

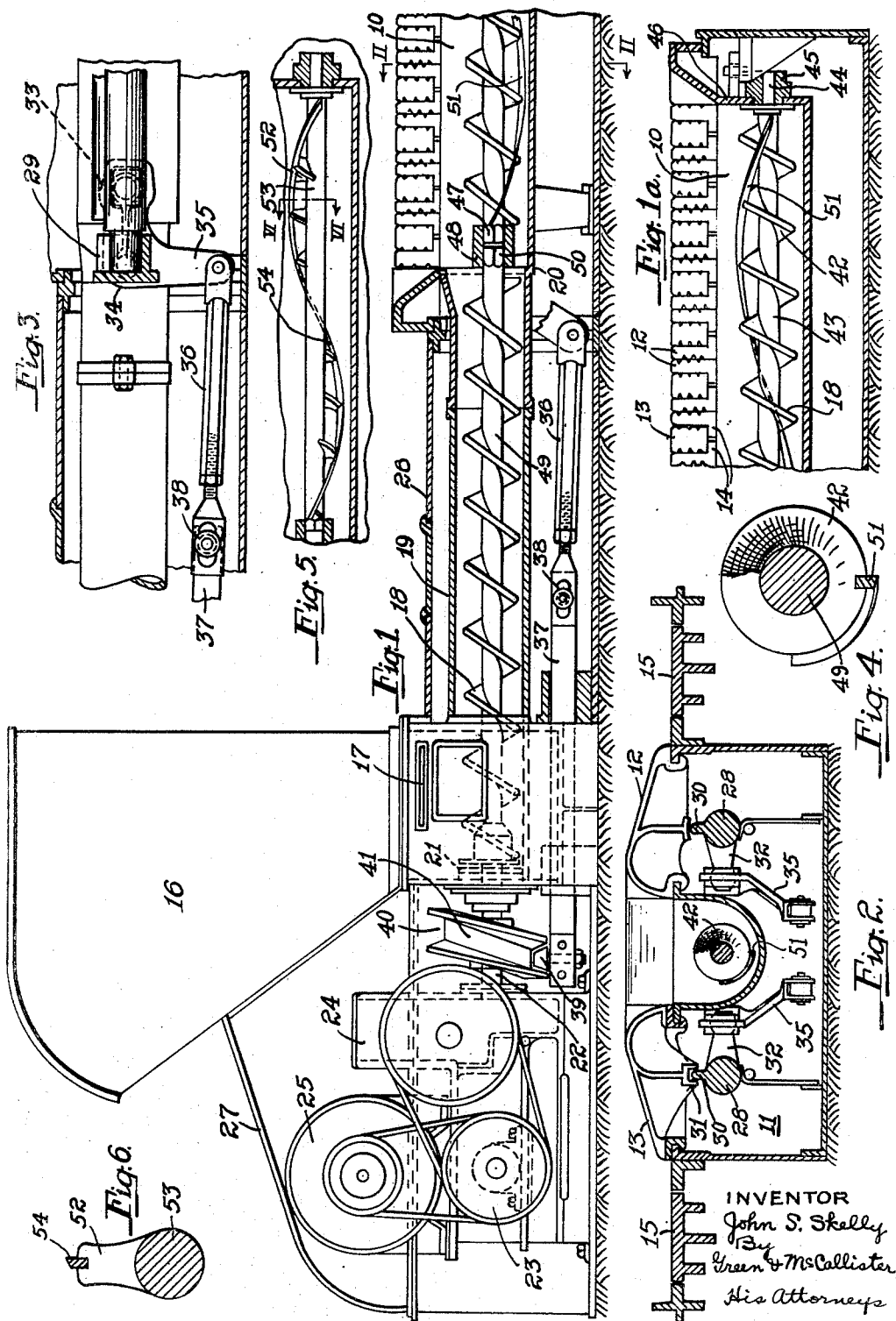
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UNDERFEED STOKER

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UNDERFEED STOKER

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6 Claims. (Cl. 110-44)

This invention relates to underfeed stokers and more particularly to underfeed stokers of the single retort type.

In an application heretofore filed by me and serially numbered 757,777, filed Dec. 17, 1934, I have disclosed a single retort stoker in which the fuel is fed from the magazine to the retort by means of a screw conveyor, is agitated within and immediately above the retort by means of an agitator which reciprocates lengthwise of the retort adjacent its floor or bottom and in which the fuel issuing from the top of the retort overflows onto tuyere blocks. Some of these tuyere blocks are reciprocated toward and from the retort side walls and in this manner the fuel bed supported thereon is kept mobile and the spent fuel and ash is caused to move toward the dumping gates.

While my prior application discloses a stoker of the side retort type, all of the essential elements entering into its make-up are equally applicable to one which is bilaterally symmetrical and in which the retort is centrally located between ash dumping gates.

The stoker of this application resembles that of my former application and in fact is similar thereto in that it utilizes a screw feed for conveying fuel from the magazine to the retort and utilizes tuyere blocks some of which reciprocate toward and from the side walls of the retort for agitating the fuel and conveying the spent fuel and ash to the side dumping gates.

Instead, however, of utilizing an agitator which reciprocates lengthwise of the retort, adjacent its bottom or floor, I utilize a screw feed for constantly moving the fuel along the retort and I make use of a rotary agitator which takes the form of a cutter bar or slice bar which is carried by and spirals the feed screw. This bar is secured within or to the outer peripheral edges of the flights of the feed screw. The bar, as the screw is rotated, causes a progressive undulation of the fuel mass within and immediately above the retort.

I find that in stokers of relatively large capacity, it is preferable to have the flights of the feed screw within the retort continuous, but in some stokers of relatively small capacity it may be preferable to utilize a sectional flight screw in the retort. Since these sectional flights spiral the screw shaft, I secure the cutter or slice bar within or to the outer ends of these sectional flights.

This bar when utilized with a sectional flight conveyor not only serves its purpose as an undulator for the fuel mass within and directly

above the retort, but also serves to strengthen and brace the sectional flights of the conveyor.

I find that by giving to the undulator bar one complete pitch as it spirals the conveyor from one end to the other thereof, but a reverse pitch to that of the conveyor which it encircles, I provide an extremely efficient means not only for keeping the fuel mass from coking to the walls of the retort but for maintaining the mass in such a state of mobility as to attain smokeless combustion of the volatile constituents of the fuel.

In the drawing, accompanying and forming part of this application:

Figures 1 and 1a taken together illustrate, in longitudinal section, a stoker embodying this invention and disclose the full flight screw feeding mechanism within the retort.

Fig. 2 is a view in sectional elevation taken on line II-II of Fig. 1 looking in the direction of the arrows;

Fig. 3 is a fragmentary view, partially in section and partially in elevation illustrating certain features of the mechanism for reciprocating certain of the tuyere blocks.

Fig. 4 is an enlarged view of the full flight screw conveyor and the cutter bar shown in Fig. 2.

Fig. 5 is a fragmentary view in elevation illustrating the complete sectional flight conveyor and cutter bar located within the retort which in certain size stokers I preferably substitute for the full flight conveyor shown in the other views and

Fig. 6 is an enlarged view taken on line VI-VI, Fig. 5, looking in the direction of the arrows.

The stoker that I have chosen as one embodiment of this invention comprises a single elongated horizontal retort 10 supported centrally within a wind box 11. Extending outwardly from each side wall of the retort and jointly supported by the retort side walls of the wind box side walls are tuyere blocks 12 and 13. Tuyere blocks 12 are stationary and tuyere blocks 13, which are supported by lateral extensions 14 formed on tuyere blocks 12, are adapted to be reciprocated toward and from the retort side walls.

Beyond the tuyere blocks are positioned ash-receiving dump gates 15.

It will be understood that this invention can be embodied with equal effect in a side retort stoker, as shown in my said former application.

The stoker unit is provided with a fuel magazine or hopper 16 having a more or less restricted outlet controlled by a slide 17. Through

the orifice controlled by slide 17 fuel flows by gravity to a screw conveyor 18 which is adapted to feed the same through conduit 19 to the inlet end 20 of the retort in a continuous uninterrupted stream.

Screw conveyor 18 is connected through a coupling member 21 with a power off-take shaft 22 which is driven from an electric motor 23 through a speed-change and reducing-gear mechanism 24. The motor 23 also drives a blower 25.

By means of the speed change mechanism the speed of screw conveyor 18 may be varied to vary the amount of fuel fed per unit of time to the retort. Feed screw tube or housing 19 is covered by a housing 26 which leads from wind box 11 to a housing 27 which surrounds the blower. These housings serve to conduct air under pressure supplied by blower 25 to the wind box beneath the retort and the tuyère blocks.

In order to reciprocate tuyère blocks 13 toward and from the retort side walls I employ mechanism like that disclosed in my said former application Serial No. 757,777. This tuyère block reciprocating mechanism comprises a rock bar 28 for each row of tuyère blocks. These rock bars extend throughout the length of the retort and each is suitably journaled in bearings which permit the bars to have limited oscillatory movement. The bearing for one end of one of the rock bars is shown at 29 (Figure 3).

Each rock bar is provided with an upstanding flange 30 which extends throughout the length of the row of tuyère blocks located thereabove and which, having operative connection with the movable tuyère blocks 13 (as shown in Fig. 2 at 31), causes these tuyère blocks to reciprocate as the bars are rocked.

Each rock bar is further provided with an arm 32 near one end which projects inwardly toward the retort and which has operative connection with one arm 33 of a bell crank lever 34. The other or lower arm 35 of the bell crank lever, by means of an adjustable link 36, is connected to a rod 37 through a lost motion connecting device 38.

The inner end of rod 37 carries a tapered roller 39. This roller is located within a tapered groove 40 formed in the outer periphery of a circular cam member 41 mounted on the power off-take shaft 22.

The construction of this mechanism is such that, as the power off-take shaft is rotated, rock bars 28 will be rocked or oscillated through the agency of bell crank lever 34, link 36, reciprocating rod 37, lost motion connecting device 38 and rotary cam member 41 and roller 39. It will be understood that the amount of lost motion desired in device 38 may be obtained by means of replaceable liners (not shown). In Figs. 1a and 2 I show a full flight conveyor screw 42. The shaft 43 of this screw at one end 44 is journaled within a bearing 45 secured to or carried by the rear end 46 of the retort 10. The inner end of shaft 43 is squared, as shown at 47, and by means of a sleeve coupling 48 is connected to the shaft 49 of conveyor screw 18. The outer end of shaft 49 is squared as shown at 50.

Cutter bar or slice bar 51 spirals screw conveyor 42 with its pitch reversed to that of the screw. As shown in Figs. 2 and 4, the bar is let into slots formed in the outer peripheries of the flights of the screw conveyor 42. The bar is not only held in position by being located within the slots cut in the flights of the con-

veyor but is preferably welded in position within the slots.

In Figs. 5 and 6 I have illustrated a partial flight rotary conveyor made up of flight segments 52 formed on rotating shaft 53. These sections may either be cast integral with the shaft or, if desired, may be welded to the same.

These flight sections spiral the shaft, as shown in Fig. 5, and to the outer ends of these sections a cutter or slice bar 54 is secured. The pitch of this bar is also reversed to that of the flight sections. As shown in Figs. 5 and 6, the outer ends of sections 52 are slotted to receive the bar 54 and this bar is preferably welded in place within the slots.

In this form of device the bar 54 not only serves as a slice bar and undulator and acts as a brace for sections 52 and materially strengthens the device as a whole, but tends to retard and pile up the fuel above the retort.

When the stoker is in operation, the rotary conveyor causes fuel to rise within the retort throughout its entire length. The slice or cutter bar in its rotation causes some retardation of the fuel and in addition, it causes a progressive undulation of the fuel within the retort and that immediately above the same.

I find that in stokers of relatively large capacity, that is for this type of stoker, I prefer to use the full flight conveyor but in stokers of relatively small capacity the sectional flight conveyor is sometimes preferable.

I find that the spirally positioned reverse pitch undulator, in the form of a slice or cutter bar, when utilized with either continuous or sectional flight conveyor, causes the fuel mass within the retort and that immediately above the same to pile up and undulate from one end of the retort to the other in a progressive manner and this provides a high state of mobility to the mass. I also find that the undulator bar serves as a slice bar or cutter bar and in its rotation in spaced relation to the shaft of the conveyor prevents coking of the fuel mass to the sides and bottom of the retort.

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

1. In an underfeed stoker, an elongated horizontal retort, an enclosed screw for feeding fuel into said retort, a screw conveyor within the retort and driven by said first mentioned screw, and an undulator secured to and spiralling the screw conveyor within the retort whereby during operation of said conveyor said undulator rotates about the axis of the conveyor and between it and the retort walls.

2. In an underfeed stoker, an elongated horizontal retort, a fuel magazine, a screw conveyor for feeding fuel from said magazine to said retort, a rotatable fuel conveyor within the retort, and an undulator bar spiralling the conveyor within the retort and movable around its axis and between it and the retort walls.

3. A stoker comprising, a retort, open at the top throughout its length, having a fuel receiving aperture at one end thereof below the confines of its lateral walls, and closed at the end opposite thereto, a fuel hopper, a fuel conveying passage between said hopper and the fuel receiving aperture of said retort, a screw located within said passage for propelling fuel there-through and into said retort, a second screw located within said retort adjacent the bottom thereof and below the upper edges of the end and

lateral walls thereof, and a continuous cutter blade, extending substantially throughout the length of said retort and movable between the walls thereof and said second screw, and means
5 for operating both screws and said blade.

4. In an underfeed stoker, an elongated horizontal retort, an enclosed screw for feeding fuel into said retort, a screw conveyor within the retort and driven by said first mentioned screw,
10 and a rotatable undulator spiralling the screw conveyor within the retort and movable between its outer periphery and the retort walls; the pitch of the undulator being the reverse of the pitch of the screw conveyor.

15 5. In an underfeed stoker, an elongated horizontal

retort, a fuel magazine, a screw conveyor for feeding fuel from said magazine to said retort, a rotatable fuel conveyor within the retort, and a rotatable undulator bar spiralling the conveyor within the retort and movable between
5 its periphery and the retort walls; the pitch of the undulator bar being the reverse of the pitch of the screw conveyor.

6. In an underfeed stoker, an elongated horizontal retort, a screw located within and extending lengthwise of the retort and an undulator
10 bar of reverse pitch to said screw secured to the outer periphery thereof and extending throughout substantially its entire length.

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