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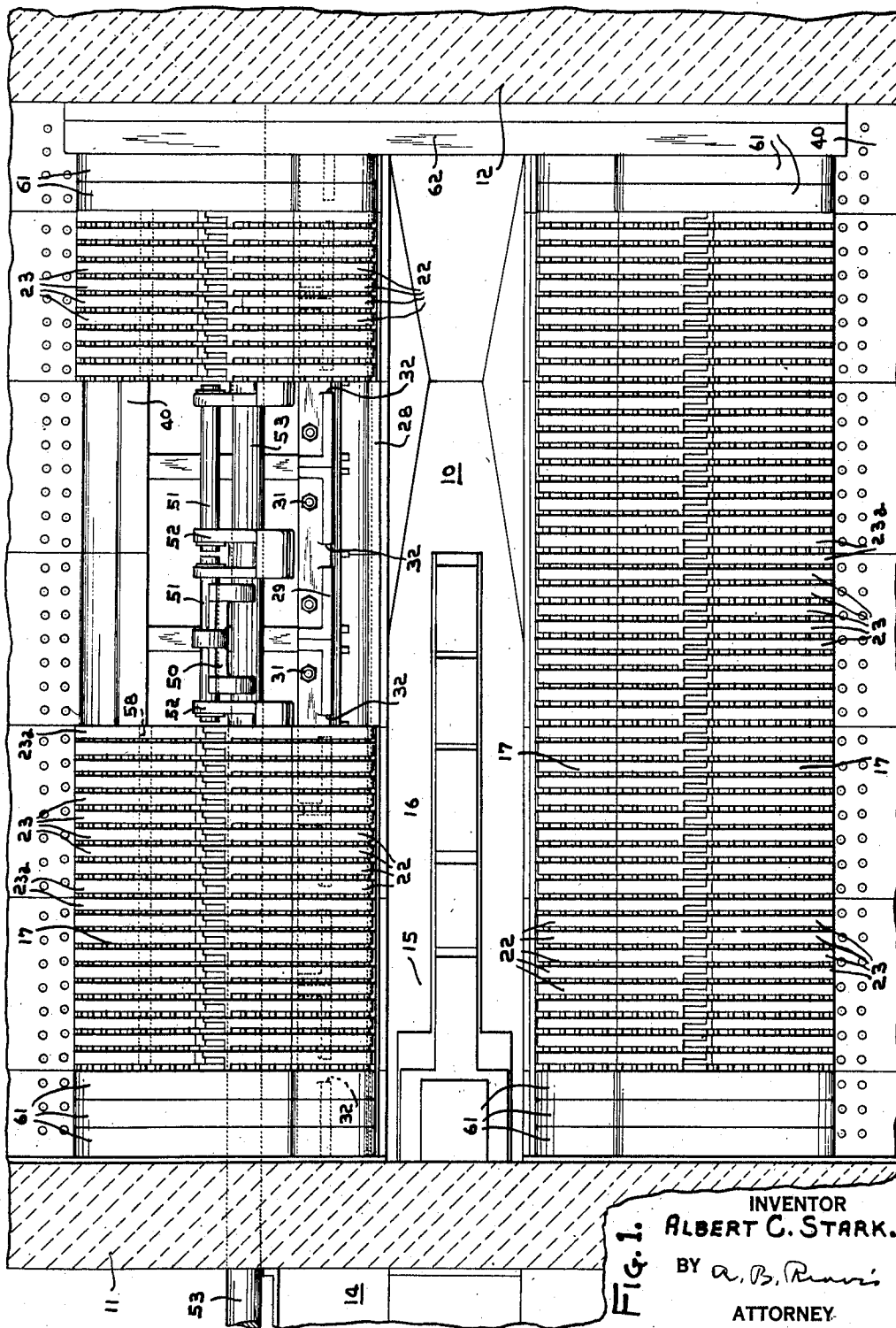
A. C. STARK

2,335,549

STOKER GRATE CONSTRUCTION

Filed Oct. 25, 1940

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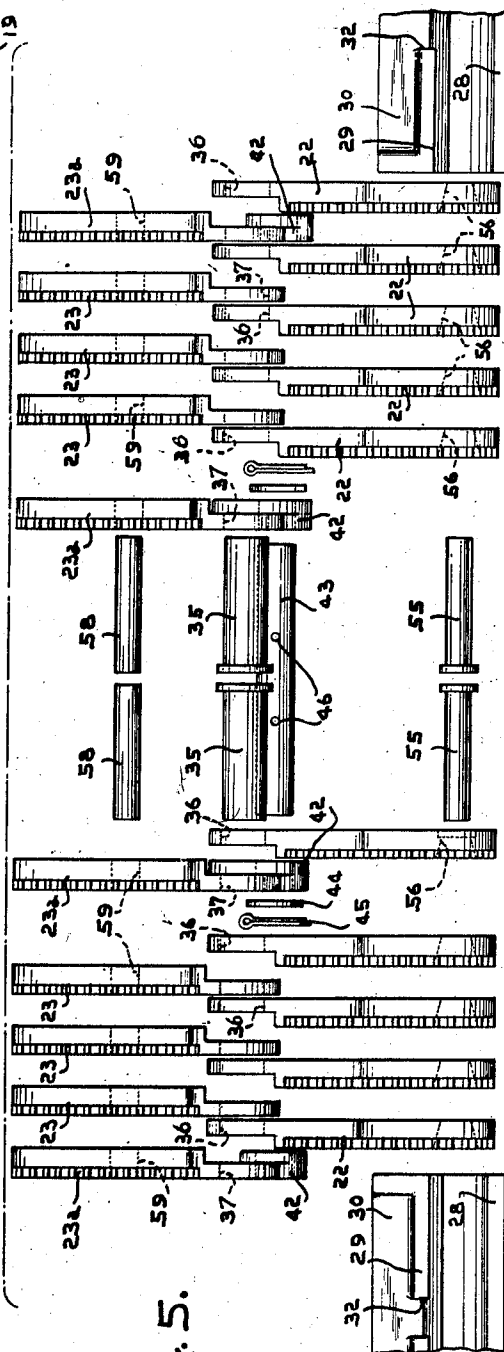
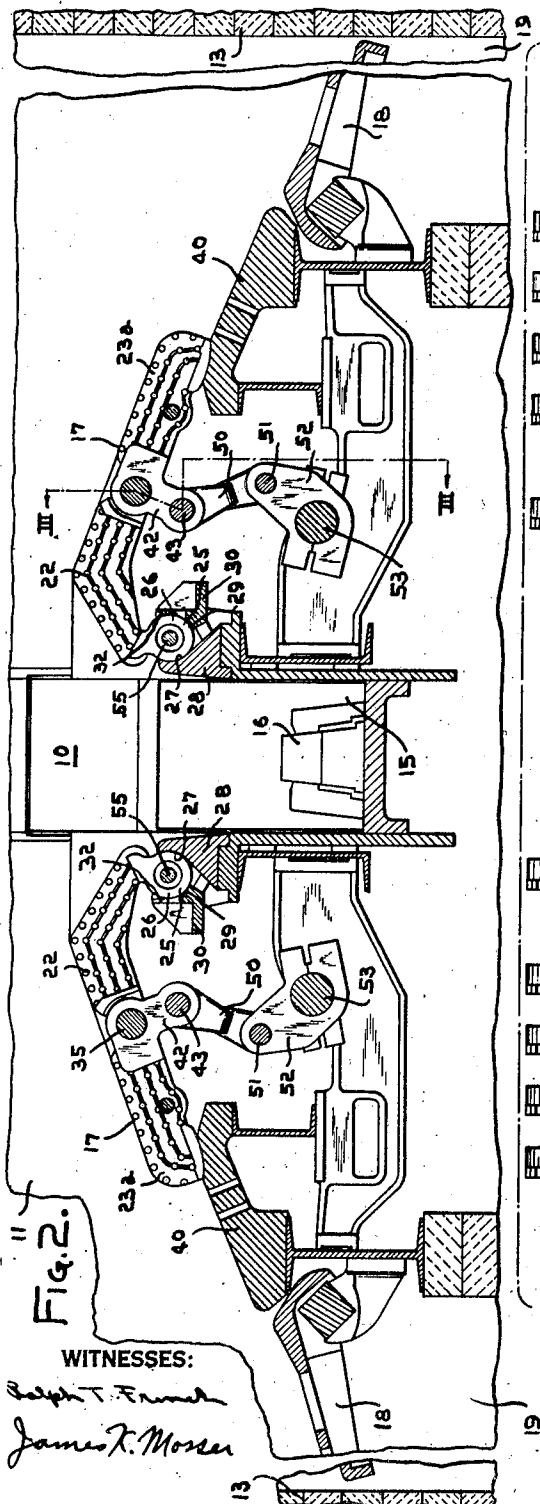
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BY
A. B. R. R. R.
ATTORNEY

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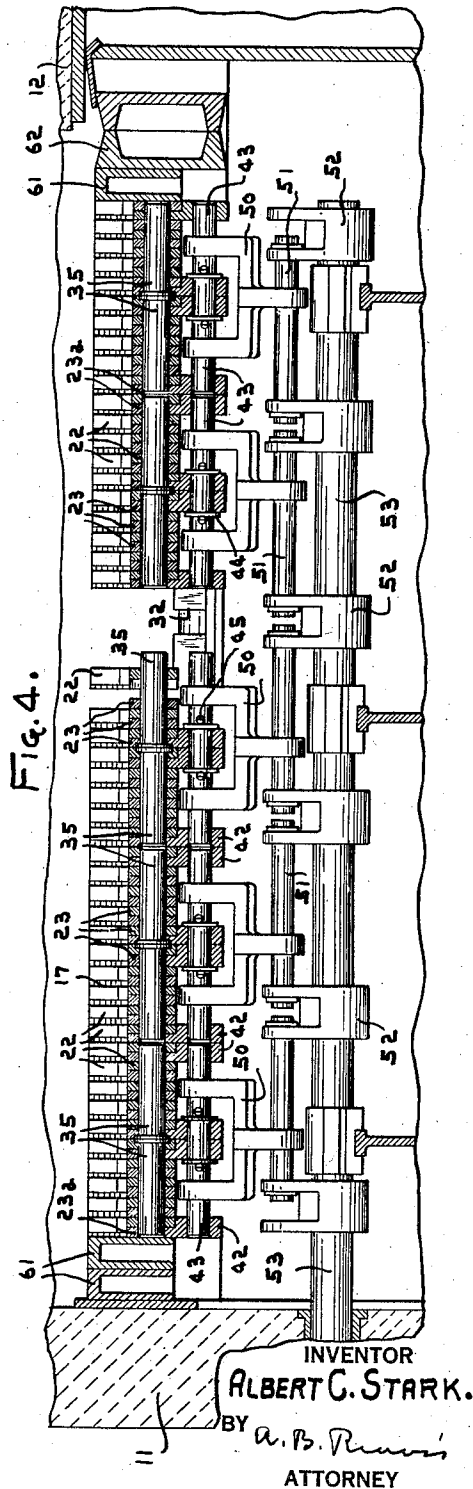
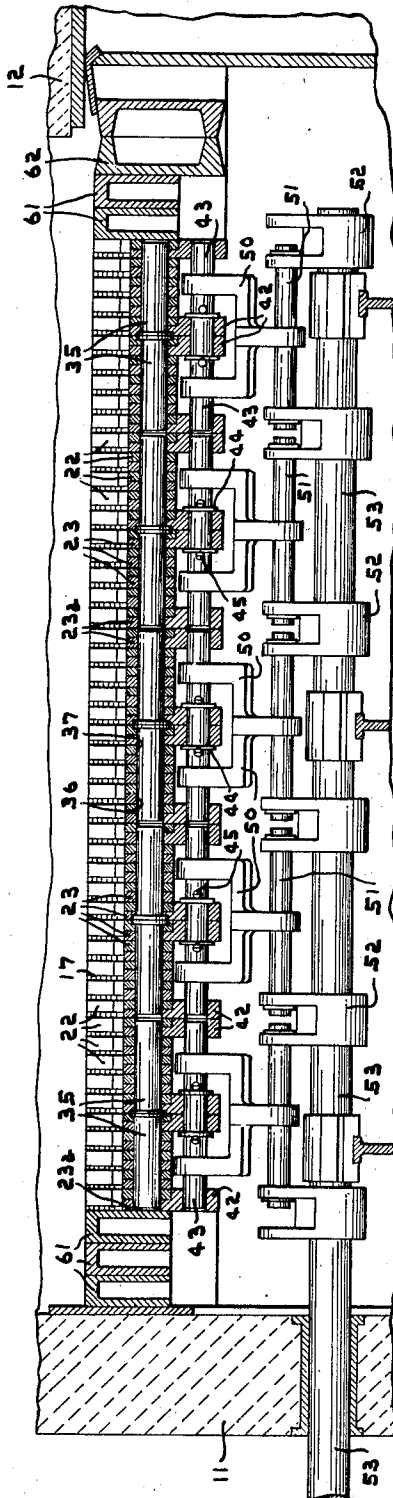
A. C. STARK

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STOKER GRATE CONSTRUCTION

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3 Sheets-Sheet 3



INVENTOR
ALBERT C. STARK.
BY *A. B. Pinner*
ATTORNEY

UNITED STATES PATENT OFFICE

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STOKER GRATE CONSTRUCTION

Albert C. Stark, Sharon Hill, Pa., assignor to
Westinghouse Electric & Manufacturing Com-
pany, East Pittsburgh, Pa., a corporation of
Pennsylvania

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5 Claims. (Cl. 110—47)

This invention relates to stokers, more particularly to stokers having one or more retorts together with an overfeed grate structure adapted to receive fuel from the retort or retorts, and has for an object the provision of improved apparatus of this character.

In stokers of the type referred to above and fully disclosed in Patent No. 1,683,341, granted September 4, 1928, to applicant's assignee, it has been necessary, when removing or replacing burned-out grate members to require the services of two or more operators, one working above the grate surface and one or more below that surface, in order to reach, release and remove various fastening means such as cotter pins, bolts, lock bearings and locking pins, etc. The primary object of the present invention is to provide a grate structure of the type herein referred to that is so constructed and arranged as to enable a single individual to enter the furnace and, while supported by the stoker, remove and replace any grate or grates in any part of the grate assembly in a comparatively short period of time without excessive labor and without any assistance from anyone below the grate surface.

These and other objects are effected by the invention as will be apparent from the following description and claims taken in accordance with the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a plan view of a single-retort stoker embodying the present invention;

Fig. 2 is a transverse sectional view of the stoker shown in Fig. 1;

Fig. 3 is a sectional view taken along the line III—III of Fig. 2, looking in the direction of the arrows;

Fig. 4 is a view similar to Fig. 3 illustrating the stoker during the operation of removing or assembling grate members thereof; and,

Fig. 5 is an enlarged exploded view of a grate section together with the parts cooperating therewith to retain the same in normal operating position.

Referring now to the drawings more in detail, there is shown a furnace and stoker assembly 10 including front, rear and side furnace walls 11, 12 and 13, respectively. Fuel from the hopper 14 is fed to the single central retort 15 of the stoker by conventional means, such as the ram 16, operated by an engine (not shown).

Disposed at the two sides of the retort 15 are overfeed grate structures 17—17. Each of the overfeed grate structures 17 extends at substantially right angles to the retort 15 and receives

fuel therefrom. The fuel passes over the grate 17, where it is burned, and discharges upon ash disposal mechanism provided by dump plates 18 from which it may be periodically dumped into the ash pits 19 therebelow.

Each of the overfeed grate structures 17 comprises a plurality of series of grate members, each series as herein shown consisting of a first grate member 22 and a second grate member 23 or 23a considered in the direction of fuel feed.

All of the first grate members 22 are pivotally connected to the sides of the retort 15 at the upper edges thereof by means of a slot and cylindrical connection 25. The connection at 25 is provided by a bearing recess 27 provided in the elongated bearing member 28, together with a complementary recess 29 in the bearing locking member 30, the latter being secured to the bearing member 28 by suitable means such as the bolts 31. Each locking member 30 is provided intermediate its length with a notch 32 through which the cylindrical lug 26 of the grate bar 22 may be withdrawn when the lug 26 has been slid longitudinally of the bearing member into alignment with the notch.

Each lateral grate structure 17 is divided into a plurality of grate sections, five in number, in the construction herein illustrated (Fig. 1). Preferably, each bearing member 28 is of a length corresponding to the width of the grate section 17. At the same time, the bearing locking members 30, while of the same length as the bearing members, are preferably disposed in staggered relation thereto, whereby they overlap and connect adjacent bearing members (Fig. 1). In the embodiment herein illustrated, each grate section comprises ten series of first and second grate members 22 and 23 or 23a.

Referring now to Fig. 5 wherein there are shown, in separated relation, the various parts making up a single ten series grate section, it will be seen that the first grate members 22 are joined to the second grate members 23 and 23a by means of headed pivot pins 35 adapted to pass through openings 36 and 37 in adjacent overlapping ends of the first and second grate members, respectively.

The last end of the second grate member 23 is slidably supported upon the stationary grate member 40. In order to suitably agitate the fuel bed to break up coking formations thereof and to advance the same along the grate surface, means is provided for raising and lowering the grate sections at the point of pivotal connection of the two grate members. To this end, a num-

ber of the second grate members 23 are provided with depending lugs 42 through which pass connecting link pins 43. The second grate members which have the depending lugs 42 are herein designated as 23a to distinguish them from the otherwise similar second grate members 23 which do not have the depending lugs. Inasmuch as all of the members 22, 23 and 23a are held together by means of pivot pins 35, it is only necessary that a sufficient number of the members 23a, with the depending lugs, be used to transmit motion from the connecting link pins 43 to the grate sections.

As shown in Figs. 3, 4 and 5, each grate section of ten series of grate members includes four second grate members 23a with lugs and six second grate members 23 without lugs. The grate members 23a, having the lugs 42, are restrained from sliding laterally by cotter pins 45 and washers 44 abutting the lugs, the cotter pins passing through holes 45 provided in the pins 43 for this purpose.

Each connecting link pin 43 is supported by the spaced bifurcated arms of a connecting link 50, the latter having a stem portion carried by a driving arm pin 51 in turn supported by a plurality of driving arms 52 carried by the drive shaft 53, the latter extending through the front wall of the furnace for connection with the engine device by which it is driven. It will be apparent from consideration of Fig. 2 that partial rotation of the drive shaft 53 will operate through the linkage 52, 51, 50, 43 and 42 to raise and lower the adjacent pivotally connected ends of the first and second grate members.

In order to prevent accidental withdrawal of the cylindrical pivotal portion 25 of the first grate members 22 from the bearing members 28 through the notch 32 of the bearing lock 29, pins 55 extend through the openings 56 in a plurality of first grate members. Likewise, the pins 58 connect a plurality of second grate members 23 and 23a by extending through openings 59 provided therein.

Removable spacing members 61 are provided at each side of the grate surface 17 and, preferably, the usual compensator 62 is provided (Figs. 3 and 4).

The procedure for removing the grates of a selected section is as follows: A removable spacing member 61 is removed from each side of the grate surface, thereby providing room permitting prying of the grate sections and their pins toward either the front or the rear wall of the furnace by the distance vacated by the removed spacing member. The sections are moved so as to expose a slot 32 in the bearing locking member 29 at one side of the particular section to be removed. The first grate member 22 is removed by sliding or prying it off the pivot pin 35 and the link pin 55 in a lateral direction, the grate being removed from the bearing by drawing it through the notch 32. The corresponding grate member 23a with the depending lug is removed by sliding or prying it off the pivot pin 35 and the connecting link pin 43.

In Fig. 4, there is shown the position of the grate structure with a spacing member 61 removed from each side of the grate surface and the grates forced to both sides to provide the opening exposing the notch 32. In the illustration two grate members have already been removed and the third is partially removed.

The link pin 55 is removed with the final first grate member 22 and the pivot pin 35 is removed by rotating the second grate member 23a about

the connecting link pin 43 until it is possible to remove the pivot pin 35 by drawing it under the adjacent grate section.

By sliding the remaining part of the grate section laterally along the bearing member 28 until the notch 32 at the other side of the section is exposed, a similar removal of the remaining portion of the section may be made. The last two second grate members 23a are removed by ejecting the cotter pins 45 and sliding out the connecting link pin 43 under an adjacent grate section. The cotter pins 45, as well as the washers 44, are readily accessible from the furnace. The pins 58 are removed with the final second grate member 23.

The assembly of any section of ten grate members is made by reversing the above procedure.

While the invention has been shown in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof, and it is desired, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What is claimed is:

1. In a stoker; a retort; a grate section providing an overfeed fuel supporting surface arranged to receive fuel from the retort and including a plurality of series of grate members, the members of each series being pivotally connected together in end-to-end relation and the series being disposed side by side; a plurality of longitudinally-aligned pins each extending through and pivotally connecting adjacent overlapping ends of a number of first and second grate members considered in the direction of fuel feed; fixed side members at the ends of the grate section; and a removable spacing member disposed at each side of the fuel supporting surface between the latter and the fixed side members, removal of said spacing members providing room for movement of the grate members constituting the fuel supporting surface and the pivot pins laterally towards both sides to provide a space between a selected pair of adjacent pins and between the grate members connected by said pair of pins, whereby said last-mentioned grate members may be slid off said pins and removed from the grate surface.

2. In a stoker; a retort; a grate section providing an overfeed fuel supporting surface arranged to receive fuel from the retort and including a mat-like structure comprising a plurality of series of grate members, the members of each series being pivotally connected together in end-to-end relation and the respective series being disposed in substantially abutting parallel relation; a plurality of pins each extending through and pivotally connecting adjacent overlapping ends of a number of grate members, said pins being longitudinally-aligned and in substantially abutting end-to-end relation from side to side of the mat-like structure; fixed side members at the ends of the grate section; and a removable spacing member at each side of said structure between the latter and the fixed side members, removal of said spacing members providing room for movement of the grate members constituting the mat-like structure and of the pivot pins towards both sides to provide a space between a selected pair of series of grate members and between the pivot pins of the latter, whereby said grate members may be slid off said pins and removed from the mat-like structure.

3. In a stoker; a retort; a grate structure pro-

viding an overfeed fuel supporting surface arranged to receive fuel from the retort and comprising a plurality of grate sections arranged in side-by-side relation, each grate section comprising a plurality of series of grate members, the members of each series being pivotally connected together in end-to-end relation and the respective series being disposed in substantially parallel abutting relation, a plurality of pivot pins each extending through and pivotally connecting adjacent overlapping ends of a plurality of the grate members, said pins being longitudinally aligned and extending in substantially abutting end-to-end relation from side to side of the grate structure; fixed side members at the ends of the grate section; and a removable spacing member at each side of said grate structure between the latter and the fixed side members, removal of said spacing members providing room for movement of the grate members and the pivot pins towards both sides to provide a space between a selected pair of series of grate members and between the pivot pins of the latter, whereby said grate members may be slid off said pins and removed from the grate structure.

4. In a stoker; a retort; a grate structure providing an overfeed fuel supporting surface arranged to receive fuel from the retort and comprising a plurality of grate sections arranged in side-by-side relation, each grate section comprising a plurality of series of grate members, the members of each series being pivotally connected together in end-to-end relation and the respective series being disposed in substantially parallel abutting relation; a plurality of pivot pins each extending through and pivotally connecting adjacent overlapping ends of a plurality of grate members, said pins being longitudinally aligned and extending in substantially abutting end-to-end relation from side to side of the grate structure; an elongated bearing structure pivotally supporting the first grate members considered in the direction of fuel feed; a locking structure associated with the bearing structure for preventing removal of the first grate members from the bearing, said locking structure having one or more notches through which the first grate members may be removed one at a time; fixed side members at the ends of the grate section; and

a removable spacing member at each side of the grate structure between the latter and the fixed side members, removal of said spacing members providing room for movement of the grate members and their pivot pins towards both sides to provide a space between a pair of series of grate members and between the pivot pins of the latter and aligned with a notch in the bearing locking structure, whereby said grate members may be slid off said pins and removed from the bearing structure through said notch.

5. In a stoker; a retort; a grate structure providing an overfeed fuel supporting surface arranged to receive fuel from the retort and comprising a plurality of grate sections arranged in side-by-side relation, each grate section comprising a plurality of series of grate members, the members of each series being pivotally connected together in end-to-end relation and the respective series being disposed in substantially parallel abutting relation; a plurality of pivot pins each extending through and pivotally connecting adjacent overlapping ends of a plurality of grate members, said pins being longitudinally aligned and extending in substantially abutting end-to-end relation from side to side of the grate structure; a plurality of elongated bearing members each pivotally supporting a plurality of the first grate members considered in the direction of fuel feed; a locking member associated with each bearing member for preventing removal of the first grate members from their bearing members, each of said locking members having a notch through which the first grate members may be removed one at a time; fixed side members at the ends of the grate section; and a removable spacing member at each side of the grate structure between the latter and the fixed side members, removal of said spacing members providing room for movement of the grate members and their pivot pins towards both sides to provide a space between a pair of series of grate members and between the pivot pins of the latter and aligned with a notch in a selected bearing locking member, whereby said grate members may be slid off said pins and removed from the bearing member through said notch.

ALBERT C. STARK.