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W. M. DUNCAN  
FURNACE

1,515,846

Filed Feb. 10 1921

2 Sheets-Sheet 1

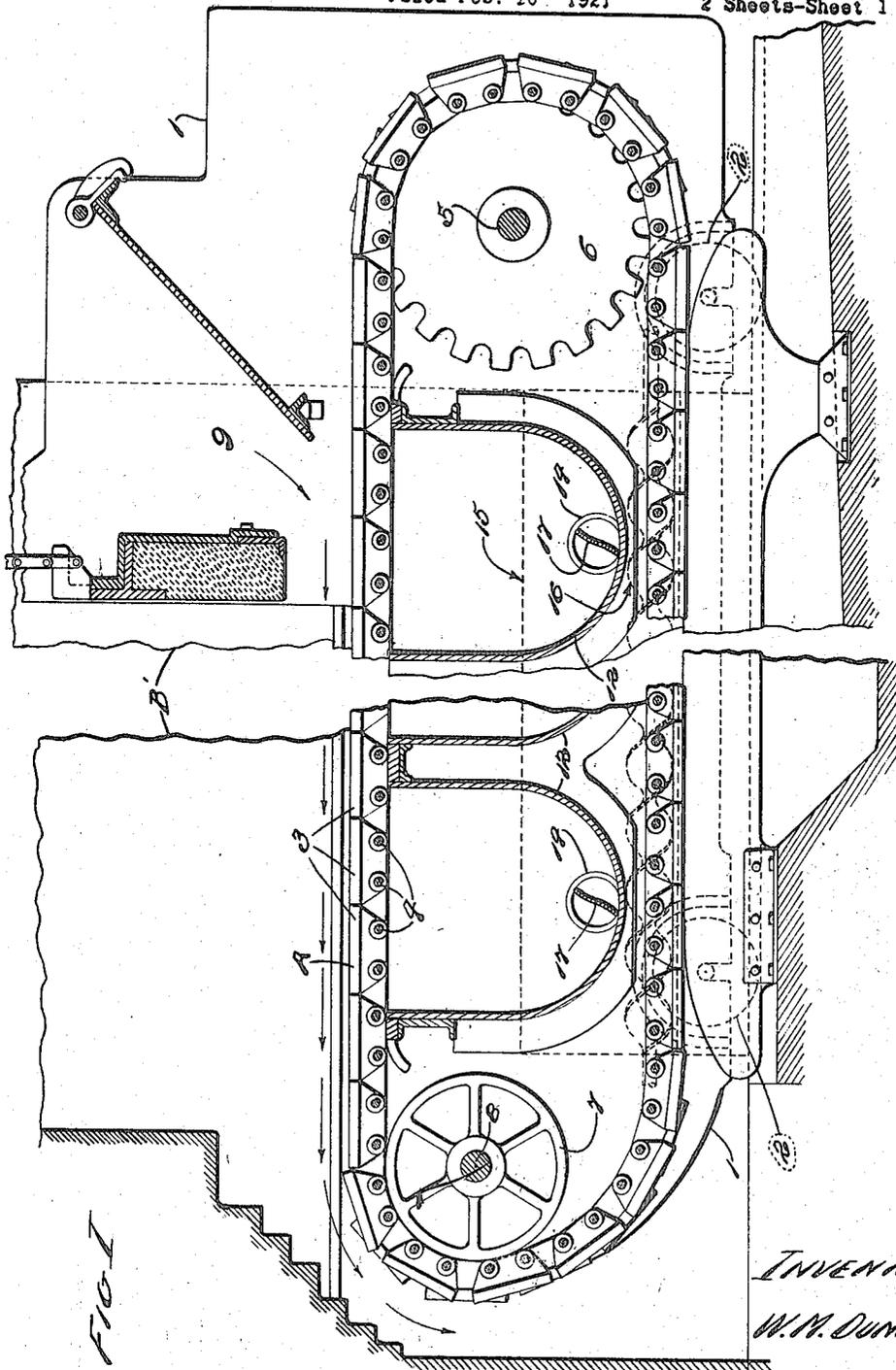


FIG. 1

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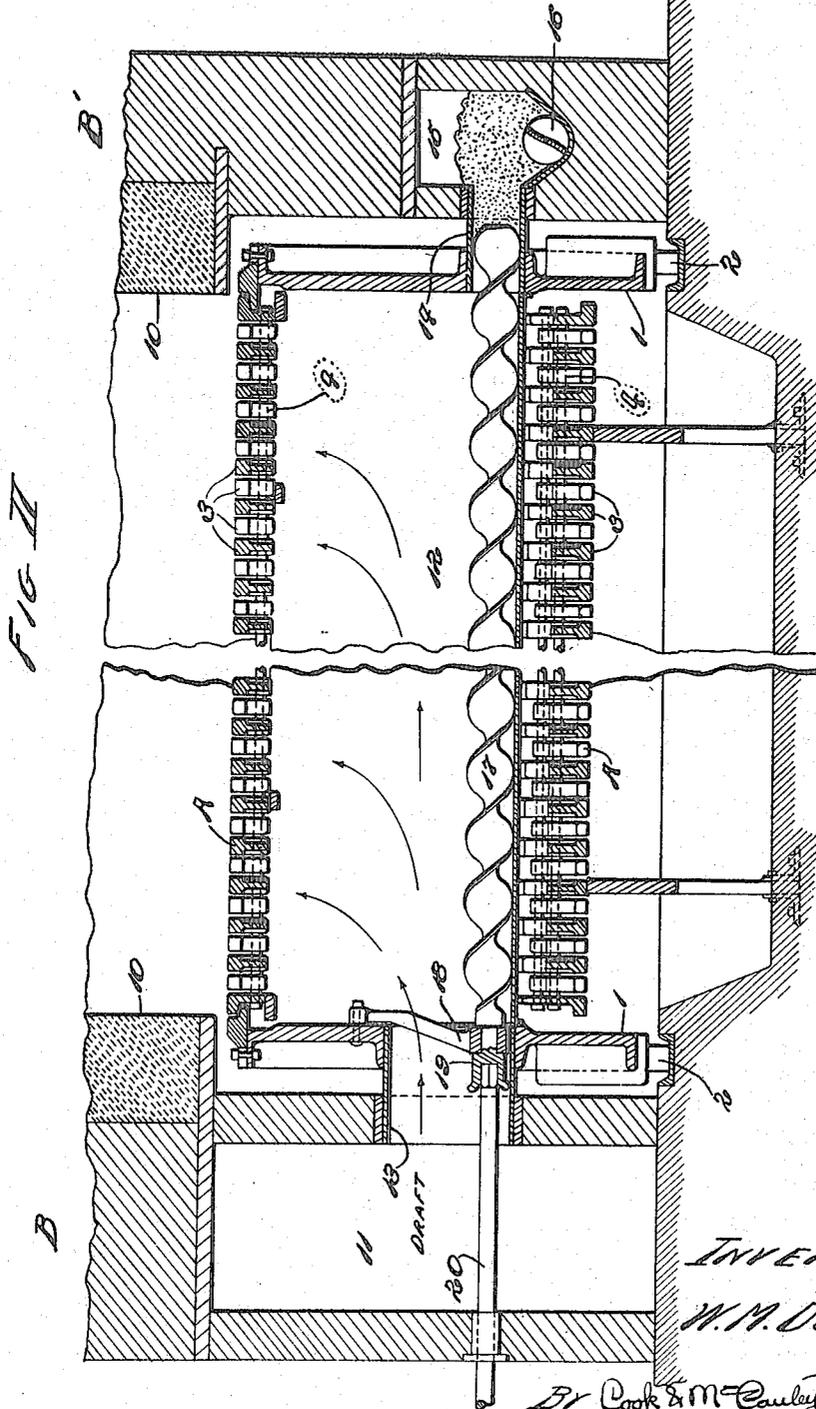
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# UNITED STATES PATENT OFFICE.

WILLIAM M. DUNCAN, OF ALTON, ILLINOIS.

FURNACE.

Application filed February 10, 1921. Serial No. 444,018.

*To all whom it may concern:*

Be it known that I, WILLIAM M. DUNCAN, a citizen of the United States of America, and a resident of Alton, in the county of Madison, State of Illinois, have invented certain new and useful Improvements in Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to improvements in furnaces, and more particularly to a furnace provided with draft boxes surrounded by a traveling grate, the main object being to provide an efficient means for removing ashes from the draft boxes which lie below the fuel supporting portion of the grate.

In the preferred form of the invention, each draft box is open at the top for the discharge of draft through the fuel supporting portion of the grate, and this allows the ashes together with fine particles of fuel to drop into the draft box. As a means for removing the ashes from the draft box, I have shown a conveyor whereby ashes are transmitted from the bottom of the draft box and through an ash outlet at one end of the box. This ash conveyor is preferably in the form of a rotary screw arranged longitudinally of the draft box at the bottom thereof and extending into the ash outlet.

A further object of the invention is to prevent leakage of draft through the ash outlet, and this is preferably accomplished by forming an ash seal in said outlet, the ashes being pushed into the outlet so as to close the same at a point beyond the ash conveyor.

Another object is to provide an ash discharge device adapted to be carried by a portable mechanical stoker, and having detachable elements allowing the portable stoker to be moved into and out of the furnace.

Fig. I is a longitudinal section, illustrating a mechanical stoker embodying the features of this invention, the middle portion of the apparatus being broken away.

Fig. II is a transverse section of the apparatus shown in Fig. I.

To illustrate the invention, I have shown a mechanical stoker comprising an endless chain grate A supported between side frame members 1 mounted on wheels 2. The chain grate comprises many grate links 3 connected by means of pivot rods 4 arranged trans-

versely of the grate. A power shaft 5 (Fig. I), supported by the side frames 1, is provided with any desired number of sprocket wheels 6 for transmitting movement to the endless chain grate. The chain grate passes around the sprocket wheels 6 and also around a plain idle wheel, or roll 7, the latter being mounted on a shaft 8. The fuel passes from a hopper 9 to the top face of the grate, as indicated by arrows in Fig. I.

The furnace is provided with suitable side walls B and B', including refractory members 10 located adjacent to the side margins of the grate. The lower portion of the side wall B is hollow, as shown in Fig. II, to provide an inlet passageway 11 for the draft. 12 designates draft boxes surrounded by the traveling grate and extending from a side frame 1 at one side of the grate to the frame 1 at the other side. All of these boxes are open at the top to provide for the delivery of the draft to the grate.

One end of each draft box is provided with an intake nipple 13 for the admission of draft and the opposite end is provided with a nipple 14 for the discharge of ashes. Since the grate is supported by a portable frame, including the side frame members 1 adapted to be moved into and out of the furnace, the nipples 13 and 14 are detachable, each nipple being telescoped with one of the side frame members 1 and also with one of the furnace walls.

The ash passageway 15 is formed in the lower portion of the furnace wall B' so as to communicate with all of the nipples 14, and a rotary screw conveyor 16 is located in the bottom of this passageway.

Each draft box 12 contains an ash conveyor 17 whereby ashes are transmitted along the bottom of the draft box and pushed into its ash outlet nipple 14, said conveyor 17 being in the form of a rotary screw arranged longitudinally of the draft box at the bottom thereof and extending into the outlet nipple 14. The screw conveyor 17 terminates in the outlet nipple, and the external diameter of the screw is approximately equal to the internal diameter of the nipple.

One end of each screw conveyor 17 is rotatably mounted in a bearing 18 extending from one of the side frame members 1, and the same end is provided with a socket 19. A rotary operating shaft 20, extending through the furnace wall B, is inserted into

the socket 19, and this operating shaft can be withdrawn from the socket to permit removal of the grate-supporting frame which is supported by the wheels 2.

5 The screw conveyors 17 are rotated at suitable intervals for the purpose of removing the ashes which accumulate in the draft boxes, the ashes being pushed into the outlet nipples 14 where they accumulate beyond  
10 the ends of the screw conveyors 17 to form seals which prevent the escape of draft through the ash outlets. All of the nipples 14 communicate with the ash passageway 15, but the ash seals in the nipples 14 prevent  
15 the escape of draft from one draft box to another.

The screw conveyor 16 is operated at intervals to remove ashes from the ash passageway 15.

20 I claim:

1. A furnace provided with an endless traveling grate, a draft box surrounded by said grate, said draft box being open at the top for the discharge of draft through the  
25 fuel-supporting portion of the grate, said draft box also having an ash outlet at one of its ends, and a conveyor whereby ashes are transmitted along the bottom of said draft box and pushed into said ash outlet, so as to  
30 form a seal in said outlet, said conveyor comprising a rotary screw arranged longitudinally of said draft box at the bottom thereof and terminating in said ash outlet.

2. A furnace provided with an endless  
35 traveling grate, a draft box surrounded by said grate, said draft box being open at the top for the discharge of draft through the fuel-supporting portion of the grate, said draft box also having an ash outlet at one  
40 of its ends, and a conveyor whereby ashes are transmitted along the bottom of said draft box and pushed into said ash outlet, so as to form a seal in said outlet, said conveyor comprising a rotary screw arranged  
45 longitudinally of said draft box at the bottom thereof and terminating in said ash outlet, said ash outlet being cylindrical and approximately equal in diameter to the rotary screw.

50 3. A furnace provided with an endless traveling grate, a draft box surrounded by said grate, said draft box being open at the top for the discharge of draft through the

fuel-supporting portion of the grate, said draft box also having an ash outlet at one  
55 of its ends, and a conveyor whereby ashes are transmitted along the bottom of said draft box and pushed into said ash outlet, so as to form a seal in said outlet, said conveyor comprising a rotary screw arranged  
60 longitudinally of said draft box at the bottom thereof and terminating in said ash outlet, the furnace being provided with an ash passageway communicating with said ash outlet, and means for forcing ashes through  
65 said ash passageway.

4. A furnace provided with side walls; an endless traveling grate supported between said side walls, draft boxes surrounded by  
70 said endless grate, each of said draft boxes being open at the top for the discharge of draft through the fuel supporting portion of the grate, one of said side walls having a draft passageway and the other side wall  
75 being provided with an ash passageway, one end of each draft box having a draft inlet communicating with said draft passageway and the other end having an ash outlet leading to said ash passageway, and conveyors  
80 whereby ashes are transmitted from the bottoms of the draft boxes and into the ash outlets, so as to form ash seals in said ash outlets.

5. A furnace provided with side walls, an endless traveling grate supported between  
85 said side walls; draft boxes surrounded by said endless grate, each of said draft boxes being open at the top for the discharge of draft through the fuel supporting portion of the grate, one of said side walls having a  
90 draft passageway and the other side wall being provided with an ash passageway, one end of each draft box having a draft inlet communicating with said draft passageway and the other end having an ash outlet lead-  
95 ing to said ash passageway, and conveyors whereby ashes are transmitted from the bottoms of the draft boxes and into the ash outlets, so as to form ash seals in said ash outlets, said conveyors comprising rotary screws  
100 each arranged longitudinally of one of the draft boxes at the bottom thereof and terminating at the ash outlet.

In testimony that I claim the foregoing I hereunto affix my signature.

WILLIAM M. DUNCAN.