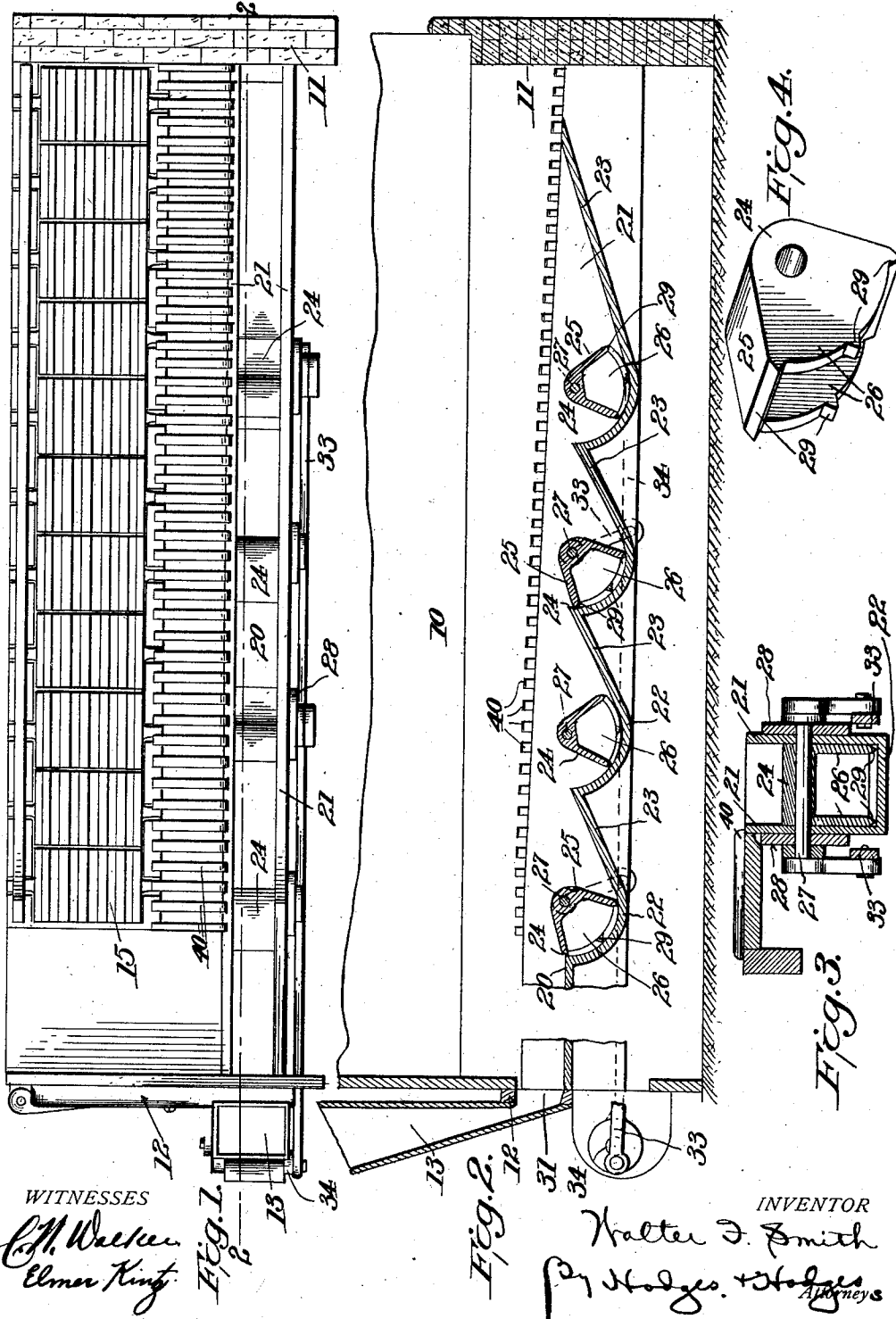


W. F. SMITH.
FUEL FEEDING MECHANISM.
APPLICATION FILED JULY 13, 1911.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WALTER F. SMITH, a citizen of the United States, residing in Baltimore city and State of Maryland, have invented new and useful Improvements in Fuel-Feeding Mechanism, of which the following is a specification.

This invention relates to certain new and useful improvements in fuel feeding mechanism, and has reference more particularly to that class of apparatus known as "under-feed stokers".

One of the objects of the invention is to provide improved means for automatically and smoothly feeding fuel to the fire box of a steam boiler or other furnace.

A further object is to provide means for maintaining a stratum of green fuel below the coked surface as the fuel is being fed to the furnace, whereby said coked surface is constantly broken up and deposited on the furnace grate without impeding the passage of the remaining fuel, or otherwise interfering with the feed of the latter.

A further object is to provide means for gradually and automatically decreasing the depth of the stratum of green fuel as the latter is operated upon by the feeding mechanism, whereby green coal is prevented from being thrown directly on the furnace grate, thus preventing smoke emission at the stack.

A further object is to provide an under-feed stoker with an improved and novel form of conveyer mechanism adapted to impart a continuous feeding and kneading action to the fuel as the latter is fed, whereby formation of large masses of coke and clinkers is prevented.

A further object is to provide an under-feed stoker mechanism capable of operation under natural draft conditions, whereby forced hand firing conditions are obtained without the aid of manual stoking, and with less attention than is ordinarily required in hand firing.

The invention will be hereinafter fully set forth and particularly pointed out in the claims.

In the accompanying drawings:—Figure 1 is a horizontal sectional view of a furnace illustrating my improved fuel feeding mechanism in plan. Fig. 2 is a longitudinal sectional view on the line 2—2 Fig. 1. Fig. 3 is a detailed transverse sectional view. Fig. 4 is a detail view illustrating one of the conveyer members.

Referring to the drawings, 10 designates a steam boiler or other similar furnace provided with the usual bridge wall 11 and doors 12. Each door is provided with a hopper 13 adapted to receive fuel from any suitable source of supply and discharge the same within the furnace in a manner to be later described. The grate 15 may be of any suitable or preferred construction and extends from the bridge wall to the front wall of the furnace in the usual or preferred manner. In Fig. 1 I have shown but one-half of the usual furnace.

Located within the furnace and communicating with the hopper 13 is a retort 20, comprising side plates 21 extending from the front wall to the bridge wall of the furnace parallel with the grate 15, said sides being united by an integral imperforate bottom 22, said sides and bottom being preferably cast in one piece, although I do not desire to limit myself in this particular. The bottom 22 is provided with a plurality of stepped or inclined portions 23 forming uptakes for the fuel, said uptakes gradually and successively increasing in height as they approach the bridge wall of the furnace. That is to say each succeeding uptake terminates nearer the top of the sides 21 than the next preceding uptake. Pivotally mounted adjacent the uptakes are a series of conveyer members 24, which may be of any suitable shape. For purposes of illustration I have shown these members in the form of a quadrant of a circle, although I do not desire to limit myself in this particular. Each member, however, is provided with walls 25 arranged at an angle to each other and joined by end walls 26 forming a relatively light shell. Each conveyer member is keyed or otherwise secured to a short shaft 27 pivotally mounted in the sides 21 of the retort, suitable bushings 28 being provided to serve as bearings for said shafts. Each conveyer is so mounted with relation to one of the uptakes 23 that one of the angular walls 25, in one position of the conveyer member will form a practical continuation of said uptake, the other wall 25 serving as an abutment to force the fuel along and over the next succeeding uptake. Thus each succeeding conveyer member is mounted higher than the preceding one. In order to prevent binding of the conveyer members by reason of fuel working down between the same and the uptake or

other portions of the conveyer I provide said conveyer members with lugs 29, allowing a slight clearance. The conveyer member 24 adjacent the hopper 13 is arranged at a slightly different angle from the remaining conveyer members, and the fuel entering the retort 20 through hopper 13 is deposited directly upon said member. The conveyer members are each provided with crank arms, preferably formed integral with the shafts 27, and connected to links 33 extending along the sides of the retort and driven by suitable shafting 34 which receives power in any preferred form. The operation of the links is so timed that one set of conveyer members is moving in one direction, *i. e.*, to bring the wall 25 in alinement with the uptakes, and the other set of conveyers is moving in the direction to force the fuel along the uptakes. In the arrangement shown each alternate conveyer member is connected to the link on one side, the remaining conveyer members being connected to the link on the other side. Extending from the retort 20 to the grate 15 are a series of transverse grate bars 40, said grate bars spanning the space between the retort and said grate.

The operation is as follows:—Fuel is supplied to the hopper 13 in any preferred manner. As the upper wall 25 of the first conveyer member 24 comes into approximately horizontal position, the fuel is raised thereby, the top surface of the fuel being usually coked by the heat of the furnace, just as soon as it enters the latter. The coked portion of the fuel, or at least a part thereof is deposited upon the grate bars 40, the stratum of green fuel below the coked surface being deposited into the pocket formed by the other wall 25 of the conveyer member and the first uptake 23. The next movement of the vertical wall 25 of the conveyer member forces the fuel along the first uptake and over the upper wall 25 of the next conveyer member. As the latter continues to rise the coked surface thereabove is deposited upon the grate bars 40 and the green fuel is forced along into the next uptake. Each successive conveyer member operates in a similar manner and it will be noted that the operation of the conveyer members is alternate. That is, as the vertical wall of one conveyer member is moving the fuel along the next adjacent uptake, the conveyer member at the rear end of said uptake is approximately in alinement with the uptake. By providing the alternately operating conveyer members 25, and the uptakes 23 of different heights, the fuel is fed forward smoothly and without clogging at any point. The arrangement of the uptakes is such that a comparatively deep stratum of green fuel is provided at the end of the conveyer adjacent the front wall of

the furnace, said fuel being topped by a stratum of coked fuel. The depth of the stratum of green fuel by reason of the increasing height of the uptakes and conveyer members, gradually decreases, so that by the time the stream of fuel reaches the bridge wall the depth of the fuel has been so diminished that practically all of it will be coked. Thus the conveyer members will deposit thoroughly coked fuel upon grate bars 40 throughout the length of the retort, and practically no green fuel reaches the grate 15. The action of the conveyer members is such that they not only feed the green fuel forward, but they also break up the coked top layer of the fuel and deposit the same upon the grate bars. This is decidedly effective in that it prevents clogging of the retort and conveyer members by the formation of solid unyielding masses of coke or clinker, which is a common experience with this class of fuel feeding mechanism.

From the foregoing it will be seen that I have produced a fuel feeding mechanism that is very simple in construction and adapted to prevent the deposit of green fuel upon the furnace grate, and thereby avoiding smoke emission at the stack. It will also be noted that the arrangement of the mechanism is such that the furnace can operate under natural draft, thereby rendering the use of forced draft unnecessary for any and all conditions where natural draft would be sufficient for hand firing.

Having thus explained the nature of my invention and described an operative manner of constructing and using the same, although without attempting to set forth all of the forms in which it may be made, or all of the forms of its use, what I claim is:—

1. An automatic stoker comprising a retort provided with an imperforate bottom having spaced apart uptakes, conveyer members provided with depending walls, pivots for said conveyer members located in a plane above said uptakes, means for supplying fuel to said retort, and means for operating said conveyer members, one of the walls of each conveyer member being adapted to periodically form a prolongation of an adjacent uptake, contiguous conveyer members being arranged to oscillate in opposite directions, whereby the fuel is alternately supported and moved in said retort.

2. An automatic stoker comprising a retort provided with an imperforate bottom having spaced apart uptakes, depending shell like conveyer members provided with angularly disposed walls, pivots for said conveyer members located in a plane above said uptakes, means for supplying fuel to said retort, and means for operating said conveyer members, one of the walls of each conveyer member being adapted to periodically

cally form a prolongation of an adjacent uptake, contiguous conveyer members being arranged to oscillate in opposite directions, whereby the fuel is alternately supported and moved in said retort.

3. An automatic stoker comprising a retort provided with an imperforate bottom having spaced apart uptakes, conveyer members provided with depending angularly disposed walls, one of said walls of each conveyer member being adapted to periodically form a prolongation of an adjacent uptake, lugs formed on said conveyer members and cooperating with the bottom of the retort to prevent binding of the fuel, means for supplying fuel to said retort, and means for oscillating said conveyer members.

4. An automatic stoker comprising a retort provided with an imperforate bottom having spaced apart uptakes, said uptakes being of progressively increased length from front to rear, conveyer members formed with depending angularly disposed walls, pivots for said conveyer members located in a plane above said uptakes, one of said walls of each conveyer member being adapted to periodically form a prolongation of an adjacent uptake, means for supplying fuel to said retort, and means for oscillating said conveyer members, contiguous conveyer members being arranged to oscillate in opposite directions.

5. An automatic stoker comprising a retort having an imperforate bottom, a hopper for directing fuel to said retort, a plurality of independent conveyer members within said retort, each formed with angularly disposed depending walls, and means for oscillating said conveyer members, one of said conveyer members being located to receive all the fuel entering the retort through said hopper, contiguous conveyer members being arranged to oscillate in opposite directions, whereby said walls alternately support and move the fuel in said retort.

6. An automatic stoker comprising a retort, having an imperforate bottom, conveyer members within said retort formed with depending angular walls, and means for oscillating said conveyer members, said means including reciprocating links, the alternate conveyer members being connected with one of said links, the remaining conveyer members being connected with the other link, whereby contiguous conveyer members are oscillated in opposite directions

to alternately support and move the fuel in the retort.

7. An automatic stoker comprising a retort provided with an imperforate bottom having spaced apart uptakes, conveyer members formed with depending angularly disposed walls, pivots for said conveyer members located in a plane above said uptakes, one of said walls of each conveyer member being adapted to periodically form a prolongation of an adjacent uptake, means for supplying fuel to said retort, a hopper for directing fuel to said retort, and means for oscillating said conveyer members, one of said conveyer members being located to receive all the fuel entering the retort through said hopper, contiguous conveyer members being arranged to oscillate in opposite directions.

8. An automatic stoker comprising a retort provided with an imperforate bottom having spaced apart uptakes, conveyer members supported in a plane above said uptakes and each adapted to periodically form a prolongation of an adjacent uptake, said conveyer members being arranged in sets, means for supplying fuel to said retort, and means for oscillating each set of conveyer members in a direction opposite to the oscillation of the members of the other set and simultaneously therewith, whereby said conveyer members alternately support and move the fuel in said retort.

9. The combination with a grate, of an automatic stoker comprising a retort provided with an imperforate bottom having spaced apart uptakes, conveyer members supported in a plane above said uptakes and cooperating with said uptakes, one face of each conveyer being adapted to periodically form a prolongation of an adjacent uptake, means for supplying fuel to said retort, means for oscillating said conveyer members, and grate bars spanning the space between said grate and said retort, contiguous conveyer members being arranged to oscillate in opposite directions, whereby the fuel in said retort is alternately lifted to said grate bars and moved through said retort.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WALTER F. SMITH.

Witnesses:

JULIUS H. WYMAN,
DWIGHT M. LUDINGTON.