The present invention relates to travelling grate stokers and particularly to an improved form of return rail key therefor.

The fuel supporting surface of a travelling grate stoker due to its nature takes the form of an endless conveyor made up of a plurality of grate bars or "keys" mounted in end to end side by side relation on carrier bars extending transversely of the stoker, the carrier bars being connected at their ends, and sometimes at intermediate points also, to driving chains running over sprockets at the front and rear of the stoker for advancing the fuel supporting surface through the furnace. Some of these keys are known as return rail keys because they act to support the lower reach of the conveyor-like grate on its return from the rear end to the front end of the stoker as these keys ride upon and are in turn supported by the return rails. Due to the surface wear which these keys suffer in being dragged along the return rails under the weight of the grate, provision must be made for their removal and replacement, preferably without disturbing any of the remaining keys of the grate.

A feature of the invention resides in an improved form of return rail key assembly permitting the ready removal of any worn return rail key without disturbing any of the other keys forming part of the travelling grate.

A second feature resides in an improved construction and arrangement enabling removal of any ordinary grate key from its carrier bar without first removing all other keys between its location and one end of the carrier bar.

The invention will be best understood upon consideration of the following detailed description of an illustrative embodiment thereof when read in conjunction with the accompanying drawings in which—

Figure 1 is a fragmentary plan view of the fuel supporting surfaces of a travelling grate embodying the invention;

Figure 2 is a vertical sectional view taken through the grate surface along line 2–2 in Fig. 1 and shows one of the return rail key assemblies in elevation;

Figure 3 is a plan view corresponding to Fig. 2, partly broken away, to illustrate details of construction;

Figure 4 is a rear end view of the return rail key assembly shown in Figs. 2 and 3;

Figure 5 is a fragmentary elevation of the stoker, partly in section, as seen at the location of the driving sprockets which advance the grate and illustrates the manner of removal of a return rail key assembly; and

Fig. 6 is a sectional view on line 6–6 in Fig. 1 illustrating the manner of securing ordinary grate keys to a carrier bar.

As illustrated in Fig. 1, a travelling grate of the type contemplated herein is made up of a plurality of grate keys 10 arranged in side by side end to end relation on carrier bars 11 that extend transversely of the grate. Secured upon each carrier bar 11 near its forward longitudinal face is a dovetail member 12 seating in corresponding dovetail recesses on the underside of the grate keys 10 to secure them to the carrier bar. As illustrated in Fig. 6 the dovetail recess that secures an ordinary grate key 10 to the dovetail member 12 of a carrier bar 11 is formed by oppositely facing hooked-like lugs 15 depending from the key 10. The hooks 15 engaging beneath the dovetail shoulders of carrier bar 11 prevent a key 10 being lifted off until slid along the bar to a position where one hook 15 aligns with one of several slots 16 cut vertically in the rear longitudinal face of the dovetail portion 12 of the bar 11, Fig. 1. These positions are ordinarily occupied by the special keys, designated as a whole by the numeral 13 in Fig. 1, that are mounted at intervals transversely of the carrier bar between adjacent grate keys 10 and function as return rail keys, as well as to lock the standard keys 10 against removal.

As the lower reach of the endless conveyor-like grate travels from the rear back to the front of the stoker the key assemblies 13 ride upon return rails 14 located beneath the grate, as shown in Fig. 5, so that the lower reach of the grate is supported to prevent its sagging.

In accordance with the present invention each return rail key assembly 13 consists of three major parts, a pair of keys 20 and 21 positioned side by side and a locking member 22 mounted between and pivotally connected to them. The opposing faces of the keys 20 and 21 are maintained spaced by bosses 23 thereon so that the locking member 22 may be mounted therebetween in a position overlying a slot 40 in carrier bar 11, the keys 20, 21, themselves being pushed immediately adjacent to and straddling the slot. Rivets 24 extending through the bosses rigidly connect these keys.

The locking member 22 is provided near its forward end with laterally projecting truncated 25 engaged in recesses 26 in the opposing side faces of the keys 20 and 21, these recesses being
open at their forward ends for a reason which will be referred to hereinafter.

Depending from the underside of each key 20 and 21 near its forward end is a hook member 21 which is a portion of the forward boss 23 and is engaged with the undercut shoulder 28 on the forward longitudinal face of the dovetail member 12 on which the grate keys 10 are mounted. Near their rear ends the keys 20 and 21 have lugs 30 which are portions of the rearward bosses 23 and extend therethrough into the usual air passage 31 in carrier bar 11. Lugs 30 are connected to an angle member or hook 32 engaged beneath the underside of the longitudinal rib 33 that defines the rear edge of the air passage 31. Only a single hook member 32 is required for the two keys 20 and 21. The angle member 32 is connected to the lugs 30 by rivets 34 and thus serves also to rigidly connect the keys 20, 21 at their rear portions.

The hooks 27 and 32 on the keys 20 and 21 act to prevent lifting of a return row key assembly 13 from the carrier bar 11 until the assembly is moved laterally of the bar, to the right in Fig. 2, for disengaging the hooks. When in the position shown in Fig. 2 this lateral movement of the return row key assembly is prevented by a lug key on the locking member 22 which is positioned to fit into a slot 40 and engages a vertical portion 37 of the carrier bar 11 that faces in the direction opposite to the direction of lateral movement for disengaging the return row key assembly. The structure illustrated this vertical face 31 is provided by notching the undercut shoulder 38 at the rear longitudinal face of dove-tail member 12 so as to form the vertical slot 40 in Fig. 1. A cotter pin 39 engaged in transverse apertures near the rear end of the locking member 22 and the key 21 prevents the locking member being pivotally raised until the cotter pin is removed.

As shown in Figs. 3 and 4, particularly, the ends of cotter pin 39 are concealed within recesses 39 in the outer faces of key 21 and locking member 22. Thus the cotter pins are shielded by overlapping parts of these elements and protected against burning.

As illustrated at the top right portion of Fig. 5, the forward end or nose of each key ordinarily overlaps the rear or tail end of the next key in advance as seen in Fig. 5. Accordingly, a return row key assembly cannot be removed nor its locking members 22 raised until the assembly is located at a point where it is passing around the chain sprockets. When the tail end of the return row key which it is desired to remove is canton sufficiently to clear the nose of the next succeeding key and cotter pin 39 is removed, the locking member 22 may be raised. When the lug 35 has been lifted out of slot 40 and clears the top of the dovetail member 12 the return row key assembly 13 may be shifted laterally of its carrier bar 11, i.e. forwardly of the grate, to a position in which the hooks 27 and 32 clear the shoulder portions of the bar that they engage. The entire assembly may then be lifted off the carrier bar.

If only a locking member 22 requires replacement it may be readily removed intact when the cotter pin is taken out. The only other direct connection between the keys 20, 21 and the locking member 22 consist of the trunnions 26 on the latter seating in the recesses 26 in the keys. Because these recesses are open at their forward ends to the front end face of the keys, the trunnions may readily be slid out of the recesses to detach a locking member 22.

In the event that a grate key 10 becomes worn and requires replacement removal of the nearest return row key assembly 13 permits the grate keys being slid along the carrier bar 11 to the location of the cut-away portion or slot 40 in the dove-tailed member 12. On reaching this position each grate key may be tilted upwardly and forwardly and then lifted off the carrier bar because the provision of the slot 40 renders the dove-tail 12 incomplete at this point.

What I claim is:

1. In a chain grate stoker: a transversely extending carrier bar having a vertical slot cut in one of its longitudinal faces at a point between its ends; grate keys mounted on said bar beyond said slot; oppositely facing hooks depending from said keys and engaged beneath said bar for securing them thereon, each key being slidable along said bar to align one hook thereof with said slot to permit lifting and removal of the key from the bar; another key mounted on said bar immediately adjacent the slot therein; hooks on said other key engaged beneath the said bar to prevent lifting of the key from said bar, said key being movable laterally of said bar to disengage its hooks to permit said lifting; a locking member carried and engaged on the latter being a face portion of said bar facing in the direction opposite said lateral movement to remove said key for locking said key on said bar; and a pivotal connection between said locking member and said other key for permitting the latter to be disengaged from said bar to enable removal of said other key from the path of said grate keys to positions in which one hook thereof aligns with said slot.

2. In a chain grate stoker: a transversely extending carrier bar having a vertical slot cut in one of its longitudinal faces at a point between its ends; grate keys mounted on said bar beyond said slot; oppositely facing hooks depending from said keys and engaged beneath said bar for securing them thereon, each key being slidable along said bar to align one hook thereof with said slot to permit lifting and removal of the key from the bar; another key mounted on said bar immediately adjacent the slot therein; hooks on said other key engaged beneath the said bar to prevent lifting of the key from said bar, said key being movable laterally of said bar to disengage its hooks to permit said lifting; a locking member carried and engaged on the latter being a face portion of said bar facing in the direction opposite said lateral movement to remove said key for locking said key on said bar; and a pivotal connection between said locking member and said other key for permitting the latter to be disengaged from said bar to enable removal of said other key from the path of said grate keys to positions in which one hook thereof aligns with said slot.

3. In a travelling grate stoker: a transversely extending carrier bar; a pair of spaced grate keys mounted side by side on said bar and having aligned recesses formed in the opposing side faces thereof, said recesses being laterally of said keys; hooks on said keys engaged beneath said bar to prevent lifting of the keys from said bar, said keys being movable laterally of said bar for disengaging said hooks; a locking member mounted between said keys and engaging a portion of said bar facing in the direction of said laterally mounted member, said member being pivotally and trunnioned and seated on said keys for permitting pivoting.
movement of said member with respect to said keys to disengages said locking member from said bar and to swing it to a position wherein said trunnions may be disengaged from the recesses in said keys for enabling dismounting of said locking member from between said grate keys without removing them from said carrier bar.

4. In a travelling grate stoker; a transversely extending carrier bar having a vertical slot cut in one of its longitudinal faces at a point between its ends; a pair of spaced grate keys mounted side by side on said bar and having aligned recesses formed in the opposing side faces thereof, said recesses being open at the under side of said keys; depending hooks on said keys engaged beneath said bar to prevent lifting of the keys from said bar, said keys being movable laterally of said bar for disengaging said hooks; a locking member mounted between said keys and having a lug depending into said slot for engaging a face portion of said bar facing in the direction opposite said lateral movement for preventing said movement; and trunnions on said locking member seated in said key recesses for permitting pivotal movement of said member with respect to said keys to disengage said locking lug from said bar and to swing said member to a position wherein said trunnions may be disengaged from the recesses in said keys for enabling dismounting of said locking member from between said grate keys without removing them from said carrier bar.

5. In a travelling grate having a transversely extending carrier bar; a grate key mounted on said bar having depending hook portions facing in the same direction and engaged beneath the bar to prevent lifting of the key from the bar, said key being movable laterally of the bar to disengage said hooks and permit said lifting; a locking member carried by said key and having a portion engaging a part of said bar facing oppositely to the direction of lateral movement of said key to disengage it for preventing said movement of said key; and a pivotal connection between said key and locking member for permitting the latter to be disengaged from said bar to allow said lateral movement of said key.

6. In a travelling grate; a transversely extending carrier bar having an opening therethrough intermediate its longitudinal edges; a grate key mounted on said bar; similarly facing hooks depending from said key, one hook engaging beneath a lower longitudinal edge of said bar and the other depending through said opening to engage the under side of said bar at one side of said opening; said key being movable laterally of the bar to disengage said hooks and permit lifting of the key from the bar; a locking member carried by said key and having a portion engaging a face of said bar facing to oppositely said direction of lateral movement to prevent said movement of said key; and a pivotal connection between said key and locking member for permitting the latter to be disengaged from said bar to allow said lateral movement of said key.

7. In a travelling grate having a transversely extending carrier bar; a grate key mounted on said bar and having similarly facing hooks depending from said key and engaged beneath the bar to prevent lifting of the key from the bar, said key being movable laterally of the bar to disengage said hooks and permit said lifting; a locking member carried by said key and engaging a portion of said bar facing oppositely to said direction of lateral movement to prevent said movement of said key; a pivotal connection between said key and locking member for permitting the latter to be disengaged from said bar to allow said lateral movement of said key; and means securing said locking member in locking relation with said key.

8. In a travelling grate having a transversely extending carrier bar; a grate key mounted on said bar; rearwardly facing hooks depending from said key and engaged beneath the bar to prevent lifting of the key from the bar, said key being movable forwardly on the bar to disengage said hooks and permit said lifting; and a locking member carried by said key and having a portion engaging a rearwardly facing portion of said bar to prevent said forward movement of said key; and a pivotal connection between said key and locking member for permitting the latter to be disengaged from said bar to allow said lateral movement of said key.

9. In a travelling grate wherein grate key assemblies constructed as recited in claim 6 are mounted so that the tail portion of one grate key assembly is overlapped by the nose portion of the succeeding grate key assembly, characterized in that each grate key assembly the key and locking member are positioned in side by side relation with aligned transverse apertures extending therethrough with the aperture of each member extending through a recess in the outer side face thereof, said apertures being located in the tail portion of the key and locking member so as to be overlapped by the nose portion of the following key; and fastening means extending through said apertures and located entirely within the apertures in the recesses and key in the locking member.

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