

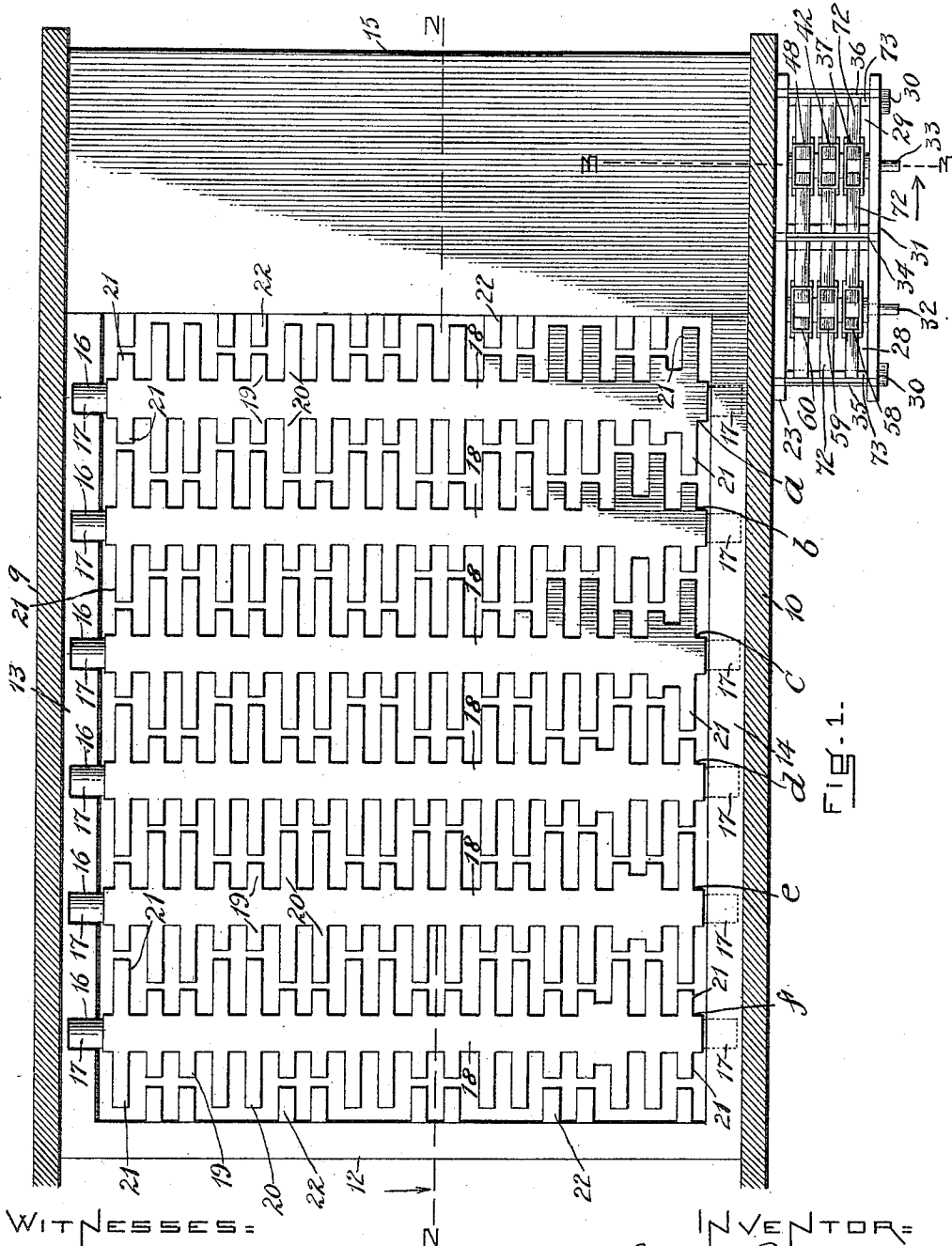
H. H. RUGGLES.
GRATE.

APPLICATION FILED MAY 7, 1909.

971,565.

Patented Oct. 4, 1910.

3 SHEETS-SHEET 1.



WITNESSES:
M. A. Atwood.
Frederick A. Higgins

INVENTOR:
Horace H. Ruggles.
By Henry Williams
ATTY.

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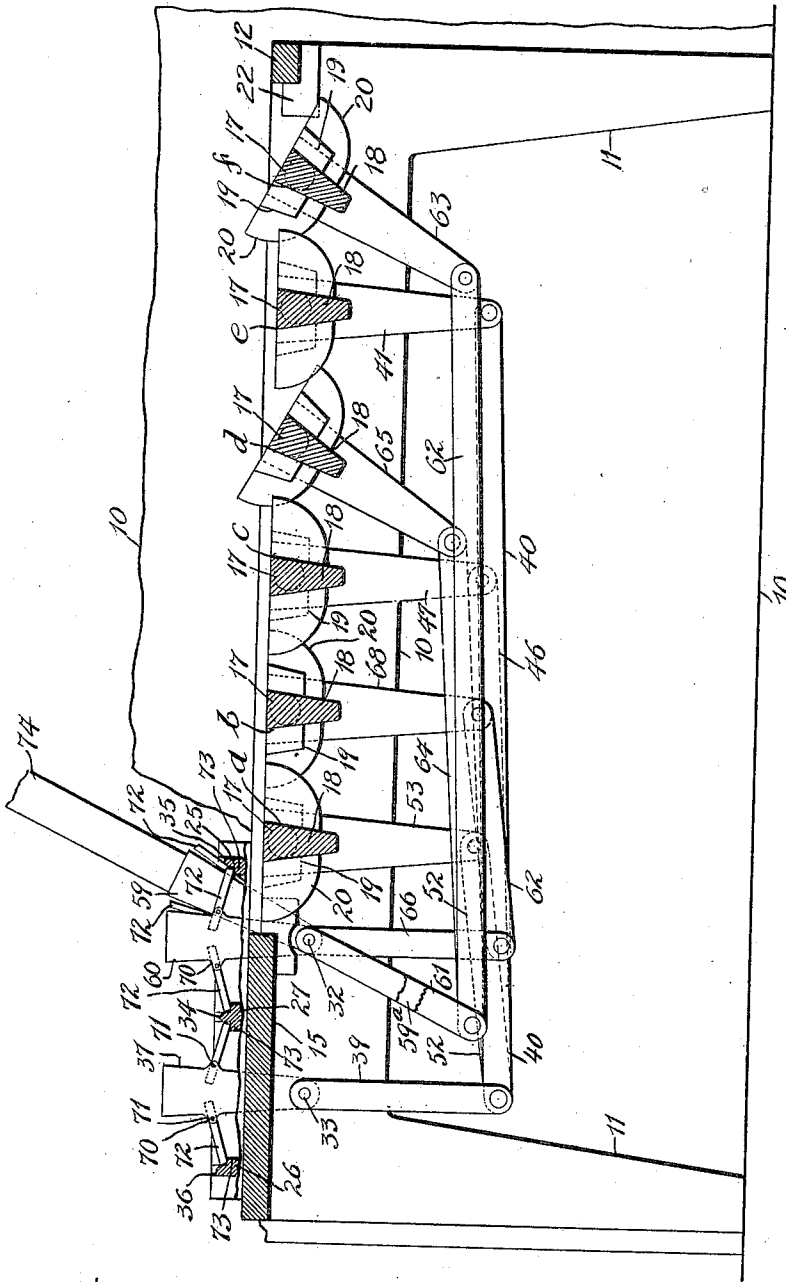


FIG. 2.

WITNESSES:

M. A. Atwood
Frederick A. Higgins

INVENTOR:

Clarence H. Ruggles,
By Henry Williams
Atty.

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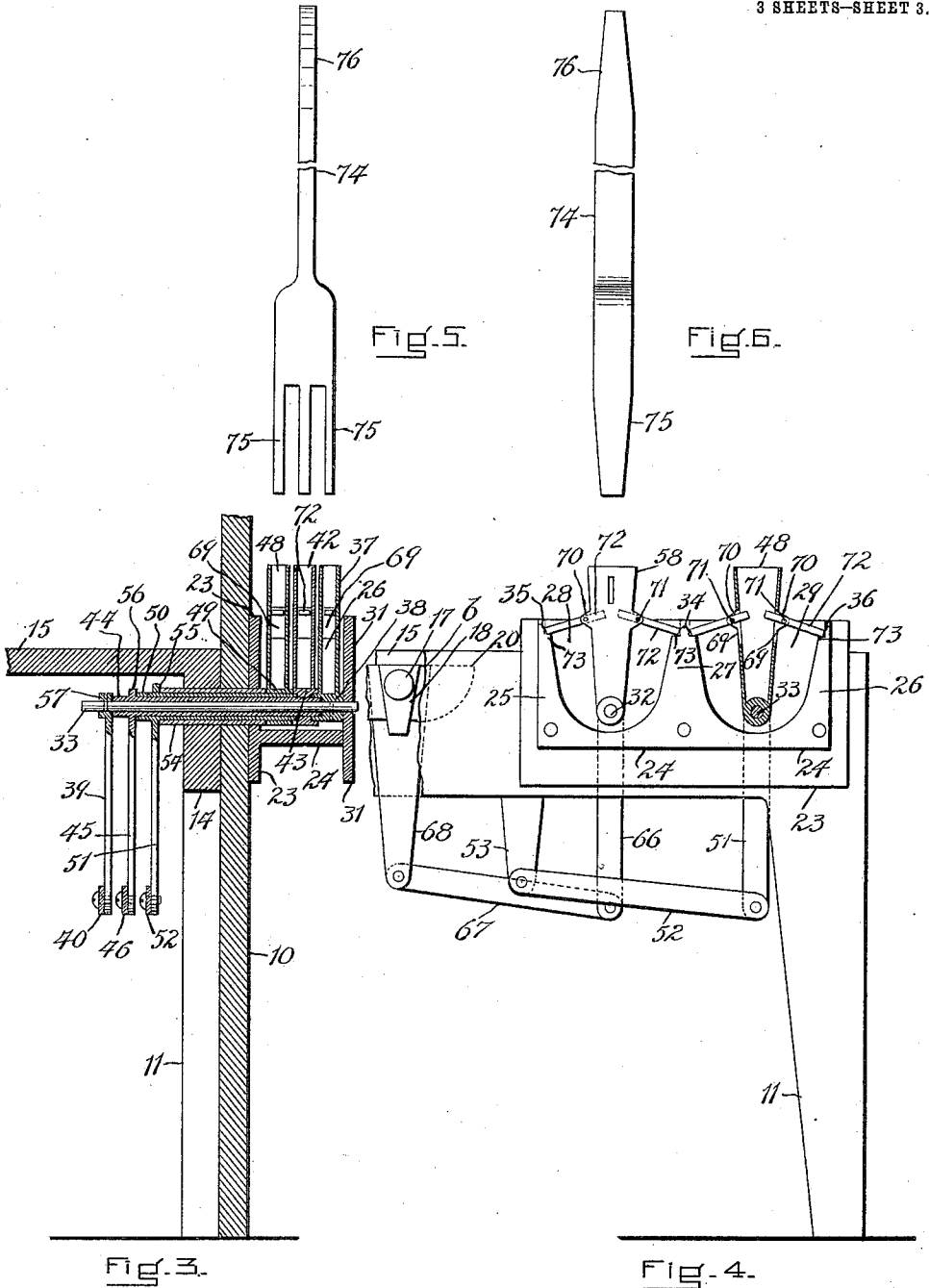


FIG. 3.

FIG. 4.

WITNESSES.

M. A. Atwood
Frederick A. Higgins

INVENTOR

Horace H. Ruggles
By Henry Williams
Atty

UNITED STATES PATENT OFFICE.

HORACE H. RUGGLES, OF BOSTON, MASSACHUSETTS.

GRATE.

971,565.

Specification of Letters Patent.

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To all whom it may concern.

Be it known that I, HORACE H. RUGGLES, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Grates, of which the following is a specification.

This invention relates to improvements in grates, more particularly such as are adapted for use in steam-boiler furnaces, although the mechanism described may be used in connection with any furnaces or stoves to which it is applicable: and the invention relates specifically to that class of grates in which the grate comprises a plurality of sections, each section comprising a rocking grate-bar and teeth extending therefrom, and each grate-bar being separately connected with a mechanism for imparting partial rotation thereto whereby the ashes or cinders above each section may be reached separately and dumped into the ash-pit.

The principal objects of the invention are to operate rotatively either one or more sections independently of the others, thus reaching ashes or clinkers at any desired portion of the fire and preventing the fire from burning unevenly; and to construct the operating mechanism in such a manner that practically no dust can pass through it from the combustion-chamber or from the ash-pit.

The nature of the invention is fully described in detail below, and illustrated in the accompanying drawings, in which:—

Figure 1 is a plan view of my improved grate and grate-mechanism, two of the walls of a steam-boiler furnace being shown in horizontal section. Fig. 2 is a longitudinal vertical section looking from the farther side, taken on line 2—2, Fig. 1—a portion being represented as broken out and two of the sections being shown as rotated simultaneously into a dumping position. Fig. 3 is a cross vertical section taken on line 3—3, Fig. 1, looking toward the right or front of the furnace. Fig. 4 is a detail, part in elevation and part in vertical section—a portion being represented as broken out—the front wall of the operating mechanism being removed. Figs. 5 and 6 are front and side elevations respectively of the shaker adapted for use in connection with this mechanism.

In all the figures except Fig. 2 the parts

are in their normal position, and in Fig. 2 the shaker is in position and operating two of the grate-bars.

Similar characters of reference indicate corresponding parts.

Reference-numerals 9 and 10 represent opposite side walls of a steam-boiler furnace. The frame which supports the grate, and is itself supported in position by legs 11 or other suitable means, consists of the rear bar 12, the side bars 13 and 14, and the broad front bar 15, all constructed as usual. The side bars are suitably recessed at 16 to support the shanks 17 of the rocking grate-bars 18, each said grate-bar being independent of the others. These grate-bars are provided with oppositely extending teeth arranged preferably in pairs on both sides, said pairs being alternately short teeth 19 and comparatively long teeth 20, and said alternate pairs being disposed on the different bars so that pairs of long teeth are opposite pairs of short teeth on the adjacent bars. At the opposite ends of the bars I prefer that there should be single teeth 21, said single teeth on the different bars being alternately long and short. Preferably I provide pairs of teeth 22 extending from the parts 12 and 15 inward toward the pairs of short teeth 19 extending outwardly from the grate-bars 18 which are adjacent to the parts 12 and 15. The principal object of arranging the teeth in pairs for the entire length of each bar except near its extreme opposite ends is that when a pair of single teeth are provided next the bars 13, 14, there is a greater proportion of space thus furnished at those points, and hence the draft is somewhat increased next the portions 13 and 14 of the frame. The effect is to prevent an undue proportion of ashes from collecting at the sides of the grate, as is ordinarily the case by reason of the fact that the draft is normally greater toward the middle of the grate than next the sides. By providing single teeth 21 next the sides the draft is approximately equalized.

23 represents a plate rigidly secured to the outer surface of the side wall 10 (Figs. 1, 3 and 4) near the front end thereof, and rigid or integral with this plate is a structure from whose bottom 24 there extend up the two end walls 25 and 26 and the central wall 27, said structure being preferably integral and of such a shape as to provide be-

tween the said central wall and the end walls a pair of trough-shaped chambers 28 and 29, the shape of said chambers being illustrated in Fig. 4. Secured at 30 to the outer surface of this structure is a plate 31 (Figs. 1 and 3) which provides bearings for the horizontal shafts 32 and 33. These shafts 32 and 33 are exactly alike and extend through the lower portions of the chambers 28 and 29 and centrally through comparatively large openings in the plate 23, the side wall 10, and the side bar 14 of the grate-frame. The central partition 27 is formed up centrally into a check-bead 34 and the end walls 25 and 26 are provided respectively with check-beads 35 and 36, as illustrated in Figs. 1, 2 and 4.

Each of the chambers 28 and 29, which are flaring toward their upper ends, contains a plurality of swinging socket-holders, preferably somewhat funnel-shaped, and all alike, the number of the socket-holders in the two chambers corresponding to the number of grate-sections and, of course, grate-bars 18. As there are six grate-bars in the drawings there are six swinging socket-holders, three in each chamber. Of course there may be more or less of these holders according to the number of grate-bars and grate-sections. The socket-holder 37 extends up from and is rigid with a collar 38 which is rigidly secured (Fig. 3) to the shaft 33, and the inner end of this shaft has rigidly secured to it the upper end of an arm 39 whose lower end is pivotally connected to a substantially horizontal link 40 whose opposite end is pivotally connected with the lower end of an arm 41 (Fig. 2) extending downward from and rigidly connected with the grate-bar 18 of the grate-section which is lettered *e*, in the drawings. The socket-holder 42 extends up from and is rigid with a collar 43 which is rigid on a sleeve 44 surrounding the shaft 33, and rigid with this sleeve is a downwardly extending arm 45 whose lower end is pivotally connected with one end of a link 46, (dotted lines in Fig. 2,) the opposite end of said link being pivotally connected with an arm 47 (full lines in Fig. 2) extending down from and rigid with the grate-bar 18 of section *c*. The socket-holder 48 extends up from the bottom plate 49 which is rigid with the sleeve 50 which surrounds the sleeve 44, the outer end of said sleeve 50 being rigidly secured to the upper end of an arm 51 whose lower end is pivotally connected to a link 52 (full and dotted lines in Fig. 2) whose opposite end is pivotally connected with the downwardly extending arm 53 rigidly secured at its upper end to the grate-bar 18 of section *a*. A sleeve 54 surrounds the sleeve 50 between the socket-holder 48 and a suitable flange 55 on the upper end of the arm 51, and a flange 56

on the upper end of the arm 45 is provided, said flanges serving to prevent sidewise movement of the arms 51 and 45, and a similar flange 57 is provided on the upper end of the arm 39 against which the sleeve 44 extends, all as illustrated in Fig. 3.

The three socket-holders 58, 59 and 60 are exactly like the socket-holders 37, 42 and 48, and are located in the chamber 28, and are connected with the grate-sections *f*, *d* and *b* respectively in exactly the same manner that the socket-holders 37, 42 and 48 are connected with the grate-sections *e*, *c* and *a*. The mechanism connecting the socket-holder 58 with the grate-section *f* consists of the shaft 32, downwardly extending arm 61, link 62, and arm 63 extending down from the grate-section *f*, as illustrated in Fig. 2, in which said section *f* is in dumping position. The mechanism connecting the socket-holder 59 with the grate-section *d* comprises a downwardly extending arm shown at 59^a through the broken out portion of the arm 61, said arm 59^a being rigidly connected with the said socket-holder, the lower end of said downwardly extending arm being pivotally connected with the link 64 whose opposite end is pivotally connected with the arm 65 which extends down from the socket-holder *d*, said socket-holder being also in dumping position. The mechanism connecting the socket-holder 60 comprises the downwardly extending arm 66 rigidly connected at its upper end with said socket-holder 60 and pivotally connected at its lower end by the link 67 to the arm 68 which extends down from the section *b*—see Figs. 2 and 4, Fig. 4 illustrating the mechanism which connect sections *a* and *b* with their respective socket-holders. The mechanism connecting the socket-holders 58, 59 and 60 with the grate-sections *f*, *d* and *b* is exactly like the mechanism connecting the socket-holders 37, 42 and 48 with the grate-sections *e*, *c* and *a*, and the mechanism illustrated in Fig. 3 is simply duplicated in connection with the rod 32.

Each of the socket-holders is provided with opposite openings 69, as illustrated in Fig. 4, and between suitable ears 70 pivots 71 (Figs. 2 and 4) support the inner ends of latches 72, said latches extending normally outward from the opposite edges of the socket-holders at slight angles to the same, their outer ends resting on ledges 73 formed on the partitions 25, 26 and 27 slightly below the check-beads 35, 36 and 34, as illustrated in Figs. 1, 2, and 4. These latches when in their normal position serve to center the socket-holders and hold them locked in vertical position.

In Figs. 5 and 6 I have shown a shaker adapted particularly for operating the mechanism of a grate constructed as above de-

scribed. One end of this shaker 74 is provided with as many prongs 75 as there are sockets in a single chamber, and the opposite end 76 is preferably made of substantially the shape of one of these prongs. By means of this shaker one, two or three of the socket-holders in a single chamber may be vibrated. If the condition of the fire is such that a single grate-section only needs to be shaken or rotated, section *e* for example, the end 76 or one of the side prongs 75 is inserted in the socket-holder 37 and pressed down upon the inner ends of the pair of latches 72 hung in said socket-holder, the effect being to depress the inner ends and raise the outer ends of the latches from their position on the ledges 73 and against the check-beads 36 and 34, thus lifting the latches into the position illustrated in Fig. 2 in which the shaker is shown inserted in the socket-holder 59. By swinging or vibrating the shaker in the socket-holder 37, the grate-section *e* may be swung into dumping position, and rotated as desired. If it is desired to operate two of the grate-sections, two of the prongs of the shaker may be inserted in two of the socket-holders, thus dumping or vibrating two of the sections at the same time. This is the case in Fig. 2 in which two of the prongs of the shaker are inserted in two socket-holders, 58 and 59, swinging up the outer ends of the latches in these socket-holders and operating the grate-sections *d* and *f*. Should it be desired to operate three socket-holders at the same time, 37, 42 and 48 for example, the three prongs are inserted in the several socket-holders with the effect of swinging the three grate-sections *a*, *c* and *e*, said grate-sections being preferably arranged alternately with the grate-sections *b*, *d* and *f* which are connected with the socket-holders in chamber 28. Thus one or more of the socket-holders in each chamber may be operated simultaneously, operating the corresponding number of grate-sections. It is evident therefore that any portion or portions of the fire which need clearing or dumping can be reached, as desired. When withdrawing the shaker the socket-holder or holders are swung into vertical position, and the outer ends of the latches 72 fall by gravity upon the ledges 73 and are locked in position against the check-beads 34 and 35 or 34 and 36.

This mechanism is constructed with particular reference to preventing the escape of ashes and dust. The various parts surrounding the shafts 32 and 33 and connecting the socket-holders with the mechanism connected with the grate-sections are arranged so that they are dust-proof, and all the parts contained in the chambers in the structure 24, 25, 26 and 27 are effectually protected from dust or ashes, and even the

latches themselves operate to prevent the descent of dust in any quantity into the chambers when the socket-holders are in their normal position.

When but two of the prongs 75 are inserted, the third prong lies outside one of the outer socket-holders above the plate 31 or the plate 23 as the case may be.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is:—

1. In a grate, a plurality of rocking-sections each comprising a grate-bar and teeth and being independent of the other sections; a dust-proof plate rigidly secured to the outer surface of one of the side walls of the grate; a socket-supporting structure secured to and extending outward from said plate and provided with a chamber having substantially vertical walls at its opposite ends; locking check-beads supported on the upper edges of said walls longitudinally therewith; a rocking-shaft extending horizontally through the lower part of said chamber and through corresponding holes in the dust-proof plate and the side wall of the frame of the grate; a series of substantially funnel-shaped vertical socket-holders rigidly secured at their lower ends to said rocking-shaft, each socket-holder being provided with openings in its opposite end walls; latches pivotally hung in said openings and with their inner ends extending into the funnel-shaped sockets and their outer ends extending oppositely from the end walls in the sockets and resting normally on the end walls of the structure supported by the plate, the outer ends of said latches bearing against the check-beads and thereby supporting the sockets centrally in substantially vertical position; sleeves surrounding said shaft and extending from the different socket-holders into the grate-frame above the grate, the outer sleeve fitting slidably in the openings in the dust-proof plate and side wall of the grate-frame; and separate mechanisms connecting said sleeves with corresponding rocking-sections.

2. In a grate, a plurality of sets of independently operating rocking-sections each comprising a grate-bar and teeth and being independent of the other sections; a dust-proof plate rigidly secured to the outer surface of one of the side walls of the grate; a socket-supporting structure secured to and extending outward from said plate and provided with a plurality of chambers each having a substantially vertical wall at its outer end and the structure being further provided with a partition wall between said chambers; locking check-beads supported on the upper edges of said end walls and partition wall longitudinally therewith; rocking-shafts extending horizontally through the lower parts of said chambers and

through corresponding holes in the dust-proof plate and the side wall of the frame of the grate; a plurality of series of substantially funnel-shaped vertical socket-holders, said series being rigidly secured at their lower ends to said rocking-shafts in parallel lines, each socket-holder being provided with openings in its opposite end wall; latches pivotally hung in said openings and with their inner ends extending into the funnel-shaped sockets and their outer ends extending oppositely from the end walls in the sockets and resting normally on the end walls and partition wall of the structure supported by the plate, the outer ends of said latches bearing against the check-beads and thereby supporting the sockets centrally in substantially vertical

position; sleeves surrounding each of said shafts and extending from the socket-holders in the different chambers into the grate-frame above the grate, the outer sleeves on each shaft fitting slidably in the openings in the dust-proof plate and side wall of the grate-frame; and separate sets of mechanisms connecting said separate sets of sleeves with the separate sets of rocking-sections.

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

HORACE H. RUGGLES.

Witnesses:

HENRY W. WILLIAMS,
M. A. ATWOOD.