April 2, 1940. J. S. BENNETT 2,195,808

STOKER

Filed May 13, 1937 2 Sheets-Sheet 1

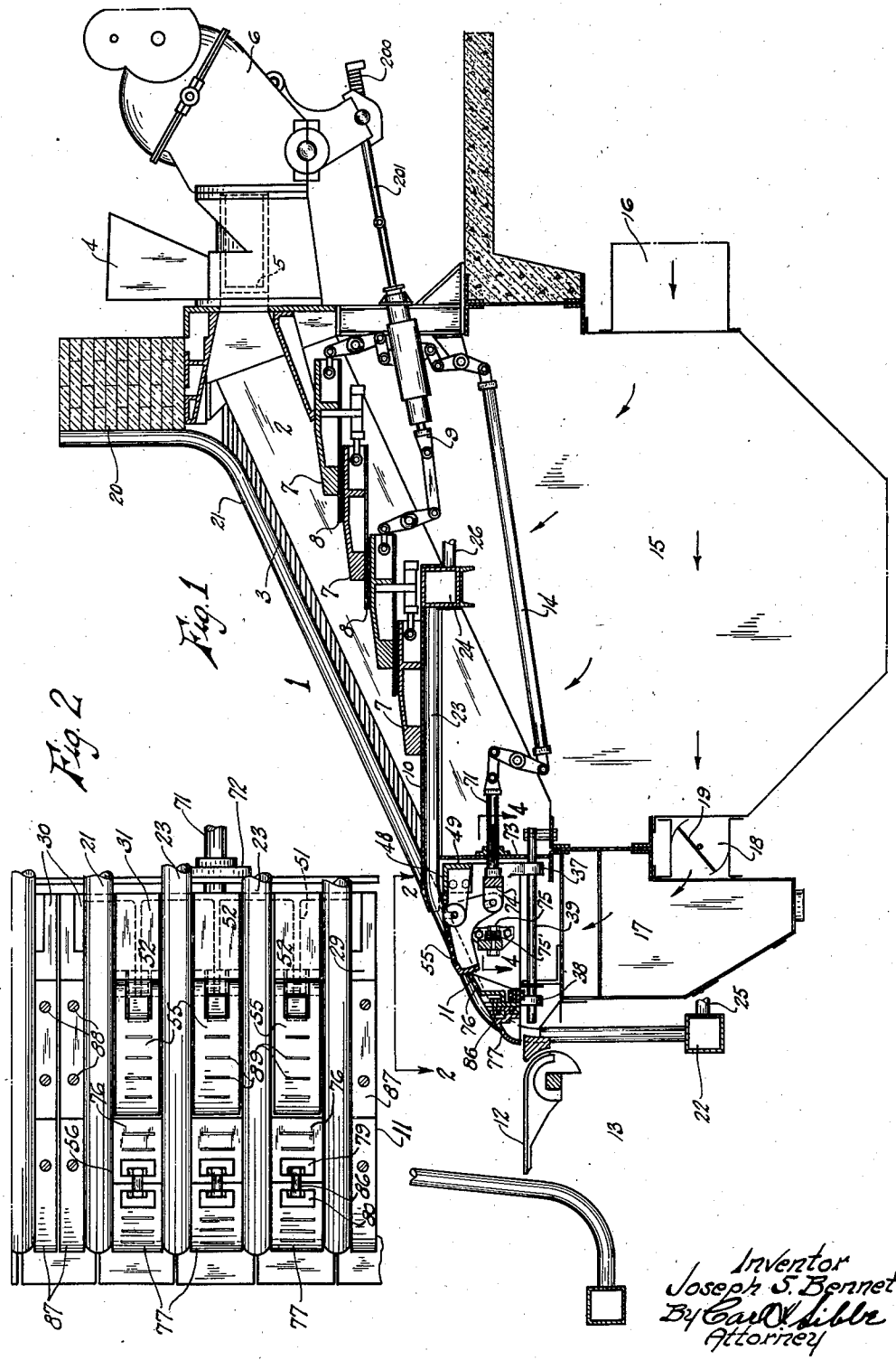


Fig. 1

Fig. 2

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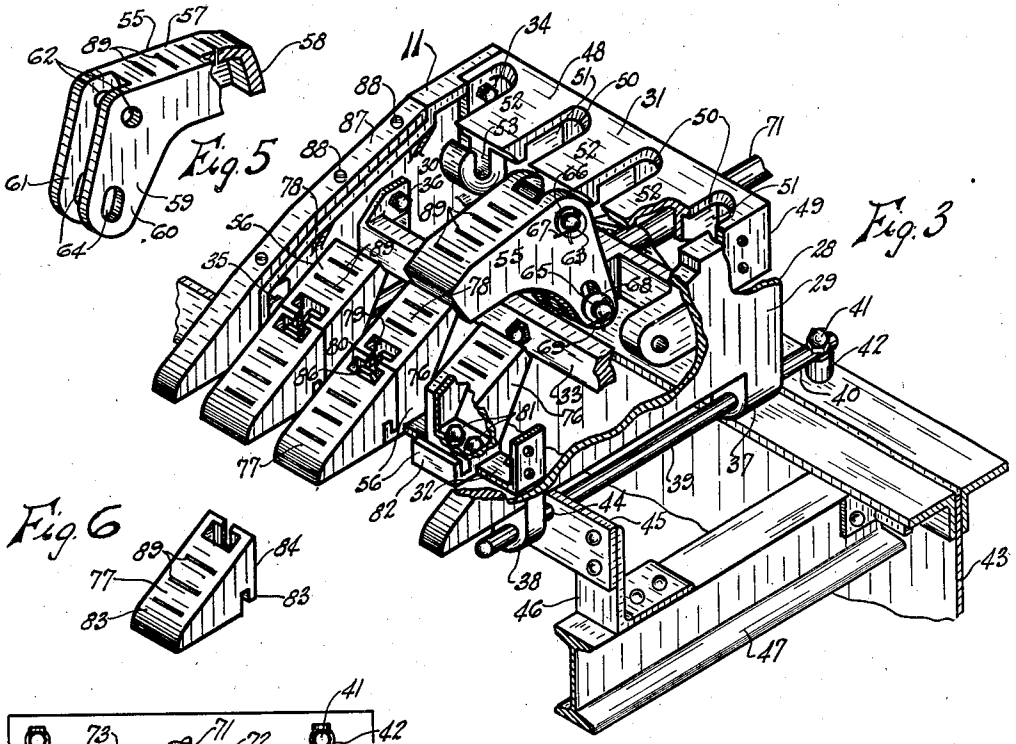


Fig. 3

Fig. 5

Fig. 6

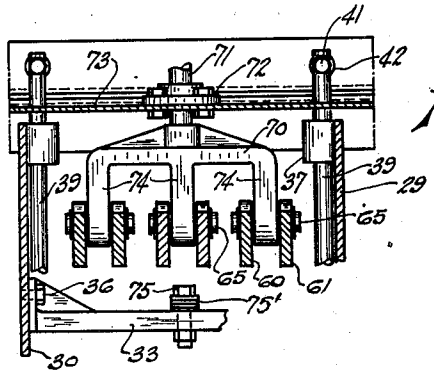


Fig. 4

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STOKER

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Application May 13, 1937, Serial No. 142,389

9 Claims. (Cl. 110—44)

This invention relates to furnace stokers, and more particularly to the overfeed section or extension grates of such devices.

One object of the present invention is to provide a generally improved extension grate construction which functions to both agitate and feed the partially consumed fuel and refuse toward the dump plates or ash pit of the furnace.

Another object is to provide an extension grate consisting of vertically and horizontally movable elements for agitating and feeding the partially consumed fuel and refuse toward the ash pocket or dump plates of the furnace.

Another object is to provide an extension grate of the stated character adapted for use in connection with fluid cooled stokers.

Other and more specific objects will become apparent as the description of the invention progresses.

Of the drawings:

Fig. 1 is a longitudinal sectional view taken through one of the retorts of an underfeed stoker showing the preferred embodiment of the invention applied to a stoker of the fluid cooled type.

Fig. 2 is a fragmentary plan view taken substantially along line 2—2 of Fig. 1.

Fig. 3 is a perspective view of an extension grate section with certain parts removed, and others broken away to show the construction of the various elements thereof.

Fig. 4 is a sectional view taken substantially along line 4—4 of Fig. 1.

Fig. 5 is a perspective view with a corner thereof broken away showing the structure of one of the vertically movable elements of the extension grate.

Fig. 6 is a perspective view of the nose portion of one of the pusher elements of the extension grate.

Referring to the drawings, the numeral 1 designates generally a stoker consisting in the present instance of alternately disposed retorts 2 and tuyère rows 3. Fuel from a hopper 4 is fed to the retorts 2 by rams 5, driven by any suitable power mechanism indicated generally at 6. The bottom of each retort 2 consists of a series of alternately disposed pushers 7 and dead plates 8, the pushers 7 being reciprocated by the power mechanism 6 through any suitable link and lever mechanism indicated generally at 9. The lower end of each retort is provided with an extended dead plate or coal plate 10. A series of overfeed or extension grate sections 11 provided at the lower end of the stoker feed the partially consumed fuel and refuse to dump plates 12 which in turn may be actuated from time to time by any suitable operating mechanism to discharge the refuse accumulating thereon into an ash pocket 13. The extension grate sections 11 may also be actuated by the power mechanism 6 through any suitable link and lever mechanism indicated generally at 14. For a more detailed description of the operating means for the rams, pushers and extension grates reference may be had to United States Patent No. 2,005,005.

Draft air is supplied to the furnace from a plenum chamber 15 which receives its air from any suitable fan or blower mechanism (not shown) through a communicating passage 16. Air is supplied to the extension grate sections 11 from a common chamber 17 disposed therebeneath which communicates with chamber 15 by means of a communicating passage 18 having an adjustable damper 19 provided therein.

Mounted in cooling relation with each tuyère row 3, and a portion of the front wall 20 of the furnace, are fluid conducting tubes 21. These tubes extend downwardly and form a portion of the overfeed section 11, and terminate at their lower ends in a transversely disposed header 22. The upper end of tubes 21 are connected to one of the steam drums of a boiler (not shown). Also mounted in cooling relation with each coal or dead plate 10 are tubes 23. The rearwardly disposed ends of these tubes extend in parallel relation with the lower ends of tubes 21, and also terminate in header 22. The forwardly disposed ends of tubes 23 terminate in a transverse header 24 mounted in any suitable manner beneath the stoker 1. Fluid from the boiler is supplied to header 22 by downtake connections 25, while uptake connections 26 connect header 24 with the boiler after a well known fashion.

The term "front herein employed in the description of the various elements indicates the portion of the elements extending toward the front or power mechanism 6 of the stoker, while the term "rear" indicates the portions extending toward the rear or dump plates 12.

Each overfeed or extension grate section 11 comprises a framework 28 consisting of a pair of spaced, substantially triangular side plates 29 and 30, an upper transverse tie member 31, a lower transverse tie member 32, and a transverse abutment member 33. The upper and lower transverse members 31 and 32 are secured to side plates 29 and 30 in any suitable manner, such as by bolts 34 and 35 respectively. Abutment member 33 is also secured to side plates 29 and 30

by bolts 36. Side plates 29 and 30 each have depending from the lower edge thereof a pair of depending apertured projections 37 and 38 through which extends a supporting rod 39. The forwardly disposed end 40 of each supporting rod 39 is secured by means of a bolt 41 to a substantially hollow supporting element 42 secured to a transverse girder 43. The rearwardly disposed ends of supporting rods 39 extend through apertures 44 provided in a vertically disposed bar 45. Each end of bar 45 is secured to a bracket 46 which in turn is secured to a longitudinally extending beam 47. By this construction it is seen that the extension grates may be reciprocated on the supporting rods 39, upon operation of the power mechanism 6 through the link and lever mechanism 14 previously described.

Transverse member 31, as shown more particularly in Figs. 1 and 3, is of substantially angular construction, having a substantially flat top wall 48 and a substantially vertical front wall 49. Top wall 48 has provided therein a series of slots 50 arranged in spaced relation and open at the rearwardly disposed ends thereof for receiving the tubes 21 and 23. A series of ribs 51 extend rearwardly of and are integrally connected to front wall 49. These ribs are also integral with the lower surfaces of the rearwardly extending projecting portions 52 of transverse member 31 and terminate at the rearwardly disposed ends thereof in hooks 53. Each extension grate section 11 also comprises in the present instance three rocking or vertically movable elements 55 and three horizontally movable pusher elements 56 disposed in longitudinal alignment with the projecting elements 52 of transverse member 31, and between the tubes 21 and 23, as shown more particularly in Figs. 2 and 3. The number of elements 55 and 56 may obviously be varied in each unit without departing from the invention. Each rocking element 55, as shown in Fig. 5, is of angular construction and consists of an upper fuel supporting surface 57 and a vertically disposed fuel pushing surface 58. The forwardly and downwardly disposed end 59 of each element 55 is bifurcated. The legs 60 and 61 of the bifurcated end 59 have provided therein aligned apertures 62 for receiving a supporting pin 63. The lower ends of legs 60 and 61 have also provided therein a pair of transversely aligned slots 64 for receiving an operating pin 65. A washer 66 is provided at the ends of pin 63 exteriorly of element 55 and cotter pins 67 hold the pin against axial movement. A washer 68 is provided at each end of pin 65 and cotter pins 69 also hold said pin against axial movement. In assembly each element 55 is moved forwardly, so that the corresponding hook 53 extends between the legs 60 and 61. Element 55 is then moved downwardly until pin 63 engages the corresponding hook 53.

The elements 55, as well as the entire framework 28, are actuated by a reciprocatory operating member 70. Member 70 is connected to one end of a rod 71 mounted in a bearing 72 provided in the front closing plate 73 of the overfeed section of the stoker. The other end of rod 71 is secured in any suitable manner to the linkage 14 previously described. The stroke of rod 71 may be varied by increasing or decreasing the number of washers 200 provided on the operating rod 201 for linkage 14 as described in the hereinbefore referred to Patent No. 2,005,005. The rearwardly disposed end of each arm 74 has provided therein a transverse aperture for receiving an associated operating pin 65. Thus, upon reciprocation of rod 71 a rocking movement will be imparted to the elements 55. As shown in Figs. 1 and 3, the transverse abutment member 33 has provided intermediate the ends thereof an adjustable bolt 75 disposed centrally thereof, and which is adapted to be engaged by the inner end of arm 74 associated with the middle rocking element 55 when the latter has been actuated a predetermined distance. Continued movement of rod 71 then causes a reciprocatory movement of the framework 28. Bolt 75 has provided thereon a series of removable washers 75' whereby the rocking movement of elements 55 and the reciprocatory movement of the framework 28 as a whole may be varied.

Each pusher element 56 consists of a forward or base portion 76, and a rear or nose portion 77 detachably secured thereto. Each portion 76 comprises an upper fuel engaging surface 78 having a substantially T-shaped slot 79 provided at the rearwardly disposed end thereof which aligns with a correspondingly shaped slot 80 provided at the forwardly disposed end of nose portion 77. Each base portion 76 is of substantially hollow construction, as shown in Fig. 3, and is secured to transverse member 32 in any suitable manner, such as by bolts 81. Extending rearwardly from the lower end of each base portion 76 is an upwardly extending flange 82 forming a hook which is adapted to interlock with the downwardly extending flange 83 of the corresponding nose portion 77.

As shown more particularly in Fig. 6, each nose portion 77 is of substantially triangular construction and contains an upper fuel engaging surface 83, a substantially vertical forward surface 84 and vertical side surfaces 85. Thus, to install a pusher element 56 on the framework, base portion 76 is first secured to transverse member 32 by the bolts 81. The nose portion is then first moved into abutting relation with the base portion, and then downwardly until flanges 82 and 83 overlap. A bolt 86 (Figs. 1 and 2) is then inserted in slots 79 and 80, which effectively holds the parts in proper position. The bolts employed are substantially I-shaped having a head at each end and a reduced shank therebetween, the heads of said bolt fitting in the extended portions of the slots, while the shank thereof extends into the reduced portions thereof. The upper edge of each side plate 29 and 30 is provided with a renewable element 87 secured thereto in any suitable manner, such as by screws 88.

From the foregoing description it is seen that upon operation of power mechanism 6 a reciprocatory movement is imparted to rod 71 through the interconnecting linkage 14. As rod 71 and operating member 70 move rearwardly, elements 55 are actuated upwardly to agitate or break up any of the fuel masses supported thereby. This upward movement continues until the middle arm 74 of operating element 70 engages bolt 75 when the entire framework, including pusher elements 56, as well as the elements 55, are moved rearwardly to feed the fuel and refuse to the dump plates 12 of the stoker. Upon movement of operating member 70 in the reverse direction the elements 55 are first moved downwardly until the lower edges thereof engage transverse abutment bar 33 whereupon the entire framework is moved forwardly. In this manner the clinker and fuel masses are not only broken up, but the refuse is effectively fed to the rear of the stoker. Elements 55 and 56 have also provided in the upper sur-

faces thereof apertures 89 through which draft air from chamber 17 may pass to the fuel bed. Draft air may also pass between the tubes 21 and 23 and elements 55 and 56, and between elements 55 and 56.

From the foregoing description it is seen that the embodiment of the invention herein shown is extremely effective in agitating the fuel, thereby breaking up clinker and masses of fuel and feeding the same to dump plates provided at the rear of the stoker. By this construction efficient combustion of the fuel is effected, as well as the elimination of large clinker masses, which often occur during operation of the furnace.

While the embodiment herein shown and described is admirably adapted to fulfill the objects primarily stated, it is to be understood that the invention is not to be limited thereto since it may be embodied in other forms, all coming within the scope of the claims which follow.

What is claimed is:

1. An extension grate for stokers comprising a reciprocable framework, one or more rocking grate elements mounted on said framework, operating means for said rocking elements and said framework, means operatively connecting said rocking grate elements to said operating means, stop means provided on said framework for limiting the rocking movement of said elements, said stop means being disposed in spaced relation with said operating means, whereby upon operation of the latter a rocking movement is first imparted to said grate elements and continued movement of said operating means causes actuation of said framework.

2. An extension grate for stoker furnaces comprising, a reciprocatory framework, a series of pusher elements supported on said framework, and a second series of rocking elements also supported on said framework, and operating means for said framework and rocking elements.

3. An extension grate for stoker furnaces comprising a framework adapted for reciprocation, fluid conducting tubes mounted in spaced relation above said framework, a series of rocking elements disposed between said tubes, and a second series of pusher elements disposed beneath said rocking elements for feeding the fuel and refuse to a receiving device.

4. An extension grate for stoker furnaces comprising, a framework, means for supporting said framework for reciprocatory movement, fluid conducting tubes mounted in spaced relation adjacent said framework, a series of rocking elements disposed between said fluid conducting tubes, means for pivotally supporting said rocking elements on said framework, and an abutment member for limiting the rocking movement of said elements.

5. An extension grate for stoker furnaces comprising, a framework, means for supporting said framework for reciprocatory movement, fluid conducting tubes mounted in spaced relation adjacent said framework, a series of pusher elements disposed between said fluid conducting tubes, each of said pusher elements comprising a base portion and an extended nose portion detachably secured thereto, means for rigidly securing said base portions to the framework, and interlocking means for detachably securing said nose portions to said base portions.

6. An extension grate for stoker furnaces comprising, a framework, means for supporting said framework for reciprocatory movement, fluid conducting tubes mounted in spaced relation adjacent said framework, a series of rocking elements disposed between said fluid conducting tubes, means for pivotally supporting said rocking elements on said framework, a second series of pusher elements mounted on said framework and disposed in longitudinal alignment with said rocking elements, and means for actuating said framework and rocking elements.

7. An extension grate for stoker furnaces comprising, a framework, means for supporting said framework for reciprocatory movement, said framework consisting of a pair of widely spaced side plates, an upper transverse tie member, a lower transverse tie member, and an intermediate abutment member, secured to said side plates, a series of rocking elements detachably supported adjacent said upper transverse member, and a series of pusher elements detachably secured to said lower transverse member, and means provided on said abutment member for limiting the movement of said rocking elements.

8. An extension grate for stoker furnaces comprising, a framework, means for supporting said framework for reciprocatory movement, said framework consisting of a pair of widely spaced side plates, an upper transverse tie member, a lower transverse tie member, and an intermediate abutment member, secured to said side plates, a series of rocking elements detachably supported adjacent said upper transverse member, and a series of pusher elements detachably secured to said lower transverse member, means provided on said abutment member for limiting the movement of said rocking elements, and operating means for actuating said framework and rocking elements.

9. An extension grate for stoker furnaces comprising, a framework, means for supporting said framework for reciprocatory movement, said framework consisting of a pair of widely spaced side plates, an upper transverse tie member, a lower transverse tie member, and an intermediate abutment member secured to said side plates, a series of rocking elements detachably supported adjacent said upper transverse member, and a series of sectional pusher elements detachably secured to said lower transverse member, each of said sectional elements consisting of a base portion, and a nose portion detachably secured thereto, and means provided on said abutment member for limiting the movement of said rocking elements.

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