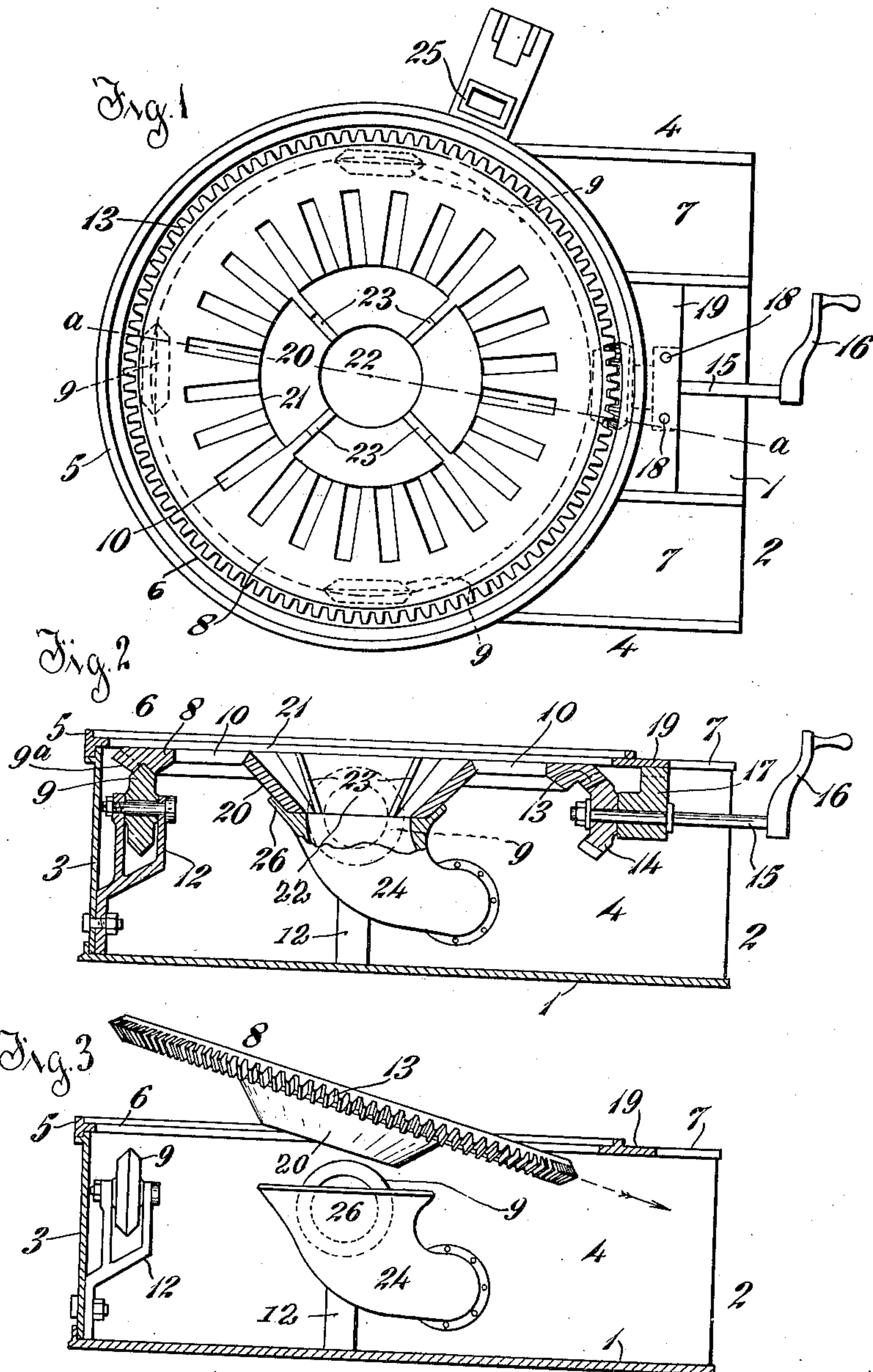


W. H. JAMES.  
UNDERFEED GRATE DEVICE FOR HEATING FURNACES.  
APPLICATION FILED DEC. 28, 1908.

990,815.

Patented Apr. 25, 1911.



Witnesses

Oliver J. Harman  
Norma Heiser.

Inventor

William H. James,  
by John Elias Jones,  
his attorney.



# UNITED STATES PATENT OFFICE.

WILLIAM H. JAMES, OF CINCINNATI, OHIO.

UNDERFEED GRATE DEVICE FOR HEATING-FURNACES.

990,815.

Specification of Letters Patent.

Patented Apr. 25, 1911.

Application filed December 28, 1908. Serial No. 469,642.

*To all whom it may concern:*

Be it known that I, WILLIAM H. JAMES, a citizen of the United States of America, and a resident of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Underfeed Grate Devices for Heating-Furnaces, of which the following is a specification.

10 This invention relates to furnaces of the underfeed type, in which the fuel is fed to the grate from below, a central opening being provided in the rotary grate through which the fuel passes upward from a feed-  
15 chute that leads into the ash-pit from the side thereof, and the object of the invention is to provide means whereby the fuel is fed through a circular pendent extension integrally-surrounding the central entrance-orifice of the grate and thereby preventing the  
20 discharge-end of the feed-chute becoming burned or otherwise injuriously affected by the live coals on said grate, and a further object of the invention is to provide a construction of circular-revolving rotary grate  
25 and its supports whereby said grate can be readily removed from the door-side of the ash-pit without removing any of the superstructure above said ash-pit nor removing  
30 any of the parts from within the said ash-pit excepting the gear and its support that are used in rotating said grate.

The invention consists of a rotary grate having a central inlet opening or orifice, a  
35 pendent, circular integral flange surrounding said central orifice of the grate, a suitable ash-pit within which said grate is supported and rotates and a feed-chute entering from one side of said ash-pit with its exit  
40 orifice or mouth engaging the lower edge of said circular pendent rim of the grate; and the invention further consists of a rotary grate having a central inlet-orifice, a circular rim or flange integrally-depending  
45 from said central orifice of the grate, an ash-pit having suitable walls and an opening in which said grate is supported, rollers supported on bearings within said ash-pit and adapted to be engaged by the circular  
50 groove in the under side of the grate, an open or door side forming part of said ash-pit, a feed-chute leading internally from one side of the ash-pit with its exit or discharge orifice duly registering with but independent of the said central pendent flange  
55 on the grate and a shaker device removably-

supported within the ash-pit and adapted to be withdrawn together with the open door-side of the ash-pit so that the said grate can be tilted and raised from engagement with  
60 the exit-orifice of the feed-chute for withdrawing said grate through the open side of the ash-pit without disturbing any of the superstructure above said ash-pit or sectioning said grate. 65

Other features of the invention will be fully described in detail hereinafter and particularly pointed out in the claim.

In the accompanying sheet of drawings, Figure 1 is a plan view of the ash-pit and  
70 base portion of a heater, showing my improved underfeed grate device, the superstructure being entirely removed and omitted; Fig. 2, a cross-section taken through the device on the dotted-line *a, a*, Fig. 1, but  
75 with the shaker-handle raised a quarter of a turn; and Fig. 3, a cross-section showing the ash-pit similar to that in Fig. 2, but with the grate, feed-chute and roller-bearings in elevation and with said grate somewhat elevated above the exit of said feed-  
80 chute and tilted in its withdrawal position, the grate-shaker devices being removed from place and the door-side of the ash-pit omitted for the free withdrawal of said  
85 grate.

In said drawings, 1 indicates the bottom of the ash-pit, 2 the open door-side thereof, 3 the rounded side opposite to that of said open door-side and 4, 4 the opposite longi-  
90 tudinal sides of the ash-pit.

5 indicates the top lid or cover of the ash-pit, having a large circular opening 6, almost its entire diameter and having rear  
95 extensions 7, 7 that project over the opposite ends of the door-side of the ash-pit. The circular portion of the member 5 forms part of the fire-box, a circular grate 8 being supported on rollers 9 with its upper surface  
100 on a level with the under surface of the inner portion of member 5 and coinciding with the opening or orifice 6. The grate 8 has radial slots 10 for ventilation and the dropping of the ashes into the ash-pit below  
105 and a groove 9<sup>a</sup> is made in the under side of the grate near its periphery for engagement with the rollers 9. There are three of the rollers 9, preferably shown in the several positions seen in dotted lines in Fig. 1 and supported in forked brackets 12, one  
110 bracket being secured to the side 3 and the other two brackets to the sides 4, 4 of the



ash-pit. The rim of the circular grate 8 is constructed with gear teeth 13 for engagement with a pinion 14 that is attached to a shaft 15 for revolving with the latter. The shaft 15 has a handle 16, and is supported in a bearing block 17, the latter being, in turn, removably attached by means of bolts 18 to the cross-bar 19 of the cover or member 5 of the ash pit. The cross-bar 19 connects the extensions 7-7 of the member 5, as best seen in Fig. 1, and is preferably made integral with the member 5 and its extensions 7-7. The grate shaker device comprises the parts 14, 15, 16 and 17 that are readily attached to and detached from position for meshing of the pinion 14 with the gear teeth 13 arranged along the periphery of the grate 8.

20 indicates a pendent flange or rim integrally-surrounding the circular opening 21 made centrally in the rotary grate beginning preferably at the inner ends of the radial slots 10 and terminating in a central inlet-opening 22, the latter being best seen in Fig. 1. The flange 20 is preferably in the form of a hollow truncated-cone with smooth sloping inner and outer surfaces, the inner surface having a series of tapered ribs 23 for positively moving the fuel in the rotation of the grate.

24 indicates the inner discharge portion of the feed-chute 25, the latter entering through one of the sides 4 of the ash-pit just below one of the rollers 9, the exit-mouth 26 of said discharge end 24 being flared to suit the inclination of the conical-extension 20 of the grate, as best seen in Fig. 2. The lower end of the conical-extension 20 of the grate rests within said flared end 26 of the discharge portion of the feed-chute so that the upper edge of said flared portion 26 lies somewhat below the bottom of the grate and thus the excessive heat in the ventilated portion of the grate does not sufficiently contact with said flared portion or edge 26 to injure the latter in any manner and the lower end of the cone 20 turns freely within said portion 26 for a central bearing of the grate as there is no warping or roughening of either said cone 20 or flared portion 26 in the use of the device. The fuel passes freely upward through the discharge portion 24 of the feed-chute into and beyond the conical portion 20 of the rotary grate and no part of said fuel escapes from the joint be-

tween said cone 20 and the discharge end of the feed-chute into the ash-pit below.

It will be seen that in the peculiar construction of my device, the rotary grate can be readily removed from place on its bearings within the ash-pit by raising such grate and tilting it into the position seen in Fig. 3, the arrow to the right, in the ash-pit entrance, indicating the direction of withdrawal of the grate through the ash-pit doorway, but it is obvious that the grate shaker-pinion 14, its bearing 17, shaft 15, handle 16 and ash-pit door must be first removed before such withdrawal can be effected through the door-side of the ash-pit. This is an important feature in connection with the use of my device herein, for the reason that no part of the superstructure above the ash-pit need be removed nor disturbed in withdrawing said grate from place or in putting such a grate in place, which frequently happens in connection with repairs to a heater, the grate being the part mostly in need of due repair, all as is well known.

In my form of grate with integral pendent-flange feed-center, the unburned end of the feed-chute renders it unnecessary to remove such feed-chute for repairs, such removal being heretofore requisite when the mouth of the feed-chute was brought up within the central orifice of the rotary-grate.

The grate can be made of a single piece of material and not in sections as is customary in this type of heater, which is also an important feature and enables a true and continuous formation of teeth 13 along the periphery of the grate and a better engagement of the shaker-pinion 14 in connection with said teeth 13.

I claim:—

In an underfeed furnace, the combination with an ash-pit having an open front and a circular opening in its top, of a rotary grate having a central opening surrounded by a depending, truncated cone-shape flange provided on its inner surface with fuel-moving ribs, said grate being mounted on frictional rollers and provided with cog-teeth on its outer periphery, a flaring-mouth feed-chute into which the cone-shape flange is adapted to fit, and means for rotating the grate.

WILLIAM H. JAMES.

Witnesses:

JOHN ELIAS JONES,  
NORMA KEISER.