Jan. 19, 1954 W. KESSLER 2,666,404

STOKER APPARATUS

Filed Feb. 13, 1951

2 Sheets-Sheet 1

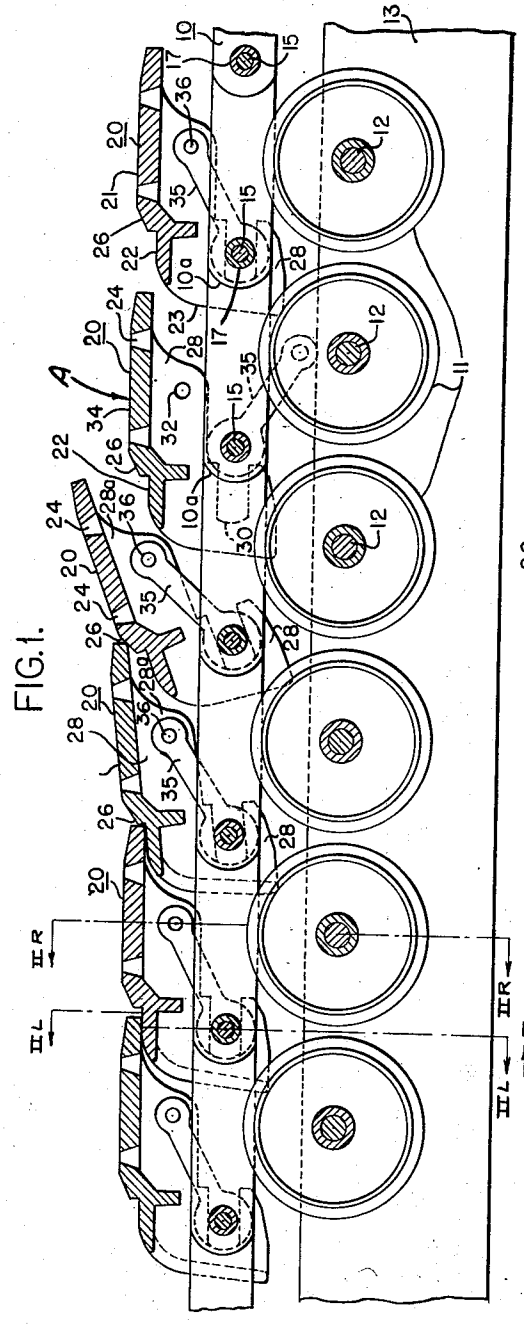


FIG. 1.

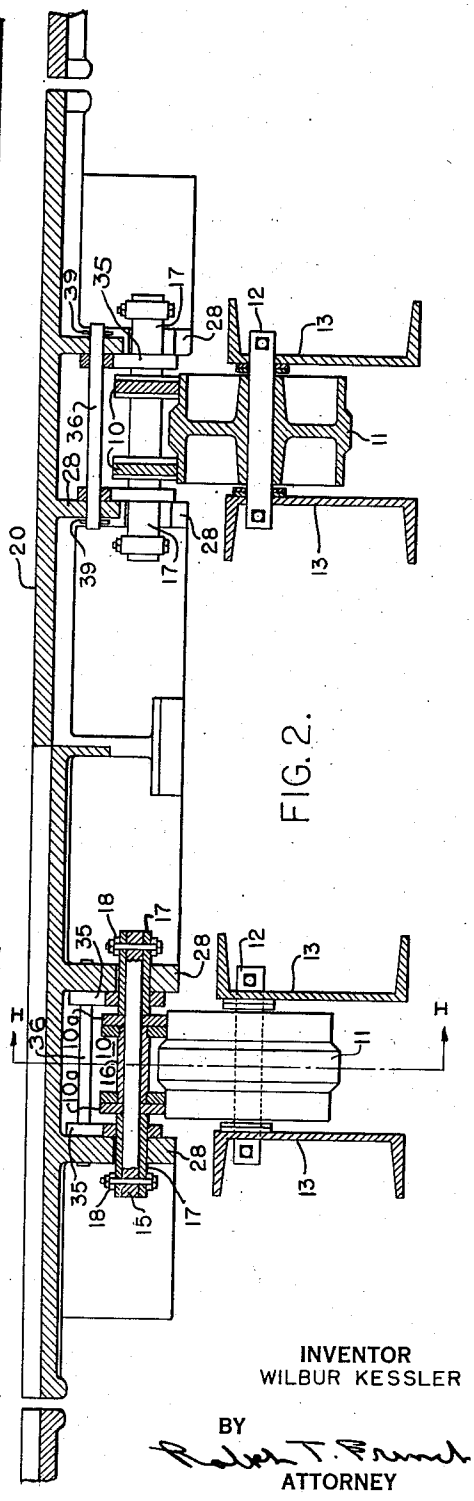


FIG. 2.

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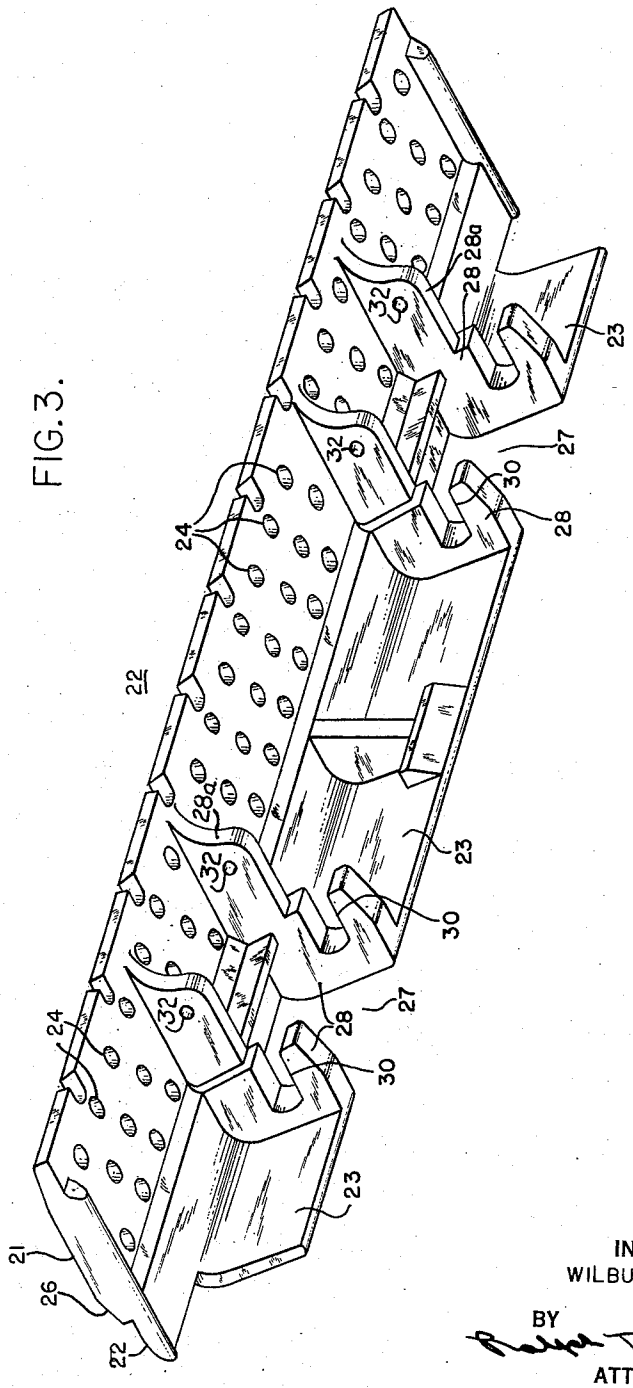
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2 Sheets-Sheet 2

FIG. 3.



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Patented Jan. 19, 1954

2,666,404

UNITED STATES PATENT OFFICE

2,666,404

STOKER APPARATUS

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Application February 13, 1951, Serial No. 210,714

6 Claims. (Cl. 110—40)

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This invention relates to traveling chain grate stoker apparatus, and more particularly, to grate bar means for apparatus of this type.

In order to facilitate maintenance of a traveling chain grate stoker, it is desirable to employ grate bars which may individually be secured to or demounted from the grate chain without necessitating removal of adjacent grate bars. In the usual furnace, access to the grate chain and bars may be more readily accomplished from the combustion chamber than from a point beneath the traveling grate assembly. It is thus also desirable that the grate bars be constructed and arranged to enable ready demounting and replacing thereof from the portion of the furnace above the traveling grate equipment.

It is an object of the present invention to provide an improved grate bar assembly having the aforementioned desired features of construction.

Another object of the invention is the provision of an improved grate bar having a depending web or lug with an open-end recess for demountable engagement with a pivot pin of the grate chain, and linkage means for detachably connecting the pivot pin of the grate chain to the grate bar at a point spaced from the pivot pin, whereby the linkage means can be readily made accessible by tilting the grate bare upwardly.

A further object of the invention is to provide chain grate equipment of the aforesaid construction, in which each grate bar is provided with a top or working surface having an offset leading edge for receiving the trailing edge of an adjacent grate bar.

It is also an object of the invention to provide a grate bar assembly having the above features of construction and adapted to permit each grate bar element to swing about its pivot pin to a limited extent during travel around the usual sprockets of the stoker apparatus, without disengagement of the slotted webs from the pivot pin.

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

Fig. 1 is a fragmentary sectional view of a portion of a stoker chain and grate bar assembly employing grate bars constructed in accordance with the invention;

Fig. 2 is a sectional view of the apparatus shown in Fig. 1, the portion to the left of the centerline being taken along line II—L of Fig. 1, and the right-hand portion being taken along the line II—R of Fig. 1; and

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Fig. 3 is a perspective view of one of the improved grate bars shown in Fig. 1.

The traveling chain grate stoker apparatus illustrated in Figs. 1 and 2 may be of any suitable construction comprising two or more endless grate chains 10 suitably mounted on driving sprockets (not shown), and having an upper run supported on a plurality of rollers 11, which are, in turn, journaled on pins 12 carried by beams 13 of the usual stoker frame structure. As best shown in Fig. 1, the grate chain 10 is made up of a plurality of pairs of links 10a, each pair having forward ends pivotally connected to the trailing ends of the adjacent links in advance thereof by means of transversely disposed pivot pins 15. Referring to Fig. 2 of the drawings, each pivot pin 15 carries a central bushing 16 intermediate the chain links 10a and outer bushings 17 disposed on the outer ends of the pin and projecting therewith a substantial distance outwardly of the chain links. A locking element 18 is secured by a suitable pin to the outer end of each bushing 17 and the pivot pin 15. It will thus be seen that the links of the grate chain 10 are pivotally connected together by the pivot pins 15 to form a continuous chain adapted to travel from right to left, as viewed in Fig. 1 of the drawings. It will be understood that in practice, these grate chains are arrange in pairs, as best shown in Fig. 2; the number of such pairs of chains utilized in a chain grate being dependent on, and varying with, the width of the stoker.

Mounted on the spaced grate chains 10 are a plurality of grate bars generally indicated by the reference character 20, which are adapted to lie in horizontal relation during traverse of the upper run of the stoker, as shown in Fig. 1, and to tilt or swing outwardly to a limited extent during the return run (not shown), such operation of the apparatus being well understood in the art. According to the invention, each of the grate bars 20 comprises a substantially rectangular fuel bed portion 21 having an offset leading edge 22 and a forwardly depending flange or web portion 23 extending at an angle from the leading edge, as best shown in Fig. 3 of the drawings. Suitable air ports 24 may be formed in the fuel bed portion 21. The top or working surface of the fuel bed portion 21 is preferably tapered or beveled, as indicated by the reference character 26, adjacent the offset leading edge surface 22. The forward flange portion 23 of each grate bar 20 has formed therein suitable openings 27 for receiving the grate chains 10 hereinbefore referred to, and is further joined to the fuel bed portion 21 through the medium of a number of

depending web portions 28, which are disposed in planes normal to the flange and fuel bed portions on opposite sides of each of the openings 27. Each of the web portions 28 has formed therein a slot 30 which extends substantially parallel to the fuel bed portion 21 and opens rearwardly, thus constituting a hook portion adapted to receive the bushings 17 of an associated pivot pin 15, when the apparatus is assembled as shown in Fig. 1. At a point spaced between the slot 30 and the fuel bed portion 21, each of the web portions 28 terminates in a lug portion 28*a* provided with an aperture 32.

Referring again to Fig. 1, each of the pivot pins 15 and bushings 17 have pivotally mounted thereon a pair of link elements 35, which are interposed between the links of the grate chain 10 and the respective web portions 28 of each grate bar of the assembly. The opposite end of each of the link elements 35 is pivotally connected to the portion of the associated web 28 adjacent the fuel bed portion 21, by means of a pin 36, which is secured in the apertures 32 of each pair of webs. As shown in Fig. 2, each pin 36 may be rendered readily detachable from the web 28 and links 35, suitable means such as cotter pins 39 being provided for normally retaining each pin in its assembled position.

It will be apparent that in operation of the stoker apparatus, the grate chain 10 in traveling over the rollers 11 will transmit drag or pull to each of the grate bars 20 solely through the medium of the pivotally connected links 35, so that the pivot pins 15 and bushings 17 are adapted to remain in a substantially intermediate position relative to the associated slot 30 of each grate bar.

If it is desired to effect removal of one of the grate bars 20, such as that indicated at A in Fig. 1, two or more grate bars in advance thereof are initially tilted to progressively greater degrees as shown, the trailing edges thereof being adapted to ride over the beveled surfaces 26 of the leading portion of the adjacent bars. The grate bar A is thus released sufficiently to permit upward tilting thereof to facilitate access to the links 35, which can then be detached from the web portions 28 by removal of the associated pin. Subsequent removal of the grate bar A can then be completed upon shifting it forwardly to disengage the slot 30 from the pivot pin 15, the position shown in Fig. 1, after which it can be lifted out.

It will be apparent that installation of a new grate bar may be readily accomplished by taking the aforementioned steps in the reverse order.

From the foregoing it will thus be understood that a traveling grate chain and bar apparatus constructed in accordance with the invention is adapted to promote the desired operation of the stoker in the well known manner, and is constructed and arranged to facilitate inspection and replacement of any individual grate bars from a point within the furnace, as well as from beneath the traveling grate, as desired.

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 other changes and modifications without departing from the spirit thereof.

What is claimed is:

1. A grate bar assembly for a stoker of the chain grate type having pivot pins disposed transversely relative to the direction of travel, comprising a substantially rectangular fuel-supporting portion having a leading edge and a trailing edge, a flange portion extending at an angle from said leading edge, a plurality of web portions depending from the grate bar and disposed in planes normal to said leading edge and flange portion, each of said web portions having a slot near said leading edge and extending in a longitudinal plane spaced from and substantially parallel to said fuel-supporting portion, each of said slots having parallel longitudinal sides extending from a closed end to an opening at the end of the web remote from said flange portion, said slots being adapted to receive one of the pivot pins of the grate chain in sliding engagement with said longitudinal sides, each web portion terminating in a lug portion having a linkage connection at a point intermediate the corresponding slot and said trailing edge of the fuel-supporting portion, and links adapted to be mounted rotatably on said pivot pins and detachably connected to said linkage connections.

2. A grate bar assembly for a stoker of the chain grate type having pivot pins disposed transversely relative to the direction of travel, comprising a substantially rectangular fuel-supporting portion having a leading edge, a flange portion extending at an angle from said leading edge, a plurality of web portions depending from the grate bar and disposed in planes normal to said leading edge and flange portion, each of said web portions having a slot formed in a longitudinal plane spaced from and substantially parallel to said fuel-supporting portion, each of said slots having a closed end near the flange portion and its opposite end opening at the end of the web remote from said flange portion, said slots being adapted to receive, in longitudinally slidable engagement, one of the pivot pins of the grate chain, parallel lug portions formed integrally with said web portions and said fuel-supporting portion, said lug portions having laterally aligned apertures, a transversely disposed removable pin engaged in said apertures, and links adapted to be mounted rotatably on said pivot pin and detachably connected to said lug portions through the medium of said removable pin for imparting the drag of the grate chain to said grate bar, said links being of such a length as to maintain clearance between said closed ends of said slots and said pivot pin.

3. Stoker chain grate apparatus of the class including a grate chain having longitudinally spaced, transversely disposed pivot pins and a plurality of grate bars, each grate bar comprising a substantially rectangular fuel-supporting portion disposed in transverse relation to said chain and having a leading edge and a trailing edge, said fuel-supporting portion having a flat working surface and spaced integral web portions formed thereon normal to the opposite side thereof, said web portions being adapted to straddle the grate chain and terminating in hook portions disposed near the leading edge of the grate bar and loosely engaging a pivot pin, and parallel link elements pivotally connected to said pivot pin and detachably connected to the respective web portions at points spaced from said hook portions and near the trailing edge of said grate bar, whereby said grate bar is freely tiltable about said pivot pin and subjected to the pull of said grate chain entirely through the medium of said link elements.

4. Stoker chain grate apparatus as set forth in claim 3 characterized by provision of an offset leading edge on each grate bar for engage-

ment with the trailing edge of an adjacent grate bar of like construction.

5. Stoker chain grate apparatus as set forth in claim 3 further characterized by provision of an inclined cam surface between the working surface of the fuel bed portion of each grate bar and the offset leading edge thereof to facilitate tilting thereof in engagement with the trailing edge of the adjacent grate bar.

6. In stoker chain grate apparatus of the class described, a traveling grate chain having longitudinally spaced, transversely disposed pivot pins, a plurality of grate bars carried by said grate chain, each bar comprising a substantially rectangular fuel-supporting portion having a working surface with a thin trailing edge and an offset leading edge for receiving the overlapping trailing edge of the adjacent grate bar, a pair of transversely spaced web portions disposed normal to said fuel-supporting portion adjacent the leading edge of each grate bar and depending from the side opposite said working surface thereof, said web portions of each grate bar straddling the grate chain and having open-end slots formed parallel to the chain run for loose engagement with a corresponding pivot pin, a removable pin connected transversely between the web portions of each grate bar at a

point intermediate the trailing edge of the bar and the slots in said web portions, and a plurality of link elements pivotally connected in pairs to the ends of each of said pivot pins and detachably connected to the respective removable pins between the web portions of said grate bars for transmitting thereto the drag of said grate chain, each of the grate bars being readily removable from a point above the working surface thereof by initially tilting it about the associated pivot pin to render the removable pin and link elements accessible, detaching the removable pin and link elements from the web portions and then disengaging the slotted web portions from the pivot pin.

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