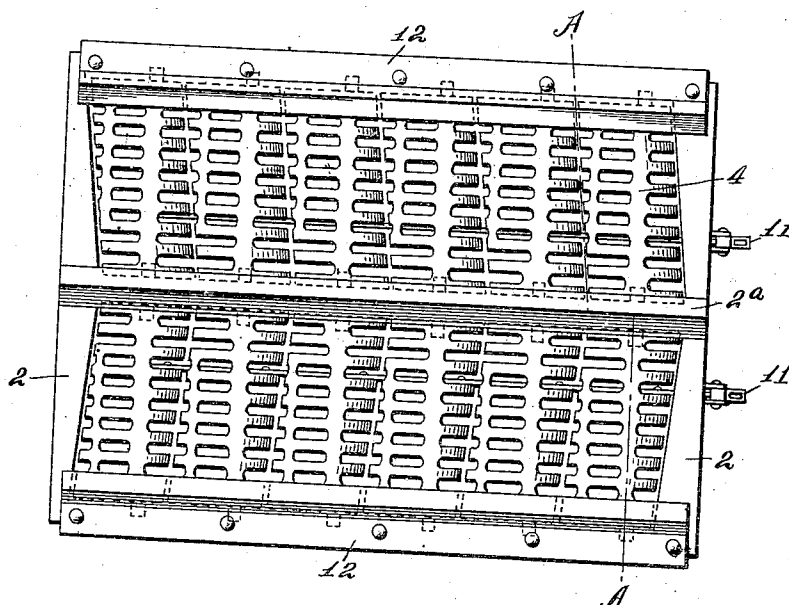


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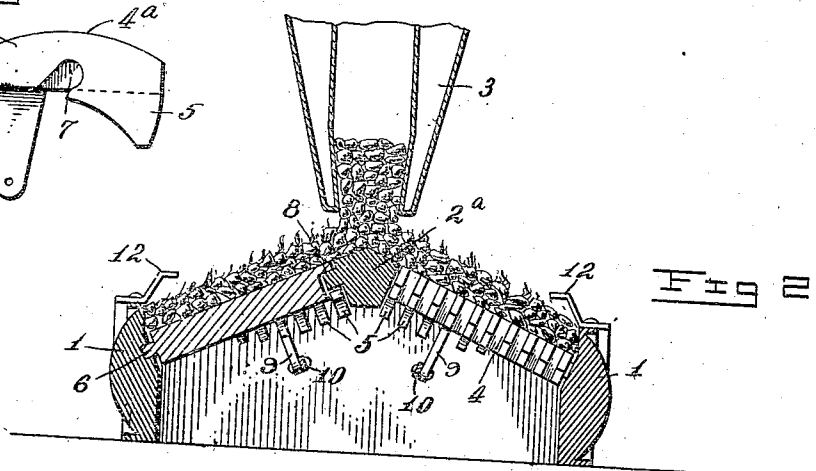
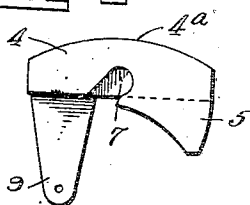
Patented Aug. 30, 1910.

2 SHEETS—SHEET 1.

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Witnesses

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GRATE.

APPLICATION FILED APR. 27, 1909.

968,735.

Patented Aug. 30, 1910.

2 SHEETS—SHEET 2.

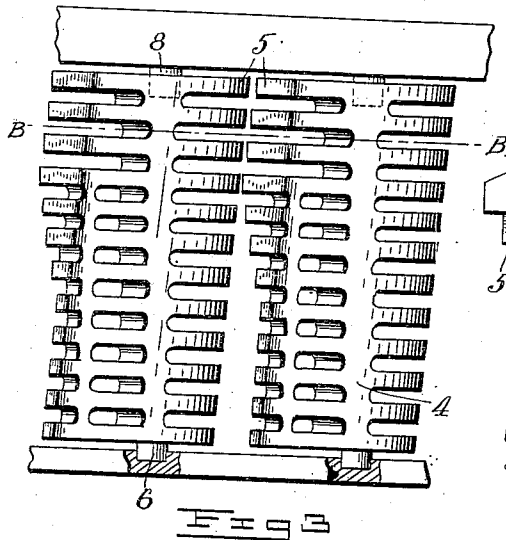


Fig 2

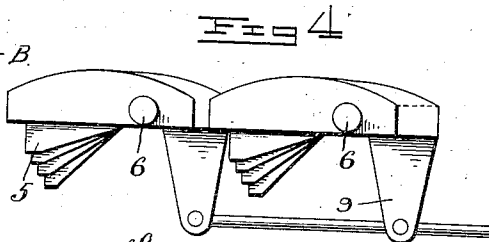


Fig 4

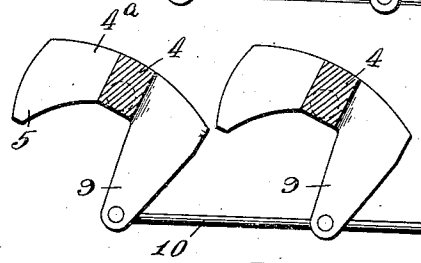


Fig 5

Fig 7

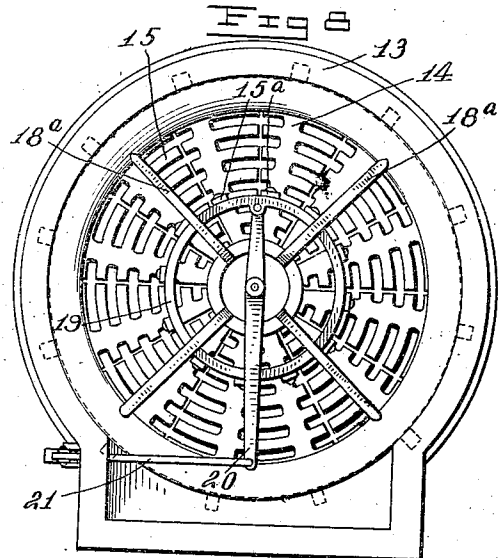
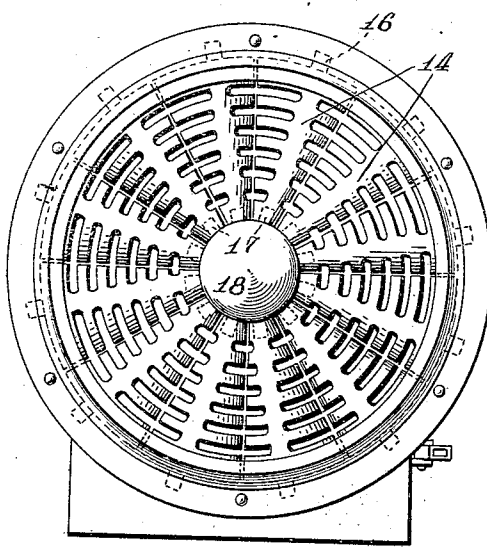


Fig 8

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UNITED STATES PATENT OFFICE.

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GRATE.

968,735.

Specification of Letters Patent. Patented Aug. 30, 1910.

Application filed April 27, 1909. Serial No. 492,523.

To all whom it may concern:

Be it known that we, DAVID BOIES and JOSEPH A. WADDELL, Jr., both citizens of the United States, and residents of Scranton, in the county of Lackawanna, State of Pennsylvania, have invented certain new and useful Improvements in Grates, of which the following is a specification.

This invention relates to grates of that general type employed by heaters disclosed in prior patents of applicants Nos. 399,443, 346,646 and 348,806, and has for its purpose to provide a grate wherein the fuel is evenly distributed throughout the surface of the grate whereby a more uniform and perfect heating of the boiler surface is effected.

The invention is particularly applicable to inclined or ridge shaped grates that are fed from a hopper or magazine located above and intermediate of the grate. It is, however, equally as applicable to a conical grate or to a grate wherein the feed takes place at the two outer edges of a grate sloping toward a central line. Also it may be employed with the grate bars extending continuously from the highest to the lowest part of the grate or with a grate in which the grate bars are divided intermediately and the parts independently oscillated for the purpose of shaking the grate. According to the present practice grates of this type are arranged at an inclination substantially parallel to the natural slope assumed by the pile of fine coal fed upon the grate, so that a fire-bed of uniform thickness from the top to the bottom is produced.

The object of the present invention, and which by practical demonstration has proven to be highly satisfactory, is to avoid shaking through fine coal at the apex or point of feeding of the grate while agitating it sufficiently to cause the coal to feed from the hopper or magazine; and at the same time to produce the necessary agitation and grate openings at the lower ends of the grate bars, or at the bottom of the grate, to insure full discharge of the ash or spent fuel.

With these objects in view our invention is described in the course of the following specification, and set forth in the claims.

Referring to the accompanying drawings wherein is shown the invention in its preferred structure, Figure 1 is a plan view of a grate of the ridge type and disclosing

the present invention, Fig. 2 is a transverse sectional view of the same taken along the line A—A, Fig. 3 is a top plan view of two grate bars disclosing the same in partly opened position. Fig. 4 is an end elevation of two of the grate bars, Fig. 5 is a similar view in section taken along the line B—B of Fig. 3 and showing the manner of operation, Fig. 6 is an end elevation of a single bar opposite to that shown in Fig. 4, Fig. 7 is a top plan view disclosing the application of the invention to a conical grate, and Fig. 8 is a bottom plan view of Fig. 7.

Referring to the several views, wherein like numerals of reference indicate corresponding parts in the different views shown, the invention comprises a plurality of grate bars 4 suitably mounted to oscillate within a fire-place 1, the ends 2 of which slope upwardly to an intermediate point on which is supported a ridge or bar 2^a whose upper faces incline within the plane of the slant of the grate bars 4. Said grate bars are trunnioned at their upper and lower ends to effect which said bars are provided with trunnions 6 at their lower ends that seat within bearings in the sides of the fire-place 1, and at their upper ends said bars are recessed as at 7 for the reception of projections 8 formed to either side of the ridge or supporting bar 2^a.

The grate bars 4 are curved on their upper surfaces as shown at 4^a and are provided with a plurality of flanges 5, the spaces between which provide the draft necessary to support combustion. The upper ends of the grate bars are centrally trunnioned so that with the circular upper surfaces, there is a relatively small agitation of the coal, although the trunnion is not concentric with the greatest surface and therefore there is some agitation—sufficiently to cause feeding of the fuel from the hopper. As disclosed in Fig. 4, the flanges on each bar are of varying dimensions, said flanges coöperating with the sides of their respective adjacent bars whereby to effect variable openings between said bars when the bars are oscillated, said openings having an increasing width away from the fuel feeding portion of the grate. By this arrangement, the fuel is prevented from falling through between the bars at the point of feeding, and the ash of the fuel is permitted to pass through along the lower sides of the grate.

The further feature of the invention and one which renders the operation of the grate positive in its action is in having the axis of oscillation of the grate bars disposed at a diagonal to the sides thereof, so that the fuel in gravitating, is subjected to considerable lateral displacement and, therefore, more effective treatment inasmuch as it crosses the bars in its descent, and there is also afforded by this arrangement considerable space on the agitation of the bars for the escape of the ash, clinkers, etc.

The means for oscillating the bars comprises a downwardly depending member 9 on each bar which has on its lower point pivotal connection with a common bar 10 and that bar in turn connects with a pivoted lever supporting means 11 by which latter means the several grate bars are oscillated in unison as will be obvious.

Along each of the upper sides of the fire-place there is an inwardly disposed guard plate 12 adapted to keep the fuel from overriding the fire-place.

The fuel hopper or magazine 3 is disposed above the grate bars and precisely over the central or upper supporting ridge 2^a whereby the fuel is evenly distributed upon said bar and which by reason of the peculiar disposition of the bars and their manner of operation, is caused to travel in substantially the proportions of feeding across the entire surface of the grate.

Referring to Figs. 7 and 8 wherein is shown the application of the invention in a modified form to a grate of the conical type, the numerals 14 indicate the grate bars constructed substantially along the lines of those above described and which in like manner are trunnioned at their lower ends 16 within a circular fire-place 13 and at their upper ends 17 within a common central conical member 18. The axis of oscillation of the bars 14 is disposed in like manner to that shown and described of the foregoing figure whereby the supporting area of each bar is varied from one end to the other when the bars are oscillated. The means for actuating this type of grate comprises a spider 18^a fixed within the fire-place and adapted to movably support a ring 19 which has pivotal connection with the members 15^a depending from the grate bars 14, so that by agitation of the connecting levers 20 and 21 the several bars are oscillated on their trunnions as will be obvious.

Having thus described the invention, what we claim as new therein and desire to secure by Letters Patent, is:—

1. A grate comprising a suitable support and rigid grate bars having bearings adapting them to oscillate in said support, flanges on each of said bars adapted to cooperate with the next adjacent bar and effect an opening of relatively increasing width be-

tween the bars from the middle of said grate to either side thereof, when the grate bars are oscillated.

2. A grate comprising a suitable support and rigid grate bars having bearings adapting them to oscillate in said support; said bearings being located to fix the axis of oscillation at an angle to the sides of the grate bar, and flanges on each grate bar cooperating with the next adjacent bar whereby the fuel supporting area of each bar is varied from one end to the other when the grate bars are oscillated.

3. A grate comprising a plurality of bars having means for actuating the same to shake the grate; a fuel feeding hopper disposed above and centrally of the grate; lateral flanges having depending portions of varying width on each bar adapted to cooperate with the sides of the next adjacent bar and effect an opening of decreasing width between the bars from said hopper when said bars are oscillated.

4. A grate comprising a plurality of bars having means for actuating the same to shake the grate; a fuel feeding hopper disposed above and centrally of the grate; lateral flanges having depending portions of varying width on each bar adapted to cooperate with the next adjacent bar when said bars are actuated and effect an opening between the bars of increasing width from said hopper to the outer sides of the grate.

5. A grate comprising a suitable support and grate bars having bearings adapting them to oscillate in said support, a fuel feeding hopper disposed above and centrally of the grate; said grate bar bearings being located to fix the axis of oscillation at an angle to the longitudinal axis of said grate bars, flanges having depending portions of varying width on each bar adapted to cooperate with the next adjacent bar when said bars are actuated and effect an opening between the bars of increasing width from said hopper to the outer sides of the grate.

6. In combination with a grate comprising a plurality of bars having means for actuating the same to shake the grate and open spaces between said bars, means for feeding fuel to the grate, and flanges having depending portions of varying width carried by each of the bars and adapted to cooperate with the next adjacent bar when said bars are actuated, whereby the degree of opening between the bars increases from the fuel feeding point.

The foregoing specification signed at Scranton, Pa., this 29th day of March, 1909.

DAVID BOIES.
JOS. A. WADDELL, Jr.

In presence of two witnesses—

J. J. BELDEN,
E. A. STIMPSON.