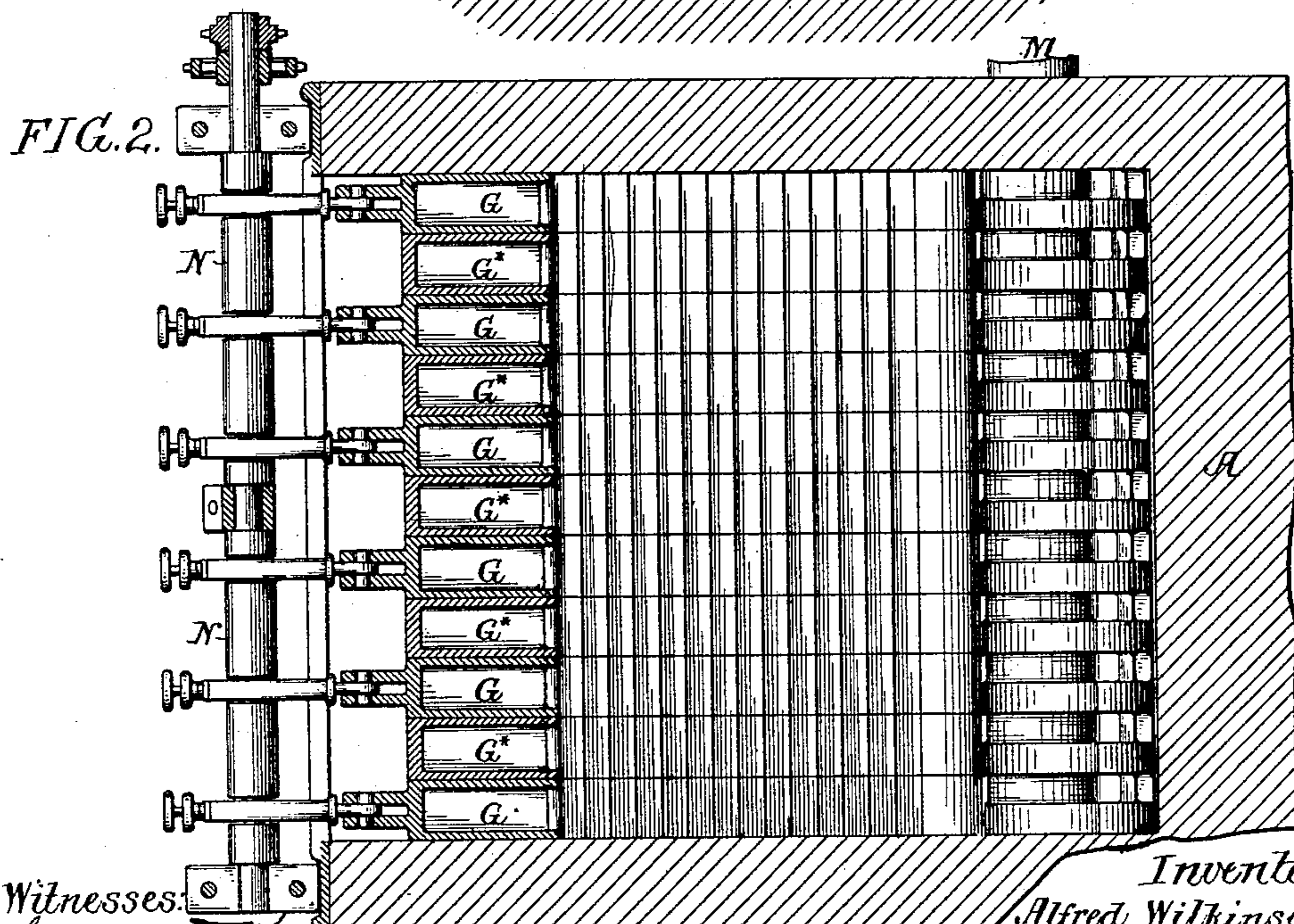
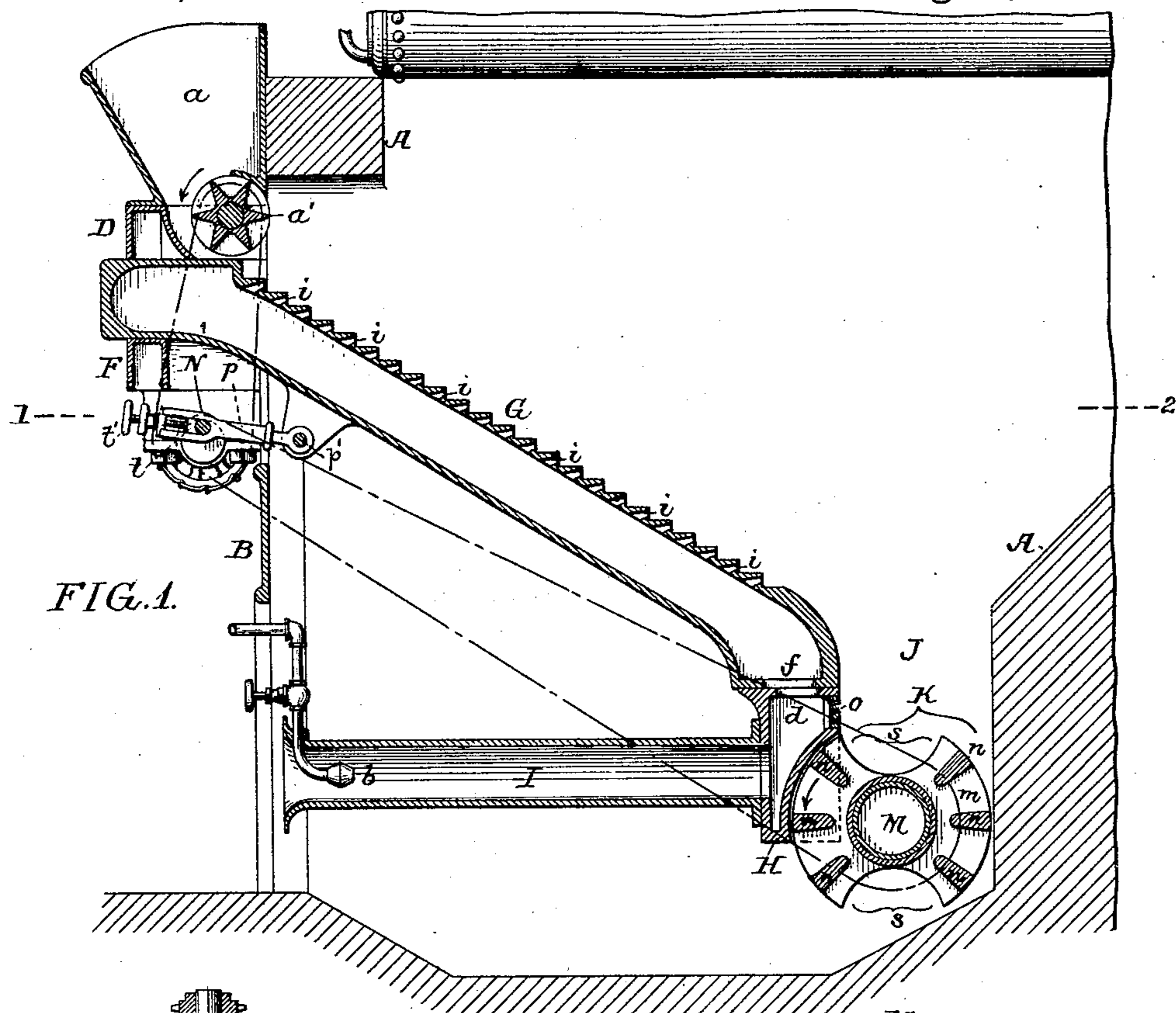


(No Model.)

A. WILKINSON.
FURNACE GRATE.

No. 480,538.

Patented Aug. 9, 1892.



Witnesses:

Hamilton D. Turner
Alex. Barkoff

Inventor:

Alfred Wilkinson
by his Attorneys
Hudson & Hudson

UNITED STATES PATENT OFFICE.

ALFRED WILKINSON, OF PHILADELPHIA, PENNSYLVANIA.

FURNACE-GRATE.

SPECIFICATION forming part of Letters Patent No. 480,538, dated August 9, 1892.

Application filed February 29, 1892. Serial No. 423,257. (No model.)

To all whom it may concern:

Be it known that I, ALFRED WILKINSON, a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Furnace-Grates, of which the following is a specification.

The object of my invention is to construct a furnace-grate especially adapted for the effective combustion of bituminous coal or of the fine grades of anthracite, such as pea, buckwheat, or culm and the like; and this object I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal section of sufficient of a steam-boiler furnace to illustrate my invention; and Fig. 2 is a plan view of the same, partly in elevation and partly in section, on the line 1 2, Fig. 1.

In Fig. 1, A represents part of the masonry structure of a steam-boiler furnace, and B the front plate of the same. Upon the upper portion of this plate is a hopper *a* for containing the fuel, this hopper having in the lower portion in the present instance a vaned wheel *a'*, intended to be rotated in the direction of the arrow by any of the usual forms of mechanism adapted for the purpose, although such feed wheel need not be used in all cases.

Projecting from the front plate of the furnace below the hopper are two hollow bearing blocks or brackets D and F, which form bearings for the upper ends of the grate-bars G, each of these grate-bars being hollow and being inclined throughout the greater portion of its length at an angle corresponding with the natural angle of repose of a mass of granular material, the upper portion of each bar, however, being horizontal, so as to fit between and be supported by the brackets D and F, some of the bars being also free to move forward and backward between the brackets, as explained hereinafter.

The lower portion of each grate-bar is turned downward, so as to form a vertical foot resting upon a hollow transverse beam or girder H, suitably mounted in the masonry structure of the furnace, the lower ends of the grate-bars and the upper face of said beam or girder forming a reasonably tight fit.

From the front of the hollow girder H projects a pipe I, which is open at the front end and is provided with a steam blast or injector nozzle *b*, whereby a flow of air and steam through the pipe and into the hollow girder H is caused. In the upper portion of the hollow girder H are formed ports *d* and in the bottom of the grate-bars G are formed like ports *f*, so that the air forced into the hollow girder has free access to each of the hollow grate-bars. The inclined portion of each of the hollow grate-bars is stepped, as shown in Fig. 1, and in the front of each of these steps is formed a tuyere-like opening *i*, through which a stream or jet of air is injected into and through the mass of fuel resting upon the grate-bars, these jets being thus distributed throughout every portion of the mass of fuel, so as to insure effective combustion of all portions of said mass.

A space or well J is formed between the bridge-wall of the furnace and the hollow girder H and downwardly-extended portions of the foot of the grate, as shown in Fig. 1, and jets of air are projected into this well through openings in a perforated plate *o*, which is adapted to the slotted front of the hollow girder H, as shown in Fig. 1, so that any fuel which escapes combustion in its passage downward over the grate-bars G is exposed to these air-currents in the well J, and combustion of the same is thereby insured. The bottom of the well J is closed by a rotating ash-discharger K, consisting in the present instance of a series of disks *m*, secured to a hollow shaft M, which is adapted to turn in suitable bearings in the side walls of the furnace and projects beyond one of said side walls for the application of power whereby it can be rotated. Each disk *m* has side lugs *n*, whereby the disks are separated to the desired extent, and in each disk are formed opposite recesses *s*, segmental in the present instance. Hence as these recesses are successively brought under the well J by the rotation of the ash-discharger they form longitudinal troughs or channels for receiving the ashes and conveying the same forward in the direction of the arrow, Fig. 1, so as to dump them into the ash-pit, the adja-

cent face of the girder H being preferably concaved so as to permit the disks *m* to work in close proximity thereto.

Certain of the grate-bars G—for instance, 5 those marked with a star in Fig. 2—are stationary; but the alternate grate-bars are movable to and fro on their bearings on the hollow girder H and bracket F, such to-and-fro movement being imparted to said grate-bars 10 from a crank-shaft N, which is mounted in suitable bearings depending from the bracket F and is slowly rotated by any suitable means—as, for instance, by means of a sprocket-wheel receiving a chain belt adapted to a 15 sprocket-wheel on the shaft of the distributor *a'* of the fuel-hopper, as shown by dotted lines in Fig. 1. The shaft N has one crank for each of the movable grate-bars G, the crank-pin being embraced by the outer end of a link *p*, 20 the inner end of which is connected to a pin *p'*, carried by a stud on the under side of the grate-bar. The forked outer end of the link *p*, which embraces the pin of the crank-shaft N, is provided with a follower *t*, adjustable by 25 means of a set-screw *t'*, so as to provide either a snug fit upon the crank-pin or for permitting any desired amount of lost motion in order to regulate the extent of reciprocation of the movable grate-bars.

30 The rotating shaft of the discharger K may, if desired, be driven by a belt adapted to sprocket-wheels on the shaft M of said ash-discharger and on the crank-shaft N—as shown, for instance, by dotted lines in Fig. 1.

35 I do not here claim, however, the special form of rotary ash-discharger which I have shown and described, as this forms the subject of a separate application filed by me July 23, 1892, Serial No. 440,965.

40 I prefer to use the steam jet or injector *b* as a means of causing inflow of air through the pipe I; but other forms of blast mechanism may be substituted for the steam-jet, if desired, or with some fuels natural draft may 45 be relied upon. When steam is mixed with the air, however, it serves to keep the grate-bars cool, and thereby prevents warping or other distortion of said bars.

Having thus described my invention, I 50 claim and desire to secure by Letters Patent—

1. The within-described grate for furnaces, said grate consisting of hollow inclined bars, each of which has a series of tuyere-openings in the inclined fuel-supporting face of the 55 bar, and means for supplying air to said hollow grate-bars, substantially as specified.

2. The within-described grate for furnaces, said grate consisting of a series of hollow in-

clined bars, in combination with means for supplying air to said bars, each of the bars 60 being stepped on the fuel-supporting face and said steps having in the fronts of the same tuyere-openings for the discharge of air into the bed of the fuel, substantially as specified. 65

3. The within-described grate for furnaces, said grate consisting of a series of hollow inclined bars, some of which are movable to and fro past the others, the bars having 70 tuyere-openings in their fuel-supporting faces, in combination with means for supporting the grate-bars at top and bottom, means for moving the movable bars of the grate, and means for forcing air into the bars, substantially as specified. 75

4. The combination, in a grate for furnaces, of the hollow inclined grate-bars having 80 tuyere-openings in their fuel-supporting faces, a hollow transverse beam or girder supporting said bars and communicating with the interior of the same, and means for forcing air into said hollow beam or girder, substantially as specified.

5. The combination, in a grate for furnaces, of the hollow inclined grate-bars having 85 tuyere-openings in their fuel-supporting faces, a hollow transverse beam or girder supporting said bars and communicating with the interiors of the same, an air-inlet pipe communicating with said hollow beam or girder, and a 90 steam jet or injector for causing a flow of air and steam into and through said pipe and into the girder, substantially as specified.

6. The combination, in a grate for furnaces, of the hollow inclined grate-bars having 95 tuyere-openings in their fuel-supporting faces, the hollow beam or girder serving as a support for said bars and communicating with the interiors of the same, means for forcing air into said hollow beam or girder, and a 100 perforated air-distributor in front of said girder, substantially as specified.

7. The within-described grate for furnaces, said grate consisting of hollow inclined bars, each of which has a series of tuyere-openings 105 in the inclined fuel-supporting face of the bar, and an automatic ash-discharger located adjacent to the bases of said hollow inclined bars, substantially as specified.

In testimony whereof I have signed my 110 name to this specification in the presence of two subscribing witnesses.

ALFRED WILKINSON.

Witnesses:

EUGENE ELTERICH,
HARRY SMITH.