Dec. 16, 1924. 1,519,382

N. M. LOWER

UNDERFEED STOKER

Filed Dec. 11, 1920 4 Sheets-Sheet 1

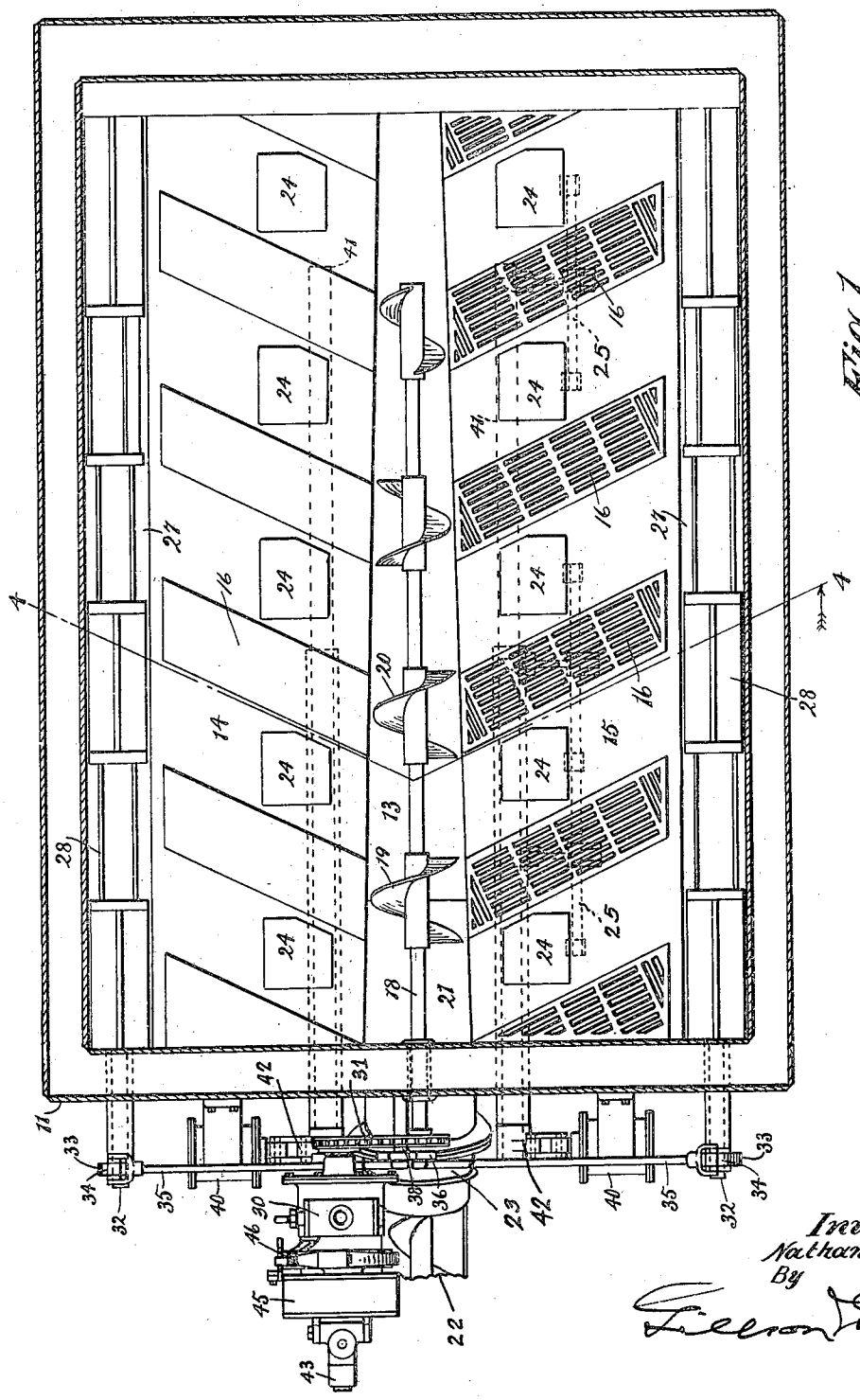


Fig. 1.

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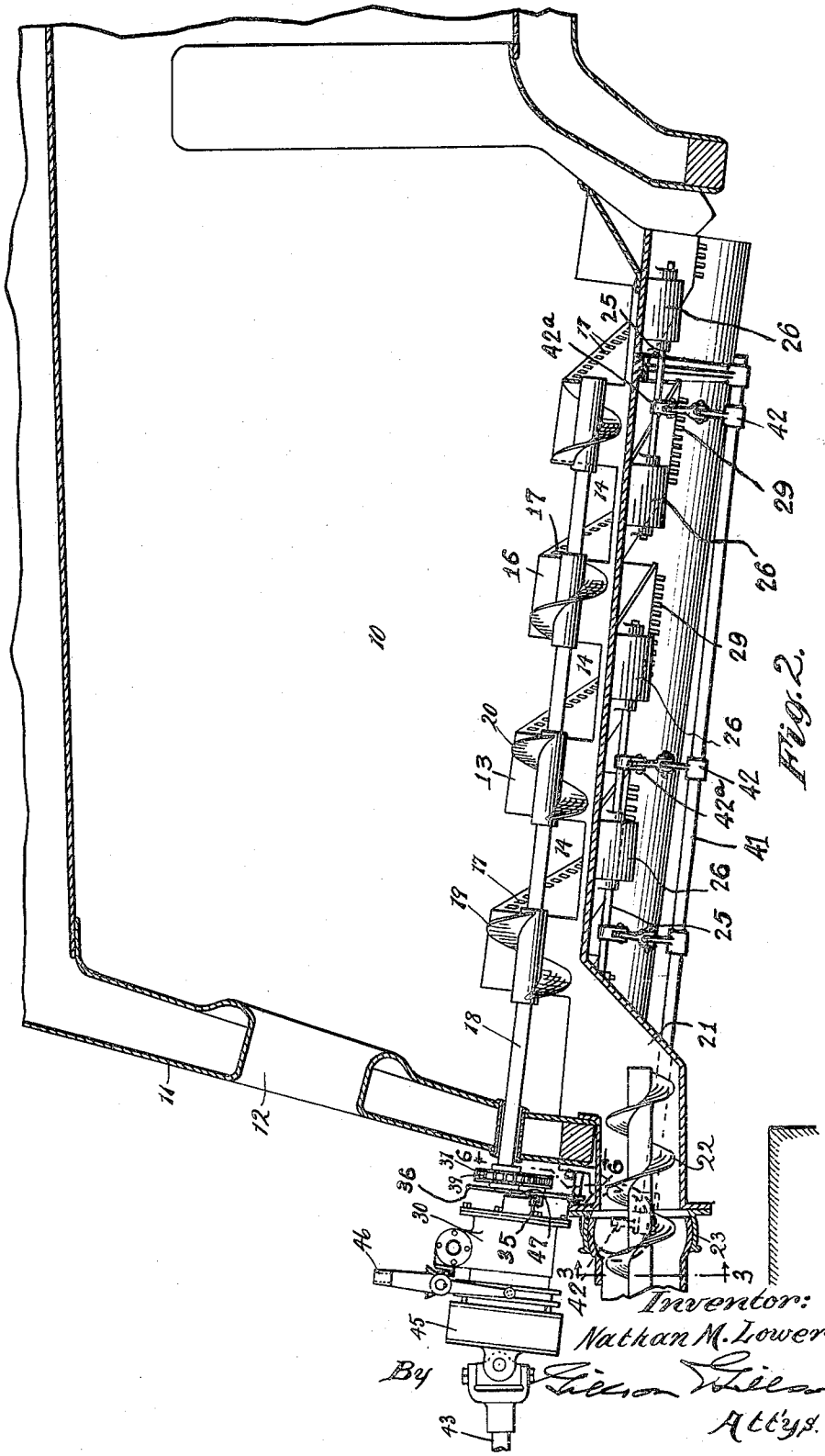


Fig. 2.

Inventor:
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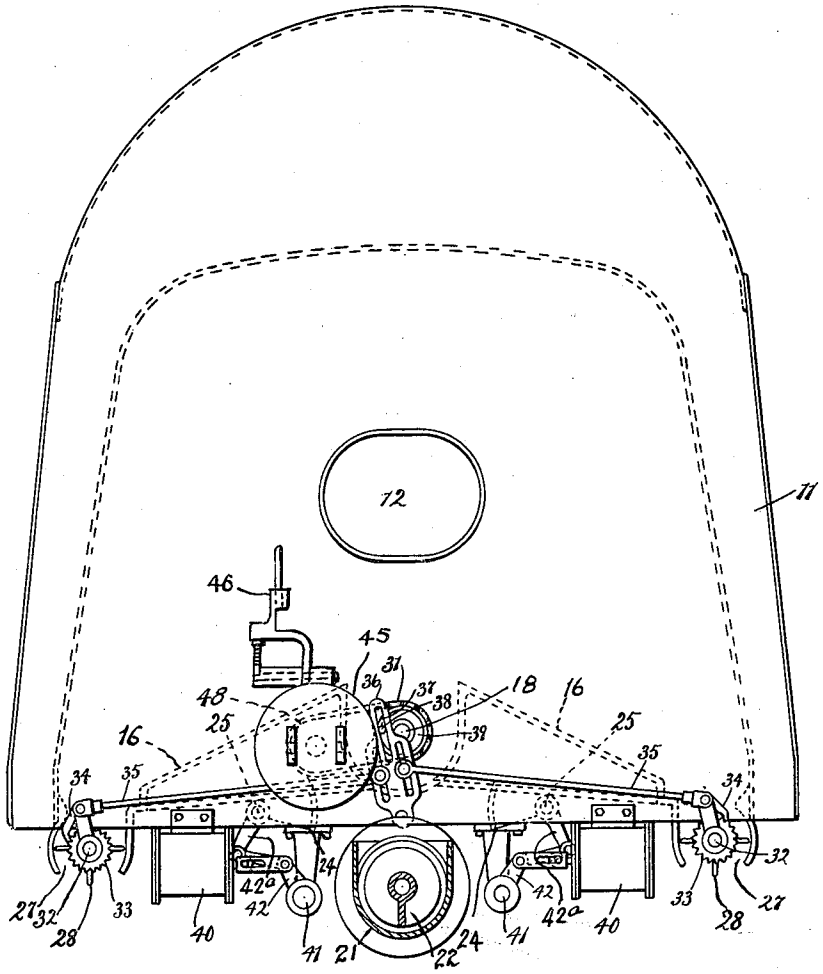


Fig. 3.

Inventor:
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UNDERFEED STOKER

Filed Dec. 11, 1920 4 Sheets-Sheet 4

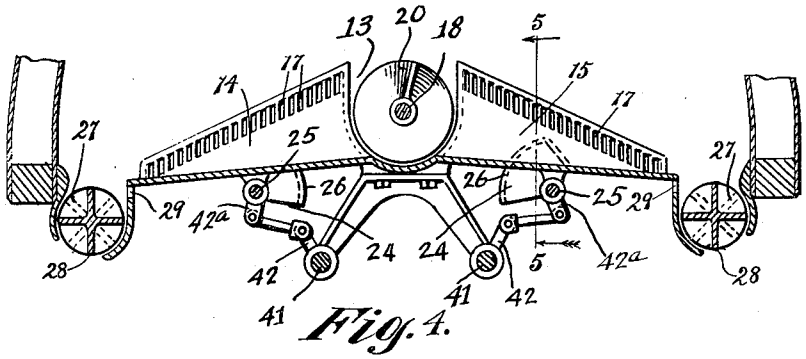


Fig. 4.

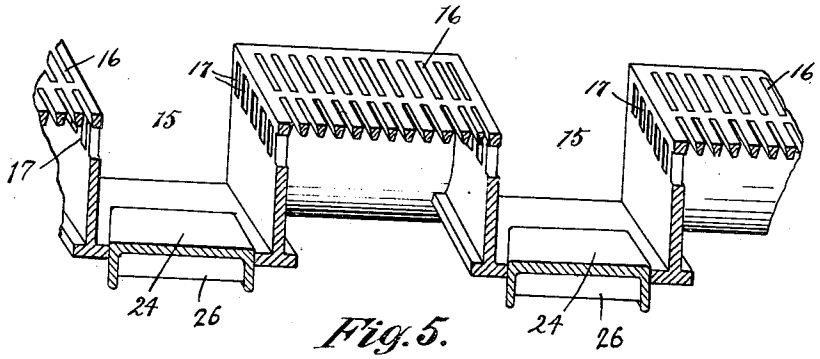


Fig. 5.

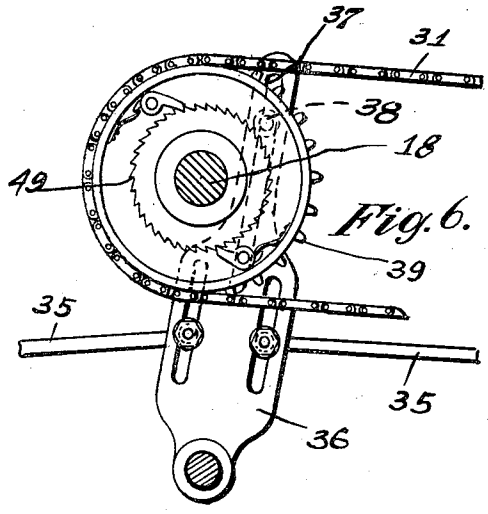


Fig. 6.

Inventor:
Nathan M. Lower
By Eilen Kilen
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Patented Dec. 16, 1924. 1,519,382

UNITED STATES PATENT OFFICE.

NATHAN M. LOWER, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO LOCOMOTIVE STOKER COMPANY, A CORPORATION OF PENNSYLVANIA.

UNDERFEED STOKER.

Application filed December 11, 1920. Serial No. 429,968.

To all whom it may concern:

Be it known that I, NATHAN M. LOWER, a citizen of the United States, and resident of Pittsburgh, county of Allegheny, and State of Pennsylvania, have invented certain new and useful Improvements in Underfeed Stokers, of which the following is a specification, and which are illustrated in the accompanying drawings, forming a part thereof.

The invention relates to underfeed stokers primarily intended for use in connection with locomotives but readily adapted to stationary furnaces.

The objects of the invention are to provide improved means for feeding the fuel to and spreading it upon the grate surface, and to facilitate the coking of the fuel.

The invention consists in a structure such as that hereinafter described and as illustrated in the accompanying drawings, in which—

Fig. 1 is a detail plan section of a furnace taken above its grate, some of the details of construction being in part omitted;

Fig. 2 is a detail central longitudinal vertical section through the fire-box;

Fig. 3 is a detail, partly in section, of a rear elevation of the furnace, on line 3—3 of Fig. 2;

Fig. 4 is a detail section on the line 4—4 of Fig. 1, some parts being omitted;

Fig. 5 is a detail section on the line 5—5 of Fig. 4; and

Fig. 6 is a sectional detail of a ratchet device used in the operating mechanism.

The fire-box of a locomotive is indicated at 10, its back head 11 being provided with the usual hand firing opening 12. The bottom of the fire-box is provided with a central longitudinal channel 13, from which there lead laterally toward each side wall of the fire-box channels, as 14, 15, their number being dependent upon the length of the fire-box. The portions of the fire-box bottom, intermediate of the lateral channels 14, 15, are grated, as represented at 16, and upon them the combustion of the fuel is mainly accomplished. The side walls of the channels 14, 15, may be and preferably are provided with a series of air ports 17 adjacent their upper margins.

Within the channel 13 there is located a shaft 18, carrying a conveying screw or spiral vane which is preferably interrupted, being formed in sections, as 19, 20, which are located between the channels 14, 15.

Fuel is delivered to the channel 13 from a conduit 21 entering through its bottom and adjacent the front end of the fire-box, there being a conveying screw 22 within the conduit 21 for advancing the fuel. Fuel is delivered into the conduit 21 from any suitable source, not shown. In the case of a locomotive fuel would be taken from the tender, and inasmuch as the device is illustrated as adapted for use on a locomotive the conduit 21 is shown as being sectional in form, the two sections being united by a ball and socket joint, as 23, to permit of relative movement of the two vehicles.

As the fuel enters the channel 13 a portion of it will find its way into the first pair of lateral channels, the remainder being carried forward by the screw section 19, whereupon a portion of it enters the next pair of lateral channels, and eventually all of these lateral channels are supplied.

The bottom of the fire-box is inclined downwardly from the central channel, and consequently the fuel entering the lateral channels will be advanced therein in part by gravity. Tilting advancing plates, as 24, are located in the bottoms of these several lateral channels, such plates at each side of the fire-box being carried upon a single rocker shaft 25, by means of which they are swung upwardly and laterally, thereby pushing forward the fuel which rests upon or has passed them. In order to prevent fuel from dropping through the apertures in the bottoms of the channels, within which these plates are fitted, each plate is provided at its swinging end and sides with a depending skirt 26.

The pressure exerted upon the fuel by the screw 22 and the screw sections, as 19 and 20, forces the fuel into the lateral channels in such quantity as to cause it to overflow upon the grate surfaces 16, and the advancing pressure exerted by the plates 24 has a similar effect. The lateral channels serve the additional function of coking retorts, so that when the fuel reaches the grate surfaces its volatile content has been largely evaporated. The combustion commences within the channels, due to the air entering through the ports 17, and is completed upon the grated surfaces. Any ash which does not escape through the grates gravitates to

the lower ends thereof and is discharged through a passage 27, guarded by a four-leafed rotating valve 28. Any fuel which passes to the lower ends of the lateral channels is delivered to the passage 27, and is retained by the valve 28 a sufficient time to cause its complete combustion, air ports 29 being provided in one wall of the passage 27 above the valve.

The shaft 18 is rotated from a prime mover, conventionally shown at 30, the means provided for transmitting power from this motor to the shaft being shown as a sprocket chain 31. The motor is preferably of the oscillating type, and power is transmitted from its shaft 47 to the sprocket wheel 48, driving the chain 31 through ratchet and pawl mechanism 49, shown in Fig. 6.

The shafts, as 32, carrying the ash-discharging valves are rotated by a step by step movement by means of a ratchet wheel 33, mounted upon each, with which there cooperates a pawl 34, given an oscillating movement through the medium of a link bar 35, connected with a rocker arm 36 having a slot 37, within which works a wrist pin 38 carried by the sprocket wheel 39 on the shaft 18. The two links 35, one for each valve, are adjustably secured to the rocker arm 36, thereby providing for variations in the throw of the pawls 34, and consequently of the rate at which the valves are turned. The shafts 25 are rocked by any suitable means, there being conventionally shown for this purpose as connected to each through one of the cranks 42 and a connecting rod a reciprocating motor 40, rocking a shaft 41, which is connected to the shaft 25 by means of cranks 42 mounted on the shaft 41, and connected by means of links with crank arms 42^a mounted on the shaft 25.

The screw 22 may be driven from any suitable source of power, preferably derived from the prime mover 30. To this end there is shown a shaft 43, connected to the prime mover by means of ratchet and pawl mechanism housed within a casing 45, and which may be controlled in any well known manner, as by means of a lever 46. The shaft 43 may be suitably connected with the rearward end of the screw 22. This driving mechanism is common in locomotive stokers, and forming no part of the present invention is not fully illustrated.

While I have shown an operative structure, the invention may be embodied in different forms and I do not, therefore, desire to be limited to the details as herein shown and described.

I claim as my invention—

1. In an underfeed stoking device, in combination, a fire-box bottom inclined downward from its middle portion toward each side thereof and having a central longitudinal channel and lateral channels leading outwardly therefrom, the bottoms of the lateral channels inclining downward from the central channel, the portions of such bottom intermediate of the lateral channels being grated, and means for advancing fuel in the central channel.

2. In an underfeed stoking device, in combination, a fire-box bottom inclined downward from its middle portion toward each side thereof and having a central longitudinal channel and lateral channels leading outwardly therefrom, the bottoms of the lateral channels inclining downward from the central channel, the portions of such bottom intermediate of the lateral channels being grated, means for advancing fuel in the central channel, and means for advancing fuel in the lateral channels.

3. In a stoking device, in combination, a fire-box bottom inclined downward from its central portion toward each side thereof and being provided with a central longitudinal channel, lateral channels leading outwardly from the central channel, the bottoms of the lateral channels inclining downward from the central channels, and having ash-discharge opening at the outer ends of said lateral channels, the portions of the bottom intermediate of the lateral channels being grated, and means for advancing fuel through the central channel and causing its discharge into the lateral channels.

4. In an underfeed stoking device, in combination, a fire-box bottom inclined downward from its middle portion toward each side thereof and having a central longitudinal channel and lateral channels leading outwardly therefrom, the bottoms of the lateral channels inclining downward from the central channel, the portions of such bottom intermediate of the lateral channels being grated, and a screw conveyor within the central channel.

5. In an underfeed stoking device, in combination, a fire-box bottom inclined downward from its middle portion toward each side thereof and having a central longitudinal channel and lateral channels leading outwardly therefrom, the bottoms of the lateral channels inclining downward from the central channel, the portions of such bottom intermediate of the lateral channels being grated, and a shaft within the central channel having an interrupted screw vane.

6. In a stoking device, in combination, a fire-box bottom inclined downward from its central portion toward each side thereof and being provided with a central longitudinal channel, lateral channels leading outwardly from the central channel and having ash-discharge openings at the outer ends of said lateral channels, the bottoms of the lateral channels inclining downward

from the central channel, the portions of the bottom intermediate of the lateral channels being grated, means for advancing fuel through the central channel and causing its discharge into the lateral channels, and rotative valves for controlling the discharge openings.

7. In an underfeed stoking device, in combination, a fire-box bottom inclined downward from its middle portion toward each side thereof and having a central longitudinal channel and lateral channels leading outwardly therefrom, the bottoms of the lateral channels inclining downward from the central channel, the portions of such bottom intermediate of the lateral channels being grated and the side walls of the lateral channels having air ports, and means for advancing fuel in the central channel.

8. In an underfeed stoker, in combination, a fire-box bottom having a central longitudinal channel and lateral channels leading therefrom, the bottoms of the lateral channels inclining downward from the central channel, and means for forcing fuel through the central channel.

9. In an underfeed stoker, in combination, a fire-box bottom having a central longitudinal channel and lateral channels leading therefrom, the bottoms of the lateral channels inclining downward from the central channel, the portions of the bottom between the lateral channels being grated, and means for forcing fuel through the central channel.

10. In an underfeed stoker, in combination, a fire-box bottom having a central longitudinal channel and lateral channels leading therefrom, the bottoms of the lateral channels inclining downward from the central channel, the side walls of the lateral channels being provided with air ports, and means for forcing fuel through the central channel.

11. In an underfeed stoker, in combination, a fire-box bottom having a central longitudinal channel and lateral channels leading therefrom, the bottoms of the lateral channels inclining downward from the central channel, such bottom being provided with ash-discharge openings at its side margins, and means for forcing fuel through the central channel.

12. In an underfeed stoker, in combination, a fire-box bottom having a central longitudinal channel and lateral channels leading therefrom, the bottoms of the lateral channels inclining downward from the central channel, such bottom being provided with valve-controlled ash-discharge openings at its side margins, and means for forcing fuel through the central channel.

13. In an underfeed stoker, in combination, a fire-box bottom having a central longitudinal channel and lateral channels leading therefrom, the bottoms of the lateral channels inclining downward from the central channel, a feed conduit delivering to the rearward end of the central channel, and means for forcing fuel through such conduit.

14. In an underfeed stoker, in combination, a fire-box bottom having a central longitudinal channel and lateral channels leading therefrom, the bottoms of the lateral channels inclining downward from the central channel, a feed conduit delivering to the rearward end of the central channel, means for forcing fuel through such conduit, and means for advancing fuel in the lateral channels.

15. In an underfeed stoker, in combination, a fire-box bottom having a central longitudinal channel and lateral channels leading therefrom, the bottoms of the lateral channels inclining downward from the central channel, a feed conduit delivering to the forward end of the central channel, means for forcing fuel through such conduit, an oscillatable plate in each lateral channel for advancing fuel therein, and means for actuating such plates.

16. In an underfeed stoker, in combination, a fire-box bottom having a central channel and lateral channels leading therefrom, a rotative shaft located longitudinally within the central channel, and a series of screw flights mounted on the shaft and between the lateral channels.

17. In an underfeed stoker, in combination, a fire-box bottom having a central channel extending longitudinally thereof and lateral channels in communication with said central channel, said lateral channels extending outwardly and forwardly from said main channel, and means for forcing fuel along said central channel.

18. In an underfeed stoker, in combination, a fire-box bottom having a central channel and lateral channels leading therefrom, said central channel inclined downward from the rear to the front of said fire-box, and means for forcing coal along said central channel.

NATHAN M. LOWER.