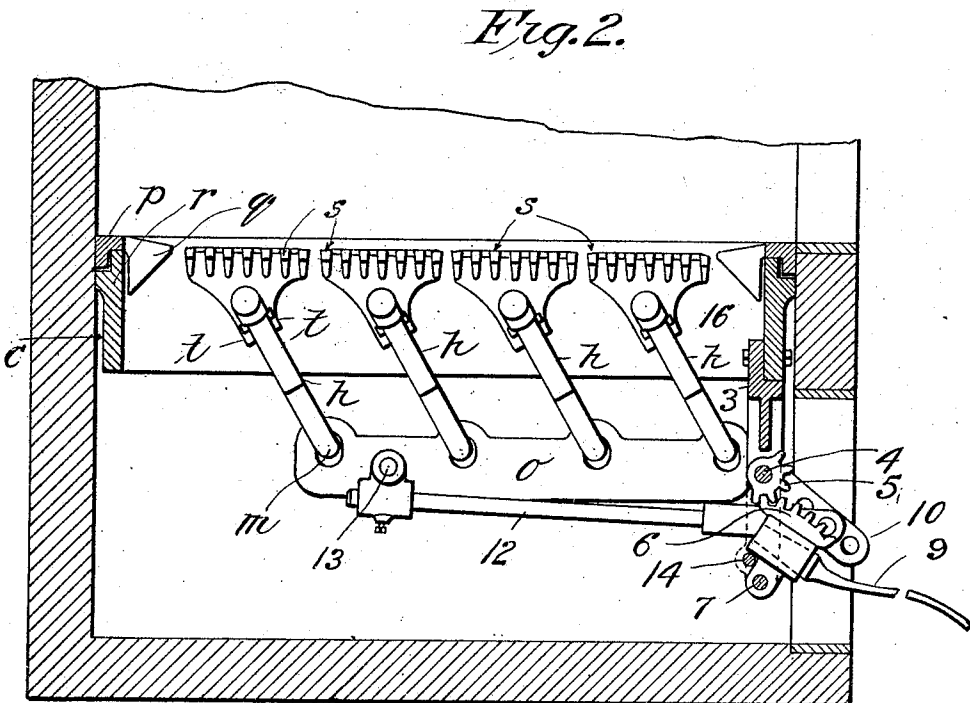
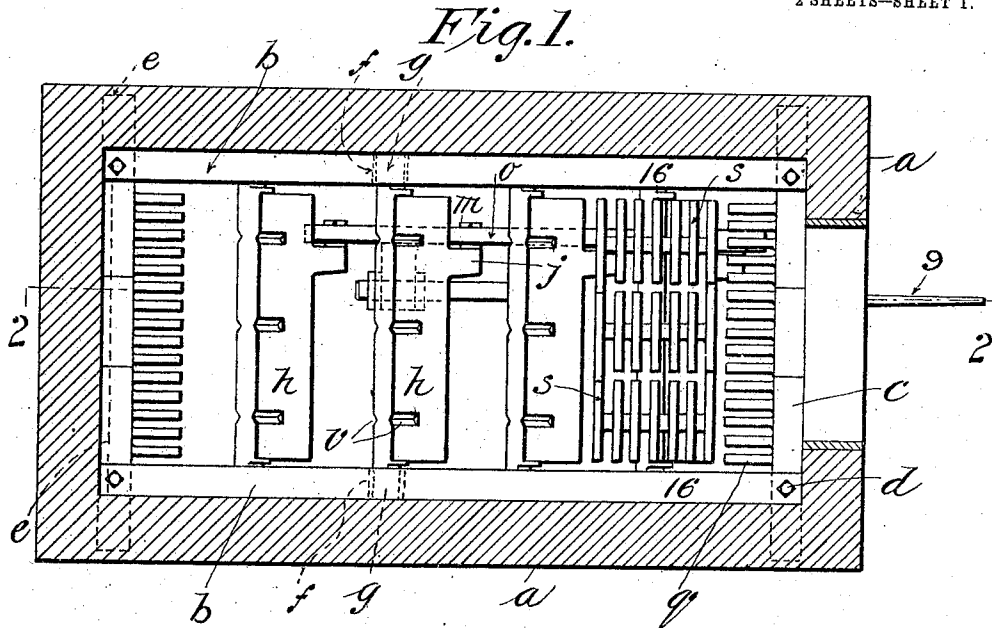


940,849.

Patented Nov. 23, 1909.

2 SHEETS—SHEET 1.



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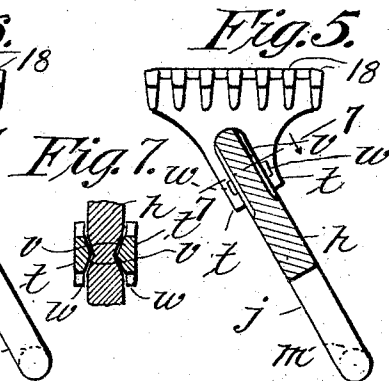
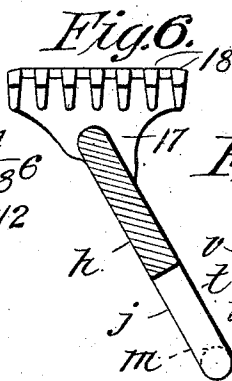
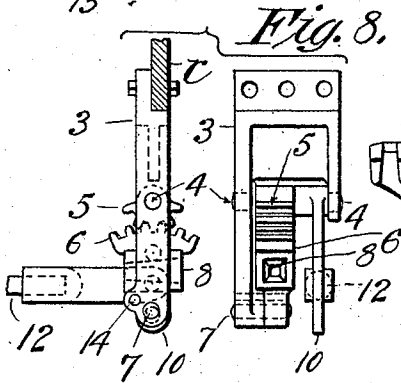
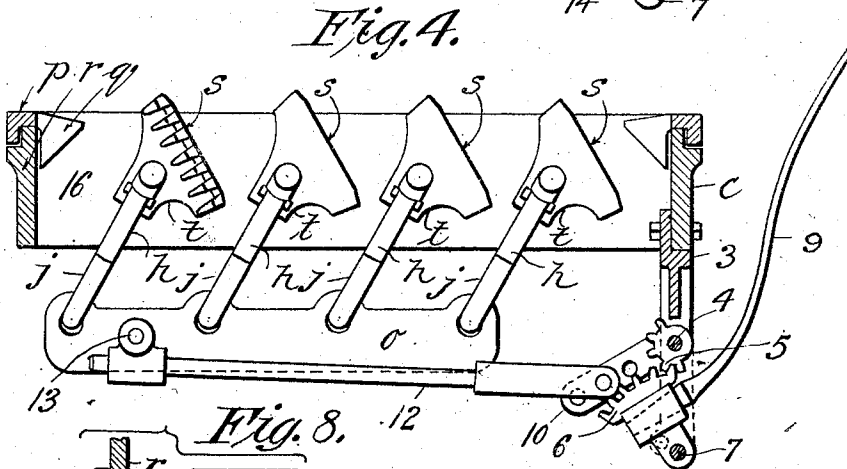
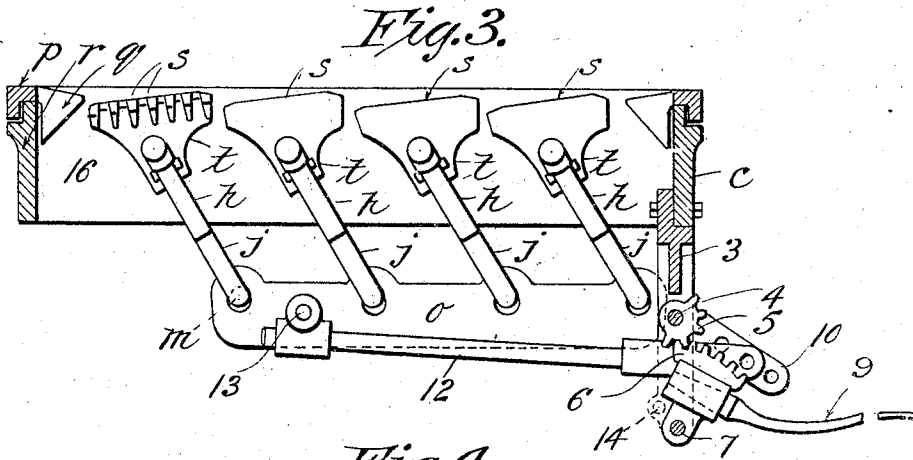
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FURNACE GRATE.
APPLICATION FILED OCT. 28, 1905.

940,849.

Patented Nov. 23, 1909.

2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

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FURNACE-GRATE.

940,849.

Specification of Letters Patent.

Patented Nov. 23, 1909.

Application filed October 28, 1905. Serial No. 284,835.

To all whom it may concern:

Be it known that I, WILLIAM H. BAUSH, a citizen of the United States of America, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Furnace-Grates, of which the following is a specification.

This invention relates to grate construction for furnaces and is particularly adapted for use in such furnaces as are installed under steam boilers, the object of the invention being to provide a furnace in which the surface of the grate consists of removable toothed sections loosely mounted on the upper edge of rocker-bars extending in parallelism transversely of the furnace, the construction of these removable sections and of said bars being such that when the rocker-bars are swung in one direction from their normal position, the action of the said removable surface sections will be to only break up the clinkers and shake down the fire while movement of the rocker-bars in the opposite direction from the normal operates to open wide spaces between said sections whereby the material supported on the grate may be dumped into the ash-pit. From this it will be seen that one of the distinguishing characteristics of the invention lies in the provision of means whereby when the rocker-bars are swung in one direction from the normal it will be impossible to dump the fire; whereas, when the rocker-bars are swung in the opposite direction from the normal an unusually wide space is provided between the movable sections referred to, whereby the dumping operation may be greatly facilitated; thus the shaking and breaking up of the clinkers may be effected without any possibility of producing openings between the surface sections of the grate which will permit the dropping of the fire, and the opening through which this dumping is effected and which is usually distributed equally on opposite sides of the removable grate section is, by means of this invention, located entirely on one side.

A further object of the invention lies in a compact and efficient mechanism for transmitting the oscillating movements to the rocker-bars; other objects of the invention residing in the general construction and arrangement of the parts of the structure as a whole, all as will more fully appear in the

following specification and be carefully pointed out in the claims.

The invention is clearly illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of a grate constructed according to this invention, certain of the removable sections of the grate being omitted and the furnace walls being in section. Fig. 2 is a sectional elevation of Fig. 1 taken on line 2—2 of this last named figure, the section, however, not running through the rocker-bars. Fig. 3 is a sectional elevation of the grate showing the rocker-bars when swung to one side of their normal position to impart the desired shaking action. Fig. 4 is a sectional elevation like Fig. 3, but showing the rocker-bars swung in the opposite direction to the shaking position, whereby wide openings are provided between the removable surface sections of the grate to permit the dumping of the latter. Fig. 5 shows a rocker-bar in sectional end elevation with a removable section of grate applied to the upper edge thereof and illustrates the mode of construction adopted to maintain the upper surface of the removable section in a proper horizontal position while permitting their easy removal. Fig. 6 shows a modification of the construction in that the grate section and the rocker-bar are cast in one piece. Fig. 7 is a transverse section through Fig. 5 on line 7—7, more fully illustrating the mode of applying the removable grate section to the rocker-bar. Fig. 8 shows, in front and side elevation, the shaking and dumping mechanism suspended from the lower front edge of the grate-frame, as shown in Figs. 2, 3, and 4.

Referring to the drawings, *a* indicates the furnace-wall; *b* the sides, and *c* the end members of a box-like frame in which the grate is supported, the end and side members of this frame being secured together rectangularly as shown by means of bolts *d* at the corners, the end members extending, as shown in dotted lines, beyond the sides of the frame and entering the furnace-wall to support the frame, all of which is common construction.

In the opposite sides of the frame-members *b* holes *f* are provided to receive the trunnions *g* cast on the ends of the rocker-bars *h*. These bars are carried in the frame in parallelism one with the other, and near

one end thereof each is provided with a depending arm *j* on the lower end of which is a short arm *m* parallel with the rocker-bar; and loosely hung on these short arms is a connecting-bar *o* with which a shaking and dumping mechanism is connected which will be described farther on. These rocker-bars are practically flat plates and they are inclined toward the door of the ash-pit, as shown in Figs. 1 and 2, because in this position they serve to deflect the air up through the grate and facilitate the combustion of the fuel evenly over the grate surface.

By means of the bar *o* all the rocker-bars may be moved in unison, and at the forward and rear end of the frame of the grate, a bar *p* carrying "dead" teeth *q* is fitted over an upstanding rib *r* on the end-frame *c*. While these "dead" teeth are not absolutely essential elements of the grate construction, they are usually employed as it permits the movable elements of the grate surface to be located at such a distance from the end-walls of the frame as to render their operation and construction more convenient and efficient.

As shown in the various drawings, the surface of the grate is made up of the toothed removable sections *s* which are provided with depending lugs *t* constructed to fit astride of the upper edge of the rocker-bars *h*, the sides of the latter, as shown in Figs. 1, 5, and 7, being provided with channels *v* which are clearly shown in Fig. 7 and in which the lugs *t* have a sliding fit whereby the removable sections *s* are prevented from tipping or moving sidewise when placed on the rocker-bars.

To still further assure the maintenance of the proper position of the removable sections *s*, bosses *w* may be cast on the lugs *t* transversely thereof to give a broader bearing on the rocker-bars and prevent any twisting movement thereof relative to the rocker-bars.

When the grate is shaken or dumped, the sections *s* are prevented from lateral displacement by extending the teeth *s* at each or one end of the sections in opposite directions to bring them to a bearing against the similarly located teeth of the other contiguous sections, and this contact serves to hold the sections against lateral displacement.

One of the essential features of this invention consists in casting the lugs *t* obliquely on the underside of the sections *s* relative to the plane of the grate surface, whereby the normal position of the rocker-bars *h* will be inclined relative to the grate surface, as shown in Figs. 2, 3 and 4. And while it is most desirable that the sections *s* which make up the grate surface should be removably supported on the rocker-arm owing to the many conveniences and economies resulting from this construction, these parts may be cast in one piece as shown in

Fig. 6, without impairing the efficiency of the shaking and dumping features of this grate construction which have been referred to above.

To operate the grate-bars to shake up the fire or to dump the same, the following mechanism has been provided whereby the necessary swinging movement may be imparted to the rocker-bars.

On the lower edge of the forward end of the grate-frame, a plate 3 is bolted, reference being had to Fig. 8 particularly, in which this plate is shown in end and front elevation. It is provided with two down-hanging arms, as shown, between which is hung a shaft 4 carrying a broken gear 5 in mesh with a segmental gear 6 pivotally supported on a stud 7 at the lower end of the longer of said arms of the plate 3 and below the shaft 4. On the body of this segmental gear, a rectangular pocket 8 is provided opening toward the ash-pit door into which a shaker-bar 9 may be inserted whereby the segmental gear may be oscillated on its supporting stud 7 to rotate the broken gear 5 in opposite directions, the latter being provided with an arm 10 which, by this movement, may be swung back and forth and by means of the connecting-rod 12, pivotally supported on the arm 10 at one end and pivotally connected by a bolt 13 at its opposite end to the bar *o* thus imparts to the rocker-bars oscillating movements.

Near the lower end of the long arm of the plate 3 is a stop-pin 14 so located relative to the segmental rack 6 as to arrest the swinging movement of the latter toward the ash-pit door, at such a point as will locate the upper surfaces of the removable sections *s* all in the same plane, which is a horizontal one.

Obviously, the weight of the rocker-bars *h* being hung in a frame as they are by their upper corners and also the weight of the bar *o* has a tendency to cause the rocker-bars to swing down to vertical position, and this will always cause the segmental gear to bring up against the stop-pin 14.

To effect the shaking of the grate, the bar 9 would be raised from the position shown in Fig. 2 to that shown in Fig. 3 and then swung back again thereby moving the sections *s* from their level position to that shown in Fig. 3 and back again whereby the fire will be lifted; and the clinkers caught between the contiguous edges of the sections *s* will be broken up and dropped through to the ash-pit.

When it is desired to dump the grate, the stop-pin 14 is removed and the shaker-bar 9 swung upwardly, whereby, owing to the angular relation of the surface of the sections *s* relative to the rocker-bars *h*, the movement of these from the position shown in Fig. 2 to that shown in Fig. 4 opens so wide a space

between the sections *s* that the dumping of the grate is quickly effected. If the rocker-bars occupied a rectangular position relative to the surface of the grate sections only one-half of the width of the spaces 16 shown in Fig. 4 would be available for dumping, and these would be located on the opposite sides of each section. The present construction therefore makes it far more convenient to shake down the fire and eliminates the possibility of over-doing it by the creation of too wide an opening between the grate-sections; but it provides a far more efficient dumping-grate and the weight of the rocker-bars and of the bar *o* in their tendency toward a position of rest, aid in imparting the necessary momentum to swing these parts to the position shown in Fig. 4 to dump the fire.

The grate sections *s* are, as shown in Fig. 5 particularly, provided with a vertically disposed web 17 the lower portion of which constitutes the lugs *t*, said web running transversely of the rocker-bar; and extending across this rib parallel with the rocker-bar are the webs or arms 18 whose upper surface constitutes the grate surface.

In Figs. 3 and 4 the sections *s* are shown only in outline, the teeth 18 being omitted.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States, is:—

1. In a shaking and dumping grate, a frame, a series of rocker-bars pivotally mounted therein and having depending portions below the pivot of the same, said rocker-bars being arranged parallel to each other and inclined toward the front of the frame, each bar being provided with de-

pressions *v* in the sides of the same, a series of individual grate-sections mounted on said bars and having slotted lugs for engaging the depressions in the bars, whereby the grate-sections are prevented from transverse displacement, and lugs on the ends of said sections for preventing the longitudinal displacement of the grate sections with relation to the rocker-bars, a depending arm on the frame, a broken gear thereon, a segmental gear also on the depending arm and meshing with the broken gear, a bar connecting the rocker-bars, a link connected to said bar and extending to and connected with the broken gear, means for rotating the segmental gear whereby the grate sections are placed so that their normal upper surfaces are inclined either toward or away from the front of the frame, as described.

2. A grate construction comprising a frame, rocker-bars hung therein, a connecting piece for said bars, a link for operating the bars, grate sections carried by the bars, an arm on the frame, a broken gear thereon, an arm connected to the broken gear and connected to the link, a segmental gear also mounted on the arm and meshing with the broken gear, a removable pin on the arm carrying said gears and in the path of the segmental gear whereby movement of the same in one direction is prevented, and means for effecting the rotation of the last mentioned gear whereby the grate sections are placed in shaking and dumping positions, as described.

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