(No Model.)

E. McFARLAND & L. PASSMORE.

GRATE FOR FURNACES, HEATERS, &c.

No. 337,849. Patented Mar. 16, 1886.

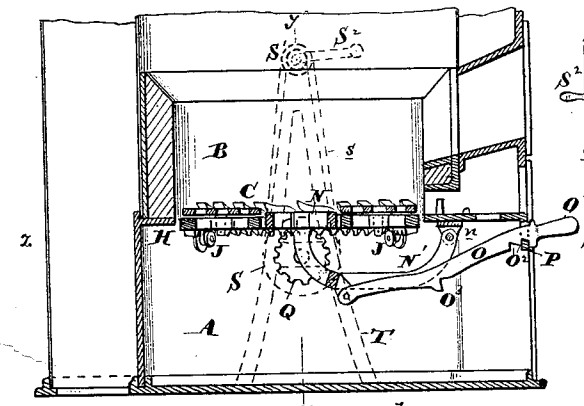


Fig. 1

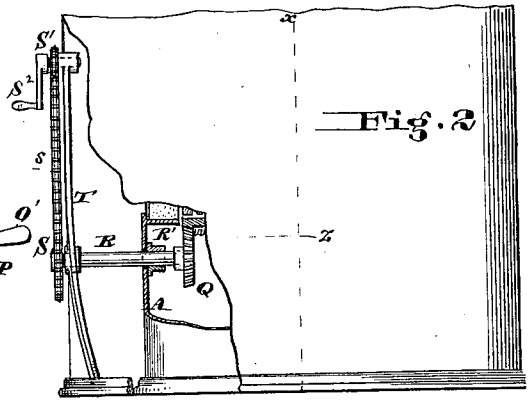


Fig. 2

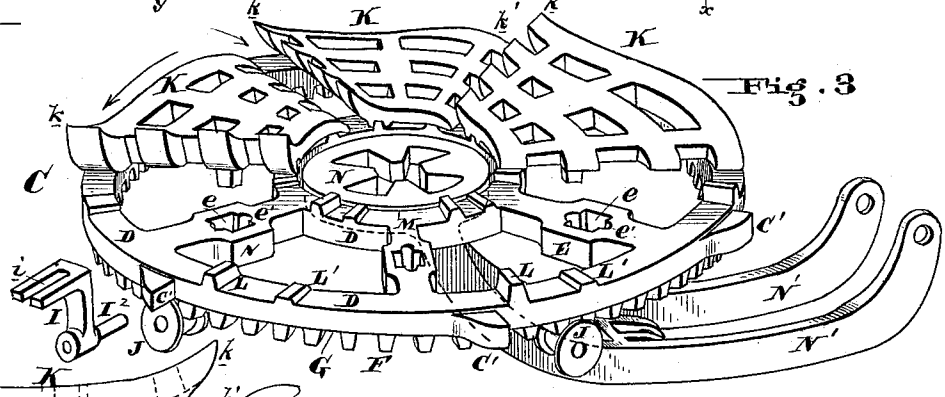


Fig. 3

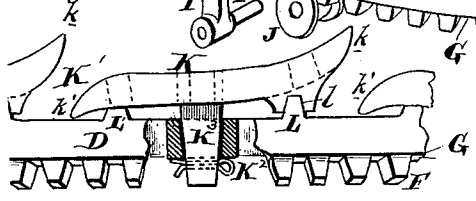


Fig. 4

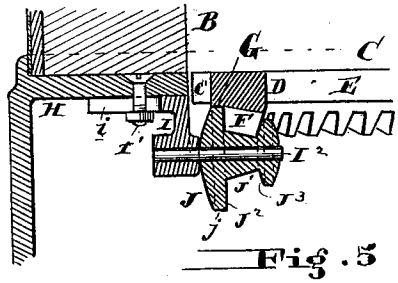


Fig. 5

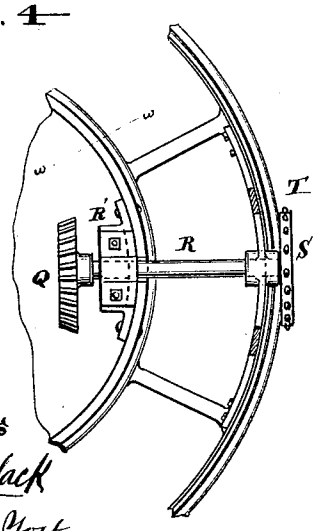


Fig. 6

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UNITED STATES PATENT OFFICE.

EDWARD McFARLAND AND LEVIS PASSMORE, OF PHILADELPHIA, PA.

GRATE FOR FURNACES, HEATERS, &c.

SPECIFICATION forming part of Letters Patent No. 337,849, dated March 16, 1886.

Application filed May 13, 1885. Serial No. 165,291. (No model.)

To all whom it may concern:

Be it known that we, EDWARD McFARLAND and LEVIS PASSMORE, citizens of the United States, residing at Philadelphia, in the county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Grates for Furnaces, Heaters, &c., of which the following is a specification.

Our invention has reference to grates for furnaces and heaters; and it consists in certain improvements, all of which are fully set forth in the following specification, and shown in the accompanying drawings, which form part thereof.

Heretofore in grates formed of rocking bars or rotary reciprocating grates the consumed coal or ashes on the lower part of the fire were very slowly and imperfectly removed through their action, and that, too, with an expenditure of much time and labor.

The object of our invention is to overcome these defects by so forming the grate that it may be rotated continuously in one direction and be made to positively bore out any obstruction to the draft, thus removing all ashes and slag in a speedy and positive manner. This action insures the fire being very hot, and consequently reduces the consumption of fuel required to produce a given amount of heat, avoiding the accumulation of ashes and thereby all obstructions to draft.

In the patent to Doyle, No. 121,236, is shown a reciprocating rotary grate having radial cutting-bars made triangular in cross-section, the upper surface of said cutting-bars being oblique, and the forward or cutting edges vertical, thus forming open passage-ways from above to below the grate.

In our construction the helical cutting-grates are so formed that the forward or cutting edges of one projects over the rear or tail edges of the next, thus forming an oblique passage-way between them, but which is protected from above and prevents the fire falling through, except when positively rotated.

In the drawings, Figure 1 is a sectional elevation, on line *x x*, of the lower part of a furnace provided with a grate embodying our improvements. Fig. 2 is an elevation of same with part in section. Fig. 3 is a perspective view of the grate removed from the furnace and with part of the cutters removed. Fig. 4 is a detail view showing how the cutting-grates are fastened to the revolving frame. Fig. 5 is a sectional elevation, showing how the grate is supported and allowed to rotate, and said section is taken in plane through one of the supporting-rollers. Fig. 6 is a sectional plan view on line *z z*.

A is the ash-pit, and B is the chamber above the grate, which is surrounded with fire-brick which rests upon the annular flange H in the usual manner.

C is the grate proper, and consists of a circular motive frame formed of two concentric rings, D, connected by radial arms E, and upon which the cutting-grates K are supported. The outer ring, D, is provided with an annular bearing, G, and bevel-teeth F, which rest upon the anti-friction rollers J, loosely carried upon bearings I^2, secured to the adjustable brackets I, which are furnished with slot *i*, through which bolts I′ pass, whereby said brackets are adjustably secured to the flange H. These anti-friction rollers J are formed with two flanges of different diameters, connected by a tapering hub, J′, the inner face, J^2, of the larger flange being made flat, while the inner face, J^3, of the smaller flange is made inclined. The object of this construction is to enable said rollers to properly hold and support the motive ring-frame of the grate. While the frame rests upon the flanges *j* of the rollers, the teeth F thereof fit down into the grooves and insure the rotating grate being properly and positively guided in its rotation.

The grates K are formed fan-shaped, and have their upper surfaces helically curved, the forward ends rising in the form of cutting-teeth above the rear ends of the preceding grate, the two being separated by a space, K′, through which the ashes, separated by the boring action of the cutters, is caused to pass from above the grate down into the ash-pit. These grates K have the downwardly-extending and preferably tapering prong K^3, which extend through holes *e* in the arms E, and may

be secured therein by pins K^2. *e'* are air-spaces around said pins, extending up through said arms E and prevent the said arm and prong from becoming burned.

The rings D of the motive grate-frame are provided with the lugs L L', the former of which supports the grates at their rear ends, thereby holding the grates clear of the supporting-frames, allowing free circulation of air and also giving a positive connection by which the backward thrust in the act of cutting is distributed over three points of connection between the said grates and their supporting-frames. The outer periphery of the grate-frame is provided with a series of teeth or projections, C', the function of which is to scrape the collecting ashes and coal from between the flange H and the grate and keep a clear open air passage-way. The grate is rotated by a bevel-wheel, Q, secured to a shaft, R, which extends from the outside of the furnace into the ash-pit thereof, passing through a dust-tight journaled box, R', which prevents the passage of dust from the shaft into the hot-air space of the furnace. The outer end of the shaft R is journaled in the frame T and carries a sprocket-wheel, S, which is connected by a chain, *s*, with a sprocket-pinion, S', journaled in the upper part of the frame T and adapted to be rotated by a crank, S^2. By this means a small amount of power exerted on the crank will with facility rotate the grate, overcoming all resistances in the bed of coal supported thereon, cutting away the under part thereof and insuring the entire fire being thoroughly cleaned.

The center part of the grate-frame is made circular, forming an aperture, M, into which fits a removable grate, N, hinged by arms N' to a bracket, *n*, secured upon the under side of the flange H and directly in front of the door.

Hinged to the arms N' is a lever, O, which extends through the front part, P, of the furnace and is provided with a handle, O', and notches O^2, and stop O^3, the former of which, by catching upon the part P of the furnace, holds the grate N fully up in its position or just slightly below the frame of the grate C, whereby a poker may be inserted and any clinkers can be thrust down into the ash-pit without dropping the center of the fire out or by letting the grate end fully down, the movement being arrested by stop O^3, in which case the entire center of the fire may be dropped out and the contents of the furnace pushed down into the ash-pit.

In case any grate K becomes burned out, another grate may be inserted without putting out the fire by simply scraping away coal, and after withdrawing the burned grate drop a new one into position.

We do not limit ourselves to the particular constructions shown, as they may be modified in various ways without departing from our invention.

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

1. A rotary furnace-grate provided with cutting teeth or grates by which a rotation of the grate cuts positively into the ashes and cinders, forcing them from above to below the same, the forward or cutting edge of one grate extending above the rear or tail edge of the grate next behind it, so as to form an oblique passage-way, substantially as and for the purpose specified.

2. A rotary grate provided with a circle of separate and removable inclined teeth or grates upon its upper surface, the cutting-edge of each of said teeth or grates overlapping the rear portion of the one succeeding it, substantially as described.

3. A rotary grate provided with a circle of separate removable inclined teeth or grates upon its upper surface, the cutting-edge on each of said teeth or grates overlapping the rear portion of the one succeeding it and in which the teeth are of less width than the radius of the grate proper, forming a circular opening in the center, in combination with a stationary grate which fits into and fills said opening, substantially as described.

4. In a furnace, a rotary grate having gear-teeth, in combination with grooved supporting-rollers to receive the gear-teeth of the grate positively supporting and guiding it, a bevel-pinion meshing therewith, and a shaft secured thereto and extending from within the ash-pit to the outside of the furnaces, by which said grate may be rotated, substantially as and for the purpose specified.

5. In a furnace, a rotary grate having gear-teeth, in combination with grooved supporting-rollers to receive the gear-teeth of the grate positively supporting and guiding it, a bevel-pinion meshing therewith, and a shaft secured thereto and extending from within the ash-pit to the outside of the furnace by which said grate may be rotated, and sprocket-wheels, chain, and crank to rotate said shaft, substantially as and for the purpose specified.

6. The combination of the frame D E with helical cutter-grates K, in which their forward ends, *k*, are raised and their rear ends depressed, and in which the surface between the ends K K' is practically horizontal, substantially as and for the purpose specified.

7. The combination of the frame D E, having holes *e*, with the removable helical cutter-grates K, in which their forward ends are raised and their rear ends depressed, and their center provided with a shank, K^3, substantially as and for the purpose specified.

8. A rotary grate having beveled teeth F and flange G, in combination with anti-friction wheels J, formed with large flange *j*, upon which the grate rests, and groove J', shaped to conform to the gear-teeth on the grate-frame flange, said roller being used to support said flange and receive the teeth, and

thereby guide the grate-frame and keep it in position, substantially as and for the purpose specified.

9. The frame of a rotating grate having beveled teeth F and flange G, anti-friction wheels J, formed, substantially as shown, to support said flange and receive the teeth, and adjustable brackets to carry said wheels, in combination with the frame of the furnace, substantially as and for the purpose specified.

10. The frame D E, having lugs L L′, and hole *e*, in combination with helical grates K, having notches *l*, and shank K^3, substantially as and for the purpose specified.

In testimony of which invention we have hereunto set our hands.

EDWARD McFARLAND.
LEVIS PASSMORE.

Witnesses:
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