

July 11, 1933.

E. KRIEGER

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AUTOMATIC STOKER

Filed Jan. 20, 1931

2 Sheets-Sheet 1

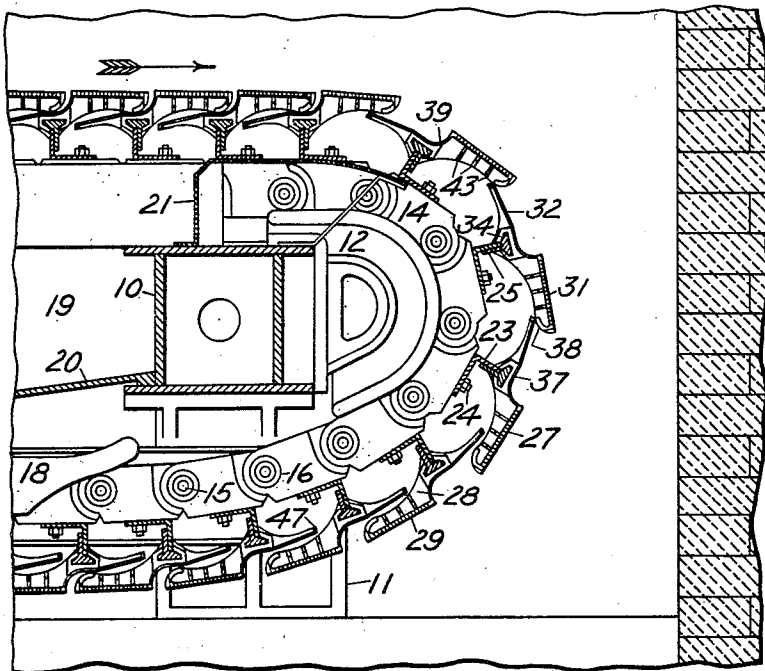


Fig. 1

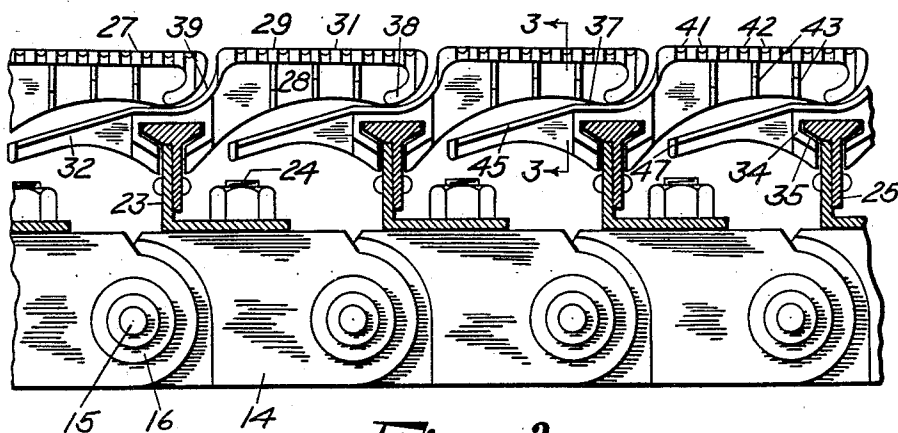


Fig. 2

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2 Sheets-Sheet 2

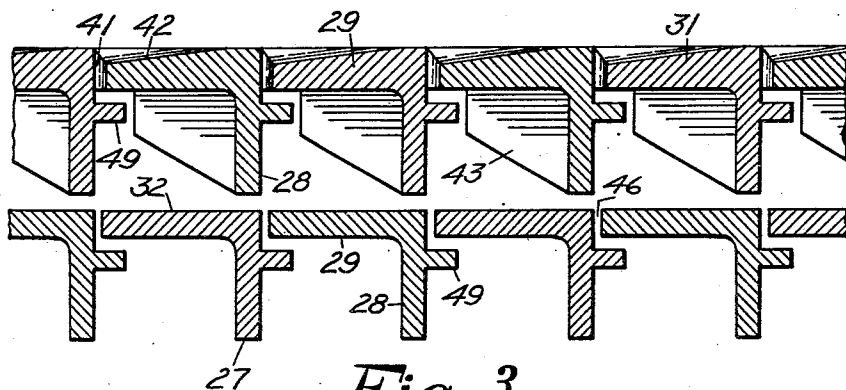


Fig. 3

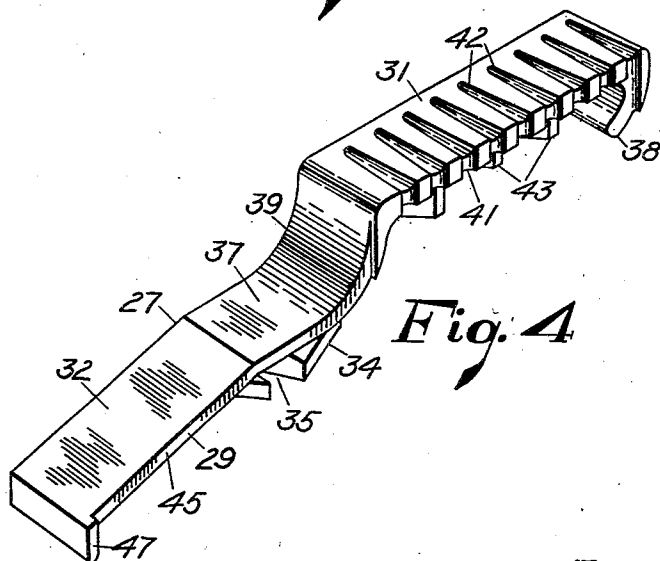


Fig. 4

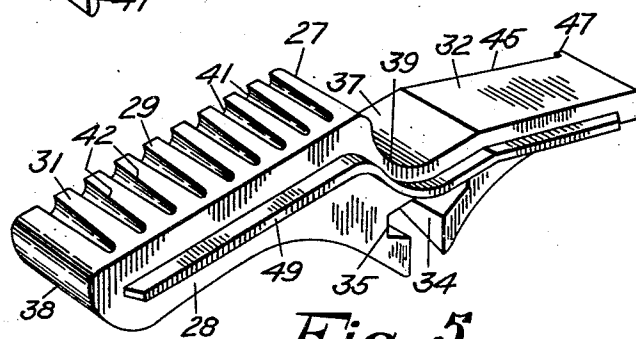


Fig. 5

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AUTOMATIC STOKER

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This invention relates to automatic stokers for furnaces, and more particularly to the construction and arrangement of the fuel supporting parts in stokers of the traveling grate type.

Traveling grate stokers are usually provided with two or more parallel endless chains which are driven by a suitable source of power. These chains carry cross members on which the fuel supporting members or grate clips are mounted. The grate clips transport fuel through the furnace from a hopper at the front thereof and deliver to the fuel the air necessary for combustion, the combustible residues being deposited at the rear of the furnace.

Various difficulties have been encountered in the past in the operation of such stokers. It has been found that with certain prior constructions the air is not evenly distributed to the fuel throughout the length of each grate clip, and the rate of combustion is accordingly not uniform. The grate clips, and particularly the rear or leading ends thereof, are sometimes destroyed by the heat of the burning fuel. Fine particles of ash and fuel sift through the grate surface into the air compartments therebelow, necessitating the frequent removal of the accumulated material. The grate sometimes carries a part of the ash to the front of the furnace and deposits it upon the floor of the boiler room. This is unsightly and undesirable. The grate clips of adjacent transverse rows separate at the front and rear of the stoker, and they sometimes become blocked by fuel particles or otherwise and break as they come together.

It is accordingly one object of my invention to provide a traveling grate which will distribute air uniformly to the fuel bed and which will prevent particles of ash or fuel from sifting through into the air compartments therebeneath.

It is a further object of my invention to provide a traveling grate which will withstand the heat of the fuel bed indefinitely without being injured thereby.

A further object is to provide a traveling grate which will deposit all of the combustible material at the rear of the furnace.

A further object is to provide a traveling grate which will operate smoothly at all times without binding or breaking of parts.

With these and other objects in view, as will be apparent to those skilled in the art, my invention resides in the combination of parts set forth in the specification and covered by the claims appended hereto.

In accordance with my invention, I provide a traveling grate stoker having a series of spaced parallel grate supporting bars arranged to be moved through a furnace in a direction perpendicular to their length. A row of long narrow grate clips is mounted on each bar to support the fuel bed and admit air thereto for combustion. Each grate clip extends in the direction of movement, and its leading or fuel supporting portion overlies the trailing portion of the clip in advance thereof. The clips are preferably mounted somewhat loosely on the bars with their centers of gravity in advance of the support, so that each clip rests by gravity upon the next, preferably contacting therewith directly above the supporting bar. Each clip may comprise a vertical web and a horizontal flange, and the edge of the flange may be spaced from the laterally adjacent clip, as by means of notches cut therein to permit air to flow upwardly between the clips. One side of the clip may have a laterally extending rib which is spaced from the top of the clip and underlies the flange on the laterally adjacent block, thereby forming a tortuous passage which permits air to flow therethrough but prevents the sifting of fine particles of fuel or ash.

Referring to the drawings illustrating one embodiment of my invention and in which like reference numerals indicate like parts,

Fig. 1 is a longitudinal section through the rear portion of a traveling grate stoker;

Fig. 2 is an enlarged view of a portion of the grate shown in Fig. 1;

Fig. 3 is an enlarged cross section on the line 3-3 of Fig. 2;

Fig. 4 is a perspective view of a grate clip; and

Fig. 5 is a perspective view of the clip

shown in Fig. 4 viewed from the opposite side.

The embodiment illustrated in the drawings comprises a transverse horizontal rear girder 10 supported at each end on a vertical pedestal 11. Two or more members 12 (one only being shown) are mounted on the rear face of the girder to provide curved tracks for endless parallel grate chains which pass around the girder. These chains are formed of links 14 pivotally connected to each other by means of pins 15. The pins carry rollers 16 which roll upon the track 12 as the chain moves thereover, and a shoe 18 is provided to guide the chain on to the lower track (not shown), all of which is well known in this art. The space 19 in front of the girder is enclosed by a compartment bottom plate 20 and an air seal 21, and air is supplied to this space under pressure from any suitable source.

A series of spaced parallel grate supporting bars are arranged transversely of the stoker, and as illustrated these comprise angles 23 fastened to the links 14 by bolts 24, and T-shaped members 25 riveted to the angles. These transverse bars carry the grate clips 27 which form the actual fuel supporting surface.

Each grate clip 27 comprises a thin vertical web 28 and a flange 29 extending horizontally from one side of the web at the upper edge thereof. The leading or rear portion 31 of the clip is elevated to provide the fuel support proper, and the trailing or front portion 32 is depressed and at assembly extends beneath the portion 31 of the corresponding clip in the next row. The trailing portion 32 is preferably of sufficient length to underlie substantially the entire extent of the fuel supporting section of the next clip, so as to catch any siftings which may fall therefrom. This portion 32 of the clip may be sloped downwardly at a slight angle toward the end of the clip in order to avoid interference between the clips of adjacent rows as they pass around the ends of the stoker.

In order to mount the clips on the stoker, I provide a supporting portion in the form of a boss or enlargement 34 on the web 28 of each clip, and this boss is formed with a T-shaped slot or opening 35 therethrough which fits the transverse supporting bar. This fit is preferably slightly loose, as indicated in Fig. 2, and the boss is spaced from the center of gravity of the clip in a direction toward the front of the furnace. With this construction the leading end of each clip rests by gravity upon the corresponding clip in the next row, and the fuel supporting portion 31 of the clip forms a beam which is supported at each end as distinguished from a cantilever beam. The stresses in the metal are thus greatly reduced. Moreover, in the embodiment illustrated, the entire fuel supporting portion 31 of the clip is in advance of the slot 35, the trailing por-

tion 32 is in front thereof, and a flat horizontal surface 37 is provided directly above the slot to support the leading end of the adjacent clip. This clip with its superimposed load of fuel does not therefore produce any bending action in the clip on which it rests, for the force is transmitted by compression directly to the transverse supporting members 25.

I preferably provide an extension flange 38, which curves downwardly from the flange 29 at the leading end of the clip and contacts with the flat portion 37 of the clip beneath. This increases the area of contact between the clips and forms a firm support which overcomes any tendency of the clips to tip laterally. Since the clips of adjacent rows are in actual contact, there is no opportunity for undesirable and uneven leakage of air between them. As the clips pass around the front and rear of the stoker, they move apart and then come together again. At the same time the leading end of each clip slides over the surface 37 of the adjacent clip. This sliding or rubbing action keeps the contacting surfaces clean and free from all accumulations of fuel or refuse which might tend to build up on them. Such accumulations in the past have often resulted in breakage of clips or forced the leading ends of the clips to project upwardly into the fire and become burned.

The flat surface 37 is preferably connected to the fuel supporting surface by a concave surface or large radius fillet 39. This adds to the strength of the clip and avoids any sharp internal corner in which particles of fuel or ash might become lodged. The leading end of each clip is spaced slightly from the upper part of this curved portion 39 of the next clip to leave room for expansion and to avoid breakage of clips if the chain should sag.

The fuel supporting portion of the flange 29 is preferably made somewhat thicker than the remainder, so that it may better withstand the heat of the fuel bed. It is also provided with spaced notches 41 in its edge through which the air for combustion may flow. A series of parallel transverse grooves 42 may be provided in the upper surface of the flange to assist in distributing the air uniformly to the fuel, each groove preferably leading from one of the notches 41. Spaced vertical ribs 43 may be provided beneath the flange for strengthening purposes.

In order that air may readily flow upwardly to the notches 41 in the fuel supporting section of the flange 29, the remainder of the flange is cut back slightly at 45, to provide a narrow slit 46 between the laterally adjacent clips at assembly (Fig. 3). A small lug 47 is provided at the trailing end of the clip to ensure the proper spacing.

For the purpose of minimizing the sifting of fine fuel or ash through the notches 41, I

preferably provide a rib 49 on the opposite side of the web 28 from the flange 29. This rib is spaced downwardly from the upper surface of the clip for a distance slightly exceeding the thickness of the flange, and at assembly it underlies the flange of the laterally adjacent clip and is spaced both vertically and laterally therefrom to provide a tortuous air passage. The rib 49 extends throughout substantially the entire length of the block and provides the anti-sifting tortuous air passage not only in the fuel supporting part of the block but also in the trailing portion 32 thereof. As a result, siftings cannot reach the air chamber 19 without passing against the air current through two tortuous passages in series (see Fig. 3), and the amount of such siftings is reduced to a minimum.

The operation of my invention will now be apparent from the above disclosure. The grate and the fuel bed supported thereon travels in the direction of the arrow shown in Fig. 1, and air under pressure is supplied to the chamber 19. This air flows upwardly through the slits 46 and passes into the fuel bed through the notches 41 and the grooves 42. The leading end of each clip rests by gravity on the surface 37 of the adjacent clip and prevents any undesirable leakage of air between the rows. The air is thus distributed evenly and the rate of combustion is uniform. Any siftings which fall through the notches 41 will be retained by the rib 49 or by the trailing portion 32 beneath, and will be deposited in the ash pit as the clips pass around the rear end of the stoker. Mechanical stresses in the clips are reduced by supporting their leading ends on the clips in the next row, and this construction provides a sliding action which keeps the contacting surfaces clean and unobstructed. This eliminates to a large extent burning or breaking of clips.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A grate clip for a traveling grate stoker comprising a long narrow metal body having a centrally located supporting boss, an elevated fuel supporting portion at the leading end, and a depressed portion at the other end which has its upper surface below that of the fuel supporting portion, the center of gravity of the clip being in advance of the boss in the direction of travel, and the depressed portion being so shaped that when assembled with other similar clips the depressed portion will carry the leading end of the adjacent clip.

2. A grate clip for a traveling grate stoker comprising a long narrow metal body having a centrally located supporting boss, an elevated fuel supporting portion at the leading end, and a depressed portion at the other end which has its upper surface below that of the fuel supporting portion, the center of gravity

of the clip being in advance of the boss, and the depressed portion being so shaped that when assembled with other similar clips the depressed portion will underlie substantially the entire fuel supporting portion of the adjacent clip and carry the leading end thereof.

3. A traveling grate stoker comprising parallel endless chains, transverse parallel grate supporting bars mounted on the chains, and a row of narrow fuel supporting grate clips loosely mounted upon each grate bar, each clip having an elevated fuel supporting surface adjacent to its leading end and a depressed surface directly above its corresponding grate bar, the center of gravity of each clip being in advance of said depressed surface so that the leading ends of the clips rest by gravity upon the depressed surfaces of the clips in the next row in advance.

4. A traveling grate stoker comprising parallel endless chains, transverse parallel grate supporting bars mounted on the chains, and a row of narrow grate clips mounted side by side upon each bar, each clip having an elevated fuel supporting portion at the leading end and a depressed portion at the other end underlying substantially the entire fuel supporting portion of the corresponding clip in the next row, laterally adjacent clips having parts overlying throughout substantially the entire length thereof which are spaced both vertically and laterally, whereby two tortuous air passages are provided in series to prevent sifting of fine fuel and ash.

5. A traveling grate stoker comprising parallel endless chains, transverse parallel grate supporting bars mounted on the chains and a row of narrow grate clips loosely mounted side by side upon each bar with the center of gravity of each clip in advance of the bar in the direction of travel, each clip having a flange providing a leading fuel supporting portion and a depressed trailing portion underlying substantially the entire fuel supporting portion of the next clip in an adjacent row and supporting the same, each clip also having a rib on one side which extends substantially the entire length of the clip, the rib being so shaped and so spaced from the top of the clip that it underlies the flange on the laterally adjacent clip, whereby two tortuous air passages are provided in series between the clips.

6. A grate clip for a traveling grate stoker comprising an elongated flange having an elevated substantially horizontal fuel supporting surface adjacent to the leading end of the clip and a depressed surface at the trailing end of the clip, a rib extending along one side of the clip and spaced from the upper edge thereof, said rib underlying the flange of a laterally adjacent clip at assembly, and a centrally located supporting boss, the center of gravity of the clip being in advance of the boss in the direction of travel,

whereby the leading end of the clip will rest by gravity upon the depressed surface of the clip in advance thereof at assembly.

7. A grate clip for a traveling grate stoker comprising an elongated flange having an elevated substantially horizontal fuel supporting surface adjacent to the leading end of the clip and a depressed surface which extends to the trailing end of the clip and underlies substantially the entire fuel supporting portion of an adjacent similar clip at assembly, a vertical web beneath the flange, and a rib extending along one side of the clip and spaced from the upper edge thereof by a distance slightly exceeding the thickness of the flange, the edge of the flange being cut away in both the fuel supporting portion and the depressed trailing portion of the clip to permit air to flow between two laterally adjacent clips when they are assembled on a stoker.

8. A grate clip for a traveling grate stoker comprising an elongated flange having an elevated substantially horizontal fuel supporting surface adjacent to the leading end of the clip, a depressed substantially horizontal surface in front of the fuel supporting surface and a downwardly sloping surface extending to the trailing end of the clip, a vertical web beneath the flange, a rib extending along one side of the clip and spaced from the upper edge thereof by a distance slightly exceeding the thickness of the flange, and a boss on the web directly beneath the said depressed surface provided with a T-shaped transverse slot, the flange being cut away to permit air to flow between two laterally ad-

jacent clips when they are assembled on a stoker.

9. A grate clip for a traveling grate stoker comprising an elongated flange having an elevated substantially horizontal fuel supporting surface adjacent to the leading end of the clip, a depressed substantially horizontal surface in front of the fuel supporting surface, a concave surface of comparatively large radius connecting the fuel supporting surface with the depressed surface, and a downwardly sloping surface extending to the trailing end of the clip, a vertical web beneath the flange, a rib extending along one side of the clip and spaced from the upper edge thereof by a distance slightly exceeding the thickness of the flange, and a boss on the web provided with a T-shaped transverse slot, the flange being cut away to permit air to flow between two laterally adjacent clips when they are assembled on a stoker.

10. A traveling grate stoker comprising parallel endless chains, transverse parallel grate supporting bars mounted on the chains, and a row of narrow fuel supporting grate clips loosely mounted upon each grate bar, each clip having an elevated fuel supporting surface adjacent to its leading end and a depressed surface which extends to its trailing end, and the center of gravity of each clip being in advance of its support so that the leading ends of the clips rest by gravity upon the depressed surfaces of the clips in the next row in advance.

Signed at Buffalo, New York, this 17 day of January 1931.

EUGENE KRIEGER.

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