Jan. 30, 1951 F. B. HALL 2,539,780

AUTOMATIC STOKER WITH RECIPROCATING AGITATOR

Filed June 28, 1945 2 Sheets-Sheet 1

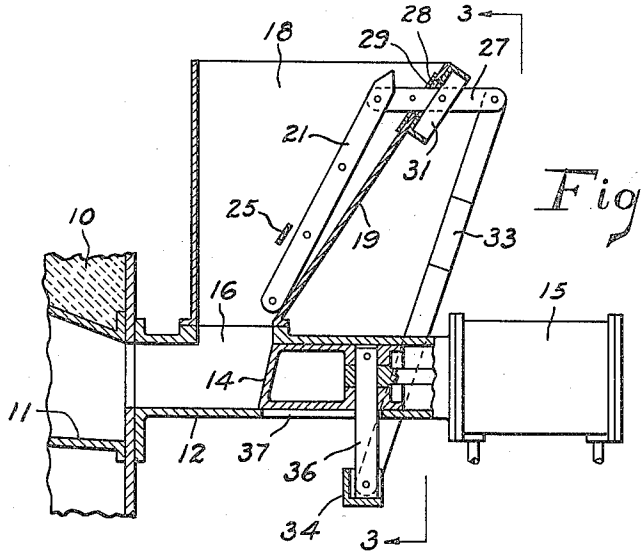


Fig. 1

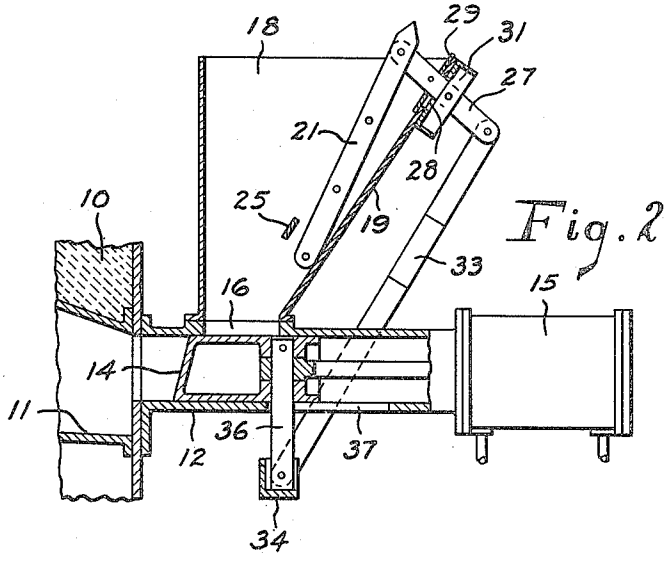


Fig. 2

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AUTOMATIC STOKER WITH RECIPROCATING AGITATOR

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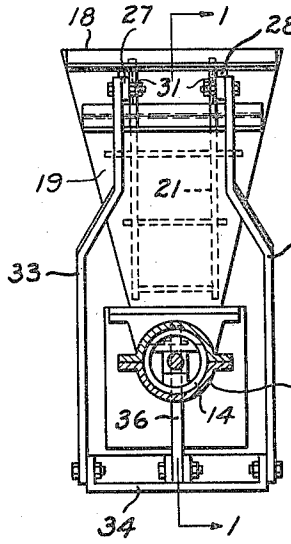


Fig. 3

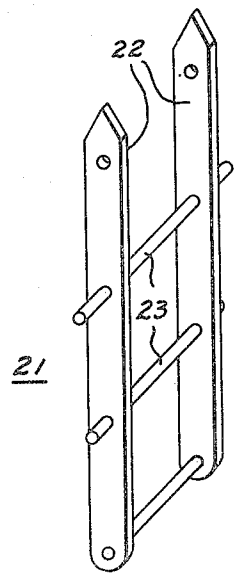


Fig. 4

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AUTOMATIC STOKER WITH RECIPROCATING AGITATOR

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3 Claims. (Cl. 222—243)

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This invention relates to automatic stokers, and more particularly to stokers of the type having a hopper from which fuel is delivered to a furnace by means of a reciprocating ram.

Difficulties are frequently encountered in the operation of such stokers through failure of the fuel to move downwardly from the hopper in a proper manner. In order to overcome this trouble it has been proposed to mount various agitating devices within the hopper and to move these devices in various ways in an attempt to stir up the fuel and prevent it from arching against the walls of the hopper. None of these prior constructions have proven to be entirely satisfactory in operation.

It is accordingly the main object of the invention to provide an automatic stoker having a reciprocable ram to deliver fuel to a furnace, and a dependable mechanism for ensuring a proper feed of fuel from the stoker hopper to the ram.

It is a further object of the invention to provide an automatic stoker of the reciprocating-ram type having a fuel hopper and an agitating device mounted within the hopper and movable in a novel manner to effect a dependable downward movement of the fuel from the hopper.

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

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

Fig. 1 is a longitudinal section through an automatic stoker, the section being taken on the line 1—1 of Fig. 3;

Fig. 2 is a view similar to Fig. 1, but showing the moving parts in a different phase of the operating cycle;

Fig. 3 is a section taken on the line 3—3 of Fig. 1; and

Fig. 4 is a perspective view of an agitating device.

The embodiment illustrated comprises a furnace having a front wall 10 and an underfeed retort 11, only the front portion of the retort being shown. A horizontal ram casing 12 is mounted in front of the wall 10 and communicates with the front end of the retort 11. A fuel-feeding ram 14 is mounted in the ram casing 12, and this ram is reciprocated, either continuously or intermittently, by means of a suitable motor 15. As illustrated, this motor is of the fluid-actuated type, secured to the front end of the ram casing.

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Fuel enters the ram casing through an opening 16 in the upper wall thereof. This opening is so located in relation to the ram 14 that as the ram moves to its rearmost position (shown in Fig. 2) it will pass beneath the opening and close the same. When the ram is in its forward position shown in Fig. 1, it will be substantially clear of the opening so that fuel may enter the ram casing. A suitable hopper 18 having the usual upwardly and forwardly sloping front wall 19, is supported on the top of the ram casing in position to supply fuel by gravity to the opening 16.

Certain types of fuel, such as wet coal, tend to arch across the hopper so that gravity alone cannot be depended upon to ensure a proper downward movement of the fuel through the opening. Consequently little or no coal will be delivered to the retort 11, and as the fuel bed becomes depleted various parts of the stoker within the furnace may be exposed and overheated. In order to avoid these difficulties I provide an agitating device 21 within the hopper 18 and I provide mechanism to move this device positively up and down in timed relation with the strokes of the ram 14. This mechanism is so constructed that the agitator 21 will move upwardly while the ram is moving rearwardly on its fuel feeding stroke, and downwardly while the ram is moving forwardly on its idle or return stroke. Thus during the idle stroke of the ram the downwardly moving agitator will push fuel downwardly through the opening 16, aided by gravity, so that the space vacated by the forwardly moving ram will be filled as fast as it is vacated. Consequently the ram will feed a full charge of fuel at each rearward stroke.

The agitator 21 may be constructed in various forms, but in the preferred embodiment illustrated this device is made somewhat as a ladder (see Fig. 4) with two spaced upright members 22 connected by a plurality of transverse rods 23. This device is mounted within the hopper and close to the front wall 19 thereof. In fact, the lower ends of the uprights 22 are in slidable contact with this wall, and the entire device slopes upwardly and forwardly adjacent the wall. A transverse bar 25 (Fig. 1) extends across the hopper behind the lower portion of the agitator to prevent it from moving appreciably away from the wall 19.

In order that the agitator may be moved in the manner desired, the upper ends of the uprights 22 are pivotally connected to the rear ends of two laterally spaced levers 27 which extend through slots 28 in the hopper wall 19. These

slots are covered by small plates 29 supported by the levers and resting slidably against the rear surface of the wall 19 to prevent leakage of fuel through the slots. The levers 27 are fulcrumed intermediate their lengths on brackets 31 secured to the front surface of the wall 19, and the front ends of the levers are pivotally connected to the upper ends of two links 33 which extend at a downward and rearward inclination on opposite sides of the ram casing. The lower ends of these links are pivotally connected to a transverse bar 34 located beneath the ram casing. This bar is rigidly connected to the ram 14 by means of a vertical bar 36 which extends through a slot 37 in the bottom of the ram casing.

The operation of the invention will now be apparent from the above disclosure. The hopper 18 will be filled with fuel, and the motor 15 will serve to reciprocate the ram 14. During the rearward travel of the ram it will push a charge of fuel rearwardly into the retort 11, simultaneously raising the agitator 21 through the action of the links 33 and levers 27. Throughout the forward or idle stroke of the ram the links and levers will serve to lower the agitator 21 in a positive manner without dependence upon gravity, thereby forcing the fuel in the hopper downwardly through the opening 16 into the ram casing. Thus as fast as the ram is withdrawn forwardly, the space in the rear thereof will be immediately filled with fuel which is forced downwardly by the positive action of the downwardly moving agitator. The downward movement of the agitator terminates simultaneously with the forward movement of the ram, and the upward movement of the agitator terminates simultaneously with the rearward movement of the agitator. The entire mechanism is very simple, dependable, and inexpensive.

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

1. An automatic stoker comprising a ram casing having an upper wall provided with an opening, a fuel hopper mounted above the ram casing and arranged to supply fuel to the interior of the ram casing through the said opening, a reciprocable ram in the ram casing arranged to feed charges of fuel rearwardly, means to reciprocate the ram, an agitator mounted within the hopper, a lever located above the ram casing and connected at its rear end to the agitator, means providing a fulcrum for the lever intermediate its length, a link extending downwardly and rearwardly from the front end of the lever, and means connecting the lower end of the link to the ram so that the said lower end will be moved forwardly and rearwardly with the ram.

2. An automatic stoker comprising a ram casing having an upper wall provided with an opening, a fuel hopper mounted above the ram casing and arranged to supply fuel to the interior of the ram casing through the said opening, the hopper having a front wall, a reciprocable ram in the ram casing arranged to feed charges of fuel rearwardly, means to reciprocate the ram, an agitator mounted within the hopper, a lever fulcrumed intermediate its length on the front wall of the hopper and connected at its rear end to the agitator, a link extending downwardly and rearwardly from the front end of the lever, and means connecting the lower end of the link to the ram so that the said lower end will be moved forwardly and rearwardly with the ram.

3. An automatic stoker comprising a ram casing having an upper wall provided with an opening and a lower wall provided with a slot, a fuel hopper mounted above the ram casing and arranged to supply fuel to the interior of the ram casing through the said opening, the hopper having an upwardly and forwardly sloping front wall, a reciprocable ram in the ram casing arranged to feed charges of fuel rearwardly, means to reciprocate the ram, an agitator mounted within the hopper adjacent the front wall thereof, two laterally spaced levers fulcrumed intermediate their lengths on the front wall of the hopper and connected at their rear ends to the agitator, two links extending downwardly and rearwardly from the front ends of the levers and on opposite sides of the ram casing, a transverse bar connecting the lower ends of the links and located beneath the ram casing, and an upright bar extending through the said slot and connecting the ram to the transverse bar to move the same back and forth with the ram.

FRED B. HALL.

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